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Factors influencing the quality of life among Indonesian elderly

A nursing home-based cross-sectional survey

Bayu Anggileo Pramesona
Mayjend HM Ryacudu Government Hospital, Kotabumi, Indonesia and
College of Public Health Sciences, Chulalongkorn University,
Bangkok, Thailand, and
Surasak Taneepanichskul
College of Public Health Sciences, Chulalongkorn University, Bangkok, Thailand

Abstract

Purpose – In spite of being a significant public health concern, quality of life (QoL) amongst elderly in nursing home (NH) settings is rarely analyzed. The purpose of this paper is to examine the level of QoL and factors influencing QoL amongst elderly NH residents in Indonesia.

Design/methodology/approach – A survey was conducted amongst 181 elderly at three NHs in three districts in Yogyakarta province, Indonesia. Purposive sampling was used for the study site and sample collection. Face-to-face interviews were performed using the WHO Quality of Life BREF Indonesian version questionnaire to assess elderly QoL. Multivariate linear regression was performed to determine the factors influencing the QoL amongst elderly NH residents.

Findings – The response rate was 66.3 percent. A total of 64.1 percent of elderly had a fair level of QoL, whereas 16.6 percent still had a poor level of QoL. A total of 86.7 percent of elderly lived in an NH due to compulsion, and more than half (53.6 percent) perceived inadequacy of care. The QoL was significantly low amongst those who live in NHs due to compulsion, no social support resources, not receiving any kind of support, having three chronic diseases and perceived inadequacy of care (p < 0.05). Multivariate analysis revealed that perceived adequacy of care reasons for living in NH was associated with QoL (p < 0.001).

Originality/value – Perceived adequacy of care and reason for living in an NH were highlighted as predictors of QoL amongst elderly NH residents. Improving adequate healthcare services and developing treatment strategies to enforce the adaptation process is required in order to maintain the QoL in elderly NH residents.

Keywords Quality of life, Nursing home, Indonesia, Elderly

Paper type Research paper

Introduction

The proportion of elderly aged 60 years or above is the fastest growing population globally[1]. Additionally, the increment of life expectancy and decline of birth rates have concurrently resulted in a drastic increase of the ageing population in Indonesia[2]. The ageing population in Indonesia was 8.6 percent of the total population in 2015, this number is predicted to increase to 14.1 percent in 2030 and will be almost triple in 2050[3]. This particular condition places Indonesia as the eight largest elderly population globally and ranks the country third among 25 Asia-Pacific countries[3, 4].
In the past few decades, a comprehensive view of healthcare could be derived from the quality of life (QoL) measurement[5]. The WHO defined QoL as an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns, which consists of physical health, psychological, social relationships and environment domain[6]. It is a broad concept that encompasses physical health, psychological state, independence level, social relationships, personal beliefs and relationship to salient features of the environment[7]. The concept of aging affects the changes and losses of socioeconomic, environmental, educational and nutritional status[8]. The elderly are often affected by conditions closely linked to the normal ageing process and age-related changes, which require general reconsideration of needs, opportunities and available places of residence[9].

Previous studies found that ageing was significantly associated with a number of negative outcomes, such as poor mental health, physical co-morbidities, poor coping abilities, impaired functioning and cognitive performance and bereavement[10, 11], which in turn leads to lower QoL. All these risk factors greatly affect the level of independence and autonomy of elderly which influences the decision to institutionalize them.

Institutionalization is often a result of functional decline in older adults and is generally regarded as an outcome that signals failure of care systems to support elders effectively in the community[12, 13]. The elderly were usually reluctant to move into a nursing home (NH) as they worried about feeling lonely and marginalized following this move[14–16]. They generally feared poor residential care quality, a change in family support and QoL[17]. QoL amongst elderly has become a cause for concern because it reflects the health status and well-being of this vulnerable population. Yogyakarta province has the largest elderly population in Indonesia with the highest life expectancy rate[18, 19], but also has the highest of the old dependency ratios compared to the national standard[20]. However, there is lack of concern regarding QoL and its associated factors among elderly NH residents in Yogyakarta, Indonesia. Hence, assessing the QoL and understanding the factors influencing the QoL amongst the elderly in NH settings would be beneficial as baseline information in making the future policy strategies relating to the QoL amongst elderly in NHs. This study aimed to assess the level of QoL and factors influencing the QoL among elderly NH residents in Yogyakarta province, Indonesia.

Methodology
A survey was conducted amongst the elderly aged 60 years or above at three NHs in three districts in Yogyakarta province, Indonesia. A total of 273 elderly NH residents were asked to participate in this study. A total of 218 residents were eligible to be respondents based on the following inclusion criteria: residents had or had no chronic diseases and had been living in an NH for at least one month. Residents who were diagnosed by a physician as having severe cognitive impairment or dementia were not able to communicate their opinions meaningfully, were experiencing psychotic disorders, experiencing alcohol/drug misuse, were under anti-depressants medication treatment and/or unwilling to participate were excluded from the sample selection process. The number of excluded respondents based on the above criteria was 37 elderly NH residents. Therefore, the final number of eligible respondents in this study was 181 elderly NH residents. All eligible respondents were recruited purposively, informed verbally and submitted written consent forms.

Ethical approval for this study was obtained from the Medical and Health Research Ethics Committee, Faculty of Medicine, Universitas Gadjah Mada, Indonesia (Ref. KE/FK/0131/EC/2017).

This study was conducted from February to March 2017. Face-to-face interviews were performed for approximately 30–45 min for each respondent during the data collection process. Medical records and information from healthcare workers or NH staff were obtained to cross-check the data relating to chronic diseases, cognitive impairment or dementia status.
There were two parts to the questionnaire in order to assess the socio-demographic characteristics and QoL amongst respondents. Part 1: socio-demographics of respondents consisted of gender, age, marital status, education level, length of stay in NH, social support resource, type of support, chronic diseases, reason for living in NH and perceived adequacy of care. Part 2: the QoL in elderly NH residents was assessed using the WHO Quality of Life BREF (WHOQOL-BREF) Indonesian version which consisted of 26 items, divided into four domains: physical health, psychological, social relationships and environment. The raw score in each domain was converted to a transformed score with the range of transformed scores being from 0 to 100[6]. The mean score of items within each domain was used to calculate the domain score. Domain scores are scaled in a positive direction; a higher score denoted a higher QoL. Scores were then categorized into three levels of QoL in each domain such as poor: < mean−SD levels; fair: mean−SD to mean+SD; and good: > mean+SD[21]. Overall, the QoL level and category was derived from the mean of those four domain accumulation scores.

Statistical analysis
Descriptive statistics were used to describe the socio-demographic characteristics and QoL (scores and levels) of the respondents. An independent t-test was used to analyze the difference between means of QoL for each socio-demographic variable. Multivariate linear regression was performed to determine the predictors of QoL in elderly NH residents. Statistical significance was set at p-value < 0.05.

Results
From the total 273 elderly residents in three NHs in three districts, 181 elderly NH residents were finally recruited as the eligible respondents, and completed the interview for this study, giving a response rate of 66.3 percent. According to socio-demographic characteristics, nearly two-third of respondents (65.7 percent) were female, with 71.8 percent of residents aged < 80 years and already resident in an NH for less than four years (56.9 percent). A vast majority (87.8 percent) had no partner (single/widowed/divorced) and 83.4 percent of respondents had no or low educational backgrounds. The majority of respondents (72.9 percent) had less than three chronic diseases; most of the elderly (59.7 percent) still received support from their family and/or others, while the majority (65.7 percent) received psychological and/or financial support. A total of 86.7 percent of respondents reported that they lived in an NH due to compulsion (poverty, living alone at home, no one to take care of respondents at home and/or homelessness) and more than half (53.6 percent) reported a perceived inadequacy of care (Table I).

The overall QoL mean score of respondents was 47.72 with an SD of 6.61. The majority (64.1 percent) had a fair level of QoL. However, 16.6 percent of elderly NH residents still had poor levels of QoL. The psychological domain mean score was the lowest score compared to physical, social relationship and environment domain of QoL mean scores. In contrast, the social relationship domain mean score was highest compared to the other three domains of QoL (Table II).

Following univariate analysis, QoL was significantly low among those who live in NHs due to compulsion (95% confidence interval (CI) −9.12 to −3.71), with no social support resources (95% CI −5.24 to −1.41), not receiving any kind of support (95% CI −5.34 to −1.36), having ≥3 chronic diseases (95% CI −4.74 to −0.43) and perceived inadequacy of care (95% CI −5.89 to −2.18) (p < 0.05) (Table II).

Multivariate analysis revealed that perceived adequacy of care (95% CI 1.49 to 5.05) and the reason for living in NH were significantly associated with QoL (95% CI 2.68 to 7.93) (p < 0.001) (Table III).

Discussion
A total of 181 elderly NH residents completed the WHOQOL-BREF Indonesian version questionnaire in our study. A similar WHOQOL-BREF questionnaire to assess the QoL
### Quality of life among Indonesian elderly

#### Table I.

The difference between QoL mean scores by independent *t*-test

| Socio-demographic factors                      | n (%) | Mean ± SD | *p*-value | 95% CI   |
|------------------------------------------------|-------|-----------|-----------|---------|
| **Age (years)**                                 |       |           |           |         |
| < 80                                           | 130 (71.8) | 47.64 ± 6.68 | 0.814     | -1.90   | 2.42   |
| ≥ 80                                           | 51 (28.2)  | 47.90 ± 6.48 | 0.914     | -2.16   | 1.94   |
| **Gender**                                     |       |           |           |         |
| Female                                         | 119 (65.7) | 47.69 ± 6.85 | < 0.001   | -5.24   | -1.41  |
| Male                                           | 62 (34.3)  | 47.79 ± 6.16 | 0.001     | -5.34   | -1.36  |
| **Marital status**                             |       |           |           |         |
| No partner                                     | 159 (87.8) | 47.83 ± 6.62 | < 0.001** | -4.74   | -0.43  |
| With partner                                   | 22 (12.2)  | 46.91 ± 6.59 | < 0.001***| -9.12   | -3.71  |
| **Education level**                            |       |           |           |         |
| No or low education                            | 151 (83.4) | 47.47 ± 6.55 | 0.255     | -4.11   | 1.09   |
| Higher education                               | 30 (16.6)  | 48.98 ± 6.84 | < 0.001** | -5.34   | -1.36  |
| **Length of stay (years)**                     |       |           |           |         |
| < 4                                            | 103 (56.9) | 47.63 ± 6.63 | 0.199    |         |        |
| ≥ 4                                            | 78 (43.1)  | 47.83 ± 6.62 | < 0.001** | -4.74   | -0.43  |
| **Social support resource**                    |       |           |           |         |
| None                                           | 73 (40.3)  | 45.73 ± 6.37 | 0.001*    | -4.34   | -1.36  |
| From family or others                          | 108 (59.7) | 49.06 ± 6.45 | < 0.001***| -9.12   | -3.71  |
| **Type of support**                            |       |           |           |         |
| No support                                     | 62 (34.3)  | 45.51 ± 6.54 | < 0.001***| -5.89   | -2.18  |
| Psychological or financial                     | 119 (65.7) | 48.87 ± 6.37 | < 0.001***| -9.12   | -3.71  |
| **Chronic diseases**                           |       |           |           |         |
| > 3                                            | 49 (27.1)  | 45.83 ± 6.01 | 0.019**   | -4.34   | -1.36  |
| < 3                                            | 132 (72.9) | 48.42 ± 6.70 | < 0.001***| -9.12   | -3.71  |
| **Reason for living in NH**                    |       |           |           |         |
| Compulsion                                     | 157 (86.7) | 46.87 ± 6.15 | < 0.001***| -9.12   | -3.71  |
| Own willingness                                | 24 (13.3)  | 53.28 ± 6.93 | < 0.001***| -9.12   | -3.71  |
| **Perceived adequacy of care**                 |       |           |           |         |
| No                                             | 97 (53.8)  | 45.84 ± 6.63 | < 0.001***| -5.89   | -2.18  |
| Yes                                            | 84 (46.4)  | 49.88 ± 5.91 | < 0.001***| -5.89   | -2.18  |

**Notes:** *n = 181. *, **, ***Significant at *p* < 0.01, *p* < 0.05 and *p* < 0.001, respectively*

#### Table II.

Assessment of quality of life in elderly nursing home residents

| Domains                | Mean ± SD | Median | QoL levels | n | %    |
|------------------------|-----------|--------|------------|---|------|
| Physical               | 47.56 ± 7.49 | 44.0   | Poor       | 33 | 18.2 |
| Psychological          | 43.49 ± 8.58 | 44.0   | Poor       | 30 | 16.6 |
| Social relationship    | 51.43 ± 9.73 | 50.0   | Poor       | 13 | 7.1  |
| Environment            | 48.31 ± 8.79 | 50.0   | Poor       | 43 | 23.8 |
| Overall QoL            | 47.72 ± 6.61 | 47.0   | Poor       | 30 | 16.6 |

**Note:** *n = 181*
amongst the urban elderly community in India revealed a higher QoL mean SD score when compared to our study finding[22]. A much higher (58.77) overall QoL mean score was found in another study which was conducted in the NH study setting[9]. The different findings of mean scores in QoL might be due to the difference of observed associated factors which influence QoL in different settings. The different instrument tools used to assess the QoL could also be responsible for this variation in results.

In terms of the QoL domains, our study found that physical and psychological domains were the lowest two mean scores compared to social relationship and environment domain mean scores (Table I). These findings are similar to a study in Macao that revealed that older adults had significantly poorer scores on physical and psychological domains of QoL compared to the normative data from the Hong Kong Chinese population[23]. These lower mean scores on physical and psychological domains might be related to the socio-characteristics of respondents. The majority of elderly NH residents were female with no partner. Gender and marital status seemed to affect perceived psychological well-being amongst the geriatric population. Han et al[24] found that there are gender differences in the correlation between QoL and marriage. Married men had a higher QoL compared to single men. On the contrary, single women had a higher QoL than married, separated or divorced women. Another factor which might influence those findings is related to the educational background of respondents. The elderly in our study had no or low educational backgrounds. This factor could probably influence their perceived mental health well-being. It was observed that a lower educational background was a predictor for a poor psychological QoL amongst the elderly, both in the community and in the NH study settings[25].

In the univariate analysis, we found that QoL was significantly low among those who experienced ≥3 chronic diseases. It seems that the elderly who presented with chronic diseases tend to have a lower QoL. This finding is in line with a study in Turkey suggesting that the presence of a chronic disease declined the QoL amongst the geriatric population[26]. Lower QoL was also a significant factor among those who had no social support resources and had not received any kind of support. Unsar et al[27] emphasized the importance of family support or living with spouse. Moving in to an NH could become a stressful situation for the elderly. It might be due to the change of environmental conditions and adaptation processes, including having to live apart from their family or spouse. Although social support may not eliminate the stressful situation, it would make the elderly more optimistic. Therefore, social support is an important resource for better health-related QoL among elderly NH residents[28]. Social support helps the elderly to overcome difficult situations, create new solutions and reduce their despair[29, 30].

QoL was also found to be significantly low among those who live in an NH due to compulsion in the univariate analysis. The majority of our respondents lived in an NH due to compulsion due to reasons such as poverty, living alone at home, no one to take care of.

| Predictive factors          | 95% CI  |
|-----------------------------|---------|
| Education level             | 0.190   |
| Social support resource     | 0.066   |
| Type of support             | 2.034   |
| Chronic diseases            | 1.574   |
| Reason for living in NH     | 5.305   |
| Perceived adequacy of care  | 3.274   |

Table III. Multivariate linear regression analysis of QoL score

Notes: n = 181. $R^2 = 0.471$; adjusted $R^2 = 0.195$; SE = 5.927. *Significant at $p < 0.001$
them and homelessness and living as a beggar, resulting in the municipal public order agency (Satuan polisi pamong praja) picking them up from the street. All those situations classified this group of elderly into “neglected” or “almost neglected” in the households[20]. The national census stated that about 12 percent of the elderly in Yogyakarta were living alone. This percentage was ranked third compared to all provinces in Indonesia[20]. These forced conditions might affect their psychological domain of QoL, and influence the whole QoL. This assumption is relevant when we look at the psychological domain mean score of QoL in this study finding which was lowest when compared to physical, social relationship and the environment domain of QoL (Table I).

Perceived adequacy of care was also revealed as the associated factor for QoL among elderly NH residents in the multivariate analysis. More than half the respondents perceived inadequacy of care from NH staff who should be responsible for taking care of the elderly. In a geriatric population, most diseases are chronic. A lower QoL was also significantly associated with those who have ≥3 chronic diseases in our study finding. Apart from medical treatments, psychological and social support might definitely be required through a wide range of services, home care or long-term care in certain units[28]. Once the elderly are admitted to hospitals or NHs, their interactions with family or surrounding people are severely limited[31]. This sudden change of environmental situations might lead to stressful conditions for the elderly. Therefore, when the elderly were not be able to take care of themselves, both healthcare professions and social workers were needed to assist them in activities which cannot be performed, to provide health education and emotional support as well[32]. Providing adequate care should be given equal importance to providing adequate social support toward elderly NH residents. Both professionals in healthcare and social workers should recognize that social support is associated with health-related QoL and pay attention to the importance of social support for the residents in daily practice[27].

Conclusion
The majority of elderly NH residents in Yogyakarta province, Indonesia, had a fair level of QoL. Furthermore, perceived adequacy of care and reason for living in an NH were highlighted as predictors of QoL amongst those elderly NH residents. Hence, improving adequate healthcare services and developing treatment strategies by the professionals in healthcare and social workers is required in order to support the QoL maintenance in elderly NH residents.

Strength and limitation
The strength of our study is the widely validated and reliable WHOQOL-BREF questionnaire used to assess the QoL in various study settings. The limitation of this study is that the sampling technique was purposive since we only selected government NHs for the study sites. Therefore, the findings may not be generalized to the private NHs due to the genuine background, facilities and service availability differences among elderly NH residents. Regardless, this study finding could be beneficial as baseline information in making the future policy strategies relating to the QoL amongst elderly in NHs, particularly in underlining the important roles of social workers and health-related professions on QoL in elderly NH residents.

References
1. United Nations, Department of Economic and Social Affairs. World population prospects: the 2012 revision, highlights and advance tables. New York, NY: United Nations; 2013.
2. Statistics Indonesia [BPS]. Life expectancy rate by gender and province, 2010–2014. [cited 2016 Aug 6]. Available from: www.bps.go.id/linkTableDinamis/view/id/1114
3. Teerawichitchainan B, Knodel J. Data mapping on ageing in Asia and the pacific: analytical report. Chiang Mai: HelpAge International, East Asia and Pacific Regional Office; 2015. [cited 2016 Jun 22]. Available from: www.researchgate.net/profile/Bussarawan_Teerawichitchainan/publication/276204522_Data_mapping_on_ageing_in_Asia_and_the_Pacific/links/5552195b08ae980cm606a8a7.pdf

4. United Nations, Department of economic and social affairs. World population ageing 2015. New York, NY: United Nations; 2015.

5. Kaplan RM Quality of life: an outcomes perspective. Arch Phys Med Rehabil. 2002 Dec; 83(12 Suppl 2): S44-50. doi: 10.1053/apmr.2002.36955

6. World Health Organization [WHO]. WHOQOL-BREF introduction, administration, scoring and generic version of the assessment. Geneva: WHO; 1996. [cited 2016 Aug 15]. Available from: www.who.int/mental_health/media/en/76.pdf

7. The World Health Organization Quality of Life assessment (WHOQOL): position paper from the world health organization. Soc Sci Med. 1995 Nov; 41(10): 1403-9.

8. Huang TT, Liu CB, Tsai YH, Chin YF, Wong CH. Physical fitness exercise versus cognitive behavior therapy on reducing the depressive symptoms among community-dwelling elderly adults: A randomized controlled trial. Int J Nurs Stud. 2015 Oct; 52(10): 1542-52. doi: 10.1016/j.ijnurstu.2015.05.013

9. Scocco P, Nassuato M. The role of social relationships among elderly community-dwelling and nursing-home residents: findings from a quality of life study. Psychogeriatrics. 2017 Jul; 17(4): 231-7. doi: 10.1111/psg.12219

10. Kanauchi M, Kubo A, Kanauchi K, Saito Y. Frailty, health-related quality of life and mental well-being in older adults with cardiometabolic risk factors. Int J Clin Pract. 2008 Sep; 62(9): 1447-51. doi: 10.1111/j.1742-1241.2008.01830.x

11. Sivertsen H, Bjorklof GH, Engedal K, Selbaek G, Helvik AS. Depression and quality of life in older persons: a review. Dement Geriatr Cogn Disord. 2015; 40(5-6): 311-39. doi: 10.1159/000437299

12. Bakker C, de Vugt ME, van Vliet D, Verhey FR, Pijnenburg YA, Vernooij-Dassen MJ, et al. Predictors of the time to institutionalization in young- versus late-onset dementia: results from the needs in young onset dementia (NeedYD) study. J Am Med Dir Assoc. 2013 Apr; 14(4): 248-53. doi: 10.1016/j.jamda.2012.09.011

13. Brodaty H, Comors MH, Xu J, Woodward M, Ames D. Predictors of institutionalization in dementia: a three year longitudinal study. J Alzheimers Dis. 2014; 40(1): 221-6. doi: 10.3233/JAD-131850

14. Scocco P, Rapattoni M, Fantoni G. Nursing home institutionalization: a source of eustress or distress for the elderly? Int J Geriatr Psychiatry. 2006 Mar; 21(3): 281-7. doi: 10.1002/gps.1453

15. Mattimore TJ, Wenger NS, Desbiens NA, Teno JM, Hamel MB, Liu H, et al. Surrogate and physician understanding of patients' preferences for living permanently in a nursing home. J Am Geriatr Soc. 1997 Jul; 45(7): 818-24.

16. Hertz JE, Rossetti J, Koren ME, Robertson JF. Management of relocation in cognitively intact older adults. J Gerontol Nurs. 2007 Nov; 33(11): 12-8.

17. Biedenharn PJ, Normoyle JB. Elderly community residents' reactions to the nursing home: an analysis of nursing home-related beliefs. Gerontologist. 1991 Feb; 31(1): 107-15.

18. Statistics Indonesia [BPS]. Indonesia-population distribution Jakarta 2010 [cited 2016 Aug 8]. Available from: http://sp2010.bps.go.id/index.php/site?id=34&wilayah=DI-Yogyakarta

19. Statistics Indonesia [BPS]. The number and distribution of population in DI Yogyakarta Province 2010 [cited 2016 Aug 8]. Available from: http://sp2010.bps.go.id/index.php/site?id=34&wilayah=DI-Yogyakarta

20. Statistics Indonesia [BPS]. Statistik Penduduk Lanjut Usia 2015. Statistik BP (Ed.) Jakarta: Badan Pusat Statistik; 2016.

21. Oluwina AK, Ohaeri JU. Subjective quality of life of recently discharged Nigerian psychiatric patients. Soc Psychiatry Psychiatr Epidemiol. 2003 Dec; 38(12): 707-14. doi: 10.1007/s00127-003-0691-7
22. Kumar SG, Majumdar A, GP. Quality of life (QOL) and its associated factors using WHOQOL-BREF among elderly in urban Puducherry, India. J Clin Diagn Res. 2014 Jan; 8(1): 54-7. doi: 10.7860/JCDR/2014/69963917

23. Hong Kong Project Team. Hong Kong Chinese version World Health Organization quality of life measure – abbreviated version. Hong Kong; 1997.

24. Han KT, Park EC, Kim JH, Kim SJ, Park S. Is marital status associated with quality of life? Health Qual Life Outcomes. 2014 Aug; 12: 109. doi: 10.1186/s12955-014-0109-0

25. Kuok KCF, Li L, Xiang Y-T, Nogueira BOCL, Ungvari GS, Ng CH, et al. Quality of life and clinical correlates in older adults living in the community and in nursing homes in Macao. Psychogeriatrics. 2017 May; 17(3): 194-9. doi: 10.1111/psyg.12214

26. Akyol Y, Dürmuş D, Doğan C, Bek Y, Cantürk F. Quality of life and level of depressive symptoms in the geriatric population. Turk J Rheumatol. 2010; 25(4): 165-73. doi: 10.5152/trj.2010.23

27. Unsar S, Dindar I, Kurt S. Activities of daily living, quality of life, social support and depression levels of elderly individuals in Turkish society. J Pak Med Assoc. 2015 Jun; 65(6): 642-6.

28. Drageset J, Eide GE, Nygaard HA, Bondevik M, Nortvedt MW, Natvig GK. The impact of social support and sense of coherence on health-related quality of life among nursing home residents—a questionnaire survey in Bergen, Norway. Int J Nurs Stud. 2009 Jan; 46(1): 65-75. doi: 10.1016/j.ijnurstu.2008.07.005

29. Tsai HH, Tsai YF. Changes in depressive symptoms, social support, and loneliness over 1 year after a minimum 3-month videoconference program for older nursing home residents. J Med Internet Res. 2011 Nov; 13(4): e93. doi: 10.2196/jmir.1678

30. Erdem K, Ejder Apay S. A sectional study: the relationship between perceived social support and depression in Turkish infertile women. Int J Fertil Steril. 2014 Oct; 8(3): 303-14.

31. Hung WW, Ross JS, Boockvar KS, Siu AL. Recent trends in chronic disease, impairment and disability among older adults in the United States. BMC Geriatrics. 2011; 11(47): 1-12. doi: 10.1186/1471-2318-11-47

32. Theofanidis D, Kapadhos TH, Kampisiouli E. Changes in psychological state of elder patients during their hospitalization. Rostrum of Asclepius. 2007; 2: 1-9.

**Corresponding author**

Surasak Taneepanichskul can be contacted at: surasak.t@chula.ac.th

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Can early initiation to breastfeeding prevent stunting in 6–59 months old children?

Muldiasman, Kusharisupeni and Endang Laksminingsih

Department of Public Health Nutrition, Faculty of Public Health, University of Indonesia, Jakarta, Indonesia, and
Besral
Department of Biostatistics, Faculty of Public Health, University of Indonesia, Jakarta, Indonesia

Abstract

Purpose – The prevalence of stunting in children under five years old is high (37.9 percent). The health advantage of breast milk as a prevention is recognized. The purpose of this paper is to examine the relationship of early initiation to breastfeeding, wherein a child is breastfed within an hour of birth, as a means of preventing stunted growth in 6–59 month old children in Jambi province, Indonesia.

Design/methodology/approach – This paper used data from the 2015 National Nutrition Survey in Jambi province. A total of 2,502 children aged 6–59 months were analyzed by binary logistic regression.

Findings – The results showed that as many as 27.5 percent (95% CI: 25.2–29.9) children aged 6–59 months were stunted and 54.1 percent (95% CI: 51.1–57.1) had not been introduced to breastfeeding soon after birth. The analysis showed that delayed initiation to breastfeeding is a significant factor in stunting amongst 6–59 month old children. ($p = 0.024; \text{AOR} = 1.3; 95\% \text{ CI: 1.0–1.6}$). Other results of the analysis showed a significant association between water source and birth weight issues as causes for stunting.

Originality/value – Research revealed that delayed initiation into breastfeeding results in a 1.3 times higher risk of stunting. Furthermore, early initiation to breastfeeding reduces the risk of consuming polluted river water that is a health risk and cause of stunting.

Keywords Indonesia, Breastfeeding, Early initiation to breastfeeding, Stunting in children

Paper type Research paper

Introduction

The purpose of this study was to determine the relationship between early initiation to breastfeeding with stunting in children 6–59 months. Stunting in children under five years is a global problem, mainly experienced in developing countries. The results of a joint UNICEF, World Health Organization (WHO) and World Bank analysis of 142 national survey results of poor and developing countries, found that in 2011, stunting prevalence affected 165 million children with an estimated 127 million children under five projected to be stunted by 2025[1, 2]. Stunting in under-five children is a problem in Indonesia where basic health research (Riskesdas) revealed the high prevalence of stunting in under fives in 2007, 2010 and 2013 by 36.8, 35.6 and 37.2 percent[3–5]. Jambi Province has a stunting problem greater than the national average by 37.9 percent[5].

Stunting creates a barrier to the forming and development of organs and has a short term impact on mortality, morbidity and disability. Long term consequences include negative
impacts on adult body size, intellectual ability, economic productivity, reproductive ability and metabolic and blood vessel disease[1, 6, 7].

Diarrhea, cough, cold, fever, shortness of breath, are associated with stunting in children under five[8] and is a proven risk of respiratory tract infection by four times[9]. The risk of stunting increases based on an unhealthy source of drinking water[10] and poor sanitation facilities[11, 12]. Low participation in basic community health checks is another risk factor of stunting in urban areas[13].

Early initiation to breastfeeding, exclusive breastfeeding, duration of breastfeeding, and vitamin A administration are associated with preventing stunting in children under five years of age. Previous research indicates an exclusive breastfeeding relationship with stunting[14, 15] and a relationship between supplementation to breast feeding during the first four months ($p = 0.04$) with stunting in children[16].

**Methods**

Data from the National Nutrition Survey in Jambi province in 2015 were studied. Data were collected through Nutrition Status Monitoring Activities using a cross-sectional design including questionnaires, interviews and observations. The status of exposure and disease were observed simultaneously in individuals over the same period between September and October 2015.

The research location was Jambi Province, Indonesia consisting of ten districts/cities. In total, 30 clusters were selected from each district and city. In each cluster ten households were selected as the sample.

The population of this study was all children aged 6–59 months in Jambi province. The sample criteria included the following: child’s birth date is known, the child is weighed at birth and during observation, the child’s length is measured at birth and during observation, the determinant of stunting questionnaire in the child is complete.

The selection of clusters in districts and cities is systematically randomized based on probability proportional to size. The nutritional status used was collected by looking at birth records, viewing MCH books, interviews with toddlers and field observations. Stunting is measured anthropometrically according to WHO standards 2005.

Data collection was conducted by graduates of the Nursing and Midwifery Academy. There were six people in each District/City and two field supervisors. The Data collector and supervisor team attended three days training on September 18–20, 2015. Training materials comprised: nutrition program policies, sampling methods, interview techniques, anthropometric measurements, questionnaire content and field practice.

Univariate analysis was performed to provide a stunting prevalence picture in children 6–59 months, early initiation to breastfeeding and other variables. The bivariate analysis was conducted to find out the association of each independent variable with stunting variable in children 6–59 months. Multivariate analysis was conducted to see the relationship of early initiation to breastfeeding with stunting in children 6–59 months. Analysis was done by binary logistic regression for survey data.

**Results**

**Stunting in children 6–59 months**

A total of 27.5 percent (95% CI: 25.2–29.9) children aged 6–59 months are stunted in Jambi province, Indonesia, in 2015.

**Early initiation to breastfeeding and child characteristics 6–59 months**

Most children of 6–59 months do not get the opportunity to breastfeed early (54.1 percent; 95% CI: 51.1–57.1) with irregular visits to community base health services/posyandu (44 percent). The number of boys (52 percent) is almost the same as girls (48 percent).
A small number of them do not have good sanitation facilities (14 percent). Some of them are not exclusively breastfed (41 percent). A small number of them have a history of diarrhea in the last one month (15 percent). Over a third of them had a history of cough (38 percent), cold (45 percent), fever (35 percent) in the last one month. A small number of them do not boil drinking water (13 percent). Most of them live in rural areas (74 percent). Father and mother ethnicity is predominantly, non native or “The Outsider” (41 percent) and Mixed (12 percent). Some of them have well water as a source of drinking water (57 percent). A few (3 percent) of their families have an inadequate quality source of drinking water (cloudy/smelly/tasty/colorful). A small number of them have poorly structured homes (3 percent). A small number of them have a large number of household members (18 percent). Fathers education (53 percent) and mothers education (55 percent) are basic. A minority of fathers jobs are “not fixed and others” (15 percent) while a small portion of mothers (21 percent) are working. Few of them weigh less than 2,500 gram (3 percent). More than a quarter of them had a birth length of less than 48 cm (27 percent) (Table I).

Other results of the analysis showed a significant association between water source and birth weights to stunting (Table II). The most dominant risk factor for stunting was age 24–59 months with a risk 2.5 times higher than the age of 6–11 months ($p = 0.000$; AOR = 2.5; 95% CI: 1.8–3.6).

**Discussion**

**Stunting in children 6–59 months**

Based on the research results, it is known that 27.5 percent (95% CI: 25.2–29.9) of children aged 6–59 months were stunted in Jambi province in 2015. This is lower than 2007 (36.4 percent), 2010 (30.2 percent), 2013 (37.9 percent) but still remains a serious problem that needs further treatment. If the trend of stunting problems continues, an estimated 127 million toddlers will be stunted by 2025[1, 2].

In 2012, through the World Health Assembly Resolution 65.6, a comprehensive effort on the nutritional condition of mothers, infants and children, known as the "six global nutrition targets for 2025" was recommended. This policy concerns the first target of a 40 percent reduction in the number of children under-five who are stunted[2]. Nutritional interventions alone (specific programs) are not sufficient to achieve optimal child development and nutrition, as it is important to strengthen sensitive nutrition development efforts and improve them with evidence-based, nationwide multi-sectoral plans aimed at stunting, combining nutritional interventions with health, family planning, water and sanitation strategies and other factors that influence the stunting risk (sensitive programs). It takes a measurable work plan to develop and oversee the implementation of commitments and targets[1, 17].

**Early initiation to breastfeeding and stunting**

This study shows that children who do not get an early initiation to breastfeeding are 1.3 times more likely to be stunted than those who are breastfed early. These results illustrate early initiation to breastfeeding as a form of maternal care and the best giving of nutrients early in life that can reduce the risk of stunting. Early breastfeeding initiation is one of the entrances to successful breastfeeding at a later time and ensures children receive appropriate nutritional intake[2, 7].

Similar results are proven in previous studies. Initiation of breastfeeding after six hours of birth or discarding colostrum due to ignorance of its health benefits as well as breastfeeding supplementation is a risk factor for stunting children under five[18]. This study shows that one of the efforts to overcome stunted problems in children is to provide early initiation to breastfeeding. Early initiation to breastfeeding takes place naturally, where the child after birth is directly placed in the mother’s chest to initiate the search for the mother’s nipple to feed within the first hour of birth. Early initiation to breastfeeding is
| Variables                                      | Children 6–59 months |          |          |          |          |          |          |
|------------------------------------------------|----------------------|----------|----------|----------|----------|----------|----------|
|                                                | Normal   | Stunting | OR      | 95% CI   | p-value  |          |          |
| Early initiation to breastfeeding               |          |          |          |          |          |          |          |
| Yes                                            | 881      | 76.7     | 267      | 23.3     | 1        | Ref      |          |
| No                                             | 933      | 68.9     | 421      | 31.1     |          |          |          |
| Visiting community base health service          |          |          |          |          |          |          |          |
| Good (≥ 4 times in 6 month)                     | 1,105    | 74.2     | 385      | 25.8     | 1        | Ref      |          |
| Not good (< 4 times in 6 month)                 | 709      | 70.1     | 303      | 29.9     | 1.5      | 1.2      | 1.8      | 0.000** |
| Birth weight                                    |          |          |          |          |          |          |          |
| Normal (≥ 2,500 gram)                          | 1,764    | 73.0     | 653      | 27.0     | 1        | Ref      |          |
| Low birth weight (< 2,500 gram)                 | 50       | 58.8     | 33       | 41.2     | 1.9      | 1.1      | 3.2      | 0.044** |
| Length at birth                                 |          |          |          |          |          |          |          |
| Normal (≥ 48 cm)                                | 1,350    | 73.7     | 482      | 24.1     | 1.2      | 0.9      | 1.5      | 0.052*  |
| Less (< 48 cm)                                  | 465      | 69.4     | 205      | 30.5     | 1.2      | 0.9      | 1.5      | 0.052*  |
| Exclusive breastfeeding                         |          |          |          |          |          |          |          |
| Yes                                            | 1,088    | 73.9     | 385      | 26.1     | 1        | Ref      |          |
| No                                             | 727      | 70.6     | 302      | 29.4     | 1.2      | 0.9      | 1.4      | 0.104*  |
| Diarrhea history in the last 1 month            |          |          |          |          |          |          |          |
| No                                             | 1,566    | 73.0     | 503      | 26.4     | 1        | Ref      |          |
| Yes                                            | 248      | 66.6     | 125      | 33.4     | 1.4      | 1.1      | 1.7      | 0.007** |
| Cough history in previous month                 |          |          |          |          |          |          |          |
| No                                             | 1,128    | 72.9     | 419      | 27.1     | 1        | Ref      |          |
| Yes                                            | 686      | 71.8     | 269      | 28.2     | 1.1      | 0.9      | 1.3      | 0.590   |
| Cold history in previous month                  |          |          |          |          |          |          |          |
| No                                             | 998      | 73.0     | 368      | 27.0     | 1        | Ref      |          |
| Yes                                            | 817      | 71.9     | 319      | 28.1     | 1.1      | 0.9      | 1.3      | 0.560   |
| Fever history in previous month                 |          |          |          |          |          |          |          |
| No                                             | 1,187    | 73.4     | 430      | 26.6     | 1        | Ref      |          |
| Yes                                            | 628      | 70.9     | 257      | 29.1     | 1.1      | 0.9      | 1.4      | 0.231*  |
| Shortness of breath history in previous month   |          |          |          |          |          |          |          |
| No                                             | 1,758    | 72.5     | 668      | 27.5     | 1        | Ref      |          |
| Yes                                            | 56       | 73.8     | 20       | 26.2     | 0.9      | 0.6      | 1.5      | 0.790   |
| Boiling drinking water                          |          |          |          |          |          |          |          |
| Yes                                            | 1,565    | 71.9     | 612      | 28.1     | 1        | Ref      |          |
| No                                             | 250      | 76.7     | 75       | 23.3     | 0.7      | 0.5      | 1.1      | 0.119*  |
| House structure                                 |          |          |          |          |          |          |          |
| Good                                           | 1,766    | 72.9     | 657      | 27.1     | 1        | Ref      |          |
| Not good                                       | 48       | 61.0     | 31       | 69.0     | 1.7      | 1.1      | 2.6      | 0.013** |
| Sanitation facilities                           |          |          |          |          |          |          |          |
| Yes                                            | 1,587    | 73.7     | 565      | 26.3     | 1        | Ref      |          |
| No                                             | 227      | 64.9     | 123      | 35.1     | 1.5      | 1.1      | 2.0      | 0.003** |
| Water sources                                   |          |          |          |          |          |          |          |
| Pipe                                           | 362      | 71.4     | 144      | 28.6     | 1        | Ref      |          |
| Well                                           | 1,031    | 72.3     | 395      | 27.7     | 0.9      | 0.7      | 1.2      | 0.741   |
| River                                          | 26       | 45.3     | 31       | 54.7     | 3.0      | 1.5      | 5.9      | 0.001** |
| Rainwater collection                            | 113      | 83.2     | 23       | 16.8     | 0.5      | 0.3      | 0.9      | 0.025** |
| Gallon refill                                   | 283      | 75.1     | 94       | 24.9     | 0.8      | 0.6      | 1.2      | 0.299   |

Table I. Bivariate analysis of early initiation to breastfeeding relations and other determinants with stunting in children 6–59 months (continued)
easy, takes a short time and has a long-term effect on the child. This opportunity can be accomplished if the mother of the newborn is aware of the benefit and process of early breastfeeding. Promotion efforts to educate the mother and family should be carried out before birth.

Other results of the analysis showed a significant association between age, water source and birth weights to stunting in 6–59 months of children. These results indicate that stunting is caused by many factors.

Early initiation to breastfeeding ensures that the baby gets colostrum that increases the child’s immunity to infection and furthermore, exclusive breastfeeding will keep children away from contaminated water sources for at least the first 6 months. Adequate foods and no infection make the child grow optimally[19–22] and reduces the risk of stunting.

| Variables                           | Children 6–59 months | Crude OR | 95% CI | p-value |
|-------------------------------------|----------------------|----------|--------|---------|
|                                     | n   | %    | n   | %    |         |          |         |
| Quality of water source             |      |      |      |      |         |          |         |
| Good                                | 1,775 | 72.7 | 665 | 27.3 | 1       | Ref      | 0.109*  |
| Not good                            | 39   | 63.5 | 23  | 36.5 | 1.5     | 0.9      | 2.6     |
| Number of household members         |      |      |      |      |         |          |         |
| Small (≤ 4 persons)                 | 1,494 | 73.0 | 552 | 27.0 | 1       | Ref      | 0.294   |
| Big (> 4 persons)                   | 321  | 70.4 | 135 | 29.6 | 1.1     | 0.9      | 1.4     |
| Region type                         |      |      |      |      |         |          |         |
| Urban                               | 497  | 77.4 | 145 | 22.6 | 1       | Ref      |         |
| Rural                               | 1,318 | 70.8 | 542 | 29.2 | 1.4     | 1.1      | 1.8     | 0.011**|
| Father and mother ethnicity         |      |      |      |      |         |          |         |
| Origin                              | 796  | 66.7 | 307 | 33.3 | 1       | Ref      |         |
| Mixed ethnic                        | 230  | 79.4 | 60  | 20.6 | 0.5     | 0.4      | 0.7     | 0.000**|
| Outsider ethnic                     | 788  | 77.3 | 231 | 22.7 | 0.6     | 0.5      | 0.7     | 0.000**|
| Father’s education                  |      |      |      |      |         |          |         |
| Medium (high school or above)       | 878  | 74.3 | 303 | 25.7 | 1       | Ref      |         |
| Basic (Junior high school or not)   | 937  | 70.9 | 384 | 29.1 | 1.2     | 0.9      | 1.4     | 0.087*  |
| Mothers education                   |      |      |      |      |         |          |         |
| Medium (high school or above)       | 849  | 75.1 | 282 | 24.9 | 1       | Ref      |         |
| Basic (Junior high school or not)   | 965  | 70.4 | 406 | 29.6 | 1.3     | 1.0      | 1.6     | 0.023**|
| Father’s occupation                 |      |      |      |      |         |          |         |
| Fixed work                          | 1,534 | 72.2 | 589 | 27.8 | 1       | Ref      |         |
| Labor and others                    | 281  | 74.0 | 98  | 26.0 | 0.9     | 0.7      | 1.2     | 0.517   |
| Mothers occupation                  |      |      |      |      |         |          |         |
| Housewife                           | 1,445 | 73.0 | 535 | 27.0 | 1       | Ref      |         |
| Career                              | 369  | 70.7 | 153 | 29.3 | 1.1     | 0.9      | 1.4     | 0.357   |
| Age (months)                        |      |      |      |      |         |          |         |
| 6–11                                | 356  | 84.7 | 64  | 15.3 | 1       | Ref      |         |
| 12–23                               | 580  | 74.1 | 203 | 25.9 | 1.9     | 1.4      | 2.6     | 0.000**|
| 24–59                               | 878  | 67.6 | 421 | 32.4 | 2.6     | 1.9      | 3.7     | 0.000**|
| Sex                                 |      |      |      |      |         |          |         |
| Boys                                | 928  | 71.4 | 373 | 28.6 | 1       | Ref      |         |
| Girls                               | 886  | 73.8 | 315 | 26.2 | 0.9     | 0.7      | 1.1     | 0.188*  |

Table I. 

Notes: n = 2,502. Ref, reference. *p < 0.25; **p < 0.05
The difference in risk of stunting based on drinking water sources was also revealed by several other researchers[10, 23].

The results of this study indicate that there are differences in the growth of children by age. Growth disorders will accumulate with age[24–27]. Differences in the growth of children by age are also found elsewhere. For two years the age of the child was 9 cm in contrast to the WHO standard in Malawi, then only increased by 1 cm by age 2–3 years from 10 cm difference. Differences of two centimeters (20 percent) occur at birth, 4 cm (40 percent) occur from birth to 12 months of age, and 3 cm (30 percent) occur from 12–24 months. Early cause is a combination of growth disorders in the uterus, inadequate nutrition after birth, marked by low exclusive breastfeeding (28 percent) and low nutritional intake of breast milk due to malnourished mother, and infection after birth[27].

**Conclusion**

Early initiation to breastfeeding can be associated with preventing stunting in 6–59 month of children after adjusted to all others variables. There is also a significant association between water source and birth weight to stunting. Children with a low birth weight are 2.0 times at higher risk of stunting than normal-born. The most dominant risk factor for stunting was age 24–59 months with a risk 2.5 times higher than the age of 6–11 months. Early initiation to breastfeeding is easy and has a long-term positive health benefit on the child.

**Recommendations**

Promoting breast feeding benefits to mothers should begin before birth. Support from health personnel, especially officers who assist the birth process, should be increased.

It is important to reinforce the importance of early initiation to breastfeeding and clean drinking water sources as a prevention to stunting. Improvement of drinking water sources by replacing contaminated river water with clean pipe water should be practiced. Finally, it is important to introduce additional and more regular educational programs for pregnant women about how to prevent low birth weight in babies together with clear information on the benefits of early breastfeeding.

| No. | Variables                                      | B    | p-value | Adjusted OR | 95% CI  |
|-----|-----------------------------------------------|------|---------|-------------|---------|
| 1   | No early initiation to breastfeeding          | 0.241| 0.024   | 1.3         | 1.0 1.6 |
| 2   | Birth weight (<2,500 gms)                    | 0.095| 0.011   | 2.0         | 1.2 3.4 |
| 3   | Diarrhoea                                     | 0.317| 0.016   | 1.4         | 1.1 1.8 |
| 4   | House structure (not good)                   | 0.456| 0.047   | 1.6         | 1.0 2.5 |
| 5   | Water sources                                 |      |         |             |         |
|     | Pipe                                          |      |         |             |         |
|     | Well                                          | −0.018| 0.895  | 1.0         | 0.7 1.3 |
|     | River                                         | 0.759| 0.032   | 2.1         | 1.1 4.3 |
|     | Rainwater collection                          | −0.527| 0.102  | 0.6         | 0.3 1.1 |
|     | Gallon refill                                 | −0.067| 0.710  | 0.9         | 0.6 1.3 |
| 6   | Region type (rural)                           | 0.301| 0.031   | 1.4         | 1.0 1.8 |
| 7   | Father and mother ethnicity                   |      |         |             |         |
|     | Origin                                        |      |         |             |         |
|     | Mixed ethnic                                  | −0.522| 0.004  | 0.6         | 0.4 0.8 |
|     | Outsider ethnic                               | −0.385| 0.001  | 0.7         | 0.5 0.9 |
| 8   | Age (months)                                  |      |         |             |         |
|     | 6–11                                         |      |         |             |         |
|     | 12–23                                        | 0.604| 0.000   | 1.8         | 1.3 2.6 |
|     | 24–59                                        | 0.926| 0.000   | 2.5         | 1.8 3.6 |
|     | Intercept                                    | −1.901|        |             |         |

**Note:** Ref, reference

The difference in risk of stunting based on drinking water sources was also revealed by several other researchers[10, 23].

The results of this study indicate that there are differences in the growth of children by age. Growth disorders will accumulate with age[24–27]. Differences in the growth of children by age are also found elsewhere. For two years the age of the child was 9 cm in contrast to the WHO standard in Malawi, then only increased by 1 cm by age 2–3 years from 10 cm difference. Differences of two centimeters (20 percent) occur at birth, 4 cm (40 percent) occur from birth to 12 months of age, and 3 cm (30 percent) occur from 12–24 months. Early cause is a combination of growth disorders in the uterus, inadequate nutrition after birth, marked by low exclusive breastfeeding (28 percent) and low nutritional intake of breast milk due to malnourished mother, and infection after birth[27].

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It is important to reinforce the importance of early initiation to breastfeeding and clean drinking water sources as a prevention to stunting. Improvement of drinking water sources by replacing contaminated river water with clean pipe water should be practiced. Finally, it is important to introduce additional and more regular educational programs for pregnant women about how to prevent low birth weight in babies together with clear information on the benefits of early breastfeeding.
References

1. Black RE, Victora CG, Walker SP, Bhutta ZA, Christian P, de Onis M, et al. Maternal and child undernutrition and overweight in low-income and middle-income countries. Lancet. 2013 Aug; 382 (9890): 427-51. doi: 10.1016/s0140-6736(13)60937-x

2. World Health Organization [WHO]. Global Nutrition Targets 2025: Stunting Policy Brief. WHO/NMH/NHD/143. Geneva: WHO; 2014.

3. Ministry of Health. Basic Health Research. Jakarta: Ministry of Health Republic Indonesia; 2007.

4. Ministry of Health. Basic Health Research. Jakarta: Ministry of Health Republic Indonesia; 2010.

5. Ministry of Health. Basic Health Research. Jakarta: Ministry of Health Republic Indonesia; 2013.

6. Paiva M, Souza TO, Canon F, Perot C, Xavier LC, Ferraz KM, et al. Stunting delays maturation of triceps surae mechanical properties and motor performance in prepubertal children. Eur J Appl Physiol. 2012 Dec; 112(12): 4053-61. doi: 10.1007/s00421-012-2387-8

7. Black RE, Allen LH, Bhutta ZA, Caulfield LE, de Onis M, Ezzati M, et al. Maternal and child undernutrition: global and regional exposures and health consequences. Lancet. 2008 Jan; 371 (9608): 243-60. doi: 10.1016/s0140-6736(07)61690-0

8. Checkley W, Buckley G, Gilman RH, Assis AM, Guerrant RL, Morris SS, et al. Multi-country analysis of the effects of diarrhoea on childhood stunting. Int J Epidemiol. 2008 Aug; 37(4): 816-30. doi: 10.1093/ije/dyn099

9. Dharmage SC, Rajapaksa LC, Fernando DN. Risk factors of acute lower respiratory tract infections in children under five years of age. Southeast Asian J Trop Med Public Health. 1996 Mar; 27(1): 107-10.

10. Chirande L, Charwe D, Mbwana H, Victor R, Kimboka S, Issaka AI, et al. Determinants of stunting and severe stunting among under-fives in Tanzania: evidence from the 2010 cross-sectional household survey. BMC Pediatr. 2015 Oct; 15: 165. doi: 10.1186/s12887-015-0482-9

11. Wamani H, Astrom AN, Peterson S, Tumwine JK, Tylleskar T. Predictors of poor anthropometric status among children under 2 years of age in rural Uganda. Public Health Nutr. 2006 May; 9(3): 320-6.

12. Rah JH, Cronin AA, Budgaiyan B, Aguayo VM, Coates S, Ahmed S. Household sanitation and personal hygiene practices are associated with child stunting in rural India: a cross-sectional analysis of surveys. BMJ Open. 2015 Feb; 5(2): e005180. doi: 10.1136/bmjopen-2014-005180

13. Reyes H, Perez-Cuevas R, Sandoval A, Castillo R, Santos J, Dombrowsa SV, et al. The family as a determinant of stunting in children living in conditions of extreme poverty: a case-control study. BMC Public Health. 2004 Nov; 4: 57. doi: 10.1186/1471-2458-4-57

14. Dhatrak PP, Pitale S, Kasturwar NB, Nayse J, Relwani N. Revalence and epidemiological determinants of malnutrition among under-fives in urban slum, Nagpur. National Journal of Community Medicine. 2013; 4(1): 91-5.

15. Fikadu T, Assegid S, Dube L. Factors associated with stunting among children of age 24 to 59 months in Meskan district, Gurage Zone, South Ethiopia: a case-control study. BMC Public Health. 2014 Aug; 14: 800. doi: 10.1186/1471-2458-14-800

16. Gordon NH, Halileh S. An analysis of cross sectional survey data of stunting among Palestinian children less than five years of age. Matern Child Health J. 2013 Sep; 17(7): 1288-96. doi: 10.1007/s10995-012-1126-4

17. de Onis M, Dewey KG, Borghi E, Onyango AW, Blossner M, Daelmans B, et al. The world health organization’s global target for reducing childhood stunting by 2025: rationale and proposed actions. Matern Child Nutr. 2013 Sep; 9(5): 6-26. doi: 10.1111/mcn.12075

18. Kumar D, Goel NK, Mittal FC, Misra P. Influence of infant-feeding practices on nutritional status of under-five children. Indian J Pediatr. 2006 May; 73(5): 417-21.

19. Kramer MS, Guo T, Platt RW, Svekofsky Z, Dzikovich I, Collet JP, et al. Infant growth and health outcomes associated with 3 compared with 6 mo of exclusive breastfeeding. Am J Clin Nutr. 2003 Aug; 78(2): 291-5. doi: 10.1093/ajcn/78.2.291

20. Brown JE Nutrition Through the Life Cycle. Belmont, CA: Thomson/Wadsworth; 2005.
21. Permatasari TAE, Syafrudin A. Early initiation of breastfeeding related to exclusive breastfeeding and breastfeeding duration in rural and urban areas in Subang, West Java, Indonesia. J Health Res. 2016; 30(5): 337-45.

22. Huhtanen S, Laukkanen A.A. Guide to Sanitation And Hygiene for Those Working in Developing Countries. Tampere: Tampere University of Applied Sciences, TAMK; 2006.

23. Oktarina Z, Sudarti T. Risk factors stunting in toddlers (24-59 months) in Sumatra. Jurnal Gizi dan Pangan. 2013; 8(3): 175-80.

24. Darteh EK, Acquah E, Kumi-Kyereme A. Correlates of stunting among children in Ghana. BMC Public Health. 2014 May; 14: 504. doi: 10.1186/1471-2458-14-504

25. Hien NN, Hoa NN Nutritional status and determinants of malnutrition in children under three years of age in Nghean, Vietnam. Pak J Nutr. 2009; 8(7): 958-64.

26. Zottarelli LK, Sunil TS, Rajaram S. Influence of parental and socioeconomic factors on stunting in children under 5 years in Egypt. East Mediterr Health J. 2007 Nov-Dec; 13(6): 1330-42.

27. Dewey KG, Huffman SL. Maternal, infant, and young child nutrition: combining efforts to maximize impacts on child growth and micronutrient status. Food Nutr Bull. 2009 Jun; 30(S2): S187-9. doi: 10.1177/15648265090302s201

Corresponding author
Muldiasman can be contacted at: rajomudojr@gmail.com

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Needs of patient with advanced stages of cancer in a Thai community
Mixed method approach

Panita Krongyuth, Pimpan Silpasuwan and Chukiat Viwatwongkasem
Faculty of Public Health, Mahidol University, Bangkok, Thailand, and
Cathy Campbell
School of Nursing, University of Virginia, Charlottesville, Virginia, USA

Abstract
Purpose – The purpose of this paper is to explore the needs of people with cancer in advanced stages and to analyze factors that influence them.

Design/methodology/approach – A concurrent mixed-method design was used. Descriptive design was conducted in Ubon Ratchathani Province, Thailand. Data were collected from a convenience sample of patients with advanced cancer of any tissue or organ. Questionnaires were completed by 110 patients aged 60 years and above (response rate 110/130 = 84.6 percent). In-depth interviews were conducted with a total of eight patients. Content analysis of semi-structured interviews of a sub-sample was subsequently performed to better understand the real needs of patients with advanced stages of cancer at home setting.

Findings – The majority (77.5 percent) reported a preference to spend their final days at home. The four most common palliative care needs were more information about disease and medical treatment (98.2 percent), more treatment for pain (97.3 percent), health education for family caregivers (95.5 percent) and health volunteers visit at home (95.5 percent). Content analysis of the qualitative data suggested that patient needs health care providers to deliver open communication, pain management and provide psychosocial supports.

Originality/value – The result showed that patients-related variables are associated with the palliative care needs in patients with advanced stages of cancer. Communication skills and pain management are the key components to support the need for palliative care at home and to benefit the quality of life in terminally ill patients.

Keywords Palliative care, Cancer patients

Paper type Research paper

Introduction
Cancer is a potential life-threatening disease. In 2014, the World Health Organization (WHO) projected that the number of annual new cancer cases will rise from 14m in 2012 to 22m within the next two decades[1]. In high-income countries, such as the United States, an estimated 1,688,780 new cancer cases are expected to be diagnosed in 2017 and 600,920 are expected to die of cancer or about 1,650 people per day[2]. In England, 356,860 new cases of cancer were registered in 2014. Data from the Office of National Statistics (ONS) revealed that cancer was the leading cause of death in England, accounting for 29 percent of all deaths in 2014[3]. In Thailand, data from the Health Information Unit, Bureau of Health Policy and Strategy revealed that cancer is the first leading cause of death in adults. The mortality rate per 100,000 populations from cancer has increased from 95.2 in 2011 to 113.7 in 2015[4]. In 2011, the WHO...
has reported that over 29m (29,063,194) people have died from diseases requiring palliative care at the end of life[5]. Most patients with advanced stages of cancer suffer from pain, fatigue, anxiety, depression, dyspnea and other symptoms[6, 7]. Moreover, when confronting death at the end of life, patients may suffer certain phobias, i.e. fear of pain, lack of all control, loss of dignity and fear of dying alone[8]. As a result, holistic palliative care plays an important role not only in controlling symptoms but also maintaining or improving patient quality of life (QOL). Palliative care focuses on the relief of suffering and supports for the best possible QOL for patients facing serious life-threatening disease and for their families regardless of whether the final outcome is death or cure of the illness[9, 10].

Palliative care is an approach to care for patients with potentially life-threatening disease and their families, focusing on all aspects of holistic health care such as pain treatment, advising family members, referring to social services. The ultimate goal is to provide patients and families with the best QOL during the trajectory of diseases[11]. The data from previous studies showed that many terminally ill patients would prefer to stay and die in their own homes, but unfortunately some of patients may not be able to do so[11–14]. Evidence has presented many benefits of home care for palliative care patients. These are, for example, relieving the symptom burden, increasing the patients’ self-management of the illness, increased receipt of sufficient information to handle an illness emergency, relieving the caregivers’ burden, and the positive effects on the satisfaction of care[15]. Despite the fact that many studies have also demonstrated that palliative home-based care by physicians or nurses supports patients to die at home, most were performed in countries where palliative is integrated into mainstream medicine. Regarding the latest report from the Worldwide Palliative Care Alliance in 2014, Thailand is classified as a country where palliative care is only provided in some areas[4].

Palliative care services delivery was the highlighted national policy in Thailand[16]. Palliative care services in Thailand are mainly delivered in hospital settings; integrative palliative care from hospitals has not been effectively linked with community settings[17, 18]. Wright et al[19] classified palliative care activity across the globe, and countries were allocated to one of four categories: no known palliative care activity, capacity building activity, localized care provision, and palliative care services integrated in the health system. Thailand is classified as a nation in category 3 because localized palliative care provision is available in hospital. The improvement of community and home-based palliative care programs is needed to increase the coverage of palliative care services[20]. Moreover, costs of medical care in home programs are less than those in acute services care used in emergency departments and hospital wards[21, 22]. No national statistics in Thailand are available on the rate of death at home or are related directly to the place of death. It differs from western countries such as in the UK, where the rate of death at home increased from 18.3 percent in 2004 to 20.8 percent in 2010[23].

The essence of palliative care is that the holistic care includes the psychological, social, and spiritual needs of the patients[24]. Thus, the needs of patients with advanced stages of cancer become a healthcare issue. However, the literature reveals that most of research studies were conducted to assess needs of palliative care among patient in hospital[25–28]. The result of this study will inform professional nurses and guide policies on how to provide appropriate health care services for patients with advanced stages of cancer. Moreover, an expected outcome of this study could guide care at home aiming to improve patients’ QOL and place when the end of life comes. Therefore, the objective of this study aimed to explore the needs of patients with advanced stages of cancer in home setting.

Methods

Design

The concurrent mixed-method design, combining a major quantitative and minor qualitative, was used[29]. First, descriptive design was conducted to explore specific needs and problems among elderly patients. The study populations included 110 patients who enrolled in

Needs of patient with advanced stages of cancer
A self-report questionnaire was developed by the researcher based on literature reviews aimed to explore patients’ needs in the study. The general characteristics were created for the collection of basic demographic and clinical data.

The palliative care needs were developed by the research based on literature reviews consisting of 13 items. The interview was conducted on the bases of the item of the questionnaire choosing those considered less deep in the evidence base. A purposive sample of 8 patients was subsequently selected for the interviews. Participants who enrolled in home-based palliative care for at least 1 month were identified by an oncologist nurse. Interviews were taped on tape recording machines and transcribed verbatim. Each participant was given a code number for identification purposes to maintain their anonymity. New participants were added until saturation of the data was reached[30].

Measurement

A self-report questionnaire was developed by the researcher based on literature reviews aimed to explore patients’ needs in the study. The general characteristics were created for the collection of basic demographic and clinical data.

The palliative care needs were developed by the research based on literature reviews consisting of 13 items. It asks about different needs: information (item 1–3), physical (item 4–7), emotional/spiritual (items 8–10) and social supports (item 11–13). Each item represents one need of cancer patients and scale was rated on a scale from 1 (not important) to 5 (very important). Five experts were invited to assess content validity index and the questionnaire was revised according to their comment. Afterwards, the reliability was tested by a pilot test on a convenience sample of 30 patients with advanced stages of cancer at the OPD/IPD and returned to the researcher. The reliability of the questionnaire, as well as the reliability of the questions of each dimension, was measured with Cronbach’s α coefficient. Results showed that the Cronbach’s α coefficient for the overall questionnaire was 0.852.

The semi-structure interview is presented in Table II. All interviews were conducted at patient’s home. Individual oral interviews were conducted in the Thai language.

Data analysis

The characteristics of the participants were presented in terms of frequency and percentage for categorical data and mean with standard deviation for continuous data. The relationship between individual variables was assessed with Spearman’s correlation coefficient. Significance was set at $p < 0.05$. Regarding the qualitative data, we used it to confirm the quantitative findings by examining the coded units of meaning in each narrative content and then recorded to identify the emerging themes. Content analysis was used to explore the needs of home-based palliative care[31]. This study used data triangulation through data collection to identify major issues. The data that were derived from the interviews reached a saturation point when no new information emerged from the interviews. All the transcriptions were read and analyzed by the researcher. The analysis proceeded by defining codes that were derived from the data. The combination of larger thematic categories was used, which were coded and linked using notes and interview summaries[32].

Ethical considerations

Approval was obtained for conducting research with human subjects through the Institutional Review Board (IRB), Faculty of Public Health, Mahidol University (MUPH 2013-142) and the approval from the Health Research Ethics Committees of Sapprasitthiprasong Hospital (Code No. 003/2557).
Results of the quantitative study

Sample characteristics
A total of 111 patients participated in this phase. The majority of the participants were female (64.0 percent), with mean age 66.16 years (SD = 6.73) ranged from 60 to 84 years, living with spouse (71.2 percent), Buddhist (93.7 percent), and attained primary school grade (82.0 percent). The health care costs were mostly covered by universal coverage scheme (94.6 percent). Most of them preferred home as a place for caring (77.5 percent). In this sample, the most common cancers in male were liver (32.5 percent) and lung (27.5 percent). The most common cancers in female were breast (29.6 percent) and cervical (11.3 percent) (Table I).

Needs of palliative care among patients with advanced stages of cancer
The participants had high levels of needs for all 13 items, and the four most important needs among cancer patients for palliative care included information needs (98.2 percent), patients needed more treatment for pain (97.3 percent), needed more information for caregiver (95.5 percent) and health volunteers visit at home (95.5 percent) (Table II). There was no correlation between patients’ higher age, income, duration of being diagnosis and patients’ needs (Table III).

Results of the qualitative study
Based on content analysis, we found three core needs of patients with advanced stages. First, our interviews revealed the issue of type of information needs, pain management, and social support.

Type of information needs. Type of information, the first core quality of palliative care, was described by participants. The participants were described as being ill-informed regarding a chance to ask about cancer treatment and care. First, patients needed information about diseases and treatment:

When doctors said I have cancer stages 4. I don’t want to listen any things. I only needs to know the chance of cure and spread of disease. I need to know how long I can live. (P2)

One participants confirmed:

I preferred full treatment (at initially time); I think I can cure and I don’t think that I will die. Doctors should told me what I have to do […] medicine, surgery […] […] (P10)

Participants required discussion together about therapeutic options. As participants described:

I want to talk with my family before make decision for surgery. (P1)

My family more worries and suffered after they know I have to operate. They don’t want I do. Doctor have to talk with me and family about this […]. (P2)

As the time passes and symptoms get worst, the participants need information about chances of cure and progressive of disease. As participants described:

I needed to know how long that I can live […] I can cured […]. If not I don’t needed any aggressive treatment. (P8)

I want to finish every things house, land […] before I gone. I needed to know how long […]. (P5)

The last, patient needs times to talk about peaceful death:

I have to go soon. I know about diseases and […] How I can go with peaceful mind and no worries. (P9)
Pain management. All of them experienced moderated to severe pain on a daily basis. The participants described their experience by pain and its consequence as below:

I do not want to have pain again. The pain disturbed me and also made sleepless night. I don’t want to talk to anyone, I don’t want to make them upset. I actually felt regret for my husband and families. When I was not pain, I feel so good. When I was in pain, I want to gone. The pain scared me. I have no fear for dying when I still suffered with the same pain. I thought that if I die soon, it better. (P6)
I was really uncomfortable […]. My family bring me to hospital in night time. It difficult when they move me. I thought it would be better I die. I would no longer be pain. (P1)

Two essential needs for an effective pain management were identified by cancer patients. The first need was for 24 hours palliative care cover and medication:

I think night times are long. I want to talk with palliative care team, when pain increase. (P9)

Patients expressed a need for pain relieve medication:

My son take me to take injection when I have severe pain. I want doctors come to give me injection or educate my family to help me. (P5)

Why doctor don’t educate my family to help me for pain relief continuously […] injection morphine. (P7)

Providing psychosocial support. Psychosocial support involves psychosocial-spiritual comfort. Patients expressed their need of psychosocial support. The first need was patients needed friends and did not want to be alone. As participants described:

I am happy to spend my time at home. I sit here at the door, look at other people outside. I’m not strong to go out […] (sign) and waiting who will come. I am waiting them for small talk. I enjoy to listen and answer their questions. (P3)

I want friends ['Moo-ma-ha’ in Thai language] come to see me and family around my home. (P8)

While being with friends and family, the participants expressed that touching helped them fell warmth:

Friends or family hold my hand. It was communicate of their affectionate feeling. I know, I am not alone. (P10)
The second requirement for social support is positive lasting memories for both of physician, patients and family. The patients reflected the activity of their feeling when oncologist said “No appointment.” As a participant expressed:

No appointments, it means my diseases going down. I still want to go hospital for checked up my diseases. It mean I still have hope to live longer. When doctors said no appointment, I told him, I can go hospital and happy to meet others cancer patients. (P1)

Another participant confirmed this:

When doctor said no appointment and don’t come. I felt so sad why doctor talk to me like this. Why he don’t like me so he don’t want I came. (P6)

In addition, some dissatisfaction was expressed about the last memories with their physician:

I felt unimpressed […]. I felt uncomfortable […] why told me no appointment (’mai-nud’ in Thai language)? I know that they had many patients to care but why […] caring me. (P4)

The last requirement included patients being aware about their caregivers and family. Patients mentioned their concern of being a burden of their life:

I lost of myself as a mother, I feel regret for my daughter. I am sick and not having any others person to help me. Last night, I woke up my daughter because I was in pain and asking her to message my body […] asking her to do physical care. She looks so tried and needed longer rest. I really feel sorry to wake her up in midnight to take care me, but what I can do. I cannot control my body. I am suffering a lot. (P2)

Discussion

The quantitative results revealed that slightly more than half participants required caring at their home. The place of death is a major theme among patients in palliative care delivery research. Most patients at the end of life prefer dying at home[14]. The result demonstrated the greatest needs of a majority of patients that they require better understanding about their diseases, prognosis and medical treatment. This study is similar to the study of Morrison and colleagues[33] which indicated the top five needs concerning the treatment, care, and health information. A 2012 systematic review[34], aimed to explore unmet needs of palliative home care patients and caregivers, indicated that they need more information about diseases, in terms to manage their lives and make decisions. They also wanted a specific information regarding treatment, medication, and side effects. The core information-related need include listening actively and providing a safe space for conversation about peaceful death. Steele and Fitch’s[35] study revealed that eight of the top 10 most frequently reported needs were not physical, such as fears about the cancer returning or spreading. Moreover, the study in Denmark[36] indicated that women with pre-diagnosis period required an overview of the treatment process supplemented with information, involvement, and help to prepare themselves for treatment. Also, relatives need to be involved.

Effective pain management is the second greatest need among patients with advanced stages of cancer and the greatest need among caregivers. Most of the evidence indicated that pain was a common and devastating symptom of cancer-affected patients [37–39]. The 71 percent of patients in Indonesia and 67 percent of patients in Netherlands suffered from pain and pain-related difficulties with everyday activities[40].

Providing psychosocial support is the last need. Our finding appeared to be consistent with Yi et al.[41] that health professional was the most important needs category; information was next; and psychosocial needs were the most unmet needs. The psychosocial supports had the highest mean score in the unmet needs category. The strongest influencing factor was “no one to talk with.” Another aspect which emerged from the analysis of qualitative data is touching. The findings provide some relevant implications for nursing
practice, education and research. Nurses’ roles in community health nursing should be to know the needs of their patient while caring at home setting. With this knowledge, nurses should be able to anticipate patients’ needs, and enhance their experiences by providing appropriate interventions.

Regarding the strengths of our study, this is the first to provide an in-depth description of the needs of palliative care at home setting. The inclusion and exclusion criteria for participants contributed to population representatives, and the results may therefore be transferred to other similar contexts.

This study may provide only limited insight into the influence of patient’s experience on their palliative care services from one hospital. Since the data were collected in the end stages of patients, the interview was always terminated when patients had pain and others symptoms distress. Only some data related to research objectives were presented. We, therefore, acknowledge that future studies should attempt to know what is a need and barrier of palliative care among cancer patients and their families.

Conclusion
The current evidence suggests patients with advanced stages of cancer required home as the best place for their end of life. Therefore, home-based care supports patients to relieve suffering from symptom distress, and also helps them in improving QOL in their environment with their loved ones.

References
1. Torre LA, Bray F, Siegel RL, Ferlay J, Lortet-Tieulent J, Jemal A. Global cancer statistics, 2012. CA Cancer J Clin. 2015 Mar; 65(2): 87-108. doi: 10.3322/caac.21262
2. Siegel RL, Miller KD, Jemal A. Cancer statistics, 2017. CA Cancer J Clin. 2017 Jan; 67(1): 7-30. doi: 10.3322/caac.21387
3. Department of Health Improving outcomes: a strategy for cancer. [updated 2011 Jan; cited 2017 May 2]. Available from: www.gov.uk/government/uploads/system/uploads/attachment.data/file/388160/fourth_annual_report.pdf
4. Ministry of Public Health Thailand. Statistical Thailand 2015. [updated 2015; cited 2017 May 2]. Available from: www.bps.moph.go.th/new_bps/sites/default/files/health_statistic2558.pdf
5. Worldwide Palliative Care Alliance. Global atlas of palliative care at the end of life. [updated 2014 Jan; cited 2017 May 2]. Available from: www.who.int/nmh/Global_Atlas_of_Palliative_Care.pdf
6. Stark L, Tofthagen C, Visovsky C, McMillan SC. The symptom experience of patients with cancer. J Hosp Palliat Nurs. 2012 Jan-Feb; 14(1): 61-70. doi: 10.1097/NJH.0b013e318236de5c
7. Deshields TL, Potter P, Olsen S, Liu J. The persistence of symptom burden: symptom experience and quality of life of cancer patients across one year. Support Care Cancer. 2014 Apr; 22(4): 1089-96. doi: 10.1007/s00520-013-2049-3
8. Rehse B, Pukrop R. Effects of psychosocial interventions on quality of life in adult cancer patients: meta analysis of 37 published controlled outcome studies. Patient Educ Couns. 2003 Jun; 50(2): 179-86.
9. World Health Organization [WHO]. National cancer control programmes: policies and managerial guidelines. 2nd ed. Geneva: WHO; 2002.
10. National Institute for Clinical Excellence [NICE]. Guidance on cancer services: improving supportive and palliative care for adults with cancer. [updated 2004 Mar; cited 2017 May 2]. Available from: www.nice.org.uk/guidance/csgsp/evidence/supportive-and-palliative-care-the-manual-s
11. Morse JM. Toward a praxis theory of suffering. ANS Adv Nurs Sci. 2001 Sep; 24(1): 47-59.
12. Dasch B, Blum K, Gude P, Bausewein C. Place of death: trends over the course of a decade: a population-based study of death certificates from the years 2001 and 2011. Dtsch Arztebl Int. 2015 Jul; 112(29-30): 496-504. doi: 10.3238/arztebl.2015.0496

13. Gu X, Cheng W, Cheng M, Liu M, Zhang Z. The preference of place of death and its predictors among terminally ill patients with cancer and their caregivers in China. Am J Hosp Palliat Care. 2015 Dec; 32(8): 835-40. doi: 10.1177/1049909114542647

14. Shih CY, Hu WY, Cheng SY, Yao CA, Chen CY, Lin YC, et al. Patient preferences versus family physicians’ perceptions regarding the place of end-of-life care and death: a nationwide study in Taiwan. J Palliat Med. 2015 Jul; 18(7): 625-30. doi: 10.1089/jpm.2014.0386

15. Gomes B, Calanzani N, Curiale V, McCrone P, Higginson IJ. Effectiveness and cost-effectiveness of home palliative care services for adults with advanced illness and their caregivers. Cochrane Database Syst Rev. 2013 Jun; 6: CD007760. doi: 10.1002/14651858.CD007760.pub2

16. Nilmanat K. Palliative care in Thailand: development and challenges. CJNR. 2016; 26(3): 262-64.

17. Pokpalagon P, Hanucharurnkul S, McCorkle R, Tongprateep T, Patoonwan A, Viwatwongkasem C. Comparison of care strategies and quality of life of advanced cancer patients from four different palliative care setting. Pacific Rim Int J Nurs Res. 2012; 16(4): 326-42.

18. Krongyuth P, Campbell CL, Silpasuwon P. Palliative care in Thailand. Int J Palliat Nurs. 2015 Jul; 20(12): 600-7. doi: 10.12968/jjn.2014.20.12.600

19. Wright M, Hamzah E, Phungrassami T, Bausa-Claudio A. Hospice and palliative care in South-East Asia: a review of development and challenges in Malaysia, Thailand and the Philippines. New York, NY: Oxford University Press; 2010.

20. Nilmanat K, Phungrassami T. Status of end of life care in Thailand. Proceeding of the UICC World Cancer Congress 2006 Bridging the Gap: Transforming Knowledge into Action; 2006 Jul 8-12; Washington DC. Available from: http://2006.confex.com/uicc/uicc/techprogram/P10631.htm

21. Brumley R, Enguidanos S, Jamison P, Seitz R, Morgenstern N, Saito S, et al. Increased satisfaction with care and lower costs: results of a randomized trial of in-home palliative care. J Am Geriatr Soc. 2007 Jul; 55(7): 993-1000. doi: 10.1111/j.1532-5415.2007.01234.x

22. Kim SH, Chung BY, Xu Y. Evaluation of a home-based hospice and palliative care program in a community health center in Korea. Asiam Nurs Res (Korean Soc Nurs Sci). 2009 Mar; 3(1): 24-30. doi: 10.1016/s1976-1317(09)60013-x

23. Gomes B, Higginson IJ. Evidence on home palliative care: charting past, present, and future at the Cicely Saunders Institute – WHO collaborating centre for palliative Care, Policy and Rehabilitation. Prog Palliat Care. 2013; 21(4): 204-13. doi: 10.1179/1743291X13Y.0000000065

24. Ferrell B, Paice J, Koczywas M. New standards and implications for improving the quality of supportive oncology practice. J Clin Oncol. 2008 Aug; 26(23): 3824-31. doi: 10.1200/jco.2007.15.7552

25. Kongsuwan W, Locsin RC. Promoting peaceful death in the intensive care unit in Thailand. Int Nurs Rev. 2009 Mar; 56(1): 116-22. doi: 10.1111/j.1466-7657.2008.00674.x

26. Kongsuwan W, Chaipetch O, Matchim Y. Thai Buddhist families’ perspective of a peaceful death in ICUs. Nurs Crit Care. 2012 May-Jun; 17(3): 151-9. doi: 10.1111/j.1478-5153.2012.00495.x

27. Thepsuriyanon S, Mayuret W. Development of a palliative care system for patient with end-stage cancer in Sunprasitthiprasong Hospital. J Nurses Care. 2013; 31(1): 24-33.

28. Pokpalagon P. Palliative model in Thailand. Nursing Journal of the Ministry of Public Health. 2016; 26(3): 41-52.

29. Creswell JW. Research design: qualitative, quantitative and mixed methods approaches. 3rd ed. Nebraska: SAGE; 2009.

30. Streubert HS, Speziale HJ, Carpenter DR. Qualitative researching: in advancing the humanistic imperative. 3rd ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2003.

31. Stemler S. An overview of content analysis. Practical Assessment, Research & Evaluation. 2001; 7(17): 137-46
32. Miles MB, Huberman MA, Saldana J. Qualitative data analysis: a method sourcebook. Thousand Oaks, CA: SAGE Publications Inc.; 2014.

33. Morrison V, Henderson BJ, Zinovieff F, Davies G, Cartmell R, Hall A, et al. Common, important, and unmet needs of cancer outpatients. Eur J Oncol Nurs. 2012 Apr; 16(2): 115-23. doi: 10.1016/j.ejon.2011.04.004

34. Ventura AD, Burney S, Brooker J, Fletcher J, Ricciardelli L. Home-based palliative care: a systematic literature review of the self-reported unmet needs of patients and carers. Palliat Med. 2014 May; 28(5): 391-402. doi: 10.1177/02692163135111141

35. Steele R, Fitch MI. Supportive care needs of women with gynecologic cancer. Cancer Nurs. 2008 Jul-Aug; 31(4): 284-91. doi: 10.1097/01.Ncc.0000305743.64452.30

36. Holt KA, Hansen HP, Mogensen O. Supportive care needs for women with gynecological cancer and their relatives during the prediagnostic period. Cancer Nurs. 2014 Nov-Dec; 37(6): 457-67. doi: 10.1097/ncc.0000000000000117

37. Wentlandt K, Seccareccia D, Kevork N, Workentin K, Blacker S, Grossman D, et al. Quality of care and satisfaction with care on palliative care units. J Pain Symptom Manage. 2016 Feb; 51(2): 184-92. doi: 10.1016/j.jpainsymman.2015.10.006

38. Makmai S, Sirichayanugul C, Srichayanugul T. Common symptoms and needs of pre-discharge advanced-stage cancer patients: a case-study at phrae hospital, Thailand. Thai Cancer Journal. 2014; 33(4): 132-45.

39. Nilmanat K, Chailungka P, Temsak P, Promnowi C, Tulathamkit K, Noorurai P, et al. Living with suffering as voiced by Thai patients with terminal advanced cancer. Int J Palliat Nurs. 2010 Aug 16(8): 393-9. doi: 10.12968/ipjn.2010.16.8.393

40. Effendy C, Vissers K, Osse BH, Tejawinata S, Vernooij-Dassen M, Engels Y. Comparison of problems and unmet needs of patients with advanced cancer in a European country and an Asian country. Pain Pract. 2015 Jun; 15(5): 433-40. doi: 10.1111/papr.12196

41. Yi M, Park K, Park EY. Psychosocial needs of low-income people with cancer in Korea. Eur J Oncol Nurs. 2014 Dec; 18(6): 549-56. doi: 10.1016/j.ejwn.2014.07.005

**Corresponding author**
Panita Krongyuth can be contacted at: cherpk@gmail.com

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Effectiveness of the intervention program for dengue hemorrhagic fever prevention among rural communities in Thailand

A quasi-experimental study

Suda Hanklang
Faculty of Nursing, Vongchavalitkul University, Nakhon Ratchasima, Thailand

Paul Ratanasiripong
California State University, Long Beach, California, USA, and

Suleegorn Sivasan
Faculty of Nursing, Vongchavalitkul University, Nakhon Ratchasima, Thailand

Abstract

Purpose – The purpose of this paper is to evaluate the effectiveness of the intervention program for dengue fever prevention among people in rural communities.

Design/methodology/approach – A quasi-experimental study was designed for two groups. The intervention group received five weeks of dengue hemorrhagic fever prevention program consisted of knowledge broadcast, campaign, model house contest and group education. The control group received only the usual care of health promoting hospitals. The primary expected outcomes were changes in knowledge, perceived susceptibility, perceived severity, perceived benefit, perceived barriers and preventive action from baseline data, post-intervention and three-month follow-up, along with a comparison between the two groups. The secondary expected outcomes were changes in house index (HI) from baseline to post-intervention and three-month follow-up, along with a comparison between the two groups.

Findings – From the total of 64 participants, 32 were randomly assigned to the control group and 32 were randomly assigned to the intervention group. There were significant differences in knowledge, perceived susceptibility, perceived severity, perceived benefit, perceived barriers, preventive action and HI in the intervention group after received the five-week intervention program and at three-month follow-up (p < 0.05).

Originality/value – Dengue hemorrhagic fever prevention program based on the Health Belief Model was effective in lowering HI and improving knowledge, perceived susceptibility, perceived severity, perceived benefit, perceived barriers and preventive action among people in rural communities. The intervention program may be beneficial in primary care in such a rural community.

Keywords Thailand, Prevention, Health belief model, Dengue hemorrhagic fever, Quasi-experimental study

Paper type Research paper
Introduction

Dengue is a mosquito-borne disease found mainly in countries with tropical and subtropical climates. The global prevalence of dengue has grown dramatically in recent decades. Currently, about half of the world’s population is at risk of infection[1]. Globally, one recent estimate indicates 390m dengue infections per year (95 percent credible interval of 284–528m), of which 96m (67–136m) manifest clinical symptoms[2]. An estimated 500,000 people with severe dengue require hospitalization each year and about 2.5 percent of those infected dies[1].

Dengue fever is a disease caused by the dengue virus. The main cause of dengue virus infection in human is through bites from infected female mosquitoes (*Aedes aegypti*)[3]. Dengue virus is a carrier disease found in all age groups[3]. The symptoms of dengue fever include high fever, chills, fatigue, rash, nausea, vomiting, headache, sore throat and pain (muscle, back, joint and abdomen areas)[4]. In severe cases, it can be life threatening due to serious bleeding and shock[4]. The most effective intervention is to prevent mosquito bites[5].

Thailand is still suffering from dengue fever nationwide and during all seasons. In 2017, Thailand has reported 52,049 dengue cases from all 77 provinces, including 62 deaths[6]. The Ministry of Public Health has adopted a policy to control dengue hemorrhagic fever in the National Health Development Plan No. 11 (2012–2016) which targeted the reduction of dengue hemorrhagic fever rate to not more than 25 percent of the median in the past five years and the reduction of morbidity rate to not more than 0.02 percent[7].

The Northeastern region of Thailand has the largest land area. Nakhon Ratchasima province has the highest population in the Northeast region and the second highest population in the country. The incidence of dengue hemorrhagic fever in Nakhon Ratchasima in the past five years (2013–2017) were 269.29, 33.58, 274.53, 62.45, 65.38 per 100,000 population, respectively. In 2017, the prevalence of dengue hemorrhagic fever in Nakhon Ratchasima were 1,716 cases with the morbidity rate of 65.38 per 100,000 population and two cases of death by dengue hemorrhagic fever, giving the mortality rate of 0.08 per 100,000 population[6]. The model forecasting of dengue hemorrhagic fever in 2017 showed that Nakhon Ratchasima was the high-risk area to monitor the disease[8].

It is believed that the outbreak of dengue hemorrhagic fever is mainly from mosquitoes and by the general nature of mosquitoes, like laying eggs in containers of water inside and outside the house. This is due to the behaviors of local rural people. Some behaviors that may not be appropriate include disorganized house, inadequate lighting management, hanging dirty clothes in the house, not covering water storage container and leaving wet waste with water. As a result, mosquito breeding becomes widespread[9].

Dengue morbidity can be reduced by applying effective communication that can achieve behavioral outcomes that augment prevention programs[10]. At present, the main method to control or prevent the transmission of dengue virus is to combat vector mosquitoes through preventing mosquitoes from accessing egg-laying habitats by environmental management and modification, active monitoring and surveillance of vectors to determine the effectiveness of control interventions[5, 10].

The Health belief model (HBM), developed from the theory of social psychology, describes the behavior of individuals[11]. The HBM believes that people who change their behavior must perceive their susceptibility, perceived severity, perceived benefits of modifying health behaviors and perceived fewer barriers of preventive behaviors, cues to action, modifying factors and health motivation[11, 12]. Therefore, from HBM constructs, the researcher expected to apply the theory of HBM to use in the prevention of dengue disease because theory says individuals will seek ways to follow the recommendations for prevention and rehabilitation as long as the disease prevention practice is more positive.
than the difficulty[11]. By following these theory instructions, a person must feel fear for the disease or feel threatened. In addition, a person must feel to have an ability for disease prevention[13]. Previous studies in Thailand have adopted the HBM to modify dengue prevention behaviors and received good results[14, 15]. Therefore, this research is based on the HBM as a theoretical framework for the prevention measures and for designing intervention activities.

It is necessary to encourage people in the community to receive knowledge about the disease, promote risk perception and benefits of disease prevention so that people can find solutions to reduce the barriers to disease prevention then take action to prevent dengue fever. The dengue hemorrhagic disease prevention in the community must be supported by the community and apply the campaign for community awareness of the dengue problem. Previous studies have focused mainly on source reduction of water containers in a household and vector control[16–18]. These studies earlier did not investigate the combination of vector control activities, and the behavior changing based on the HBM for dengue fever prevention. For this study, the researchers are interested in examining the effects of the dengue hemorrhagic fever prevention intervention program in rural communities. The data from this study will lead to health promotion planning for dengue hemorrhagic prevention in rural communities. The focus is on promoting knowledge in disease prevention, raising awareness of risk and severity of disease, encouraging the benefits of disease prevention and reducing barriers to disease prevention. The main objective of the community intervention program is for eradicating dengue hemorrhagic fever which is a major public health problem in Thailand.

**Research objective**

The purpose of this study is to examine the effectiveness of the intervention program for dengue hemorrhagic fever prevention among rural communities in Thailand based on the theory of HBM (Figure 1).

**Study design**

This is a quasi-experimental study that examined the effect of dengue hemorrhagic fever prevention intervention in rural communities. Participants were randomly divided into two

| Independent variable |
|----------------------|
| Dengue Hemorrhagic Disease Prevention Intervention which comprised 4 main activities based on theory of HBM: |
| (1) Providing the knowledge of dengue hemorrhagic fever through the community |
| (2) Dengue campaign for distribution dengue knowledge |
| (3) Contest for safety dengue house |
| (4) Group education |

| Dependent variables |
|---------------------|
| (1) Knowledge of dengue hemorrhagic fever |
| (2) Dengue hemorrhagic fever awareness in terms of: |
| (2.1) Perceived susceptibility |
| (2.2) Perceived severity |
| (2.3) Perceived benefits of protection |
| (2.4) Perceived barriers to protection |
| (3) Practice to prevent dengue hemorrhagic fever |
| (4) House index (HI) is the percentage of houses infested with larvae and/or pupae |

Figure 1.
Theoretical framework of the study

354 JHR
32,5
groups as explained below. The experimental group received a five-week intervention program while the control group continued life as usual. Variables were measured before the intervention, after the five-week intervention, and at three-month follow-up.

Sample size
The sample size was calculated by the following formula[19]:

\[
n = \frac{2(Z_{a/2} + Z_{\square})^2 \times \sigma^2}{\Delta^2} = \frac{2(1.96 + 0.84)^2 \times (3.41)^2}{(2.38)^2} = 32,
\]

\(n\) = sample size; \(Z_{a/2}\) = percentile value (100 – (α/2)) percent under the normal curve set at 0.05 = 1.96 (two-tailed); \(\square = 0.20; Z_{\times} = 0.84; \Delta = \pi_2 - \pi_1\), mean difference of preventive practice score for dengue fever prevention from previous studied[14] = 2.38, \(\sigma\) = standard deviation of mean difference of preventive practice score for dengue fever prevention from previously studied[14] = 3.41.

The sample size needed for this study was 32 for each group.

Participant inclusion criteria include: at least 20 years old; Thai nationality; both male and female; has lived in the community for more than six months; able to answer questions, no problem speaking, listening and communicating; no training on educational program for dengue hemorrhagic fever prevention in the previous six months; willing to participate in this study; and able to sign the informed consent form.

The criteria for excluding participants from this step are: participants who have difficulties communicating in Thai; and participants who are not available at the time of data collection (Figure 2).

Participants
Two districts were randomly selected from Nakhon Ratchasima province. Then, two sub-districts from two districts were randomly chosen. Further, two villages were randomly selected from the two sub-districts to be part of the study. To prevent the contamination of data, the entire village was randomly assigned as either experimental group or control group. Individual household from each village is randomly selected to be included in the study. They were excluded if they had lived in the community less than six months, had symptoms or illnesses that limit activity, or had participated in any education program for dengue prevention during the prior six months.

Data collection
Participants were randomly divided into two groups (intervention group, \(n = 33\); control group, \(n = 33\)). The intervention group was assigned to a five-week program. The control group received the usual health education from public health personnel. Evaluations by questionnaire were measured three times for both groups. The questionnaire consisted of 52 questions that took approximately 45 min for respondents to complete. Written consent forms were obtained from participants prior to data collection. This study was approved by the Committee of Human Ethical Research, Maharat Hospital, Nakhon Ratchasima.

Research instrument
Part 1: demographic information included seven items on gender, age, marital status, highest education, occupation, income and information obtained from the community.
Part 2: knowledge about dengue hemorrhagic fever included 20 items that assessed participant’s knowledge of the causes of dengue fever, signs and symptoms, treatment and prevention. The score of 1 point was given for each correct answer and 0 point for each wrong answer.

Part 3: perception of dengue hemorrhagic fever prevention included 20 items which derived from four main constructs of HBM: perceived susceptibility, perceived severity, perceived benefits, and perceived barriers to prevention. Perception measurement utilized a three-point Likert scale that included disagree (1), neither agree nor disagree (2) and agree (3).

Part 4: dengue fever prevention practices were measured using five items derived from principle for dengue hemorrhagic fever prevention practices from the Department of Disease Control, Ministry of Public Health, Thailand[20].

**Intervention**
Participants in the control group did not receive any interventions. Participants in the experimental group were enrolled in the intervention program based on the HBM theory. The HBM has four constructs representing the perceived threat and net benefits: perceived susceptibility, perceived severity, perceived benefits and perceived barriers[12]. The specific intervention program included four main activities based on HBM theory.
Activity 1: providing knowledge of dengue hemorrhagic fever
Implementation timeframe: Weeks 1–5.

The objective of this activity was to provide the knowledge of dengue hemorrhagic fever through the daily community broadcast. The messages were based on HBM constructs as described below:

1. Raise the perceived susceptibility: “dengue is a problem in community for all age group.”
2. Raise the perceived severity: “it is a little one but it is the one that can kill you.”
3. Raise the perceived benefits: “take care of the house environment, then the safe environment will protect your family from dengue hemorrhagic fever.”
4. Reduce the perceived barriers: “just few minutes for easy clean-up can reduce many risks from dengue.”

Activity 2: dengue hemorrhagic fever campaign
Implementation timeframe: Week 2.

The emphasis is on individuals to receive information through campaign activities:

1. The individuals who took part in the campaign consisted of the head of the village, assistant head of the village, village health volunteer, adults in the village and students in the village. Mosquito mascot and cartoons were also part of the campaign parade.
2. Poster boards were used during campaign parade to raise awareness of dengue hemorrhagic fever such as principle for dengue hemorrhagic fever prevention practices from the Department of Disease Control and mosquito life cycle.
3. Campaign announcements about practices to eradicate larvae using temephos or abate sand and using mosquito repellent.
4. Distribution of leaflet and messages on dengue hemorrhagic fever, such as signs and symptoms of dengue hemorrhagic fever.
5. All participants in the parade campaign went to all the houses in the village to identify mosquito breeding sites. If an open water container was found, the participants removed all the water from it.

Activity 3: a contest for safety dengue house
Implementation timeframe: Weeks 3–4 and announcement of the winner during Week 5.

The objective of this activity was to find a model house that is safe from dengue and to encourage villagers to see the importance of environmental management and create good examples for their neighbors:

1. Defined the attributes of the house that is safe from dengue on the basis of the hygienic and clean house assessment from the Department of Disease Control, Thailand then selected major topics in the assessment. An award-winning house has to show the important features of all attributes.
2. Assigned the committee to evaluate the houses that participate in community contest. The committee consisted of seven representatives of the community,
including the village head (one), the assistant village heads (two) and village health volunteers (four).

(3) Public announcement to recruit people in the community to the contest and to inform the rules of the contest.

(4) Evaluation process.

(5) The announcement of the award for the winner and the second place during the group activity at the village hall.

(6) The winners received a large certificate to display at the front of their houses to be examples to neighbors and motivate them to be safe from dengue.

Activity 4: group education
Implementation timeframe: Week 5.
The objective of this activity was to provide knowledge about dengue hemorrhagic fever. Activity was set in the community hall with the following activities:

(1) knowledge exhibition about dengue, mosquito’s repellent and methods for eradicating mosquitos; and

(2) stage play and role play that reflected the susceptibility for risks, the dengue severity, the benefits of prevention, and reduction in barriers to prevent dengue hemorrhagic fever.

Validity and reliability of research instruments
The intervention program and research instrument were adapted from the literature review based on the HBM theory and were reviewed by experts in the field. Content validity: a panel of three experts evaluated the content validity of the intervention program and research instrument. For content validity testing, CVI was analyzed and found to be 0.89.
Reliability: the questionnaire was tested for reliability with 30 people with similar characteristics to the samples. For internal consistency reliability testing, Cronbach’s α coefficient was analyzed. All scales had good levels of internal consistency of more than 0.70.

Data analyses
Statistical Packet for the Social Sciences 23.0 was used for data analyses. Descriptive statistics were calculated to describe demographic characteristics and other backgrounds of the participants. To compare the data between the two groups, t-test and \( \chi^2 \) test were used. Two-way repeated measures ANOVA was used to analyze the difference in the total scores of six scales for dengue hemorrhagic fever prevention between the two groups across times of measure. The \( \chi^2 \) test was used for analyzing the difference in the number of house index (HI) between the two groups.

Results
A total of 64 of the initial 66 participants completed the study questionnaires at three timeframes. Thus, data analyses were performed using 64 subjects. At baseline, there were no significant differences in general characteristics between the intervention group and control group. However, there was a significant difference in gender (see Table I).
Table II showed HI decreased in both groups at the end of the intervention program and revealed a significant difference between groups for both the post-intervention and the follow-up.

Comparison of the groups before starting intervention revealed no significant difference in the scores of knowledge, perceived susceptibility, perceived severity, perceived benefits, perceived barriers and preventive action (see Table III).

The intervention group had increases in the scores of knowledge, perceived susceptibility, perceived severity, perceived benefits, perceived barriers and preventive action after intervention. Only preventive action showed the interaction between group and time ($F = 11.19$, $p$-value $< 0.001$) (Table IV).

**Discussion**
A quasi-experimental study was designed to assess the effectiveness of the intervention program based on HBM to prevent dengue hemorrhagic fever.
Results demonstrated that this intervention program significantly increased the knowledge, perceived susceptibility, perceived severity, perceived benefits, perceived barriers and preventive action. This finding supported the assumption that applying the HBM to the intervention in rural communities can promote the preventive actions and may be beneficial in the primary care of people with a high risk of dengue hemorrhagic fever.

The intervention program was created to meet the HBM theory because protective behavior is related to the knowledge, perceived susceptibility, perceived severity, perceived benefits and perceived barriers. Although education campaigns have increased people's awareness of dengue, it remains unclear to what extent this knowledge is put into practice, and to what extent this practice actually reduces mosquito populations. In this study, the intervention encouraged the practice of participants in many ways. The knowledge was provided via daily broadcast to the community, dengue campaign and group education at the village hall. Cues-to-action was implemented via the contest for a model house for safety from dengue, which was in line with an earlier research suggestion that there is a greater likelihood of positive outcomes for preventive actions when the participants are supported and encouraged by the good model in the community.

After the intervention program, the total scores on the six scales for dengue hemorrhagic fever prevention were significantly higher in the intervention group than those in the control group. These results support the effectiveness of the intervention program directly. However, in the follow-up phase, some scores were decreased; this may be because the community engagement tends to be insufficient. Thus, the approach toward enhancing community involvement is important.

The results of this study showed that the HI for the intervention group decreased for both post-intervention and follow-up. The effectiveness of the program on preventive action is consistent with the earlier studied that showed the direct link between knowledge of dengue preventive measures and container protection practice. In order to decrease the breeding site of mosquitoes, it is necessary for people in the community to change the behaviors for the dengue hemorrhagic fever prevention.

Conclusions
Dengue hemorrhagic fever is pervasive among rural communities. In the present study, we conducted a quasi-experimental study to investigate the effectiveness of the intervention program. The effects were measured by the knowledge, perceived susceptibility, perceived severity, perceived benefits, perceived barriers and preventive action. After participation in the intervention program, the five scales showed a significant increase; therefore, the intervention program may be beneficial in primary care in such a rural community.

| Variables            | Intervention group X (SD) | Control group X (SD) | t    | p-value |
|----------------------|---------------------------|----------------------|------|---------|
| Knowledge            | 15.28 (2.22)              | 14.91 (1.91)         | 0.725| 0.471   |
| Perceived susceptibility| 13.28 (1.17)              | 13.16 (1.14)         | 0.433| 0.667   |
| Perceived severity   | 13.16 (1.25)              | 13.00 (0.95)         | 0.564| 0.575   |
| Perceived benefits   | 13.47 (1.08)              | 13.37 (1.13)         | 0.340| 0.735   |
| Perceived barriers   | 14.09 (0.93)              | 13.97 (0.93)         | 0.337| 0.735   |
| Preventive action    | 4.41 (0.76)               | 4.25 (0.84)          | 0.781| 0.438   |

Note: n = 64

Table III. Comparison of study variables between groups at baseline
| Variables                  | Group          | Baseline $\bar{X}$ (SD) | Post-test $\bar{X}$ (SD) | Follow-up $\bar{X}$ (SD) | Group $F$ (p-value) | Group × Time $F$ (p-value) |
|---------------------------|----------------|-------------------------|--------------------------|--------------------------|---------------------|--------------------------|
| Knowledge                 | Intervention   | 15.28 (2.22)            | 16.84 (1.63)             | 17.22 (0.91)             | 12.35 (0.001)       | 11.82 ( < 0.001)         |
|                           | Control        | 14.91 (1.91)            | 15.71 (2.14)             | 15.94 (1.85)             |                     | 0.80 (0.450)             |
| Perceived susceptibility  | Intervention   | 13.28 (1.17)            | 14.06 (1.08)             | 13.44 (1.08)             | 3.20 (0.075)        | 4.62* (0.011)            |
|                           | Control        | 13.16 (1.14)            | 13.50 (1.08)             | 13.28 (0.99)             |                     | 0.49 (0.616)             |
| Perceived severity        | Intervention   | 13.16 (1.25)            | 13.84 (1.22)             | 13.53 (0.95)             | 5.80 (0.017)        | 4.10* (0.018)            |
|                           | Control        | 13.00 (0.95)            | 13.34 (0.87)             | 13.13 (0.79)             |                     | 0.49 (0.616)             |
| Perceived benefits        | Intervention   | 13.47 (1.08)            | 14.00 (1.11)             | 13.75 (0.84)             | 3.73 (0.055)        | 1.72 (0.181)             |
|                           | Control        | 13.37 (1.13)            | 13.50 (0.88)             | 13.50 (0.98)             |                     | 0.66 (0.518)             |
| Perceived barriers        | Intervention   | 14.09 (0.93)            | 14.41 (0.84)             | 14.31 (0.69)             | 4.14 (0.043)        | 1.22 (0.299)             |
|                           | Control        | 13.97 (0.93)            | 14.13 (0.83)             | 13.97 (0.86)             |                     | 0.28 (0.736)             |
| Preventive action         | Intervention   | 4.41 (0.76)             | 4.94 (0.25)              | 5.00 (0.00)              | 65.86 ( < 0.001)    | 0.26 (0.775)             |
|                           | Control        | 4.25 (0.84)             | 3.66 (1.15)              | 3.78 (0.87)              |                     | 11.19 ( < 0.001)         |

Notes: $n = 64$. *Statistical significant difference between baseline and post-test measures
References

1. World Health Organization [WHO]. Dengue and severe dengue; (2017). [updated: 2017 Apr; cited 2018 Mar 24]. Available from: www.who.int/mediacentre/factsheets/fs117/en/

2. Bhatt S, Gething PW, Brady OJ, Messina JP, Farlow AW, Moyes CL, Drake JM, Brownstein JS, Hoen AG, Sankoh O, Myers MF, George DB, Jaenisch T, William Wint GR, Simmons CP, Scott TW, Farrar JJ, Hay SI. The global distribution and burden of dengue. Nature. 2013 Apr 25; 496 (7446): 504-7. doi: 10.1038/nature12060

3. Guerdan BR. Dengue fever/dengue hemorrhagic fever. Am. J. Med. 2010 Spring; 7(2): 51-3.

4. Singhi S, Kissoon N, Bansal A. Dengue and dengue hemorrhagic fever: management issues in an intensive care unit. J. de Pediatr. 2007; 83(2):22-35.

5. Ballenger-Browning KK & Elder JP. Multi-model Aedes aegypti mosquito reduction interventions and dengue fever prevention. Trop Med Int Health. 2009; 14(12): 1542-1551.

6. Department of Disease Control, Ministry of Public Health, Thailand. Dengue hemorrhagic fever report 2017; (2017). [updated: 2018 Jan 4; cited 2018 Mar 24]. Available from: www.thaivbd.org/n/histories/view/2804

7. Ministry of Public Health, Thailand. Guideline for surveillance prevention and control of dengue fever; 2017. [updated: 2016 Jun 23; cited 2018 Mar 24]. Available from: www.thaivbd.org/n/uploads/file/PDF/คู่มือปฏิบัติงาน/Dengue/Dengue%20รักษา%20ไข้%20แบบ%20รักษา%20แบบการรักษา.pdf

8. Department of Disease Control, Ministry of Public Health, Thailand. The model forecasting of dengue hemorrhagic fever in 2017; 2017. [updated: 2017; cited 2018 Mar 24]. Available from: www.thaivbd.org/n/uploads/file/PDF/Dengue/2560/dengue_forecast_60.pdf

9. Samuel PP, Thenmooshi V, Nagaraj J, Dilip Kumar T, Tyagi BK. Dengue vectors prevalence and the related risk factors involved in the transmission of dengue in Thiruvananthapuram district, Kerala, South India. J Vector Borne Dis. 2014; 51(1): 313-9.

10. World Health Organization [WHO]. Global strategy for dengue prevention and control. World Health Organization, WHO Press, Geneva; 2012.

11. Strecher VJ, Rosentock IM. The health belief model. In: Glanz K, Lewis FM, Rimer BK editors. Health behavior and health education: theory, research and practice. 2nd ed. San Francisco, CA: Jossey-Bass, 1997: 41-59.

12. Rosenstock I. Historical origins of the health belief model. Health Educ Monogr. 1974; 2(4): 328-335.

13. Lennon JL. The use of the Health Belief model in dengue health education. Dengue Bulletin. 2005; 29: 217-19.

14. Auttapoom K, Ratanasuwan W, Sujirarat D, Tipayamongkolgul M. The effectiveness of the health belief model and the participation of the community in controlling mosquito larvae in Khummuang District, Kalasin Province. Proceeding of 12th Naesuan Research Conference on Jul 21–22, 2016, Naesuan University, Phitsanulok Province.

15. Saengkhae H. The effect of health education program for prevention and control of dengue hemorrhagic fever in family core leaders, Muangphai Subdistrict, Aranyaprathet District, Srakaew Province. PRRJ. 2015; 10(1): 65-81.

16. Phuanukoonnon S, Mueller I, Bryan JH. Effectiveness of dengue control practices in household water containers in Northeast Thailand. TM & IH. 2005; 10(8): 755-63.

17. Chaiokoolvatana A, Chanruang S, Pothalek P. A comparison of dengue hemorrhagic fever control interventions in northeastern Thailand. Southeast Asian J Trop Med Public Health. 2008; 39(4): 617-24.

18. Ballenger-Browning KK, Elder JP. Multi-model Aedes aegypti mosquito reduction interventions and dengue fever prevention. TM & IH. 2009; 14(12): 1542-51.

19. Polit DF, Hungler BP. Nursing Research: Principles and methods. 3rd ed. Philadelphia, OA: Lippincott, 1987.
20. Department of Disease Control, Ministry of Public Health, Thailand. Manual for guiding cognizant of diseases and health hazards for the public people. The Bureau of Risk Communication and Behavioral Health Development. 1st ed. The Agricultural Federative Co-operation of Thailand Limited, Bangkok, 2013: 20-23.

21. Koenraadt CJM, Tuiten W, Sithiprasasna R, Kijchalao U, Jones JW, Scott TW. Dengue knowledge and practices and their impact on Aedes aegypti populations in Kamphaeng Phet, Thailand. Am. J. Trop. Med. Hyg. 2006; 74(4): 692-700.

Corresponding author
Suda Hanklang can be contacted at: en101_987654@hotmail.com
Biological properties in relation to health promotion effects of *Garcinia mangostana* (queen of fruit)

A short report

Naymul Karim and Jitbanjong Tangpong

School of Allied Health Sciences, Walailak University, Nakhon Si Thammarat, Thailand

Abstract

**Purpose** – For the prevention and cure of disease, patient use various types of chemical and drug agents. Along with their curative effect, almost all drugs have some destructive effects and side-effects. Due to the minimal and/or none of unwanted side-effect, recently, the use of herbal remedy as the drug of choice becomes the preference choice. The mangosteen, *Garcinia mangostana*, contains various types of polyphenols. It has been used as a traditional medicine from the ancient times till present days. The purpose of this paper is to investigate the biological properties of mangosteen in relation to health promotion effects.

**Design/methodology/approach** – Several research papers from well-known database (such as PubMed, Google scholar, Scopus and Sciencedirect) were reviewed without considering publication-times to understand the biological properties of mangosteen.

**Findings** – Mangosteen and its xanthone exerted diverse biological activities such as anti-oxidant, anti-inflammatory, anti-allergy, anti-bacteria, anti-fungal, anti-malaria, anticancer and anti-diabetes.

**Originality/value** – Based on these studies, mangosteen is beneficial dietary supplement of overall human health.

**Keywords** *Garcinia mangostana*, Xanthones, Biological properties

**Paper type** Short report

Introduction

The mangosteen, *Garcinia mangostana* (GM), which defines as "queen of fruits" [1], is native plant mainly found in the tropical rainforest areas of South-Asian countries, e.g., Myanmar, Thailand, Indonesia, Malaysia, Sri Lanka, etc. It belongs to the Guttiferae Family. GM has known and being used as traditional medicine to treat various types of diseases such as diarrhea, abdominal pain, dysentery, wound-infections and chronic ulcer [1]. According to various studies, GM extracts possess potent anti-oxidant [2], anti-tumoral [3], anti-allergic [4], anti-inflammatory [5] anti-bacterial [6] and anti-fungal activities [7]. Mangostana is famous for its tasty fruit named as mangosteen fruit. It is a dark purple/reddish color fruit with white soft and delicious consumable pulp. This pulp is little bit acidic and sweet in flavor with charming smell. Products containing mangosteen juice/extract are highly demandable in the beverage market; and in the USA, the sales of mangosteen products exceeded up to $200m in 2008. A variety of secondary metabolites have been isolated from GM; xanthone is one of them [8]. Mangosteen fruit contains 160 aromatic compounds (epicarp) and 105 compounds (endocarp) evaluated by gas chromatography–mass spectral analysis [9].

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Tang et al.[10], in their randomized, double-blind, placebo-controlled trial, reported that mangosteen intake for 30 days enhanced human immune responses compared to placebo controls. Udani et al.[11] found that intake of blended mangosteen juice by obese subjects for eight-weeks ameliorated the inflammation compared to placebo group. Another randomized, double-blind, placebo-controlled trial by Kudiganti et al.[12] revealed that consumption of meratrim (contained GM fruit rinds) for 16 weeks by healthy overweight subjects, significantly reduced the body weight, BMI, hip size and serum lipid profile compared to the placebo control. After ingestion of 60 mL mangosteen juice by healthy adult subjects with high-fat breakfast, xanthone were detected in serum approximately 762–4,030 nM/L/h and 0.9-11.1 μM in 24 hours urine indicate the well-absorption of xanthone when taken with high-fat-diet[13]. Chang et al.[14] unveiled that acute administration of 250 mL mangosteen juice one hour before cycle ergometer exercise, does not have impact on exercise-mediated physical fatigue. The acute toxicity study of ethyl-acetate fraction shows no toxicity to the experimental rat evaluated by physical changes and mortality[15]. Therefore, GM and its isolated xanthones are safe for people.

Xanthone from GM
Xanthone (known as xanthen-9H-ones), an active compound, is an important element of oxygenated heterocycles group. It is the secondary metabolites obtained from higher plant family, fungi and lichen. It has been classified into five major groups: simple oxygenated xanthone, xanthone glycosides, prenylated xanthone, xanthone-lignoids and miscellaneous xanthone[8]. Maruganadan et al.[16] revealed that around 1,000 different xanthones have been isolated from the natural source. During the year of 2000 to 2004, about 278 new xanthones have been obtained from 20 higher plant families[17]. Mangostin (known as α-mangostin) is the first xanthone and was first isolated in 1855. Currently, 54 xanthones were isolated from the GM’s pericarp, e.g., β-mangostin, γ-mangostin, mangostenol, 1-isomangostin, 1-isomangostin hydrate, etc.[8].

Side effect of GM
There are few scientific reports published about mangosteen side-effect. Daily consumption of mangosteen juice for a long time may produce type-B lactate acidosis in chronic kidney disease patient and metabolic syndrome. This may be due to the releasing of cytochrome-c, by the α-mangostin, cytosol from the mitochondria and directly impair the mitochondrial electron transport that leads to lactic acidosis[18]. Liu et al.[19] found that α- and γ-mangostin from GM can inhibit platelet aggregation and induce cytolysis, therefore it should be avoided before any surgery.

Biological properties of GM
Anti-oxidant properties
Many scientists reported that GM and its isolated xanthone exhibited potent anti-oxidant properties[20–23]. In the cisplatin-induced nephrotoxic rats, the α-mangostin from GM exerted renoprotective effect by reducing cisplatin-induced renal oxidative/nitrosative stress[2]. Tjahjani et al.[20] evaluated the anti-oxidant activity of the different fraction of mangosteen rind, and found that the ethyl-acetate fraction exerted higher anti-oxidant than other fractions. The GM's pericarp extract also inhibited the formation of pentosidine and reduced advanced glycation end-products accumulation in the skin, which suppressed the glycation stress and improve skin conditions[21]. Xie et al.[22] found that drinking 245 mL mangosteen contained beverage by healthy populations enhanced the plasma anti-oxidant capacity (maximum 60 percent after one hour). A clinical study reported that oral administration of polar fraction extract from mangosteen pericarp to human subjects for 24-weeks enhanced the anti-oxidant activity without producing potential side-effect[23].

Health promotion effects of Garcinia mangostana

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Anti-allergy and anti-inflammatory properties

Anti-allergy and anti-inflammatory properties of GM have been proved by various scientific evidence. The GM's pericarp inhibited the histamine- and serotonin-induced isolated thoracic rabbit aorta contractions, and blocked the histamine and serotonin receptor, respectively[4]. In RBL-2H3 cell line, 40 percent ethanol extract of mangosteen was found to inhibit the histamine release and prostaglandin E2 (PGE2) synthesis activities[24]. The 18 hours treatment of γ-mangostin suppressed the continuous PGE2 release and cyclooxygenase-2 (COX-2) gene expression in the C6 rat gloma cells in concentration-dependent manners[5]. The extracted isogarcinol from GM exhibited anti-inflammatory activity by suppressing the CD4 T-cells regulation in the murine model[25]. The combination of Garcinia with cocoa, coffee and green tea significantly reduced the lipid content from serum and liver in a dose-dependent manner. It also improved homeostasis model by assessing insulin resistance index and pro-inflammatory cytokines (TNF-α, IL-6)[26].

Anti-bacterial and anti-fungal properties

A number of studies described anti-bacterial and anti-fungal properties of xanthone extracts from GM[6–7, 27–30]. It was reported that the polysaccharides compound obtained from mangosteen fruit increased polymorphonuclear phagocytic cell activity against Salmonella enteritidis[27]. Prenylated xanthone from GM's pericarp has potential effect on tuberculosis, showed potent anti-bacterial activity by inhibiting Mycobacterium tuberculosis[28]. Sakagami et al[6] found that α-mangostin inhibited the vancomycin-resistant Enterococci (VRE) and MRSA (MIC value 6.25 and 12.5 µg/ml). Different xanthones (α, γ-mangostin, gartanin, garcinone D, BR-xanthone and euxanthone) isolated from mangosteen exhibited the anti-fungal activity against phytopathogenic fungi (e.g. Fusarium oxysporum vasinfectum, Alternaria tenuis, and Dreschlera oryzae, etc.) by showing potent inhibitory activity[7]. Moreover, ethanol and chloroform extract of mangosteen demonstrated anti-bacterial activity, evaluated by colony formation and zone of inhibition of the E. coli, streptococcus and lactobacillus bacteria[29, 30].

Anti-malarial properties

The α-mangostin from GM exhibited in-vitro anti-malarial activity (IC₅₀ values 17 ± 1 µM) against Plasmodium falciparum compared to chloroquine standard drug (IC₅₀ values 0.59 ± 0.02 µM), evaluated on P. falciparum-infected erythrocytes[31]. Laphookhieo and his team isolated four xanthone (5-O-methylcelebixanthone, celebixanthone, cochinchinone C and β-mangostin) from the root of Cratoxylum cochinchinicense, and found that β-mangostin exerted better in-vitro anti-malarial effect (IC₅₀ value 7.2) than other compound (IC₅₀ values 3.2, 4.9 and 2.6 mg/ml, respectively), when they were evaluated via [3 H]-hypoxanthine uptake by P. falciparum[32]. An in-vivo study exposed that α-mangostin (IC₅₀ = 0.2 ± 0.01 µM) showed more effective anti-malarial activity than γ-mangostin (IC₅₀ = 121.2 ± 1.0 µM) against chloroquine resistant strain of P. falciparum on the malarial murine model[33]. In addition, different fraction of mangosteen exerted synergistic anti-malarial activity with artemisinin drug against Plasmodium falciparum 3D7 clone[34].

Anti-tumoral properties

Several studies revealed the anticancer activities of xanthones derivative from GM[35–41]. In HL60 cell line, six xanthones (α, β, γ-mangostin, mangostinone, garcinone E and 2-isoprenyl-1,7-dihydroxy-3-methoxy xanthone) possessed the cytotoxic effect by inhibiting cell growth, while the α-mangostin exerted the highest inhibitory activity than others[3]. The α-mangostin also induced the mitochondrial dysfunction in the early phase through activating caspases-3/-9, ROS production, and cytochrome-c release[35]. Nakagawa et al[36]
unveiled that the α-mangostin exerted in-vitro cytotoxic effect against DLD-1 cell line. In HeLa cell line, encapsulation of GM with methyl-cellulose and ethyl-cellulose nanoparticles showed two-fold higher better anticancer activity than the encapsulation of GM with ethyl-cellulose[37]. The α-mangostin exhibited the most potent mammalian DNA polymerase inhibition, evaluated by the inhibition of human DNA topoisomerases I and II activities (IC50 values 15.0 and 7.5 μM). It also suppressed the HCT116 cell proliferation (LC50 value 18.5 μM)[38]. In prostate cancer, gartanin xanthone bind with androgen receptors (AR) and enhance AR degradation[39]. Manimekalai et al.[40] revealed that mangosteen showed anticancer activity on HepG2 cell line evaluated by the cell viability assay. A total of 14 isolated compounds from chloroform fraction of mangosteen exerted anticancer activity against different cancer cell line, e.g., HepG2, HCT116 and MCF7[41].

Anti-diabetic properties
Different fractions of the GM’s pericarp and isolated xanthone showed an anti-diabetic effect by inhibiting α-amylase and α-glucosidase enzyme activities[42, 43]. Ethanolic extract of GM showed the anti-diabetic effect against streptozotocin-induced diabetic rats by lowering high blood glucose, biochemical parameters, hepatic architectures and increased the HDL and total protein levels, compared to the control group[44]. While, in high-fat-diet- and streptozotocin-induced diabetic mice, mangosteen vinegar rind from GM, lowered the hyperglycemia, hyperlipidemia, oxidative stress marker, hepatic damage marker and improved the glycogen contents and anti-oxidant markers[45]. In similar model, isolated xanthone from GM demonstrated the nephroprotective effect by reducing the body weight, high glucose level, kidney hypertrophy, kidney damage marker and MDA level of plasma and kidney tissue[46].

Conclusion
Recently, the increasing awareness on the negative impacts of nutrition and diets, such as causing obesity, development of chronic diseases, cardiovascular disease, diabetes, cancer and other disease, was quite alarming as well as obvious especially in the western countries. A large number of bioactive compounds have already been identified in foods and drinks, contain high percentage of polyphenolic compounds (e.g. xanthone, lignans, phenolic acids, etc.).

The GM possesses potential biological properties without producing noticeable side-effect. It boosts up immune systems, reduced metabolic syndromes and its associated diseases, respectively. The GM’s xanthone was found to associate with health beneficial effects by lowering oxidative stress, reducing inflammation, managing and controlling obesity and diabetes, inhibiting the growth of cancer cells as well as showing anti-allergic, anti-bacterial, anti-fungal and anti-malarial properties.

However, most of investigations on GM mentioned in this report were conducted either in cell-free, cell-type or animal model and none of them was on humans. Therefore, the further studies of health effects on human subjects are crucial and needed.

References
1. Cui J, Hu W, Cai Z, Liu Y, Li S, Tao W, et al. New medicinal properties of mangostins: analgesic activity and pharmacological characterization of active ingredients from the fruit hull of Garcinia mangostana L. Pharmacol Biochem Behav. 2010 Apr; 95(2): 166-72. doi: 10.1016/j.pbb.2009.12.021
2. Perez-Rojas JM, Cruz C, Garcia-Lopez P, Sanchez-Gonzalez DJ, Martinez-Martinez CM, Ceballos G, et al. Renoprotection by alpha-Mangostin is related to the attenuation in renal oxidative/nitrosative stress induced by cisplatin nephrotoxicity. Free Radic Res. 2009; 43(11): 1122-32.
3. Matsumoto K, Akao Y, Kobayashi E, Ohguchi K, Ito T, Tanaka T, et al. Induction of apoptosis by xanthones from mangosteen in human leukemia cell lines. J Nat Prod. 2003 Aug; 66(8): 1124-7. doi: 10.1021/np020546u

4. Chairungsrierd N, Furrakawa K, Ohta T, Nozoe S, Ohizumi Y. Histaminergic and serotonergic receptor blocking substances from the medicinal plant *Garcinia mangostana*. Planta Med. 1996 Oct; 62(5): 471-2. doi: 10.1055/s-2006-957943

5. Nakatani K, Yamakuni T, Kondo N, Arakawa T, Oosawa K, Shimura S, et al. γ-Mangostin inhibits inhibitor-κB kinase activity and decreases lipopolysaccharide-induced cyclooxygenase-2 gene expression in C6 rat glioma cells. Mol Pharmocol. 2004 Sep; 66(3): 667-74. doi: 10.1124/mol.104.002626

6. Sakagami Y, Iinuma M, Piyasena KG, Dharmaratne HR. Antibacterial activity of α-mangostin against Vancomycin Resistant Enterococci (VRE) and synergism with antibiotics. PhytoMedicine. 2005 Mar; 12(3): 203-8.

7. Gopalakrishnan G, Banumathi B, Suresh G. Evaluation of the antifungal activity of natural xanthones from *Garcinia mangostana* and their synthetic derivatives. J Nat Prod. 1997 May; 60(5): 519-24. doi: 10.1021/np970165u

8. Gutierrez-Orozco F, Failla ML. Biological activities and bioavailability of mangosteen xanthones: a critical review of the current evidence. Nutrients. 2013 Aug; 5(8): 3163-83. doi: 10.3390/nut5083163

9. Manimekalai I, Sivakumari K, Ashok K, Rajesh S. Phytochemical profiling of mangosteen fruit, *Garcinia mangostana*. World J Pharm Pharm Sci. 2016; 5(2): 221-52.

10. Tang YP, Li PG, Kondo M, Ji HP, Kou Y, Ou B. Effect of a mangosteen dietary supplement on human immune function: a randomized, double-blind, placebo-controlled trial. J Med Food. 2009 Aug; 12(4): 755-63. doi: 10.1089/jmf.2008.0204

11. Udani JK, Singh BB, Barrett ML, Singh VJ. Evaluation of mangosteen juice blend on biomarkers of inflammation in obese subjects: a pilot, dose finding study. Nutr J. 2009 Oct; 8(1): 48. doi: 10.1186/1475-2891-8-48

12. Kudiganti V, Kodur RR, Kodur SR, Halemane M, Deep DK. Efficacy and tolerability of Meratrim for weight management: a randomized, double-blind, placebo-controlled study in healthy overweight human subjects. Lipids Health Dis. 2016 Aug; 15(1): 136. doi: 10.1186/s12944-016-0306-4

13. Chitchumroonchokchai C, Riedl KM, Soksumrarn S, Clinton SK, Kinghorn AD, Failla ML. Xanthones in mangosteen juice are absorbed and partially conjugated by healthy adults. J Nutr. 2012 Apr; 142(4): 675-80. doi: 10.3945/jn.111.156992

14. Chang CW, Huang TZ, Chang WH, Tseng YC, Wu YT, Hsu MC. Acute *Garcinia mangostana* (mangosteen) supplementation does not alleviate physical fatigue during exercise: a randomized, double-blind, placebo-controlled, crossover trial. J Int Soc Sports Nutr. 2016; 13(1): 20. doi: 10.1186/s12970-016-0132-0

15. Rahmayanti F, Suniarti DF, Masud ZA, Bachtiar BM, Wimardhani YS, Subita GP. Acute oral toxicity testing of ethyl acetate fraction from *Garcinia mangostana* Linn extract in sprague-dawley rats. Res J Med Plants. 2016; 10(3): 261-4. doi: 10.3923/rjmp.2016.261.264

16. Muruganandan S, Srinivasan K, Gupta S, Gupta PK, Lal J. Effect of mangiferin on hyperglycemia and atherogenicity in streptozotocin diabetic rats. J Ethnopharmacol. 2005 Mar; 97(3): 497-501. doi: 10.1016/j.jep.2004.12.010

17. Sousa ME, Pinto MM. Synthesis of xanthones: an overview. Curr Med Chem. 2005; 12(21): 2447-79.

18. Wong LP, Klemmer PJ. Severe lactic acidosis associated with juice of the mangosteen fruit *Garcinia mangostana*. Am J Kidney Dis. 2008 May; 51(5): 829-33. doi: 10.1053/j.ajkd.2007.12.043

19. Liu Y, Park JM, Chang KH, Chin YW, Lee MY. α- and γ-mangostin cause shape changes, inhibit aggregation and induce cytolysis of rat platelets. Chem Biol Interact. 2015 Oct; 240: 240-8. doi: 10.1016/j.chembiol.2015.08.021

20. Tjahjani S, Widowati W, Khiong K, Suhendra A, Tjokropranoto R. Antioxidant properties of *Garcinia mangostana* L (mangosteen) rind. Procedia Chem. 2014; 13: 198-203. doi: 10.1016/j.proche.2014.12.027
21. Ohno R, Moroishi N, Sugawa H, Maejima K, Saigusa M, Yamanaka M, et al. Mangosteen pericarp extract inhibits the formation of pentosidine and ameliorates skin elasticity. J Clin Biochem Nutr. 2015 Jul; 57(1): 27-32. doi: 10.3164/jcbn.15-13

22. Xie Z, Sintara M, Chang T, Ou B. Functional beverage of *Garcinia mangostana* (mangosteen) enhances plasma antioxidant capacity in healthy adults. Food Sci Nutr. 2015 Jan; 3(1): 32-8. doi: 10.1002/fsn3.187

23. Suthammarak W, Numpraphrut P, Charoensakdi R, Neungton N, Tunrungruangtavee V, Jaisupa N, *et al.* Antioxidant-enhancing property of the polar fraction of mangosteen pericarp extract and evaluation of its safety in humans. Oxid Med Cell Longev. 2016 Jul; 2016: 12511. doi: 10.1155/2016/1293036

24. Nakatani K, Atsumi M, Arakawa T, Oosawa K, Shimura S, Nakahata N, *et al.* Inhibitions of histamine release and prostaglandin E2 synthesis by mangosteen, a Thai medicinal plant. Biol Pharm Bull. 2002 Sep; 25(9): 1137-41.

25. Li W, Li H, Zhang M, Zhong Y, Wang M, Cen J, *et al.* Isogarcinol extracted from *Garcinia mangostana* L. ameliorates systemic lupus erythematosus-like disease in a murine model. J Agric Food Chem. 2015 Sep; 63(38): 8452-9. doi: 10.1021/acs.jafc.5b03425

26. Chang CW, Hsu YJ, Chen YM, Huang WC, Huang CC, Hsu MC. Effects of combined extract of cocoa, coffee, green tea and garcinia on lipid profiles, glycaemic markers and inflammatory responses in hamsters. BMC Complement Altern Med. 2015 Aug; 15(1): 269. doi: 10.1186/s12906-015-0806-1

27. Chanarat P, Chanarat N, Fujihara M, Nagumo T. Immunopharmacological activity of polysaccharide from the pericarb of mangosteen garcinia: phagocytic intracellular killing activities. J Med Assoc Thai. 1997 Sep; 80(S1): S149-54.

28. Saksamrarn S, Suwannapoch N, Phakhodee W, Thanuhiiranlert J, Ratanaumukul P, Chimnoi N, *et al.* Antimycobacterial activity of prenylated xanthones from the fruits of *Garcinia mangostana*. Chem Pharm Bull (Tokyo). 2003 Jul; 51(7): 857-9.

29. Soetikno JS, Handayani R, Rahayu RD. Assay for antimicrobial activity of mangosteen rind extracts. Journal of Innovations in Pharmaceuticals and Biological Sciences. 2016; 3(1): 54-60.

30. Janardhanan S, Mahendra J, Girija AS, Mahendra L, Priyadharsini V. Antimicrobial effects of *Garcinia mangostana* on cariogenic microorganisms. J Clin Diagn Res. 2017 Jan; 11(1): 19-22. doi: 10.7860/jcdr/2017/22143.9160

31. Mahabusarakam W, Kuaha K, Wilairat P, Taylor WC. Prenylated xanthones as potential antiplasmodial substances. Planta Med. 2006 Aug; 72(10): 912-6. doi: 10.1055/s-2006-947190

32. Laphookhieo S, Syers JK, Kiattansakul R, Chantrapromma K. Cytotoxic and antimalarial prenylated xanthones from Cnatoxylum cochinchinense. Chem Pharm Bull (Tokyo). 2006 May; 54(5): 745-7.

33. Upegui Y, Robledo SM, Gil Romero JF, Quinones W, Archbold R, Torres F, et al. In vivo antimalarial activity of α-mangostin and the new xanthone δ-mangostin. Phytother Res. 2015 Aug; 29(8): 1195-201. doi: 10.1002/ptr.5362

34. Tjahjani S. Antimalarial activity of *Garcinia mangostana* L rind and its synergistic effect with artemisinin in vitro. BMC Complement Altern Med. 2017 Feb; 17(1): 131. doi: 10.1186/s12906-017-1649-8

35. Matsumoto K, Akao Y, Yi H, Ohguchi K, Ito T, Tanaka T, et al. Preferential target is mitochondria in alpha-mangostin-induced apoptosis in human leukemia HL60 cells. Bioorg Med Chem. 2004 Nov; 12(22): 5799-806. doi: 10.1016/j.bmc.2004.08.034

36. Nakagawa Y, Inuma M, Naoe T, Nozawa Y, Akao Y. Characterized mechanism of α-mangostin-induced cell death: caspase-independent apoptosis with release of endonuclease-G from mitochondria and increased miR-143 expression in human colorectal cancer DLD-1 cells. Bioorg Med Chem. 2007 Aug 15; 15(16): 5620-8. doi: 10.1016/j.bmc.2007.04.071

37. Pan-In P, Wanichwecharungruang S, Hanes J, Kim AJ. Cellular trafficking and anticancer activity of *Garcinia mangostana* extract-encapsulated polymeric nanoparticles. Int J Nanomedicine. 2014; 9: 3677-86. doi: 10.2147/ijn.S66511
38. Mizushina Y, Kuriyama I, Nakahara T, Kawashima Y, Yoshida H. Inhibitory effects of α-mangostin on mammalian DNA polymerase, topoisomerase, and human cancer cell proliferation. Food Chem Toxicol. 2013 Sep; 59: 793-800. doi: 10.1016/j.fct.2013.06.027

39. Li G, Petiwala SM, Yan M, Won JH, Petukhov PA, Johnson JJ. Gartanin, an isoprenylated xanthone from the mangosteen fruit (Garcinia mangostana), is an androgen receptor degradation enhancer. Mol Nutr Food Res. 2016 Jun; 60(6): 1458-69. doi: 10.1002/mnfr.201600057

40. Manimekalai I, Sivakumari K, Ashok K, Rajesh S. Antioxidant and anticancer potential of mangosteen fruit, Garcinia mangostana against hepatocellular carcinoma (HEPG-2) cell line. World J Pharm Pharm Sci. 2016; 5(2): 253-93.

41. Mohamed GA, Al-Abd AM, El-Halawany AM, Abdallah HM, Ibrahim SRM. New xanthones and cytotoxic constituents from Garcinia mangostana fruit hulls against human hepatocellular, breast, and colorectal cancer cell lines. J Ethnopharmacol. 2017 Feb; 198: 302-12. doi: 10.1016/j.jep.2017.01.039

42. Loo AE, Huang D. Assay-guided fractionation study of α-amylase inhibitors from Garcinia mangostana pericarp. J Agric Food Chem. 2007 Nov; 55(24): 9805-10. doi: 10.1021/jf071500f

43. Ryu HW, Cho JK, Curtis-Long MJ, Yuk HJ, Kim YS, Jung S, et al. α-Glucosidase inhibition and antihyperglycemic activity of prenylated xanthones from Garcinia mangostana. Phytochemistry. 2011 Dec; 72(17): 2148-54. doi: 10.1016/j.phytochem.2011.08.007

44. Taher M, Tg Zakaria TM, Susanti D, Zakaria ZA. Hypoglycaemic activity of ethanolic extract of Garcinia mangostana Linn. in normoglycaemic and streptozotocin-induced diabetic rats. BMC Complement Altern Med. 2016 May; 16(1): 135. doi: 10.1186/s12906-016-1118-9

45. Karim N, Jeenduang N, Tangpong J. Anti-glycemic and anti-hepatotoxic effects of mangosteen vinegar rind from Garcinia mangostana against HFD/STZ-induced type II diabetes in mice. Pol J Food Nutr Sci. 2018; 68(2): 163-9. doi: 10.1515/pjfns-2017-0018

46. Karim N, Jeenduang N, Tangpong J. Renoprotective Effects of xanthone derivatives from Garcinia mangostana against high fat diet and streptozotocin-induced type II diabetes in mice. Walailak J Sci Technol. 2018; 15(2): 107-16.

Corresponding author
Jitbanjong Tangpong can be contacted at: njibjoy@yahoo.com

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Interventions commonly used to prevent work-related musculoskeletal disorders among healthcare workers

Sanpatchaya Sirisawasd, Sasitorn Taptagaporn and Chaweewon Boonshuyar
Faculty of Public Health, Thammasat University, Bangkok, Thailand, and Poramet Earde
Department of Physical Therapy, Faculty of Allied Health Science, Thammasat University, Bangkok, Thailand

Abstract

Purpose – The purpose of this paper is to review the prevalence and risk factors of work-related musculoskeletal disorders (WMSDs) among healthcare workers (HCWs) in order to ascertain the occupation with the highest susceptibility to WMSD in the health sector. This paper will also review the effective interventions which have been used to prevent WMSDs among HCWs.

Design/methodology/approach – This study is a literature review of 11 papers related to the prevalence and risk factors of WMSDs and 12 papers about the interventions being used to prevent WMSDs among HCWs. The papers were retrieved from respectable databases such as PubMed, Science Direct, Google Scholar and E-Thesis.

Findings – Nurses belong to the major group of HCWs who had the highest prevalence of WMSDs compared with other health professionals and other hospital workers. Although there are several interventions being commonly used to prevent WMSD risk factors, some interventions were unsuccessful in the prevention of WMSDs in healthcare tasks. Therefore, it is necessary that future research focuses on the tasks of HCWs that are WMSD risk factors and tries to innovate or redesign ergonomic workstations to prevent those risk factors.

Originality/value – The expected benefit of this study is to motivate ergonomists to provide appropriate and innovative interventions to ensure health and safety for nurses and other HCWs.

Keywords Work-related musculoskeletal disorders, Healthcare workers

Paper type General review

Introduction

Musculoskeletal disorders (MSDs) are disorders that occur in the muscle, tendon, ligament, bone, joint, intervertebral disc and skeleton of the whole body. In general, diagnosis of MSDs caused by work is accepted by an agreement in each country. In 2007, the Ministry of Labor in Thailand, classified MSDs as being within the group of occupational diseases. The Bureau of Policy and Strategy in Thailand’s Ministry of Public Health reported an increase in the morbidity rate of work-related musculoskeletal disorders (WMSDs) from 121.93 per 100,000 persons per year in 2015 to 135.26 per 100,000 persons per year in 2016. Due to this rapid increase, there is an urgent need for innovation in ergonomic interventions to prevent an increasing health problem among the workforce[1].

WMSDs are one of the most common health problems among healthcare workers (HCWs). Previous studies indicated that HCWs, whose responsibilities include carrying, transferring or...
relocating patients, regular forward bending of the whole body and prolonged standing, were exposed to a high risk of WMSDs in the neck, lower back and knee regions[2, 3]. Moreover, a study by Yasobant and Rajkumar[4] showed that HCWs working in a prolonged sitting, standing, awkward posture or cramped positions put employees at a major risk of WMSD. There are personal factors to WMSDs as well. Mirmohammadi et al. also reported that female HCWs were more prone to develop WMSDs than male HCWs and that the body mass index of the HCWs was also related to WMSDs[2]. Specifically, nurses had the highest prevalence of WMSDs compared to dentists and physical therapists, while laboratory technicians and physicians had a lower prevalence[5]. Also, Manmee et al. reported that Thai nurses had the highest prevalence rate of WMSDs when compared to support staff in hospitals[6]. Although there is research regarding the prevalence and risk factors of WMSDs in HCWs, there are no cross comparisons between each occupation in the healthcare sector.

Therefore, this paper reviews the existing literature on the prevalence, risk factors and prevention of WMSDs among HCWs to find the occupations that have the highest prevalence and related risk factors of WMSDs. The emphasis is on workstation redesign and innovative approaches to reduce or to prevent WMSDs among HCWs according to their job characteristics and postures[7–17].

Methods
Papers published between 1990 and 2017 were selected from respectable databases such as PubMed, Science Direct, Google Scholar and E-Thesis. Keywords used to search for these papers included: WMSDs, healthcare workers, physicians, dentists, physical therapists, pathologists, laboratory technicians, allied health professions, nurses, hospital workers, ergonomic design, workstation, guidelines and scientific tools such as electromyography (EMG), 3-D electromagnetic tracking system, lumbar motion monitor (LMM) and anthropometric measurements. Inclusion criteria included studies that showed prevalence and risk factors of WMSDs in each body part. In total, 11 papers about the prevalence and risk factors of WMSDs among HCWs were selected for review. In total, 12 additional papers were reviewed to explore the guidelines and the innovative interventions that can reduce or prevent the risk factors of WMSDs in each body part. Studies that report a result of the intervention suggested following a self-report questionnaire survey were excluded.

Results
There are many groups of HCWs in the hospital setting including physicians, dentists, nurses, physical therapists, laboratory technicians or allied health professions. Almost all HCWs had reported problems that are categorized under WMSDs. The common WMSDs among HCWs included the upper and lower back, neck, shoulder and hand/wrist. Risk factors were repetitiveness, awkward postures, working in the same position for long periods and bending/twisting of the back for physicians. Eye care physicians experienced a higher prevalence of WMSDs in all body parts compared to family medicine physicians[18]. Dentists were also found to work with prolonged periods of time sitting in inadequate ergonomic working environments. That is why dentists have the highest prevalence of overall WMSDs (92 percent)[19]. Additionally, physical therapists and allied health professions who work in laboratories work with prolonged use of medical devices such as microscopes and sonographs. WMSDs among physical therapists were mainly in the lower back (46.5 percent), shoulder (45.2 percent) and neck (44.9 percent)[20], while the overall WMSDs among other allied health professions such as microscope workers, pathologists and radiologic technologists were 62, 76 and 88.9 percent, respectively[21–23]. Among nurses, the overall prevalence of WMSDs was about 55.6–91.7 percent. When focusing on the body part, nurses have the highest prevalence in the shoulder (12.6–64.4 percent) followed by lower back (44.1–58.5 percent), upper back (16.8–44.9 percent) and hand/wrist (16.2–36.1 percent) because
they work with more tasks requiring patient handling and transfer or lifting of patients/equipment than other HCWs[3, 24, 25]. Table I shows the prevalence and risk factors of WMSDs among HCWs in each body part from the selected papers.

Regarding interventions, the redesign of workstations and guidelines were used to prevent risk of WMSDs. These interventions vary according to the HCW’s working postures and job characteristics. From previous research, the scientific tools used to measure between, before and after intervention included: EMG, 3-D electromagnetic tracking system, LMM and anthropometric measurements. For the subjective tools, they used modified WMSD questionnaires, satisfaction forms and comfort scales. Results show that the interventions not only reduce muscle activity, but HCWs were also satisfied when they used the new workstation. For example, an ergonomic dentist chair with an arm rest and thoracic support was used to reduce WMSDs in the upper limb[7]. Microscope workstations with arm support also reduced WMSDs in allied health professions who work in laboratories when analyzed by EMG[9, 10], while the self-report questionnaires showed satisfaction with the new workstation[10]. Since nurses show the highest prevalence of WMSDs when classified by body region, there were many interventions recommended. However, from previous research, interventions cannot prevent all risks of WMSDs in nurses[11]. Table II shows the workstation and guidelines that previous research recommended to use for the prevention of WMSDs among HCWs.

Discussion
Table I shows that WMSDs among HCWs occurred primarily in the upper body part including lower and upper back, neck and shoulder, while Table II shows the interventions and guidelines that help to prevent WMSDs among HCWs. It must be noted that all interventions and guidelines were designed by considering the job characteristics that include risk factors of WMSDs.

A previous study[18] found that physicians were exposed to patients in the same working posture resulting in repetitive work, awkward positions and bending or twisting the back. Similarly, dentists, worked with repetitive head rotation, spine rotation and prolonged leg bending resulting in dentists complaining about WMSDs[26]. Furthermore, bad working habits and uncomfortable physical postures are the causes of MSDs, discomfort and fatigue among dentists[27]. Regarding these working postures, Haddad et al.[7] found that the ordinary dentist chair was a risk factor that caused WMSDs in the trapezius muscle among dentists so they designed an ergonomic dentist chair with an arm rest and thoracic support. The result showed that the ergonomic dentist chair reduced EMG activity in the trapezius.

Among laboratory technicians, Fritzche et al.[21] found that the prevalence of WMSDs in pathologists who are microscope users was 76 percent, whilst pathologists with visual problems, mainly myopia, was at 90 percent. Jain and Shetty[22] indicated that 94 percent of microscope users in the laboratory reported some visual problems during microscope use, while WMSDs of microscope workers were reported in the neck, back, shoulder and wrist and hand regions, respectively. There are many interventions and guidelines to prevent WMSDs in laboratory technicians, i.e., the guidelines of Mitchell et al.[14], and the Centers for Disease Control and Prevention[15]. Also, the Occupational Safety and Health Administration guidelines for microscope workers suggested that the standardized microscopes should be ergonomically designed as shown in Table II[16].

There are many studies aimed at reducing the problems of WMSDs in laboratory-based microscope workers by redesigning new ergonomic workstations. For example, in 2002, Kotler et al.[9] designed a new microscope workstation by using a table fitted with unique adjustable slanting “wings,” also allowing the forearms to be angled at 90° at the elbow and to rest on the surface while operating the control knobs and sitting on the ergonomic chair.
| Study                  | Year | Country | Population                  | Sample size | Study design   | Overall | Lower back | Upper back | Neck | Shoulder | Hand/Wrist | Risk factors                                                                                                                                                                                                 |
|------------------------|------|---------|-----------------------------|-------------|----------------|---------|------------|------------|------|----------|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Kitzmann et al.[18]a   | 2011 | USA     | Eye care physicians         | 94          | Cross-sectional study | 26      | 19         | 46         | 11   | 17       |            | Repetitive work, awkward positions, working in the same position for long periods, bending/twisting the back                                                                                     |
| Kitzmann et al.[18]a   | 2011 | USA     | Family medicine physicians  | 92          | Cross-sectional study | 9       | 12         | 21         | 11   | 7        |            |                                                                                                                                                                                                          |
| Kierklo et al.[19]      | 2011 | Poland  | Dentists                    | 230         | Cross-sectional study | 92      | 35         | 47         | 47   | 20       |            | Working duration and working hours, standing work posture, no rest breaks, limited ergonomics in the work environment of dentists                                               |
| Weerapong et al.[20]   | 2008 | Thailand| Physical therapy students  | 1,784       | Cross-sectional study | 46.5    | 26.2       | 44.9       | 45.2 | 18.3     |            | Prolonged lecture hours, physical therapy practice, sports activities, sitting in the same position for long periods                                                                                 |
| Fritzsche et al.[21]   | 2012 | Switzerland | Pathologists                | 163         | Cross-sectional study | 76      | 39.8       | 45.5       | 78   | 60.2     | 27.6 (arm)  | Gender (female), more weekly working hours, hours spent at the computer                                                                                                                                        |
| Jain et al.[22]        | 2014 | India   | Microscope users in medical | 50          | Cross-sectional study | 62      | 61.3       | 83.9       | 9.7  | 6.4 (hand) | 31.1       | Prolonged working hours and anxiety during or after microscope use, using microscope for 11–15 years, using microscope for more than 15 years, using microscope for more than 30 h/week |
| Lamar[23]               | 2004 | USA     | Radiologic technologists    | 160         | Cross-sectional study | 88.9    | 73.3       | 52.2       | 36.7 | 31.1     |            | Patient positioning, transporting equipment, sonographer’s posture                                                                                                                                            |
| Timubu et al.[3]       | 2010 | Nigeria | Nurses                      | 160         | Cross-sectional study | 84.4    | 44.1       | 16.8       | 28   | 12.6     |            | > 30 years of clinical experience, working in the same positions for long periods, lifting or transferring dependent patients, treating an excessive number of patients in one day                                    |
| Sinsongsuk et al.[24]  | 2006 | Thailand| Nurses                      | 356         | Cross-sectional study | 55.6    | 33.4       | 19.4       | 15.5 | 19.8     | 18.4       | Not having regular exercise, having managerial tasks, working in awkward posture and lifting objects between 10–25 kg                                                                                     |
| Jin et al.[25]         | 2011 | Thailand| Nurses                      | 248         | Cross-sectional study | 91.7    | 58.5       | 44.9       | 20   | 64.4     | 36.1       | Cumulative of employment, documenting patient records, making bed with patient in it, preparation of equipment, job control and social support                                                              |

**Note:** a30-day prevalence
| Study           | Year | Country      | Population                          | Sample size | Study design | Tools                | Intervention                                                                 | Conclusion/Recommendation                                                                 |
|-----------------|------|--------------|-------------------------------------|-------------|--------------|----------------------|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| Haddad et al[7] | 2012 | Iran         | Dentists                            | 12          | Experimental study | Electromyography (EMG) | Redesign an ergonomic dentist chair with arm rest and thoracic support      | Intervention can reduce WMSDs in upper extremities                                          |
| Murphey and Milkowski[8] | 2006 | USA          | Sonographers                        | 22          | Experimental study | Electromyography (EMG) | Provide forearm support to worker when using their instruments Leading to working posture being changed to near natural position | Intervention can decrease WMSDs                                                             |
| Kofler et al[9] | 2002 | Austria      | Medical students, residents, senior doctors | 12          | Experimental study | Electromyography (EMG) | Design a new microscope table fitted with unique adjustable slanting “wings” Allowing the forearms to be angled at 90° at the elbow and to rest on the surface Operating the control knobs and sitting on the ergonomic chair with support for the lower back | Intervention can reduce mean EMG in neck, shoulder, upper arm, forearm, back                |
| Sillanpää et al[10] | 2003 | Finland      | Microscope workers                  | 10          | Experimental study | Electromyography (EMG) | Forehead and upper extremities support Good sitting posture with chair adjustments and variation in posture | Intervention can reduce mean EMG in neck and shoulder Microscope that workers were happy to use |                                                                                                                                 |
| Nelson et al[11] | 2003 | USA          | Nurses                              | 134 (63 intervention and 71 non-intervention) | Experimental study | Electromyography (EMG) 3-D electromagnetic tracking system Questionnaires Anthropometric measurements Perceived by comfort scale | Bathing patient in bed (top side) Bed height adjusted according to caregiver’s needs Use new air mattress | Reduction in lumbar spine moment 60% Reduction in left shoulder movement 50% Reduction in lumbar force 50% |

(continued)
| Study | Intervention | Conclusion/Recommendation |
|-------|--------------|--------------------------|
| Bathing patient in bed (under side) | - Bed height adjusted according to caregiver’s needs  
- Use new air mattress | No significant improvement when bathing under side |
| Making an occupied bed | - Bed height adjusted according to caregiver’s needs  
- Use new air mattress | Not significant |
| Dressing a patient in bed | - Bed height adjusted according to caregiver’s needs  
- Use new air mattress | Not significant |
| Transferring from bed to stretcher | - Elevate chair that facilitated lateral transfers by converting from chair to stretcher  
- Use friction-reducing device to minimize force requirements | Redesigned task perceived by caregivers as more comfortable  
External applied forces reduced 48%  
Erector spinae activity reduced 25%  
Shoulder muscle activity reduced 33% |
| Transferring patient from bed to wheelchair | - Elevate ceiling-mounted lift for this task, assumed that sling was incorporated into patient clothing or bedding (new technology in development) | Intervention perceived by caregivers as more comfortable  
Lumbar spine movement reduced by 54%  
Left shoulder movement reduced by 69%  
Right shoulder movement reduced by 45%  
Lumbar force reduced 58% |

(continued)
| Study | Year | Country | Population | Sample size | Study design | Tools | Intervention | Conclusion/Recommendation |
|-------|------|---------|------------|-------------|--------------|-------|--------------|--------------------------|
|       |      |         |            |             |              |       | Transferring patient from bed to geri-chair | Redesign perceived by caregivers as more comfortable |
|       |      |         |            |             |              |       | Elevate chair that facilitates lateral transfers by converting from chair to stretcher | Lumbar spine forces reduced 36% |
|       |      |         |            |             |              |       | Use friction-reducing device to minimize force requirements of the task | Erector spinae activity reduced 25% |
|       |      |         |            |             |              |       | Pulling patient up in chair | Shoulder muscle activity reduced 45% |
|       |      |         |            |             |              |       | Test recline and incline operation of occupied chair that converts to stretcher | Redesign perceived by caregivers as more comfortable |
|       |      |         |            |             |              |       | Pulling patient up to head of the bed | Shoulder movements reduced by 40% |
|       |      |         |            |             |              |       | Head of height adjustable bed tilted 10 degrees downward | External applied force reduced by 31% |
|       |      |         |            |             |              |       | Patient’s knees bent | |
|       |      |         |            |             |              |       | Use of innovative beds with shear less pivots would eliminate this task by preventing patients from sliding down in bed | |
|       |      |         |            |             |              |       | Applying anti-embolism stockings | |
|       |      |         |            |             |              |       | Bed height adjusted according to caregiver’s needs | |
|       |      |         |            |             |              |       | Caregiver approached task from foot of bed, thereby improving body mechanics | Lumbar movement reduced 23% |
|       |      |         |            |             |              |       | | Left shoulder movement reduced 29% |
|       |      |         |            |             |              |       | | Erector spinae activity reduced 20% |
|       |      |         |            |             |              |       | | Shoulder muscle activity reduced 27% |

(continued)
| Study                          | Year | Country     | Population          | Sample size | Study design          | Tools                                                                                                                                    | Intervention                                                                 | Conclusion/Recommendation                                                                 |
|-------------------------------|------|-------------|---------------------|-------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| Weiner et al.[12]             | 2017 | Israel      | Nurses              | 48          | Experimental study    | Lumbar motion monitor (LMM)                                                                                                            | Repositioning a patient in bed (move to head of bed) Ergonomically advantageous assistive device including Sliding sheet Regular cotton sheet Carrier | Use of sliding sheet satisfied by nurses Using assistive devices have a significant influence on the back, upper limbs, shoulders and neck loading |
| Goyal et al.[13]              | 2009 | UK          | Workers in radiology department | –           | –                     | Guideline of an ergonomically designed workstation and reporting room in radiology department | Use the guideline to design a good workstation in both working environment and working condition that are the factors related to WMSDs | Work under guidelines can reduce the risk factors of WMSDs                                   |
| Mitchell et al. [14]          | 2016 | USA         | Laboratory workers  | –           | –                     | Recommendation of laboratory ergonomics | The neutral posture could be set as the guideline for the laboratory ergonomics including Ears over shoulders Shoulders in line with the hips Forearms 90° angle or more from the upper arms, wrists straight (not bent, angled, or twisted) Shoulders relaxed Elbows hanging close to the sides Head is balanced on spinal column not tilted or rotated to any side | Neutral posture can prevent WMSDs                                                          |
| Center for disease control and prevention (CDC)[15] | 2016 | USA         | Microscope workers  | –           | –                     | Recommendation of microscope use-to prevent musculoskeletal disorders | The microscope workers should not use the microscope more than 5 h/day, and should take frequent short breaks from microscopy work | Recommendation can prevent the risk factors of WMSDs                                      |

(continued)
| Study                                      | Year | Country | Population          | Sample size | Study design | Tools                                      | Intervention                                                                 | Conclusion/Recommendation                                                                 |
|-------------------------------------------|------|---------|---------------------|-------------|--------------|-------------------------------------------|--------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Occupational Safety and Health Administration (OSHA) [16] | 2011 | USA     | Microscope workers  | –           | –            | OSHA fact sheet on laboratory safety ergonomics for the prevention of musculoskeletal disorders | Recommendation 1. Sitting near the workstation 2. Do not lean on the hard edges 3. Use arm rest to support forearms and prevent forearms on the edges 4. Keep elbows close to the body 5. Adjust workstation for upright head position 6. Do not bend the neck in microscope session 7. Adjust eyepieces or mount the microscope on a 30° angle stand for easier use 8. Keep scopes repaired and clean 9. Use a microscope with work rotation between the colleagues, if possible 10. Take a break every 15 minutes by closing the eyes or focus on something such as green garden in the distance, walking around every 30–60 min | Recommendation can prevent the risk factors of WMSDs |
| Helander et al. [17]                      | 1991 | USA     | Microscope workers  | –           | –            | Recommendation about planning and implementation of microscope work | The way to develop and improve microscope work is to Design the better ergonomic microscope workstations and microscopes More efficient product design Use the microscopes with the monitor Using microscope training Work rotation Limitation of overtime work | Recommendation can prevent the risk factors of WMSDs |
with support for the lower back. The result showed that the new design of an ergonomic workstation can reduce EMG activities in the microscope workers’ muscles.

Another example is the study of Sillanpää et al.[10] who designed a new ergonomic microscope table with forearm support for microscope workers. They found that the new ergonomic microscope table reduced EMG activity of muscles in the neck and shoulder, and that microscope workers in their study were satisfied to work with the new ergonomic microscope table. In 2010, Sillanpää and Nyberg[28] recommended the design of microscope workstations that should have forehead and support of the upper extremities and good sitting postures with chair adjustments and variation in posture. Helander et al.[17] also recommended that using ergonomic microscope workstations and introducing training programs can reduce visual problems and muscular fatigue in microscope workers.

Similarly, workers in the radiology department spent more time in front of a computer monitor. Factors including lighting, temperature and ventilation, special circumstances, noise, personal factors and training were found to be related to repetitive strain injuries. In 2004, Lama[23] reported that the radiology technologists reported a prevalence of musculoskeletal symptoms in the back, right hand/wrist and dominant hand/wrist, right shoulder and dominant shoulder. For guidelines and interventions to reduce WMSDs in workers in the radiology department, Goyal et al.[13] discussed the key features of an ergonomically designed workstation and reporting room in the radiology department that can be used as the guideline to design a good workstation because the working environment and working conditions were also found to be related to WMSDs. Specifically, regarding sonographers in the radiology department, Murphey and Milkowski[8] studied about an adjustment of sonographer scanning postures. They indicated that the EMG activities of the muscle in the shoulder and forearm were decreased when the sonographer changed their working posture to near natural position and used the support under the forearm when they used their instruments.

Among physical therapists who work with patients with physical problems, they were found to work with awkward postures in their physical therapy practice. Weerapong et al.[20] reported that the highest prevalence of WMSDs among Thai physical therapy students was in the lower back followed by shoulder, neck, upper back and wrist/hand. This is because Thai physical therapy students must work in prolonged seating positions during their physical therapy training. Bae and Min[29] reported that WMSDs among the physical therapists were mostly found in the shoulders followed by hand and back, neck, arm, hip and knee, respectively. Moreover, a previous prospective cohort study with one-year follow-up[30] reported that the incidence rate of WMSDs among physical therapists was 20.7 percent.

Similar to physical therapists, nurses have to take care of patients with physical disabilities and patients who cannot help themselves. Nurses in particular are required to take care of all patients in all units. Furthermore, previous studies[5, 6] show that nurses were at the highest risk of developing WMSDs when compared with other healthcare workers and support workers. Tinubu et al.[3] indicated that the 12-month period and point prevalence rate of WMSDs in any part of the body among Nigerian nurses were 78 and 66.1 percent, while most WMSDs occurred in the lower back, neck and knees, respectively. Thai nurses also had a high prevalence rate of WMSDs because they were exposed to physical workloads, non-neutral working postures and a psychologically demanding workload. Sinsongsuk et al.[24] reported that the 12-month prevalence of WMSDs among Thai nurses was about 55.6 percent. Common areas of the body that were found to be related to WMSDs were lower back 33.4 percent, shoulders 19.8 percent and upper back 19.4 percent. In 2011, Jin et al.[25] reported that 92 percent of Thai nurses had WMSD symptoms in their body a 12-month period during which time 54 percent of them visited a physician or physical therapist, while common injury areas related to their work were lower back, shoulders and neck. The top 3 major hazards of their workload were nursing management, repositioning patient in bed and preparing and distributing medication, while...
the top 3 major hazardous working postures were neck/shoulder in non-neutral posture, bending and twisting waist in awkward posture and prolonged standing. Literature reviews\cite{24, 25, 31} showed that lower back pain was a major cause of WMSDs among nurses. Based on three hazard categories developed by Nelson \textit{et al.}\cite{32}, the author studied patient handling tasks for nurses. They focused on the ten high risk tasks in order to redesign new working postures and used this tool to collect data shown in Table II. The interventions proposed in their study included manual assistive devices, mechanical devices and administrative management. When they applied ten interventions to ten tasks, the results showed that the biomechanical and EMG data in all interventions were statistically different between the intervention and non-intervention groups in joint moments, forces and muscle activity\cite{11}. However, three out of ten interventions cannot prevent all risk of WMSDs including, i.e., bathing patient in bed (under side), making an occupied bed and dressing a patient in bed. Therefore, future research should investigate the tasks of nurses that are the risk factors of developing WMSDs and develop innovative ergonomic workstation designs to effectively prevent WMSDs in nurses.

Weiner \textit{et al.}\cite{12} studied about repositioning a passive patient upwards in bed by choosing an assistive device including regular cotton sheet, sliding sheet and carrier and predicted the risk for low back disorder based on the LMM torso kinematic inputs. The result showed that assistive devices used by nursing personnel had a significant influence on the back, upper limbs, shoulders and neck loading, and the result from the focus group indicated that nurses were satisfied to use the sliding sheet because it can be kept under the patient for extended periods, while using a carrier required extracting it out after every repositioning of the patient.

From the above discussion, it can be seen that many guidelines and new ergonomic workstations were designed according to the position of work and job characteristics. When they compared the EMG activities between before and after intervention, EMG activities in after intervention were found less than before intervention. However, if the intervention by workstation redesign has some limitations, the guidelines or administrative controls will be used.

\section*{Conclusion}

The most common interventions used in HCWs were introducing arm support and height adjustments. WMSDs among HCWs were found to vary based on the position of work and job characteristics. Therefore, in future research, workstation redesign should also be considered according to the position of work and job characteristics of HCWs. This literature review offers evidence that the ergonomically designed workstation is the recommended intervention that can reduce and prevent the risk factors of WMSDs among HCWs in terms of muscle activity, force and job satisfaction. This study provides directions for future research on developing ergonomic intervention or innovation to prevent the risk factors of WMSDs among HCWs.

\section*{References}

1. The situation of occupational and environmental diseases report. Bangkok: Bureau of Occupational and Environmental Diseases, Ministry of Public Health; 2017.

2. Mirmohammadi S, Yazdani J, Etemadinejad S, Asgarinejad H. A cross-sectional study on work-related musculoskeletal disorders and associated risk factors among hospital health cares. Procedia Manuf. 2015; 3: 4528-34. doi: 10.1016/j.promfg.2015.07.468

3. Tinubu BM, Mbada CE, Oyeyemi AL, Fabunmi AA. Work-related musculoskeletal disorders among nurses in Badan, South-West Nigeria: a cross-sectional survey. BMC Musculoskelet Disord. 2010; 11 Jan: p. 12. doi: 10.1186/1471-2474-11-12
4. Yasobant S, Rajkumar P. Work-related musculoskeletal disorders among health care professionals: a cross-sectional assessment of risk factors in a tertiary hospital, India. Indian J Occup Environ Med. 2014; 18(2): 75-81. doi: 10.4103/0019-5278.146896

5. Yasobant S, Rajkumar P. Health of the healthcare professionals: a risk assessment study on work-related musculoskeletal disorders in a tertiary hospital, Chennai, India. Int J Med Public Health. 2015; 5(2): 189-95. doi: 10.4103/2230-8598.153836

6. Marnee C, Janpol K, Homsuwan W, Invichai S. Musculoskeletal disorder among Rajavithi hospital workers in central Bangkok, The 19th Triennial Congress of the International Ergonomics Association; 2015; Aug 9–14; Melbourne.

7. Haddad O, Sanjari MA, Amirfazli A, Narimani R, Parvinpour M. Trapezius muscle activity in using ordinary and ergonomically designed dentistry chairs. Int J Occup Environ Med. 2012; 3(2): 76-83.

8. Murphey SL, Miliowski A. Surface EMG evaluation of sonographer scanning postures. J Diagn Med Sonogr. 2006; 22(5): 298-305. doi: 10.1177/8756479306292683

9. Kofler M, Kreczy A, Geschwendtner A. “Occupational backache” – surface electromyography demonstrates the advantage of an ergonomic versus a standard microscope workstation. Eur J Appl Physiol. 2002; 86(6): 492-7. doi: 10.1007/s00421-002-0676-6

10. Sillanpaa J, Nyberg M, Laippala P. A new table for work with a microscope, a solution to ergonomic problems. Appl Ergon. 2003; 34(6): 621-8. doi: 10.1016/S0003-6870(03)00651-6

11. Nelson A, Lloyd JD, Menzel N, Gross C. Preventing nursing back injuries: redesigning patient handling tasks. AAOHN J. 2003; 51(3): 126-34.

12. Weiner C, Kalichman L, Ribak J, Alperovitch-Najenson D. Repositioning a passive patient in bed: Choosing an ergonomically advantageous assistive device. Appl Ergon. 2017 Apr; 60: 22-9. doi: 10.1016/j.apergo.2016.10.007

13. Goyal N, Jain N, Rachapalli V. Ergonomics in radiology. Clin Radiol. 2009; 64(2): 119-26. doi: 10.1016/j.crad.2008.08.003

14. Mitchell T. Laboratory ergonomics: risk factors and workbench assessment. [cited 2016 Sep 26]. Available from: www.working-well.org/articles/pdf/Lab_Ergo.pdf

15. George E. Occupational Hazard for pathologists microscope use and musculoskeletal disorders. Am J Clin Pathol. 2010; 133(4): 543-8. doi: 10.1309/AjcpuxdsSkjkrfWv

16. OSHA. OSHA fact sheet: laboratory safety ergonomics for the prevention of musculoskeletal disorders. No. OSHA FS-3462 8/2011; Occupational Safety and Health Administration; [cited 2016 Sep 26]. Available from: www.osha.gov/Publications/ laboratory/OSHAfactsheet-laboratory-safety-ergonomics.pdf

17. Helander MG, Grossmith EJ, Prabhu P. Planning and implementation of microscope work. Appl Ergon. 1991; 22(1): 36-42.

18. Kitzmann AS, Fethke NB, Baratz KH, Zimmerman MB, Hackbarth DJ, Gehrs KM. A survey study of musculoskeletal disorders among eye care physicians compared with family medicine physicians. Ophthalmology. 2012; 119(2): 213-20. doi: 10.1016/j.ophtha.2011.06.034

19. Kierklo A, Kobus A, Jaworska M, Botulinski B. Work-related musculoskeletal disorders among dentists – a questionnaire survey. Ann Agric Enviro Med. 2011; 18(1): 79-84.

20. Weerapong P, Kurustien N, Ngowtrakul B, Chuecharoen N. A prevalence study of musculoskeletal disorders self-reported in Thai physical therapy students. The 9th Southeast Asian Ergonomics Society Conference (SEAES 2008); 2008 October 22-24; Bangkok.

21. Fritzschke FR, Ramach C, Soldini D, Caduff R, Tinguely M, Cassoly E, Moch H and Stewart A. Occupational health risks of pathologists – results from a nationwide online questionnaire in Switzerland. BMC Public Health. 2012; 12 Dec. p. 1054. doi: 10.1186/1471-2458-12-1054

22. Jain G, Shetty P. Occupational concerns associated with regular use of microscope. Int J Occup Med Environ Health. 2014; 27(4): 591-8. doi: 10.2478/s13882-014-0288-2
23. Lamar SL. Investigation of factors associated with prevalence and severity of musculoskeletal symptoms among the workers in clinical specialties of radiologic technology: an ergonomic and epidemiological approach. North Carolina State University; 2004.

24. Sinsongsuk T, Taptagaporn S, Jiamjarasrangsi W. The prevalence and work-related factors of musculoskeletal complaints among female nursing personnel in King Chulalongkorn Memorial Hospital. Occupational and Environmental Diseases Journal. 2006; 1: 17-29.

25. Jin S, Srisaenpang S, Pinitsoontorn S, Eungpinichpong W. Prevalence of work-related musculoskeletal disorders among registered nurses in Srinagarind Hospital, Thailand. J Health Res. 2011; 25(2): 61-8.

26. Garbin AJÍ, Garbin CAS, Arcieri RM, Rovida TAS, da Graça Fagundes Freire AC. Musculoskeletal pain and ergonomic aspects of dentistry. Revista Dor. 2015; 16(2): 90-5.

27. Jodalli PS, Kurana S, Shameema, Ragher M, Khed J, Prabhu V. Posturedontics: how does dentistry fit you? J Pharm Bioallied Sci. 2015; 7(S2): S393-7. doi: 10.4103/0975-7406.163463

28. Sillanpää J, Nyberg M. The ergonomics of microscope work. In: Méndez-Vilas A, Díaz J editors. Microscopy: science, technology, applications and education. Badajoz: Formatex Research Center; 2010. pp.1533-8. [cited 2016 June 1]. Available from: www.formatex.info/microscopy4/1533-1538.pdf

29. Bae YH, Min KS. Associations between work-related musculoskeletal disorders, quality of life, and workplace stress in physical therapists. Ind Health. 2016; 54(4): 347-53. doi: 10.2486/indhealth.2015-0127

30. Campo M, Weiser S, Koenig KL, Nordin M. Work-related musculoskeletal disorders in physical therapists: a prospective cohort study with 1-year follow-up. Phys Ther. 2008; 88(5): 608-19. doi: 10.2522/ptj.20070127

31. Tongchim N, Taptagaporn S, Mongkolsomlit S. Prevalence and ergonomic factors of work-related low back pain among nurses in Thammasat University Hospital. Safety and Environment Review. 2014; 23(3): 53-8.

32. Nelson A. Identification of risks tasks in nursing homes and spinal cord injury units: a pilot study. Unpublished research data from pilot study

**Corresponding author**

Sasitorn Taptagaporn can be contacted at: sasitapp@gmail.com

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Health and disease concepts: an approach to health development

Samlee Plianbangchang

College of Public Health Sciences, Chulalongkorn University,
Bangkok, Thailand

Abstract

Purpose – Health for all is an ideal goal that all governments aspire to reach. The purpose of this paper is to assess the definitions of the key terms used to better appreciate the role of the WHO member states in their efforts to achieve improved healthcare systems that suit each nation’s particular needs.

Design/methodology/approach – Definitions of the terms disease, illness and health are discussed against health concepts as a means of assessing the most effective approach toward achieving an effective universal healthcare system.

Findings – Universal health and treatment of sickness and disease have improved globally, but the target of achieving total wellness still remains as a goal for the future and may be impeded by diseases that have not yet evolved. The implementation of a universal health coverage system is a positive step toward achieving the goals of health and wellness for the present times.

Originality/value – This is a commentary piece.

Keywords Health, Disease, Illness, Health development

Paper type Commentary

Concepts of disease, illness and health

In public health, the question of how to measure health is a difficult topic. In a disease-ridden society, when the level of disease or illness is determinable, health becomes measurable. However, when a society is healthy, disease or illness becomes less determinable and health becomes less measurable. Additionally, the three basic elements in the field of public health: people, disease or illness and health in the context of their environment are worth examining. The classical definition of illness: “an unhealthy condition or unhealthy state of body or mind”[1] contrasts with illness “as bad moral quality, a condition of wickedness, disagreeableness, troublesomeness, hurtfulness and badness”; while “disease is a corruption of the body, and by extension a corruption of spirit and/or mind”[2].

Disease may also be defined as “a failure of the adaptive mechanisms of an organism to counteract adequately the stimuli and stresses to which it is subject, resulting in a disturbance in function or structure of some part of the body”[3]. This definition is similar to Meerlo’s definition[4] “a failure reaction to a noxious stimulus,” and disease defined as “an unsuccessful reaction interfering with normal life.” Meanwhile, Clark[5] states that “there are no diseases, there are only sick people.” Another ecological definition is that “disease is an impairment of the normal state of the living animal”[1].

From the ecological standpoint, disease and illness are closely related resulting in Wylie[6] defining health as “the perfect adjustment of an organism to its environment.” Health in this context is an expression of adaptability, and disease is the failure thereof. This can be compared to Webster’s Dictionary definition,[1] “health is the condition of an organism or one of its parts in which it performs its vital functions normally or properly.” However, a more satisfactory definition of disease is needed. The real problem of health measurement is the...
problem of measurement of disease or illness (morbidity). Health is measurable as long as
disease or illness is measurable but when disease or illness becomes immeasurable and
imperceptible, then health also becomes immeasurable.

Among health definitions, the most widely used is from the World Health Organization
namely, “Health is a state of complete physical, mental and social well-being and not merely
the absence of disease or infirmity”[7]. This definition has been regarded as an attainable
goal whilst others criticize it as being too ideal and unrealistic. Also, a range of conditions
keep people at some point short of positive health[8]. Nonetheless, the above variation of the
concepts of health are commonly accepted as statements of an ideal, or as Besson[9]
described it, “optimum health.”

Whatever definitions of health might be used, only one that is realistic, practical and
quantifiable should be accepted for operational purposes because the concepts of health,
disease or illness will change according to advancement in health science, technology and
financial investment.

**Health development perspective: an approach**

The WHO defines health as “a state of complete physical, mental and social well-being and
not merely the absence of disease or infirmity”[7] and its objective of “The attainment by all
people of the highest possible level of health”[10] has already provided a broad-based
foundation for the developmental approach toward positive health as a mandatory function
of its member states and other stakeholders.

Initially, the WHO had to assist its member countries to fight against diseases stemming
from the low levels of development, poverty, lack of education and many other prevailing
environmental and ecological problems. It was realized that it is not yet possible for
everyone to fully enjoy complete physical, mental and social well-being, and not merely the
absence of disease or infirmity. In 1977, the World Health Assembly of the WHO resolved to
set the main social target/goal for the governments and the WHO “toward the attainment by
all people of the world by the year 2000 of a level of health that will permit them to lead a
socially and economically productive life”[11].

Additionally, at the International Conference on Primary Health Care (PHC) held in
Alma Atar, USSR in 1978, there was consensus that a PHC approach is the key to attaining
the social goal of “Health for All” by the year 2000. However, it was evident by the year 2000,
that the achievements of the targets were not at all uniformly met, and yet, it was equally
noted that more global health resources were indeed mobilized and made available for
supporting worldwide efforts in health development. Furthermore, the general health
conditions of people around the world were perceptibly improved, especially in developing
countries, even though not uniform or equal. Evidently, PHC forms an integral part, both, of
the country’s health system, of which it is the central function and main focus, and of the
overall social and economic development of the community[12].

Therefore, the World Health Assembly later agreed to keep the goal of “Health for All”
without specifying the target date, and since 2000, the idea of a Universal Health Coverage
system was conceived as an important step toward Health for All.

To move toward good health, investments in public health interventions, particularly
health promotion and disease prevention as well as effective health care must be ensured
throughout the life cycle of individuals and at the same time, people who are already sick
must receive the best treatment and care to limit the degree of morbidity or disability.
To stay healthy, people will have to ensure proper behaviors and lifestyles, and, as far as
health is concerned, always keep in mind the influence of two broad areas of health
determinants, i.e., environment and genetic endowment.

When the intervention moves forward into the area of secondary prevention, health
becomes more negative with an increased degree of dependence of a person on others. It is
indeed important to delay this pathological process through the most efficient and effective
development and implementation of a public health policy program combined with an
effective medical intervention system that complements a successful health care system.

References
1. Gove PB. Webster’s Third New International Dictionary. Springfield, MA: G&C Merriam Com; 1968.
2. Alland FA. Adaptation in Cultural Evolution: an Approach to Medical Anthropology. New York, NY: Columbia University Press; 1970.
3. Hoerr NL, Asol, A. Blakiston’s New Gould Medical Dictionary. 2nd ed. New York, NY: McGraw-Hill; 1956.
4. Meerloo JAM. Illness and Cure – Studies on the Philosophy of Medicine and Mental Health. New York, NY: Grune & Stratton; 1964.
5. Clark DW, MacMahon B. Preventive Medicine. Boston, MA: Little, Brown and Co.; 1967.
6. Wylie CM. The definition and measurement of health and disease. Public Health Reports. 1970; 85(2): 100-4.
7. World Health Organization [WHO]. WHO Basic Document: Preamble to WHO Constitution. Geneva: WHO; 2009.
8. Dunn HL. Postscript: Health and Demography. New York, NY: Bureau of Statistical Services; National Office of Vital Statistics; 1956.
9. Besson G. The health-illness spectrum. Am J Public Health Nations Health. 1967; 57(11): 1901-5.
10. World Health Organization [WHO]. WHO Basic Document: Article 1 of WHO Constitution. Geneva: WHO; 2009.
11. World Health Organization [WHO]. World Health Assembly Resolution. WHA 32.30. Geneva: WHO; 1977.
12. World Health Organization [WHO]. Alma-Ata 1978, Primary Health Care. Health for All Series, No. 1. Geneva: WHO; 1978.

Corresponding author
Samlee Plianbangchang can be contacted at: samleep40@gmail.com
Life narrative to substance use: voices from LGBTQ people

Nanchatsan Sakunpong
Graduate School of Srinakharinwirot University, Bangkok, Thailand

Abstract

Purpose – While there is a growing amount of literature showing that lesbian, gay, bisexual, transgender and queer (LGBTQ) people are more at risk to use substances compared to non-LGBTQ people, there is a gap in knowledge about the exploration of the life narrative, before and the turning point of substance use. The purpose of this paper is to discuss life narrative, before and the turning point of substance use.

Design/methodology/approach – Ten participants from diverse sexual orientation/gender were invited to join this study including queer, lesbian, transgender, gay, tomboy and bisexuals who were diagnosed with a substance use disorder. The narrative qualitative research was used as the research methodology. Each of the participants had in-depth interviews with the research team once or twice, with each time lasting from 30 to 120 min until the saturation of the data. Thematic analysis and the trustworthiness process were used to analyze the data.

Findings – Three themes emerged from this study including the following: life before substance use; life turning point; and motivation to stop using substances. Each theme had several categories to define the theme.

Originality/value – The results of this study can help counseling psychologists and clinicians who work with LGBTQ addicts to become aware that there is not only psychological treatment available for LGBTQ addicts needed for recovery, but also a social movement that promotes equality among LGBTQ people, such as advocacy against oppression with regard to family, school, community and the public.

Keywords LGBTQ people, Life narrative, Psychology narrative, Substance use

Paper type Research paper

Introduction

Heterosexual discourse based on patriarchal values has overwhelmed people throughout the world, including Thai society, pushing lesbian, gay, bisexual, transgender and queer (LGBTQ) people to become socially marginalized. Although some international mass media have recognized Thailand as an open place for LGBTQ people, there is still social oppression, such as no right to marriage, the lack of opportunity to be accepted as a worker in various careers, and being bullied both physically and psychologically at school and in the workplace because of their gender identity or sexuality[1, 2]. As a result, some LGBTQ people develop psychiatric symptoms, such as depression, suicidal ideation or actually committing suicide, [3–5] as well as turning their life toward substances to deal with their psychological pain. Many studies revealed that LGBTQ people take more risks to use illicit drugs; in one study reported that homosexual males take more risks in terms of using amphetamines than heterosexual males[6], which was similar to one study showed that homosexual males and females had higher levels of non-medical drug usage and lower levels of abstinence than heterosexual males or females[7]. In addition, it is not
only illegal substances, but also legal substances such as alcohol that LGBTQ people use to remedy psychological suffering. One study shows that homosexual females use alcohol more often than heterosexual females[8]. In conclusion, we can assume that LGBTQ people have more risks to use non-medical substance as well as more difficulty being abstinent from drugs in comparison to non-LGBTQ people. However, there is still not enough literature to describe the in-depth road of life among LGBTQ people and why they have to cope with adversity by using illegal drug or alcohol. This leads to the objective of this study that aims to explore the life narrative of Thai substance dependent LGBTQ people. The results of this study can be the guideline for counselors or clinicians to design an appropriate intervention for Thai LGBTQ clients.

Methods
This study employed a narrative research approach that prioritized the story of marginalized persons based on the constructivist paradigm[9]. The narrative inquiry often tells the story from the beginning to the turning point in the story that changes their direction in life.

Participants and setting
The research team conducted in-depth interviews with ten LGBTQ participants who attended the rehabilitative stage in a substance dependence treatment center in central Thailand. All of the participants were diagnosed as having a substance use disorder. The participants included individuals of various sexual orientations/genders, such as transgender females, tomboys, gays, lesbians, bisexuals and queer people, who identified themselves. The personal profile of the participants was listed in Table I.

After being approved by the research ethics committee, the research team went to a substance dependence treatment center to build rapport with both the nurses and ex-addict staff members. The researcher asked them to introduce LGBTQ people who were in the process of substance dependence rehabilitation. The research team contacted the participants, explained the objective of the research, invited them to be interviewees and asked to sign the consent forms before collecting the data. Each participant was interviewed one or two times lasting from 30 to 120 min and used voice recordings. The interview guides were created from related theories and studies, but the researcher used them only in the initial interview phase and allowed the data to emerge mainly from participants by probing. The interview guide included the following questions: “Would you please tell me your story and how you got here?” and “What kind of social oppression have you faced in your lifetime and how this is related to your substance use.”

| Alias | Current age | Age at first substance use | Type of current substance abuse | Educational background | Gender/sexual orientation |
|-------|-------------|---------------------------|--------------------------------|------------------------|--------------------------|
| Boy   | 47          | 10                        | Amphetamine alcohol           | Primary school         | Queer                    |
| New   | 41          | 15                        | Alcohol                       | Vocational certificate | Queer                    |
| Jennie| 44          | 15                        | Alcohol                       | Secondary school       | Queer                    |
| Pat   | 34          | 24                        | Amphetamine                   | Bachelor’s degree      | Transgender woman        |
| Bell  | 29          | 18                        | Amphetamine                   | Secondary school       | Transgender woman        |
| Poy   | 36          | 18                        | Methamphetamine              | Secondary school       | Lesbian                  |
| Eve   | 31          | 17                        | Methamphetamine              | Secondary school       | Lesbian                  |
| Ann   | 31          | 9                         | Amphetamine                   | Primary school         | Tomboy                   |
| Man   | 28          | 27                        | Amphetamine                   | Bachelor’s degree      | Gay male                 |
| Ef    | 31          | 16                        | Amphetamine                   | Secondary school       | Bisexual                 |

Table I. Personal profiles of the participants
Data analysis
Thematic analysis was used to analyze the data[10]. Both inductive and deductive methods were employed to generate the themes and categories[11]. First, the researcher transcribed the voice recording word for word. Then, the researcher read the transcripts about each participant several times to identify the common and emerging themes. Later, codes and categories were generated to support each theme. The results of this narrative research were written into stories in a chronological sequence[12]; beginning with their life before using substances, followed by significant turning points that resulted in substance use and later, their motivation to remain abstinent from drugs and alcohol.

Trustworthiness
Trustworthiness is a method to ensure that the results from a qualitative study are both reliable and valid[11]. The data and triangulation method were used to ensure credibility by collecting data from various sexual orientations/genders of participants such as gay males, transgender women, tomboys, bisexuals and lesbians, as well as using data from different methods, such as interviewing and observations to make sure of the veracity and credibility of the study. Furthermore, the researcher had several debriefing sessions between the researchers and her supervisor, an expert in qualitative research in data analysis process. The results of data analysis were sent back to all of the participants to prove the credibility of the study before publication. All of the data would be destroyed after the one-year completion of the study by deleting voice recordings and Microsoft word files from both computers and drives.

Ethical considerations
The ethical considerations were approved by the Research Ethics Committee of the Drug Dependence Treatment Center (No. 021/2560 on June 2, 2017). The name of this Drug Dependence Treatment Center is deliberately not identified to ensure the confidentiality of the participants.

Results
The findings were divided into three themes. Each theme had several categories with quotations, their alias, their sexual orientation/gender and their age. These themes may overlap because the events occurred continuously, as follows.

Theme 1: life before using substance
Theme 1: life before substance use had predisposing conditions that can cause participants to use substances in a later period in their life, which was divided into five categories.

Category 1: family relationship problem. Most of the participants were raised in broken homes, characterized by the loss of parents through abandonment, divorce or death. Some participants were hurt by a lack of emotional support from their families. They often thought about their love-deprived childhoods and needed someone for emotional support or act as a positive role model in order to deal with adversity:

My mother has never listened to me or taken care of me. I had to live with my grandmother instead. She never visited me on Mother’s Day, so I had to lie in the empty chair while my friends came with their parents or asked a neighbor to come with me that day. (Poy told her story in tears, lesbian, aged 36)

My parents were separated since I was a child. I lived with my mother and stepfather. I was bullied many times by relatives around my home, while my mother worked all day to earn money. I often said to my sister that if we had a father to protect us, we would not be bullied like this. (Ef, bisexual, aged 31)
Category 2: social oppression toward gender identity. Almost all participants had experiences of being oppressed because of their gender identity. They experienced social oppression in several ways including family, peers, teachers, employers, co-workers, as well as members of the public. Some of them were rejected by parents and physically abused; some were bullied by their peers; and some could no longer work and eventually turned to substance abuse because of social rejection. Also, some participants tried to stop using substances, but they relapsed due to social oppression:

If queers couldn’t get into a beauty pageant, they could go to be sex workers […] I used to find several jobs but when I passed to the interview phase, they didn’t accept me to work with them. It’s just because I looked like a woman, but my title was mister. (Pat, transgender, aged 34)

My aunt used to ask me if I needed to change from being gay to being a man because she knew a doctor who could treat me. (Man, gay, aged 28)

Some staff members didn’t accept me as I am, this was the reason I sometimes drank alcohol again. (Jennie, queer, aged 44)

Category 3: internalized homophobia. Some participants had internalized homophobia because of social rejection. Sometimes they denied that they were LGBTQ people. They tried to portray themselves as heterosexual people, as a result of their fear of being rejected by society. If they expressed themselves as a heterosexual men or women, they would be more easily accepted by people, despite the fact that it was not fair to have to hide their true identities due to social stigma:

I questioned myself about who I am. I used to post in Pantip that if I already had a girlfriend, but I accidentally had a sexual experience with a man and I enjoyed it. What could I do? (Ef, bisexual, aged 31)

I’m not gay or like a tomboy, who have to hide themselves. I’m a lesbian, so I look like an ordinary woman. (Poy, lesbian, aged 36)

Category 4: unsatisfied love. The factor of broken relationships or repeated, unsatisfied relationships was common experiences among the participants. Some of them warned themselves not to fall in love with anybody in order to protect their vulnerable hearts. Some of them had dreamed of idealized relationships and tried to find a white knight to save them, but often left them alone and in tears. The pain of unrequited or unsatisfactory love can create the conditions that lead to self-medication through substance abuse and the tendency to relapse after a period of sobriety among LGBTQ people:

We had to accept that we didn’t have a uterus. It’s normal for a man to want to have sex with a woman and leave us. (New, queer, aged 41)

Oh! Love was so important. I nearly committed suicide by swallowing twenty paracetamol tablets and had to have my stomach pumped because I needed attention from my boyfriend. He left me and I feared that he had another girlfriend. (Bell, transgender, aged 29)

Category 5: sexual or physical abuse. Some participants experienced sexual or physical abuse by their partner or a person they trusted. The trauma from these events caused them to use drugs as a way to manage their pain and feelings of shame. One of the participants was a tomboy, was raped by a man who was a close friend. To add insult to injury, she became pregnant by her rapist. She took revenge by hunting the man down and killing him, which caused her to be imprisoned. After that, she used drugs to heal herself from this shameful event:

The father kicked down the door and saw me asleep on the bed and covered in blood. I couldn’t wake up. It tore up the inside of my body and the man was not there (the man who raped me). I cried
in a hospital and found out later that I was pregnant. This event destroyed my life. Everything went to the end and was never the same. I ran away from my girlfriend because it’s so shameful for me. (Ann, tomboy, aged 31)

**Theme 2: life turning point**
This theme describes the events or conditions that brought the participants to substance abuse, which can be divided into two categories, as follows.

*Category 1: role models and the persuasion of friends.* Many participants were hurt after their life crisis and they made the decision to start using drugs. Role models, such as family and friends, showed them how to heal with pains and had brought them into the cycle of addiction. Some of them stayed in a risk situation such as working within nightclub or loved to hang out with friends at night and that this led them to substance abuse:

- After I fought with my mother, I went to stay with my friends. Then, I woke up at night and saw they used drugs. Finally, I started using drugs because I feared that I couldn’t get along with them.
  (Poy, lesbian, aged 36)
- I was a waiter in a night cafe and I liked drinking. It started with little and finally I became dependent on alcohol. The environment was important in terms of alcohol and other substances.
  (Boy, queer, aged 47)

*Category 2: need benefits from substance use.* Participants received something in exchange for using drugs, such as psychological relief from pain, more money or arousal during sex with partners. These benefits induced them to start using drugs:

- When I had sex with my girlfriend, I felt more endurance and helped her to reach orgasm. I felt proud of myself and enjoyed sex more while using drugs.
  (Ef, bisexual, aged 31)
- I had to drink when I worked as a tour guide. I had to work daytime and nighttime so I needed to drink alcohol to help me sleep easier and work more. Drinking helped me to get along with my guests and entertain them better.
  (Jennie, queer, aged 44)

**Theme 3: motivation to stop using substances**
Although the participants were in the rehabilitative stage of substance dependence treatment, some of them did not decide to stop or decrease their drug intake. However, half of them were aware of the negative outcomes of substance use, and they had the intention to stop using drugs that led to construct a third theme, which can be divided into three categories.

*Category 1: social support from family.* The participants could feel love, caring and forgiveness from family, although they disappointed them. This family support motivated them to make a strong decision to receive substance treatment and to show gratitude to their parents:

- My mother wanted me to stay at a substance dependence treatment center, but I didn’t until finally she cried and screamed at me and said ‘Do you want me to die because of you, I can’t bear anymore’. I felt sad because I made her cry and that time she had cancer and was getting chemotherapy so I promised to myself I’d stop using drugs.
  (Bell, transgender, aged 29)
- My mother saw me shaking (from alcohol withdrawal symptoms). I had never been like that before. I couldn’t eat in front of people and had to eat in my bedroom because my hand tremor. She said that I had to get treatment.
  (New, queer, aged 41)

*Category 2: social support from staff and peers in substance treatment centers.* Although most participants did not want to treat themselves, they were forced to stay at substance treatment center but the social support from staffs and peers within substance treatment
center was important reason that could change their mind to stop using drugs and improve their life to be a better person:

I like to talk with her (staff) every day because she listened to me. It seemed like she really understood me, by her eyes, voice and gestures. I’m sure that I can stop using drugs. (Man, gay, aged 28)

Category 3: occupational reasoning. The participants were aware that they are LGBTQ people and had to take care of themselves in their old age because they may not have their own legal family. They needed a job that could support them financially, and did not use substances anymore because it would cause them to lose their job again:

My boss recommended me for treatment here because I can’t work anymore. (Jennie, queer, aged 44)

This gender may not have his/her own family so I like to work here as an ex-addict staff and do my best to take care of my life and mother. (New, queer, aged 41)

Discussion
The emerging themes from the life narratives of LGBTQ people can be described by implementing case formulation model[13, 14] including predisposing factors, precipitating factors and protective factors that could be employed to explain a psychological disorder like substance use disorder. "The life before using substances" theme can be compared to the predisposing conditions that cause the risks of using substance among LGBTQ people. Some of these conditions are similar to non-LGBTQ people who use substances, such as family relationship problems, unsatisfactory relationships and sexual or physical abuse[15, 16]; however, the emerging facts from this study showed the interesting results that the social oppression in regard to gender identity as well as internalized homophobia was important conditions which can turn LGBTQ people toward substance use to heal their pain. The aspect of social oppression may come from within the family, school, peers or in the workplace, and some of the participants turned this oppression on themselves by the way of internalized homophobia. Both homophobia and internalized homophobia effected the mental health and the well-being of LGBTQ people[17, 18]. These were the important conditions causing participants to use substances.

The themes of "life turning point" and the "motivation to stop using substances" were similar to the precipitating conditions that activated participants to start using substances, as well as the protective factors that supported them in changing their lives to abstinence from drugs and alcohol. The turning point and motivation to the abstinence of LGBTQ people were not different from non-LGBTQ people. Peers and role models in a family as well as substance treatment centers were key factors leading people to substance abuse[19, 20]. However, LGBTQ people have a higher rate of substance use in comparison to non-LGBTQ people because of hostile attitudes, a homophobic culture, maltreatment and discrimination [6, 21], so they need something to help to recover from their pain. As a result, a supportive system consisting of family[22] as well as communities such as substance treatment centers, [19, 21] which can play a key role in sheltering LGBTQ people from adversity, especially an open-minded and non-discriminatory attitude because of their gender identity.

Conclusion and recommendation
This study aimed to explore the life narratives of Thai LGBTQ people who used substances in a substance treatment center by using narrative qualitative research. The ten participants with diverse sexual orientations/genders were invited to participate. The trustworthiness was used to ensure the results from the qualitative data. There were three emerging themes, including the following: life before using substances; life turning point; and motivation to
stop using substances, were the results of the qualitative study based on the experiences of Thai LGBTQ people.

The results of this study can help counseling psychologists and clinicians who work with LGBTQ addicts in order to gain a wider perspective, such as the fact that not only the psychological treatment of LGBTQ addicts needed for recovery (such as counseling for unsatisfied relationships, healing traumatic experiences from sexual/physical abuse and social oppression), but also the social movement that promotes equality. Counseling psychologists can help deliver the message to families, schools, communities and the public that LGBTQ people are no different from non-LGBTQ people. In addition, they need empowerment to face social stigma as well as discrimination. Counseling psychologists should be aware about their own attitudes toward these clients and understand that same-sex attraction and behaviors are normal variants of human sexuality. Furthermore, treatment should include social resources such as family, peers and community in order to aid recovery from substance use.

References
1. Sankatiprapa K. Katthoe sexual harassment: its significance in heterosexual discourse. Bangkok: Srinakharinwirot University; 2007.
2. Potiwan P, Tongyu M, Apichatvullop Y. The result of post-operative male to female transsexual for transgender identity development. KKU Research Journal. 2011; 1(1): 79-94.
3. Blake SM, Ledsky R, Lehman T, Goodenow C, Sawyer R, Hack T. Preventing sexual risk behaviors among gay, lesbian, and bisexual adolescents: the benefits of gay-sensitive HIV instruction in schools. Am J Public Health. 2001 Jun; 91(6): 940-6.
4. Cochran SD, Mays VM. Lifetime prevalence of suicide symptoms and affective disorders among men reporting same-sex sexual partners: results from NHANES III. Am J Public Health. 2000 Apr; 90(4): 573-8.
5. Russell ST, Joyner K. Adolescent sexual orientation and suicide risk: evidence from a national study. Am J Public Health. 2001 Aug; 91(8): 1276-81.
6. Flentje A, Heck NC, Sorensen JL. Substance use among lesbian, gay, and bisexual clients entering substance abuse treatment: comparisons to heterosexual clients. J Consult Clin Psychol. 2015 Apr; 83(2): 325-34. doi:10.1037/a0038724
7. Cochran SD, Ackerman D, Mays VM, Ross MW. Prevalence of non-medical drug use and dependence among homosexually active men and women in the US population. Addiction. 2004 Aug; 99(8): 889-98. 10.1111/j.1360-0443.2004.00759.x
8. Drabble L, Midanik LT, Trocki K. Reports of alcohol consumption and alcohol-related problems among homosexual, bisexual and heterosexual respondents: results from the 2000 National Alcohol Survey. J Stud Alcohol. 2005 Jan; 66(1): 111-20.
9. Havanon N. Narrative approach: the turning point of social science research. J Mek Soc. 2009 May; 52(2): 1-22.
10. Bold C. Using narrative in research. London: Sage; 2012.
11. Podhisita C. Art and science of qualitative research. Bangkok: Amarin Printing and Publishing; 2011.
12. Reswell JW. Qualitative inquiry and research design: choosing among five traditions. 3rd ed. Thousand Oaks, CA: Sage; 2013.
13. Racine NM, Riddell RR, Khan M, Calic M, Taddio A, Tablon P. Systematic review: predisposing, precipitating, perpetuating, and present factors predicting anticipatory distress to painful medical procedures in children. J Pediatr Psychol. 2016 Mar; 41(2): 159-81. doi:10.1093/jpepsy/jsv076
14. Winters NC, Hanson G, Stoyanova V. The case formulation in child and adolescent psychiatry. Child Adolesc Psychiatr Clin N Am. 2007 Jan; 16(1): pp. 111-32, ix; doi: 10.1016/j.chc.2006.07.010
15. Adams S, Leukefeld CG, Peden AR. Substance abuse treatment for women offenders: a research review. J Addict Nurs. 2008; 19(2): 61-75. 10.1080/10884600802111648
16. Sinha R. Chronic stress, drug use, and vulnerability to addiction. Ann N Y Acad Sci. 2008 Oct; 1141: 105-30. doi: 10.1196/annals.1441.030
17. Rowen CJ, Malcolm JP. Correlates of internalized homophobia and homosexual identity formation in a sample of gay men. J Homosex. 2002; 43(2): 77-92.
18. Frost DM, Meyer IH. Internalized homophobia and relationship quality among lesbians, gay men, and bisexuals. J Couns Psychol. 2009 Jan; 56(1): 97-109.
19. Sakunpong N, Choochom O, Taephant N. Development of a resilience scale for Thai substance-dependent women: a mixed methods approach. Asian J Psychiatr. 2016 Aug; 22: 177-81. doi: 10.1016/j.ajp.2015.10.011
20. Sangchanchai P, Netrakom P. Hiranwiwatkun N. Textbook of addictive psychiatry. Bangkok: Office of the Narcotics Control Board; 2007.
21. Meyer IH. Prejudice, social stress, and mental health in lesbian, gay, and bisexual populations: conceptual issues and research evidence. Psychol Bull. 2003 Sep; 129(5): 674-97. 10.1037/0033-2909.129.5.674
22. Padilla YC, Crisp C, Rew DL. Parental acceptance and illegal drug use among gay, lesbian, and bisexual adolescents: results from a national survey. Soc Work. 2010 Jul; 55(3): 265-75.

Corresponding author
Nanchatsan Sakunpong can be contacted at: nanchatsans@gmail.com

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