The Effect of Support Group in Quality of Life of Breast Cancer Patients Undergoing Treatment in Bandung City

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Abstract. Breast cancer is the second largest cancer suffered by women in Indonesia. The problem that was generally complained of breast cancer patients was the decline in the quality of life of patients. Support groups are one of the more formal ways that social support can be given and received. The purpose of this study was to analyze the effect of group support in the quality of life of breast cancer patients. This study used quasi experiment method. Sampling technique was purposive sampling with number of samples were 40. The location this research was in cancer layer homes in Bandung City. The result of Repeated Anova in intervention groups showed the p-value was 0.000 or <0.05. As for the control group, the p-value showed 0.214 or >0.05. The result of One Way Anova in posttest 1 was 0.124 and for posttest 2 was 0.000. Support groups could be established in Cancer Layer Home as an effort to improve the quality of life of breast cancer patients.

Keywords: Breast Cancer, Cancer Homecare, Support group, Quality of life

1. Introduction
Breast cancer becomes the ultimate health problem for women today. Its development is so rapid that in 2012 there are 1.7 million new breast cancer patients worldwide. The incidence number globally is 39 to 43.3 per 100,000 people, while the number of deaths is 12.5% to 1.9% from the total of patient numbers. The number of incidence for breast cancer in Indonesia in 2012 is 40 per 100,000 people, according to Globocan and IARC. There are approximately 61,682 breast cancer patients, placing the second highest after cervix cancer in Indonesia. Yogyakarta is the province with the highest prevalence of breast cancer: 240 per 100,000 people, while in West Java the number is 30 per 100,000, placing lower in national breast cancer prevalence.

The most common problem for breast cancer patients are the decline of their life quality. This can be identified within the span of 6 months, 18 months, 36 months, and 60 months after diagnosis. This condition is easy to identify from advanced stage cancer patients undergoing chemotherapy.
One factor relevant to the patient’s quality of life is determining the type of treatment. A study finds that early choice for breast cancer patients is undergoing traditional or alternative treatment does not bring significant impact. This is different from the healthcare staff, who think otherwise. While some patients choose to undergo conventional therapy (modern), some others would go for the traditional way. The analysis of quality of life of breast cancer patients becomes necessary, knowing the relevancy to the development of their health condition. It also becomes the success indicator of the treatment program they’re undergoing. Moreover, it is the basis of intervention development that could improve their quality of life. In a systemic review of 27 articles relating to the determinant factor of their life quality, shows that patients with comorbidity, who undergoes chemotherapy, receives little social support, as well as has a lot of unfulfilled needs, are indicators of low life quality. Several studies show their attempt of improving the quality of life of breast cancer patients uses a method called writing expression, brings patients in a yoga class and exercise program reveals that music therapy has an effect of lowering anxiety. While another reference shows that support group may offer several activities that educate the patients about health, physical exercise, and art therapy. Compared to those three interventions, only support group that provides support intervention deriving from the patient’s social circles. The analysis result says lack of social support may contribute to this decline. Several other results also show that the form and approach are various depending on the objectives. The aim of this research is to analyze the impact of support group toward the quality of life of breast cancer patients. This research also involves one peer in support group who has been previously briefed. It also modifies the research element by including emotion, self-esteem support, information, and realistic support in the support group activity. The expected result is comprehensive change in the quality of life of the patients from the aspects of physical, psychological, social, and spiritual.

2. Method
The research was designed with quasi experiment and pretest posttest approach with control study. The population in Cancer Halfway House throughout 2017 is 250 patients. Sampling technique applies non probability sampling with purposive sampling approach. The inclusion criteria in this research is for intervention and control group for those patients undergoing treatment from surgery, radiation therapy, chemotherapy, those who are literate and willing to be respondents in pretest, posttest 1 and posttest 2. Meanwhile, exclusion criteria is those patients with feeble conditions and unable to participate in research activities, as well as those in stadium I or IV. The total number of the respondents is 40, discreetly divided into intervention group and control group.

The implementation of pilot study aims to test module content to be used and measure the implementation technique of support group. The result of pilot study is to revise several medical terms into a more easily digestible ones. This also includes combining two sessions into one. The final stage is forming peer. Peers are breast cancer patients entering the last stage of chemotherapy, having quality of lifescore between 290 and 410, and willing to be peer. They are briefed by researcher and given module to do peer exercise session before they do it to support group member.

The implementation of research starts from measuring the pretest of quality of life using quality of life
cancer survivor version (QOL-CSV)\cite{26,27} published by National Medical Center and Beckman Research Institute City of Hope consisting of 41 question items in English which has been translated into Indonesian by expert in Language Center Unpad. This is followed by face validity test.

Support group in this research have 5 groups with each peer 4 members in average. The implementation between groups in different time because it has been adjusted with the condition of respondents at Cancer Halfway House. The first week of implementation lasted for 2 hours. The first day is Session I and Session II. Session I includes introduction for each support group member and explain the objective, rules, and series of activities during the 30-minute support group.

This also includes responding and offering solutions for any problems. This activity lasted for 30 minutes. The second day of support group implementation is Session III and Session IV. The Session III activity is sharing health information about breasts, and necessary nutrition and possible physical activities. Peer uses leaflet as the media in giving health information. This activity lasted for 45 minutes.

Session IV is to assign meaning to life and think positively. This activity is focused more on how to raise spirit and spirituality of support group member. The activity lasted for 30 minutes. The second to the fifth week consists of guiding support group member done by peer through direct visitation or once-a-week phone call. For four weeks, peer will directly ask the health condition including total health condition, appetite, sleeping disorder, pain, fatigue, family support, and religious ritual activities. The sixth week is evaluation and posttest 2.

3. Research Result

The aims of this study was to determine the effect of support group on the quality of life of respondents. As the initial exposure to the results of this study begins with supporting data such as the characteristics of the peer, then will be presented the results of the quality of life in the control group and quality of life after receiving support group in intervention group and compare of quality of life on control group and intervention group.

| Characteristics                  | N   | %  |
|----------------------------------|-----|----|
| Education Level                 |     |    |
| Elementary School               | 4   | 80 |
| Middle School                   | 0   | 0  |
| High School                     | 1   | 20 |
| Occupation                      |     |    |
| Unemployed                      | 4   | 80 |
| Employed                        | 1   | 20 |
| Treatment                       |     |    |
| Post-chemotherapy               | 3   | 60 |
| Radiotherapy                    | 2   | 40 |
| Age (years)                     | Min | Max| Mean |
|                                 | 43  | 54 | 46.6 |
| Skor QoL                        | 296 | 350| 320.6|
| Span of suffering breast cancer (months) | 3   | 36 | 16  |
Table 2. Respondent Characteristics

| Characteristics                | Intervention Group (N=20) | Control Group (N=20) | Homogeneity Test |
|-------------------------------|---------------------------|----------------------|------------------|
|                               | N  | %       | N  | %       |                  |
| Education level               |    |         |    |         | 1.000<sup>c</sup>|
| Elementary School             | 12 | 60      | 13 | 65      |                  |
| Middle School                 | 3  | 15      | 3  | 15      |                  |
| High School                   | 4  | 20      | 3  | 15      |                  |
| University                    | 1  | 5       | 1  | 5       |                  |
| Marital Status:               |    |         |    |         | 0.751<sup>c</sup>|
| Married                       | 15 | 75      | 16 | 80      |                  |
| Single                        | 5  | 25      | 4  | 20      |                  |
| Occupation:                   |    |         |    |         | 0.831<sup>b</sup>|
| Employed                      | 6  | 30      | 6  | 30      |                  |
| Unemployed                    | 14 | 70      | 14 | 70      |                  |
| Current treatment:            |    |         |    |         | 0.785<sup>c</sup>|
| Post-surgery                  | 4  | 20      | 1  | 5       |                  |
| Chemotherapy                  | 9  | 45      | 14 | 70      |                  |
| Radiotherapy                  | 5  | 25      | 3  | 15      |                  |
| Drug control                  | 2  | 10      | 2  | 10      |                  |
| Cancer Stadium:               |    |         |    |         | 0.444<sup>b</sup>|
| Stadium II                    | 13 | 65      | 12 | 60      |                  |
| Stadium III                   | 7  | 35      | 8  | 40      |                  |
| Age(years old)                |    |         |    |         | 0.111<sup>a</sup>|
| Mean                          | 51 | 32-78   | 46.05 | 20-68 |                  |
| Span of cancer diagnosis      |    |         |    |         | 0.066<sup>a</sup>|
| (months)                      | 17.9| 3-48    | 11.25 | 3-26 |                  |
| Reproduction Status:          |    |         |    |         |                  |
| First menstruation(years)     | 14.35 | 9-18     | 14.40 | 9-18   | 0.934<sup>a</sup>|
| Marital age(years)            | 8.35  | 10-30    | 18.65 | 14-27  | 0.826<sup>a</sup>|
| First pregnant(years)         | 21.60 | 16-32    | 18.90 | 16-28  | 0.130<sup>a</sup>|
| Pregnant frequency            | 3.60  | 1-9      | 3.05  | 0-9    | 0.325<sup>a</sup>|
| Breastfeeding(months)         | 20.20 | 4-24     | 18.30 | 5-24   | 0.418<sup>a</sup>|

Legend:  a : independent t test,  b : chi square  c: fisher’s exact

Table 3. Scores of Quality of life Aspect and Data Normality Test

| Quality of Life Aspect          | Maximum Number | Intervention Group | Control Group |
|--------------------------------|----------------|--------------------|---------------|
|                                | Maximum | Pre Test | Post test | Post test | Post test | Pre Test | Post test | Post test |
|                                | Mean     | mean     | 1 mean    | 2 mean    | 1 mean    | mean     | 1 mean    | 2 mean    |
| Physical Aspect                | 80       | 46       | 47        | 57        | 40        | 44       | 47        |
| Psychological Aspect           | 180      | 100      | 119       | 138       | 106       | 109      | 109       |
| Social Aspect                  | 80       | 54       | 58        | 62        | 53        | 53       | 52        |
| Spiritual Aspect               | 70       | 67       | 68        | 69        | 67        | 67       | 68        |
| Total                          | 410      | 268      | 293       | 326       | 267       | 273      | 275       |
| Normality test                 | 0.407    | 0.798    | 0.160     | 0.769     | 0.593     | 0.960    |


Table 4. Score Difference of Quality of life in Intervention Group

| Quality of life | Mean±SD | F      | P   |
|----------------|---------|--------|-----|
| Pretest        | 268±44  | 52.798 | 0.000 |
| Posttest 1     | 293±35  |        |     |
| Posttest 2     | 325±23  |        |     |

Table 5. Mean Difference Score of Quality of life in Control Group

| Quality of life | Mean±SD | F    | P   |
|----------------|---------|------|-----|
| Pretest        | 267±33  | 1.655 | 0.214 |
| Posttest 1     | 273±41  |      |     |
| Posttest 2     | 275±38  |      |     |

Table 6. Impact of Support Group Score toward Quality of life in Posttest 1 between Intervention Group and Control Group

| Quality of life | F   | P   |
|----------------|-----|-----|
| Posttest 1     | 1.979 | 0.124 |
| Posttest 2     | 7.717 | 0.000 |

4. Discussion

Table 4 shows the value of F is 53.798 with p-value 0.000 and p-value <0.05 meaning that there is a mean significant difference in quality of life score in intervention group. Table 4 shows that the margin between pretest and posttest 1 is 25 temporary number for pretest and posttest 2 is 57 numbers.

In session III of support group activity is to give health information by peer to support group member. In the briefing session, peers discussed with researcher about the health education material and the experience of peers and healthcare staff, so this makes the peer better understand the researcher’s material.

This health information is part of the support that help the members maintain healthy lifestyle and correct the wrong assumption about the effects of chemotherapy. It is part of the emotional support, the health education and emotional support helps breast cancer patients lower their anxiety level, emotional disturbance, and depression.[28] Moreover, it also helps improve the quality of life of patients.

The combination of information support through health education and emotional support may impact to their life quality. Education health and emotional support for six weeks and doing follow-up through phone calls. The research result show significant increase to the quality of life in general and physical and emotional prosperity in specific.[29]

The most commonly discussed topic during the 3rd session of support group is how to overcome the effects of chemotherapy that was meant to lower the patient’s anxiety level. The result showed change in education level during the 1st phase of intervention. The next step shows improvement on self-efficacy. Their adequate knowledge becomes the patient’s motivation to improve their quality of life and their own breast cancer patients at the end of the research. The importance of psychoeducation to breast cancer patients. When patient gets support based on information that the patient needs, then he will show a better
change in terms of his life quality.\textsuperscript{[30]}

Table 5, however, shows the mean result of quality of life score within the measurement with F value of 1.655 or p-value $>0.05$, which means that between pretest and posttest 2 there is significant mean difference of quality of life score in the control group. In this table also, we can see the margin between pretest and posttest 1 is 6, while for pretest and posttest 2 is 8.

The non-specific score change in quality of life of respondents in control group may be triggered by the fact that support was not given consistently and not specifically. Control group obtains support such as from the patients in the halfway house, the nurses or healthcare staff. They also attend majlis ta'lim and other religious activities.\textsuperscript{[31],[32]}

The lack of clarity in giving support to breast cancer patients may trigger change to the life quality, especially emotion aspects become insignificant, social and health function.\textsuperscript{[33]} Different results in this research, shown in table 4, non-specific change occurs not only in psychological aspect but also social. This may be caused by family burden and financial condition, which in the end, affect social aspect.

Table 6 shows that in posttest 1, the F value (1.979) with p-value 0.124 or $>0.05$, meaning that there is no significant mean difference for quality of life score, and it could be concluded that support group doesn’t play significant role to improve quality of life during posttest 1.

Insignificant results in posttest 1 are caused by there is an intervention during measurement, where in week 3 support group with controlling phase is still in session V. The change in quality of life of these patients were done 1 month of more after the intervention, shows the change in their life quality.\textsuperscript{[34]}

On the other hand, in posttest 2 between intervention group and control group, F value is 7.1717 with p-value 0.0000 or $<0.05$. It can be concluded that there is a significant mean difference of the quality of life score in intervention group and control group. Also, support group plays role in improving the quality of life of the patients during posttest 2.

The result of posttest 2 is closely related to the activity of session V from support group, which his health controlling by peer by contacting a member of support group through phone calls every week for the total of four weeks. Or, if the peer and support group member are still in Cancer Halfway House, then they can do direct visitation. Session V is a series that follows up session I to session IV, but the implementation is not in a group format because the respondents have gone back home to their own regions.\textsuperscript{[35],[36]}

The personal guidance to breast cancer patients by directly visiting them or continuously calling them works so well. This way, they can share private matters to their peers. This series of guidance turn out to contribute to the improvement of their life quality.\textsuperscript{[37],[38]}

The limitation of this research includes lack of standardization of choosing peer in the first place quantitatively, to either measure early knowledge of peer during support group briefing and determine evaluation format throughout the process and the content for each session in support group. Therefore, the selection process was only based on the peer criteria drafted by researcher. The implementation of session V was not in a group format because it’s impossible for peer and support group to gather in Cancer Halfway House. Session V is a health controlling activity for support group member. This is done by contacting support group through phone calls. This session is more individualistic than group session.

5. Conclusion

The conclusion of this research is that support group has significant change toward the quality of life of breast cancer patients. Intervention group shows significant mean in quality of life before and after given support group, but control group shows otherwise. Respondents participating in support group for six weeks, show significant mean difference on the score of quality of life. Peer may be formed in Cancer Halfway House, especially for patients who are in the phase of treatment control, with better health condition, and finishing chemotherapy or radiotherapy treatment.
6 Reference

[1] Cardoso F 2016. Global Status of Advanced Metastatic Breast Cancer, 2005-2015 (Portugal: Pfizer oncology, Advance Breast Cancer Converence ABC3)

[2] Kementrian Kesehatan Indonesia 2016. Oktober, Bulan Peduli Kanker Payudara. Pusat Informasi dan Data kementerian Kesehatan (Indonesia : Pusdatin)

[3] Purkayastha D, Venkateswaran C, Nayar K and Unnikrisnann UG 2017 Prevalence of Depresion in Breast Cancer Patient and Its Association with Quality of Life. The Indian J of Palliat Care. Juli-Sep 23 268-73

[4] Maly RC, Liu Y, Liang LJ, and Ganz PA 2014 Quality of Life Over 5 Year After a Breast Cancer Diagnosis Among Low-Income Women: Effects of Race/ Ethnicity Patient-Physician Communication. Cancer March 15

[5] Kwan M et al 2010 Quality of life among women recently diagnosed with invasive breast cancer: the Pathways Study. Breast Cancer Res Treat: 123 507–24

[6] Lu W, Cui Y, Chen X, Zheng Y, Gu K, Cai H, Zheng W and Shu X 2009. Change in Quality of Life among Breast Cancer Patients Three Years Post-Diagnosis. Breast Cancer Rest Treat 114 357-69

[7] Irawan E, Rahayuwarti, L, and Yani, D Indonesia 2017 Hubungan Penggunaan Terapi Modern Dan Komplementer Terhadap Kualitas Hidup Pasien Kanker Payudara Yang Menjalani Kemoterapi. Jurnal Keperawatan Padjadjaran (JKP).

[8] Rahayuwarti L, Ibrahim K and Mardiah W 2016 Health Seeking Behavior on Breast Therapies: Patients’ Versus Providers’ Views. J Com Pub Health Nurs 2016 2:3

[9] Paraskevi T 2012 Quality of Life Outcomes in Patients with Breast Cancer. Oncology Reviews ; 6:e2

[10] Dodd MJ, Cho MH, Cooper BA and Miaskowski M 2010 The Effect of Symptom Clusters on Function Status and Quality of Life in Women with Breast Cancer. Eur J Onc Nurs 14 101-10

[11] Ho PJ, Gernaat S, Hartman M and Verkooljen 2018 Health-related quality of life in Asian patients with breast cancer: a systematic review. BMJ Open 8: e020512

[12] Wu P-H, Chen SW, Huang WT Chang SC and Hsu MC 2018 Effects of a Psychoeducational Intervention in Patients With Breast Cancer Undergoing Chemotherapy. J Nurs Res Aug 26 266-279

[13] Aguirre-C A, Pelletier G, Gonzalez-M A, Blanco-D L, Garcia-B P and Maren-J B 2017. The Relevance of Experiential Avoidance in Breast Cancer Distress. Psychooncology 26 4 469–75

[14] Lu Q, Wu I, Dong L, You J, Huang J and Hun Y 2018 The impact of an expressive writing intervention on quality of life among Chinese breast cancer patients undergoing chemotherapy. Supportive Care in Cancer 10.1007/s00520-018-4308-9

[15] Yagli N and Ulger O 2015. The effects of yoga on the quality of life and depression in elderly breast cancer patients. Complementary Therapies in Clinical Practice. 7-10. Elsevier Publication.

[16] Boehm K, Cramer H, Staroszynski T and Oestermann, T 2014. Arts Therapies for Anxiety, Depression, and Quality of Life in Breast Cancer Patients: A Systematic Review and Meta-Analysis. Hindawi Publishing Corporation Evidence-Based Complementary and Alternative Medicine 2014 103297, 9

[17] Allicoc M, Haynes-M L, Johnson L, Carpenter W, Vines A, Belle D, Phillips R and Cerry M 2017. Peer Connect fo African American Breast Cancer Survivors and Caregivers. Society of Behavioral Medicine 19 April

[18] Felder TM, Estrada RD, Quinn JC, Phelps KW, Parker PD and Heiney SP 2017 Expectations and Reality: Perceptions of Support among African American Breast Cancer Survivor. Ethn Health. Sep 4 1-17

[19] Ho RT, Fong TC, Lo PH, Ho SM, Leung PP, Spiegel D and Chan CL 2016 Randomized Controlled Trial Of Supportive-Expressive Group Therapy and Body-Mind-Spirit Intervention for Chinese
Non-Metastatic Breast Cancer Patients. Support Care Cancer 24 4929–37
[20] Ashing-Giwa K, Tapp C, Rosales M, McDowel K, Martin V, Santifer R, Clark P, Steward J, Lewis L and Mitchell E 2012 Peer-Based Model of Support Care Oncology Nursing Forum 39 6 Period November. P.585-91
[21] Björnrklett HG, Lindemalm C, Ojutkangas ML, Berglund A, Letocha H, Strang P and Bergvist L 2012. A Randomized Controlled Trial of Support Group Intervention on The Quality of Life and Fatigue. Support Care Cancer 20 12 3325-34
[22] Galantino ML, Schmid P, Botis S, Dagan C, Leonard SM and Milos A 2010 Exploring Wellness Coaching and Traditional Group Support for Breast Cancer Survivor: A Pilot Study. Rehabilitation Oncology 28 1
[23] Mattson F and Hall G 2011 Health as Communication Nexus: A Service Learning Approach; Linking Health Communication with Social Support. Chapter 6. (United State of America: Property of Kendall Hunt Publishing Co)
[24] Sujarweni VW 2015 Statistik untuk Kesehatan. (Yogyakarta Indonesia: Penerbit Gava Media) p 20
[25] Dahlan S 2012 Statistik untuk Kedokteran dan Kesehatan.(Jakarta Indonesia: Salemba Medika) p 90
[26] Haris, Rahayuwati L and Yamin A 2018 The Factor Relevant to The Quality of Life of Breast Cancer Patients. Proceeding The 6Th Padjadjaran International Nursing Conference, 23-24 May (Bandung Indonesia: Nursing faculty of Padjadjaran University)
[27] Chopra I and Kamal KM 2012. A Systematic Review of Quality of Life Instruments In Long-Term Breast Cancer Survivor. Health and quality of life outcomes. 10 14
[28] Lancu M, Pop F, Farcas R, Gherman A, Zgaia A, Vlad C, Irimie A and Achimas-C P 2017 The Effect of Psychological Group Intervention on Emotional Problems, Event Impact and Quality of Life in Breast Cancer Patients Under Radiotherapy: A Pilot Study. JEBP 17 2 September, 133-46
[29] Park HJ, Bae SH, Jung YS and Kim KS 2012 Quality of Life and Symptom Experience in Breast Cancer Survivor After Participating in A Psychoeducational Support Program. Cancer Nursing 35, 1 10.1097/NCC.0b013e318218266a
[30] Inan F and Ustun B 2018 Home-Based Psychoeducational Intervention for Breast Cancer Survivor. Cancer Nursing May/Jun 41 3 238-47
[31] Crook B and Love B 2016. Examining the Light and Dark of an Online Young Adult Cancer Support Community. Qualitative Health Research Sage Pub. 27 938-48
[32] Hatamipour H, Rossouli M, Yaghmaie F, Zendedel K and Majd HA 2015 Spiritual Needs of Cancer Patients: A Qualitative Study. Indian J Palliative C / Jan-Apr 21
[33] Kasim M, Hanafia K, Ceung H and Rahman M 2015 Influence of Support Group Intervention on Quality of Life of Malaysian Breast Cancer Survivor. Asia-Pacific Journal of Public Health . 27 2 NP495 –NP505.
[34] Tehrani AM, Farajzadegan Z, Rajabi FM, and Zamani AR 2011 Belonging to A Peer Supprt Group Enhace The Quality of Life and Adherence Rate in Patients Affected by Breast Cancer: A Non-Randomized Controlled Clinical Trial. JRMS May 16 5 658-65
[35] Sharif F, Abshorshori N, Tahmasebi S, Hazrati M, Zare N and Masoumi S 2010 The Effect of Peer-Led Education on The Quality of lifeof Mastectomy Patients Referred to Breast-Cancer Clinics in Shiraz, Iran 2009. Health And Quality of Life Outcomes.8 74
[36] Høybye MT, Dalton SO, Deltour I and Bidstrup 2010. Effect of Internet Peer-Support Groups on Psychosocial Adjustment to Cancer; A Randomised Study. British J canc 102 1348-54
[37] Mahendran R, Lim H, Tan J, Ng H, Chua J, Lim S, Kua E and Griva K 2017 Evaluation of Brief pilot Psychoeducational Support Group Intervention for Family Caregivers of Cancer Patients: a quasi-experimental Mixed-Methods Study. Health and Quality of Life Outcome 15 17 BioMed Central.
[38] Shin S and Park H 2017 Effect of Empowerment on the Quality of Life of the Survivors of Breast Cancer: The Moderating Effect of Self-Help Group Participation. *Jpn J Nurs Sci* **14** 4, 311–19

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