Assessment of Perceived Health Status in Hypertensive and Diabetes Mellitus Patients at Primary Health Centers in Oman

Ahmed Al-Mandhari, Ibrahim Al-Zakwani, Alya Al-Hasni, Nada Al-Sumri

ABSTRACT

Objectives: This study aimed to assess the impact of diabetes mellitus and hypertension as well as other demographic and clinical characteristics on perceived health status in primary health centers in Oman.

Methods: In a cross-sectional retrospective study, 450 patients (aged ≥ 18 years) seen at six primary health centers in Wilayat A' Seeb in the Muscat region, Oman, were selected. Perceived health status of the physical (PSCC) and mental (MSCC) components of quality-of-life were assessed using the 12-item short form health survey (SF-12). The analyses were performed using univariate statistical techniques.

Results: The mean age of the participants was 54 ± 12 years and they were mostly female (62%). The presence of both diabetes mellitus and hypertension was associated with lower physical scores compared to those with diabetes alone (p = 0.001) but only marginally lower than those with hypertension alone (p = 0.066). No significant differences were found across the disease groups in mental scores (P = 0.578). Age was negatively correlated (p < 0.001) but male gender (P < 0.001), married (p < 0.001), literate (p < 0.001) and higher income (p = 0.002) were all associated with higher physical scores. Moreover, longer disease duration was associated with lower physical scores (p < 0.001). With regards to the mental status, male (p = 0.005), marriage (P = 0.017) and higher income (p < 0.001) were associated with higher mental scores. Polypharmacy was associated with lower physical (p < 0.001) and mental (p = 0.005) scores.

Conclusions: The presence of both diseases was associated with lower physical scores of perceived health status. Health status was also affected by various demographic and clinical characteristics. However, the results should be interpreted in light of the study’s limitations.

Keywords: Perceived health status, Hypertension, Diabetes mellitus, Primary health centers, Oman.

INTRODUCTION

Perceived health is a subjective assessment that people make about their own health state and it is an indicator of overall health status. It is included as one of the World Health Organization (WHO) health targets. Perceived health status is not a substitute for more objective health outcomes but rather complements them. Perceived health status accords well with objective health status. It is a useful and valid measure of population’s overall well-being. This is because lower ratings of health status have been associated with increased morbidity and mortality. Perceived health status is generally accepted as a valid measure of health status in population studies.
and understanding its correlates may help public health professionals prioritize health promotion and disease–prevention interventions. Several factors related to demographic, socio-economic and lifestyle characteristics have been found to be related to perceived health status. Chronic diseases such as stroke and disability have also been found to influence one’s perception of health. 

Hypertension and diabetes mellitus are considered to be the most prevalent chronic diseases in both developing and developed countries. A large survey in the United States from 1996-2005 concluded that self-rated fair or poor health was three times more common among adults with diabetes than those without diabetes. Existing studies on the perceived health and symptoms of elderly patients with diabetes have shown that diabetic patients rate their health more negatively and report more symptoms than do non-diabetic patients. Duration of diabetes is also an important factor in perception of one’s own health. It is a significant predictor of mortality in people with older onset diabetes but not in those with younger onset diabetes where physical health status is controlled. 

Similarly, it is also well known that hypertension affects patient’s quality of life. Self-perception of health status correlates well with hypertension and its co-morbid conditions. Individuals with two or more risk factors who rated their own health as ‘not good’ were much more likely to have a stroke. These were gender specific and education sensitive. Men appeared to be at greater risk of stroke than women, as were older educated people of both sexes. Perceived ill-health amplifies the risk for development of coronary artery disease. Perceived health status is also reflected in the number of visits to the health care system. Hypertensive patients with poor self-perceived health tend to have more visits. To our knowledge, there are currently no specific studies on perceived health status on hypertension and diabetes mellitus patients in Oman. The aim of this study was to assess the impact of diabetes mellitus and hypertension as well as other demographic and clinical characteristics on perceived health status in primary health centers in Oman.

METHODS

This was a retrospective cross-sectional study conducted in the Wilayat of As-Seeb (one of the six Wilayats in the Muscat region). At the time of the study, the primary health care service was provided by six health centers (Al-Maabela North, Al-Maabela South, Al-Shaadi, As-Seeb, Al-Khoudh and Al-Mawaleh). These centers provide comprehensive primary health care services as prescribed by the Ministry of Health (MoH) of Oman. They also serve a considerable population (223, 267 patients). In addition, these centers run specialty clinics for chronic conditions including those for hypertension and diabetes. The target population for this study was all patients with hypertension and/or diabetes aged ≥ 18 years of age attending the aforementioned health centers during the study period (January 1st 2007 till December 31st 2007).

Hypertension and diabetic registries in each of the 6 health centers were used to obtain the total number of patients registered in the study period (2,923 patients). To estimate an approximate prevalence rate of 20% for diabetes mellitus and hypertension patients with an error margin of 5% and 95% confidence intervals, a sample size of 227 patients was needed. To compensate for drop-outs, losses to follow-up, as well as missing information, the sample size was more than doubled to 450. About 15% of the patients were sampled from each of the health centers. The patients were selected randomly on the day that they came for their follow up provided they matched the inclusion criteria (diabetes/or hypertension).

Two forms were used to collect the needed data. The first was a checklist of indicators/outcomes for each disease (diabetes/hypertension) with socio-demographic details (Form 1). The second was the 12-item short form health survey (SF-12) questionnaire that was used to assess the perceived health status (Form 2). The questionnaire, Form 1, was administered by the investigators (AH & NS). Information was retrieved from the computerized healthcare system in each of the health centers (known as the Al-Shifaa). Some of the information regarding demographic variables was obtained by direct interview with the patients. This information included age, sex, marital status, financial status, educational status and lifestyle status (smoking, alcohol drinking). It also included history of any chronic illness or disability (asthma, osteoarthritis, cancer, depression, seizure, etc), duration of hypertension/diabetes, number of visits, and drug history. Health indicators like blood pressure (BP), body mass index (BMI), glycated hemoglobin (HbA1c) were recorded retrospectively. For the
control of hypertension, BP value of < 140/90 mmHg was considered to be good control. However, for patients with diabetes, BP value of < 130/80 mmHg was considered as good control. With regards to HbA1c, a value < 7% represented good control. Complications of hypertension /diabetes were also included. Recorded complications were retinopathy, nephropathy, neuropathy, coronary artery disease and cerebrovascular disease.

Form 2 was the questionnaire SF-12, which is an internationally developed tool to assess perceived health status. It has been translated into different languages, but not Arabic. The Arabic version was obtained from the principal investigator (AM) who had translated and published it in a previous study. The SF-12 questionnaire measures generic health concepts relevant across age, disease, and treatment groups. It provides a comprehensive psychometrically sound and efficient way to measure health from patient’s point of view by scoring standardized responses to standard questions. The 12 questions assess eight dimensions of health: 1) physical functioning; 2) physical role; 3) bodily pain; 4) general health; 5) vitality; 6) social functioning; 7) emotional role; and 8) mental health. Two scores were given for each option, after which all scores were added up to give two component summary (PCS) and the mental component summary (MCS) scores. The SF-12 questionnaire was administered by the authors themselves (AH, NS) who were trained in keeping consistency when asking the questions.

Institutional review board approval was granted and verbal consent was taken by the interviewers just before the interview. Patient confidentiality was strictly maintained throughout.

Statistical analysis

Descriptive statistics were used to describe the data. For categorical variables, frequencies and percentages were reported. Differences between groups (hypertension, diabetes, both) were analyzed using univariate logistic regression. However, the relationship between the variables, finance and number of prescriptions, with clinic type was analyzed using Fisher’s exact test. For continuous variables, mean and standard deviation were used to present the data while analysis was performed using univariate ordinary least squares (OLS) regression. For those continuous variables that are abnormally distributed, median and interquartile ranges were used to present the data while the analysis was performed using the non-parametric test, Kruskal-Wallis. The relationship between the various demographic, clinical and healthcare resource use characteristics and health-related quality of life as measured by SF-12 were evaluated using OLS regression (categorical and continuous variables) and Pearson’s correlation coefficient test (continuous variables). However, the relationship between duration and both physical and mental component scores of SF-12 were analyzed using Spearman’s correlation coefficient. An a priori two-tailed level of significance was set at the 0.05 level. Statistical analyses were conducted using STATA version 11.1 (STATA Corporation, College Station, TX).

RESULTS

In total, 450 participants were randomly enrolled for this study. Twenty-one percent (n = 95), 39% (n = 176), and 40% (n = 179) had hypertension, diabetes, and both hypertension and diabetes, respectively. The overall mean age of the participants was 54 ± 12 years. Most of the participants were females (62%; n = 277), married (75%; n=339), literate (56%; n = 254), non smoker (91.1%; n = 410), had high BMI (30 ± 5.7 kg/m²), poor blood pressure control (81%; n = 364), poor HbA1c control (88%; n = 390), had more frequent healthcare visits (monthly or less) (60%, n = 271), had higher number of prescriptions (≥ 4) (64%; n = 289) with a median disease duration of 7 (4-10) years (Table 1).

Those participants with diabetes alone were significantly younger compared to those with hypertension (49 vs. 54 years; P < 0.001) or those with both hypertension and diabetes (49 vs. 56 years; p < 0.001). Illiteracy was associated more with those that had both hypertension and diabetes than those with diabetes alone (50% vs. 33%; p = 0.005). Systolic (141 vs. 129 mmHg; P < 0.001) and diastolic (84 vs. 80 mmHg; p < 0.001) blood pressures were significantly higher in those with dual diseases compared to those with diabetes alone. Furthermore, blood pressure control was worse in those with dual disease when compared to those with hypertension (6% vs. 33%; p = 0.001) or diabetes (6% vs. 19%; p = 0.015) alone. With regards to blood pressure control, those with hypertension alone fared better when compared to those with diabe-
tes alone (33% vs. 19%; p < 0.001). Those that had dual disease had worse control of their HbA1c (< 7%) when compared to those that had diabetes alone (14% vs. 26%; p < 0.001). Dual disease was also associated with higher number of prescription use compared to those with single diseases (88% vs. 50% vs. 45%; p < 0.001). Moreover, those with dual disease were associated with higher median disease duration compared to those with both hypertension and diabetes alone (8 vs. 6 vs. 6 years; p < 0.001).

Dual disease was associated with lower physical scores of the SF-12 when compared to those with diabetes alone (37 vs. 42; p = 0.001) but only marginally lower when compared to those with hypertension alone (37 vs. 39; p = 0.066). No significant differences in mental components of the SF-12 quality-of-life instrument were noted across the different diseases (Table 2).

Table 3 outlines the relationships between the various demographic and clinical characteristics of participants against the physical components of the SF-12. Age was negatively correlated with the physical components. Specifically, older age was associated with lower physical scores (rho -338; p < 0.001). Male (43 vs. 37; p < 0.001), married (40 vs. 35; p < 0.001), and literate (42 vs. 36; p < 0.001) participants were associated with higher physical components of the SF-12 when compared to their opposite counterparts.

| Table 1. Demographic and clinical characteristics of the study participants |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Characteristic                  | All (N = 450)   | Diabetes mellitus (n = 95; 21%) | Hypertension (n = 176; 39%) | Diabetes mellitus and hypertension (n = 179; 40%) | p value         |
| Age (mean ± SD), years          | 54 ± 12         | 49 ± 14         | 54 ± 12         | 56 ± 10         | < 0.001         |
| Female gender, n (%)            | 277 (62%)       | 52 (55%)        | 114 (65%)       | 111 (62%)       | 0.269           |
| Married, n (%)                  | 339 (75%)       | 78 (82%)        | 129 (73%)       | 132 (74%)       | 0.207           |
| Literate, n (%)                 | 254 (56%)       | 64 (67%)        | 101 (57%)       | 89 (50%)        | 0.017           |
| Smoking status, n (%)           | 40 (8.9%)       | 6 (6.3%)        | 16 (9.1%)       | 18 (10.2%)      | 0.561           |
| Monthly income, n (%)           | < 100 OR        | 40 (8.9%)       | 8 (8.4%)        | 21 (11.9%)      | 0.025           |
|                                | 100-199 OR      | 154 (34%)       | 22 (23%)        | 59 (34%)        | 73 (41%)        |
|                                | 200-499 OR      | 171 (38%)       | 43 (45%)        | 62 (35%)        | 66 (37%)        |
|                                | 500-999 OR      | 61 (14%)        | 14 (15%)        | 29 (16%)        | 18 (10%)        |
|                                | ≥ 1000 OR       | 24 (5.3%)       | 8 (8.4%)        | 5 (2.8%)        | 11 (6.2%)       |
| Body mass index (mean ± SD), kg/m² | 30 ± 5.7       | 29 ± 5.7       | 30 ± 5.8       | 30 ± 5.7       | 0.161           |
| SBP (mean ± SD), mmHg           | 138 ± 17        | 129 ± 16        | 140 ± 16        | 141 ± 16        | < 0.001         |
| DBP (mean ± SD), mmHg           | 83 ± 9          | 80 ± 8          | 85 ± 10         | 84 ± 10         | < 0.001         |
| BP control*, n (%)              | 86 (19%)        | 18 (19%)        | 58 (33%)        | 10 (6%)         | < 0.001         |
| HbA1c (mean ± SD), %            | 8.5 ± 2.2       | 9.3 ± 2.2       | N/A             | 8.2 ± 2.1       | < 0.001         |
| HbA1c control (< 7%), n (%)**   | 60 (22%)        | 47 (26%)        | N/A             | 13 (14%)        | 0.015           |
| Monthly visits or less, n (%)   | 271 (60%)       | 58 (61%)        | 106 (60%)       | 107 (60%)       | 0.979           |
| No. of prescriptions, n (%)     | ≤ 1             | 26 (5.8%)       | 8 (8.4%)        | 17 (9.7%)       | 1 (0.6%)        | < 0.001         |
|                                | 2-3             | 135 (30%)       | 44 (46%)        | 71 (40%)        | 20 (11%)        |
|                                | ≥ 4             | 289 (64%)       | 43 (45%)        | 88 (50%)        | 158 (88%)       |
| Disease duration, median (IQR), years | 7 (4-10)       | 6 (3-9)        | 6 (3-10)        | 8 (5-12)        | < 0.001         |

SD: Standard deviation; SBP: Systolic blood pressure; DBP: Diastolic blood pressure; N/A: Not applicable; IQR: Inter-quartile range; No: Number, OR: Oman Rial
* BP control: < 130 mmHg for SBP and < 80 mmHg for DBP for patients with diabetes; and < 140 mmHg for SBP and < 90 mmHg for DBP for the rest
** Percents are only for patients with diabetes
Table 2. Self-perceived health status on the physical (PSCC) and mental (MSCC) health components of the SF-12 quality-of-life instrument

| Characteristic                        | All (N = 450) | Diabetes mellitus (n = 95; 21%) | Hypertension (n = 176; 39%) | Diabetes mellitus and hypertension (n = 176; 40%) | p value |
|---------------------------------------|--------------|---------------------------------|----------------------------|---------------------------------|--------|
| PS CC (mean ± SD)                     | 39 ± 11      | 42 ± 10                         | 39 ± 11                    | 37 ± 12                         | 0.002  |
| MSCC (mean ± SD)                      | 44 ± 10      | 43 ± 11                         | 45 ± 11                    | 44 ± 9                          | 0.578  |

SD: Standard deviation; Analyses were carried out by univariate ordinary least squares (OLS) regression

The table also indicates that higher monthly income was associated with higher physical scores (p = 0.002). Those who had monthly visits (or fewer) were associated with higher physical scores when compared to those with longer visits (40 vs. 37; p < 0.001). Furthermore, those with higher number of prescriptions were associated with lower physical scores (p < 0.001). Moreover, longer disease duration was associated with lower physical components of the SF-12.

Table 3. Relationship between demographic and clinical characteristics against both physical (PSCC) and mental (MSCC) composite scores of the SF-12 (N=450)

| Characteristic                          | PSCC Rho or means wherever appropriate | p value | MSCC Rho or means wherever appropriate | p value |
|-----------------------------------------|----------------------------------------|---------|----------------------------------------|---------|
| Age                                     | -0.338                                 | < 0.001 | 0.096                                  | 0.043   |
| Female gender (vs. male)                | 37 vs. 43                              | < 0.001 | 43 vs. 46                              | 0.005   |
| Married (vs. un-married)                | 40 vs. 35                              | < 0.001 | 45 vs. 42                              | 0.017   |
| Literate (vs. illiterate)               | 42 vs. 36                              | < 0.001 | 44 vs. 44                              | 0.839   |
| Smokers (vs. non-smokers)               | 40 vs. 39                              | 0.627   | 42 vs. 44                              | 0.209   |
| Monthly income                          |                                        |         |                                        |         |
| < 100 OR                                |                                        |         |                                        |         |
| 100-199 OR                              | 37 vs. 36                              | 0.124   | -0.003                                 | 0.950   |
| 200-499 OR                              | 39 vs. 36                              | 0.530   | 0.016                                  | 0.734   |
| 500-999 OR                              | 43 vs. 36                              | 0.051   | 44 vs. 44                              | 0.747   |
| ≥ 1000 OR                               | 43 vs. 36                              | 0.055   | 45 vs. 43                              | 0.151   |
| Body mass index                         | -0.073                                 | 0.124   | -0.003                                 | 0.950   |
| SBP (mmHg)                              | -0.145                                 | 0.002   | 0.056                                  | 0.238   |
| DBP (mmHg)                              | -0.030                                 | 0.530   | 0.016                                  | 0.734   |
| BP control (vs. not-controlled)         | 41 vs. 38                              | 0.051   | 44 vs. 44                              | 0.747   |
| HbA1c (%)                               | 0.117                                  | 0.055   | -0.087                                 | 0.151   |
| HbA1c control (< 7%) (vs. not controlled) | 36 vs. 39                              | 0.062   | 45 vs. 43                              | 0.269   |
| Monthly visits or less (vs. longer visits) | 40 vs. 37                              | < 0.001 | 46 vs. 42                              | < 0.001 |
| No. of prescriptions, n (%)             |                                        | < 0.001 |                                        |         |
| ≤ 1                                     |                                        |         |                                        |         |
| 2-3                                     | 41 vs. 44                              | 45 vs. 46 |                                        |         |
| ≥ 4                                     | 37 vs. 44                              | 44 vs. 46 |                                        |         |
| Disease duration, median (IQR), years   | -0.255                                 | < 0.001 | -0.037                                 | 0.434   |

SD: Standard deviation; SBP: Systolic blood pressure; DBP: Diastolic blood pressure; N/A: Not applicable; IQR: Inter-quartile range; No: Number
* BP control: < 130 mmHg for SBP and < 80 mmHg for DBP for patients with diabetes; and < 140 mmHg for SBP and < 90 mmHg for DBP for the rest
** Percents are only for patients with diabetes
higher mental scores when compared to those with longer visits (46 vs. 42; P < 0.001). Furthermore, those with higher number of prescriptions were associated with lower mental scores (p = 0.005). Higher scores of the physical component of perceived health was significantly associated with good control of systolic blood pressure (p = 0.002). There was marginally significant association between good blood pressure control in patients with hypertension and patients with diabetes and the physical component of the perceived health (p = 0.051). HbA1C control was only marginally associated with higher physical scores (p = 0.062). Such association was not significant with the mental scores.

**DISCUSSION**

This is the first study of its kind in Oman to assess the association between perceived health status and various socio-demographic factors, type and duration of disease in patients with diabetes and hypertension. The study found that patients with dual disease have lower physical score than those with diabetes or hypertension alone. One explanation for this finding is that patients with diabetes were at younger age compared to those with dual diseases. This is further supported by the findings that older age was associated with lower physical score. Another possible explanation could be that patients with dual diseases are using multiple medications and have longer disease history compared to those with diabetes only. However, there was no significant difference in the mental score between patients having diabetes and/or hypertension.

Age was found to be negatively correlated with physical scores. This is self-explanatory as physical illness increases with age. In contrast, no correlation was found between the mental score and age. However, this finding is expected given the Omani culture with extended family concept which may play a role in securing the emotional status of elderly people. Being male and married was associated with higher physical and mental scores. Such findings can be explained by the fact that men are having better overall perception of life compared to women. Similarly, married people have less frequent visits to health care facilities and are emotionally stable compared to the unmarried counterparts. The findings of the current study are in the same line with those of other studies. Martin Lindstrom and colleagues found in their study that “never married and the divorced” had significantly higher poor self-rated health than “married” group. On the other hand, financial status has a significant effect on the perceived health status as higher monthly income was associated with better self-perceived physical and mental scores. This is similar to the findings of the study done by Wagstaff and Van Doorslaer, in which they found negative effect of low income on population health. This could be explained by the fact that people with higher income have better access to high quality health care services. Literacy had a positive effect on the physical component of the self-perceived health but not on the mental component. A recent study done by Faresjo and Rahmqvist concluded that educational level appears to be a vital factor for good perceived health. This can be explained as literate people read more and become more anxious about their health in our culture. Smoking was not shown to have any effect on the self-perceived health in this study as majority of the population was non-smokers. Furthermore, BMI was not shown to have significant effect on the perceived health status in our study. This is in contrary with other studies which have shown that obese as well as underweight subjects were more likely to have poor self-rated health. The finding in our study could be explained by the fact that the majority of the selected sample had high BMI.

Interestingly, our study found that perceived health status is affected by the number of visits to a local health center. Those with frequent visits like monthly or less had higher scores of perceived physical and mental health status. This could mean that continuity of care has a positive influence on the self-perceived health status. This is similar to what Finkelstein et al. found in their study. As there are factors that reflect disease control and at the same time may have an impact on the perceived health status, the current study found interesting results. On the one hand, it was found that patients with longer disease duration have lower physical score. In contrast, no significant association was found with the perceived mental health status. Such finding was not explored in patients with hypertension or diabetes. However, presence of chronic diseases was found to be associated with poor self-rated health. On the other hand, the study showed that patients using four or more drugs reported lower physical and mental scores. This finding is similarly reported by some studies such as the one reported...
by Moen et al. However, only marginal association was found between perceived physical health status and HbA1C, which is considered as one of the indicator of disease control. Such association was not found with the perceived mental health. This could be explained by the fact that physical symptoms of diabetes such as polyuria, polydipsia and nocturia affect patient's quality of life and hence link with the perceived physical health. Similarly, there was only marginal association between controlled blood pressure (< 130/80 mmHg for patients with diabetes and < 140/90 mmHg for hypertensive) and the perceived physical health (p = 0.051). In contrast, good control of the systolic blood pressure had significant positive effect on the physical score of the self-perceived health (p = 0.002). There was no association with the perceived mental health. However, no similar studies showed such results. This needs to be explored by further studies and on other chronic illnesses.

In spite of our study findings, it deems necessary to state its limitations. The first limitation is that the sample was selected from one area in the capital region (Muscat), which might not represent the whole community with regard to the demographics and clinical characteristics. Secondly, Arabic self-perceived health status questionnaire was used for the first time in patients with diabetes and hypertension in Oman or the region at large. However, this questionnaire has been used earlier in the Omani general community, which showed it to be a valid and reliable instrument. Moreover, this questionnaire can be used in diabetes and hypertension since it covers all domains of health. It is also important to note that correlations, though statistically significant, were generally weak.

**CONCLUSION**

Our study showed that there was significant association between perceived health status and other demographic, socio-economic and clinical characteristics of patients suffering from chronic illnesses. These findings reflect the importance of considering these factors in order to ensure providing comprehensive care. Furthermore, it reflects the importance of considering these factors during care delivery in order to improve the quality of life for patients suffering from such chronic illnesses. However, more research on this area is needed to corroborate our findings in Oman or the region at large.

**ACKNOWLEDGEMENTS**

The authors would like thank the Ministry of Health for approving the study. Special thanks for all the Medical Officers in-charge of the above health centers and to Dr. Rizvi (Department of Family Medicine & Public health, Sultan Qaboos University). The authors reported no conflict of interest and no funding was received on this work. The authors alone are responsible for the content and writing of the paper.

**Conflict of interest statement:** All authors declare that they have no conflict of interest.

**Source of funding:** None.

**REFERENCES**

1. European Community Health Indicators and Monitoring (ECHIM). Public Health. [cited 2010 May 23]. Available from: URL: http://www.healthindicators.eu/object_document/o5873n28314.html
2. The European Commission. Development of public health performance indicators for the pharmaceutical sector. [cited 2011 Feb 23]. Available from: URL: http://ec.europa.eu/health/ph_information/dissemination/pharma/index_en.print.htm
3. Hunt SM, McKenna SP, McEwen J, Backett EM, Williams J, Papp E. A quantitative approach to perceived health status: a validation study. J Epidemiol Community Health 1980; 34(4): 281-6.
4. Unden AL, Elofsson S. Health from the patient's point of view. How does it relate to the physician's judgement? Fam Pract 2001; 18(2): 174-80.
5. Hennessy CH, Moriarty DG, Zack MM, Scherr PA, Brackbill R. Measuring health-related quality of life for public health surveillance. Public Health Rep 1994; 109(5): 665-72.
6. Lorraine PJ, Hammock RL, Blanton JM. Predictors of self-rated health status among Texas residents. Prev Chronic Dis 2005; 2(4): A12.
7. Alves LC, Rodrigues RN. Determinants of self-rated health among elderly persons in Sao Paulo, Brazil. Rev Panam Salud Publica 2005; 17(5-6): 333-41. [In Portuguese].
8. Molarius A, Berglund K, Eriksson C, Lambe M, Nordstrom E, Eriksson HG, et al. Socioeconomic conditions, lifestyle factors, and self-rated health among men and women in Sweden. Eur J Public Health 2007; 17(2): 125-33.
9. Molarius A, Janson S. Self-rated health, chronic diseases, and symptoms among middle-aged and elderly men and women. J Clin Epidemiol 2002; 55(4): 364-70.
10. Cott CA, Gignac MA, Badley EM. Determinants of self-rated health for Canadians with chronic disease.
and disability. J Epidemiol Community Health 1999; 53(11): 731-6.

11. Self-rated fair or poor health among adults with diabetes--United States, 1996-2005. MMWR Morb Mortal Wkly Rep 2006; 55(45): 1224-7.

12. Dasbach EJ, Klein R, Klein BE, Moss SE. Self-rated health and mortality in people with diabetes. Am J Public Health 1994; 84(11): 1775-9.

13. Stewart AL, Greenfield S, Wells K, Rogers WH, Berry SD, et al. Functional status and well-being of patients with chronic conditions. Results from the Medical Outcomes Study. JAMA 1989; 262(7): 907-13.

14. Emmelin M, WeinheilI L, Stgemayr B, Dahlgren L, Stenlund H, Wall S. Self-rated ill-health strengthens the effect of biomedical risk factors in predicting stroke, especially for men -- an incident case referent study. J Hypertens 2003; 21(5): 887-96.

15. Bosworth HB, Siegler IC, Brummett BH, Barefoot JC, Williams RB, Clapp-Channing NE, et al. The association between self-rated health and mortality in a well-characterized sample of coronary artery disease patients. Med Care 1999; 37(12): 1226-36.

16. Finkelstein MM. Hypertension, self-perceived health status and use of primary care services. CMAJ 2000; 162(1): 45-6.

17. Ministry of Information Sultanate of Oman. Governorate of Muscat. [cited 2011 Feb 23]. Available from: URL: http://www.omanet.om/english/regions/muscat1.asp?cat=reg

18. Lindstrom M. Marital status, social capital, material conditions and self-rated health: a population-based study. Health Policy 2009; 93(2-3): 172-9.

19. Unden AL, Elofsson S, Andreasson A, Hillered E, Eriksson I, Brismar K. Gender differences in self-rated health, quality of life, quality of care, and metabolic control in patients with diabetes. Gend Med 2008; 5(2): 162-80.

20. Wang R, Zhao Y, He X, Ma X, Yan X, Sun Y, et al. Impact of hypertension on health-related quality of life in a population-based study in Shanghai, China. Public Health 2009; 123(8): 534-9.

21. Natarajan S, Nietert PJ. Hypertension, diabetes, hypercholesterolemia, and their combinations increased health care utilization and decreased health status. J Clin Epidemiol 2004; 57(9): 954-61.

22. Kirchengast S, Haslinger B. Gender differences in health-related quality of life among healthy aged and old-aged Austrians: cross-sectional analysis. Gend Med 2008; 5(3): 270-8.

23. Anson O, Paran E, Neumann L, Chernichovsky D. Gender differences in health perceptions and their predictors. Soc Sci Med 1993; 36(4): 419-27.

24. Johnson RJ, Wolinsky FD. Gender, race, and health: the structure of health status among older adults. Gerontologist 1994; 34(1): 24-35.

25. de Belvis AG, Avoliso M, Spagnolo A, Damiani G, Sicuro L, Cicchetti A, et al. Factors associated with health-related quality of life: the role of social relationships among the elderly in an Italian region. Public Health 2008; 122(8): 784-93.

26. Wagstaff A, van Doorslaer E. Income inequality and health: what does the literature tell us? Annu Rev Public Health 2000; 21: 543-67.

27. Faresjo T, Rahmqvist M. Educational level is a crucial factor for good perceived health in the local community. Scand J Public Health 2010; 38(6): 605-10.

28. Jia H, Lubetkin EI. The impact of obesity on health-related quality-of-life in the general adult US population. J Public Health (Oxf) 2005; 27(2): 156-64.

29. Ahmadipour H, Faradazdeeg Z, Kachoei A, Pirdehghan A. Secondary prevention by Enhancing Adherence In in Diabetic Patients. Int J Prev Med 2010; 1(1): 50-55.

30. Moen J, Antonov K, Larsson CA, Lindblad U, Nilsson JL, Rastam L, et al. Factors associated with multiple medication use in different age groups. Ann Pharmacother 2009; 43(12): 1978-85.

31. Al Mandhari AS, Hassan AA, Haran D. Association between perceived health status and satisfaction with quality of care: evidence from users of primary health care in Oman. Fam Pract 2004; 21(5): 519-27.