Quality of life among type II diabetic patients attending the primary health centers of King Saud Medical City in Riyadh, Saudi Arabia

Saleh Alsuwayt[1], Mohammed Almesned[2], Shahad Alhajri[3], Naif Alomari[1], Razan Alhadlaq[1], Abdullah Alotaibi[1]

[1]Academy of Family Medicine, King Saud Medical City, Riyadh, [2]Head Department of Family and Community Medicine, King Saud Medical City, Riyadh, [3]Epidemiology Specialist, Ministry of Health, Saudi Arabia

ABSTRACT

Background/Aim: Type 2 diabetic patients (T2DM) have lower quality of life (QoL) compared to the general population. This study was conducted to determine QoL of T2DM patients and analyze factors that affect patients' QoL. **Methods:** We conducted this cross-sectional study in January to February of 2019 at several primary care health centers (PCHC) in Riyadh, Saudi Arabia. All adult T2DM patients were invited to participate in the study. We used the EQ-5D-3L and EQ VAS tools to determine the patients' health state and their self-rated overall health. **Results:** A total of 274 T2DM patients were surveyed, 149 (54.4%) were males. The mean age was 59.7 ± 10.4 years. Of the five EQ-5D-5L domains, self-care had the highest proportion that reported no problem (n = 183, 66.8%). The mobility domain had the highest proportion of reported severe problems (n = 37, 13.5%) and extreme problems (n = 7, 2.6%). Nineteen (6.9%) patients reported with a full state of health. The mean EQVAS was 65.9 ± 22.1, with only 24.1% reported as between 81–100%. Females, patients above 75 years old, those who are in the low socioeconomic income, unemployed, widow had lower EQ VAS. **Conclusion:** Males, with higher socioeconomic status, employed, married and younger patients experience better QoL compared to their counterparts. The overall health related QoL among our diabetic patients is low. These findings suggest improvement of health-related QoL, and more efforts should be invested in patient education particularly among patients who are in the low socioeconomic status, the elderly, females and the unemployed.

Keywords: Primary care clinics, quality of life, type 2 diabetes

Introduction

Diabetes mellitus (DM) is one of the most common metabolic disorders in the world and the prevalence of diabetes in adults. The 2010 world prevalence of diabetes among adults aged 20 – 79 years old is 6.4% (approximately 285 million adults) and is projected to increase to 7.7% (approximately 439 million adults) by 2030.[1,2] The International Diabetes Federation (IDF) has produced estimates of diabetes prevalence since the year 2000 and has demonstrated a large and increasing burden, with significant regional variability.[3-5]

In the United States of America, the prevalence of DM increased by 75% from 1988 – 1994 to 2005 – 2010.[6] Many other countries have reported an increase in the prevalence of DM including 12.4% in the United Kingdom,[7] and 5.5% in France.[8] In the Middle East and North African region (MENA), the current prevalence was reported at 9.2% which translates to 34 million people.[9] In the Gulf area, the estimated prevalence was projected

Address for correspondence: Dr. Saleh Alsuwayt, Academy of Family Medicine, King Saud Medical City, P.O. Box: 13322, Riyadh, Saudi Arabia. E-mail: Alsuwayt@gmail.com

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at 23.1% in the United Arab Emirates, 7.5% in Yemen, and 27.1% in Saudi Arabia by the year 2035.[2]

The rapid urbanization has driven rapid transitions in lifestyle thereby increasing the risk factors for obesity, hypertension, and type 2 diabetes (T2DM).[10] The burden of the increasing prevalence of T2DM significantly affects the allocation of resources, health-promoting policies, and the prevention of the disease.[11] In Saudi Arabia alone, patients with diabetes have medical healthcare expenditures that are ten times higher ($3,686 vs. $380) than patients without diabetes.[12]

The health-related quality of life (HRQoL) scale measures a person's physical, cognitive, social, emotional, psychological, role, and spiritual status.[13,14] It measures the acceptable outcome or efficacy of self-care among adults with Type II diabetes mellitus and was shown to correlate with quality of life (QoL).[15,16] Studies have shown that T2DM patients rated HRQoL lower than the general population.[16] The EQ-5D-3L index score (which defines a respondent's health status according to five dimensions: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression was lower for older people with T2DM and was positively associated with mobility, pain/discomfort, and anxiety and depression.[17] Among Saudi patients with T2DM, the HRQoL on the role-emotional aspect with a mean score of 28.3%, lower than the physical health domains, and was significantly associated to a low level of education.[18] In Saudi Arabia, male patients and those with high monthly income, those T2DM patients who have no diabetes-related complications, and those with random blood glucose level of <200 mg/dl were found to have higher HRQoL index scores.[19] The predicted quality-adjusted life years (QALYs) was shown to be a composite measure of diabetes risk control and estimate the lifetime health outcomes of patients with T2DM and can be used in clinical practice, trials, economic evaluation, and health policy formulation.[20,21]

This study was conducted to determine the HRQoL of T2DM patients in our institution and analyze factors that affect patients' QoL. Through this, medical practitioners and health experts will gain more insight on the common issues faced by T2DM patients and help in the disease management of the patients, as well as allow policy makers to review, formulate and implement guidelines and management protocols to improve QoL and reduce morbidity and mortality.

Methods

We conducted this cross-sectional study in January to February of 2019 at the primary care health centers (PCHC) of King Saud Medical City in Riyadh, Saudi Arabia. All adult patients diagnosed with T2DM who were attending the PCHC aged 18 years old and above were invited to participate in the study. Patients younger than 18 years old, pregnant, those with mental and/or physical disability, and those with critical or advanced complications were excluded from the study. Sample size was calculated using the formula $Z_{1-\alpha/2}^2 \, P \, (1\text{-}p)/d^2$ with 5% type 1

error, 80% power and 95% confidence level. The calculated sample size was 274 patients.

Verbal consent was secured from each patient. Consenting patients were asked to answer the questionnaire. The questionnaire included questions on demographics which included age, gender, nationality, marital status, level of education, job, monthly income, moral and social support, problem with access to health center and satisfaction with the service of the moral and social support, problem with access to health center and satisfaction with the service of the PCHC [Supplementary data 1].

The EQ-5D-3L descriptive system which comprises the five dimensions including; ability to move, personal care, typical activities, pain and discomfort, and anxiety and depression was used to describe how good or bad the patient's health state.[22]

The EQVAS (EQ Visual Analog Scales) was used to indicate the overall health on the day of the questionnaire completion. Patients were also asked to self-rate their health status using a scale (from 0-100). The mean EQVAS was calculated and presented as a mean and standard deviation.[22]

Collected data were analyzed using the Statistical Program for Social Sciences (SPSS) version 23.0 (SPSS Inc, IBM, Armonk, New York, USA). Descriptive characteristics are reported as numbers and percentages for categorical variables and as mean and standard deviation for continuous variables. Chi-square test was used to compare proportions between two categorical groups, independent t-test was used to compare between two means, and one-way analysis of variation (ANOVA) was used to compare between 3 or more means. Pearson correlation was used to determine correlation between variables. A *P* value of ≤0.05 was considered statistically significant.

Ethical approval was obtained from the Research Ethics Committee of KSMC and the Institutional Review Board (IRB), with approval number H1RI-08-Apr19-05. (Approved in 30 April, 2019).

Results

A total of 274 T2DM patients were surveyed, 149 (54.4%) males and 125 (45.6%) females. The mean age was 59.7 ± 10.4 years (range: 35 to 85 years old). Majority (n = 264, 96.4%) were Saudi nationals. Two hundred and sixteen (78.8%) patients have moral and social support from family and friends. Majority of the patients (n = 238, 87.2%) have no problems accessing the health center, and 173 (63.2%) were satisfied (excellent to very excellent) with the service of the PCHC. Table 1 shows the demographic profile of the surveyed patients.

Table 2 shows the frequencies and proportions reported by dimension and level of the EQ-5D-5L. Of the five domains, self-care has the highest proportion that reported no

problem (n = 183, 66.8%) and slight problem (n = 60, 21.9%) followed by anxiety and depression domain with 137 (50.0%) no problem and 92 (33.6%) slight problems. On the other hand, the mobility domain has the highest proportion of reported severe problems (n = 37, 13.5%) and extreme problems (n = 7, 2.6%). There were only 19 (6.9%) patients who reported with a full state of health.

Females showed to have a significantly higher mean overall EQ-5D-5L compared to males (p < 0.001). Mean EQ-5D-5L proportionately and significantly increased with increasing age and was highest at age group above 75 years old (p < 0.001). Widows had significantly higher mean EQ 5D-5L compared to

Table 1: Demographic profile of the 274 surveyed T2DM patients

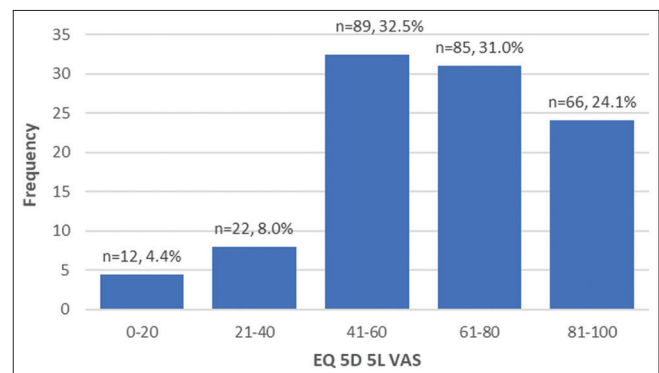| Demographic variables	Mean (SD)	n (%)
Age, in years	59.7 (10.4)	
Gender		
Males		149 (54.4)
Females		125 (45.6)
Nationality		
Saudi		264 (96.4)
Non-Saudi		10 (3.6)
Marital status		
Married		185 (67.5)
Single		8 (2.9)
Divorced		28 (10.2)
Widow		53 (19.3)
Educational level		
PhD		2 (0.7)
Masters		7 (2.6)
Bachelor		79 (28.8)
Secondary		95 (34.7)
Middle school		12 (4.4)
Primary		36 (13.1)
Uneducated		43 (15.7)
Employment		
Have work/employed		76 (27.7)
Without work/unemployed		198 (72.3)
Monthly income		
<5000		84 (30.7)
5000 - <10000		100 (36.5)
10000 - <15000		57 (20.8)
15000 or more		33 (12.0)
Soral and social support from friends and family		
Yes		216 (78.8)
No		58 (21.2)
Have problems accessing the health center		
Yes		35 (12.8)
No		239 (87.2)
Satisfaction with the services offered by the PCHC		
Very excellent		49 (7.9)
Excellent		124 (45.3)
Just satisfied		56 (20.4)
Bad		31 (11.3)
Very bad		14 (5.1)

other marital status (p < 0.001). Mean EQ-5D-5L was significantly higher among the low level of educated patients (p < 0.001). The unemployed posted significantly higher EQ-5D-5L compared to those patients who were employed (p < 0.001). Patients who had a net monthly household income of <5,000 SAR had significantly higher mean EQ-5D-5L compared to others (p = 0.025). However, there were no significant differences in the mean EQ-5D-5L among patients with and without moral and social support, among patients who have/do not have problems accessing health center, and their satisfaction with the services offered by the PCHC (p = 0.457, P = 0.997, and P = 0.081, respectively) [Table 3].

The mean EQVAS was 65.9 ± 22.1 (range: 0-100). A large proportion of patients self-rated EQVAS as 41 – 60 (n = 89, 32.5%), 61 – 80 (n = 85, 31.0%) and 81 – 100 (n = 66, 24.1%) [Figure 1]. Male patients reported a significantly higher mean EQVAS compared to females (68.63 ± 22.15 versus 62.64 ± 21.58, P = 0.025). Younger patients had significantly higher mean EQVAS compared to their older counterparts (p < 0.001). Married patients had significantly higher mean EQVAS compared to the others (p < 0.002). A higher level of education (Bachelor's degree and above) posted higher mean EQVAS (p < 0.001). Patients who were employed had significantly higher mean EQVAS compared to those who were not employed (p < 0.001). Patients who had a monthly net income of more than 15000 a month posted a higher mean EQVAS (p = 0.029), as well as those who were satisfied with the services offered by the PCHC (p = 0.001). There were no significant differences in the mean EQVAS among patients who have/who do not have moral and social support (p = 0.077), and among patients who have/who do not have problems accessing the health center (p = 0.945) [Table 4].

EQ-5D-5L have significant positive correlation with the female gender (r = 0.260, P < 0.001), older age beyond 65 years old (r = 0.465, P < 0.001), divorced/separated/widowed (r = 0.373, P < 0.001), educational level below bachelor's degree (r = 0.483, P < 0.001), unemployed (r = 0.370, P < 0.001), and negatively correlated with income level less than 10,000 SAR per month (r = -0.168, P = 0.005). On the other

Figure 1: EQ = 5D-5L frequency distribution

Table 2: EQ-5D-5L frequencies and proportions reported by dimension and level					
	Mobility *n* (%)	Self-care *n* (%)	Usual activities *n* (%)	Pain/Discomfort *n* (%)	Anxiety/ Depression *n* (%)
Level 1 (No problem)	57 (20.8)	183 (66.8)	65 (23.7)	76 (27.7)	137 (50.0)
Level 2 (slight problems)	107 (39.1)	60 (21.9)	126 (46.0)	138 (50.4)	92 (33.6)
Level 3 (Moderate problems)	66 (24.1)	21 (7.7)	52 (19.0)	47 (17.2)	37 (13.5)
Level 4 (Severe problems)	37 (13.5)	6 (2.2)	25 (9.1)	11 (4.0)	6 (2.2)
Level 5 (Extreme problems/Unable to do)	7 (2.6)	4 (1.5)	6 (2.2)	2 (0.7)	2 (0.7)
Total	274 (100)	274 (100)	274 (100)	274 (100)	274 (100)

Table 3: Study sample characteristics, EQ-5D-5L according to sociodemographic variables			
Demographic variables	*n*	Mean (SD)	*P*
Overall	274	1.96 (0.72)	
Gender			
Male	149	1.78 (0.65)	<0.001Θ
Female	125	2.16 (0.74)	
Age groups			
35-45	25	1.54 (0.44)	<0.001 *
46-55	76	1.71 (0.58)	
56-65	97	1.86 (0.53)	
66-75	58	2.40 (0.78)	
Above 75	18	2.67 (1.03)	
Marital status			
Single	8	1.90 (0.44)	<0.001*
Married	185	1.80 (0.64)	
Divorced/separated	28	1.96 (0.54)	
Widowed	53	2.52 (0.81)	
Educational level			
PhD	2	1.60 (0.57)	<0.001*
Master	7	1.34 (0.29)	
Bachelor	79	1.66 (0.55)	
Secondary	95	1.80 (0.61)	
Middle School	12	2.30 (0.88)	
Primary	36	2.24 (0.62)	
Uneducated	43	2.61 (0.78)	
Employment			
Yes	76	1.53 (0.40)	<0.001Θ
No	198	2.12 (0.75)	
Net monthly income of household			
<5000	84	2.09 (0.77)	0.025 *
5000 - <10000	100	1.95 (0.69)	
10000 - <15000	57	1.94 (0.72)	
More than 15000	33	1.64 (0.57)	
Moral and social support			
Yes	216	1.94 (0.72)	0.457Θ
No	58	2.02 (0.70)	
Have problems accessing health center			
Yes	35	1.95 (0.68)	0.997Θ
No	239	1.95 (0.73)	
Satisfaction with services offered by the PCHC			
Very excellent	49	1.87 (0.69)	0.081 *
Excellent	124	1.89 (0.69)	
Satisfied	56	1.97 (0.69)	
Bad	31	2.10 (0.83)	
Very bad	14	2.440 (0.78)	

*ANOVA; Θ independent *t*-test

hand the EQVAS was significantly negatively correlated with the female gender (r = -0.136, *P* = 0.025), older age beyond 65 years old (r = -0.323, *P* < 0.001), divorced/separated/widowed (r = -0.229, *P* < 0.001), educational level below bachelor's degree (r = -0.311, *P* < 0.001), unemployment (r = -0.323, *P* < 0.001), and satisfaction (r = -0.238, *P* < 0.001), but was positively correlated with income level of less than 10,000 SAR per month (r = 0.179, *P* = 0.003).

Table 4: Study sample characteristics, EQVAS according to sociodemographic variables			
Demographic variables	*n*	Mean (SD)	*P*
Overall	274	65.90 (22.05)	
Gender			
Male	149	68.63 (22.15)	0.025ᶿ
Female	125	62.64 (21.58	
Age groups			
35-45	25	74.12 (21.44)	<0.001 *
46-55	76	70.68 (19.90)	
56-65	97	68.10 (21.88)	
66-75	58	57.93 (22.03)	
Above 75	18	48.06 (17.33)	
Marital status			
Single	8	64.38 (29.93)	<0.002*
Married	185	69.22 (21.14)	
Divorced/separated	28	61.79 (23.39)	
Widowed	53	56.72 (20.79)	
Educational level			
PhD	2	50.00 (0.0)	<0.001*
Master	7	87.14 (15.60)	
Bachelor	79	73.11 (19.71)	
Secondary	95	66.74 (23.34)	
Middle School	12	63.75 (17.60)	
Primary	36	60.42 (18.79)	
Uneducated	43	53.26 (20.81)	
Employment			
Yes	76	77.37 (16.39)	<0.001ᶿ
No	198	61.50 (22.39)	
Net monthly income of household			
<5000	84	61.90 (22.95)	0.029 *
5000 - <10000	100	64.65 (21.69)	
10000 - <15000	57	69.23 (21.89)	
More than 15000	33	74.09 (18.73)	
Moral and social support			
Yes	216	67.12 (21.25)	0.077ᶿ
No	58	61.34 (24.47)	
Have problems accessing health center			
Yes	35	66.66 (24.03)	0.945ᶿ
No	239	65.93 (21.80)	
Satisfaction with services offered by the PCHC			
Very excellent	49	72.78 (20.23)	0.001 *
Excellent	124	66.67 (21.96)	
Satisfied	56	66.61 (20.14)	
Bad	31	59.94 (23.59)	
Very bad	14	45.36 (20.33)	

*ANOVA; ᶿindependent *t*-test

Discussion

An essential component of managing patients with T2DM is substantiating a high QoL. It has been said that "patients who feel good about their life despite having diabetes, they have more energy to take good care of themselves, feel better day-to-day" and stay healthier.[22] For this reason, the EQ-5D-5L and the EQ VAS has been developed and used for patients to self-assess their QoL amidst the never-ending demands of the disease.

This study showed that majority of our patients reported lesser problems when it comes to self-care and anxiety/depression. Our result is similar (although lower in percentage) to the study among German general population which reported 93.0%

without problems with self-care.[23] This translates to the fact that patients know their disease and were aware of the possible complications that may ensue. On the other hand, our patients reported problems on mobility (13.5% severe and 2.6% extreme). This is very true among older patients and patients who have concomitant complications including peripheral neuropathy, stroke, on insulin treatment, nephropathy and arthritis as described by Bruce *et al.*[24] in 2005. Among diabetic patients, their risk of mobility impairment increases by 6% a year (by increasing age) and from 40% to 222% increased risk in mobility impairment depending on the concomitant complication.[23] Furthermore, an increased risk in mobility impairment was shown to be significantly associated with non-adherence to lifestyle modification and non-adherence to self-care practices.[25] This

implies that patients who practice self-care are those patients that have a high QoL, very good self-care behavior, and thus less risk for complications. The 19 patients who reported full state of health were majority males, married, with income of >10,000 SAR a month, with good moral support structure and without problems accessing the PCHC.

This study also showed that females experience more problems compared to males. One probable reason is that females report greater burden and restriction in their social interactions and less leisure time flexibility as well as their difficulty with dietary adherence as explained by Misra and Lager.[26] Older patients, particularly those age group above 75 years old experience more problems and burdens of the disease because of the development and increasing prevalence of concomitant complications. Reports showed that older adults report 14 or more unhealthy days compared to their younger counterparts.[27] Married individuals will most likely receive more moral and physical support from family. Although in our study we found out that having moral support or not, will not significantly affect the QoL. However among widows, the compounded issues not just the disease but the psychological and social aspects may further add to the burden which explains why widows experience more problems and have lower QoL.[28] Similar to the previous studies, low socioeconomic status (<5,000 SAR monthly income) and diabetics with a high school education or less had a negative impact on the QoL.[29-31]

Another highlight of this study is that only one in four (24.1%) of our patients perceive their health status as very good to excellent based on their EQ VAS results. Male patients, younger patients, married, those with higher level of education and income level perceived their health status very good to excellent. This is in agreement to previous studies that showed similar results.[32-35]

This study supports the validity, reliability and responsiveness of the EQ-5D-5L and the EQ VAS in modeling health outcomes for health practitioners and health institutions management of Type 2 diabetics. This study showed that patients perception of their health state and the dimensions that were most affected by the condition correlated well with their overall health (whether good or bad). Although there were more patients who perceived their health as having problems particularly on mobility with only 19 patients coming up with perfect health perception, the overall EQ VAS showed more patients who perceived their health as good to excellent. One limitation is, we were not able to repeatedly measure the QoL over time to enable examination of the QoL as the disease progress. Moreover, we were not able to establish causality because of the observational design of the study. Another limitation of the study is that the questionnaire was conducted in such a limited time that the participants might have answered the questionnaire without sufficient understanding of the questions particularly the poorly-educated and the elderly patients. However, we were able to deduce and identify health-related dimensions that affect the QoL among our patients despite the limitations.

Key points

- The mobility domain has the highest proportion of reported severe and extreme problems
- Females have a higher mean overall EQ-5D-5L compared to males, whereas males have a higher mean EQVAS compared to females
- Mean EQ-5D-5L proportionately increase with increasing age and was highest at age group above 75 years old
- Younger patients, married, and those employed have a higher mean EQVAS as well as were more satisfied with the services offered by the PCHC
- Males, with higher socioeconomic status, employed, married and younger patients experience better QoL compared to their counterparts.

Conclusion

This study indicates a significant effect of T2DM on the QoL of diabetic patients. Males, with higher socioeconomic status, employed, married and younger patients experience better QoL compared to their counterparts. The overall health related QoL among our diabetic patients is low. These findings suggest improvement of health-related QoL and health outcomes of diabetic patients, and more efforts should be invested in patient education particularly among patients who are in the low socioeconomic status, the elderly, females and the unemployed.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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[Supplementary data 1]: The used questionnaire in study

Peace be upon you.

  We thank you for your cooperation with us in the success of this study aimed at diabetes patients and study the quality of life of the patient, which will help to improve and develop the therapeutic steps of the patient ..

Wishing you a speedy recovery ..

Personal Information:

..

1. Gender: ☐ Male ☐ Female

2. Age: ....

3. Nationality : ☐ Saudi ☐ Non-Saudi

4. Marital status: ☐ Married ☐ single ☐ Divorced ☐ widow

5. level of education: ☐ Ph.D. ☐ Master ☐ bachelor ☐ secondary ☐ Middle school ☐ primary ☐ Uneducated

6. Job: ....

7. Monthly income: ☐ less than 5,000 ☐ from 5000 and less than 10,000 ☐ From 10,000 and less than 15,000 ☐ 15,000 and above

8. Are you diabetic patient? ☐ Yes (HgA1C……..) ☐ No

9. Is there moral and social support from friends and family around you?
    ☐ Yes ☐ No

10. Do you have problems accessing the health center? (Eg, road congestion, parking, etc.)
  ☐ Yes, mention it .... ☐ No

11. How satisfied are you with the service offered to you in health centers?
    ☐ Very Excellent ☐ Excellent ☐ satisfied ☐ Bad ☐ Very bad

Under each of the items below, please tick only one box that best describes your health condition TODAY.

Ability to move
I have no problems while walking ☐
I have minor problems when walking ☐
I have moderate problems when walking ☐
I have severe problems when walking ☐
I do not have the ability to walk ☐

Personal care
I do not have any problems when bathing or wearing my clothes myself ☐
I have slight problems when bathing or wearing clothes myself ☐
I have moderate problems when bathing or wearing clothes myself ☐
I have severe problems when bathing or wearing clothes myself ☐
I do not have the ability to shower or wear clothes myself ☐

Typical activities (eg, work, study, housework, family or recreational activities)
I have no problems practicing my usual activities ☐
I have minor problems with my usual activities ☐
I have moderate problems in practicing my usual activities ☐
I have severe problems in practicing my usual activities ☐
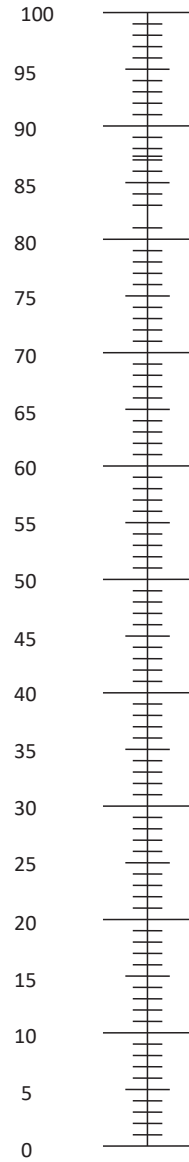I do not have the ability to practice my usual activities ☐

Pain / discomfort
I do not feel any pain or discomfort ☐
I feel a slight degree of pain or discomfort ☐
I feel a moderate degree of pain or discomfort ☐
I feel very much pain or discomfort ☐
I feel very pain or discomfort ☐

Anxiety / depression
I have no anxiety or depression ☐
I have a slight degree of anxiety or depression ☐
I have a moderate degree of anxiety or depression ☐
I have a high degree of anxiety or depression ☐
I have a very high degree of anxiety or depression ☐

• We would like to know how bad or healthy you are today.
• This scale is listed from 0 to 100.
• 100 points to the best imaginable health condition and zero
to the worst imaginable health condition.
• Put (×) on the scale to indicate your health status today.
• Now, please type the number you indicated on the scale in the box below.

Your health condition today =

best state of health imaginable

100

95

90

85

80

75

70

65

60

55

50

45

40

35

30

25

20

15

10

5

0