Turkish Journal of Cancer
Vol. 32/ No. 4/2002

A study on the reliability and validity of the Turkish version of the MQOLS-CA2 in people with cancer

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The aim of this study was to examine reliability and validity of the MQOLS-CA2 (Multidimensional Quality of Life Scale-Cancer) in people with cancer. Study sample was 72 people with cancer. Validity was established with content validity, construct validity and criterion validity. Content validity was made using literature review, expert review and acceptability rate. Factor analysis was used for construct validity. Comparing global score of the MQOLS-CA2 with the Medical Outcomes Study -MOS- 36 Item Short Form Health Survey (SF-36) made criterion validity. Reliability was assessed using the internal consistency and test-retest methods. MQOLS-CA2 showed good content validity. The acceptability rate was excellent (96%). Factor analysis confirmed the presence of 5 factors in the MQOLS-CA2. A strong correlation of the MQOLS-CA2 score with the SF-36 was coherent (r: 0.78, P<0.001). The results of the test-retest method of the MQOLS-CA-2 showed the stability of 5 subscales in the MQOLS-CA2. Reliability coefficient of the subscales found through test-retest ranged between 0.56 and 0.91. The Cronbach alpha was calculated as 0.76. Obtained findings suggest that the Turkish version of the MQOLS-CA2 is a valid and reliable tool that could be employed in quality of life research on people with cancer. [Turk J Cancer 2002;32(4):148-163]

Key words: Cancer patients, MQOLS-CA2, SF-36, validity, reliability

The word “health” may mean something different to a person with cancer than to a person who is free of illness or disability. Nevertheless, the concept of health can be usefully operationalized and measured. By looking at the instruments of measurement; “health” can be defined by a matrix of i) independence in the activities of daily living, ii) mental well-being (including the equally nebulous concept of energy), iii) social function and iv) the absence of symptoms (e.g. pain). Similar approaches have been taken in the measurement of another concept currently in vague, that of “quality of life” (QOL). Since both concepts are hard to define, it is hardly surprising that there is no consensus

about what they are and how they differ. World Health Organization (1) has declared health to be “a state of complete physical, mental and social well-being, and not merely the absence of disease”. Despite the expansion and application of the QOL concept within lay speech and the different sciences, no precise definition of the concept exists. Because of its subjective nature there are different definitions. Walker (2) describes it as a concept embraces a wide range of physical and psychological characteristics and limitations that describe an individual’s ability to function and derive satisfaction from doing so. It is also described as a multidimensional construct that refers to patients’ “appraisal of and satisfaction with their current level of functioning as compared to what they perceive to be possible or ideal” (3). Many other definitions of both “health” and “QOL” have been attempted, often linking the two and, for QOL, frequently emphasising components of happiness and satisfaction with life (4). Different sciences will focus on relevant aspects of QOL representing their own discipline. Sociology will focus on QOL in relation to welfare whilst psychology will primarily be interested in the individual’s growth and development. Within medicine and nursing sciences the focus is QOL in relation to different degrees of health, symptoms, illnesses and treatments because these are the domains of the health care professionals (5-7).

Different ways of describing clinical aspects of QOL have been performed. De Haes and Van Knippenberg (8) claim that within the clinical field QOL has to be approached as a multidimensional construct composed minimally of four domains, these are; 1) physical and functional status, 2) disease and treatment related physical symptoms, 3) psychological functioning and 4) social functioning.

Guyatt et al (9) refers to three different alternatives to classify the domains of health related QOL; 1) physical, social and emotional health, 2) psychological every-day-life function, social relationships, physical status, disability, discomfort, iatrogenic effects, 3) symptoms, general health perception, somatic discomfort, physical function, role function and psychological well-being.

Sullivan (10) lists the following core dimensions of health related QOL in clinical research; 1) physical complaints/well-being, 2) psychological distress/well-being, 3) functional status, 4) role functioning, 5) social functioning/well-being and 6) health/QOL perceptions.

Bergner (11) suggests the following domains of QOL; 1) symptoms, 2) functional status; self-care, mobility and physical activity, 3) role activities; work and household management, 4) social functioning; personal interactions, intimacy and community interactions, 5) emotional status; anxiety, stress, depression, locus of control and spiritual well-being, 6) cognition, 7) sleep and rest, 8) energy and vitality, 9) health perceptions and 10) general life satisfaction.

All these approaches to the QOL concept within the clinical field indicate a multidimensional concept and the content of the different approaches overlaps a great deal. However, the focus is on the individual’s total situation to disease, symptoms and/or treatment.

Over the past two decades, numerous instruments have been developed to measure health related quality of life, i.e. Euro Quality of Life Scale (EuroQOL), Nottingham Health Profile (NHP), The MOS 36- Item Short Form Health Survey (SF-36) and Sickness Impact Profile (SIP) (12-15). Although these measures

are measuring health-related QOL, they may still be too general for specific purposes as they do not contain disease specific content relating to cancer-specific symptoms i.e. nausea and fatigue. As a result, disease-specific instruments have been developed for use in patients with cancer, i.e. Missoulo-VITAS Quality of Life Index (MVQOLI), McGill Quality of Life Questionnaire (MQOL), EORTC Core Questionnaire (QOL-C30), FACIT Core Questionnaire (FACT-G) and Multidimensional Quality of Life Scale-Cancer 2 Version (MQOLS-CA2) (16-20).

MVQOLI was developed specifically to assess the multidimensional QOL of patients who know that they are dying and that the goal of treatment is palliative. It measures five domains including symptom, function, interpersonal, well-being and transcendent (16).

MQOL was designed to measure QOL of people at all stages of a life-threatening illness, from diagnosis to cure or death and includes five domains (physical well-being, physical symptoms, psychological symptoms, existential well-being and support) (17).

QOLQ-C30 was developed to measure aspects of QOL pertinent to patients with a broad range of cancer that are participating in clinical trials. It consists of four main domains: 5 function domains (physical, role, cognitive, emotional, social); 3 symptom scales (fatigue, pain, nausea and vomiting); single items for symptoms (shortness of breath, loss of appetite, impact of the disease) and 2 global items (health, overall quality of life) (18).

FACT-G was developed with the same aim with QOL-C30 and measures four domains of QOL (physical well-being, functional well-being, social/family well-being, emotional well-being) (19).

The MQOLS-CA2, a psychometric measure of QOL developed by Padilla (20), operationalizes the construct as a personal statement of the positivity or negativity of attributes that characterize one's life. It consists of 5 quality of life dimensions: psychological well-being, general physical well-being, nutrition, symptom management and interpersonal well-being.

As it was seen above almost all instruments measure similar domains regarding the QOL. The different domains in instruments express different concepts which to most of them extent overlap but are not necessarily synonymous, i.e. social/family well-being, interpersonal well-being. Although no universal domain in QOL exists, the different ways it has been conceptualised provide information on the different characteristics of the concept. However, domains in a QOL instrument reflect the professional background of the person who developed it.

Although a further wave of articles on QOL exploring the use of Turkish versions of different instruments with different disease groups, there was no study among patients with cancer. We aimed, therefore, to determine the suitability of the MQOLS-CA2 for assessing quality of life in patients with cancer. The reasons for choosing MQOLS-CA2 are 1) it is one of the most widely used tools in quality of life assessment, 2) it includes main QOL domains related to cancer, 3) scoring system is much practical than other instruments, 4) it has been revised several times after its development, 5) its validity and reliability results are more satisfactory and 6) we have official permission to use it.

Materials and Methods

The study was performed at the outpatient Oncology Clinics of the Lutfi Kırdar Teaching and Research Hospital in Istanbul, Turkey. The study sample was selected from cancer patients who visited the outpatient oncology clinics between 15 June and 15 September 2000. Sample size that met selection criteria was 159. The criteria for sample selection were people who were at least 18 years of age, were able to complete the questionnaire and were without other comorbidity. Random sampling of hospital chart codes was used to identify a target sample of 75 patients in 159 to contact for participation. Informed consent was obtained before the study. Three people refused to participate to the study. Thirty one female (43.1%) and 41 male (56.9%), a total of 72 people with cancer with mean age 48±15.5 (range: 18-72 years) were involved in the study. The majority of them were married (83.3%), had secondary school or less education level (75%), 52.8% of them described their financial situation as moderate. The sample included the following diagnoses: 19 lung cancer (26.4%), 15 colon cancer (20.8%), 7 breast cancer (9.7%), 5 gynaecological cancers (6.9%) and 26 (36.1%) others. The mean duration of cancer was 10.91 months, with a standard deviation of 14.09 months, a range between 2 and 96 months. At the time of the study 20 patients (27.8%) were undergoing chemotherapy and 52 patients (72.2%) combined treatment (Table 1).

Instruments

A. Multidimensional Quality of Life Scale-Cancer (MQOLS-CA2)

In 1992 Padilla (20) developed MQOLS-CA2 using previous version of the MQOLS. MQOLS-CA2, which is appropriate for persons with cancer, includes 33 items assessing 5 quality of life dimensions: psychological well-being (PSY: 12 items), general physical well-being (PHY: 7 items), nutrition (NUT: 4 items), symptom management (SYM: 5 items) and interpersonal well-being (INT: 5 items). The items in PSY are adjusting to disease or treatment, enjoying life, worry about financial security, feeling useful, feeling happy, satisfy life, worry about disease, able to concentrate, having a good (general) quality of life, satisfy with appearance, worry about unfinished business and meaning life. The items in PHY are present health state, ability to do things patients like to do, strength, tiring easily (i.e. fatigue), able to sleep/getting sufficient sleep, able to work/carry out usual tasks and able to get around the way patient wants. The items in NUT are appetite, able to eat, worry about weight and taste changes. The items in SYM are pain distress, pain amount, bowel movements, nausea and vomiting. The items in INT are receiving love from others, interference with relation, fulfil responsibilities, receiving emotional support and making others happy.

The MQOLS-CA2 uses 100 mm linear analogue scales. The respondent marks an “X” on a 100 mm line or intersects “/” the line at the point that most closely reflects how the individual feel at the time. The ends of a line are anchored with words that donate an extreme positive or negative response. The anchor denoting the poorest quality of life is the zero end of the scale while the anchor denoting the best quality of life marks the 100 mm point. Each item is

scored by measuring the distance from the zero end to the “X” with a centimetre ruler. To avoid a response set, the zero end of the scale may be on the right or left hand side. Total or subscale scores are obtained by summing the items in the total scale or in each of the subscales and dividing by the number of items in the total scale or relevant subscale. This provides a score from 0 to 100 which is 1) easy to understand 2) easy to compare with other subscales of different item lengths and 3) easy to check for errors in coding. The higher score means the greater the QOL is (20).

B. The Medical Outcomes Study -MOS- 36 Item Short Form Health Survey (SF-36)

SF-36, which was developed by Ware (14), was designed for use in clinical practice and research, health policy evaluations and general population surveys.

The SF-36 includes one multi-item scale, which assesses three major health attributes and eight health concepts:

1. Functional status (physical functioning, social functioning, role limitations attributing to physical problems, role limitations attributing to emotional problems): Physical functioning includes 10 items. These are: being able to do vigorous activities such as running, lifting heavy objects; being able to do moderate activities such as moving a table, pushing a vacuum cleaner; lifting or carrying groceries; climbing several flights of stairs; climbing one flight of stairs; bending, kneeling, or stooping; walking more than a kilometer; walking several hundred meters; walking about 100 meters and bathing and dressing him or herself.

In the social functioning, there are two questions. These are “during the past 4 weeks to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbours or groups” and “during the past 4 weeks has your health limited your social activities (like visiting with friends or close relatives)?”.

The role limitations attributing to physical problems include 4 items: 1) cut down on the amount of time people spent on work or other activities; 2) accomplishing less than people would like; 3) limiting the kind of work or other activities and 4) having difficulty performing the work or other activities as a result of physical health during the past 4 weeks.

The role limitations attributing to emotional problems include 3 items: 1) cut down on the amount of time people spent on work or other activities; 2) accomplishing less than people would like and 3) do not work or perform other activities as carefully as usual as a result of emotional problems during the past 4 weeks.

2. Well-being (mental health, energy/fatigue -vitality-, pain): Mental health dimension includes 5 questions: “During the past month: have you been a very nervous person; have you felt so down in the dumps nothing could cheer you up; have you felt calm and peaceful; have you felt downhearted and blue and have you been a happy person?”.

Energy/fatigue -vitality- consists of 4 questions including “did you feel full of pep”; “did you have a lot of energy”; “did you feel worn out” and “did you feel tired” during the past month?

There are two questions in the pain dimension: “How much bodily pain have you had during the past 4 weeks” and “how much did pain interfere with your normal work including work both outside the home and housework during the past 4 weeks”.

3. Overall evaluation of health (general health perception): In this dimension there are 6 items: “In general what would you say about your health”; “compared to one year ago how would you rate your health in general now”; “do you see yourself to get sick a little easier than other people”; “can you say you are as healthy as anybody you know”; “do you expect your health to get worse” and “can you say your health is excellent” (14).

In total, 35 of the items contribute to these states and a further unscaled single item asks about change in health status over the previous year. For the eight dimensions, scores are coded, summed and transformed onto a scale from 0 (worst possible health status) to 100 (best possible health status). The score of the subgroups as well as the final global score of the SF-36 changes between 0 and 100, respectively (14).

Before the study MQOLS-CA2 was translated following Brislin’s steps (21) in translations: a) find competent bilingual translators who are familiar with the content, b) after practice, one translator was asked to translate from the source language (English) to the target language (Turkish) (another translator was asked to blindly back translate from the Turkish into the English); c) several raters examined the original English, the Turkish and back-translation versions for meaning errors; d) when the meaning errors were nil, the target version was pretested on monolingual target language populations and revisions were made in both English and Turkish versions if the pre-test showed problems in comprehension and e) the English and Turkish versions were then administered to bilingual 20 subjects. Results of the paired t-test showed that there were no significant differences between the English and Turkish versions of MQOLS-CA2 ($t=0.14$, $p=0.89$). In the pilot testing, the average time required to complete the questionnaire was 8.3 minutes. The SF-36 was translated into Turkish by using the ethnographic translation method as described previously in a study in 1995 (22).

The study was approved by the Hospital Institutional Review Board for the Protection of Human Subjects in Research. Participants were informed that the investigator was not affiliated with the hospital and was not employed by the hospital. Before the study, informed consent was obtained from the 72 patients by explaining aim and subject of the study. Instruments were administered in education room at hospital. That room was so quite and well lighted. Therefore, we assumed that patients would concentrate to instruments without some disturbing factors such as noise. Descriptive forms collected information regarding socio-demographic variables (e.g. sex, age) and cancer-related variables (e.g. metastasis, duration of cancer). Afterwards, the patients were asked to self-complete the MQOLS-CA2 and the SF-36. It was also suggested that subjects could receive help to complete the questionnaires from a friend or relative or investigator if necessary. Some people (n=3) were able to self-complete the Turkish version of instruments with some assistance from investigator. Investigator read same things what write on, didn’t change the questions or items and didn’t make additional explanation. Instruments took an average of 17 minutes to complete (range: 14 to 40 minutes).

Validity for the MQOLS-CA2 was established in three ways: content validity, construct validity and criterion (convergent) validity. Content validity was made using literature review, expert review and acceptability rate. Factor analysis was used for construct validity. Comparing global score of the MQOLS-CA2 with the SF-36 made criterion validity. Reliability of the MQOLS-CA2 was assessed using the internal consistency and test-retest methods. A statistician performed statistical analysis with the Statistical Package for the Social Sciences (SPSS) and significance for all analyses was taken at the 5% level.

Table 1
General characteristics of the sample

	Number	**%**
Sex		
Female	31	43.1
Male	41	56.9
Age (mean years±SD)	Mean: 48±15.5 (range: 18-72 yrs)	
Marital Status		
Single	8	11.1
Married	60	83.3
Divorced/widow/ separated	4	5.6
Educational status		
Illiterate (no formal education)	12	16.7
Primary school (5 yrs education)	2	2.7
Secondary school (8 yrs education)	40	55.6
High School (11-12 yrs education)	12	16.7
University	6	8.3
Financial status		
Poor	34	47.2
Moderate	38	52.8
Type of cancer		
Lung	19	26.4
Colon	15	20.8
Breast	7	9.7
Gynaecological cancers	5	6.9
Others	26	36.1
Disease duration (mean months±SD)	Mean: 10.91±14.09 (range: 2-96 months)	
Type of treatment		
Chemotherapy	20	27.8
Combined treatment	52	72.2
Metastasis		
Present	22	30.6
Absent	50	69.4

Table 2
Factor construct of the MQOLS-CA2

Item No	F1	Item No	F2	Item No	F3	Item No	F4	Item No	F5
PSY2 (adjusting to disease or treatment)	0.79	PHY1 (present health status)	0.78	NUT20 (appetite)	0.78	SYM5 (pain distress)	0.69	INT9 (receive love from others)	0.64
PSY3 (enjoying life)	0.76	PHY12 (able to do thing you like to do)	0.68	NUT22 (able to eat)	0.77	SYM19 (pain amount)	0.89	INT10 (interference with relation)	0.63
PSY4 (worry about financial security)	0.66	PHY14 (strength)	0.88	NUT23 (worry about weight)	0.75	SYM21 (bowel movements)	0.72	INT30 (fulfil responsibilities)	0.63
PSY6 (feeling useful)	0.78	PHY15 (tire easily)	0.86	NUT26 (taste changes)	0.76	SYM24 (nausea)	0.76	INT32 (receive emotional support)	0.77
PSY7 (feeling happy)	0.87	PHY16 (able to sleep)	0.63			SYM25 (vomit)	0.77	INT33 (making others happy)	0.69
PSY8 (satisfying life)	0.78	PY18 (carry out usual tasks)	0.69						
PSY11 (worry about disease)	0.89	PHY27 (able to get around the way you want)	0.74						
PSY13 (able to concentrate)	0.92								
PSY17 (having a good QOL)	0.73								
PSY28 (satisfying with appearance)	0.68								
PSY29 (worry about unfinished business)	0.83								
PSY31 (meaning life)	0.82								
Eigene Value	11.83		4.28		3.10		2.16		1.66
Percent (%)	32.5		11.8		8.6		6.0		4.6

Results

1. Validity

1.1. Content validity: MQOLS-CA2 showed good content validity as assessed by review literature, expert committee and acceptability rate. The acceptability rate was excellent (96%). In all, 72 patients completed the questionnaire. Completion of the MQOLS-CA2 was timed. The range was 5-30 minutes, with 78% completing in 10 minutes or less.

1.2. Construct validity: Factor analysis confirmed the presence of 5 factors in the MQOLS-CA2 (Table 2). These dimensions are psychological well-being (factor 1: 12 items), general physical well-being (factor 2: 7 items), nutrition (factor 3: 4 items), symptom management (factor 4: 5 items) and interpersonal well-being (factor 5: 5 items). Eigen values were 11.83, 4.28, 3.10, 2.16 and 1.66 respectively. All items have strong loading of 0.63 and over on subscales in the MQOLS-CA2.

1.3. Criterion validity: A strong correlation of the MQOLS-CA2 score with the SF-36 was coherent (r:0.78, P<0.001).

2. Reliability

2. 1. Stability: Test-retest correlation coefficient for the 5 subscales in the MQOLS-CA2 ranged from 0.56 to 0.91. The lowest value belonged to the symptom management, and the highest value belonged to the general physical well-being (Table 3).

Table 3
Test – retest results

Dimensions	r	P
Psychological well-being	0.77	P<0.001
General physical well-being	0.91	P<0.001
Nutrition	0.67	P<0.001
Symptom management	0.56	P<0.001
Interpersonal well-being	0.62	P<0.001
Total quality of life	0.86	P<0.001

2. 2. Homogeneity: The Cronbach alpha for MQOLS-CA2 was calculated as 0.76.

Discussion

The MQOLS-CA2 underwent rigorous psychometric testing using acceptable sample size. General principles of Brislin's steps (21) in translation were followed. Content validity, construct validity, criterion validity, test-retest reliability and internal consistency were established.

1. Validity

Validity establishes whether the tool is measuring what it intended to measure. Validity will vary from one sample to another and from one situation to another; therefore, validity testing actually validates the use of an instrument for a specific group or purpose, rather than being directed toward the instrument itself. An instrument may be valid in one situation but not valid in another. Therefore, validity needs to be re-examined in each study situation (23). There are three main approaches to assessing validity: content validity, construct validity and criterion validity (24). In this study, the Turkish version of MQOLS-CA2 showed that it had acceptable validity in all these three areas.

1.1. Content validity: Content validity is concerned with whether or not the questions (items) asked cover the content area satisfactorily, i.e. the completeness of the instrument. Content validity is essential for all measures, although other forms of validity should also be established. Content validity is obtained from three sources: the literature, expert review and acceptability rate (23). Selection of at least five experts is recommended; however, a minimum of three experts is acceptable if it is not possible to locate additional individuals with expertise in the area (25). Berk (26) recommends that the experts first make an independent assessment and then meet for a group discussion of specifications. The specifications are then revised and resubmitted to the experts for a final independent assessment. It was thought that the MQOLS-CA2 includes main quality of life dimensions such as psychological well-being, physical well-being and interpersonal relationships after reviewing literature about QOL (8-11,16-19). Additionally, consensus by a panel of experts in oncology and pain management supports the content validity of MQOLS-CA2 (27). In this study, each member of expert committee (6 physicians and 6 nurses who work with cancer patients) reviewed the MQOLS-CA2 independently and then they met for final revision. After this procedure they decided that MOQLS-CA2 had desirable content validity. The acceptability rate was excellent (96%) and there was no missing data. In all, 72 patients completed the questionnaire. Completion of the MQOLS-CA2 was timed. The range was 5-30 minutes, with 78% completing in 10 minutes or less. It is showed that MQOLS-CA2 is a relatively brief and well-tolerated instrument appropriate for use in studies with cancer patients.

It was decided that MQOLS-CA2 had good content validity depending on literature review, expert committee review and acceptability rate.

1.2. Construct validity: Construct validity, the most theoretical form of validity, is designed to establish validity where no other measure exists. Exploratory factor analysis can be performed to examine relationships among the various items of the instrument. Items that are closely related are clustered into a factor. The analysis may indicate the presence of several factors, which may indicate the presence of several construct factors rather than single

construct. The number of constructs in the instrument can be validated through the use of confirmatory factor analysis. Items that do not fall into a factor and thus do not correlate with other items may be deleted (23,28). In this study factor analysis confirmed the presence of 5 factors in the MQOLS-CA2 (Table 2). Table 2 describes the 5 main factors found: psychological well-being (factor 1: 12 items), general physical well-being (factor 2: 7 items), nutrition (factor 3: 4 items), symptom management (factor 4: 5 items) and interpersonal well-being (factor 5: 5 items).

The table affirms the importance of psychological well-being as a primary quality of life dimension. The items providing the most consistent construct validity for the psychological well-being of the MQOLS-CA2 are adjusting to disease or treatment, enjoying life, worry about financial security, feeling useful, feeling happy, satisfying life, worry about disease, able to concentrate, having a good (general) quality of life, satisfy with appearance, worry about unfinished business and meaning life. Factor loading listed in table 1 validates the relevance of general physical well-being as the second most important dimension in the MQOLS-CA2 content domain. The items that stand out as descriptors of this dimension include present health state, able to do things patients like to do (i.e. watch TV, read), strength, tire easily (i.e. fatigue), able to sleep/getting sufficient sleep, able to work/carry out usual tasks (i.e. dressing, comb hair, toilet), able to get around the way patient wants. The third important dimension in the MQOLS-CA2 content domain was symptom management including 5 items. The items in symptom management are pain distress, pain amount, bowel movements, nausea and vomit. The third important dimension in the MQOLS-CA2 content domain, interpersonal well-being are receive love from others, interference with relation, fulfil responsibilities, receive emotional support and make others happy. The items in the last dimension, which is nutrition, include appetite, able to eat, worry about weight and taste changes.

In table 2 factor loading to predict items from factors were higher than 0.50 for each item with its hypothesized factor. All items have strong loading of 0.63 and over on subscales in the MQOLS-CA2. These illustrated that all items were strongly related to their factors.

The quality of life indexes that include different items were used in some studies that were made among cancer patients (27,29-33). In those studies the importance of psychological well-being was shown as a primary QOL dimension. Psychological well-being was consistently the most important factor accounting for the largest part of the variance in the factor structures similar to present study results. In studies mentioned above, the items providing the most consistent construct validity for the psychological well-being subscale of MQOLS-CA2 were satisfying life, having a good (general) QOL, meaning life and feeling happy. The item, enjoying life, has a strong loading of 0.70 on psychological well-being. In our study the items providing the most consistent construct validity for the psychological well being subscale were able to concentrate, worry about disease, feeling happy and worry about unfinished business. In those studies it was shown that factor loadings validated the relevance of physical well-being as the second most important dimension in the health related QOL content domain. The items that stand out as descriptors of this dimension included tire easily (i.e., fatigue), able to work/carry out usual tasks and strength. In those studies symptoms/side effects factor usually

occupied the third or fourth position in factor structure. Consistent descriptors of this factor included nausea, vomit, pain amount and pain distress. These results were consistent with our study's findings. The nutrition factor was apparent in four of the six studies. In one study that was made with cancer patients, the items "able to eat" and "appetite" emerged with the physical well-being factor. In a study that was made in patients with pelvic cancer same two items are found under psychological well-being (31). "Able to eat" and "appetite" also appeared under psychological well-being in the patients with colostomy (30). Finally, inconsistent representation of interpersonal well-being items was found across the six versions of the QOL. Future version of the QOL should standardize the items that address interpersonal and intimacy concerns. In our study nutrition and interpersonal well-being subscales showed consistency with MQOLS-CA2's original factor construct (31).

The present study has examined the structural aspect of QOL. From the structural point of view, results of the factor analyses of MQOLS-CA2 confirm the construct validity of 5 subscales representing 5 important quality of life dimensions. These dimensions are psychological well-being, general physical well-being, nutrition, symptom management and interpersonal well-being. Identifying this structure within the domain of chronically ill people's concept of QOL or health is consonant with holistic views of health (34,35). Our result is congruent with the philosophy of holistic care, in which people, not the disease, are treated. Diseases can be treated as separate entities, but the whole being of the person, the physical, psychosocial and spiritual dimensions, must be integrated in the functioning process (34). Thus, once holistic care is emphasized, attention has to be given to matters relating to the physical, psychosocial and spiritual dimensions.

1.3. Criterion (convergent) validity: In many cases, other instruments are available to measure the same construct. For a number of possible reasons, the existing instruments may not be satisfactory for a particular purpose or a particular population. However, it is important to determine how closely these instruments measure the same construct as the newly developed instrument. Criterion validity is a strong method of validity, which relies upon other tools, previously developed which measure similar attributes. All selected instruments are administered to same sample and correlation between the results are assessed (23,36). In this study, criterion validity was evaluated by comparing the MQOLS-CA2 total score and SF-36 total score. The SF-36 was chosen as a gold standard, because it is a very well known tool through the world and has been used in lots of research studies in both clinical area and general public survey since it was developed (22,37,38). In fact, a search of the CINAHL, MEDLINE, PsychInfo, Social Science Abstracts, and Pro Quest Digital Dissertations (DAI) databases yielded 2209 SF-36 citations reflecting its use in a wide variety of populations. Among the population studies 153 journal articles were related to cancer patients. The strong correlation of the MQOLS-CA2 score with the SF-36 was coherent ($r:0.78$, $P<0.001$) as it was expected. This suggests that the questions within the two scales are consistently assessing the same issues and the correlation was sufficient to demonstrate that the MQOLS-CA2 measures similar attributes as does the SF-36.

2. Reliability

Assessing the reliability of the instrument is essential in determining its ability to measure something in a consistent and reproducible manner. In other words, reliability is concerned with how consistently an instrument measures the concept of interest. Reliability testing is considered as a measure of the amount of random error in the measurement technique. Since all measurement techniques contain some random error, reliability exists in degrees and is usually expressed as a form of correlation coefficient with a 1.00 indicating perfect reliability and 0.00 indicating no reliability (23,24,27). Estimates of reliability are specific to the sample being tested. Thus, high reported reliability values on an established instrument do not guarantee that reliability will be satisfactory in another sample or with a different population. Therefore, reliability testing needs to be performed on each instrument used in a study prior to performing other statistical analyses. Reliability testing focuses on two aspects of reliability: stability and homogeneity (23). Reliability of the questionnaire is assessed using the internal consistency (homogeneity) and test-retest (stability) method (23,24,27).

2.1. Stability: Stability is concerned with the consistency of repeated measures. This is usually referred to as test-retest reliability (27). The time interval between test and retest is a central issue with this measure; the intervals must be sufficiently long to minimise recall bias, but sufficiently short to ensure the nature of the item under investigation has not changed. A period of two weeks to a month is recommended between the two measures. After retesting, correlation analysis is performed on the scores from the two measures. A high correlation coefficient indicates high reliability (23). Correlation values as $r>0.5$ is a realistic proposal for reliability (36).

The test-retest approach was favoured for the MQOLS-CA2 as it fitted easily into the study programme and was appropriate for a self-report questionnaire.

In this study a convenience sample of 72 patients completed both test and retest questionnaires for a single episode. Response rate was 100%. Two weeks was judged to be optimum retest interval; this would be sufficiently long for patients to forget their initial responses to the 33 items, but not so long that most quality of life domain would change substantially. Pearson's correlation was chosen as test statistic. The results of the test-retest method of the MQOLS-CA2 showed the stability of 5 subscales in the MQOLS-CA2. As table 2 shows correlation coefficient for the 5 subscales ranged from 0.56 to 0.91. The lowest value belonged to the symptom management and the highest value belonged to the general physical well being. The MQOLS-CA2 has been revised several times after it was developed (28,31). In Ferrell and his co-workers' study (27) test-retest reliability coefficients for the MQOLS-CA2 have been reported as $r=0.60$. In this study sufficient test-retest reliability for a new instrument had been proven (39).

2.2. Homogeneity: Tests of instrument homogeneity address correlation of various items within the instrument. More recently, testing the homogeneity of all the items in the instrument has been seen as a better approach to determine reliability. This procedure examines the extent to which all the items in the instrument measure the same construct. It is a test of internal consistency. Internal consistency assesses the correlation between multiple indicators of a concept measured at a similar point in time. Each indicator, usually an item, is

considered a separate but equal measure of the underlying concept (27). According to Ozdamar (24) the lowest acceptable coefficient for a well-developed instrument is 0.80, but for newly developed instrument, a reliability of 0.70 is considered acceptable. In most applied studies, the lowest acceptable level of internal consistency reliability is 0.70 for group level and 0.90 or higher for individual analysis. Values lower than 0.70 suggest that some items in the scale do not capture the patient's attitude in the same manner as other items. The internal consistency coefficient value increases as the number of items increases. In Ferrell and his co-workers' study (27) internal consistency coefficients for the MQOLS-CA2 was alpha=0.80. In another study, the coefficient alpha for the total score was 0.93 and for subscales was 0.65 to 0.89 (40). In our study Cronbach alpha value was found 0.76 showing good internal consistency. Nunnally (39) indicated that a reliability of 0.70 or higher is acceptable for instruments used in research. So the MQOLS-CA2 has demonstrated sufficient internal consistency reliability for a new instrument (39).

Conclusion

The present study confirms MQOLS-CA2 as an important addition to the quality of life measures available for use in cancer patients. Obtained findings suggest that the Turkish version of the MQOLS-CA2 is a valid and reliable tool that could be employed in the research on people with cancer.

Abbreviations

QOL: Quality of life
PHY: Physical well-being (general)
SYM: Symptom management
PSY: Psychological well-being
NUT: Nutrition
INT: Interpersonal well-being

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