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Development of a Scale to Measure Health-Related Quality of Life of Cancer Patients

Sana Fatima[1*] & S. Reshma Jamal[2]
[1]Doctoral Scholar, Department of Psychology, A.M.U, Aligarh
[2]Associate Professor, Department of Psychology, A.M.U, Aligarh

ABSTRACT
Health-related Quality of Life plays a crucial role in the lives of diseased or non-diseased people. A healthy individual could contribute more to home, community, society, workplace, and nation than an unhealthy individual. A healthy lifestyle adds to a better quality of life and life satisfaction. The present study focuses on developing and standardizing the Health-related Quality of Life Scale specifically designed for cancer patients. The sample of Cancer patients (N=300) was collected from the Department of Radiotherapy, JNMCH, A.M.U., Aligarh. The preliminary scale consisted of 35 items, and after the proportion agreement method, 25 items were retained for item analysis. An exploratory factor analysis was carried out and confirmed 18 items clustered into four factors, namely: social, emotional, physical, and mental. The reliability coefficient of the scale was found to be (α= 0.61). Further, the EFA explained 65.01% total variance confirming the factorial validity check of the scale.

Keywords: *Health-related quality of life, Scale development, Cancer patients.*

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INTRODUCTION

Health-related quality of life

Kaplan [1] was the first who used the term Health-related quality of life "refers to the impact of health conditions on function." Health-related quality of life (HRQoL) is "a multi-dimensional concept that includes domains related to physical, mental, emotional, and social functioning. When the quality of life is considered in the context of health and disease, it is commonly referred to as health-related quality of life (HRQoL) to differentiate it from other aspects of quality of life" [2]. QoL is a broader concept whereas; HRQoL is narrow as its main focus is on the health of people. World Health Organization [3] defined health as *"not only the absence of infirmity and disease but also a state of complete physical, mental, and social well being,"* healthcare professionals were reminded importance of patient's health that it could be affected by social and environmental factors. The concept of HRQoL of life rises above life expectancy, death causes, and population health; instead, it focuses on the effect health has on the QoL of people. Health is precious resource for human; therefore its role cannot be neglected in forming QoL[4].

At the personal level, HRQoL covers functional state, mental and physical health, social support, health risks and conditions, socioeconomic status, and perceptions. The associated concept of HRQoL is well-being, which evaluates the positive aspects of life, like life satisfaction and positive emotions. HRQoL directs the effect of health on an individual's ability to live a joyful life.

Public health officials and healthcare professionals have used HRQoL inventories to measure short- and long-term disabilities, the severity of disease, intensity of illness, effects of chronic illness, and treatments. Though there exist several measures of HRQoL, methodological development in this area is still ongoing. HRQoL instruments mainly measure self-perceived health status. The present scale is made for evaluating HRQoL in cancer patients.

METHOD

Participants

The participants for the present study consisted of 300 cancer patients. Patients were selected from OPD of the Department of Radiotherapy, Jawaharlal Nehru Medical College and Hospital, A.M.U., Aligarh. A purposive sampling method has been used for the data collection.

Health- Related Quality of Life Scale

Step 1: Instrument Design

Item Generation and Selection:

An effort was made to review the literature on HRQoL. Based on that, statements were formed by keeping their relevancy aligned with the concept, they were simple in language, non-ambiguous, and positive and negative keyed. To determine the face and content validity of the construct, 8 judges (who have knowledge and expertise in various areas of psychology) were selected to evaluate the statements of the scale on a 4-point Likert scale based on relevance (1-Not relevant, 2-Items need revision and 3-Relevant but need some revision and 4-Very relevant) and simplicity (1-Not clear, 2-Items need revision 3-Clear but need some revision and 4-Meaning is clear). Judges rated each item based on how well the items reflect about health- related quality of life.

Step 2: Judgment

Table-1**:** *Showing ratings on a 35-item scale by 8 experts on a 4-point Relevance scale andcalculation of I-CVI and S-CVI/UA.*

Items	Relevant (rating 3 or 4)	Not Relevant (rating 1 or 2)	I-CVIs*	Interpretation
1	7	1	0.87	Appropriate
2	8	0	1.00	Appropriate
3	7	1	0.87	Appropriate
4	4	4	0.5	Eliminated
5	7	1	0.87	Appropriate
6	3	5	0.37	Eliminated
7	7	1	0.87	Appropriate
8	5	3	0.62	Eliminated
9	8	0	1.00	Appropriate
10	7	1	0.87	Appropriate
11	7	1	0.87	Appropriate
12	7	1	0.87	Appropriate
13	7	1	0.87	Appropriate
14	5	3	0.62	Eliminated
15	8	0	1.00	Appropriate
16	7	1	0.87	Appropriate
17	6	2	0.75	Need for Revision
18	7	1	0.87	Appropriate
19	8	0	1.00	Appropriate
20	5	3	0.62	Eliminated
21	7	1	0.87	Appropriate
22	6	2	0.75	Need for Revision
23	4	4	0.5	Eliminated

24	5	3	0.62	Eliminated
25	7	1	0.87	Appropriate
26	7	1	0.87	Appropriate
27	7	1	0.87	Appropriate
28	5	3	0.62	Eliminated
29	7	1	0.87	Appropriate
30	7	1	0.87	Appropriate
31	7	1	0.87	Appropriate
32	7	1	0.87	Appropriate
33	7	1	0.87	Appropriate
34	7	1	0.87	Appropriate
35	7	1	0.87	Appropriate

Total=28.24

Number of items considered relevant by all judges=4, Total no. of items 35, Total no. of experts 8, Mean I-CVI=0.80; S-CVI/UA= 4/35=0.11, Interpretation of I-CVIs: If the I-CVI is higher than79 percent, the item will be appropriate. If it is between 70 and 79 percent, it needs revision. If it is less than 70 percent, it is eliminated.

Table-2**:** *Showing ratings on a 35-item scale by 8 experts on a 4-point Clarity Scale and calculationof I-CVI and S-CVI/UA.*

Items	Relevant (rating 3 or 4)	Not Relevant (rating 1 or 2)	I-CVIs*	Interpretation
1	7	1	0.87	Appropriate
2	8	0	1.00	Appropriate
3	7	1	0.87	Appropriate
4	4	4	0.5	Eliminated
5	7	1	0.87	Appropriate
6	3	5	0.37	Eliminated
7	7	1	0.87	Appropriate
8	5	3	0.62	Eliminated
9	8	0	1.00	Appropriate
10	7	1	0.87	Appropriate
11	7	1	0.87	Appropriate
12	7	1	0.87	Appropriate
13	7	1	0.87	Appropriate
14	5	3	0.62	Eliminated
15	8	0	1.00	Appropriate
16	7	1	0.87	Appropriate
17	6	2	0.75	Need for Revision
18	7	1	0.87	Appropriate

19	7	1	0.87	Appropriate
20	4	4	0.5	Eliminated
21	7	1	0.87	Appropriate
22	4	4	0.5	Eliminated
23	6	2	0.75	Need for Revision
24	5	3	0.62	Eliminated
25	7	1	0.87	Appropriate
26	7	1	0.87	Appropriate
27	7	1	0.87	Appropriate
28	4	4	0.5	Eliminated
29	7	1	0.87	Appropriate
30	7	1	0.87	Appropriate
31	7	1	0.87	Appropriate
32	7	1	0.87	Appropriate
33	7	1	0.87	Appropriate
34	7	1	0.87	Appropriate
35	7	1	0.87	Appropriate
		Total=27.87		

Number of items considered relevant by all judges=3, Total no. of items 35, Total no. of experts 8, Mean I-CVI=0.79; S-CVI/UA= 3/35=0.08, Interpretation of I-CVIs: If the I-CVI is higher than79 percent, the item will be appropriate. If it is between 70 and 79 percent, it needs revision. If it is less than 70 percent, it is eliminated.

The content validity assessment was done by proportion agreement procedure known as Content Validity Index (CVI). According to the Content Validity Index (CVI) a rating of 3 or 4 shows that the content is consistent and valid with the conceptual frame [5]. Out of 35 items, only 25 items were valid with CVIs ranging from 0.87 (7/8) to 0.100 (8/8). Therefore, 25 items were withheld and rest of the 10 items was dropped.

Step 3:

Procedure

The 25 items of the scales were validated and approved by the judges. Patients were asked to rate each items on 7-point Likert-rating scale (1= strongly disagree, 2 = disagree, 3 = slightly disagree, 4= neutral, 5 = slightly agree, 6= agree, and 7= strongly agree) based on their perception of HRQoL.

Development of Health-related quality of life scale

Reliability analysis and Inter correlation matrix were examined to overcome the existence of multicollinearity and singularity in the scale. After analysis, the final scale comprised 18 items. Principal component analysis was applied in the present study. All 25 items were taken from the original scale. 7 items were discarded, and only 18 items were selected based on factor loading, .i.e., above .40 in the final scale.

Factor Analysis

A factor analysis was done on the items selected for the scale using Principal Component Analysis (PCA) extraction method and the orthogonal varimax rotation method. The value of Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was .797, and Bartlett's Test of Sphericity was significant (p=0.00).

The unrestricted factor analysis produced 4 factor solutions with Eigen values greater than one, which recovered 65.012% of the sample variance. The Eigen values and the scree plot revealed a noticeable gap between the four factors and resulted in a more meaningful, interpretable four factor model solution: Factor1 CPV= 17.43, Factor2 CPV= 30.12, Factor3 CPV= 41.08, Factor4 CPV= 50.23. The retained 18 items fall in the following four factors namely social, emotional, physical, and mental.

Factor Structure of Health- related quality of life scale
Factor analysis showed four factors of HRQoL described below.

Table-3: Factor Structure of Health- related quality of life scale

Dimensionality Reduction Information			Factors			
Dimensions	Items	Health- related quality of life	Factor 1	Factor 2	Factor 3	Factor 4
Social HRQoL	Item 16	I find hard to get along with people.	.904			
	Item 18	I face difficulty to connect with people.	.895			
	Item 15	My relations with others are not satisfactory.	.881			
	Item 14	My social interaction is limited due to health-related problems.	.778			
	Item 17	I feel satisfied with social activities and relationships.	.747			
Emotional HRQoL	Item 3	I feel irritated.		.733		
	Item 8	I feel sad and depressed.		.682		
	Item 12	I lose my temper easily.		.668		
	Item 9	I feel anxious.		.652		
	Item 7	I feel loneliness.		.520		
Physical HRQoL	Item 20	I need help doing my usual activities.			.672	
	Item 22	I am able to do my daily activities.			.659	
	Item 13	I seek help from another person.			.652	
	Item 21	I feel lazy in doing things because of tiredness.			.571	
	Item 19	Sometimes I feel tired.			.565	
Mental HRQoL	Item 4	I think positively.				.731
	Item 5	I can cope with illness easily.				.682
	Item 2	I feel calm and relaxed.				.619
Percentage of Variance			17.436	12.690	10.959	9.146
Cumulative Percentage of Variance (CPV)			17.436	30.126	41.085	50.231

Item number 16,18,15,14, 3, 8, 12, 9, 7, 20, 13, 21, 19 were negatively keyed whereas, item number 17, 22, 4, 5, and 2 were positively keyed.

Dimension 1-Social: it covers the aspect of an individual's social life like relations with significant other, group, and community.
Dimension 2-Emotional is related to a person's emotion or intense feelings about life's positive or negative aspects.

Dimension 3- Physical: include things related to the body like fatigue, pain, and fitness.
Dimension 4- Mental: it is related to mental health and the person's positive/negative mental state.

Draft of scale and Item analysis

The health-related quality of life scale consisted of 18 items which measure four dimensions, namely social (5 items), emotional (5 items), physical (5 items), and mental (3 items). Respondents rate each item on a 7-point rating scale: strongly disagree to strongly agree (i.e. 1to 7).

Table-4: Showing items in each dimension

Dimensions	*Items*	*Number of items*
Dimension 1	16, 18, 15, 14, 17	5
Dimension 2	3, 8, 12, 9, 7	5
Dimension 3	20, 22, 13, 19, 21	5
Dimension 4	4, 5, 2	3
Total		**18**

Reliability Coefficient

The Cronbach alpha of the HRQoL Scale of 18 items was found .612. Whereas the Cronbach alpha for social (α=.939), emotional (α=.779), physical (α =.671), and mental (α=.608) were also found reliable.

Table-5: Showing Mean, SD, and Reliability of the Health-related quality of life Scale on four dimensions

Dimensions	Mean	SD	No. of items	Cronbach α
1. Social	19.42	8.84	5	.939
2. Emotional	15.63	6.77	5	.779
3. Physical	14.16	4.93	5	.671
4. Mental	13.80	3.12	3	.608
Total	**63.01**	**17.10**	**18**	**.612**

Inter-item correlations

Inter-item correlations for each dimension were calculated. For the dimension1 item correlations ranged from 0.56 to 0.93; for dimension2 item correlations ranged from 0.31 to 0.56; for dimension3 item correlations ranged from 0.08 to 0.53; and for dimension4 item correlations ranged from 0.19 to 0.46. All correlation values for each factor were significant at 0.01 level.

Inter-Factorial Validity

Inter-factorial correlations show that every single factor was linked with one another, and measuring the similar construct, therefore, verifies the inter-factorial validity.

Table-6: Inter-factorial Validity

Dimensions	Dimension 1	Dimension 2	Dimension 3	Dimension 4
Dimension 1	1	.408**	.340**	.342**
Dimension 2		1	.218**	.394**
Dimension 3			1	.176**
Dimension 4				1

**Correlation coefficients are significant at the 0.01 level (2-tailed)

Applications

The Health-related quality of scale could be used for the following purposes

1. It can be administered by doctors, clinicians, counselors, and other mental health professionals to understand patients and choose the best suitable treatments and therapies.
2. It can be used in settings like OPD, wards, and clinics.
3. This scale is suitable for group and individual testing.
4. It can be used for research purposes, specifically in interview methods, survey methods, and counselling.
5. It can be used in conjunction with other relevant scales and self-report inventories.

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Ethical issues

None

Conflict of interest

The authors declare no conflict of interest in the study.

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