Palestinian Medical and Pharmaceutical Journal (PMPJ). 2023; 8(3): 379-386

The Relationship between Health-related quality of life and body mass index among Palestinian Dietetic Center Clients

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Received: (31/5/2022), Accepted: (10/2/2023)

ABSTRACT

Quality of life (QOL) is defined as individuals' assessment of their position based on the values and culture of their living environment and their aspirations, expectations, concerns, and standards. It has been reported that obesity harms individuals' QOL. Several studies on the relationship between BMI and health-related quality of life (HRQL) have been conducted in various populations. However, such research has not been conducted in the Palestinian context. This study aimed to investigate the relationship between BMI and HRQL among five hundred and nine (509) clients visiting the "Nutri Health" centers for weight control. The Short Form 36 (SF-36) health survey was used to assess HRQL (health-related quality of life). The Spearsman's rho correlation test, multiple linear regression, and the Kruskal-Wallis mean rank test were employed to examine the relationship between HRQL domain scores and BMI. The study's results revealed that BMI was significantly associated with the general perception of the health domain, two physical HRQL domains (physical functioning and pain), and just one mental HRQL domain (i.e., energy/vitality). In conclusion, BMI affected more physical domains of HRQL than cognitive domains in the study sample, and physical functioning was the most affected domain.

Keywords: BMI, Obesity, Health-Related Quality of Life, Mental Health.

INTRODUCTION

Obesity has been considered the epidemic of the twenty-first century because of its high prevalence and impact on illness, death, life quality, and healthcare expenses [1]. According to the World Health Organization, 2 billion adults worldwide were overweight in 2016, with 650 million obese. The worldwide obesity rate nearly tripled between 1975 and 2016. If current trends continue, around 2.7 billion adults will be overweight by 2025, with approximately 1 billion obese [2]. Obesity affects about a third of the adult population in the Middle East and North Africa (MENA). Even though lower-income countries have a lower prevalence of obesity, their obesity and overweight rates are regarded as high and rapidly increasing [3]. According to a systematic review, the prevalence of overweight and obesity among Palestinian adults is 30% and 18%, respectively [4].

Obesity raises the risk of death and a variety of serious medical diseases, including multiple types of cancer, hypertension, type 2 diabetes, dyslipidemia, mental illness, and others [5]. Obese people are more likely to experience depression and mood issues, especially if they have been obese since childhood [1]. Obese people may also experience negative body image, low self-esteem, isolation, and social weight-related discrimination and stigma [6].

Obesity is linked to the lower general and obesity-specific quality of life (QoL) across all demographics, according to a recent systematic review [7]. The World Health Organization (WHO) defined QoL as individuals' assessment of their position based on the values and culture of their living environment, as well as their aspirations, expectations, concerns, and standards [8]. In studies focusing on the relationship between QoL and health status, QoL is referred to as health-related quality of life (HRQOL) [7]. HRQL is usually assessed by looking at aspects of physical, mental, and social functioning based on the WHO definition of health [9]: "a state of complete physical, mental, and social well-being

and not merely the absence of disease or infirmity" [10]. Regarding healthy people, overall QoL is assessed [9]. Measuring HRQL may be more relevant for functioning and surviving than clinical and physiological assessments in clinical and public health situations [11]. Even though the association between diminished HRQL and obesity has been established among various populations, no such research has been conducted in Palestine. This study aims to assess and measure the HRQL of obese Palestinian adults based on their BMI.

METHOD

Study design

This descriptive study used the baseline data for a quasi-experiment to determine the effect of weight management programs on health-related QoL among Palestinian adults visiting Dietetic Centers in the West Bank. The relationship between body mass index and HRQL among "Nutri-Health" Center clients was studied using a reliable and validated questionnaire. Nutri-Health is a specialized dietetic center in West Bank, Palestine. The data were collected between May 2019 and November 2020.

Study population

The study population comprised adults over 18 years old who were referred to Nutri-Health Center for weight control and met the inclusion criteria. The Nutri-Health Center has locations in Hebron, Jenin, Nablus, Ramallah, and Tulkarem in West Bank, Palestine. The study encouraged all eligible clients of the center's branches to participate. The data analysis included those who completed the questionnaire and baseline assessment

Sample size calculation and sampling method

The sample size was calculated using the Chan, 2003 formula: $n= 2+ (C/\delta^2)$, where $\delta= \mu_2-\mu_1/ \sigma$, $\mu_1- \mu_2$= mean the difference between baseline and follow-up variables, σ = standard deviation of the mean after the follow-up, C (a constant) = 10.5 (90% power, $\alpha = 0.05$). Means and standard deviations were brought from a similar study by Imayama et al. (2011) (1). 90% power and 0.05 level of confidence were used to calculate the sample size. Forty and sixty-three (463) participants were needed for the study. After considering the dropout of 10%, the study sample was increased to 509 participants.

Collected data

Well-trained licensed dietitians gathered data. A questionnaire and anthropometric measurements were used to collect data. It consisted of three main sections: socio-demographics (i.e., gender, age, marital status, education level, living place, work, and income), health status, and HRQL. Height, weight, BMI, and body composition were among the anthropometric measurements taken. Height was measured to the nearest 0.5 cm using a measuring tape fastened to the wall. Weight was recorded to the nearest 0.1 kg on an electronic scale. BMI was computed by multiplying weight (kg) by height (m) squared, then it was classified according to WHO guidelines, underweight (18.5), normal weight (18.5-24.99), overweight (25-29.99), obese (≥30) (2). All the equipment was calibrated, and the measurements were taken according to industry standards. The measurements were taken twice, and the average was taken.

Study instruments

The HRQL was assessed using an Arabic translation of the Short Form 36 (SF-36) health survey. The validity and reliability of this version have already been proved (3, 4). The SF-36 comprises eight scales: general health perception, physical functioning, pain, role limitation due to physical problems, role limitation due to emotional problems, energy/vitality, mental health, and social functioning. The 4-week standard recall option was employed in this investigation. The SF-36 scales are scored using a conventional scoring logarithm. The scale runs from 0 to 100, with a higher number indicating greater health (5).

Data analysis

The statistical software for social science (SPSS) version 26 was utilized in this investigation. At a p-value <0.05, all statistical values were declared significant. The mean and standard deviations of the data were computed. Univariate and multivariate analyses were used to investigate the link between HRQL domains' scores and BMI. The univariate analysis was carried out using Spearman's

rho correlation test, while the multivariate analysis was carried out using multiple linear regression. In addition, the Kruskal-Wallis mean rank test was used to examine the link between HRQL domains' scores and BMI categories.

RESULTS

Five hundred and nine (509) participants were included in the study. Participants' age ranged from 18 to 68 years, with a mean of 32.86±10.07 years. The majorities of them were females (82.9%), married (62.7%), and had a bachelor's degree (56.6%) (Table 1). According to BMI, 169 (33%) of participants were obese class I, 31% (155) of them were obese class II, 18% (92) were obese class III, 15% (77) were overweight, 2% (11) had normal weight, and 1% (5) were underweight. The mean scores of the HRQL domains of participants are shown in (Table 2).

Table (1): Participants' Socio-demographics.

Variable		Total (n= 509)	
		Number (n)	Percentage (%)
Gender	Male	87	17.1
	Female	422	82.9
Marital Status	Single	175	34.4
	Married	319	62.7
	Divorced	15	2.9
Level of education	Primary school <10 years in school	33	6.5
	Secondary school	169	33.2
	Bachelor or equivalent	288	56.6
	Higher education (masters or doctoral)	19	3.7
Employment status	Employed	210	41.3
	Unemployed	299	58.7
Family income	<1500 NIS*	107	21
	1500 – 3000 NIS	211	41.5
	3000 – 5000 NIS	150	29.5
	More than 5000 NIS	41	8.1
Living place	City	202	39.7
	Village	285	56
	Camp	22	4.3

*NIS: New Israeli Shekel

Table (2): Participants' HRQL mean scores.

HRQL Domain	Mean Score
General health perception	64.62±20.86
Physical functioning	70.80±28.36
Pain	65.18±26.36
Role limitation due to physical problems	80.40±32.38
Role limitation due to emotional problems	64.11±43.57
Energy/Vitality	51.72±19.19
Mental health	56.27±20.38
Social functioning	69.16±24.10

Relationship between BMI & HRQL

A correlation test was conducted between BMI and HRQL domains' scores. It was found that BMI was significantly correlated with total scores of physical, energy fatigue, pain, and general health HRQL domains (Table 3). Multiple linear regression was done to evaluate the prediction of HRQL scores based on BMI scores.

A significant regression equation was found ($F(5, 503) = 6.780$, $p < .001$), with an $R^2 = 0.049$. There was a significant difference in physical functioning ($p<.01$) scores among participants' BMI scores (Table 4).

Table (3): Correlation coefficients of BMI.

HRQL Domain	BMI
General health perception	-.128*
Physical functioning	-.420*
Pain	-.158*
Role limitation due to physical problems	-.087
Role limitation due to emotional problems	.001
Energy/Vitality	-.132*
Mental health	.071
Social functioning	.011

*$p<.001$ using Spearman's rho correlation test

Table (4): Relationship between the QOL and BMI – a multivariate analysis.

HRQOL Domain	Multivariate Analysis				
	Beta (95% CI)	Exp B	p-value	p-value	R square
General health perception	-.009 (-.036 to .031)	-.003	.875	0.000 **	0.049
Physical functioning	-.156 (-.056 to -.012)	-.034	.002*		
Pain	-.080 (-.044 to .007)	-.019	.145		
Energy/ Vitality	-.020 (-.042 to .029)	-.006	.723		

*$p < .01$, **$p<.001$ using simple multiple linear regression
[a] Multivariate analysis using multiple linear regression

Relationship between BMI categories & HRQL

There was only a statistically significant difference in the physical functioning domain among participants' BMI categories ($p<.05$) using Kruskal-Wallis mean rank test (Table 5). For the domain of physical functioning ($H(3)= 11.749$, $p= (.008)$), the lowest mean rank score was found in obese participants (245.15), followed by normal weight participants (254.00), and underweight (277.10), while overweight had the highest mean rank (306.95).

Table (5): Relationship between BMI categories & HRQL scores.

HRQL		Score	
		Mean Rank	*p*-value
General health perception	Underweight	267.50	.133
	Normal	258.77	
	Overweight	289.57	
	Obese	248.35	
Physical functioning	Underweight	277.10	.008*
	Normal	254.00	
	Overweight	306.95	
	Obese	245.15	

HRQL		Score	
		Mean Rank	*p*-value
Role limitation due to physical problems	Underweight	238.10	.773
	Normal	247.55	
	Overweight	268.21	
	Obese	252.96	
Role limitation due to emotional problems	Underweight	184.20	.433
	Normal	211.18	
	Overweight	257.87	
	Obese	256.48	
Pain	Underweight	145.60	.195
	Normal	259.95	
	Overweight	276.99	
	Obese	252.11	
Energy/Vitality	Underweight	250.60	.191
	Normal	278.55	
	Overweight	286.91	
	Obese	248.52	
Mental health	Underweight	177.70	.113
	Normal	238.73	
	Overweight	288.45	
	Obese	250.17	
Social functioning	Underweight	160.30	.486
	Normal	277.23	
	Overweight	252.01	
	Obese	256.10	

*$p < .01$ using Kruskal-Wallis mean rank test

DISCUSSION

In this study, 509 participants seeking weight management were included. Their average age was 32.86±10.07, and the majority of them were females. Based on their BMI, 33% were obese class I, 31% were obese class II, and 18% were obese class III. According to the findings, BMI was significantly and negatively associated with the general perception of the health domain, two physical HRQL domains (physical functioning and pain), and just one mental HRQL domain (energy/vitality).

General Health perception & BMI

The univariate analysis found a significant correlation between BMI and general perception of health. In our group, there was a significant link between overall health perception and BMI. It had a -.128 correlation coefficient which showed a significant and negative association with BMI score ($p<.001$). In a Spanish study, higher BMI was negatively linked with self-perceived health (6). In addition, according to a Catalan study, women with a higher BMI showed a lower self-perception of their health (7). Obesity has been associated with negative body image, low self-esteem, isolation, and social discrimination and stigma due to weight (8). The media also portrays increased body weight as a sign of personal failure and a lack of self-control and intelligence (9). For the above reasons, individuals with a higher BMI may have a poor perception of their overall health.

Physical Functioning & BMI

In our sample, the univariate analysis revealed a significant link between physical functioning and BMI. With a correlation coefficient of -.420, physical functioning was

significantly and negatively linked with BMI score (p<.001). A significant (p<.01) connection between physical functioning and BMI score (β= -.156) was also discovered using multivariate regression. BMI categories were significantly associated with physical functioning (p<.01), with obese participants having the lowest mean rank score. Participants who were overweight, on the other hand, received the highest mean rank scores. It is possible, based on this finding, that the effect of BMI on physical function can be noticed once it reaches the obesity level. These findings are in line with other previous research. For example, a Brazilian study found a significant linear drop in the physical domain of QoL with an increase in BMI (10). Middle-aged obese class II women reported a much worse ability to participate in life tasks than normal and overweight women, according to an American study. Obese women in class I also reported less ability to participate in life duties than overweight women (11).

Pain & BMI

In our sample, univariate analysis revealed a significant association between pain and BMI. With a correlation coefficient of -.158, the pain was significantly associated with BMI score (p<.001). The same finding was reported in investigations conducted in the United States and Spain. Higher BMI was linked to more pain reported one day before (12) and issues with the QoL pain/discomfort dimension (6). Obesity and pain have a complex relationship that is still being unraveled. Obesity is associated with chronic pain due to several factors, including mechanical constraints imposed by extra weight on skeletal muscles and joints, as well as an increase in systemic inflammation. Obesity may also have a deleterious impact on pain sensitivity, according to research. Pain, on the other hand, has been connected to weight increase as a result of decreased physical activity, physical impairment, and movement avoidance due to pain fear (13).

Energy/vitality & BMI

Based on the univariate analysis, energy/vitality was significantly linked with BMI, with a correlation coefficient of -.132 (p<.001). According to a study conducted in the United States, a higher BMI (≥40) in men was connected with a poorer degree of vitality (14). Furthermore, vitality was linked to an increase in BMI and obesity. Five-year research in Denmark indicated that SF-36 vitality predicted BMI changes among people who acquired weight. Those with lower vitality at the start of the study had higher BMI rises. In addition, women's low vitality was linked to the development of obesity (15). Obesity-related metabolic conditions could explain the association between a high BMI and decreased vitality. It was found that sleepiness and fatigue are linked to insulin resistance (16). Furthermore, it has been proposed that obesity might be produced by metabolic changes that raise energy requirements to maintain cell functioning, resulting in a reduced energy level in the body (17).

LIMITATIONS

This study is the first phase of an intervention study on the effect of weight management on HRQL. Therefore, it included individuals seeking help from the selected study centers, which might have affected the outcomes of the baseline investigations. Moreover, it included higher percentages of obese and overweight participants than those with under and normal weight. However, the strengths of this study include its large sample size, using a globally reliable and validated tool, and to our knowledge, it is the first study of its kind in Palestine.

CONCLUSION

In our study sample, BMI affected more physical domains of HRQL than cognitive domains. BMI was significantly and negatively associated with the following HRQL domains' scores: general health perception, physical functioning, pain, and energy/vitality scores. The multivariate analysis shows that physical functioning had the strongest connection with BMI. The study findings indicate the need for more quantitative and qualitative studies to find out possible ways to face the negative consequences of obesity on adults' health and their quality of life.

Ethical approval and consent to participate

An-Najah National University's institutional review board (IRB) approved this study. No incentives or awards were presented to the study participants, who agreed to participate

voluntarily. The study objectives were verbally communicated. A permission form was signed by participants who agreed to participate in the study. During the research, all applicable rules and regulations were followed. No information was released, and the experiment was exclusively for research purposes.

Consent for publication: The authors permitted publication to PMPJ

Availability of data and material: Data and materials are available upon request and with permission of Dr. Manal Badrasawi at m.badrasawi@najah.edu.

Author's contribution: Omaymah Abu Wafa: the master's student who collect the data for a master's project, Mohammad Kamal. Salman and Reem Abu Alwafa: data analysis and manuscript writing; Manal Badrasawi and Mohammed Al-Tamimi: the supervisors of the project, both contributed equally to the formulation of the idea, revised the proposal, approved the methodology, supervised the data analysis and writing**.**

Competing interest: The authors declare they have no competing interests.

FUNDING

Not Applicable

ACKNOWLEDGMENTS

The authors would like to acknowledge the participants who helped the researchers collect data. We would like to express our gratitude to "Nutri-Health" centers, who helped the researchers by taking the participant's permission to meet the participants in this study. Thanks are also to all co-researchers and fieldworkers involved in this study.

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