Original Article

The relationship between obesity and health related quality of life of women in a Turkish city with a high prevalence of obesity

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The purpose of this study was to demonstrate the relationship between body weight and HRQOL in a representative sample of nonpregnant women in reproductive age period. The data of this cross-sectional study was extracted from a survey: Manisa Demographic and Health Survey (MDHS) conducted in Manisa city in 2000. The study population of MDHS is a representative sample of 1602 reproductive (15-49) age women. World Health Organization Quality of Life Questionnaire abbreviated version (WHOQOL-BREF), which was composed of four domain factors (physical, psychological, social relations and the environment), was used to assess HRQOL. Each of four domains had a possible score ranged between 0 (poor HRQOL) and 20 (excellent HRQOL). The mean age of the women was 35.29 ± 8.19 years. Among them, 35.8 % had normal weight (BMI 18.5 to 24.9), 32.3 % were overweight (BMI 25.0 to 29.9) while 31.9 % were moderate and 3.4% were morbidly obese. After adjusting for age, level of education and co-morbid illnesses, subjects with a BMI higher than normal value, had significantly lower HRQOL scores, compared to normal-weight individuals on each of the domains, except for the environmental domain. Our results suggested that the body weight alone could negatively affect HRQOL. In other words, obesity not only increased the risk of morbidity and mortality, but also affected the perceived health and life quality negatively. In conclusion, in addition to age, socioeconomic status and co-morbid illnesses, body weight should also be controlled in studies examining HRQOL.

Key words: Health Related Quality of Life, obesity, women, WHOQOL, general health-related quality, Turkey.

Introduction

The prevalence of overweight and obesity have increased in Europe and the Mediterranean region during the last decades, regardless of the level of development.[1-11] Obesity also contributes to the burden of disease in the community, due to its association with a number of chronic conditions such as; hyperlipidemia, non-insulin dependent diabetes, hypertension and coronary artery disease.[12] Obesity has become one of the leading preventable causes of mortality, through the vision of public health.[13-14]

Although it is well documented that obesity is strongly associated with morbidity and mortality, less is known about the impact of obesity on the functional status and health-related quality of life (HRQL). The majority of published studies indicate that obesity impairs HRQL, and that higher degrees of obesity are associated with greater impairment.[15-32] Most of the studies, enrolled participants from obesity clinics, who most likely attend these clinics as a result of undesirable effects caused by their body weight.[16,17,30-33] Unfortunately there are very few population-based studies which are free of referral bias; as in the hospital-based ones that investigate the relationship between obesity and HRQOL.[34-36]

However, almost all these studies were conducted in developed countries. Developing countries, like Turkey, were reported to be experiencing the double burden of disease (both communicable and chronic diseases) in the 2002 Annual Report of the World Health Organization.[37] The prevalence of obesity is extremely high in women, and the impact of obesity on the HRQOL of the population has never been studied before in countries located in the Eastern Mediterranean region. Obesity and QOL relationship has been reported with measures of general health-related QOL and measures of obesity-specific QOL. The most popular obesity-specific QOL instruments can be listed as Impact of Weight Loss Scale, Impact of Weight on Quality of Life-Lite, Obesity and Weight-Loss Quality of Life measure and Weight-Related Symptom Measure.[38] Since obesity has a potential multidimensional effect on QOL, the use of generic scales and selection of the appropriate generic scale is crucial in the obesity related QOL

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studies. SF 36 was used in most of the HRQOL studies on obese subjects as a generic instrument. Though SF 36 was proved to be a very effective tool in assessing the HRQOL of the subjects with a variety of diseases, it is widely known as a generic tool, which spans functional health status, while WHOQOL is a relatively newly developed scale, defined as a profile which has a good underlying theoretical conceptualization of quality of life.[39] WHOQOL was cross-culturally validated simultaneously in more than 40 cultures and languages around the world.[40,41]

The purpose of this study was to demonstrate the relationship between body weight and HRQOL, in a representative sample of nonpregnant reproductive aged women, using WHO body weight classification, by excluding cases with chronic disease and by adjusting HRQOL scores for age, level of education and co-morbid illness.

Materials and methods

Setting

The study was conducted in the City of Manisa, which was one of the well-developed provinces (11th biggest province for both population size and per capita Gross Domestic Product) of Turkey and located in the Eastern Mediterranean, Aegean region of the country. The mid-year census of Manisa city was 218,314 in the year 2000.

Subjects

A representative sample of 1669 reproductive (15-49) age women, were used in the study. The data of this cross-sectional study was extracted from a representative survey: Manisa Demographic and Health Survey (MDHS) conducted in Manisa city in 2000.

Sample size and sample selection

The sample size of MDHS was calculated using an estimated infant mortality rate (the least frequent dependent variable of the survey): 43.0% 0. A 95% CI, a precision of 8% 0 and 2.0 of a design effect were used. The minimum sample size was calculated as 1680 households.[42] A total of 168 clusters by 10 households per cluster was selected by probability proportional to size sampling approach. The initial households of each cluster were chosen randomly from a sampling frame, and the rest of the households were determined systematically by every fifth household for each cluster. All reproductive age women, present in the household on the night before the interview, were eligible for the study. Of the 1680 selected households, 2.4 % (N = 40) were considered to be unoccupied and 2.7 % (N = 46) refused the interview. A total of 1728 ever-married women living in the selected households were interviewed in MDHS.

Eighty-eight women who were pregnant or who were in the 3 months post-partum period, were excluded from the analysis, since in these periods Body Mass Index would be affected by transient hormonal causes and could not be regarded as a real obesity. The subjects were divided into five BMI categories according to the WHO classification system.[43] As the goal of the study was to examine the association between HRQOL and higher BMI, subjects in the underweight category (BMI < 18.5 kg/m2) were excluded from the analysis (N =38). Finally, 1602 healthy women aged between 15-49 years were used in the analysis.

Study measures

In the original study, data was collected by six trained teams; each consisted of two interviewers, a field editor and a supervisor. The interviewers measured height by a wall-mounted stadiometer, sensitive to 0.5cm, and weight by a 0.1kg sensitive calibrated balance scale; with the subjects wearing no shoes and only light clothing. BMI was calculated by dividing weight in kilograms by square of the height in meters. World Health Organization Quality of Life Questionnaire abbreviated version (WHOQOL-BREF):

The World Health Organization Quality of Life Assessment (WHOQOL) is a generic quality of life instrument, designed to be applicable to people living under different circumstances, conditions and cultures.[40,41] The WHOQOL sets out to be a purely subjective evaluation, assessing perceived HRQOL, and in this way it differs from many other instruments used to assess HRQOL. WHOQOL also accepts HRQOL as a multidimensional concept. Hence, assessment of a number of domains is necessary to derive a comprehensive view of a person's HRQOL. Two versions are available: the full WHOQOL with 100 items and the WHOQOL-BREF with 26 items. WHOQOL-BREF, the generic profile instrument, useful in clinical and service evaluations was used in this study for reasons of brevity. It is suggested that the WHOQOL-BREF provides a valid and reliable alternative to the assessment of domain profiles using the WHOQOL-100. It provides un-weighted measure-ment on four domains: physical, psychological, social and environment. The physical domain has questions related to daily activities such as, pain and discomfort, sleep and rest, energy and fatigue, dependence to the medications and mobility and work. In the psychological domain, there are questions of positive and negative feelings, meaning of life, self-esteem, body image and physical appearance, personal beliefs and ability to concentrate. The social relationship domain is related to personal relationships, social support and sexual activity. The environmental domain explores physical security and safety, financial resources, physical environment, home environment, health and social care and their availability, leisure activities, opportunities for acquiring new information and skills and participation in and opportunities for recreation and transport. A scoring algorithm (a SPSS syntax) was used to transform the sum of the WHOQOL-BREF item scores within each domains, to a scale ranging from 0 (poor HRQOL) to 20 (excellent HRQOL).

Validity and reliability of WHOQOL for the Turkish population were completed.[44] The psychometric analysis of the Turkish version was deemed highly satisfactory.

Data analysis

Comparison of age means between BMI categories were done by ANOVA while comparisons between categorical variables were performed by using the Chi Square test.

Table 1. Descriptive characteristics of study population

		Body Mass Index Classification (kg/m^2)					
Characteristic (*N*)	Total Sample	18.5 to <25	25 to <30	30 to <35	35 to <40	≥ 40	*P* Value
N (%)	1602 (100.0)	573 (35.8)	517 (32.3)	313 (19.5)	144 (9.0)	55 (3.4)	
Mean age in years	35.2	32.0	35.3	38.4	39.2	40.1	<0.001†
(SD)	(8.1)	(7.5)	(7.9)	(7.7)	(7.7)	(6.6)	
Level of Education, %							< 0.001*
No education (293)	18.3	12.6	16.4	24.0	28.5	36.4	
Primary (904)	56.3	51.9	57.8	61.9	59.0	54.5	
Secondary and higher (405)	25.2	35.5	25.7	14.1	12.5	9.1	
Social Class, %							< 0.001*
High (87)	5.4	7.5	6.0	3.2	2.1	0.0	
Moderate (738)	46.1	44.5	45.5	49.2	50.7	38.2	
Low (777)	48.5	48.0	48.5	47.6	47.2	61.8	
Reported Comorbid Illness, %							< 0.001*
No comorbid illness (1366)	85.3	90.6	87.0	79.6	73.6	76.4	
At least one comorbid illness (236)	14.7	9.4	13.0	20.4	26.4	23.6	

**P* value is overall comparison of proportions among BMI classifications by Chi square; † *P* value is overall comparison of means among BMI classifications by ANOVA, Post hoc results: 18.5 to 24.99 < 25 to 29.99 < 30 and over, Tukey's HSD test

WHOQOL domain mean scores with SDs were calculated for the entire sample and for each BMI classification. Raw WHOQOL Domain scores were adjusted by three potential confounding variables such as age, level of education and self-reported co-morbid illnesses, by using Multiple Linear Regression models. The domain scores and age were added into the models as continuous variables, while the level of education and the co-morbid illnesses were used as categorical variables. The two additional variables that might be regarded as other confounding variables such as social class and health service utilization were not added to the multivariate analysis to avoid multi-co-linearity, since both had significant statistical associations with their peers. The level of education and the social class category revealed a non-parametric correlation coefficient higher than 0.4 and the co-morbid illnesses and health service utilization showed a significant agreement, tested with Kappa statistics (*P* <0.001).

The comparisons of WHOQOL domain scores according to BMI categories were done with two different statistical approaches. Unadjusted and adjusted mean domain scores of BMI categories were compared by ANOVA. We also analyzed the data in a risk approach; each of the four adjusted WHOQOL domain scores were categorized by two cut-off points. One is the minus 1 (-1) standard deviation (SD) value of the standard normal distribution and the other one is the plus 1 (+1) standard deviation value. The subjects having a domain score value between –1 and +1 standard deviation values were excluded from the risk approach analysis. Odds Ratios having a value below –1SD value were calculated by regarding normal BMI category (BMI <18.5 kg/m2) as reference. A *P* value of <0.05 was considered to be statistically significant. Analysis was performed using SPSS version 10.0.

Results

The mean age of the women were 35.29 ± 8.19 years. Only about one third of the subjects (*N* = 573, 35.8%) were of normal weight (BMI 18.5 to 24.9), slightly less than one third (*N* = 517, 32.3 %) were overweight (BMI 25.0 to 29.9) and an additional one third (*N* = 512,31.9 %) were either moderately (BMI 30.0 to 39.9; *N* = 457, 28.5 %) or morbidly obese (BMI> 40.0; *N* = 55, 3.4%). The prevalence of obesity could be regarded as extremely high in the study group. Overweight prevalence was elevated with aging and lower level of education. Belonging to lower social class elevated the overweight prevalence, as well (*P*<0.001). Among the respondents, 14.7% reported suffering from prolonged illnesses. The risk of suffering from any prolonged illness was associated with the increase of BMI, with the proportion of subjects reporting a prolonged illness, increased linearly from 9.4% of those who had normal weight to 23.6% of those who were morbidly obese (Table 1).

Unadjusted domain scores of WHOQOL were statistically different in overweight and obese subjects, compared to those who had normal weight, except for the environment domain. *P* values were: < 0.001 for physical and psychological well-being domains; 0.016 for social relations domain and 0.158 for the environmental domain. After adjusting for age, level of education and co-morbid illness, subjects with a BMI value higher than 30.0, had significantly lower HRQOL scores on each of the domains, except for the environmental domain. On the contrary, the environmental domain score was significantly higher in overweight and obese subjects, compared to those who had normal-weight. The higher the BMI value, the lower the environmental domain score (Table 2).

As an alternative way of expressing the relationship between the WHOQOL domain scores and the BMI, the adjusted WHOQOL domain scores were categorized by two cut-off points: –1 standard deviation value and +1

Table 2. Mean (SD) WHOQOL-BREF Domain Scores by Body Mass Index

Domain	Total Sample (*N* =1602)	Body Mass Index Classification (kg/m^2) 18.5 to <25 (*N*=573) (a)	25 to <30 (*N* =517) (b)	30 to <35 (*N* =313) (c)	35 to 40 (*N* =144) (d)	≥ 40 (*N* =55) (e)	*P* *	*P* **
Physical	15.08 (2.33)	15.33(2.30)	15.19 (2.24)	14.75(2.22)	14.60(2.79)	14.60(2.46)	< 0.001	< 0.001
Psychological	13.65 (2.47)	13.93(2.46)	13.66 (2.48)	13.45(2.49)	13.39(2.21)	12.50(2.57)	< 0.001	< 0.001
Social Relationship	14.87 (2.45)	15.06 (2.56)	14.82 (2.48)	14.89(2.18)	14.59(2.42)	14.01 (2.41)	0.016	< 0.001
Environmental	13.52 (2.20)	13.56(2.27)	13.58(2.16)	13.45(2.13)	13.52(2.12)	12.81 (2.51)	0.158	< 0.001

**P* value is overall comparison of mean unadjusted domain scores among BMI classifications by ANOVA - Post hoc comparisons (Tukey's HSD test): For Physical domain: a >(b=c)> (d=e), For Psychological domain: (a=b=c=d) > e, For Social Relationship domain: a=b=c >d= e
***P* value is overall comparison of adjusted mean domain scores among BMI classifications by ANOVA. The domain scores were adjusted by age, level of education and presence of any chronic condition. Age was used as a continuous variable, while education as categorical and presence of chronic condition as a dichotomous variable. Post hoc comparisons (Tukey's HSD test): For Physical domain: a >b >(c =d=e)
For Psychological domain: a>b>(c=d) > e, For Social Relationship domain: a >b >(c =d= e), For Environmental domain: a <b < (c =d= e)

standard deviation value of standard normal distribution of each of the four domains. The risks of having a quality of life score lower than –1 standard deviation value were constantly elevated concordant with the increase in BMI class. This regular trend could be observed in all WHOQOL domains, except for the environment domain. Having a BMI value higher than normal value could protect individuals for having a lower environment quality of life score (Table 3).

Discussion

The results of this study have shown that 32.3% of the reproductive age women were overweight and 31.9% were obese in the center of Manisa. The findings were similar with the results of other previous studies conducted in other regions of Turkey[45-47] and similar or slightly higher than those conducted in Europe and Mediterranean countries.[1,3,5, 48-50]

The scope of this study was to probe the association between body weight and the health related quality of life (HRQOL); therefore, the possible relationship between obesity prevalence and other variables was not analyzed in this paper. Here, a negative linear association was found between obesity and HRQOL in a representative sample of reproductive-aged women. Even after controlling the possible confounding variables such as age, education and presence of any co-morbid illnesses, individuals with obesity had lower WHOQOL scores on three of the four domains of WHOQOL (physical, psychological and social), than those with normal weight. These results showed that obesity could have an independent impact on HRQOL in a representative sample of the population with high obesity.

The results of this study are consistent with many other studies[17,19,27-31,33,51] that noted the relationship between HRQOL and BMI. A reversible relationship between obesity and HRQOL was also demonstrated in a number of weight loss intervention studies which show that weight loss was associated with improvement in HRQOL, and weight regain was associated with deteriorations in HRQOL.[21,18,32,52-55]

The strong relationship in each BMI category with HRQOL may be due to the gender property of our sample, since the results of the studies showed that the inverse relationship between body weight and HRQOL was more apparent in women.[51,56,57] Though many other studies suggested that the burden of obesity was primarily perceived as physical in nature,[19,58-60] this study showed that physical, psychological and social dimensions of quality of life had persistent negative associations with the degree of overweight and obesity. Nevertheless, the results of this study revealed a more powerful association between BMI and the Physical component, compared to the Psychological component consistent with the literature above.

The results of this study could be considered quite reliable, since measurements of body weight and height were actually performed, rather than obtaining by participants' self-reports, as in some other studies[19,33,51] as women were shown to underestimate their body weight consistently, resulting in a systematic bias. Non response bias was negligible since the response rate was very high (97%). In addition, age, level of education and presence of co-morbid illnesses which are the obvious confounders to obesity, were controlled when measuring HRQOL. In many studies, it was shown that the low socioeconomic status and especially low education level worsened HRQOL.[2,8,48-50, 60-63] On the other hand, co-morbid illness was considered to be an important confounder in almost every HRQOL study in a variety of settings, including the community or hospital levels.

Although some other variables such as social class, frequency of health service utilization[19]and parity[62] were reported to be the confounders of obesity, their peers were used in the adjustment analysis to avoid multi-co-linearity when measuring HRQOL. Age was used in adjustment, instead of parity; co-morbidity instead of frequency of health service utilization and education level instead of social class. However, some psychosocial determinants that might have a strong effect on HRQOL such as, type of personality, smoking, alcohol drinking, was not controlled in the analysis, since both smoking and alcohol drinking prevalence were found to be very low in this study: Less than 0.1 % of women were regular alcohol drinkers, while 27.2% were introduced to smoking, but their lifelong exposure to tobacco was of median value, 3.5 package/years and may be considered as negligible. Therefore, not adjusting for the above variables might not affect the relationship between obesity and HRQOL.

Table 3. Estimated risks (Odds Ratios) of having quality of life scores lower than –1 standard deviation value, compared to having a value higher than +1 standard deviation value for each of the BMI classification with reference to normal BMI category*

	Body Mass Index Classification (kg/m^2)				
WHOQOL-BREF Domain (n) ‡	18.5 to <25 †	25 to <30	30 to <35	35 to 40	≥ 40
Physical (356 vs 331)	1.00	4.30 (2.80-6.59) §	12.11 (7.17-20.44)	16.08 (7.87-32.87)	32.64 (7.47-142.59)
Psychological (298 vs 342)	1.00	3.25 (2.08-5.08)	11.51 (6.68-19.83)	19.62 (8.96-42.93)	29.34 (8.48-101.51)
Social Relat. (493 vs 330)	1.00	3.63 (2.49-5.29)	9.00 (5.53-14.63)	11.36 (5.72-22.54)	24.30 (5.65-104.36)
Environmental(331 vs 364)	1.00	0.25 (0.16-0.38)	0.09 (0.05-0.15)	0.07 (0.03-0.14)	0.07 (0.02-0.23)

* The values were generated from the adjusted score distributions. The domain scores were adjusted by age, level of education and presence of any chronic condition.; † Reference category , BMI= 18.5 to <25; ‡ number of subjects with QOL values lower than –1SD - number of subjects with QOLvalues higher than +1SD; § 95% Confidence Interval

Aigner *et al*., suggested the adjustment of HRQOL scores for the influence of depressive symtoms.[64] In our study, QOL scores were adjusted by age, level of education and self reported co-morbid illness including diagnosed "depression". Neither physical non-specific complaints nor depressive complaints (symptoms) of the patients were elicited from the patients thus the QOL scores were not adjusted by either of these factors. If the QOL scores had been adjusted for these variables then we may have lost the identity of obesity which can be regarded as a kind of syndrome-like clinical condition that may comprise physical, psychological and social components. Further evidence of the casuality between obesity and HRQOL was seen in the dose response relationships between obesity and HRQOL, which was clearly demonstrated in our study.

One of the findings of this study that needs some explanation is the positive relationship between adjusted environmental domain score and BMI. In other words, the more obese the women, the better environmental quality of life score they have. Unadjusted score comparisons revealed no association between BMI and Environmental domain score. This is an expected result since the Environmental domain score of WHOQOL did not show adequate discriminative activities, opportunities for acquiring new information and skills, and participation in and opportunities for recreation and transport.[44] These items can be regarded as proxy socioeconomic variables. Evidence for this decision is that the environmental domain reveals the highest correlation coefficient, (r=0.28) with the conventional socioeconomic variables such as education and social class, compared to the other three domains of WHOQOL. As such, the environmental domain itself, might act as a socioeconomic composite index, and so we might not need to adjust it by any of the socioeconomic variables. When we adjust environmental domain scores for socioeconomic variables such as age and education, the contribution of some of the proxy socioeconomic items of this domain might decrease on total domain score, increasing the impact of some individual items to the total domain score such as physical security and safety and leisure activities. These two items for instance may be better perceived in lower socio-economic groups that higher SES groups.

A few limitations are present in this study. The data of co-morbid illness were collected in a dichotomous (yes – no) fashion. However, the lack of assessment of the severity of co-morbid illnesses may be regarded as a limitation. In addition, it would be useful to record the duration of illness which might seriously affect HRQOL. The main reason for these limitations are based on the fact that, it would not be possible to obtain reliable co-morbidity related information in such a low educated sample (75% have less that 6 years of education). Another limitation is the lack of data regarding the duration of obesity or whether the subject had ever attempted to lose weight. Such data could be useful in examining the association between BMI and health-related quality of life.

In conclusion, the body weight alone was shown to have a negative impact on HRQOL, indicating that obesity not only elevated the risk of morbidity and mortality, but also affected the perceived health and life quality of the subject negatively. According to the results of the study, socioeconomic status, co-morbid illnesses and body weight should also be controlled in studies examining HRQOL.

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Original Article

The relationship between obesity and health related quality of life of women in a Turkish city with a high prevalence of obesity

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土耳其高肥胖盛行率城市婦女肥胖與健康相關生活品質之相關

本研究的目的為呈現一有代表性的育齡但非懷孕婦女樣本，其體重與HRQOL之間的相關性。這個橫斷性研究的數據來自於：2000年在Manisa城市進行的Manisa人口統計及健康調查(MDHS)。MDHS的研究族群為1602名育齡(15-49歲)的婦女組成的代表性樣本。世界衛生組織的生活品質問卷精簡版本(WHOQOL-BREF)由四個構面所構成(生理、心理、社會相關因子以及環境)，用來評估HRQOL。每一個構面的計分從0分(差的HRQOL)到20分(佳的HRQOL)之間。這些婦女的平均年齡為35.29±8.19歲。其中有35.8%的女性體重正常 (BMI 18.5-24.9)、32.3%過重 (BMI 25.0-29.9)、31.9%中度肥胖 及3.4% 為病態肥胖。在校正年齡、教育程度及合併疾病後，除了環境構面外，身體質量指數較高者比起體重正常者，皆有顯著較低的HRQOL分數。我們的結果指出僅體重一項即對HROQL有負面的影響。換言之，肥胖不只增加罹病及死亡的危險，同時對自覺健康及生活品質也有負面的影響。總而言之，除了年齡、社經狀況及合併疾病之外，在討論HRQOL時也應該控制體重這個變項。

關鍵字：健康相關生活品質、肥胖、女性、WHOQOL、一般健康相關品質、土耳其。