Iran J Public Health, Vol. 50, No.10, Oct 2021, pp.2038-2045

Original Article

Gender Differences in Health-Related Quality of Life (HRQL) of Overweight and Obese Adults in a Representative Sample of Greek Urban Population

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(Received 06 Mar 2020; accepted 20 May 2020)

Abstract

Background: The main objective was to investigate the relationship between Health-Related Quality of Life (HRQL) and Body Mass Index (BMI) status according to gender in a representative sample of Greek urban population.

Methods: In this cross-sectional study, data were collected from 1060 participants (mean age 47.10 yr, 95%CI 46.09–48.07, 52.7% females) in a stratified sample of representative urban population during 1-20 Apr 2016 in Athens, Greece. Socio-demographic characteristics and medical history were involved. BMI (kg/m^2) was calculated, based on reported height and weight. HRQL was assessed by using the Greek version of SF36. Parametric tests and multiple logistic regression analysis were applied to identify whether socio-demographic characteristics differed across BMI groups. Mann–Whitney test was used to detect significant differences in SF36 scales between men and women across different BMI and age groups. Multivariate stepwise linear regression analyses were performed to investigate the influence of sociodemographic variables on HRQL.

Results: The effect of being overweight or obese differs by age and gender and that this negative impact in HRQL was greater in women than in men. More vulnerable were overweight young and obese middle-aged woman both in terms of physical and mental health. On the other hand, HRQL of normal weight men and women did not differ in almost all age groups.

Conclusion: Gender differences on HRQL observed in the general population were mediated by the different way that the two genders affected by increases in body weight.

Keywords: Gender; Health-related quality of life; Obesity; Overweight

Introduction

Previous studies from developed countries demonstrated that being overweight or obese is associated with lower Health-Related Quality of Life (HRQL) and that the HRQL burden of be-

ing overweight and obese was higher for women than for men (1-5). On the other hand, studies from developing countries (6-8) or in people with different cultural background (1,9), exploring the relationship between Body Mass Index (BMI) and HRQL, showed conflicting results. These results may reflect sociocultural differences regarding body image and cultural differences in attitudes towards obesity. Moreover, in some studies being overweight or obese was associated with better HRQOL as compared to those with normal weight (2,10-12), especially in men (13). This phenomenon has been called as the "obesity-HRQOL paradox" (2,10,12,13).

In Greece, data concerning the relationship between increased body weight and HRQL are scarce. As acculturation impacts this relationship, the question whether increased BMI is associated with changes in HRQL requires further evaluation.

The main objective of the present study was to investigate the relationship between HRQL and BMI status according to gender in a representative sample of Greek urban population.

Materials and Methods

Data collection

This cross-sectional study was conducted from 1-20 Apr 2016. Participants were recruited by means of a four-stage, stratified sampling procedure which scheduled upon 36 from 111 municipalities throughout the broader Athens area. This sampling procedure ensured that the sample was representative of the general urban population. Individuals younger than 18 yr-old, institutionalized people and people unable to communicate with the researchers were excluded. From 1520 candidates, 1060 agreed to participate (response rate 69.7%).

Questionnaire

For each participant, a researcher completed a structured questionnaire through home-based personal interview. The questions included demographic and social characteristics, medical history, medication history, health services utilization, satisfaction from health services and the Greek version of SF36. BMI (kg/m2) was calculated, based on reported height and weight. Study participants were divided into groups in terms of their BMI (<18.5 "underweight", 18.5 to 24.99 "normal weight", 25.0 to 29.99 "overweight" and >30.0 obese).

All participants were informed about anonymity and data confidentiality before they responded to the questionnaire and an informed consent was obtained in all cases. The study was approved by the 1st Regional Health Authority of Greece.

Assessment of Health-related quality of life

HRQL assessed by using the Greek version of SF36 that has been translated and validated in the Greek general population (14,15). The questions are summarized into eight domains measuring physical functioning (PF), role physical (RP), bodily pain (BP), general health perception (GH), vitality (VT), social functioning (SF), role emotional (RE), and mental health (MH). Higher scores (0–100 range) reflect better-perceived health. Two summary scales reflect the overall physical health functioning (Physical Component Summary-PCS) and psycho-social functioning (Mental Component Summary-MCS).

Statistical analysis

Categorical variables are expressed as frequencies and percentages. Continuous variables are expressed as means±1SD confidence interval. Normality of evaluated continuous variables was tested using the Kolmogorov– Smirnov test. For categorical variables, a Chi-square test was applied to evaluate whether socio-demographic characteristics differed across BMI groups. Student's t-test was used to compare age between BMI groups. Mann–Whitney non-parametric test was used to detect significant differences in eight scales and two summary scales of SF36 between men and women across different BMI and age groups. Moreover, multivariate stepwise linear regression analyses were performed (with the eight SF-36 subscales as the dependent variables and sociodemographic characteristics as inde-

pendent variables) to investigate the influence of sociodemographic variables on HRQL. A *P*-value≤0.05 was considered to be statistically significant.

Results

Study participants were predominantly females (559 females-501 males). Overall, 462 participants (43.6%) were in the normal weight range, while 452 (42.7%) were overweight, 139 (13.1%) were obese and 7 (0.7%) were underweight. Underweight persons excluded from the analysis. The comparison of socio-demographic characteristics between normal weight and overweight adults and between normal weight and obese adults are shown in Tables 1 and 2 respectively.

Table 1: Comparison of socio-demographic characteristics between normal weight and overweight adults

Socio-demographic characteristics	*Normal weight n=462 (%)*	*Overweight n=452 (%)*	*Statistical significance*
Gender			
Males	181 (39.2)	256 (56.6)	*P*<0.001[a]
Females	281 (60.8)	196 (43.4)	(χ^2=27.913)
Age (yr old) (mean±1SD)	40.8 (±15.8)	51.4 (±16.3)	*P*<0.001[b] (t(912)=-10.015)
Marital status			
Married	243 (52.6)	308 (68.1)	*P*<0.001[a]
Unmarried	186 (40.3)	93 (20.6)	(χ^2=43.794)
Divorced	18 (3.9)	21 (4.6)	
Widowed	15 (3.2)	30 (6.6)	
Educational level			
Primary	11(2.4)	25 (5.5)	*P*<0.001[a]
Secondary	256 (55.4)	299 (66.2)	(χ^2=23.946)
Technological Education Institution	94 (20.3)	53 (11.7)	
University	101 (21.9)	75 (16.6)	
Smoking			
Yes	151 (32.7)	163 (36.1)	NS[a]
No	311 (67.3)	289 (63.9)	

[a] Chi-square test
[b] Student's *t*-test

Mean age was significantly higher for overweight in comparison with normal weight adults (t(912)= -10.015, *P*<0.001). Statistical difference was also found while comparing the normal weight and the overweight group according to the gender (χ^2=27.913, *P*<0.001), the marital status (χ^2=43.794, *P*<0.001) and the educational level (χ^2=23.946, *P*<0.001). In multivariate analysis, overweight adults were more likely to be males (*P*<0.001, OR=0.442, 95%CI 0.333-0.586) and elderly (*P*= *P*<0.001, OR=1.038, 95%CI 1.027-1.049).

The comparison of socio-demographic characteristics between normal weight and obese persons (Table 2), displayed statistically significant differences with regard to age (*P*<0.001, t(599) = -8.946), marital status *P*<0.001, χ^2=56.938) and educational level (*P*<0.001, χ^2=26.827). In multivariate analysis, only age was independently associated with obesity (*P*<0.001, OR=1.043, 95%CI 1.027-1.058).

Table 2: Comparison of socio-demographic characteristics between normal weight and obese adults

Socio-demographic characteristics	*Normal weight n=462 (%)*	*Obese n=139 (%)*	*Statistical significance*
Gender			
Males	181 (39.2)	64 (46.0)	NS[a]
Females	281 (60.8)	75 (54.0)	
Age (95% CI) (yr)	40.8 (±15.8)	54.2 (±14.4)	*P*<0.001[b] (t(599)= -8.946)
Marital status			
Married	243 (52.6)	97 (69.8)	*P*<0.001[a]
Unmarried	186 (40.3)	14 (10.1)	(χ^2=56.938)
Divorced	18 (3.9)	9 (6.5)	
Widowed	15 (3.2)	19 (13.6)	
Educational level			
Primary	11(2.4)	14 (10.1)	*P*<0.001[a]
Secondary	256 (55.4)	91 (65.5)	(χ^2=26.827)
Technological Education Institution	94 (20.3)	20 (14.3)	
University	101 (21.9)	14 (10.1)	
Smoking			
Yes	151 (32.7)	44 (31.7)	NS[a]
No	311 (67.3)	95 (68.3)	

[a] Chi-square test
[b] Student's t-test

As age differed significantly between normal weights, overweight and obese adults we compared the HRQL of men and women according BMI status across different age groups (Table 3). In general, normal weight men and women scored almost equally in SF36 subscales across different age groups, apart from the physical component parameters in 18-40 yr old age group. Young women rated their physical health lower than young men and this was statistically significant only in PCS (Table 3).

On the other hand, overweight and obese women rated their HRQL lower than overweight and obese men respectively, in almost all the SF36 subscales. This was more obvious in overweight young women (18-40 yr old) and obese young (18-40 yr old) middle aged (41-65 yr old) and elderly women (66-100 yr old). More specifically in overweight young women both physical and mental health has been affected statistically significant more than the respective group of men, while obese young women reported statistically significant worse physical health, obese middle-aged women reported statistically significant worse both physical and mental health and finally elderly women were more affected in terms of mental health. Multivariate analyses for the SF-36 (Table 4) showed that gender and age have the most pronounced negative influence on HRQL, each affecting negatively and significantly eight out of eight SF-36 subscales. BMI status was also a significant predicting factor for seven SF-36 subscales. Marital status and educational level were significant predictors for certain SF-36 subscales while smoking has no statistically significant influence in any SF-36 subscale.

Table 3: Health-Related Quality of Life (HRQL) of normal-weight, overweight and obese men and women across different age groups

Normal weight (Years old)	***PF***	***RP***	***BP***	***GH***	***VT***	***SF***	***RE***	***MH***	***PCS***	***MCS***
18-40 men	98.6[a]	96.5	94.4	85.5	77.2	90.6	96.7	72.0	58.0	51.0
(n= 101)	(6.9)	(15.8)	(16.5)	(16.7)	(16.7)	(17.0)	(16.0)	(18.2)	(4.7)	(7.7)
18-40 women	97.5	93.7	91.8	81.6	73.9	89.0	95.0	74.5	56.5	51.3 (8.2)
(n=154)	(8.6)	(22.4)	(17.3)	(18.3)	(18.3)	(18.9)	(18.6)	(17.1)	(5.2)	
P	0.079	0.433	0.064	0.056	0.157	0.498	0.296	0.276	0.001	0.714
41-65 men	82.2	75.4	79.9	67.1	61.3	76.4	78.3	64.1	50.5	46.2
(n=63)	(26.9)	(37.7)	(27.1)	(23.7)	(18.9)	(24.7)	(36.0)	(20.4)	(11.0)	(9.4)
41-65 women	83.6	76.6	78.1	64.7	58.7	76.9	78.2	61.5	50.6	45.1
(n=107)	(21.7)	(37.0)	(24.7)	(22.8)	(17.6)	(22.9)	(35.5)	(17.9)	(9.8)	(9.2)
P	0.730	0.965	0.405	0.399	0.276	0.980	0.874	0.507	0.798	0.524
66-100 men	65.3	55.9	64.0	43.4	48.8	61.0	56.9	54.1	42.6	40.7
(n=17)	(22.9)	(47.2)	(27.8)	(20.8)	(20.6)	(25.7)	(49.7)	(19.4)	(10.4)	(11.7)
66-100 women	59.5	51.2	57.9	43.5	47.5	65.6	58.3	59.8	39.4	43.8
(n=20)	(27.1)	(45.5)	(21.9)	(22.5)	(16.1)	(25.6)	(48.2)	(20.3)	(11.7)	(8.9)
P	0.424	0.798	0.424	0.619	0.940	0.707	0.869	0.158	0.357	0.407
Overweight	PF	RP	BP	GH	VT	SF	RE	MH	PCS	MCS
18-40 men	99.1[a]	99.2	93.6	82.4	75.3	91.6	98.6	74.1	57.5	51.7 (6.3)
(n=92)	(3.7)	(5.8)	(16.4)	(17.0)	(16.4)	(17.0)	(8.4)	(14.7)	(3.3)	
18-40 women	92.2	88.9	87.0	74.3	62.2	84.6	85.3	63.6	55.2	46.2 (10.3)
(n=43)	(13.1)	(28.5)	(22.6)	(19.0)	(24.2)	(25.4)	(32.8)	(17.4)	(7.0)	
P	0.000	0.002	0.065	0.007	0.003	0.115	0.002	0.001	0.070	0.001
41-65 men	84.4	80.2	82.1	62.8	59.2	81.6	81.0	64.6	50.8	46.6
(n=116)	(20.3)	(33.5)	(21.7)	(23.2)	(15.7)	(22.8)	(31.5)	(16.3)	(8.7)	(8.5)
41-65 women	78.8	75.5	77.9	60.3	60.3	82.2	75.8	65.4	48.7	47.3
(n=95)	(22.5)	(35.3)	(24.0)	(21.3)	(18.2)	(21.1)	(36.2)	(17.5)	(9.4)	(8.7)
P	0.039	0.196	0.227	0.521	0.531	0.893	0.383	0.780	0.085	0.631
66-100 men	56.1	41.7	60.7	39.7	44.9	60.2	44.4	55.7	39.0	40.5
(n=48)	(29.4)	(44.2)	(26.8)	(22.1)	(18.3)	(25.7)	(44.2)	(17.5)	(11.5)	(9.6)
66-100 women	48.3	34.0	44.2	34.4	39.2	50.9	37.4	51.3	34.7	38.4
(n=58)	(27.8)	(43.6)	(25.9)	(20.7)	(18.8)	(26.6)	(42.4)	(18.1)	(10.8)	(9.8)
P	0.154	0.322	0.003	0.379	0.205	0.063	0.414	0.088	0.054	0.193
Obese	PF	RP	BP	GH	VT	SF	RE	MH	PCS	MCS
18-40 men	96.7[a]	100	89.7	80.4	72.1	92.7	100	72.0	56.5	51.5 (5.3)
(n=12)	(8.6)	(0.0)	(18.9)	(15.7)	(16.3)	(15.5)	(0.0)	(14.9)	(3.0)	
18-40 women	88.1	73.4	79.7	62.4	65.3	76.6	75.0	63.2	51.1	45.5 (11.6)
(n=16)	(14.6)	(38.2)	(23.9)	(18.6)	(16.7)	(28.1)	(37.5)	(18.4)	(7.2)	
P	0.066	0.100	0.280	0.020	0.189	0.174	0.100	0.205	0.033	0.159
41-65 men	83.0	76.8	81.7	64.0	59.1	79.6	78.0	63.3	50.7	45.9
(n=41)	(24.9)	(38.1)	(27.7)	(23.9)	(22.3)	(23.7)	(35.4)	(19.2)	(10.8)	(9.0)
41-65 women	66.6	46.9	59.5	50.1	49.4	66.8	50.0	54.4	42.4	40.9
(n=32)	(27.6)	(47.0)	(25.7)	(20.0)	(21.9)	(28.3)	(42.3)	(20.4)	(9.8)	(10.7)
P	0.006	0.004	0.000	0.011	0.063	0.055	0.004	0.062	0.000	0.036
66-100 men	35.9	40.9	57.5	45.2	49.1	57.9	42.4	71.3	33.7	46.8
(n=11)	(35.6)	(47.8)	(29.4)	(21.2)	(21.9)	(31.3)	(49.6)	(15.6)	(12.4)	(9.1)
66-100 women	25.9	25.9	39.4	32.4	35.6	42.1	29.6	54.2	28.9	39.5
(n=27)	(30.7)	(41.3)	(25.3)	(23.0)	(19.4)	(30.2)	(41.7)	(21.2)	(11.2)	(9.8)
P	0.373	0.308	0.082	0.082	0.082	0.179	0.612	0.006	0.201	0.038

[a] Mean score and (1SD) is described

In multivariate analyses, each SF-36 subscale was explained by portions of variance ranging from 12% for MH to 44% for PF. PF, GH and VT were the HRQL subscales most significantly influenced by this set of sociodemographic characteristics and this is reflected by the high portion of variance (44%, 42% and 32%, respectively) explained by the linear regression model. On the other hand, MH was the HRQL subscale which appears to be less significantly affected.

Table 4: Multivariate analyses for SF-36 subscales

	B Coefficient (P-value)							
Variable	***PF***	***RP***	***BP***	***GH***	***VT***	***SF***	***RE***	***MH***
Constant	155.1	163.6	137.3	123.8	104.2	128.2	161.3	84.4
	P<0.001	*P*<0.001	*P*<0.001	*P*<0.001	*P*<0.001	*P*<0.001	*P*<0.001	*P*<0.001
Gender	-5.9	-8.2	-7.6	-5.3	-4.9	-5.0	-8.0	-2.6
	P<0.001	*P*<0.001	*P*<0.001	*P*<0.001	*P*<0.001	*P*<0.001	*P*<0.001	*P*=0.02
Age	-0.9	-1.1	-0.7	-0.8	-0.5	-0.6	-1.0	-0.3
	P<0.001	*P*<0.001	*P*<0.001	*P*<0.001	*P*<0.001	*P*<0.001	*P*<0.001	*P*<0.001
Marital status	-0.9	-0.9	-0.2	-0.1	1.1	-0.4	-0.7	0.6
	P=0.005	NS*	NS	NS	*P*<0.001	NS	NS	*P*=0.03
Educational	1.3	1.3	1.3	1.6	0.5	0.5	1.1	0.5
level	*P*<0.001	*P*=0.023	*P*=0.002	*P*<0.001	NS	NS	NS	NS
Smoking	1.9	3.7	1.3	0.1	-0.9	1.2	3.6	-0.3
	NS	NS	NS	NS	NS	NS	NS	NS
BMI	-0.9	-1.0	-0.7	-0.7	-0.6	-0.5	-1.1	-0.2
	P<0.001	*P*<0.001	*P*<0.001	*P*<0.001	*P*<0.001	*P*=0.005	*P*<0.001	NS
R^2=	0.44	0.31	0.30	0.42	0.32	0.22	0.28	0.12

NS*: Non-Significant

Discussion

The multivariate regression models indicate that age and gender were important predictors of HRQL and that PF was the HRQL dimension most significantly influenced by sociodemographic factors, findings known from previous studies from Greece (16,17). Moreover, the effect of being overweight or obese differs by age and gender and that this negative impact in HRQL was greater in women than in men. More vulnerable were overweight young and obese middle-aged woman both in terms of physical and mental health.

This is not surprising since societal pressures against obesity in Greece, like other developed countries, are especially focused in women as they exposed at messages from various types and forms of media about thin ideal, appearance and femminity (18). Therefore, somehow it represents the impact of acculturation regarding body image in Greece.

Similarly HRQL was significantly lower among obese women than obese men across all ages (1), at higher BMI values men reported higher HRQL than women (4), and women had a greater overall impact of obesity on their HRQL (5).

In our study, HRQL of normal weight men and women did not differ in almost all age groups. Previous studies from Greece (15) and other countries highlighted the fact that women report worse health than men (15, 19-24). This fact may be mediated by the greater negative impact that increased BMI has on women's HRQL compared to that on men.

Our study has some limitations. First, both weight and height of study participants are self-reported. Although, men may be more likely to overestimate their height, women to underestimate their weight and obese to underestimate their weights and heights (25,26), the bias resulting from self-report, with regard to misclassifica-

tion into BMI classes, is in general small (27). Second, assessment of HRQL was made using the generic instrument SF36. Generic instruments have the handicap that they may not cover all essential health aspects pertinent to one specific disease. However, they have the advantage of enabling comparisons of HRQL across different populations and diseases (28,29).

Conclusion

Gender differences were apparent in the associations between increased BMI and HRQL in Greek urban population. Taking into account that HRQL did not differ between men and women with normal BMI we could conclude that gender differences on HRQL observed in the general population are mediated by the different way that the two genders affected by increases in body weight and so the management of overweight and obese females, requires a holistic approach not only in terms of physical health but also in behavioral and psychological field.

Ethical considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

Acknowledgements

This research was funded by the 1st Regional Health Authority of Greece.

Conflict of interest

The authors have no conflicts of interest associated with the material presented in this paper.

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