

## Body mass index and quality of life among the elderly

Rina K. Kusumaratna,\*<sup>a</sup> and Adi Hidayat\*

### ABSTRACT

\*Department of Community  
Medicine, Faculty of Medicine  
Trisakti University

#### Correspondence

<sup>a</sup>DR. Dr. Rina K.Kusumaratna,  
M.Kes.

Department of Community  
Medicine, Faculty of Medicine  
Trisakti University

Jl. Kyai Tapa No.260, Grogol  
Jakarta 11440

Email:

rkusumartna@yahoo.com

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Obesity in many countries is a major public health problem. The health problems associated with an increase in the proportion of elderly in the population are further compounded by the increasing prevalence of obesity and overweight in older people. The aimed of this study was to explore any difference of quality of life (QOL) attributable body mass index (BMI) categories using the WHOQOL-BREF instruments. An observational cross-sectional study was conducted in Mampang Prapatan district, South Jakarta. A total of 296 free-living elderly aged 60 years and above were participated in this study. BMI was calculated as the weight (kg) divided by the square of the height (m<sup>2</sup>). Quality of life was measured by WHOQOL-BREF questionnaire in the Indonesian language version. The results showed that the percentage of overweight subjects was 27.5% in male and 22.2% in female elderly, while the percentage of obese subjects was respectively 8.3 and 13.2.1% respectively. In males, the mean scores on each domain of the QOL were higher compared with females. The significant differences were in social relationship (p=0.000) and environment (p=0.018) domains. Among male and female elderly the highest mean scores of each domain of QOL was observed in the environment domain, and mean scores of the environment domain was significantly higher in males compare with females (p=0.018). The results have practical implications for the health of older persons because they show that the overweight have a worse score in two QOL domains, namely psychological health and environment.

**Key words:** Body mass index, quality of life, elderly

### INTRODUCTION

Most developed and developing countries in the world are experiencing an obesity epidemic.<sup>(1,2)</sup> The high and growing frequency of excess body weight and its association with numerous chronic diseases, such as cardiovascular disease, diabetes, certain tumors

and osteomuscular disorders, signifies that overweight and obesity are an important public health problem.<sup>(3)</sup> The increased life expectancy will lead to growing numbers of frail, disabled, and institutionalized older persons with a decreased quality of life and increased costs for health care.<sup>(4)</sup> In the United States, the prevalence of overweight and obesity among

adults has increased markedly during the past few decades.<sup>(5)</sup> The impact of excess weight on physical health is well documented, as obesity is associated with higher morbidity risk and shorter life expectancy.<sup>(6)</sup> Obesity could be measured by using height and body weight indices, both of which are anthropometric indices usually used as a body mass index (BMI) of an individual; where BMI is calculated as body weight in kilograms divided by the square of height in meters.<sup>(5)</sup> In old age, the elderly are expected to have a good quality of life to conduct independent daily activities. Various definitions of quality of life have been proposed by the experts.

The World Health Organization (WHO) has defined QOL as “the individual’s perception of his/her position in life in the context of the culture and value systems in which he/she lives and in relation to his/her goals, expectations, standards and concerns”.<sup>(6)</sup> This international body has recently developed a generic profile subjective QOL instrument, the WHOQOL-100, and its brief version, the WHOQOL-BREF.<sup>(7)</sup> This instrument is to be used for measuring the quality of life among the elderly. Although it could be hypothesized that obesity is a predictor of the quality of life of the elderly, the hypothesis needs further investigation. The objective of this study was to explore any difference of quality of life (QOL) attributable to BMI categories using the WHOQOL-BREF instrument in the 60+ age group.

## METHODS

### Research design

An observational cross-sectional study was conducted in Mampang Prapatan district, South Jakarta. The study was carried out from April to September 2008.

### Research subjects

Subjects of the study, i.e. apparently healthy free-living elderly who met the inclusion criteria were randomly selected from a list in each Rukun Tetangga (RT). A total of 296 free-living elderly aged 60 years and above were participated in this study with the following inclusion criteria: individuals of both genders, mobile, apparently healthy, independent, able to verbally communicate and willing to join the study.

### Data collecting and measurements

Information was collected through home-based personal interview using a structured questionnaire, followed by a physical examination to measure blood pressure and anthropometric variables. Blood pressure was measured with a calibrated mercury sphygmomanometer. Subjects were deemed to be hypertensive where their systolic blood pressure (SBP) was  $\geq 140$ mmHg, their diastolic blood pressure (DBP) was  $\geq 90$ mmHg or they were on current antihypertensive drug treatment.<sup>(9)</sup> The anthropometric measurements used to calculate BMI, by standard procedures, included both height and weight. Height was measured using a portable microtoise to the nearest 0.1 cm and weight was measured using Sage portable scales to the nearest 0.1 kg. BMI was calculated as the weight (kg) divided by the square of the height ( $m^2$ ). For Asian population, BMI is classified into the following categories: underweight ( $<18.5$  kg/ $m^2$ ), normal (18.5–22.9 kg/ $m^2$ ), overweight (23.0–27.5 kg/ $m^2$ ), and obese ( $\geq 27.6$  kg/ $m^2$ ).<sup>(10)</sup>

Quality of life was measured by WHOQOL-BREF questionnaire in its Indonesian translation. This questionnaire is made up of 26 items which assess the following four domains: i) physical domain, consisting of

seven items, ii) psychological domain, consisting of six items, iii) social relationship domain, consisting of three items, and iv) environmental domain, consisting of eight items. The WHOQOL-BREF also measures two facets of quality of life as general outcomes, namely: i) overall quality of life, and ii) general health. Each question was assigned scores between 1 and 5, with the higher scores indicating a better quality of life. The score from each domain was calculated by multiplying each facet by a factor of four. A domain would not be assigned a score if more than 20% of the questions had not been answered by the subjects. The WHOQOL-BREF instrument was validated and indicated high validity and reliability for measuring the quality of life among the elderly.<sup>(11)</sup> Interviewers underwent standardized training to administer the questionnaire and take blood pressure readings and anthropometric measurements.

### **Ethical clearance**

Ethical clearance was approved by the Research Ethics Committee of the Faculty of Medicine, Trisakti University. The participants were requested to give a written consent, with attached signature for the illiterate or thumbprint for the illiterate. Identify of all participants was kept confidential and used for research purposes only.

### **Statistical analysis**

Univariate analyses were performed for background characteristics, and normality of distribution of the data was checked using the Kolmogorov-Smirnov test. Normally distributed data were expressed as mean and standard deviation, and percentage. ANOVA was conducted to compare each QOL domain by BMI categories. The statistical analysis was performed with the SPSS software package (Windows version 15.0 SPSS Chicago), and all

P-values less than 0.05 were considered to be statistically significant.

## **RESULTS**

The subject characteristics are shown in Table 1. One hundred and eight (36.5%) were male and 188 (63.5%) were female elderly. Mean age of the elderly was  $65.8 \pm 4.6$  years (range 60-85). The majority (81.2%) of the elderly were aged 60 to 70 years and 18.2% were aged 70+ years. From the anthropometric indices it may be concluded that male elderly were taller and heavier than females, and also had a greater knee-height. Overall, the body mass index was in the normal category for both genders. Most of the elderly (74.4%) had six years of education, while male elderly had a higher educational background. As to marital status of the elderly, there were more widowed females than males. The percentage of overweight subjects was 27.5% in male and 22.2% in female elderly, and that of obese subjects, 8.3 and 13.2%, respectively (Table 1).

Table 2 shows the mean scores for the QOL questionnaire scales based on gender. In males, the mean scores for each QOL domain were higher compared with females. The significant difference was in social relationship ( $p=0.000$ ) and environment ( $p=0.018$ ) domains. Among male and female elderly the highest mean scores of each domain of QOL were observed in the environment domain and were significantly higher in males compared with females ( $p=0.018$ ).

The highest mean scores for the psychological health and environment domains were observed in overweight subjects. As compared with underweight, normal, overweight and obesity the mean scores of psychological ( $p=0.019$ ) and environment ( $p=0.005$ ) domains showed significantly higher values (Table 3).

Table 1 Subject characteristics based on gender (n=296)

Characteristics	Gender	
	Male (108)	Female (188)
Age, yr		
60 – 70	86 (79.6)	156 (83)
70+	22 (20.4)	32 (17)
Height, cm (mean ± SD)	160.9 ± 4.5	150.6 ± 3.9
Knee-height, cm (mean ± SD)	49.0 ± 2.1	45.4 ± 1.9
Weight, kg (mean ± SD)	56.9 ± 9.8	49.1 ± 10.5
BMI, kg/m <sup>2</sup> (mean ± SD)	21.9 ± 3.5	21.6 ± 4.3
BMI categories		
underweight	22 (20.2)	49 (26.4)
normal	48 (44.0)	71 (38.1)
overweight	30 (27.5)	42 (22.2)
obesity	9 (8.3)	25 (13.2)
Education background		
≤ 6 years	65 (60.2)	155 (82.5)
7- 9 years	21 (19.4)	15 (8)
9+ years	22 (20.4)	18 (9.6)
Marital status		
married	90 (83.3)	42 (22.3)
widowed	18 (16.7)	144 (76.6)
single	-	2 (1.1)

Table 2 Mean scores for quality of life domain based on gender

Quality of life	Gender		P
	Male (108)	Female (188)	
Physical health	22.3 ± 2.7	22.1 ± 2.9	0.427
Psychological health	19.7 ± 2.2	19.3 ± 2.4	0.147
Social relationships	9.7 ± 1.4	8.3 ± 1.5	0.000
Environment	27.8 ± 3.3	26.8 ± 3.4	0.018

Table 3. Adjusted mean scores for quality of life domains according to BMI categories

Quality of life	Body mass index				P
	< 18.5 (underweight) n=71	18.5-22.9 (normal) n=119	23-27.5 (overweight) n=72	≥ 27.6 (obesity) n=34	
Physical health	22.1 ± 3.1	22.1 ± 2.8	22.7 ± 2.8	21.7 ± 2.7	0.229
Psychological health	18.7 ± 2.4	19.5 ± 2.3	19.9 ± 2.2	19.5 ± 2.1	0.019
Social relationships	8.5 ± 1.6	8.7 ± 1.6	9.1 ± 1.5	8.8 ± 1.6	0.147
Environment	26.2 ± 3.2	26.9 ± 3.3	28.1 ± 3.3	27.9 ± 3.2	0.005

Table 4 Multiple comparisons of QOL domains between BMI groups among the elderly

	Body Mass Index		Mean differences (A-B)	p-value
	Category (A)	Category (B)		
Physical health	underweight	overweight	-1.181	0.013
Environment	underweight	overweight	-1.764	0.008

After adjusting for mean scores of QOL domains (Table 3), the following four domains of QOL remained higher in the overweight category, namely the psychological health domain ( $p=0.019$ ), and environment domain ( $p=0.005$ ). On average the QOL as measured in psychological and environment domains increased significantly with level of the body mass index, especially among overweight category.

The Tukey HSD multiple comparisons illustrated that the scores for the physical health and environment domains were significantly lower in the underweight group when compared to the overweight group ( $p=0.013$  and  $p=0.008$ ) (Table 4).

## DISCUSSION

As more people are becoming increasingly older, they may expect to experience disability and poor QOL, even if they are apparently healthy. Apart from morbidity, these issues should receive due consideration. The ideal outcome of added years of life is to live through those years as a healthy individual free of disability and disease.

The results of the present study indicate that among persons aged 60 years and over in Jakarta, overweight is associated with worse scores in the psychological health and environment domains. These results were observed across the genders, regardless of age

or type of anthropometric measure used. In contrast, obesity was not associated with a worse HRQL, but the percentage of overweight and obese subjects in this study was substantial, and was comparable with that reported by a recent nationally representative study in Indonesia (8.8% overweight, 10.3% obesity), especially in Jakarta province (11.9% overweight, 15% obesity) and other provinces. The proportion of obese is greater than that of overweight, although this has also been observed in other populations around the world that have a very high prevalence of obesity. In this study there were more overweight subjects (24.3%) compared to obese (11.5%). The percentage of overweight subjects was 27.5% in male and 22.2% in female, and that of obese subjects, 8.3 and 13.2.1%, respectively. This results were difference compared to the study in the population aged 60 y and over in Spain, the percentage of overweight subjects was 48.5% in men and 39.8% in women, and of obese subjects, 31.9 and 41.1% respectively.<sup>(13)</sup>

The mean BMI in both genders were similar, but elderly men were taller and heavier compared to women. Compared with the normal weight and obese categories, overweight elderly had higher values for psychological health, social relationships and environment scores. Similar results were found in the study by Daviglius et al,<sup>(5)</sup> in which the BMI for men and women had significant inverse-graded associations with all Health Status Questionnaire. The proportion of overweight was higher than that of obese in our study, but the study in Spain showed a greater

proportion of obese compare to overweight.<sup>(13)</sup> Although these results have also been observed in other populations around the world which a very high prevalence of obesity.<sup>(14,15)</sup>

Overweight and obesity are associated with higher morbidity and shorter life expectancy, but the effect of body mass index (BMI) assessed in middle age on subsequent quality of life among older survivors is as yet undetermined. While even this has not been conclusively proved, it has been reported that individuals with favorable health risks (determined by smoking status, BMI, and exercise patterns) have half the cumulative disability of those at high risk after 32 years of follow-up. In addition, onset of disability was postponed by approximately 5 years in the low-risk compared with the high-risk group.<sup>(16)</sup> These findings suggest that healthy habits and traits may lead to postponement of initial disability and decreased lifetime disability. A lot of attention has been focused on the prevention of chronic diseases by prevention and control of major risk factors, with a resultant reduction in mortality and an increase in longevity. However, risk factors for chronic disease, which can be largely asymptomatic, can also cause subclinical disease and affect quality of life.<sup>(17)</sup>

Overweight (BMI, 23.0-27.5) and obesity (BMI,  $\geq 27.6$ ) are important determinants of type 2 diabetes mellitus, insulin resistance, hypertension, and dyslipidemia,<sup>(18)</sup> and are independently associated with future morbidity and mortality from coronary heart disease and cardiovascular disease. In addition, excess weight has is strongly correlated with a higher risk of some types of cancers (endometrial, prostate, colon, and breast), gallbladder disease, osteoarthritis, sleep apnea, respiratory problems, and other conditions. Furthermore, high BMI levels have been associated with increased health care costs. It is well known

that the obese suffer social discrimination and, in particular, that those who come to clinics in search of treatment tend to have lower self-esteem, more anxiety and a poorer body image. Nonetheless, a number of studies have found that this has affected the mental less than it has the physical components of HRQL.<sup>(20)</sup> The influence of age on the relation between BMI and mortality has not been widely studied, especially in the elderly. A population-based California cohort study showed the association between increased weight and higher mortality is primarily relevant for the younger elderly.<sup>(21)</sup> One limitation of this study was that it did not determine the influence of other factors related to overweight and obesity, such as physical inactivity or diet, on physical, mental, and social health among the elderly.

The findings of this study demonstrate the adverse impact of high BMI in the elderly on future health-related quality of life. With much of the older population facing trends of increasing overweight and obesity, preventive measures are urgently required to lessen future individual and societal burdens of disease, disability, cost of care, and impaired quality of life associated with excess weight. Strategies that emphasize primary prevention of excess weight from an early age, with the potential of ending the obesity epidemic and leading to improved quality of life, should also become an ongoing component of national public health policy.

## CONCLUSIONS

The results have practical implications for the health of older persons because they show that the overweight have a worse score in the QOL domains of psychological health and environment. Thus, the study emphasizes the need for appropriate approaches in primary care to break the vicious circle of overweight,



obesity and decreasing QOL. Not only does this shed new light on the enormous impact that excess weight could exert upon the health of the elderly population, but should serve as a spur to implement the necessary control measures.

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