RESEARCH ARTICLE

Association between Obesity and Depression among Women in Indonesia: A Questionnaire Based Study

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Abstract

Obesity is a global public health issue and the prevalence of obesity is growing worldwide every year. Studies have been performed since the early 1970s on the association between obesity and depression or other psychological disorders. In Indonesia, however, only a small number of studies have been carried out. The aim of this study was to examine whether obesity was associated with depression in a sample of women with overweight and obesity based on their BMI, anti-obesity treatment experience, and age among women in one province in Indonesia. Women aged 18 years and older who were selected from fitness centers in urban area of Yogyakarta province and self-reported BMI categorized as overweight and obese were eligible to participate. Voluntary participation in study survey was consented. A set of questionnaire consisting demographic characteristics and depression symptoms was developed and validated. Depression was assessed by the Patient Health Questionnaire-9 (PHQ-9), with a score of ≥10 used to indicate severe depression. Respondents who classified as overweight mostly had minimal depression level (33.58%) and none had severe depression level, whereas respondents who classified as obese mostly had moderate depression level (44.74%) and 3.95% had severe depression level. This study found that BMI, experience of using anti-obesity drugs, and age of respondents were significantly affected PHQ-9 score. Thus, these factors determined the level of depression among women surveyed. The study reported significant association between obesity and depression among women. This association depends on BMI, anti-obesity treatment experience, and age variables. Approaches to public health to reduce the burden of obesity or depression have to consider the strong link between these two common conditions.

Keywords: *Body Mass Index, Obesity, Depression.*

Introduction

Obesity is a global public health issue and the prevalence of obesity is growing worldwide every year. The World Health Organization (WHO) estimated that 39 percent (>1.9 billion) of adults over the age of 18 were overweight and 13 percent (>600 million) were obese [1]. Obesity contributes to other comorbidities, and one of the most common psychiatric disorders associated with obesity is depression [2].

Obesity and depression add to the global economic expense, morbidity, and mortality burden [3, 4]. Such disorders interact with other complications, such as cardiovascular diseases and diabetes mellitus [5, 6]. Studies have been performed since the early 1970s on the association between obesity and depression or other psychological disorders. Those previous studies on the relation between obesity and depression, however, had conflicting findings. Some studies have stated that obese people often appear to have depression [7, 8], but other studies did not support this conclusion in all subjects [9, 10].

Several studies found no link between obesity and depression [11, 12], while others reported

a positive relationship between obesity and depression in women but not in men [13] and a study found associations limited to severe obesity [14].

Some of the inconsistency in previous studies on obesity and depression may be due to methodological variations. Previous studies used various depression measures including depression screening issues [13], symptom scales [15], and structured diagnostic interviews [13]. Socio-demographic factors such as race or socio-economic status may either complicate or modify the relationship between obesity and depression [13].

The 9-item Patient Health Questionnaire or PHQ-9 is a self-report measurement of depression symptoms that examines the nine American Psychiatric Association DSM-IV criteria for major depressive episode diagnosis. Excellent agreement between the self-report PHQ and a clinician-structured interview was shown by confirmation studies in the general population as well as in general medical outpatients and medical inpatients. To assess the current major depression diagnosis, each item was scored as positive if endorsed as "More than half the time" or "Nearly all the time".

A major depression diagnosis required a positive response to one of the two core symptoms (depressed mood or loss of interest) and a total of five positive symptoms. Additionally, a dimensional score was calculated as the total of all 9 items (possible range 0 to 27). In this scale a score of 10 or more represents a moderate level of depressive symptoms [16].

In Indonesia, however, only a small number of studies have been carried out. The aim of this study was to examine whether obesity was associated with depression in a sample of women with overweight and obesity based on their BMI, anti-obesity treatment experience, and age among women in one province in Indonesia.

Materials and Methods

A population-based survey of women in Yogyakarta province was conducted. Study participants were recruited from selected fitness centers located in urban area of the city. All study procedures were approved by the Gadjah Mada University institutional Review Board. All women aged 18 and older and classified as obese or overweight based on body mass index (BMI) measurement enrolled in this study. A convenience sampling technique was used to recruit sampled participants. Study procedure and voluntary nature of study participation were explained and written informed consent was required to ensure confidentiality. Participants received no financial compensation for completing the survey.

A pre-validated questionnaire consisted of two section was delivered by interviewer. Each interviewer received at least three hours of training for interview technique, to ensure the consistency in data collection process. Section one of the study questionnaire consisted of age, education attainment, self-reported height, weight, physical activity, and medication use experiences for weight loss.

Section two was the 9-item Patient Health Questionnaire (PHQ) a self-report measure of depression symptoms examines the criteria of depression severity, developed by American Psychiatric Association. A total score was calculated as the total of all 9 items (range score 0 to 27).

A score of 10 or more on this scale represents a severe level of depressive symptoms, while scores less than 10 represent a mild level of depression. All data were analyzed using SPSS software, Version 21. The proportions and percentage of each variable were presented. Association between depression level and BMI category (overweight vs obese) was conducted using *Mann-whitney* test with significant level <0.05.

Results

A total of 210 women participated in this study, and Table 1 displayed the characteristics of the women surveyed. The age of respondents ranged mainly from 21-30 years of age (43.91%). Majority of respondents' level of education was Bachelor's degree (50.48%) and only 9.05 percent of the respondents had Master's.

Approximately fifty two percent of respondents have "moderate to high" number of physical activity per week. Among women surveyed, 63.81% of them classified as Overweight (BMI: 25-30 kg/m²) and the rest classified as Obese (BMI: >30 kg/m²).

Table 1: Characteristics of women surveyed

Characteristics	N	%
Age (years)		
<20	78	37.14
21-30	92	43.81
31-40	40	19.05
Level of education		
High school	85	40.48
Bachelor degree	106	50.48
Master degree	19	9.05
Physical activity a week		
Low	100	47.62
Moderate to high	110	52.38
Body mass index (BMI)		
Overweight (25-30)	134	63.81
Obese (>30)	76	36.19

Table 2 presents experience in using anti-obesity drugs among women. About 67.62% of respondents stated that they have experience on using anti-obesity drugs. Respondents who have experience on using anti-obesity drugs asked about who recommend the treatment to them. More than ninety percent of the respondents earned the recommendation from media or advertisement. Herbal tea and food supplement for weight loss were the most used type of medication. Hypnotherapy, acupuncture, and prescription drugs (sibutramine) were another form of treatment used by the respondents. These medications came with a variety of side effects, including headache, heart palpitation, heartburn, and ulcer.

Table 2: Experience in using anti-obesity drugs among women

Anti-obesity drug use profile	N	%
Ever use of anti-obesity drugs (210)		
Yes	142	67.62
No	68	32..38
Who recommend the medication (142)		
Physician	43	30.28
Friends or family	67	47.18
Media or advertisement	130	91.55
Type of medication use (142)		
Herbal tea	121	85.21
Food supplement for weight loss	156	109.86
Hypnotherapy	59	41.55
Acupuncture	45	31.69
Prescription drugs (sibutramine)	67	47.18
Side effect experienced (142)		
Headache	65	45.77
Heart palpitation	44	30.99
Heartburn	38	26.76
Ulcer	36	25.35

Table 3 shows the profile of Patient Health Questionnaire-9 (PHQ-9) scores based on obesity category. Respondents who classified as overweight mostly had minimal depression level (33.58%) and none had severe depression level, whereas respondents who classified as obese mostly had moderate depression level (44.74%) and 3.95% had severe depression level.

Table 3: Profile of Patient Health Questionnaire-9 (PHQ-9) scores based on obesity category

PHQ score	Overweight (134). N (%)	Obese (76). N (%)
Minimal (0-4)	45 (33.58)	12 (15.79)
Mild (5-9)	33 (24.63)	14 (18.42)
Moderate (10-14)	31 (23.13)	34 (44.74)
Moderately severe (15-19)	25 (18.66)	13 (17.11)
Severe (20-27)	0	3 (3.95)

The association between variables and depression level are summarized in Table 4. This study found that BMI, experience of using anti-obesity drugs, and age of respondents were significantly affected PHQ-9 score. Thus, these factors determined the level of depression among women surveyed. In terms of the differential impact of BMI on the PHQ-9 score, it was observed that women with obese had higher score of PHQ-9 that classified as "severe" depression level than women with overweight (p<0.001). This study also observed that respondents who ever used any kind of anti-obesity drugs had higher gains than respondents who never had medication for obesity (p<0.001). Nevertheless, younger respondents with age less than 30 years old showed gains that were significantly higher than older respondents (p=0.023).

Table 4: Association between variables and depression level

Variables	N	Depression level		p-value
		Mild (PHQ<10)	Severe (PHQ≥10)	
BMI				
Overweight	134	78 (58.21)	56 (41.79)	<0.001
Obese	76	26 (34.21)	50 (65.79)	
Use of anti-obesity drugs				
Yes	142	67 (47.18)	75 (52.82)	<0.001
No	68	44 (64.71)	24 (35.29)	
Age (years)				
<30	170	56 (32.94)	114 (67.06)	0.023
31-40	40	21 (52.50)	19 (47.50)	

*significant at p<0.05

Discussion

This study involved 210 respondents and was aimed at examining whether obesity was associated with depression in a sample of women with overweight and obesity based on their BMI, anti-obesity treatment experience, and age among women in one province in Indonesia. Many countries conducted similar studies [7, 17-20]. In Indonesia, however, only a small number of studies have been carried out.

The Patient Health Questionnaire-9 (PHQ-9) was used to measure the severity of depression experienced by women. The PHQ-9 is a valid and reliable instrument for diagnosing depressive and other mental disorders that are commonly found in primary care based on criteria. These features plus its briefness make the PHQ-9 a useful clinical and research tool [21].

The present study highlights a higher prevalence of depression for obese women. We found that the Body Mass Index (BMI) and the depression level were significantly related (p<0.001). Women with overweight mostly had minimal depression level, whereas obese women mostly had moderate depression level and some had severe depression level. Previous researches suggest multiple mechanisms for an association between obesity and depression. When obese individuals are on a diet, food deprivation could worsen their depression [20].

The stigma attached to obesity (especially for women) may also lead to depression, and this stigma may differ by race/ethnicity or socio-economic status [22-25]. In addition, limitations of exercise or due to chronic diseases associated with obesity can increase the risk of depression by distressing physical symptoms or reduced participation in rewarding or pleasurable activities [26].

Similar results were found in other studies. Previous studies indicated that obesity had a negative linear association with depression and that the degree of obesity is proportional to depression in women, although it is not significantly related to depression in men [10,27, 28]. A research also reported that a greater body mass index appeared to cause depression and vice versa [29]. Individuals with depression demonstrate either a reduced or an increased appetite.

Appetite can increase when depression causes the brain to release an excessive amount of cortisol from the stress hormone relative to normal individuals. Elevated cortisol increases appetite, resulting in fat accumulation within the viscera, leading to increased visceral fat and obesity. In addition, low levels of the serotonin neurotransmitter cause depression. Since the sugar consumption increases serotonin release, sugar cravings are frequently felt by people with depression.

Medicinal products used to manage mood or anxiety disorders may also result in weight gain [20]. In contrast of that, some studies do not necessarily show similar results. Some factors lead to these varying results [11, 12]. The association between obesity and depression, and the neurotransmitter contribution, play a role in these variable outcomes. Moreover, the means used to assess depression differ from study to study. The choice of scale used for assessing depression also varies across studies, and even when the same scale is used, the cut-off score for depression may vary.

Thus, these factors may contribute to different results across studies [20]. Concerning respondents' experience in using anti-obesity treatment, respondents who have ever used any type of anti-obesity drugs had higher gains than respondents who never had medication to treat their condition. The findings of this study is consistent with other studies, which showed individuals seeking weight loss treatment have been found to show elevated levels of psychiatric symptoms as well as depression.

High expectation for the success of the treatment may cause pressure as well as anxiety to the individuals and leads to depression. Therefore, differential approaches needed to overcome these problems. For example, the impact of psychopathology on compliance and outcome should be investigated to explain the high drop-out and low success levels for many types of obesity, [30].

Additionally, the results of this study suggest that age significantly affects the depression among women surveyed. Younger respondents with age less than 30 years old reported substantially higher gains than older respondents. Another study conducted in the US also revealed that 44-80 percent of young obese women were more likely to have encountered depressed mood than young, not overweight/obese women. Old obese women were about 30 percent more likely than old, not overweight/obese women to have experienced it [13]. Based on the explanation written above, intervention such as approaches to public health to reduce the burden of obesity or depression must take into account the clear association between these two common conditions. Our study faced a number of limitations.

First, the study used convenience sampling method which is included in non-random sampling. Non-random sampling techniques cannot be used to generalize research findings to populations, whereas sampling techniques using convenience sampling provide less objective research results. Second, either the direction of the causal relationship between obesity and depression or the mechanism of that relationship cannot be clearly established in this cross-sectional study. Last, this study measured the severity of depression symptoms at the time of BMI measurement and the PHQ-9 score only represents the state of mind of the respondents for the past 2 weeks.

Conclusion

The study reported significant association between obesity and depression among women. This association depends on BMI, anti-obesity treatment experience, and age variables. Approaches to public health to reduce the burden of obesity or depression have to consider the strong link between these two common conditions.

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