

Relationship between Obesity and Mental Health among Females Attending The National Nutrition Institute Clinic (Cairo)

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Abstract : Objective: To evaluate mental health profile among overweight and obese adult females. **Methods:** Analytical retrospective, case control study comparing two parallel groups. The target group included cases (n=100) who were overweight and obese adult females attending the National Nutritional Institute, Cairo (NNI) weight reduction clinic. The control group (n=100) were normal weight adult females attending with their relatives weight reduction clinic or with their infants and children the pediatrics clinic (NNI). **Results:** There were statistically significant differences between cases and controls as regards stress and depression severity (P=0.018 - P<0.001, respectively). Stress and depression tends to be more among cases. Regarding anxiety there was no statistically significant differences between cases and controls (p=0.197). There was statistically significant differences between cases and controls regarding snacking to different types of foods (p<0.05). Cases tends to snake regularly versus controls. Regarding daily activity, walking and walking regularity, showed no significant differences between cases and controls. **Conclusions:** Stress and depression symptoms are mental health problems among overweight and obese adult females. Frequent snacking is among the risk factors to develop overweight and obesity regardless of the daily activity.

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1. Introduction

Obesity is an increasingly prevalent public-health problem with significant costs in the form of disease, premature death, increased health-care costs and social stigmatization. In addition, obesity causes or exacerbates many health conditions, both independently and in association with other diseases (Patterson et al., 2004) Obesity is known to be associated with increased mortality mainly due to deaths from cardiovascular disease and diabetes (Bender et al., 2006). However there has been some debate regarding the relationship between obesity and psychiatric disorders. Early studies suggested that obesity was associated with lower levels of anxiety in middle-aged men and women and lower levels of depression in men (Crisp and McGuinness., 1976). These findings lead to the formation of a “jolly fat” hypothesis, which implied that obesity may be protective against common mental disorders. While some subsequent studies were able to replicate these findings (Jasienska et al., 2005) others failed to find any association between obesity and mental illness (Ross, 1994). More recent studies with larger sample sizes have tended to find associations in the opposite direction to that predicted by the jolly fat hypothesis. A number of studies have demonstrated increased rates of depression in obese individuals (Dong et al., 2004); although some have

suggested that this positive association may only be present among females (Carpenter et al., 2000). Simon et al., 2006). Published results from the U.S. National Co-morbidity Survey revealed a 25% increase in the odds of mood and anxiety disorders in both obese males and females. A number of theories have been proposed to explain any association between obesity and mental illness (McElroy et al., 2004). These tend to focus on the potential overlap in symptoms (disordered eating, physical inactivity, social isolation, etc), shared genetic risk factors, or similarities in the disruption of biological systems (Marniemi et al., 2002). Individuals who suffer from both obesity and common mental health disorders may also face particular risks to health and well-being. Women appear to be at most risk of obesity and common mental health disorders (depression, anxiety and stress) than men.

Aim of the work

The current study aims to examine the effect of obesity on mental health profile among females attending the National Nutrition Institute (NNI) clinic in Cairo Egypt.

2. Methods

This is a comparative cross-sectional study of parallel groups of adult women ≥ 20 years old. Subjects were selected from the National Nutrition Institute Clinic during 2010 (May to December). One

group of overweight and obese females(cases) and the second group of females with normal body weight (controls) each of 100 subjects. Body mass index cut points is used to classify weight status, normal weight with BMI 18.5–24.9 kg/m², overweight with BMI 25.0–29.9 kg/m², obese with BMI 30.0–39.9 kg/m², and extremely obese with BMI ≥40 kg/m² (Park 2009) Mental health profile of our study participants were assessed using Depression, Anxiety, Stress Scale (DASS).Seven questions for each item scored on 0-3 scale are derived. Summation of the item in each scale range from 0- to 42, accordingly normal range, mild,moderate,severe and very severe levels of depression,anxiety and stress revealed.

Cases and controls were informed about the aim of the study and motivated to participate in the study but with no obligations, and those who confirmed their willingness to join were included. An interviewing questionnaire was designed to collect the data. Most of the questions were closed ended and were pre-coded prior to the data collection to facilitate data entry and analysis. The questionnaire included questions about personal, family and socio-demographic characteristics. Weight and height were conducted for all cases and controls

Mental health assessment

Mental disorders were assessed using the short version of depression, anxiety and stress short scales 21 (DASS21) with 7 items per scale. The Depression scale assesses dysphoria, hopelessness, devaluation of life, self-deprecation, lack of interest/involvement, anhedonia, and inertia. The Anxiety scale assesses autonomic arousal, skeletal muscle effects, situational anxiety, and subjective experience of anxious affect. The stress scale is sensitive to levels of chronic non-specific arousal. It assesses difficulty relaxing, nervous arousal, and being easily upset/agitated, irritable/over-reactive and impatient. Subjects are asked to use 4-point severity/frequency scales to rate the extent to which they have experienced each state. Scores for Depression, Anxiety and Stress are calculated by summing the scores for the relevant items (DASS, 2010). Items are scored on 0-3 scale scoring. for depression, anxiety and stress are derived by summing the item in each scale (rang 0-42) For the Depression scale score, normal rangefrom0-9 mild from 10-13, moderate 14-20, severe from21-27, very severe from 28and up. For the anxiety score: normal from 0-7, mild from 8-9, moderate from 10-14, sever from 15-19and very severe from 20 and up. For the stress score: normal from 0-14, mild from 15-18 moderate from 19-25, severe from 26-33 and very severe from 34 and up.

Ethical issues:

The study was approved by the council of the Research Ethics Committee at the General

Organization of Teaching Hospitals and Institute (GOTHI).The study was conducted after explaining to the participants the steps of the study and its objectives. Only those who agreed were included and those who refused were excluded.Verbal consents were obtained from the participants in the study according to Helsinki decelerations of biomedical ethics (Temple, 2003).

Data management and analysis:

All collected questionnaires were revised for completeness and consistency and accuracy. Pre-coded data was entered on the computer using Microsoft Office Excel Software program for windows 2003. Data was then transferred to the Statistical Package of Social Sciences Software program.version 17 (SSPS) to be statistically analyzed. Data was summarized using mean and standard deviation for quantitative variables and percentage for qualitative variables. Comparison between groups was done using independent sample t- test for quantitative data, Chi square test for qualitative variables. P value equal to or less than 0.05 was considered statistically significant. Graphs were used to illustrate some information

Limitation of the study:

Some of females were negative and/or did not show much cooperation in filling the interviewing questionnaire.

3. Results

There were no statistically significant differences between cases and controls regarding socio-demographic characteristics table (1). According to body mass index of cases: overweight, mild obesity, moderate obesity, severe obesity accounted to(24%), (24%), (22%), (30%) respectively table (2).There is no statistically significant difference between cases and controls as regards number of meals but there is a statistically significant difference between cases and controls regarding consumption of different types of snacks table(3).No statistically significant difference between cases and controls regarding the daily activity, walking and walking regularity table(4).

Table(5) shows that 87% of cases and 71% of controls had different grades of stress. (32%, 29% severe and very sever among cases versus 23%, 23% severe and very severe among controls).70% of cases had different grades of anxiety versus 67% of controls. (10%, 36% severe and very severe among cases versus 8%, 25% severe and very severe among controls). 78% of cases versus 52% of controls suffer from depressive symptoms of varied degree. (11%, 15% severe and very sever among cases versus 10%, 2% severe and very severe among controls). Stress and depression were more among cases versus controls with statistical significant difference (p=0.018) for

stress and ($p < 0.001$) for depression. Regarding anxiety there was no statistically significant differences between cases and controls ($p = 0.197$).

Table (6) shows that The mean percent scores of stress are more or less the same in different degrees of obesity. The mean anxiety percent scores increases steadily with increase of weight with statistically significant difference ($p = 0.017$). Anxiety manifestations tends to increase significantly with higher levels of body weights. Irregular pattern was observed in mean scores of depression in the different grades of obesity with insignificant difference ($p = 0.277$)

Table (7) shows that there was correlation between body mass index and anxiety, but neither correlation between BMI and stress nor between it and depression among obese and overweight females.

Table (8) showed that both cases and controls gave stress symptoms (getting Impatient when delayed, over reaction to situations, using a lot of nervous energy, getting agitated, difficulty to relax, intolerance of anything that keeping from getting on with what they were doing, feeling touchy) in different proportions and grades. However, cases showed higher proportions of all stress symptoms except as regards getting Impatient when delayed. Statistically significant differences showed in: over reaction to situations, getting agitated, and difficulty to relax.

Table (9) showed that Both cases and controls gave anxiety symptoms (dryness of mouth, breathing difficulty, Hands trembling, worried about situations in which might make panic and make a fool action Feeling close to panic, awareness of heart action in absence of physical exertion, Feeling scared without any good reason) in different proportions and grades. However, cases showed higher proportions of all anxiety symptoms except as regards hand trembling. Statistically significant differences encountered in: dryness of mouth, breathing difficulty and worried about situations in which might make panic and make a fool action.

Table (10) showed that Both cases and controls gave depression symptoms (no positive feeling, difficulty to work up the initiative to do things, feeling that nothing to look forward to, feeling down-hearted and blue, inability to become enthusiastic about anything, feeling no worth much as a person, feeling that life was meaningless) in different proportions and grades. However, cases showed higher proportions of all depression symptoms except as difficulty to work up the initiative to do things, feeling that nothing to look forward to. Statistically significant differences revealed in: no positive feeling, feeling down-hearted and blue, inability to become enthusiastic about anything and feeling no worth much as a person.

Table (1) Socio-demographic Characteristics of Studied Sample:

Variables		Cases (n=100)	Controls (n=100)	Total %	Pvalue
Age group(years)	• 20 –	51	56	107	0.442
	• 30 –	33	34	67	
	• 40 +	16	10	26	
Marital Status	• Married	54	46	100	0.609
	• Not married	46	56	100	
Educational Level	• Basic education	13	12	25	0.430
	• 2ry education	42	32	74	
	• High education	45	56	101	
Occupation	• Professional	16	19	35	0.257
	• Nonprofessional	22	31	53	
	• Not working	62	50	112	

Table (2): Distribution of Cases (overweight and obese) According to Their Body Mass Index:

Variable	No	%
• Overweight (25 – 29 kg/m ²)	24	24.0
• Mild obesity (30 – 34.9 kg/m ²)	24	24.0
• Moderate obesity (34-39.9 kg/m ²)	22	22.0
• Sever obesity (≥ 40 kg/m ²)	30	30.0
• Total	100	100.0

Table (3) Meals Number and Snacks Pattern of the Studied groups:

Variable		Cases (n=100)	Controls (n=100)	P-value
No.of Meals	• One meal	2.0	4.0	0.373
	• Two meals	41.0	47.0	
	• Three meals	53.0	48.0	
	• Four meals	4.0	1.0	
Type of Snacks	• Any available	50.0	22.0	<0.001
	• Fruits/vegetable	69.0	40.0	<0.001
	• Sweets	54.0	32.0	0.002
	• Nuts	39.0	14.0	<0.001
	• Crispy	49.0	31.0	0.009
	• Soft drinks	44.0	28.0	0.018
	• Juices	38.0	24.0	0.032
	• Tea or coffee	49.0	23.0	<0.001

Table (4) Pattern of Activity Among the Studied Groups:

Variables		Cases (n=100)	Controls (n=100)	P value
Daily activity	• Very light	24.0	19.0	0.072
	• Light	55.0	44.0	
	• Moderate	21.0	37.0	
	• Heavy	0.0	0.0	
Walking		60.0	68.0	0.239
Walking regularity	• Every day	50.0	51.0	0.423
	• Every week	15.0	23.5	
	• Irregular	30.0	19.1	
	• Rare	5.00	5.90	

Table (5) Levels of Stress, Anxiety and Depression Manifestations Among Studied Groups:

Variables		Cases (n=100)	Controls (n=100)	P-value
Stress Manifestations	• Non	13	29	0.018
	• Mild	5	11	
	• Moderate	21	14	
	• Severe	32	23	
	• Very severe	29	23	
Anxiety Manifestations	• Non	30	33	0.197
	• Mild	9	7	
	• Moderate	15	27	
	• Severe	10	8	
	• Very severe	36	25	
Depression Manifestations	• Non	24	48	<0.001
	• Mild	22	15	
	• Moderate	28	25	
	• Severe	11	10	
	• Very severe	15	2	

Table (6): Mental health mean percent scores (stress, anxiety and depression) among overweight and different classes of obesity:

	Over-weight (mean±SD)	Mild obesity (mean ± SD)	Moderate obesity (mean ±SD)	Severe obesity (mean±SD)	P value
Stress	63.49±22.5	63.10±24.33	64.29±18.52	66.03±22.2	0.953
Anxiety	24.4±21.9	35.32±29.98	36.15±22.99	45.08±24.4	0.017
Depression	35.91±23.1	32.74±23.72	40.26±20.82	42.54±22.1	0.277

Table (7): Correlations between body mass index and (stress, anxiety, depression) scores among obese and overweight females:

Score	p-value	Correlation coefficient(r)
Stress	0.309	0.103
Anxiety	0.010	0.255
Depression	0.158	0.142

Table (8): Stress Manifestations in Studied Groups:

Stress Manifestations	Cases (n=100)	Controls (n=100)	p-value
1) Getting impatient when delayed			
• No	46	34	0.299
• Rarely	9	15	
• Sometimes	16	18	
• Mostly	29	33	
2) Over reaction to situations			
• No	15	37	<0.001
• Rarely	13	24	
• Sometimes	23	13	
• Mostly	49	26	
3) Using a lot of nervous energy			
• No	13	14	0.098
• Rarely	6	17	
• Sometimes	12	11	
• Mostly	69	58	
4) Getting agitated			
• No	16	18	0.021
• Rarely	15	32	
• Sometimes	16	9	
• Mostly	53	41	
5) Difficulty to relax			
• No	27	34	0.036
• Rarely	10	20	
• Sometimes	18	8	
• Mostly	45	38	
6) Intolerance of anything that keeping from getting on with what they were doing			
• Non	24	31	0.324
• Rarely	14	20	
• Sometimes	19	15	
• Mostly	43	34	
7) Feeling touchy			
• No	20	27	0.076
• Rarely	9	12	
• Sometimes	10	18	
• Mostly	61	43	

Table (9) Anxiety Manifestations in Studied Group:

Anxiety Manifestations	Cases (n=100)	Controls (n=100)	p-value
1) Dryness of mouth			
• Non	55	50	0.015
• Rarely	12	29	
• Sometimes	14	11	
• Mostly	19	10	

<u>2) Breathing difficulty</u>			
• Non	49	52	0.007
• Rarely	10	25	
• Sometimes	22	10	
• Mostly	19	13	
<u>3) Hands trembling</u>			
• Non	68	56	0.259
• Rarely	14	20	
• Sometimes	7	13	
• Mostly	11	11	
4) <u>Worried about situations in which might make panic and make a fool action</u>			
• Non	49	58	<0.001
• Rarely	6	22	
• Sometimes	14	8	
• Mostly	31	12	
<u>5)Feeling close to panic</u>			
• Non	38	40	0.343
• Rarely	14	21	
• Sometimes	17	10	
• Mostly	31	29	
<u>6) Awareness of heart action in absence of physical exertion</u>			
• Non	47	48	0.200
• Rarely	14	24	
• Sometimes	16	10	
• Mostly	23	18	
<u>7) Feeling scared without any good reason</u>			
• Non	54	58	0.183
• Rarely	13	21	
• Sometimes	9	8	
• Mostly	23	13	

Table (10) Depressive Manifestations in Studied Group:

Depressive Manifestations	Cases (n=100)	Controls (n=100)	p-value
<u>1) Absence of positive feeling.</u>			
• Non	33	54	<0.001
• Rarely	23	30	
• Sometimes	29	9	
• Mostly	15	7	
<u>2) Difficulty to work up, the initiative to do things.</u>			
• Non	42	38	0.080
• Rarely	16	29	
• Sometimes	19	10	
• Mostly	23	23	
<u>3) Feeling that nothing to look forward to.</u>			
• No	75	83	0.307
• Rarely	11	11	
• Sometimes	7	3	
• Mostly	7	3	
<u>4) Feeling down-hearted and blue.</u>			
• Non	7	14	0.002
• Rarely	20	39	
• Sometimes	17	14	

• Mostly	56	33	
5) Inability to become enthusiastic about anything.			
• Non	52	71	0.007
• Rarely	16	17	
• Sometimes	16	7	
• Mostly	16	5	
6) Feeling no worth much as a person.			
• Non	70	84	0.025
• Rarely	9	8	
• Sometimes	4	4	
• Mostly	17	4	
7) Feeling that life was meaningless.			
• Non	43	57	0.149
• Rarely	21	18	
• Sometimes	10	4	
• Mostly	26	21	

4. Discussion

The increasing prevalence of overweight and obesity is a major public health concern (Hedley et al., 2004). Previous research suggests that obesity may be significantly associated with mood disorders (Faith et al., 2002). This case-control study was conducted in the National Nutrition Institute (NNI), Cairo, with a total of 100 cases that are obese and overweight females. One control group was included in the study with a total number of 100 resembled females of the socio-demographic features being taken from the national nutritional institute. The study aims at studying the effect of obesity on mental health of obese and overweight females.

Regarding age, about half of the participants of obese and overweight females (51%) within age group of (20 -29) years. This age distribution may be explained as most females at this age either single so they seek weight reduction for better appearance or married and they gained weight due to marriage or pregnancy so they need to control their weight. Regarding marital status (54%) of cases was married and (46%) were not married. Not married cases include (43%) single females, (2%) divorced females and only (1%) widow This is may be explained by the weight changes that occur after pregnancy as many women retain some of the weight they have gained during pregnancy. In addition to Irregular lifestyles and eating patterns after the baby's birth – when the mother suddenly has to cope with feeding and looking after a baby, a household and often also a job may contribute to weight gain.

Some females gained weight after marriage even without pregnancy, as mealtime may become more important than it was before. Among married couples, an obese husband increased a wife's probability of obesity by 44%, and an obese wife increased the husband's probability of becoming

obese by 37% (Christakis and Fowler, 2007). In the present study, it was found that nearly half of the cases (45%) had achieved high level of education, (42%) had achieved secondary level of education or diploma. So their awareness is high enough to start weight reduction to avoid any health problems associated with obesity or for better body image, sometimes they start weight reduction for both reasons. Culture and education may affect directly or indirectly the body weight, educated individuals usually take care of their health and trying to control their weight, through choice of proper diet, increasing physical exercise and trying to reduce the increased weight.

Occupation of the individuals may affect body weight according to the extent of physical activity done during their work. A high proportion of cases (62%) did not work, among them (40%) were house wives followed by university students (22%). These results are almost similar to a study conducted for Malay housewives aged (20 to 50) years old by Yin and Seng, (2010), where the result on physical activity indicated that 50.4% of the housewives were categorized under low physical activity level and the prevalence of obesity and overweight recorded 33.6% and 36.1%, respectively. Regarding nutritional pattern of the cases, more than half (53%) consumed three meals in a day, two meals in (41%); only (2%) depend on one main meal per day and the remaining (4%) consumed four meals per day. However no statistical significant difference was found between cases and controls (Table 4). These results are almost similar to a study conducted by Toschke et al., (2005) in Germany where an increased meal frequency was inversely related to the prevalence of overweight and obesity, suggesting that small frequent meals might be protective. Regarding snacks there was significant differences between cases and controls in different

type of snacks as sweets, nuts, crispy, fruit or vegetable, soft drinks, tea or coffee and Juice. This may explain weight gain in obese and overweight females as these snacks usually with unlimited amount, highly dense calories even the healthy type of snacks like fruits. Usually highly caloric fruits consumed in abundant. These results are almost similar to a study conducted in Sweden by Bertéus Forslund et al., (2005), where the obese group consumed snacks more frequently compared to the reference group, and also that women consumed more snacks than men. Energy intake increased by higher snacking frequency, irrespective of physical activity.

As regards daily activity, the great majority of cases (79%) and controls (63%) perform very light and light daily activities with no statistically significant differences ($p=0.072$) (Table 5). This may be explained by the fact that the majority of obese and non obese females are not working, (62%) in cases and (50%) in controls which either housewives or university students. And there is an increasing use of mechanized transportation and a greater prevalence of labor-saving technology in the home.

The current study showed that (60%) of cases walked either when they went to work or walked as part of regular physical activity, while this activity showed in (68%) of controls with no significant difference ($p =0.423$) (Table 5). Physical activity is especially important in controlling body weight, since excess energy is converted into fat and stored in the body.

It is well recognized that physically inactive lifestyle present a major health problem to the populations of developed and developing nations, contributing to chronic diseases and psychological distress (WHO, 2002). Physical inactivity in youth has been associated with risk factors for chronic diseases, overweight and mental health (Saelens et al., 2003). A study conducted by Weinsier et al., (1998) to explore the etiology of the obesity revealed that diverging trends of decreasing energy intake and increasing body weight suggest that reduced physical activity may be the most important current factor explaining the rising prevalence of obesity.

Mental health profile of our study participants (cases and controls adult females) were assessed using DASS which is a set of three scales designed to measure depression, anxiety and stress. Regarding stress degree in cases and controls (13%) in cases and (29%) in controls were normal, the remaining (87%), (71%) in cases and controls respectively showed different degrees of stress. Severe and very severe degree in cases and controls were (32%, 29%), (23%, 23%) respectively. There was statistically significant difference between them as regards stress degree ($p=0.018$) These results are similar to the results

conducted by Kim et al., (2001) in which the stress score of obese female children were significantly higher than those of non-obese female children. As regards anxiety degree, (30%) in cases and (33%) in controls were normal while (70%) of cases had anxiety versus (67%) of controls. Severe and very severe degree in cases and controls were (10%, 36%), (8%, 25%) respectively with no statistically significant difference between cases and controls ($p=0.197$) Our study. results are almost similar to the results by Rivenes et al., (2008) stated that there was a negative association between obesity measured by BMI and anxiety in both genders. But these results are quite different from a study conducted in New Zealand by Scott et al., (2007) to investigate the associations between mental disorders (in particular the anxiety disorders) and obesity in the general population, where there was Strong associations were observed between anxiety disorders and obesity. Concerning depression degree, (24%) was normal in cases versus (48%) in controls. The rest of participants (76%) in cases and (52%) in controls showed different degrees of depression. In cases (11%, 15%) had severe and very severe stress versus (10%, 2%) in controls. There were statistical significant difference between cases and controls ($p<0.001$) These results are in agreement with a study conducted in Alameda County, California by Roberts et al., (2003) which was a prospective study to reveal association between obesity and depression, this study show significant association between obesity and depression ($p<0.001$). Also the results are almost similar to a study conducted by Simon et al., (2007) for evaluation the association between obesity and depression among middle-aged women, where depression is strongly and consistently associated with obesity, lower physical activity and (among the obese) higher caloric intake. Another study conducted by Luppino et al., (2010): which was a meta-analysis study confirmed link between depression and obesity, in which obesity was found to increase the risk of depression.

Recommendations: It was quite evident that future action is needed and broad strategy is required to increase the awareness about mental health profile of obese people during their weight reduction management helping them to reach their goals in reaching healthy weight in perfect mental health aspect. Counseling programs for mental health promotion of obese should be included in the obesity management centers and clinics.

References:

1. Patterson R.E., Frank L.L., Kristal A.R. and White E. (2004): A comprehensive examination of health conditions associated with obesity in older adults. *American Journal of Preventive Medicine*; 27, pp. 385–390.

2. Bender R., Zeeb H., Schwarz M., Jockel K.H. and Berger M. (2006): Causes of death in obesity: relevant increase in cardiovascular but not in all-cancer mortality. *J Clin Epidemiol*; 59:1064–71.
3. Crisp A.H and McGuiness B. (1976): Jolly fat: relation between obesity and psychoneurosis in general population. *Br Med J*. 1:7–9.depression: a family based study. *Int J Obes*. 28:790–795.
4. Jasienska G., Ziolkiewicz A., Gorkiewicz M. and Pajak A. (2005): Body mass, depressive symptoms and menopausal status: an examination of the “Jolly Fat hypothesis”. *Womens Health Issue*; 15:145–51.
5. Ross C.E. (1994): Overweight and depression. *J Health Social Behav*; 35: 63–79.
6. Dong C., Sanchez L.E., Price R.A. (2004): Relationship of obesity to depression: a family based study. *Int J Obes*. 28:790–795.
7. Carpenter K.M., Hasin D.S., Allison D.B., Faith M.S. (2000): Relationships between obesity and DSM-IV major depressive disorder, suicide ideation, and suicide attempts: results from a general population study. *Am J Public Health*.90:251–257.
8. Simon G., Von Korff M. and Saunders K. (2006): Association between obesity and psychiatric disorder in the US population. *Arch Gen Psychiatry*; 63:824–30
9. Simon G.E., Ludman E.J., Linde J.A., Operskalski B.H., Ichikawa L., Paul Rohde, Finch E.A. and Jeffery R.W. (2007): Association between obesity and depression in middle-aged women. Oregon Research Institute, Eugene, 97403, USA
10. McElroy S.L., Kotwal R., Malhotra S., Nelson E.B., Keck P.E. and Nemeroff C.B. (2004): Are mood disorders and obesity related? A review for the mental health professional. *J Clin Psychiatry*; 65:634–51.
11. Marniemi J., Kronholm E. and Aunola S. (2002): Visceral fat and psychosocial stress in identical twins discordant for obesity. *J Intern Med*.251: 35–43.
12. Park K. (2009): Park's Textbook of Preventive and Social Medicine, 20th Edition, Ch 10.447.
13. DASS (2010): Depression, Anxiety and Stress scales (DASS). <http://www2.psy.unsw.edu.au/groups/dass/>.
14. Temple R. (2003): Impact of the declaration of Helsinki on medical research from regulatory perspective. Address to the Scientific Session, World Medical Association General Assembly, September.
15. Hedley A.A., Ogden C.L., Johnson C.L., Carroll MD., Curtin LR. and Flegal K.M.(2004): Prevalence of overweight and obesity among US children, adolescents, and adults: 1999-2002. *JAMA*; 291:2847-2850.
16. Faith M.S., Matz P.E. and Jorge M.A. (2002): Obesity-depression associations in the population. *Journal of Psychosomatic Research*; 53:935-942.
17. Christakis N. A and Fowler J H. (2007): The spread of obesity in a large social network over 32 years. *The New England Journal of Medicine*; 357, 350–379.
18. Yin T.Z. and Seng Y.S. (2010): Weight Status, Body Image Perception and Physical Activity of Malay Housewives in Kampung Chengkau Ulu, Negeri Sembilan. *International Journal for the Advancement Science & Arts*; vol. 1, No. 1, 35.
19. Toschke A. M., Küchenhoff H., Koletzko B. and Kries R. V. (2005): Meal Frequency and Childhood Obesity. *International Journal of Obesity*; 13, 1932–1938.
20. Bertéus Forslund H., Torgerson J.S., Sjöström L. and Lindroos A.K. (2005): Snacking frequency in relation to energy intake and food choices in obese men and women compared to a reference population. *International Journal of Obesity*; 29, 711–719.
21. Dietary guidelines for Americans (DGA) (2005): U.S. Department of Health and Human Services, U.S. Department of Agriculture. www.healthier.us.gov/dietaryguidelines
22. WHO (2002): The world Health Report; Reducing Risk, Promoting Healthy Life. Geneva: World Health Organization.
23. Saelens B., Sallis J. and Nader P. (2003): Home environmental influences on children's television watching from early to middle childhood. *J Dev Behav Pediatr*; 23:127-32.
24. Weinsier R.L., Hunter G.R., Heini A.F., Goran M.I. and Sell M.S. (1988): The etiology of obesity: relative contribution of metabolic factors, diet, and physical activity. *The American Journal of Medicine*; 105, 145-150.
25. Kim E.K., Park T.S. And Kim.KK. (2001): A Study on the Obesity and Stress of elementary school children in the Kangnung. *Korean J Community Nutrition*; 6(5):715-725.
26. Rivenes A.C., Harvey S.B., Mykletun A. (2008): The relationship between abdominal fat, obesity, and common mental disorders: Results from the HUNT Study
27. Scott K.M., Bruffaerts R., Simon G.E., Alonso J., Angermeyer M. and de Girolamo G. (2007): Obesity and mental disorders in the general population: results from the world mental health surveys. *Int J Obes (Lond)*; 32(1):192-200.
28. Roberts R.E., Deleger S., Strawbridge W.J. and Kaplan G.A. (2003): prospective association between obesity and depression: evidence from the Alameda County study. *International Journal of Obesity* 27, 514-521.
29. Simon G., Von Korff M. and Saunders K. (2006): Association between obesity and psychiatric disorder in the US population. *Arch Gen Psychiatry*; 63:824–30.
30. Luppino F.S., de Wit L.M., Bouvy P.F., Stijnen T., Cuijpers P., Brenda Penninx W.J.H., Zitman F.G. (2010): Overweight, Obesity, and Depression, A Systematic Review and Meta-analysis of Longitudinal Studies. *Arch Gen Psychiatry*; 67(3):220-229.

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