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ORIGINAL ARTICLES

Personality Characteristics and Eating Behaviors Associated with Obesity and the Ability to Adhere to a low caloric diet in Middle age Egyptian Females

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Abstract: The obesity pandemic is on the rise in spite of all the efforts to control it. Forty to sixty percent of the adult population in the Western world is actively attempting to reduce their body weight, with higher figures reported in overweight/obese individuals and in women. Nevertheless, overweight and obesity remain highly prevalent, suggesting that many attempts to lose weight are unsuccessful. Personality characteristics have been hypothesized to be important variables in etiological models of eating disorders that lead to obesity. The aim of this study is to explore the relation between obesity and the ability to adhere to a low caloric diet and weight loss on one hand and personality characteristics and eating behaviors on the other hand in middle age Egyptian females. The study included a group of 103 obese Egyptian females (BMI $\geq$ 30 kg/m^2) mean age (46.2 years). All were enrolled in a program for losing weight at the Nutrition Department, NRC. A group of 41 females matched for age, health status and social back ground and with BMI between 21 and 25 kg/m^2 were taken as controls .All included subjects were subjected to the following investigations at base line and after 2 months of following a 1200 calorie balanced diet: Full medical and personal history, clinical examination, 24 hours dietary intake recall, personality characteristics questioner, eating behavior questioner, anthropometric measurements including; weight and height .Results: Significant differences were recorded between obese cases and normal controls regarding personality characters and eating behaviors (P <0.001). A strong positive correlation is detected between depressive mood and impulsivity with bad eating behavior. A negative correlation was detected between achievement, flexibility, motivation, persistence, sense of satisfaction and self esteem and bad eating behaviors. BMI has positive correlation with depressive mood and impulsivity, and negative correlation with achievement, flexibility, motivation, persistence, sense of satisfaction, and self- esteem. The numbers of kg lost reflecting the ability to adhere to the low calorie diet is positively correlated to achievement, motivation, persistence, sense of satisfaction and self-esteem and is negatively correlated to depressive mood and impulsivity. Correlation is significant at the 0.05 level and 0.01 levels. In conclusion treating obesity by restricted diets and regimens alone do not solve the problem. Personality characters that affect eating behaviors have a major role in obesity and obesity control. Nutritional and psychological education and guided support during diet therapy is a must to achieve sustained success in weight losing.

Key words: Obesity, Personality Characteristics, Eating Behaviors, adult females.

Introduction

There is a growing interest in the role of personality characters in obese persons .This is not surprising given that maladaptive behaviors, along with emotional factors are at the root of weight control problems for many individuals (Munro *et al*., 2011 and Elfhag, 2008).

The need to find long-term solutions for those seeking to overcome excessive body weight highlights the relevance of finding predictors of both weight loss and weight loss maintenance (Incledon *et al*., 2011 and Irene *et al*., 2011). Personality characteristics have been hypothesized to be important variables in etiological models of eating disorders and are potentially critical for both the development and maintenance of these symptoms that lead to obesity (Johnson *et al*., 2006). Numerous studies have investigated the role of personality in eating disorders, with most reviews observing that eating disorder samples generally score higher than non-eating disorder comparison groups on measures of personality characteristics specially impulsivity, depression, motivation, self-esteem and flexibility (Mather, *et al*., 2008 and Davis *et al*., 2008 and Claes, 2005). The obesity pandemic is on the rise in spite of all the efforts to control it. Forty to sixty percent of the adult population in the Western world is actively attempting to reduce their body weight, with higher figures reported in overweight/obese individuals and in women. Nevertheless, overweight and obesity remain highly prevalent, suggesting that many attempts to lose weight are unsuccessful (Lahmann, 2011). Behavioral or lifestyle obesity

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treatments are the most frequently adopted programs and are recommended for virtually all overweight/obese persons attempting to lose weight regardless of their level of obesity (Murawski *et al*., 2009). For individuals who successfully lost weight, maintaining their new weight is often a lifetime challenge. Thus, understanding why and how some people succeed in changing their weight-related behaviors, whereas the majority does not is a key research priority. Identifying predictors of long-term successful weight control is especially critical (Elfhag *et al*., 2005). Some studies reported that personality characteristics differ between obese patients and normal controls, which are associated with disordered eating behaviors (Cassin *et al*., 2005). Obesity is not a simple problem of extra body fat it is a multifactorial problem involving psychological, social, economical, genetical and medical factors. To treat obesity all the contributing factors should be well studied and managed in order to reach a real and long lasting cure (Kushner *et al*., 2011). The aim of this work is to study personality characteristics and eating behaviors associated with obesity and the ability to adhere to diet to lose weight successfully, and to find the relation between some personality characters and wrong eating behaviors. Understanding personality characters that may affect the wrong eating behaviors which in turn leads to obesity is one way to discover new approaches and strategies to deal with obese patients and obesity prone individuals.

Subjects and Methods:

The study included a group of 103 obese Egyptian females (BMI $\geq$ 30 kg/m^2), mean age (46.2 years). All were enrolled in a program for losing weight at the Nutrition Department, NRC. A group of 41 females matched for age, health status and social back ground and with BMI between 21 and 25 kg/m^2 were taken as controls .All included subjects were subjected to the following investigations at base line and after 2 months of following a 1200 calorie balanced diet. Weekly follow up was maintained to assure following the diet and recording weight loss .The following investigations were performed: Full medical and personal history, clinical examination, 24 hours dietary intake recall, personality characteristics questioner, eating behavior questioner personal data sheet, anthropometric measurements including; weight and height.

1-Food intake: Data on dietary intake were performed using the 24 hours dietary intake recall. Individual food intake items and portion size were accurately estimated.

2-Personality characteristics questionnaire consists of 15questions, answers were provided on a (5-point scale) for each item and each individual ranks the item subjectively ranging from (1) meaning = Never to (5) which indicates = Always, the higher the scores the more positive the evaluation. Items under evaluation are: Achievement, Depressive Mood, Flexibility, Impulsivity, Motivation, Persistence, Sense of Satisfaction, Self – esteem (Costa and Benakallick, 1996).

3-The eating behaviors questionnaire measures; Binge eating, Emotional Eating, Night Eating, Over Eating, Reward Eating, Social Eating, Eating while watching TV. Answers are subjective and were provided on a (5-point scale). (Used definitions)Binge eating: Eating huge amount of food without control. Over eating: eating huge amount of food but with sense of control, Emotional eating: eating to relief stress or boredom or bad mood without being hungry or eating after fights and frustration. Night and mid night eating: feeling a strong urge to eat before sleeping or even during mid night. Reward eating, as a reward after work or effort, this is a childhood learned behavior; mothers give sweets or chocolate if the child did something good (Evans, 2012). Social eating: eating to share the group without being hungry.

4-Personal data sheet includes; BMI (kg/m^2), exercising, family history, subjective self evaluation for general wellbeing, onset of obesity, sleep, sun exposure. (Used definitions) Exercising: Regular walking or exercising at least 30 minutes, 3 times weekly, family history, onset of obesity when did obesity started, the longer duration of obesity the higher the score on the scale ,most of our cases recall being obese since childhood. Sleep; at least 6 hours of good and deep night sleep, sun exposure: daily exposure to direct sun rays for an hour or more. Answers are subjective and were provided on a (5-point scale).

5-The anthropometrical examination: Weight was measured twice, and height was also measured twice, BMI in kilograms per square meter was calculated from weight (kg) and height (m) using standard method.

All sheets and questionnaires were taken by the same researcher as one to one interview. All evaluations was translated to be put on 1-5 scale, personal data was given by the subject herself as a subjective data. All personal comments and attitudes were recorded for each case.

Study Design and Statistics:

A case –control study to compare personality characteristics and eating behaviors between obese and non obese middle age females and their ability to adhere to low caloric diet to lose weight. Statistical analysis was performed using SPSS (10) software. Data was expressed as means ± SD of scores. Independent t-test was used to compare data between obese cases and normal controls. Pearson correlation coefficient (r) was calculated to find correlations between personality characters and some eating behaviors and personal variables.

Results:

Table 1: Cases and Controls Personal Data presented as Means ± SD of scores t-test for comparing means.

Variables	Cases Mean (±)S.D. (n=103)	Control Mean (±)S.D. (n=41)	Sig.(2-tailed) P-Value
BMI kg/m2	38.5± 6.9	23.5± 1.2	.001*
Exercising	2.3 ±.8	3.6 ±.6	.001*
Family History	4.3 ±.6	2.3± .5	.001*
Wellbeing Status	2.1± .77	4.03± .73	.001*
Obesity Onset	4.5±0.50	1.7±1.0	.001*
Sleep	2.3±0.80	4.0±.68	.035*
Exposure to sun	2.3±.80	4.1±0.71	.004*

*P-value is significant at < 0.05

Table (1) presents the personal data as means ±SE for cases, and controls. Independent t-test was used to compare the two groups. Significant differences at P <0.05 were recorded between obese cases and normal controls regarding BMI, frequency of exercising, positive family history of obesity, general wellbeing status, the longer duration and early onset of obesity, number of good and continuous sleeping hours and exposure to sun.

Table 2: Cases and Controls Personality Characters presented as Means ± SD of scores t-test for comparing means.

Variables	Cases Mean (±)S.D. (n=103)	Control Mean (±)S.D. (n=41)	P-Value
Achievement	2.0 ±1.2	4.2 ±.70	.001*
Depressive Mood	4.0 ±1.0	1.9± .70	.001*
Flexibility	1.7 ±.81	4.4± .76	.001*
Impulsivity	4.2± .6	2.6± .62	.001*
Motivation	2.6± .86	4.2± .72	.001*
Persistence	2.3±.54	4.1±.13	.001*
Satisfaction	2.4 ±.62	4.3 ±.72	.001*
Self-esteem	1.6 ±.85	4.0± .68	.001*

*P-value is significant at < 0.001

Table (2) presents personality characters data as means ±SE for cases, and controls. Paired t-test was used to compare the two groups. Significant differences at P <0.001 were recorded between obese cases and normal controls regarding; Achievement, Depressive Mood, Flexibility, Impulsivity, Motivation, Persistence, Sense of Satisfaction, and Self-esteem.

Table 3: Cases and Controls eating behaviors presented as Means ± SD of scores t-test for comparing means.

Variables	Cases Mean (±)S.D. (n=103)	Control Mean (±)S.D. (n=41)	P-Value
Binge eating	4.2±.64	1.0±.20	.001*
Emotional Eating	4.3± .69	1.5± .52	.001*
Night Eating	4.0±.81	1.4±.45	.001*
Over Eating	4.2 ±.76	1.2 ±.43	.001*
Reward Eating	4.5± .71	1.8± .68	.001*
Social Eating	3.6± .71	2.1±. 59	.001*
Eating on TV	3.9± .75	2.1± .77	.001*

*P-value is significant at < 0.001

Table (3) presents eating behaviors data as means ±SE for cases, and controls .Paired t-test was used to compare the two groups. Obese cases recorded significant higher scores (P <0.001) compared to normal controls regarding; Binge eating, Emotional Eating, Night Eating, Over Eating, Reward Eating, Social Eating, Eating while watching TV.

Table (4) presents the correlations between personality characters and eating behaviors. Correlation coefficient (r) is recorded in the table and the correlation is significant at the (0.05) level, and is highly significant at the (0.01) level. A strong positive correlation is detected between depressive mood and impulsivity with main bad eating behaviors except social eating. While strong negative correlation was detected between achievements, flexibility, motivation, persistence, sense of satisfaction and self esteem and main bad eating behaviors except social eating.

Table (5) presents the correlations between personality characters and some personal data. Correlation coefficient (r) is recorded in the table and the correlation is significant at the 0.05 level, and is highly significant at the 0.01 level. BMI has strong positive correlation with depressive mood and impulsivity, and strong negative correlation with achievement, flexibility, motivation, persistence, sense of satisfaction, and self- esteem. The numbers of kg lost, which reflects the ability to adhere to the low calorie diet is positively correlated to achievement, motivation, persistence, sense of satisfaction and self-esteem, and is negatively correlated to depressive mood and impulsivity. Exercising is positively correlated to achievement, flexibility, motivation, persistence, self-esteem and negatively correlated to depressive mood. General health status is negatively correlated to depressive mood and positively correlated to self-esteem.

Table 4: Pearson correlation between personality characters and eating behaviors.

Variables	Achievement	Depressive Mood	Flexibility	Impulsivity	Motivation	Persistence	Satisfaction	Self-esteem
Binge Eating	-.674**	.905**	-.830**	.898**	-.636**	-.621**	-.846**	-.658**
Emotional Eating	-.642**	.871**	-.793**	.958**	-.664**	-.910**	-.899**	-.694**
Night Eating	-.631**	.822**	-.693**	.988**	-.643**	-.843**	-.902**	-.643**
Over Eating	-628**	.815**	-.723**	.967**	-.621**	-.645**	-.924**	-.605**
Reward Eating	-661**	.905**	-.830**	.934**	-.674**	-.441*	-.381*	-.658**
Social Eating	-NS	+NS	-NS	+NS	-NS	-NS	-NS	-NS
Eating on TV	-NS	.423**	-NS	.406*	-.372*	-.386*	-NS	-.371*

Numbers presented in this table are the value of r =correlation coefficient

∗Correlation is significant at the 0.05 level (2-tailed) ∗∗correlation is significant at the 0.01 level (2- tailed).

Table 5: Pearson correlation between personality characters and some personal data.

Variables	Achievement	Depressive Mood	Flexibility	Impulsivity	Motivation	Persistence	Satisfaction	Self-esteem
BMI	-.573**	.774**	-.727**	.801**	-.557**	-.523**	-.372*	-.577**
Exercising	.423*	-.536**	.480**	-NS	.535**	.374*	+NS	.522**
Health status	+NS	-.389*	+NS	-NS	+NS	+NS	+NS	.368*
Kg. lost	.378*	-.411*	+NS	-.645**	.548**	.689**	+NS	+NS

Numbers presented in this table are the value of r =correlation coefficient

∗Correlation is significant at the 0.05 level (2-tailed) ∗∗correlation is significant at the 0.01 level (2- tailed).

Discussion:

The first important finding in our study is the significant differences recorded between obese cases and controls regarding personality characters evaluated which are; Achievement, Depressive Mood, Flexibility, Impulsivity, Motivation, Persistence, Sense of Satisfaction, and Self-esteem. This is supported by previous studies that reported that Impulsiveness was the strongest predictor of BMI (Provencher *et al*., 2008). Both cross-sectional and longitudinal data indicate that overweight and obese individuals are characterized by lack of control and inability to resist temptations and cravings or boredom, all traits relevant for a controlled diet and sustained physical activity. Psychosocial variables are predictors of short- and long-term weight gain and weight loss in middle-aged US women. Findings highlighted the role of general motivational factors (Macdonell, 2012). Lack of self control or compulsive behavior, emotional liability, tendency to depression and/or anxiety, these personality traits can either individually, or in combination, increase the risk of developing overweight and/or obesity (Elfhag *et al*., 2008 and Provencher *et al*., 2008).

A study reported that the personality characteristics impulsivity and reward responsiveness predict BMI indirectly through overeating. This suggests that these personality characteristics are risk factors for obesity (Incledon, 2011). Longitudinal analyses examined whether personality traits were predictors of BMI and measures of central adiposity three years late. In this study, the Impulsiveness facet was the strongest longitudinal predictor (Delgado-Rico,*et al*., 2012). Another study reported that few people, especially those treating or counseling persons with obesity would argue against the importance of motivation as a predictor of treatment success. Lack of motivation leading to poor adherence has been presented as a rationale for including motivation in weight control programs ,"self-motivation" has been identified as predictors of successful weight control in previous review articles. Autonomous (self) regulation is among the key predictors of successful weight outcomes (Stotland *et al*., 2012).

In addition there was some evidence for low self-esteem predicting obesity onset. Low self-esteem was associated with a number of modifiable risk factors, including obesity. Also obese patients were found to score lower on Persistence (Sullivan *et al*., 2007). Depressive symptoms exacerbated obesity. Depression and obesity are prevalent worldwide and are among the leading public health problems in industrialized countries. Recent systematic reviews and meta-analyses concluded that there is evidence that supports the hypothesis that depression and depressive symptoms and obesity are positively related. Conducted prospective studies suggested that the relation is bidirectional. Depression and obesity may be linked through direct psychological pathways, such as dysregulation of the hypothalamic-pituitary-adrenal axis but several indirect behavioral psychosocial pathways may also be involved (Karasu, 2012 and Konttinen, 2010). Flexibility was reported to be

higher in non obese people due to their ability to change their habits and lifestyle to be healthier (Reyes *et al*., 2012).

People who lack self-worth and regard themselves as failures may seek comfort in eating and also give up the struggle to lose weight before they've even started. Recent reports suggest that overweight patients demonstrate elevated depression and self-consciousness and lowered assertiveness (Blaine *et al*., 2005). A study suggest that if individuals fully endorse weight loss-related behavioral goals and feel not just competent but also autonomous about reaching them, as suggested by self-determination theory, their efforts are more likely to result in long-lasting behavior change (Macdonell *et al*., 2012).

The second main finding of our study that obese cases recorded significant higher scores compared to normal controls regarding wrong eating behaviors which included; Binge eating, Emotional Eating, Night Eating, Over Eating, Reward Eating, Social Eating, Eating while watching TV. Supporting our findings studies reported that emotional eating had positive associations with depressive symptoms and adiposity indicators in both sexes (Konttinen *et al*., 2010). Research on eating disorders, especially on binge-eating disorder, similarly showed that negative emotional states often precede uncontrolled eating episodes and depressive symptoms prospectively predict the development of eating disorders (Dingemans *et al*., 2012). A study implies that a tendency to eat in response to negative emotions is one factor that explains why some depressed individuals have higher BMI, WC, and fat mass. Emotional eating accounted for the positive associations between depressive symptoms and the consumption of sweet energy-dense foods in both sexes. It is not clear why some people have a tendency to eat in response to negative emotions, but several possible mechanisms have been proposed, including the inability to distinguish hunger from other aversive internal states. Eating is used as an emotion-regulation strategy and overeating as a consequence of escaping from aversive self-awareness that leads to overweight and obesity (Elfhag *et al*., 2008). Elevated BMI is associated with neuronal abnormalities mostly in frontal brain regions that subserve higher cognitive functions and impulse control (Gazdzinski, 2010). Serotonin-releasing brain neurons are unique in that the amount of neurotransmitter they release is normally controlled by food intake. Serotonin release is also involved in such functions as sleep onset, and control of mood. Hence many people learn to overeat carbohydrates to make themselves feel better. This tendency is a frequent cause of weight gain, and can also be seen in patients who become fat when exposed to stress (Lykouras, 2011). The addition of cognitive therapy while trying to lose weight might not only be effective in reducing weight and related concerns, depressed mood, and low self-esteem, but also has an enduring effect that lasts beyond the end of treatment (Konttinen, 2010).

Binge eating disorder (BED) is the most common eating disorder in the United States affecting 3.5% of females and 2% of males and is prevalent in up to 30% of those seeking weight loss treatments. A study reported that the higher levels of stress reaction in binge eating disorder sample after controlling for depression indicate that these personality dimensions are potentially important in the etiology, maintenance, and treatment of these eating disorders (Villarejo, 2012).

Our study detected a positive correlation between depressive mood and impulsivity on one hand, and wrong eating behaviors on the other hand. This suggests that these two negative personality characters promote the wrong eating behaviors that lead to obesity .While strong negative correlation was detected between achievements, flexibility, motivation, and persistence, sense of satisfaction and self esteem and wrong eating behavior. A controlling effect for the mentioned positive personality characters over wrong eating behaviors is suggested. This high lightens the important role of psychological and behavioral guidance in managing the obesity epidemic (Teixeira *et al*., 2012 and Wadden, 2000). A study reported that emotional eating was strongly correlated to impulsiveness and depression, and further linked to lower self-discipline, and lower self-esteem. These results imply that poor self- was most important for eating due to negative emotions as well as in response to external food stimuli, suggesting that the inhibition of eating and difficulties to govern ones behavior are major aspects of these eating behaviors. Impulsivity might relate to overeating through poor inhibition of food intake; reward responsiveness through the rewarding value of food (Claes *et al*., 2005 and Van den *et al*., 2011).

In our study BMI and the numbers of kilograms lost ,which reflects the ability to adhere to the low calorie diet has strong positive correlation with depressive mood and impulsivity, and strong negative correlation with achievement, flexibility ,motivation ,persistence ,sense of satisfaction, and self- esteem. This was mentioned in a study that reported that obese patients describing themselves as excessively friendly, outgoing, and sociable improved more from a weight-loss program than those with lower instances of these traits (Sutin *et al*., 2011 and Costa *et al*. 2007). Accordingly, personality traits deserve more attention at initial assessment and while planning treatment of obese patients. People with different personality styles, levels of obesity and disturbed eating practices will respond differently to the various treatments (Murawski, 2009). The position of the American Dietetic Association on weight management is that it is important to find ways to optimize individualized treatments appropriately. A link is found between personality factor, and successful weight loss with a particular weight loss treatment that facilitates dietary compliance with enhanced satiety (Lahmann *et al*., 2011).

In our study significant differences were recorded between obese cases and normal controls regarding relevant personal history which included positive family history of obesity and general wellbeing status, also in life style that included frequency of exercising, number of good and continuous sleeping hours and exposure to sun. Our study showed that exercising is positively correlated to achievement, flexibility, motivation, persistence, self-esteem and negatively correlated to depressive mood .General wellbeing status is negatively correlated to depressive mood and positively correlated to self-esteem. It is clear that personality characters have strong influence on obesity, the capability to lose weight and even on exercising (Rhodes *et al*., 2006). It has been suggested that psychological factors related to eating and physical activity (PA) might be causal links between depressive symptoms and weight gain (Wang *et al*., 2012 and Jakicic, 2003 and Jeffrey *et al*., 2003). Encouraging results from behavior modification and group therapy suggest that psychological factors may strongly influence results of obesity treatment (Wadden, 2000).

Despite the high prevalence of overweight and obesity, there are many people who are successful at maintaining a stable healthy weigh .Perhaps many of these individuals have learned in time to adopt a flexible eating self-regulation pattern and adjusting long term healthy life style. Knowing which intervention aspects are more effective and at what point in time during weight control is essential for proactively directing intervention resources to factors most clearly associated with success (Teixeira *et al*., 2010 and Sutin *et al*., 2011).

In the last 50 years, the average self-reported sleep duration in the United States has decreased by 1.5–2 hours in parallel with an increasing prevalence of obesity and diabetes. Epidemiological studies and meta-analyses report a strong relationship between short or disturbed sleep, obesity, and abnormalities in glucose metabolism (Lucassen, 2012). Sleep disorders in humans alters multiple metabolic pathways, leading to more insulin resistance, possibly decreased energy expenditure, increased appetite, and immunological changes (Eliane, 2012). Data suggest that, short sleep time may predispose to overeating in men and women (St-Onge, 2012). As for exposure to sun previous studied reported the relation between sun exposure and obesity mediated through vitamin D deficiency. Low vitamin D status is highly prevalent worldwide, and the major determinants are sun exposure and vitamin D intake. Another study reported that vitamin D deficiency was highly prevalent among studied Saudi women with obesity, poor sunlight exposure and poor dietary vitamin D supplementation (Palacios *et al*., 2012 and Ardawi *et al*., 2011).

Conclusion:

A major challenge for successful weight management is tailoring programs to meet individual needs, that is, matching personal characters and behaviors to a particular weight loss program.

Treating obesity by restricted diets and regimens alone do not solve the problem. Personality characters that affect eating behaviors have a major role in obesity and obesity control.

Nutritional and psychological education and guided support during diet therapy is a must to achieve sustained success in weight losing. To maintain a healthy physical appearance and normal BMI, a strong self esteem and motivation and other personal factors to cope with problems and stresses must be developed to protect against using food as a soothing tool for stress, impulsivity, depressive mood or other personality characters. The present results indicate that weight loss interventions especially in women should focus on reducing emotional eating and promoting a flexible self regulation approach, in addition to developing healthy life style magnifying the importance of adequate sleep, exercising and exposure to sun.

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