ORIGINAL PAPER

Psychiatric Morbidity, Personality Profile and Saliva Cortisol Levels in Overweight and Obese Patients Referred to Dietician Clinics in UKMMC

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Abstract

Objective: To assess psychiatric morbidity, personality profiles and saliva cortisol levels in overweight and obese individuals at dietician clinic.

Methods: This cross-sectional study is based on individuals who attended dietician clinic between June to November 2008. They had completed questionnaires that included General Health Questionnaire 30-items, assessment for psychiatric illness using Structured Clinical Interview for DSM-IV and personality profiles using Personality Assessment Schedule. Saliva and body mass index were taken. Results: Of the 102 patients, 16 (15.7%) were diagnosed to have psychiatric illness. There were no differences between obese and overweight patients in terms of personality traits and psychological problem. Presence of psychiatric illness was associated with higher mean body mass index. Saliva cortisol levels were not elevated in patients who had psychiatric illness.

Conclusions: Psychiatric illnesses are common in individuals who seek weight treatment. Careful psychological evaluation is important at (or before) commencement of a diet program.

Keywords: Obese, Depression, Binge Eating Disorder, Personality Traits, Saliva Cortisol

Introduction

Obesity is associated with a large number of debilitating and life-threatening disorders.1 The prevalence of overweight and obesity is increasingly posing a major public health problem.2 According to US epidemiological studies, the prevalence of obesity among US adults has increased from approximately 23% to 31% from 1990 to 2000.3

In Malaysia, the National Health and Morbidity Survey III (2006) reported that 29.1% of the adult population aged 18 years and above was found to be overweight (BMI 25.0-29.9kg/m²). The survey also found that
14.0% of the adults were obese with BMI $\geq 30.0 \text{kg/m}^2$ (NHMS III, 2006).\(^4\)

Numerous studies of psychopathology in persons with obesity have been conducted. However, the results of these studies have been inconsistent. Friedman and Brownell\(^5\) in their meta-analytic review concluded that obesity was consistently associated with depression.

Fitzgibbon et al.\(^6\) found that those obese patients who sought treatment for weight reduction reported having more psychological distress than those who did not. Carpenter et al.\(^7\) found that the relationship between obesity and depression varied by sex. Obese men (those with BMI $\geq 30 \text{kg/m}^2$) were significantly less likely to report a history of major depression, suicidal ideation, or suicide attempts in the past year than men of average weight (BMI=20.8-29.9kg/m\(^2\)). However, obese females were 37% more likely than their average-weight peers to have experienced major depression in the past year.

Petry and colleagues\(^8\) reported that the continuous variable of BMI was significantly associated with mood disorders where obese and extremely obese group had significantly increased odds of any mood disorders (i.e. major depression and dysthymia) with odds ratios (ORs) ranging from 1.21 to 2.08.

Studies have also shown a moderate positive association between obesity and anxiety disorders in the community and clinic populations.\(^9\) A study of patients attending specialist obesity services in UK was found that 60.5% of women and 42% of men met the minimum criteria for an anxiety disorder on the HADS.\(^10\) Petry and colleagues\(^8\) reported that the continuous variable of BMI was significantly associated with anxiety disorders (i.e. generalized anxiety, panic without agoraphobia and specific phobia) with odds ratios (ORs) of 1.23-2.60. However, Hasler\(^11\) found that generalized anxiety disorder (GAD) was negatively associated with being overweight in his prospective study.

According to the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV), the estimated prevalence of binge-eating disorder in the community sample ranges from 0.7 to 4%.\(^12\) Based on self-report, as many as 30% of obese patients who seek weight loss treatment met the criteria for binge eating disorder.\(^13\) When clinical interview was conducted, the rates fell to 7.6-18.8%.\(^14\)

Personalities of individuals may affect their eating behaviours. Sally\(^15\) (1976) conducted a study on obese patients with the aim to explore the characteristics of obese patients by using Minnesota Multiphasic Personality Inventory (MMPI). She found that obese women were more nonconforming and impulsive than women of normal weight. When Eysenck Personality Questionnaire (EPQ) was used, extraversion has been found to be more pronounced in obese compared to normal weights in a female population sample.\(^16\) Among men, increased extraversion and psychoticism were associated with increased body weight.\(^16\) Psychosocial stress factors have been associated with increased levels of cortisol and hypothalamo-pituitary-adrenal (HPA) axis hyperactivity. Increased cortisol response to stress has been positively correlated with central obesity.\(^17\)

The objective of the study is to assess psychiatric morbidity, personality profiles and saliva cortisol levels in overweight and obese individuals seeking treatment at the
dietician clinic in Universiti Kebangsaan Malaysia Medical Center.

**Methods**

The study was conducted at the dietician clinic in Universiti Kebangsaan Malaysia Medical Center (UKMMC), Kuala Lumpur. Participants were from those referred for dietary advice and monitoring of their weights from other hospital departments. All the participants with new appointments who were overweight or obese were approached for consent. In order to be eligible for the study, participants had to be able to give consent, be between the ages of 17-75 years at the time of sampling, have a BMI of 23kg/m² and above and have sufficient understanding of the Malay or English language.

Exclusion criteria were: taking drugs which were known to have weight gain properties (e.g. prednisolone, oral contraceptive pills, etc), medical problems which can cause weight gain (e.g. hypothyroidism, Cushing’s syndrome, polycystic ovarian disease, hypothalamic disorders, etc), unstable medical conditions (e.g. congestive cardiac failure with edema, renal failure and liver failure) and known severe psychiatric illnesses.

Anthropometric measurements were obtained using standard calibrated instruments. Height (m) was measured using a wall-mounted stadiometer and weight (kg) was measured using electronic scales. According to the Malaysian Practice Guideline on Management of Obesity, participants with BMI ≥ 23-27.4kg/m² are considered overweight. Above this range is considered obese.

The study was approved by the Ethics Committee of the UKM Medical Centre.

**Instrument**

The General Health Questionnaire (GHQ-30), which is a self-report questionnaire, was used to assess for underlying psychological distress. The instrument has been validated in the local population using English and Malay versions with a cut-off point of 6/7. The SCID was administered by the first author, and is a semi-structured interview allowing for the diagnosis of mood disorders, anxiety disorders and binge-eating disorder according to DSM-IV Axis I diagnosis.

The Personality Assessment Schedule (PAS), which is a semistructured interviewer administered schedule, is used to formalize the assessment of personality disorder and to determine personality disorder based on DSM-III-R and ICD-9. Participants’ saliva was analyzed by using DSL-10-671000 ACTIVE Cortisol Enzyme Immunoassay (EIA).

**Statistical analysis**

Statistical analysis was conducted using the SPSS version 15. Chi-squared test was used to compare the difference between groups of categorical data and the t-test was used for normally distributed data. Pearson Correlation was used to carry out to examine the correlation between two continuous variables which were normally distributed respectively. Linear regression was used for further analysis.

**Results**

A total of 240 patients were referred to the dietician clinic during the 6-month study period, of whom 107 patients kept their appointments and were approached for the study. Five (n = 5) did not give consent. The number of participants was 102 (n = 102).
The sociodemographic data of the participants is described in Table 1.

There was no significant difference in gender, age, ethnicity, marital status and household income between overweight and obese patients. However, there was a significant difference in terms of the education background in relation to BMI ($X^2 = 4.143, p = 0.042$). Men (n = 16, 32.7%) reported having more psychological distress than women (n = 14, 26.4%). However, it was not statically significant ($X^2 = 0.104, p = 0.747$).

**Table 1.** Demographic and clinical variables of the respondents

<table>
<thead>
<tr>
<th></th>
<th>Overweight (n=26)</th>
<th>Obese (n=76)</th>
<th>Statistical test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
<td></td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>16 (61.5)</td>
<td>33 (43.4)</td>
<td>NS</td>
</tr>
<tr>
<td>Female</td>
<td>10 (38.5)</td>
<td>43 (56.6)</td>
<td></td>
</tr>
<tr>
<td><strong>Age (years)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 20</td>
<td>0 (0.0)</td>
<td>1 (1.3)</td>
<td></td>
</tr>
<tr>
<td>20-29</td>
<td>1 (3.8)</td>
<td>13 (17.1)</td>
<td></td>
</tr>
<tr>
<td>30-39</td>
<td>2 (7.7)</td>
<td>20 (26.3)</td>
<td></td>
</tr>
<tr>
<td>40-49</td>
<td>4 (15.4)</td>
<td>15 (19.7)</td>
<td>NS</td>
</tr>
<tr>
<td>50-59</td>
<td>9 (34.6)</td>
<td>17 (22.4)</td>
<td></td>
</tr>
<tr>
<td>60-69</td>
<td>9 (34.6)</td>
<td>9 (11.8)</td>
<td></td>
</tr>
<tr>
<td>≥ 70</td>
<td>1 (3.8)</td>
<td>1 (1.3)</td>
<td></td>
</tr>
<tr>
<td><strong>Ethnic group</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malay</td>
<td>16 (61.5)</td>
<td>59 (77.6)</td>
<td></td>
</tr>
<tr>
<td>Chinese</td>
<td>8 (30.8)</td>
<td>11 (14.5)</td>
<td>NS</td>
</tr>
<tr>
<td>Indian</td>
<td>2 (7.7)</td>
<td>6 (7.9)</td>
<td></td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>3 (11.5)</td>
<td>12 (15.8)</td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>22 (84.6)</td>
<td>59 (77.6)</td>
<td>NS</td>
</tr>
<tr>
<td>Widow/Widower</td>
<td>1 (3.8)</td>
<td>5 (6.6)</td>
<td></td>
</tr>
<tr>
<td><strong>Total household income</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;1500</td>
<td>11 (42.3)</td>
<td>22 (28.9)</td>
<td>NS</td>
</tr>
<tr>
<td>1500-3500</td>
<td>7 (26.9)</td>
<td>20 (26.3)</td>
<td></td>
</tr>
<tr>
<td>&gt;3500</td>
<td>8 (30.8)</td>
<td>34 (44.7)</td>
<td></td>
</tr>
</tbody>
</table>
Educational level

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>3</td>
<td>(11.5)</td>
<td>8</td>
</tr>
<tr>
<td>Secondary</td>
<td>19</td>
<td>(73.1)</td>
<td>40</td>
</tr>
<tr>
<td>Tertiary</td>
<td>4</td>
<td>(15.4)</td>
<td>28</td>
</tr>
</tbody>
</table>

\[ X^2 = 4.143, p = 0.042 \]

Psychiatric illnesses and their relationship to weight status

Sixteen (n = 16, 15.7%) subjects who were diagnosed to have psychiatric illness (Table 2) were from the obese group and one subject was from the overweight group. There was a significant difference (Mann-Whitney U; p = 0.016) (Table 3) in body mass index between these two groups. Participants who were diagnosed to have psychiatric illness had a higher mean BMI (34.34 kg/m²) than those without (29.92 kg/m²). Of the 102 subjects, eleven subjects (10.8%) fulfilled the criteria for Binge Eating Disorder (BED) (Table 2). Of these eleven patients, 10 subjects were from the obese group. Even though the relationship between Binge Eating Disorder, overweight and obesity was not significant (\( X^2 = 0.912, p = 0.340 \)), the number of obese subjects having binge eating disorder was higher in the obese group than the overweight group.

Table 2. Psychiatric diagnoses among the respondents

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Depression</td>
<td>2</td>
<td>1.96</td>
</tr>
<tr>
<td>Adjustment Disorder</td>
<td>3</td>
<td>2.94</td>
</tr>
<tr>
<td>Binge Eating Disorder (BED)</td>
<td>9</td>
<td>8.8</td>
</tr>
<tr>
<td>Major Depression with BED</td>
<td>2</td>
<td>1.96</td>
</tr>
</tbody>
</table>

Table 3. Comparison between presence of psychiatric illness with body mass index

<table>
<thead>
<tr>
<th>Psychiatric illness</th>
<th>N</th>
<th>BMI (kg/m²)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Median</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>16</td>
<td>34.34</td>
<td>0.016*</td>
</tr>
<tr>
<td>No</td>
<td>86</td>
<td>29.92</td>
<td></td>
</tr>
</tbody>
</table>

* Mann-Whitney U test

The relationship between personality traits and being overweight or obese

The scores from the Personality Assessment Schedule (PAS) for each behaviour subscale were divided into normal variant (score 0-3) and traits accentuation (score 4-6). There were no participants who scored of 7-8 which indicate personality disorders. Figure
1 shows the distribution of behaviour subscale score with overweight and obesity. Overall, there was some traits accentuation in participants who were obese, i.e. sensitivity (n=20), pessimism (n=15), impulsiveness (n=14), worthlessness (n=13), irritability (n=12), aggression (n=11) and anxiousness (n=9). However, the differences between the two groups in terms of personality traits were not significant (p > 0.05).

**Figure 1.** Distribution of behavior subscales among the respondents

![Bar chart showing the distribution of behavior subscales among respondents](chart.png)

**Association between BMI and saliva cortisol levels**

Seventy eight (n = 78) saliva cortisol samples were available for analysis. The rest (n = 24) could not be tested because of unavailability of test kits or inappropriate appointment times. However, 4 of the available saliva samples could not be used as
the levels were below the minimal detection limit of the standard curve, which is 0.1µg/dL. Therefore, 74 samples were analyzed by a trained laboratory assistant. The trained laboratory assistant’s analysis was within the quality control value (QC).

Figure 2 shows the relationship between saliva cortisol levels and body mass index. When a correlation analysis was performed, there was a positive relationship between body mass index and saliva cortisol level (Pearson correlation, \( r = 0.242, p = 0.038^* \)), though the correlation is small.

**Discussion**

The complications of obesity have been extensively documented but less is known about the possible psychological morbidities.\(^{20}\) This study was able to identify that 29.4% of the participants who attended the dietician clinics have some form of psychological distress. Among those who sought dietician advice, males reported having more psychological distress (32.7%) as compared to females (26.4%). Even though obese participants (30.3%) scored higher in General Health Questionnaire (GHQ-30) as compared to overweight participants (26.3%), there was no significant difference between the two groups. O’Neil and Jarrell\(^{21}\) did not find increased rates of psychological issues among the obese in most aspects of their lives except for weight and food related issues.

Some studies found that obese people have increased risk for depression\(^{22}\) while others
showed decreased risk for depression, which indicates that depression was inversely related to obesity, especially in middle-aged men.\textsuperscript{23} Our study was able to demonstrate an association between psychiatric illness with increased body mass index ($p = 0.016$). This finding is similar to that of Johnston\textsuperscript{24} who found that prevalence of affective disorders increased with increasing body mass index.

In this study, eleven (10.8\%) of the participants fulfilled the criteria for BED. More women ($n=7$) than men ($n=4$) were diagnosed to have BED. This prevalence was much lower as compared to other studies that had used self-report questionnaire, which was about 30\%\textsuperscript{14}. Studies have found that depressive symptoms were more common in obese patients with BED than those without BED.\textsuperscript{25, 26} In this study, out of 11 participants, 10 were from obese group. Two subjects who had comorbid major depressive disorder were from the obese group. Yanovski\textsuperscript{27} found that the presence of binge eating disorder can be considered a risk factor for depression and various other forms of psychiatric illness. Therefore, comprehensive assessment on the mood-related eating behaviour is very crucial.

Provencher used NEO Five-Factor Inventory to capture the five dimensions of personality (neuroticism, extroversion, openness to experience, agreeableness and conscientiousness) in overweight and obese patient women. Only conscientiousness was positively related to BMI.\textsuperscript{28} As observed in this study, a majority of the participants had personality traits that were within normal variations (score 0-3). However, some of them do have some traits accentuation, even though they were not significant. Among the traits accentuation, sensitivity subscale has the highest frequency ($n=20$), followed by pessimism ($n=15$), impulsiveness ($n=14$), worthlessness ($n=13$), irritability ($n=12$), aggression ($n=11$) and anxiousness ($n=9$). Many reported feeling easily sensitive, especially over remarks which concern their appearances. One of the behavioural subscales that approach significant level was feeling of worthlessness ($p$ value= 0.055) when compared between the overweight and obese patients. However, we could not tell whether the sense of worthlessness was the result of being obese or whether it was the feeling of worthlessness that had led to obesity. Conscientiousness trait, which is related to perfectionism, was found in 6 subjects. This trait has been hypothesized to increase the risk of overeating and weight problems.\textsuperscript{29} No personality disorders were identified in this study. A review by O’Neil and Jarrell\textsuperscript{21} noted that many studies found only mild, if any, personality differences between obese individuals and normal-weight individuals.

The hypothalamic-pituitary-adrenal (HPA) axis which is linked to stress is also thought to be involved in the development of obesity. An increased cortisol level has been associated with various psychiatric disorders including mood and anxiety disorders.\textsuperscript{30} In this study, there was no difference in saliva cortisol levels between those who had psychological distress and those without. Similarly, no difference was found between those who had Axis I diagnosis and those without. Due to limited saliva cortisol kits, only five subjects with psychiatric illness were analyzed and in the absence of data for the rest, it is difficult to make any inferences.

Interestingly, in this study, saliva cortisol level was positively correlated with increasing body mass index even though the correlation was small ($r = 0.242$, $p = 0.038$). This finding partially supports a previous study\textsuperscript{17} which found that increased cortisol
responsivity to stress was positively correlated with obesity.

There are several limitations in this study. The results obtained from this study could have been better with a comparison group. The General Health Questionnaire (GHQ-30) used in this study is a good screening tool for psychological distress but it does not give depressive and anxiety scores.

This study involved subjects who came from a population who have never been diagnosed with psychiatric illness. Some of the subjects could have been afraid of being stigmatized when approached with psychiatric-related questions. Therefore, there is a possibility that some subjects did not reveal the underlying severity of their symptoms. SCID for binge eating disorder was used to diagnose BED. The criterion for diagnosing BED itself is still being refined. Researchers find difficulty in defining what is considered to be a large amount of food. It is also difficult to determine the actual number of binge episodes experienced by the participants. Eating behaviour is influenced by culture. Therefore, the results may vary from study to study.

There are also some limitations in using Personality Assessment Schedule (PAS). First of all, PAS is not commonly used in our setting, and it is solely based on what the participants described about their own characteristics in a very short period of time. The participants might have difficulties in describing their own deviant traits and there is a possibility of under-reporting. This could be one reason why there was no personality disorder being diagnosed. Therefore, having another informant and a longer interview time would help in the evaluation of participants’ personality traits. However, an interview with an informant was not always feasible as most of the subjects attended clinics without any partner or relatives. Furthermore, PAS does not demonstrate whether the personality profile obtained was causing or caused by obesity.

Saliva cortisol analysis was done with the help from a laboratory technician who had limited experience. The process of thawing, transferring specimens and centrifuging may influence the results. Even though the technique to collect saliva was explained to participants prior to collection, participants might not be following the instructions properly. Contamination with food could lead to faulty results. Even though saliva sample collections were all done in the morning before 12 noon, the diurnal variation of the cortisol level could give different values which would make the interpretation of results more complicated. In addition to that, only limited saliva kits were available for the research. Therefore, we could not analyze the saliva of some of the participants who had psychiatric diagnosis but were recruited subsequently.

Even though this study showed there is association between BMI with cortisol levels, the association could also be due to other medical conditions like undiagnosed Cushing’s syndrome.

In conclusion, obesity is not just a cosmetic problem; it is very much a medical and psychological problem as well. A holistic, multi-disciplinary approach which involves all relevant departments would be a better weight management approach for these patients.

Acknowledgment

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References


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