PREDICTORS OF OVERWEIGHT AND OBESITY AMONG POSTGRADUATE AFRICAN STUDENTS IN A PUBLIC UNIVERSITY IN MALAYSIA, 2017

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ABSTRACT

Background: Globally, obesity is one of the major public health problems and is an independent risk factor for cardiovascular disease (CVD). The risk for non-communicable diseases (NCDs) increases with each rise in body mass index (BMI). Hence, obesity is considered as one of the leading risk factors for mortality due to NCD. Seventy percent (70%) of 56.4 million global deaths were due to NCDs in 2015 alone, with over three quarters (30.7 million) of these mortalities happened in low and middle-income countries. Several studies have reported the association between overweight, obesity and several factors, for example, the socio-demographic factors, behavioural factors, eating pattern and psychological factors. Subsequently, this study aims to investigate the predictors of overweight and obesity among African postgraduate students in Public University Malaysia.

Materials and Methods: A cross-sectional study was conducted using a self-administered structured questionnaire. All registered full-time post graduate African students were included in the study. While the exclusion criteria were pregnant students, physically challenged that cannot stand without support and registered students that were on deferment or long medical leave. The study analysis was done using Statistical Package for Social Sciences (SPSS) version 23. Descriptive statistics (frequency and percentage) was used to summarise categorical data while. Multiple logistic regressions were used to determine predictors of overweight and obesity.

Result: Study respondents were 559 African post-graduate students in a public university in Malaysia who a selected randomly from list of post graduate students, out of which 77.3% were males and 22.7% were females. Overall there were 29.3% overweight respondents while 6.1% were obese. In multiple logistic regression, the significant predictors were: age group of 30 – 39 years (AOR=2.209; 95%CI=1.048 – 4.657) and 40 – 49 age group (AOR=2.530; 95%CI=1.043 – 6.134), gender (AOR=2.037; 95%CI 1.130 – 3.672), marital status (AOR=3.686; 95%CI=1.783 – 7.620), low physical activity level (AOR=2.478, 95%CI=1.191 – 5.157) and alcohol consumption (AOR=2.999, 95%CI=1.667 – 5.396).

Conclusion: In conclusion, the males had a higher prevalence of overweight and obesity than females. Advancing age, being male gender, being married, as well as alcohol consumption were found to predictors of overweight and obesity. The study also found a high-level physical activity to be protective against overweight and obesity.

Keywords: Overweight, Obesity, Predictor, African postgraduate students, Malaysia
1.0 Introduction

Globally, Obesity is the major public health problem and is an independent risk factor for cardiovascular disease (CVD). Overweight and obesity together with the raised in blood pressure, diabetics, tobacco use, physical inactivity and harmful use of alcohol as well as unhealthy diets are considered as the leading risk factors for mortality due to non-communicable diseases (NCDs). In 2015, seventy percent (70%) of 56.4 million global deaths were as a result of NCDs. Similarly, over three-quarters (30.7 million) of NCD mortalities happened in low and middle-income countries (WHO, 2017). The World Health Organization (WHO) defines overweight and obesity as a condition in which there is an abnormal or excessive accumulation of fat in the body thereby predisposing an individual to some condition that may impair health. Overweight and obesity can also be defined as the body mass index (BMI) of 25kg/m² to less than 30kg/m² and 30kg/m² or more respectively, while underweight and normal weight as the BMI of less than 18.5kg/m² and 18.5kg/m² to less than 25kg/m² respectively. Energy disproportion between calories consumed and calories expanded is the cardinal cause of overweight and obesity (WHO, 2016). Different factors are associated with overweight and obesity such as physical inactivity/sedentary lifestyle, age, gender, financial status, diseases, drugs etc. It can also be genetic, as some specific genes related to obesity have been identified (Xie, Waters, & Schirra, 2012 and Little, Humphries, Patel, & Dewey, 2016).

In a foreign country, student’s lifestyle and behaviour including eating pattern change very quickly leading to unhealthy habits, which may have a negative effect on their health (Hovhannisyan, 2007). Such changes can be influenced by a complex of factors involving exposure to more stress, sedentary lifestyle, accessibility and availability to familiar food, limited finances, irregular class schedules and overload, and spending more time on studying with less physical activities leading to increased or decreased intake of food or dependence of fast food with less nutritional value and high in sugar or fat (Mahfouz et al., 2016).

In line with the above introduction, several studies have reported the association between overweight, obesity and several factors, for example the socio-demographic factors (Kabir, Said, & Ismail, 2014; Peltzer et al., 2014; Nwachukwu et al., 2010; Adienbo et al. 2012; Zarei, Taib, & Zarei, 2013; Di Cesare et al., 2016; Nazaimoon, Mohamud, & Musa, 2011 etc.), behavioral factors such as physical activity level, smoking and alcohol consumption (Zarei et al., 2013; Teo, Nurul-Fadhilah, Aziz, Hills, & Foo, 2014; Sayon-Orea, Martinez-Gonzalez, & Bes-Rastrollo, 2011), eating pattern (Perez-Cueto, Verbeke, Lachat, & Remaut-De Winter, 2009, and Yildiz et al., 2011) and psychological factors (Bodenlos, Lemon, Schneider, August, & Pagoto, 2011; Babazekri, Hanafiah Juni, Afiah M.Z., & Fattah Azman, 2014; Chen & Qian, 2012). Subsequently, this study aims to further investigate the predictors of overweight and obesity among African postgraduate students in a public university.

2.0 Materials and Methods

2.1 Study location, study design and sampling

The study was conducted in a public university in Malaysia which is one of the leading research universities in Malaysia, located in central Peninsular Malaysia, near the capital city,
Kuala Lumpur. As a world-renowned centre of learning and research, it has attracted students and staff from all over the world making it a well-respected global entity.

A cross-sectional study was conducted from September 2016 to July 2017. The sampling frame was a list of the African postgraduate students obtained from all the faculties. The sample size was calculated according to the 2 proportions formula (Lwanga & Lemeshow, 1991). The total number of the study respondents was 815. All registered full-time post graduate African students were included in the study. While the exclusion criteria were pregnant students, physically challenged that cannot stand without support and registered students that were on deferment or long medical leave.

2.2 Study instrument and data collection

This study used a self-administered questionnaire which consists of a four sections namely: socio-demographic, behavioural factors, eating pattern and psychological factors. The level of physical activity was measured using the short version of the International Physical Activity Questionnaire – IPAQ (Kabir et al., 2014). The short version of the Depression, Anxiety and Stress Questionnaire – DASS (Lovibond & Lovibond, 1995) was used to measured psychological factors. The weighing scale (TANITA) and standiometer were used to measure the weight and height of the respondents respectively. The scale was reset before each use on a respondent and they were fully briefed about the procedure, and also they were asked to remove heavy clothing and their shoes and then was instructed to climb the platform and stand up right unassisted then, their weights were taken and recorded. While the height was measured by asking the respondents to stand upright, unsupported against the scale calibration, and with their heads in the Frankfort’s plane. The head-piece was then drawn and allowed to rest on their heads while the height was being recorded. Two readings were taken for each respondent in order to get accurate results. The calculation was done based on the definition of body mass index (BMI), which is weight in kilogrammes divided by height in metres; and the result expressed in kg/m². The formula for calculating BMI is shown below:

\[
\text{BMI} = \frac{\text{Weight (kg)}}{\text{Height (m)}^2}
\]

2.3 Data analysis

The study analysis was done using Statistical Package for Social Sciences (SPSS) version 23. Descriptive statistics (frequency and percentage) was used to summarise categorical data while continuous variables like age were converted into categorical. At the end, multiple logistic regression was used to determine predictors of overweight and obesity. \( P \) value set at 0.05.

3.0 Result

3.1 Response rate

From the total 815 students, 643 were eligible. Out of these 559 participated in the study, given an overall response rate of 87%.
3.2 Proportion of students based on overweight and obesity

The body weight status of the respondents was classified using WHO cut-off points of BMI. The overall overweight respondents were 164 (29.3%) while 34 (6.1) were obese as shown below Table 1.

Table 1: Distribution of the respondents according to BMI classification (N=559)

<table>
<thead>
<tr>
<th>BMI</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>4</td>
<td>0.7</td>
</tr>
<tr>
<td>Normal weight</td>
<td>357</td>
<td>63.9</td>
</tr>
<tr>
<td>Overweight</td>
<td>164</td>
<td>29.3</td>
</tr>
<tr>
<td>Obesity</td>
<td>34</td>
<td>6.1</td>
</tr>
</tbody>
</table>

3.3 Predictors of overweight and obesity

The logistic regression analysis was done to determine the predictors of overweight and obesity among the respondents, using variables that were associated with overweight and obesity in bivariate analysis. The crude odds ratio of the variables that show significant association with overweight and obesity in bivariate analysis was shown in Table 2. In the preliminary model, the study used variables with p-values less than 0.25 for all the outcome variables on bivariate analysis (Hosmer Jr, DW; Lemeshow, 2004 and Bursac, Gauss, Williams, & Hosmer, 2008). The selected reference groups were: age group 20 – 29 years, female, not married, with high physical activity level, never drank alcohol, and normal scores of anxiety and stress. The ‘ENTER’ method was used to analyse all the variables. There was no multicollinearity, and there was no significant interaction between the different variables. The model fits the data as the p-value for Hosmer – Lemeshow goodness of fit test was 0.586. The Negelkerke R-square was 0.42 which shows that about 42% of the variance was explained by the logistic model.

The results showed that respondents within the age group of 30 – 39 years have about 2 times odds of overweight and obesity than the reference group (AOR=2.209; CI 1.048 – 4.657; P=0.037). Again 40 – 49 age group have 2.5 odds of overweight and obesity than the reference group (AOR=2.530; CI 1.043 – 6.134; P=0.040). Male respondents have 2 times odds of overweight or obesity than females, which means female respondents are less likely to be overweight and obese than male (AOR=2.037; CI 1.130 – 3.672; P=0.018). Married respondents have 3 times odds to be overweight or obese than not married (AOR=3.686; CI 1.783 – 7.620; P <0.001). Furthermore, those with lower physical activity level have 2 times odds of having overweight and obesity than those with high physical activity level (AOR=2.478, CI=1.191 – 5.157; P=0.015). The study also found ever drinkers had almost 3 times odds to developed overweight or obesity than never drinkers (AOR=2.999, CI=1.667 – 5.396, P <0.001) as shown in the Table 2.
### Table 2: Predictors of overweight and obesity (N=559)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Simple logistic regression</th>
<th>Multiple logistic regression</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>COR</td>
<td>95% CI</td>
<td>p-value</td>
<td>AOR</td>
</tr>
<tr>
<td></td>
<td>Lower</td>
<td>Upper</td>
<td></td>
<td>Lower</td>
</tr>
<tr>
<td><strong>Age range</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 – 29</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 – 39</td>
<td>3.643</td>
<td>2.037</td>
<td>6.517</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>40 – 49</td>
<td>5.756</td>
<td>3.066</td>
<td>10.804</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>50 – 59</td>
<td>7.055</td>
<td>3.045</td>
<td>16.349</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>1.760</td>
<td>1.132</td>
<td>2.737</td>
<td>0.012*</td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not married</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>3.740</td>
<td>2.279</td>
<td>6.138</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td><strong>Physical Activity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>2.551</td>
<td>1.355</td>
<td>4.803</td>
<td>0.004*</td>
</tr>
<tr>
<td>Low</td>
<td>5.375</td>
<td>2.962</td>
<td>9.755</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td><strong>Alcohol consumption</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never drank</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ever drank</td>
<td>2.635</td>
<td>1.676</td>
<td>4.144</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td><strong>Anxiety</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>1.898</td>
<td>1.140</td>
<td>3.159</td>
<td>0.014*</td>
</tr>
<tr>
<td>Moderate</td>
<td>2.823</td>
<td>1.649</td>
<td>4.833</td>
<td>0.001*</td>
</tr>
<tr>
<td>Severe</td>
<td>4.982</td>
<td>2.261</td>
<td>10.979</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td><strong>Stress</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>5.819</td>
<td>3.331</td>
<td>10.164</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Moderate</td>
<td>5.455</td>
<td>1.653</td>
<td>18.007</td>
<td>0.005*</td>
</tr>
<tr>
<td>Severe</td>
<td>3917</td>
<td>0.000</td>
<td>0.000</td>
<td>0.999</td>
</tr>
</tbody>
</table>

Note: (*) – significant \( P < 0.05 \)

### 4.0 Discussion

The overall prevalence of overweight and obesity among postgraduate African students in this university in this study were 29.3% and 6.1% respectively. This finding was, however, a bit different with the result from a study among 210 Iranian postgraduate students in the same
In multiple logistic regression, the significant predictors were age, gender, marital status, the level of physical activity and alcohol consumption. This study found, advancing age was associated with an increased odds of overweight and obesity which was in line with the study conducted in the US which revealed individual with age group of 50 to 64 years (OR, 2.52; 95% CI, 1.57 – 4.05) were more likely to develop obesity than 40 to 49 age group (OR, 2.35; CI, 1.58 – 3.48), followed by 30 to 39 age group (OR, 2.12; 95% CI, 1.54 – 2.92) as well (Bowie, Juon, Cho, & Rodriguez, 2007). The result was also comparable with a study conducted in Ghana among the college students which revealed advancing age to be associated with overweight and obesity OR=5.37, 95% CI = 1.39–20.68 (Mogre, Nyaba, & Aleyira, 2014). Again the result was consistent with the study among postgraduate student in UPM, that reported a 2 times odds of overweight and obesity with advancing age (Kabir et al., 2014).

The male gender was found to be a predictor of overweight and obesity. The male gender has 2 times odds of having overweight and obesity than female. This result was comparable with the finding of the study conducted in Pakistan in which they found overweight and obesity to be associated with male gender AOR=4.96, 95% C.I:3.02 - 8.15 (Mahmood et al, 2013). Furthermore, it could be explained by the fact that, in this study, male gender have high age than female and advancing age increased the odd of overweight and obesity in a study by Bowie et al, 2007. However, it contradict results of some study conducted among adults in Malaysia by Wan Muhamud, et al (2011) in their study they reported male gender to be protective against overweight and obesity AOR=0.52, CI=0.43- 0.63, P<0.001.

Marital status was another predictor of overweight and obesity in this study. Married respondents have 3 times odds to be overweight or obese than not married (AOR=3.686; CI 1.783 – 7.620; P<0.001). Furthermore, this result was comparable with the study by Bowie et al., (2007) which revealed being single was associated with less likelihood for developing obesity than married respondents (OR, 0.68; 95% CI, 0.46 – 0.99). Also in a research conducted among Chinese adult shows 1.4 times odds of obesity among married men than those out of marriage (Xiao et al., 2013).

Another predictor of overweight and obesity found in this study was a level of physical activity. Those with lower physical activity level have almost 2.5 times odd of having overweight and obesity than those with high physical activity level (AOR=2.478, CI=1.191 – 5.157, P=0.015). The result could also mean that high-level physical activity was a protector
against overweight and obesity. This result was found to be consistent with the finding from Alhazza, M. et al (2012) and Dupuy, M. et al, (2011).

The last predictor of overweight and obesity in this study was alcohol consumption. The study found ever drinkers had almost 3 times odds to developed overweight or obesity than never drinkers (AOR=2.999, CI=1.667 – 5.396, P<0.001). However, this result could also mean that people with overweight or obesity were more likely to have engaged in alcohol consumption. Additionally, alcohol is a contributing factor to weight gain, as it stimulates metabolism resulting to overeating. It also increases a sedentary behaviour (French, Norton, Fang, & Maclean, 2010).

5.0 Conclusion and recommendation

In conclusion, this study revealed that 29.3% of the respondents were overweight while 6.1% were obese. The study also discovered advancing age, being a male gender, being married, low level of physical activity as well as alcohol consumption to be significant predictors of overweight and obesity. Therefore, there is a necessity for a plan and effective preventive measures against overweight and obesity. Special attention should be on the identified modifiable risk factors.

Acknowledgement

A special thank goes to our respondents for their timely response. We also like to thank the Deans of all faculties in the University.

Ethical approval

Ethical approval was obtained from the Ethics Committee for Human Study of the Universiti Putra Malaysia on 12 April 2017 with reference number UPM/TNCPI/RMC/1.4.18.2 (JKEUPM) – FPSK-P025/2017. Informed consent was obtained from the respondents prior to data collection and confidentiality was assured for the information given by the respondents.

Declaration

Authors declare that there is no conflict of interest regarding this article

Authors contribution

Author 1 Nura Tukur, conducted the study and prepared the manuscript.
Author 2 Dr. Suriani Binti Ismail, was a supervisor and reviewer.
Author 3 Dr. Rosliza Abdul Manaf, was a co-supervisor and reviewer.
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