

Original article

Overweight and Obesity and its Associated Factors Among Office Staff at a Higher Education Institute in Malaysia.

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Abstract:

Introduction: Overweight and obesity caused by excess body fat accumulation is a leading public health problem globally. The objective of this study was to investigate the overweight and obesity prevalence and its accompanying factors among educational office staff in Kuantan, Malaysia. **Materials and Methods:** A cross-sectional study was conducted among the staff of Widad University College (WUC) and Widad College (WC) using a self-administered validated questionnaire. Socio-demographic characteristics of the participants and obesity-related health information such as body mass index (BMI), smoking, alcoholics, physical activities and blood pressure status were obtained. The BMI was determined considering the participants weight in kilograms (kg) divided by the square of height in meters (kg/m²). Correlating the BMI with sociodemographic and health-related factors, the participants were characterized as underweight, normal, overweight and obese and presented as mean, frequency and percentage distribution. A p-value of <0.05 means a statistically significant result. **Results:** Overweight prevalence was 28.3% while obesity was 16.2 %. There were 13% of respondents underweight. A higher rate was found in males and Malay participants. Age, education, occupation, income, smoking, alcoholics, physical inactivity and hypertension were significantly linked to BMI. **Conclusions:** Overweight and obese constitute around 44% of the staff at WUC and WC, while 13 % were underweight. It is necessary to motivate employees through an effective training program organized by the employer towards maintaining a healthy lifestyle and thereby maintaining good health and improving work performance.

Keywords: overweight; obesity; associated factors; office staff; Malaysia.

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Introduction:

World Health Organization (WHO) has well-defined overweight and obesity as excess body fat accumulation that results in health impairment. This resulted in a public health problem causing a global epidemic.¹ Body mass index (BMI) reflects weight for height which is a screening method to

determine weight categories. It is the person's weight in kilograms (kg) divided by the square of height in meters (m²). According to WHO, the recommended normal BMI level is 18.5–24.9 while for overweight and obese were 25 to 29.9 kg/m² and ≥30kg/m² respectively.¹ The main aetiology of overweight and obesity are related to unhealthy lifestyle, for instance

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intake of high fat-diet and decreased physical activity in addition to genetic factors such as underlying disease, parental obesity, use of some medication and sociodemographic factors of gender, age, residential areas, education and income-level.^{2,3} This multifactorial condition raised concerns worldwide as it acts as a risk factor for public health diseases of a non-communicable nature, for example heart disease, hypertension, type-2 diabetes, and cancer. Other ailments are also known to be related to obesity and overweight such as non-alcoholic fatty liver disease, metabolic syndrome, osteoarthritis, obstructive sleep apnea, reproductive disorders, gallstones, psychiatric ailments etc. All these conditions cause a significant burden and mortality to patients worldwide.⁴

According to WHO, worldwide prevalence of obesity has increased almost three-fold from year 1975 to 2016. In 2016, >1.9 billion adults of aged ≥ 18 years old were found overweighted, from which >650 million were obese.¹ It is reported that, around 39% of adults were overweighted and about 13% were obese where in both the cases females were Predominant.^{1,5}

Obesity is found highest among Malaysian adults compared to other Southeast Asian countries and showed a fourfold rise between 1996 and 2015, from 4.4% to 17.7%, as determined by a National Health and Mobility Survey (NHMS).⁶ The NHMS 2019 showed, obesity prevalence among Malaysian adults is 19.7%.⁷ It is noticed that the lowest rates of obesity of 15.7%–18.6% are in Pulau Pinang, Pahang, Terengganu, and Sabah in relation to other states in Malaysia.⁷

A sedentary nature of work is specified as a significant risk factor for obesity. Sedentary behaviour is defined as 'any waking behaviour for instance sitting or leaning with an energy expenditure of 1.5 equivalent metabolic task (MET) or less'.^{8,9} It is reported that at the workplace, 6 in 10 working adult employees do a computer job, which shows a predominant sedentary nature of the office staff.¹⁰ Thus, in actuality sedentary results in health morbidities such as heart disease, diabetes, obesity, back and knee problems, depression and numerous other health problems.^{11,12,13} There are almost three million deaths yearly due to sedentary behaviour.¹³ The employers are indirectly burdened due to the medical claim cost of the employees and also from related lost workdays.¹⁴ It is vital to give due importance to the health of the employees as the well-being of employees is directly related to the turnover of the institute or organization.

Awareness on overweight and obesity among sedentary employees is important. There is a deficiency in data regarding the overweight and obesity prevalence within office staff in Kuantan, Malaysia. This study aimed to investigate the overweight and obesity prevalence and its association with the sociodemographic and health-related factors among the staff at Widad University College (WUC) and Widad College (WC). This study can help to raise awareness among the university staff regarding the influence of health factors that may lead to obesity and overweight.

Materials And Methods:

Study Design, Study Place, Study Period, Study Population and Study Sample

This cross-sectional study was conducted at WUC, Kuantan, Malaysia by fourth year medical students during their placement at Community Medicine Unit from April 2022 to July 2022. It was done as a requirement to fulfil their placement at Community Medicine under the guidance of supervisor/s. The study population were all 160 staff of the WUC and WC, and the sample comprised of 99 respondents. Convenient sampling technique was used to determine the sample size.

Inclusion and Exclusion Criteria

Inclusion criteria comprised of: (i) Malaysian office staff of WUC and WC, (ii) age 30 years and above, and (iii) who gave consent to participate. The staff who declined to participate were excluded from the study.

Study Instrument / Questionnaire

In this study, a validated structured questionnaire adapted from previous studies^{15,16} was used. The questionnaire comprised of two sections. The first, contained the sociodemographic characteristics of the participants including gender, age, ethnicity, marital status, education, occupation, and income. The second part contained health-related information including smoking status, drinking alcohol, performing physical activity and blood pressure. The questionnaire was set to English and Malay versions.

Smoking status was determined as (1) never smoker, (2) current smoker, and (3) ex-smoker. The never smoker is a person who did not smoke >100 cigarettes in whole life-time. Current smoker refers to a person who presently smoking daily in the last 30 days. Ex-smoker is a person who is currently smoke free for one month. Regarding alcohol consumption, they were

asked whether they were current drinkers (within the last 30 days), former drinkers, or never drink.

Physical activity was determined by their self-perceived report of inactive, insufficiently active and sufficiently active status. Inactive status was defined as only doing the sedentary work without any physical exercise per week; insufficiently active status includes a sedentary work with ≤ 1 -2.9 hours physical exercise and/or cycling weekly; and sufficiently active status was a sedentary work with ≥ 3 hours physical exercise and/or cycling weekly.^{15,16}

Blood pressure (BP) of the participants was determined following the standard method using a standard digital sphygmomanometer. Hypertension was demarcated as a 'persistent raise of systolic BP of ≥ 140 mm Hg and/or diastolic BP of ≥ 90 mm of Hg'.¹⁷ Participants known to have been diagnosed as hypertensive but under medication were also recorded as hypertensive status.

Weight and height of the participants were noted utilizing standardized instrument. The BMI was identified as the persons' weight (kg) divided by the height (m^2). Using BMI, participants were classified as: underweight (BMI < 18.5 kg/ m^2), normal (BMI 18.5 to 24.9 kg/ m^2), overweight (BMI 25 to 29.9), and obese (BMI ≥ 30 kg/ m^2).¹⁸

Methods of Data Collection

The staff list was collected from the Institutes' Human Resources Department. Staff present at the time of data collection were requested to take part in this study and briefed them on the study objectives while also, assured about privacy and confidentiality. Informed consent was taken from those who agreed. Socio-demographic and health-related data were recorded following standardized questionnaire. After that, weight, height and blood pressure were recoded utilizing standardized instruments.

Methods of Data Analysis

The data was then compiled, analysed using SPSS version 28. Socio-demographic and health-related data were calculated as numbers and percentages. The BMI was noted and its connotation with sociodemographic and health-related information were determined. Independent sample t-test was used to compare the means between two groups of the variables, while one-way ANOVA was used to compare the means between more than two groups. The overweight and obesity prevalence depending on gender, age, and ethnicity were presented as

number and percentage distribution. *P*-value of < 0.05 considered as statistically significant.

Result:

Table-1 showed the sociodemographic characteristics of respondents. The mean age of 99 sampled respondents was 38.27 years, ranging from 30 to 72, and the majority were in the age group of 30-39 years old. A total of 44 participants were male and 55 were female. In total, the majority were Malays (68.6%). Most of the respondents were married (63.6%), had a tertiary level of education (66.6%), with non-academic positions (56.6%) and had an income level of RM 3000-5999 (39.3%). Current smokers were 47.7% among males, while none females smoked at all; in total, majority of the participants (62.6%) were not ever smokers. Similarly, 87.9% of participants did not consume alcohol at all. Regarding physical activity, only 26.3% of the participants were sufficiently active. Prevalence of hypertension found in 36.3% males and in 32.3% females.

Table-1: Sociodemographic characteristics of the participants, n=99

| Sociodemographic Characteristics | | Male, n=44 | Female, n=55 | Total |
|----------------------------------|--------------|------------|--------------|-----------|
| | | n (%) | n (%) | n (%) |
| Age | 30-39 | 14 (31.8) | 29 (52.7) | 43 (43.4) |
| | 40-49 | 9 (20.4) | 16 (29.1) | 25 (25.2) |
| | 50-59 | 15 (34.1) | 7 (12.7) | 22 (22.2) |
| | ≥ 60 | 6 (13.6) | 3 (5.4) | 9 (9.1) |
| Ethnicity | Malay | 32 (72.7) | 36 (65.5) | 68 (68.6) |
| | Chinese | 3 (6.81) | 5 (9.1) | 8 (8.1) |
| | Indian | 4 (9.1) | 10 (10.1) | 14 (14.1) |
| | Others | 5 (11.4) | 4 (4.0) | 9 (9.1) |
| Marital Status | Married | 34 (77.3) | 29 (52.7) | 63 (63.6) |
| | Unmarried | 10 (22.7) | 26 (47.3) | 36 (36.3) |
| Education | Primary | 2 (4.5) | 3 (5.4) | 5 (5.1) |
| | Secondary | 11 (25.0) | 17 (30.9) | 28 (28.3) |
| | Tertiary | 31 (10.5) | 35 (63.6) | 66 (66.6) |
| Occupation | Academic | 20 (45.5) | 23 (41.8) | 43 (43.4) |
| | Non-academic | 24 (54.5) | 32 (58.2) | 56 (56.6) |
| Income (RM) | 1000-2999 | 6 (13.6) | 16 (29.1) | 22 (22.2) |
| | 3000-5999 | 20 (45.5) | 19 (34.6) | 39 (39.3) |
| | ≥ 6000 | 18 (40.9) | 20 (36.3) | 38 (38.3) |

| Sociodemographic Characteristics | | Male, n=44 | Female, n=55 | Total |
|----------------------------------|-----------------------|------------|--------------|-----------|
| | | n (%) | n (%) | n (%) |
| Smoking status | Current smoker | 21 (47.7) | 0 (0) | 21 (21.2) |
| | Former smoker | 16 (36.3) | 0 (0) | 16 (16.2) |
| | Never smoker | 7 (15.9) | 55 (100.0) | 62 (62.6) |
| Alcohol Consumption | Current drinker | 1 (2.3) | 2 (3.6) | 3 (3.1) |
| | Former drinker | 4 (9.1) | 5 (9.1) | 9 (9.1) |
| | Never drank | 39 (88.6) | 48 (87.3) | 87 (87.9) |
| Physical Activity Level | Inactive | 10 (22.7) | 12 (21.8) | 22 (22.2) |
| | Insufficiently active | 23 (52.3) | 28 (50.9) | 51 (51.5) |
| | Sufficiently active | 11 (25.0) | 15 (27.3) | 26 (26.3) |
| Hypertensive status | Normotensive | 23 (63.6) | 39 (70.9) | 67 (67.7) |
| | Hypertensive | 16 (36.3) | 16 (32.3) | 32 (32.3) |

Table 2 showed the association of BMI with sociodemographic and health-related factors of the respondents. Among the total participants, a significant association was found between mean BMI with age (p=0.01), education (p=0.01), occupation (p=0.02), and income (p=0.02). Male participants have higher BMI compared to females. In the age group of participants, the BMI gradually and significantly increased with increasing age till 59 years old and then showed a slight decline. Higher education, higher income level and academic position group of the participants showed higher BMI.

Regarding health-related factors, the table showed a significant association between smoking, alcohol drinking, physical activities and blood pressure status with BMI.

Table-2: Association of mean BMI of the respondents with sociodemographic and health-related factors

| Sociodemographic Factors | | BMI (kg/m ²) Mean (SD) | p value |
|--------------------------|---------------|------------------------------------|---------|
| Gender | Male (n=44) | 25.93 (4.86) | 0.05 |
| | Female (n=55) | 24.02 (4.59) | |
| Age in Years | 30-39 | 23.00 (4.25) | 0.01* |
| | 40-49 | 24.75 (3.88) | |
| | 50-59 | 27.94 (5.62) | |
| | ≥ 60 | 26.61 (3.03) | |

| Sociodemographic Factors | | BMI (kg/m ²) Mean (SD) | p value |
|--------------------------|-----------------------|------------------------------------|---------|
| Ethnicity | Malay | 24.96 (4.82) | 0.07 |
| | Chinese | 25.50 (4.85) | |
| | Indian | 22.35 (2.98) | |
| | Others | 27.57 (5.52) | |
| Marital Status | Married | 25.34 (4.79) | 0.20 |
| | Unmarried | 24.05 (4.72) | |
| Education | Primary | 20.28 (2.04) | 0.02* |
| | Secondary | 24.51 (5.51) | |
| | Tertiary | 25.37 (4.44) | |
| Occupation | Academic | 26.11 (.64) | 0.02* |
| | Non- academic | 23.91 (4.70) | |
| Income (RM) | 1000-2999 | 22.03 (2.67) | 0.00* |
| | 3000-5999 | 25.09 (5.23) | |
| | ≥ 6000 | 26.29 (4.64) | |
| Health Related Factors | | BMI (kg/m ²) Mean (SD) | p value |
| Smoking Status | Current smoker | 24.25 (3.75) | 0.03* |
| | Former smoker | 27.82 (3.66) | |
| | Never smoker | 24.32 (4.51) | |
| Alcohol Consumption | Current drinker | 27.56 (3.55) | 0.05* |
| | Former drinker | 28.17 (4.44) | |
| | Never drank | 24.44(4.46) | |
| Physical Activity Level | Inactive | 29.09(6.51) | 0.00* |
| | Insufficiently active | 24.71(4.48) | |
| | Sufficiently active | 21.77(4.13) | |
| Hypertension Status | Normotensive | 22.52 (3.31) | 0.00* |
| | Hypertensive | 29.78 (3.85) | |

*p (significant value): ≤0.05

Table-3 showed the distribution of weight categorization of the respondents based on age, gender and ethnicity. It was found that, in total, 28.3% of the participants were overweight, 16.2% were obese, 13.1% were underweight, while 42.4% were of normal weight. Majority of the participants were in age-group 30-39, and 40-49 years were of normal weight, while those between 50-59 and ≥60 years were mostly overweight or obese. Findings also revealed that overweight and obesity were more predominant among Malay males than others as shown in the table.

Table 3: Distribution of weight categorization of the respondents based on age, gender and ethnicity, (n=99)

| Variables | | Under Weight (BMI < 18.5 kg/m ²) n (%) | Normal Weight (BMI 18.5-24.9 kg/m ²) n (%) | Over Weight (BMI 25-29.9 kg/m ²) n (%) | Obese (BMI ≥30 kg/m ²) n (%) |
|--------------|---------------|--|--|--|--|
| Age | 30-39 (n=43) | 10 (23.2) | 22 (51.2) | 7 (16.3) | 4 (9.2) |
| | 40-49 (n=25) | 3 (12.0) | 10 (40.0) | 10 (40.0) | 2 (8) |
| | 50-59 (n=22) | 0 (0) | 7 (31.8) | 7 (31.8) | 8 (36.3) |
| | ≥ 60 (n=9) | 0 (0) | 3 (33.3) | 4 (44.4) | 2 (22.2) |
| Gender | Male (n = 44) | 3 (6.8) | 16 (36.3) | 16 (36.3) | 9 (20.4) |
| | Female (n=55) | 10 (18.1) | 26 (47.2) | 12 (21.8) | 7 (12.6) |
| Ethnicity | Malay (n=68) | 9 (13.2) | 28 (41.1) | 21 (30.8) | 10 (14.6) |
| | Chinese (n=8) | 1 (12.5) | 3 (37.5) | 2 (25) | 2 (25) |
| | Indian (n=14) | 3 (21.4) | 8 (57.1) | 3 (21.4) | 0 (0) |
| | Others (n=9) | 0 (0) | 3 (33.3) | 2 (22.2) | 4 (44.4) |
| Total | | 13 (13.1) | 42 (42.4) | 28 (28.3) | 16 (16.2) |

Discussion:

This study investigated the occurrence of overweight and obesity by measuring the BMI of the participants and its association with socio-demographic and health-related factors. The mean age of all 99 sampled respondents of this present study was 38.27 years, ranging from 30 to 72. Among the participants, majority of the respondents were Malays, married, had a tertiary level of education, held a non-academic position, were nonsmokers, were never drunk, and had normal blood pressure. However, the physical activity level of the majority of the respondents was found insufficiently active. There were significant association of BMI with age, education, occupation, and income level while the association was insignificant with gender. The overall overweight and obesity prevalence among the participants was 44.5% where 28.3% were overweight and 16.2% were obese. According to the 2019 NHMS in Malaysia, the prevalence of overweight was 30.4%, and obesity was 19.7% among Malaysian adults,⁷ which is slightly higher than our study findings; nevertheless, the findings are alarming. Overweights were predominated in age group 40-49 years, while obese were predominant in age group 50-59 years, and then it decreased slightly in age group ≥ 60 years. This study is comparable to a study in Sri Lanka showing increased BMI with age in the

young people, constant in middle age and declines in the aged people. They identified with increasing age, there is a linear increase in body fat that could be attributed to decreased physical activity, changes in hormone levels and decreased protein synthesis related to age.¹⁹ A study on the elderly population in Malaysia revealed that the prevalence of overweight has doubled from 15.6% in 1969 to 29.8% in 2006.²⁰ It is reported that obesity can affect the oldest among the old and continues even to the years before death.²¹ Our study findings emphasize the need to increase awareness of the participants on overweight and obesity and its associated health problems to prevent these problems. To develop an increased awareness on the importance of physical activity, and avoidance of smoking and alcohol drinking, a widespread dissemination of knowledge to the mass people is necessary. A good communication through a trusted media coverage needs to be ensured to get the best results in this regard.²² Good communications is an art that determines adherence to therapy.²³

Although this study displayed a higher rate of overweight and obesity prevalence in males, other studies showed that females are more prone to obesity than males.^{20,24,25} It is well documented that the general Malay population have higher obesity, the underlying reason could be dietary habits and physical inactivity.^{24,26} Higher household income

and educational level causing a higher prevalence of obesity are also comparable to other studies.^{20,24,27} Participants having academic positions showed significantly higher levels of BMI, also related to higher socioeconomic status and underlying reasons for physical inactivity, food habit and lifestyle. However, one previous study showed that obesity in non-academic staff were 2.51 times higher than academic staff.¹⁵ Nevertheless, 13% of the participants in this present study were underweight, predominantly found in female Malays and in the 30-39 age group, which needs further study to determine the causes of being underweight and its remedial accordingly.

The BMI in this present study was significantly associated with all health-related factors, for example smoking, consuming alcohol, physical activity and hypertension status. This study showed former smokers have higher BMI than current and never smokers. Previous studies showed that smokers, experienced weight gain after quitting smoking.^{25,28,29} This present study also showed the same result of feeling weight gain after smoking cessation. Gaining weight is most likely related to a higher energy intake with physical inactivity, low resting metabolic rate and high lipoprotein lipase activity. However, the molecular mechanisms causing weight gain after smoking cessation are poorly understood.^{15,29} In this study, alcohol consumption was found to have a significant association with BMI. Alcohol consumption has been shown to be associated with metabolic syndrome consisting of increased abdominal fat, diabetes mellitus, high blood pressure, and dyslipidemia.³⁰ Our study showed similarity with study by Rampal et al (2012), where participants having alcohol consumption were 5.09 times more obese than those who never consumed alcohol.¹⁵

Physical inactivity is a vibrant behavioural risk factor for the causation of obesity.³¹ Regular physical activity in adults is necessary for energy expenditure and energy balance and thus contributes to weight control. This study showed that physical inactivity is significantly associated with higher BMI. A study finding from the 2015 NHMS revealed that, less physical activity is related to an increased risk of overweight/obesity in men.³² Other studies support a noteworthy association between obese and physical inactivity.^{15,25,33} Regarding blood pressure status, this present study revealed a substantial relationship with BMI and hypertension that is parallel to other studies.^{24,25,34}

In the office setting, desk-based employees spend a long time in sitting positions due to their working conditions.³⁵ The working environment in an office setting, required the employees to be seated for a long time exposed them to sedentary lifestyle. The WHO recommends to do aerobic exercise and muscle-strengthening physical activity (MSPA) for reducing sedentary behaviour.³⁶ The recommendation for adults is 'at least 150–300 minutes of moderate-intensity, or at least 75–150 minutes of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate-intensity and vigorous-intensity activity per week; and also muscle-strengthening activities at a moderate or higher intensity involving all major muscle groups on 2 or more days per week'.³⁶ During office work involving prolonged sitting, light activity such as walking to the coworkers' place can be performed to convey any necessary message instead of email, and also extending walking to nearby resting room or washroom and standing while answering phone call is of benefit.¹⁰ Excess body fat deposition resulting in overweight and obesity causes many adverse effects on human health.³⁷ Overweight and obesity aggravates the endocrine and metabolic dysfunction,³⁸ decreases the flexibility and fitness of cardio-pulmonary and musculoskeletal functions.³⁹ Worldwide in the last 40 years, the overweight and obesity has increased significantly.⁴⁰ These are preventable public health problems,⁴¹ and are common among children and adolescents.⁴² Physical activity by doing exercise is essential to maintain fitness and to promote health.⁴³ Dissemination of knowledge on the good eating habit and change of lifestyle as well as taking part in regular physical exercise help to reduce overweight and obesity. Regular physical activity training programs need to be arranged by the employer for the improvement of the health of their employees. Ongoing training is an important part of any organization to achieve its goal; an appropriate training helps to obtain the knowledge, skill and attitudes of employees to accomplish the job well.⁴⁴

There are some limitations in this study. The cross-sectional nature of the study reflects the data, particularly for a single point in time only. This study was carried out in a single organization with limited staff. It may not represent the data as a whole among the general population. The study also investigated only four health-related factors. A further prospective study including a number of universities with all possible health-related factors is suggested to find a deeper understanding of overweight or obesity and

its associated factors. Nevertheless, the results of this study are important and have direct consequences to strengthen the knowledge, attitudes and skills of the staff and motivate them towards avoiding unhealthy lifestyle.

Conclusion:

Overweight and obesity prevalence among the staff at Widad University and College were 28% and 16%, respectively, where 36% of males and 22% of females were overweight while 20% of males and 13% of females were obese. However, 13% of the respondents were underweight, predominantly found in female Malays and in the 30-39 years' age group. A significant association was found between BMI and sociodemographic characteristics of age, education, occupation, and income as well as with all health-related characteristics of smoking, alcohol

consumption, activity level and hypertension. It is necessary to strengthen the knowledge, attitudes and skills of the staff and motivate them to take part in regular exercise and to increase physical activity and also to practice good eating habits through the effective training program. Effective training improves the work performance of the employees.

Conflict of interest

The authors declared no conflicts of interest.

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Authors' contribution

All authors have contributed substantially in the conception, design, data collection, data processing, manuscript writing and approved its final version to submit to the Journal for publication.

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