ORIGINAL ARTICLE

Working Characteristic, Occupational Sitting, Dietary Practices and Its Relationship with Nutritional Status among University Staff Population

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ABSTRACT

Introduction: Sedentary behaviour and unhealthy diets are common among university staff, driven by work demands and affecting their health. This study aimed to describe the working characteristics, occupational sitting, and nutritional status of Universiti Malaysia Terengganu (UMT) staff and examine their relationships. **Materials and methods:** A cross-sectional study using quota sampling was adopted (n=219). The Malay Occupational Sitting and Physical Activity Questionnaire (OSPAQ) and Dietary Practices were self-administered, while medical staff assessed nutritional status. Descriptive analysis, Independent t-test, Pearson correlation and Multivariate Linear Regression were employed. **Results:** Respondents had a mean daily computer usage of 6.70 ± 2.41 hours and occupational sitting time of 266.76 ± 130.79 minutes/day. Poor eating habits were prevalent including irregular practice of the Healthy Plate Concept, and insufficient intake of fruits, vegetables, and water. The majority had normal total cholesterol (36.5%) and fasting blood glucose (78.5%), yet 63.9% were overweight or obese, with mean values of 5.54 ± 0.99 mmol/L for cholesterol, 5.92 ± 1.42 mmol/L for glucose, and 27.35 ± 5.44 kg/m^2 for BMI. Females had significantly higher total cholesterol (p=0.001) and those with secondary education had higher BMI than tertiary-educated respondents (p=0.002). No significant relationship was found between work characteristics and nutritional status, but female (β = 0.582, 95% CI = 0.304, 0.861) and computer usage (β = -0.064, 95% CI = -0.125, -0.004) were predictors of total cholesterol. **Conclusion:**The study highlights the need for targeted interventions to improve dietary practices among university staff, warranting further research on work-related influences on nutritional status.
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Keywords: University staff, Working characteristics, Occupational sitting, Dietary practices, Nutritional status

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INTRODUCTION

Modern workplace has undergone significant changes that have affected many aspects of employee well-being, including nutritional status. These shifts are especially relevant to university staff population because of the demanding nature of academic positions and their sedentary work settings (1). Working in university settings generally involves a wide variety of roles, each presenting unique challenges and demands. For example, academic staff members frequently put in long hours performing cognitive work, such as research, teaching, and administrative tasks, which might result in prolonged periods of inactivity (2). Similarly, administrative and support staff may encounter desk-bound tasks that limit physical activity throughout the day. Such sedentary behaviours have been linked to adverse health outcomes, including obesity, cardiovascular diseases, and musculoskeletal disorders (3–5).

Research has indicated that university staffs spend a significant portion of their workday sitting and highlighted a high prevalence of sedentary behaviour among university staffs, with a substantial amount of their waking hours dedicated to sedentary activities. For example, university staffs in the US spent approximately 75% of their workday seated and reported rare breaks from sitting (6). In Australia, university staffs were reported to sit for an average of 7.5 hours per day on weekdays (7). While in Malaysia, it was also found that university staff spent an average total sitting time of 7.6 ± 2.4 hour per day (8).

Concomitant with occupational sitting patterns, dietary practices among university staff play an important role in shaping nutritional status. The hectic nature of academic and administrative roles may cause individuals to opt for convenient and unhealthy food choices (1). Irregular meal patterns, frequent intake of processed foods, and reliance on high-calorie snacks are all common eating practices in university settings (9). Furthermore, the pervasive culture of academic stress and tight deadlines may lead to emotional eating habits, worsening nutritional imbalances (10). Studies have shown that significant proportion (more than 50%) of university staff in Portuguese, US, South Africa had poor dietary habits and they identified workload, lack of time and healthy food option as the barrier of healthy eating (1,9,11,12). In Malaysia, university staffs (66%) were found to have excessive salt intake (13).

The relationship between occupational sitting, dietary practices, and nutritional status among university staff is multifaceted and dynamic. Long sitting hour not only affects energy expenditure but also influences metabolic processes, including glucose regulation and lipid metabolism, which can have an effect on body composition and overall health (14,15). Coupled with poor dietary habits, prolonged sitting may contribute to weight gain, insulin resistance, and micronutrient deficiencies, all of which are key determinants of nutritional status (4,14).

A country's nutritional state is a critical precondition for its development, and a nation with more productive population will benefit from improved nutrition. Understanding the synergistic effects of working characteristics, occupational sitting, and dietary practices on nutritional status is crucial for fostering a healthier workforce within university settings. Research on dietary and nutritional status has been well studied in many countries (16–18) but research in Malaysian university staff population commonly focused on impact of physical activity, alcohol consumption and smoking on nutritional status (8,19–21). There is lack of research about workplace sedentary behaviour and dietary habits among university staff as well as the effect of working characteristic and occupational sitting towards nutritional status. Understanding these effects can help with the development of workplace interventions considering the working characteristics of the university staff population, thereby contribute positively to their overall health and prevent cardiovascular risk factors. As such, the objectives of this study were to determine the working characteristic, occupational sitting and dietary practices of UMT staffs. It was also aimed to determine the relationship between sociodemographic profile, working characteristic, occupational sitting, and nutritional status among UMT staffs.

MATERIALS AND METHODS

Study design and sample selection

This study was cross-sectional and it was conducted among both academic and non-academic university staffs in UMT. University staff typically include a variety of roles such as faculty, administrative staff, technical support, and maintenance personnel. In order to ensure that staffs from these functional groups were adequately represented in the sample, quota sampling was adopted to recruit the samples from 17 selected departments in UMT, by considering the requirement of having a minimum staff size of 30 and above in each department. Using the formula by Yamane (22), the desired sample size was 184 to achieve a 95% confidence level and a 7 % margin of error, given that population of UMT staffs is 1856. Considering a 10% of non-response rate, a total of 202 respondents were needed for this study. The total sample recruited from selected department and final evaluable data was n=219.

The inclusion criteria of the participants were Malaysia UMT staffs aged 18 years and above, not on a specific diet due to illness, and were able to understand, read and write in Malay. Those who were pregnant women at the time of the recruitment and having physical disabilities or deformities were excluded from this study.

Data collection procedures

This study was conducted in two sessions. In first session, the data of working characteristics, occupational sitting and dietary practices of respondents was collected by using self-administered questionnaires in Malay language. The questionnaires consisted of three sections which were Section A: Sociodemographic profiles, Section B: Working characteristics and occupational sitting, and Section C: Dietary practices questionnaires adapted from National Health and Morbidity Survey 2019 (23). The validity of the questionnaires was determined through face validity based on expert review, and they were adopted from established questionnaires used in national health surveys.

For occupational sitting, questions were derived from the Occupational Sitting and Physical Activities Questionnaire (OSPAQ). The OSPAQ demonstrated good reliability as tested in the office workplace setting, indicated by the intraclass correlation coefficients (ICCs) for minutes spent sitting (0.66), standing (0.83), and walking (0.77) (24). The translated scales also exhibited adequate internal consistency (α=0.72) when pre-tested in a similar local working population (25). It assessed the proportion of work time spent sitting, standing, walking, and performing heavy labour, as well as the total amount of hours worked over the previous five working days. In the OSPAQ, respondents were asked, "How would you describe your situation at work in the last seven days?" The scoring method for OSPAQ is percentage-based. Respondents were asked to write the daily average proportion of their working hours spent on each of the four activities over the previous seven days. The overall percentage gained from all four activities should be 100%.

In session two, nutritional status assessments including BMI, total cholesterol and fasting blood glucose of the respondents was administered by the medical team members from Pusat Kesihatan Universiti, UMT. Height of the respondent was measured by using a portable stadiometer (SECA, Germany) while weight of the respondent was measured using a weighing scale (Tanita, Japan). BMI was then calculated by dividing body weight by square of height (kg/m2) and categorised based on Asia-Pacific and World Health Organization (WHO) guideline (26,27). Total cholesterol and fasting blood glucose were measured using CardioChek® PA Analyzer with blood samples obtained via fingerstick. The participants were required to fast at least 6 hours before the assessments were done. Total cholesterol was categorised as normal (<5.2 mmol/L), borderline high (5.2 – 6.19 mmol/L), and high (≥ 6.2 mmol/L) while fasting blood glucose was categorised as normal (<6.1 mmol/L), pre-diabetes (6.1 – 6.9 mmol/L), and diabetes (≥7.0 mmol/L) (28,29).

Data analysis

Data analysis of this study was done using the IBM Statistical Package for Social Science (SPSS) software version 23.0 applying parametric tests. Descriptive test was used to analyse sociodemographic profile, working characteristics, occupational sitting and nutritional status (BMI, total cholesterol, fasting blood glucose) among the respondents. Continuous variables were presented as mean and standard deviation while categorical variables were shown as frequency and percentage. The nutritional status between gender, educational level, and group of service and were compared by using independent sample t-test. Pearson correlation was used to analyse the relationship between nutritional status and age, working hours, computer usage and occupational sitting minutes. Multiple linear regression was conducted to determine the predictor of nutritional status. The assumptions of multiple linear regression, including linearity, normality, homoscedasticity, and multicollinearity were tested. Linearity and homoscedasticity were confirmed by examining scatterplots of residuals versus predicted values. All the residuals were approximately normally distributed. Multicollinearity was tested using the Variance Inflation Factor (VIF), with all VIF values falling below 2, indicating no multicollinearity issues. All assumptions were met, ensuring the robustness of the regression model. Statistical significance was set at $p<0.05$.

Ethical Clearance

Ethical approval was obtained from the UMT Human Research Ethics Committee (UMT/JKEPM/2023/163). Participant's confidentiality was preserved as only researchers and PKU medical staff involved in this study assessed the data. No personal data such as name, phone number and email were reported as a result. After data collection and results have been reported, those data were deleted.

RESULTS

Table I shows the sociodemographic profile of respondents. Most of the respondents (51.6%) were female while 48.4% were male. The mean age of the respondent was 40 years old. Majority of respondents (96.8%) were Malay, 2.7% were Chinese while there was one respondent from other ethic. Most of them (78.5%) were married. Meanwhile, for educational level, majority of the respondents had Bachelor's degree (54.1%), 23.3% of them had diploma level, 20.5% had level of either SRP, PMR or SPM, 17.4% of them had PhD level while the rest of them had Master's degree (8.7%). For household monthly income, most of the respondents were in M40 category (44.3%), followed by B40 (41.1%) and T20 (14.6%). Majority of the respondents were supporting staff (57.5%), while 23.7% of them were in the group of management and professionals (non-academic) and 18.7% of them were in the group of management and professionals (academic).

Table I: Sociodemographic profiles of the respondents

Characteristics	Respondents (n = 219)	
	n (%)	Mean ± SD
Age (years)		39.82 ± 8.04
Gender		
Female	113 (51.6)	
Male	106 (48.4)	
Marital status		
Married	172 (78.5)	
Single/Divorced/Single mother	47 (21.5)	
Ethic		
Malay	212 (96.8)	
Chinese	6 (2.7)	
Other	1 (0.5)	
Educational level		
Bachelor's degree	66 (30.1)	
Diploma	51 (23.3)	
SRP/PMR/SPM	45 (20.5)	
PhD	38 (17.4)	
Master's degree	19 (8.7)	
Household income (24,25)		
M40	97 (44.3)	

CONTINUE

Table I: Sociodemographic profiles of the respondents. (CONT.)

Characteristics	Respondents (n = 219)	
	n (%)	Mean ± SD
Household income (24,25)		
B40	90 (41.1)	
T20	32 (14.6)	
Group of service		
Supporting staff	126 (57.5)	
Management and professionals (non-academic)	52 (23.7)	
Management and professionals (academic)	41 (18.7)	

SD=Standard Deviation, B40= Household income <RM4360, M40= Household income ranged RM 4360-RM9619, T20=Household income >RM9619

The working characteristics of respondents were presented on Table II. Majority of them (81.3%) working in support, service and administrative areas while 18.7% working in academic areas. They had an average of 12 years working experience in UMT. Out of 219 respondents, 95% of them used computer during their work while only 5% of them did not use computer. The mean hour of computer usage per workday was 7 hours. Generally, the respondents worked 5 days in a week, the average total working hour per week was 43 hours and overtime was 5 hours per week. The respondents reported an average of 266 minutes of sitting, 85 minutes standing, 95 minutes walking and 40 minutes of heavy labour during their work day.

Table II: Working characteristics of the respondents

CharacteristicS	Respondents (n = 219)	
	n (%)	Mean ± SD
Functional Area		
Support, Service and Administrative	178 (81.3)	
Academic	41 (18.7)	
Working experience (years)		12.26 ± 7.05
Computer usage		
Yes	208 (95.0)	
No	11 (5.0)	
Computer usage (hour/day)		6.70 ± 2.41
Overtime work (hour/week)		5.03 ± 8.80
Working hour/week		43.05 ± 13.10
Working day/week		5.29 ± 0.89
Work activities (minutes/day)		
Sitting		266.76 ± 130.79
Standing		85.60 ± 56.10
Walking		95.03 ± 60.44
Heavy labour		40.22 ± 57.80

SD= Standard Deviation

Table III presented the diet practices among the respondents. It was shown that most of the respondents (81.7%) know about Malaysian Healthy Plate Concept but only 10.5% practiced it daily. On average, the respondents consumed one serving of fruits for 3 days a week and consumed one serving of vegetables for 4 days a week. The respondents drank 5 glasses of plain water and 1 glasses of sugar-sweetened beverage daily. The mean BMI of the respondents was 27.35 kg/m2 which was classified as overweight (Table IV). Most of the respondents were overweight (41.1%), 12.3% of them were having obese class I, 8.2% had obese class II while 2.3% had obese class III. One- third (33.8%) of the respondents were having normal BMI while 2.3% of them were underweight. A higher percentage of overweight and obesity (80.44%) were observed when using Asia Pacific guideline for BMI. The mean total cholesterol of the respondents was 5.54 mmol/L, classified as borderline high. The mean fasting blood glucose of the respondents was within the normal range (5.92 mmol/L).

Table III: Diet practices of the respondents

Characteristics	Respondents (n = 219)	
	n (%)	Mean ± SD
Have you ever heard/know about Malaysian Healthy Plate Concept?		
Yes	179 (81.7)	
No	40 (18.3)	
Please state what do you understand about Malaysian Healthy Plate Concept		
¼ plate of rice/ noodles/ bread/ grains/ grain products/ yams/ other carbohydrate sources		
True	206 (94.1)	
False	13 (5.9)	
¼ plate of fish/chicken/meat/legumes/other protein sources		
True	204 (93.2)	
False	15 (6.8)	
½ plate of vegetables and fruits		
True	197 (90.0)	
False	22 (10.0)	
Do you practice Malaysian Healthy Plates concept in your main course?		
Yes, everyday	23 (10.5)	
Yes, sometimes	135 (61.6)	
No	61 (27.9)	
Are you vegetarian (including lacto-ovo, lacto, ovo, and vegan vegetarian) since last month?		
Yes	17 (7.8)	
No	202 (92.2)	

CONTINUE

Table III: Diet practices of the respondents. (CONT.)

Characteristics	Respondents (n = 219)	
	n (%)	Mean ± SD
How many days a week do you eat fruit? (days/week)		3.21 ± 2.07
On the day you eat fruit (oranges, apples, bananas and so on), how much serving do you eat?		1.54 ± 0.99
How many days a week do you eat cooked vegetables and/or salad?		4.48 ± 2.21
On the day you eat cooked vegetables and/or salad, how much serving do you eat?		1.45 ± 0.99
How many glasses of plain water do you drink in a day?		5.65 ± 2.84
How many glasses of sugar-sweetened beverages do you drink in a day?		1.50 ± 1.23
***At what time do you find it most difficult for you to eat healthily?**		
In the morning: before work	66 (30.1)	
During working hours	96 (43.8)	
After work	59 (26.9)	
At dinner time	51 (23.3)	
Late at night	46 (21.0)	
***Why is this the hardest time for you to eat healthily?**		
Limited access to healthy food	42 (19.2)	
Time constraint due to working	41 (18.7)	
Insufficient self-control	33 (15.1)	
Psychological factor	20 (9.1)	
Influence of colleagues	16 (7.3)	
Exposure to unhealthy food practices in workplace	3 (1.4)	

*Respondents can choose more than one answer, SD=Standard Deviation

Table IV: Nutritional status of respondents

Characteristics	Respondents (n = 219)	
	n (%)	Mean ± SD
BMI (kg/m²)		27.35 ± 5.44
BMI classification (Asia-Pacific) (26)		
Underweight (<18.5)	5 (2.3)	
Normal (18.5-22.9)	37 (16.9)	
Overweight (23.0-27.4)	84 (38.04)	
Obese I (27.5-37.4)	65 (29.7)	
Obese II (32.5-37.4)	15 (6.8)	
Obese III (≥ 37.5)	13 (5.9)	
BMI classification (WHO) (27)		
Underweight (<18.5)	5 (2.3)	
Normal (18.5-24.9)	74 (33.8)	
Overweight (25.0-29.9)	90 (41.1)	
Obese I (30.0-34.9)	27 (12.3)	
Obese II (35.0-39.9)	18 (8.2)	
Obese III (≥ 40.0)	5 (2.3)	
Total cholesterol (mmol/L)		5.54 ± 0.99
Cholesterol level (29)		
Normal (<5.2 mmol/L)	80 (36.5)	
Borderline high (5.2-6.1 mmol/L)	77 (35.2)	
High (≥ 6.2 mmol/L)	62 (28.3)	
Fasting blood glucose (mmol/L) (28)		5.92 ± 1.42
Normal (<6.1 mmol/L)	172 (78.5)	
Prediabetes (6.1-6.9 mmol/L)	39 (17.8)	
Diabetes (≥ 7.0 mmol/L)	8 (3.7)	

SD=Standard Deviation

Table V presented the comparison of nutritional status between sociodemographic profile (gender, educational level, group of service). It was indicated that there was no significant difference in BMI between gender (p=0.895) and group of service (p=0.506) but there was significant difference in BMI between educational level (p=0.002). Respondents who had secondary educational level had higher BMI compared to tertiary education level. Result showed that there was no significant difference in total cholesterol between educational level (p=0.653) and group of service (p=0.708) but there was significant difference between gender (p=0.001) which female respondents had higher total cholesterol than male. No significant difference found in fasting blood glucose between gender (p=0.629), educational level (p=0.380), and group of service (p= 0.733).

Table V: Comparison of nutritional status between sociodemographic profile

Socio-demographic profile	BMI (kg/m²)				Total cholesterol (mmol/L)				Fasting blood glucose (mmol/L)			
	Mean	Mean difference (95% CI)	t-statistic (df)	p-value	Mean	Mean difference (95% CI)	t-statistic (df)	p-value	Mean	Mean difference (95% CI)	t-statistic (df)	p-value
Gender												
Male (n=106)	27.40 ± 5.12				5.30 ± 0.90				5.96 ± 1.21			
Female (n=113)	27.30 ± 5.76	0.097 (-1.357, 1.551)	0.132 (217)	0.895	5.87 ± 1.60	-0.460 (-0.718, -0.202)	-3.518 (217)	0.001*	5.87 ± 1.60	0.093 (-0.287, 0.473)	0.484 (217)	0.629
Education level												
Secondary (n=45)	29.56 ± 6.17				5.48 ± 1.00				6.17 ± 2.34			
Tertiary (n=174)	26.77 ± 5.10	2.788 (1.029, 4.547)	3.124 (217)	0.002*	5.56 ± 0.99	-0.075 (-0.402, 0.253)	-0.450 (217)	0.653	5.85 ± 1.07	0.317 (-0.403, 1.038)	0.885 (48.811)	0.380
Group of service												
Supporting (n=126)	27.56 ± 5.83				5.52 ± 0.98				5.89 ± 1.52			
Management (n=93)	27.06 ± 4.88	0.497 (-0.972, 1.965)	0.667 (217)	0.506	5.57 ± 1.01	-0.051 (-0.319, 0.217)	-0.375 (217)	0.708	5.95 ± 1.30	-0.067 (-0.451, 0.318)	-0.342 (217)	0.733

*Statistically significant at p<0.05

No significant relationships were found between age and BMI, total cholesterol or fasting blood glucose, nor were there significant relationships between working hour, computer usage or sitting minutes and nutritional status among the respondents (Table VI). However, multivariate linear regression analysis revealed that females (β = 0.582, 95% CI = 0.304, 0.861) and computer usage (β = -0.064, 95% CI = -0.125, -0.004) significantly predicted total cholesterol.

Table VI: Relationship between nutritional status and sociodemographic profile, working characteristics and occupational sitting

Variable	BMI					Total cholesterol					Fasting blood glucose				
	Pearson Coefficient	p-value [a]	Regression Coefficient	p-value [b]	Confidence Interval (95%)	Pearson coefficient	p-value [a]	Regression Coefficient	p-value [b]	Confidence Interval (95%)	Pearson coefficient	p-value [a]	Regression coefficient	p-value [b]	Confidence Interval (95%)
Age	0.127	0.060	0.098	0.094	-0.017, 0.214	0.044	0.520	0.004	0.722	-0.017, 0.025	0.115	0.089	0.011	0.498	-0.020, 0.041
Gender	N/A	N/A	0.357	0.650	-1.189, 1.902	N/A	N/A	0.582	<0.001*	0.304, 0.861	N/A	N/A	-0.116	0.579	-0.527, 0.295
Education level	N/A	N/A	-2.199	0.055	-4.442, 0.044	N/A	N/A	0.074	0.717	-0.329, 0.478	N/A	N/A	-0.416	0.171	-1.013, 0.181
Household income	N/A	N/A	-0.674	0.331	-2.037, 0.689	N/A	N/A	0.049	0.692	-0.196, 0.295	N/A	N/A	0.184	0.319	-0.179, 0.546

CONTINUE

Table VI: Relationship between nutritional status and sociodemographic profile, working characteristics and occupational sitting. (CONT.)

Variable	BMI					Total cholesterol					Fasting blood glucose				
	Pearson Coefficient	p-value [a]	Regression Coefficient	p-value [b]	Confidence Interval (95%)	Pearson coefficient	p-value [a]	Regression Coefficient	p-value [b]	Confidence Interval (95%)	Pearson coefficient	p-value [a]	Regression coefficient	p-value [b]	Confidence Interval (95%)
Working hour/week	0.017	0.806	0.015	0.626	-0.046, 0.077	-0.051	0.453	0.001	0.875	-0.010, 0.012	-0.066	0.334	-0.007	0.432	-0.023, 0.010
Computer usage	0.032	0.645	0.281	0.102	-0.056, 0.619	-0.085	0.220	-0.064	0.038*	-0.125, -0.004	0.042	0.549	0.067	0.141	-0.022, 0.157
Sitting minutes/workday	-0.075	0.275	-0.003	0.305	-0.010, 0.003	-0.060	0.385	-0.001	0.189	-0.002, 0.000	-0.059	0.391	-0.001	0.578	-0.002, 0.001
			R^2= 0.069					R^2= 0.091					R^2= 0.037		

Notes: [a] Pearson correlation; [b] Multiple linear regression; *Statistically significant at p<0.05

DISCUSSION

In this study, working characteristic, occupational sitting, and their relationship with nutritional status among UMT staffs were assessed. Based on the data obtained, the staffs spent almost 7 hours of computer usage and 266 minutes which is equivalent to 4 hours of sitting during working, indicating that there are sedentary work practices in university. This finding is in agreement with previous study in UPM which showed that the university staffs were seated for more than 3 hours and almost all of the university staffs were sedentary at work (25). Similarly, a study in UK university found that management, professional, and specialist job positions spent the most time sedentary (2066±416 counts) during work hours (30). Sedentary behaviour among university staff could be explained by their nature of work such as meetings, phone calls and computer work. Sedentary behaviour had been shown to have adverse effect on health such as increasing rate of obesity, metabolic syndrome, type 2 diabetes and cardiovascular diseases (3,5,31).

In term of diet practice, most of the staffs knew about Malaysian Healthy Plate Concept but only 10.5% of them practiced it daily. The consumption of fruits and vegetables among the staffs was also inadequate and below the daily recommendation (2 servings of fruits per day and 3 servings or more of vegetables per day) based on Malaysian Food Pyramid 2020 (32). This finding was in accordance with the latest National Health and Morbidity Survey, NHMS 2019 (23) which found that 94.9% of Malaysian did not meet the daily recommendations for fruits and vegetables. Similarly, a study conducted in West Texas University also reported that the average consumption of fruits and vegetables among university staffs was lower than recommended daily intake (9). One possible reasons might be due to low availability and accessibility of fruits and vegetables, especially in university setting (33). The campus dining environment has frequently been characterised by inadequate availability of healthy food and greater prices compared to unhealthy food (34–36).

Most of the respondents in this study found it most difficult to eat healthily during working, before working and after working. In the morning before work, respondents reported that they had time constraint to prepare food because some respondents had to send their children to school before working. While during working hours, respondents gave reasons that there was limited access to healthy food around the campus and there were also some influences from colleagues. Some respondents found difficult to eat healthily after working because of time constraint as well, and some of them feel tired to prepare food after working. This shows that working characteristics and working environment indirectly affect the diet practice of respondents. This finding is in consistent with previous study in a Portuguese university which showed that respondents identified work responsibilities and a lack of time as the primary barrier to healthy eating at the workplace (11). Meanwhile, staffs in Stellenbosch University were found to never buy food on campus due to the high cost, lack of variety and scarcity of healthy options (12).

The overall prevalence of overweight and obesity among the respondents was 63.9%, with 41.1% classified as overweight and 22.8% as obese, based on the WHO classification of BMI. These findings are alarming as there is an increased trend of overweight and obesity issues in Malaysia (23). This prevalence is slightly higher than the 2019 NHMS in Malaysia, which reported a prevalence of overweight at 30.4% and obesity at 19.7% among Malaysian adults (23). The higher prevalence in this study may be attributed to the higher mean age of the respondents compared to the NHMS data.

Despite the WHO's BMI categories being a global standard for assessing body fat and health risks, the relationship between BMI and body fat distribution varies among ethnic groups. There are also cultural lifestyle differences such as diet and physical activity among different ethnic groups which can influence the relationship between BMI and health outcomes. Malaysia's Ministry of Health uses a BMI cutoff of 23kg/m^2 for overweight and 27.5 kg/m^2 for obesity, taking into account the increased risks of conditions like type 2 diabetes and cardiovascular issues at lower BMIs in Asians (37). This reflects awareness of ethnic variations in body fat distribution and health risks. Therefore, defining overweight and obesity based on BMI should consider different populations' health profiles, which is crucial for effectively targeting interventions against chronic diseases that are culturally and ethnically tailored.

Nutritional status of an individual can be affected by several factors including sociodemographic profile, lifestyle behaviour and environmental factor. In this study, it was found that gender was a predictor of total cholesterol, with female staffs having higher total cholesterol compared to male. This finding is in line with a comprehensive hospital database in India which observed that women had higher hypercholesterolaemia than men (38). However, a study in UKM reported that men had greater prevalence of metabolic syndrome than women (19). The underlying causes could be difference in dietary habit and physical activities between male and female (39,40).

Besides, BMI of respondents who had secondary educational level was significantly higher than those who had tertiary educational level. A study in Japan among healthy individuals aged 40-64 years also reported that lower education level was associated with higher obesity rates (41). This may due to individuals with lower levels of education may have a limited understanding of nutrition and appropriate eating habits (42). Individuals with lower levels of education may also have lower incomes and would choose more economical but less nutritious foods, contributing to a higher BMI (43). In contrast, a study conducted among educational office staff in Kuantan (n=99) showed that higher educational level associated with lower BMI (21).

In our study, there was no significance difference of nutritional status between group of service of the staffs. However, study by Zabuddin et al. (2023) showed that academic staffs had significant higher BMI than non-academic staffs whereas in study by Rampal et al (2012), obesity among non-academic staffs was 2.51 times greater than in academic staff (21,44). The difference in socioeconomic status and physical activity level during working among academic and non-academic staffs may serve as a root cause for this situation (45). Although it seems working characteristics and environment can affect the dietary habits of respondents indirectly, there were no significant relationships found between nutritional status and working hours, computer usage, sitting minutes in this study. This result is in agreement with a study that analysed the influence of long work hours on health and lifestyles of Chinese workers aged 18 to 65 (46). The study found that lengthy work hours do not appear to have a significant impact on health of the workers and there was little evidence that lengthy work hours had substantial impact on diet, physical activity, or sleep time (46). On the other hand, a study in China revealed a surprising finding that reducing working hours from 48 to 40 had a negative impact on the health of Chinese state employees, despite the fact that the policy did not influence their income or nutrient intake (47). This shows that although reducing working hours may promote better health habits like exercise and healthy eating, but it can also lead to more socializing, potentially fostering unhealthy behaviours.

In addition, our study found that computer usage was negatively associated with total cholesterol, potentially because respondents may still engage in regular physical activity outside of computer time. Even with prolonged computer use, activities such as exercising before or after work could help regulate cholesterol levels. Contrary to the finding in our study, previous studies proved that computer usage and sitting time were positively associated with nutritional status . For example, a study conducted in Norway with larger samples (n = 48,882) found that individuals who sat for more than 10 hours per day had poorer BMI, total cholesterol and non-fasting glucose compared to those who sat for less than 4 hours (48). Computer usage for more than 1 hour per day was associated with poorer BMI and total cholesterol (48). Another study on Australian adults (n=3429) showed that there was strong association between computer sitting time and cardiometabolic risk score while weak association was found between occupational sitting and cardiometabolic risk score (49). This is because prolonged sitting leads to reduced physical activity, which can decrease energy expenditure and metabolic rate, contribute to weight gain and other related cardiometabolic disorders (50).

There are several limitations in this study. Firstly, the questionnaires were self-administered by respondents, which may lead to recall bias. Respondents may have forgotten their practices from the last 7 days when answering the OSPAQ and the dietary practices questions. However, the reliability and validity of the questionnaires used in this study have been established. Besides, there may be sampling bias in this study as quota sampling does not involve random selection. The diversity within the population may also be oversimplified. Nevertheless, we have carefully defined the quota by selecting departments that have a minimum staff size of 30 to be recruited as our study sample. We also included multiple characteristics (e.g., age, gender, functional area) to ensure diverse representation of the samples. Furthermore, due to the cross-sectional nature of study, data were collected at a single point in time, making it difficult to conclude the relationship between sociodemographic factors, working characteristics, occupational sitting, and nutritional status, as these factors may change over time. Lastly, the limitations of this study include inadequate sample size for multivariate analysis, which may have limited the ability to detect significant predictors of nutritional status.

CONCLUSION

The study highlights significant health issues among UMT staff, including high rates of overweight and obesity, sedentary behaviour, and poor dietary habits characterized by insufficient intake of fruits and vegetables. These health concerns are likely extend to similar sedentary occupations, emphasizing the need for targeted workplace health interventions. Strategies to improve staff health could include offering healthier meal options through campus dining services and implementing supportive health policies that promote nutritious meals during meetings or events and flexible work schedules for physical activity. Future research should also examine the impact of working characteristics on lifestyle behaviours and their combined effects on nutritional status. The suggested measures may benefit staff at other universities and similar sedentary professions such as office workers due to comparable work environments.

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