
PUBLIC HEALTH RESEARCH

Prevalence and Factors Associated with Overweight and Obesity among Healthcare Workers in Pejabat Kesihatan Daerah Melaka Tengah

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ABSTRACT

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Introduction	Overweight and obesity are a serious public health problem globally. Healthcare workers in some countries have been reported to be having a high prevalence of being overweight despite them being well informed of the aetiology and risks of excessive body weight. However, the problem of being overweight and obese among Malaysian healthcare workers is still poorly understood. The aim of this study is to assess the prevalence and factors associated with overweight and obesity among healthcare workers in Pejabat Kesihatan Daerah (PKD) Melaka Tengah.
Methods	This is a cross sectional study conducted between June till August 2018 involving 702 respondents sampled from all health facilities under PKD Melaka Tengah. Demographic, socio-economic and lifestyle data was collected using questionnaires whilst anthropometric measurements were taken using the electronic weighing scale and height measuring bar.
Results	Mean age was 35.81 years and overall prevalence of overweight/obesity was 55.6%. Prevalence of overweight, class I obesity, class II obesity and class III obesity was 34.3%, 14.2 %, 4.8% and 2.1% respectively. The identified risks of being overweight were those aged forty and above (OR: 2.00, 95%CI: 1.39-2.85), non-Chinese (OR: 4.97, 95%CI: 2.13-11.62), married (OR: 1.77, 95%CI: 1.15-2.73), big family size (OR: 1.43, 95%CI: 1.07-1.99), underlying NCD (OR: 1.73, 95%CI: 1.24-2.42), family history of NCD (OR: 1.94, 95%CI: 1.33-2.82), and sedentary lifestyle (OR: 1.52, 95%CI: 1.07-2.17).
Conclusions	We found a higher prevalence of overweight/obesity among healthcare workers in PKD Melaka Tengah compared to the general population. Older age group and non-Chinese ethnicity emerged as the most conspicuous factors of overweight/obesity.
Keywords	Overweight - Obesity - Healthcare workers.

INTRODUCTION

Obesity and overweight are defined as excessive or abnormal fat accumulation that possibly impairs human health.¹ Overweight and obesity were defined by World Health Organization (WHO) as follows: BMI greater than or equal to 25 (overweight) and BMI greater than or equal to 30 (obesity). According to the WHO, obesity has almost tripled since 1975. WHO also reported that in 2016, approximately 1.9 billion adults (aged 18 years and older) were overweight and out of that figure, over 650 million were reported to be obese. The prevalence overweight and obesity worldwide was 39% and 13% respectively for of adults aged 18 years and over. One of the leading causes of preventable deaths globally is overweight and obesity.²

During the past twenty years, our country has witnessed a tremendous increase in the prevalence of overweight/obesity, which has led to a major public health issue.³ The trend of overweight prevalence among adult population in Malaysian has doubled from 16.6% (1996) to 29.1% (2006) but the rate of increment has slowed down to 29.4% in 2010 and 30.0% in 2015.⁴ As for obesity prevalence, NMHS reported that the prevalence in 1996 was only 4.5%. This tripled in 2006 (14.0%) and the rate of increment increased in both 2011 and 2015 with the prevalence of 15.1% and 17.7% respectively.⁴

Overweight and obesity are strongly associated with the risk of developing many non-communicable diseases such as hypertension, diabetes mellitus, stroke, cardiovascular diseases, dyslipidemia, and some cancers.⁵ The risk of overweight/obesity is not homogeneously spread among the general population. Some groups of people might have a higher risk of developing overweight/obesity relatively to the general population. One of those groups include the healthcare workers. Despite of working in an environment that allows them to understand and aware of the aetiology, risks and consequences of overweight/obesity, many studies conducted in some countries including Mexico and USA have consistently reported that healthcare workers have a higher risk of developing overweight/obesity compared to the general population.^{6,7} The risk factors that found to be associated with overweight and obesity appears to be considerably higher among those lower socio-economic status and ethnic minorities.⁸ Some other factors such as sedentary lifestyle, unhealthy dietary habits and urbanization have also been found to be associated with overweight/obesity, gradually leading to the traditional public health issues such as communicable diseases and malnutrition.⁹ Therefore, the aim of this study is to assess prevalence and factors associated with overweight

and obesity among healthcare workers in Pejabat Kesihatan Daerah Melaka Tengah.

METHODS

Study Design and Samples

This was a cross sectional study conducted in Melaka Tengah District Health Office. The district is located in the middle of Melaka state and with a total of 1203 healthcare workers working under this health office. Health facilities in this district comprise of one main administrative office, 12 health clinics, 17 rural health clinics and six Klinik 1Malaysia. The study population included all 1203 healthcare workers in the public health facilities as a part of their routine annual medical screening in the KOPSEN Plus program and it was conducted from June 2018 till August 2018. The response rate was 58.4%. Thus only 702 participants were managed to be analyzed as they underwent the medical screening programme during the study period.

Procedure

Information regarding the study was explained to all participants and written consent was taken prior to their enrollment. Demographic and lifestyle data such as age, gender, ethnicity, marital status, routine physical activity and others (as per Borang Saringan Status Kesihatan/BSSK) were collected by the use of a self-administered questionnaires. Anthropometric measurements were taken using a calibrated Omron electronic weighing scale for weight and height measuring bar for height. The parameters were taken with shoes off and participants were only allowed to wear very light attire. Height was recorded to the nearest 0.1 cm and weight to the nearest 0.1 kg. Body Mass Index (BMI) was calculated using the formula; (kg)/height (m)². BMI was then classified according to World Health Organization guidelines. Based on the WHO BMI classification of body weight, a person is classified as underweight when BMI <18.5 kg/m², 18.5- 24.9 kg/m² (normal/ideal weight), overweight (25.0-29.9 kg/m²), obesity class I (30.0-35.9 kg/m²), obesity class II (36.0-39.9 kg/m²), and obese Class III (≥40 kg/m²).²²

Eligible Criteria

The eligibility criteria were as follows: (1) healthcare workers aged at least 18 years; (2) provided an informed consent; (3) permanent workers and (4) able to comprehend the Malay language questionnaire.

Ethical Approval

Ethics approval was obtained from the Ministry of Health, Malaysian Research Ethics Committee. Permission to conduct the study was also obtained from the Melaka Tengah District Health Office. The purpose, procedure of this study, and the

potential benefits and risks were explained by the researcher to each participant.

Data Analysis

Analysis of the data was carried out using the IBM-Statistical Package for the Social Sciences (IBM-SPSS®) version 22.0 for Windows. Data cleaning was used to detect any missing values, coding error or any illogical data value. Data was checked for completeness and normality was checked using the Kolmogorov-Smirnov test. Descriptive statistics were examined using numbers and percentages for categorical variables. Pearson chi-square was performed to determine the association between prevalence of overweight and obesity with the selected factor variables. All significant results were based on p-Value <0.05.

RESULTS

Socio-demographic and Occupational Profile

A total of 702 healthcare workers' data from Pejabat Kesihatan Daerah Melaka Tengah were analyzed in this study. Those final 702 participants were from the main administrative office, 12 health clinics, 17 rural health clinics, and 7 Klinik1Malaysia. Table 1 shows that the majority of healthcare workers were female (76.9%), married (86.2%) and Malay (89.7%). Occupational wise, 81.2% of the respondents form Klinik Kesihatan and majority of them were among the nurses (41.9%), followed by medical officers (18.1%) and medical assistants (8.0%).

Table 2 shows 29.6% of the respondents have at least one of the non-communicable diseases. Among them are hypertension (8.0%), diabetes mellitus (4.8%), bronchial asthma (7.7%), and dyslipidemia (11.3%). Meanwhile, 80.2% of our respondents have at least one familial history of non-communicable diseases (64% hypertension, 50.6% diabetes mellitus and 24.5% cardiovascular diseases). Regarding the category of body mass index (BMI), 4.8% of our respondents were underweight, 39.6% normal BMI, 34.3% overweight, 14.2% obesity class I, 4.8% obesity class II and 2.1% obesity class III. However, in term of physical activity, only 31 respondents out of 702 (4.4%) were involved in physical exercise daily, followed by 18.1% whom exercised 3-6 days/week and the majority was sedentary group (exercised less than 3days/week) with 77.5%.

Prevalence of overweight and obesity

Overall prevalence of overweight and obesity was 55.6%. Prevalence of overweight, class I obesity, class II obesity and class III obesity was 34.3%, 14.2 %, 4.8% and 2.1% respectively. More males (57.4%) than females (55.0%) were either overweight or obese. Among females, 33.5% were overweight while 21.5% were obese. Additionally, 14.4% of females had class 1 obesity, 5.2% had class II obesity while 1.9% had class III obesity. Among males, 37.0% were overweight and 20.4% were obese. For prevalence of underweight and normal weight was 4.8% and 39.6% respectively (Table 3).

In bivariate analysis, gender difference had no significant association with risk of overweight and obesity (57.4% and 55.0% respectively for male and female), p = 0.652 (OR: 1.10, 95%CI: 0.77-1.57). Age was found to have a significant association with overweight and obesity. Those respondents aged forty and above was found to have a significantly higher risk of developing overweight and obesity compared to those younger than forty years old with p-value < 0.001 (OR: 1.99, 95%CI: 1.39-2.85) (Table 4).

On the other hand, married respondents was noted to have higher odd than other marital status (single/divorced/widow/widower) in developing overweight/obesity with p-value of 0.011 (OR: 1.77, 95%CI: 1.15-2.73). Based on ethnicity, non-Chinese respondents were statistically proven to have a significant higher risk in developing overweight/obesity with p-value <0.001 (OR: 4.97, 95%CI; 2.13-11.62) (Table 4).

Other than that, factors that strongly associated with overweight/obesity among our respondents were size of family (five and more) with OR: 1.43, 95%CI: 1.07-1.99; those with underlying non-communicable diseases like diabetes mellitus, hypertension and dyslipidemia (OR: 1.73, 95%CI: 1.24-2.42); family history of non-communicable diseases (OR: 1.94, 95%CI: 1.33-2.82); and lastly sedentary lifestyle (OR: 1.52, 95%CI: 1.07-2.17). Other factors including work place, family income, and smoking status were not significantly associated with overweight/obesity (Table 4).

Table 1 Socio-demographic and occupational characteristics of respondents (N = 702)

	No of Respondents	%
Age (years)		
<30	135	19.2
30-39	390	55.6
40-49	134	19.1
50 and above	43	6.1

Overweight and Obesity among Healthcare Workers

Gender		
Male	162	23.1
Female	540	76.9
Ethnicity		
Malay	630	89.7
Chinese	33	4.7
Indian	30	4.3
Others	9	1.3
Marital Status		
Married	605	86.2
Single	83	11.8
Divorced	3	0.4
Widow/widower	11	1.6
Size of Family		
2 and less	106	15.1
3-4	295	42.0
5 and more	301	42.9
Work Place		
K1M	26	3.7
KD	57	8.1
KK	570	81.2
PKDMT	49	7.0
Occupation		
Medical Officer	127	18.1
Driver	9	1.3
PKA/PRA	29	4.1
MA	56	8.0
Nurse	294	41.9
PPKP	23	3.3
PPK	40	5.7
MLT	41	5.8
Pharmacist/PPF	37	5.3
PT	15	2.1
Others	31	4.4
Family Income		
B40 (<RM3860)	163	23.2
M40 (RM3860-8319)	400	57.0
T20 (>RM8319)	139	19.8

*K1M=Klinik 1Malaysia, KD=Klinik Desa, KK=Klinik Kesihatan, PKDMT=Pejabat Kesihatan Daerah Melaka Tengah, PKA=Pembantu Kesihatan Awam, PRA=Pembantu Rendah Am, MA=Medical Assistant, PPKP=Penolong Pegawai Kesihatan Persekitaran, PPK=Pembantu Perawatan Kesihatan, MLT=Medical Laboratory Technician, PPF=Penolong Pegawai Farmasi, PT=Pembantu Tadbir

Table 2 Health Profile of Respondents (N = 702)

	No of Respondents	%
Respondents with NCD (≥ 1)	208	29.6
Hypertension	56	8.0

Diabetes Mellitus	34	4.8
Bronchial Asthma	54	7.7
Dyslipidemia	79	11.3
Others	61	8.7
Family History of NCD (≥ 1)	563	80.2
Hypertension	449	64.0
Diabetes Mellitus	355	50.6
Bronchial Asthma	140	19.9
CVD	172	24.5
Cancer	88	12.5
CKD	48	6.8
Anemia	18	2.6
Others	40	5.7
Body Mass Index (BMI)		
Under Weight (<18.5)	34	4.8
Normal (18.5-24.9)	278	39.6
Over Weight (25.0-29.9)	241	34.3
Obese Class I (30.0-34.9)	100	14.2
Obese Class II (35.0-39.9)	34	4.8
Obese Class III (≥ 40.0)	15	2.1
Physical Activity		
Less than 3 days/week	544	77.5
3-6 days/week	127	18.1
Daily	31	4.4

*NCD=Non-communicable diseases, CVD=Cardiovascular diseases, CKD=Chronic kidney disease

Table 3 Prevalence of overweight and obesity across listed characteristics

Characteristic	Body Mass Index Category					
	Under weight	Normal weight	Over weight	Obesity Class I	Obesity Class II	Obesity Class III
Age (years)						
<30	11 (8.1%)	67 (49.6%)	39 (28.9%)	12 (8.9%)	3 (2.2%)	3 (2.2%)
30-39	17 (4.4%)	160 (41.0%)	125 (32.1%)	60 (15.4%)	18 (4.6%)	10 (2.6%)
40-49	4 (3.0%)	40 (29.9%)	59 (44.0%)	19 (14.2%)	11 (8.2%)	1 (0.7%)
50 and above	2 (4.7%)	11 (25.6%)	18 (41.9%)	9 (20.9%)	2 (4.7%)	1 (2.3%)
Gender						
Male	11 (6.8%)	58 (35.8%)	60 (37.0%)	22 (13.6%)	6 (3.7%)	5 (3.1%)
Female	23 (4.3%)	220 (40.7%)	181 (33.5%)	78 (14.4%)	28 (5.2%)	10 (1.9%)
Ethnicity						
Malay	27 (4.3%)	241 (38.3%)	222 (35.2%)	93 (14.8%)	32 (5.1%)	15 (2.4%)
Chinese	4 (12.1%)	22 (66.7%)	5 (15.2%)	1 (3.0%)	1 (3.0%)	0 (0.0%)
Indian	3 (10.0%)	13 (43.3%)	11 (36.7%)	2 (6.7%)	1 (3.3%)	0 (0.0%)
Others	0 (0.0)	2 (22.2%)	3 (33.3%)	4 (44.4%)	0 (0.0%)	0 (0.0%)
Marital Status						
Married	22 (3.6%)	235 (38.8%)	212 (35.0%)	93 (15.4%)	32 (5.3%)	11 (1.8%)
Single	11 (13.3%)	39 (47.0%)	22 (26.5%)	5 (6.0%)	2 (2.4%)	4 (4.8%)
Divorced	1 (33.3%)	1 (33.3%)	0 (0.0%)	1 (33.3%)	0 (0.0%)	0 (0.0%)
Widow/widower	0 (0.0%)	3 (27.3%)	7 (63.6%)	1 (9.1%)	0 (0.0%)	0 (0.0%)
Size of Family						
2 and less	9 (8.5%)	55 (51.9%)	25 (23.6%)	12 (11.3%)	4 (3.8%)	1 (0.9%)
3-4	20 (6.8%)	114 (38.6%)	101 (34.2%)	38 (12.9%)	12 (4.1%)	10 (3.4%)
5 and more	5 (1.7%)	109 (36.2%)	115 (38.2%)	50 (16.6%)	18 (6.0%)	4 (1.3%)

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Work Place						
KIM	2 (7.7%)	7 (26.9%)	7 (26.9%)	8 (30.8%)	2 (7.7%)	0 (0.0%)
KD	1 (1.8%)	19 (33.3%)	23 (40.4%)	12 (21.1%)	2 (3.5%)	0 (0.0%)
KK	30 (5.3%)	234 (41.1%)	190 (33.3%)	75 (13.2%)	28 (4.9%)	13 (2.3%)
PKDMT	1 (2.0%)	18 (36.7%)	21 (42.9%)	5 (10.2%)	2 (4.1%)	2 (4.1%)
Occupation						
Medical Officer	6 (4.7%)	64 (50.4%)	41 (32.3%)	13 (10.2%)	3 (2.4%)	0 (0.0%)
Driver	0 (0.0%)	2 (22.2%)	5 (55.6%)	0 (0.0%)	2 (22.2%)	0 (0.0%)
PKA/PRA	3 (10.3%)	9 (31.0%)	12 (41.4%)	2 (6.9%)	0 (0.0%)	3 (10.3%)
MA	5 (8.9%)	22 (39.3%)	14 (25.0%)	12 (21.4%)	2 (3.6%)	1 (1.8%)
Nurse	7 (2.4%)	104 (35.4%)	110 (37.4%)	51 (17.3%)	16 (5.4%)	6 (2.2%)
PPKP	0 (0.0%)	9 (39.1%)	11 (47.8%)	1 (4.3%)	1 (4.3%)	1 (4.3%)
PPK	1 (2.5%)	8 (20.0%)	16 (40.0%)	7 (17.5%)	7 (17.5%)	1 (2.5%)
MLT	2 (4.9%)	16 (39.0%)	13 (31.7%)	7 (17.1%)	2 (4.9%)	1 (2.4%)
Pharmacist/PPF	4 (10.8%)	22 (59.5%)	10 (27.0%)	1 (2.7%)	0 (0.0%)	0 (0.0%)
PT	3 (20.0%)	3 (20.0%)	5 (33.3%)	2 (13.3%)	1 (6.7%)	1 (6.7%)
Others	3 (9.7%)	19 (61.3%)	4 (12.9%)	4 (12.9%)	0 (0.0%)	1 (3.2%)
Family Income						
B40 (<RM3860)	16 (9.8%)	57 (35.0%)	53 (32.5%)	21 (12.9%)	10 (6.1%)	6 (3.7%)
M40 (RM3860-8319)	13 (3.3%)	153 (38.3%)	140 (35.0%)	64 (16.0%)	21 (5.3%)	9 (2.3%)
T20 (>RM8319)	5 (3.6%)	68 (48.9%)	48 (34.5%)	15 (10.8%)	3 (2.2%)	0 (0.0%)
Physical Activity						
Active	9 (5.7%)	74 (46.8%)	48 (30.4%)	16 (10.1%)	10 (6.3%)	1 (0.6%)
Sedentary	25 (4.6%)	204 (37.5%)	193 (35.5%)	84 (15.4%)	24 (4.4%)	14 (2.6%)
Family History of NCD						
Yes	27 (4.8%)	205 (36.4%)	200 (35.5%)	88 (15.6%)	31 (5.5%)	12 (2.1%)
No	7 (5.0%)	73 (52.5%)	41 (29.5%)	12 (8.6%)	3 (2.2%)	3 (3.3%)
Smoking Status						
Yes	3 (8.3%)	11 (30.6%)	13 (36.1%)	5 (13.9%)	3 (8.3%)	1 (2.8%)
No	31 (4.7%)	267 (40.1%)	228 (34.2%)	95 (14.3%)	31 (4.7%)	14 (2.1%)
Underlying NCD						
Yes	4 (1.9%)	69 (33.2%)	81 (38.9%)	37 (17.8%)	11 (5.3%)	6 (2.9%)
No	30 (6.1%)	209 (42.3%)	160 (32.4%)	63 (12.8%)	23 (4.7%)	9 (1.8%)

*KIM=Klinik 1Malaysia, KD=Klinik Desa, KK=Klinik Kesihatan, PKDMT=Pejabat Kesihatan Daerah Melaka Tengah, PKA=Pembantu Kesihatan Awam, PRA=Pembantu Rendah Am, MA=Medical Assistant, PPKP=Penolong Pegawai Kesihatan Persekitaran, PPK=Pembantu Perawatan Kesihatan, MLT=Medical Laboratory Technician, PPF=Penolong Pegawai Farmasi, PT=Pembantu Tadbir, NCD=Non-communicable diseases, CVD=Cardiovascular diseases, CKD=Chronic kidney disease

Table 4 Bivariate analysis of listed factors associated with overweight/obesity

Characteristics	Overweight/ Obese	Non- overweight/ Obese	χ^2	p-Value	OR (95%CI)
Age (years)					
40 and above	120 (67.8%)	57 (32.2%)	14.363	<0.001	2.00 (1.39, 2.85)*
Less than 40	270 (51.4%)	255 (48.6%)			
Gender					
Male	93 (57.4%)	69 (42.6%)	0.293	0.652	1.10 (0.77,1.57)
Female	297 (55.0%)	243 (45.0%)			
Ethnicity					
Non- Chinese	383 (57.2%)	286 (42.8%)	16.541	<0.001	4.97 (2.13, 11.62)*
Chinese	7 (21.2%)	26 (78.8%)			
Marital Status					
Married	348 (57.5%)	257 (42.5%)	6.848	0.011	1.77 (1.15, 2.73)*
Other status	42 (43.3%)	55 (56.7%)			

Size of Family					
5 and more	262 (59.0%)	182 (41.0%)	5.835	0.010	1.43 (1.07, 1.99)*
Less than 5	128 (49.6%)	130 (50.4%)			
Work Place					
PKDMT	30 (61.2%)	19 (38.8%)	0.686	0.458	1.29 (0.71, 2.33)
K1M/KD/KK	360 (55.1%)	293 (44.9%)			
Underlying NCD					
Yes	135 (64.9%)	73 (35.1%)	10.461	0.002	1.73 (1.24, 2.42)*
No	255 (51.6%)	239 (48.4%)			
Family Income					
M40 and T20	300 (55.6%)	239 (44.3%)	0.010	0.929	1.02 (0.72, 1.45)
B40	90 (55.2%)	73 (44.8%)			
Family History of NCD					
Yes	331 (58.8%)	232 (41.2%)	12.063	0.001	1.94 (1.33, 2.82)*
No	59 (42.4%)	80 (57.6%)			
Physical Activity					
Sedentary	315 (57.9%)	229 (42.1%)	5.401	0.023	1.52 (1.07, 2.17)*
Active	75 (47.5%)	83 (52.5%)			
Smoking Status					
Yes	22 (61.1%)	14 (38.9%)	0.474	0.606	1.27 (0.64, 2.53)
No	368 (55.3%)	298 (44.7%)			

*Significant results were based on p-Value <0.05.

DISCUSSION

In this study, we found a high prevalence of overweight (34.3%) and obesity (21.1%) among healthcare workers in Pejabat Kesihatan Daerah Melaka Tengah which was about 1.5 times higher than the national average (30.0% and 17.7% respectively) as reported by NHMS 2015. For prevalence of underweight and normal weight, our result was 4.8% and 39.6% respectively. In comparison, the national prevalence of underweight was 6.9% and normal weight was 45.6%.⁴

This study finding is similar with other studies conducted elsewhere that revealed a high prevalence of overweight/obesity prevalence among healthcare workers in comparison with general population. For example, a study in Mexico among 76 healthcare workers shows that 26% of male and 52% female respondents were reported obese.⁴ In another study which involved 200 healthcare workers in South Africa, the prevalence of overweight/obesity was noted to be 75%.¹⁰ Similarly in a study conducted in Nigeria, they found that 72% of healthcare workers in a hospital setting to be either obese or overweight.¹¹

Socio-demographic and occupational factors including gender, work place, family

income, and smoking status were not significantly associated with overweight and obesity. The prevalence of overweight and obesity did not differ much between male and female respondents. However, we found that prevalence of overweight/obesity among male respondents were slightly higher than female respondents (57.4% and 55.0% respectively) with OR: 1.10, 95%CI: 0.77-1.57. This finding might be due to the nature of respondents' occupation. Majority of the female respondents were among the nurses which involve a lot of physical movement at work place. In contrast with NHMS 2015, overweight/obesity was found to be more pronounced in females than males (48.9% and 46.6% respectively). Female population was believed to gain their greatest amount of weight during the child bearing period, while some of them might develop overweight/obesity due to the retention of gestational weight gain.¹² This finding was supported by a study conducted in Iran that reported a high prevalence of overweight and obesity in female respondents was attributed by differences in degree of physical activity.¹³

Overweight and Obesity among Healthcare Workers

Aged forty and above was found to be a significant factor of overweight/obesity in our study. This finding is consistent with a study conducted in Tanzania among adult population which reported that older population had a significantly higher risk of developing overweight or obesity.¹⁴ Another study found that those between 40-49 years had a 6 times higher odd of developing overweight/obesity as compared to those below 30 years old. This condition might be attributed by combination of few factors such as decrease in metabolic rate and less of physical activity, in which both factors are strongly associated with ageing.¹⁵

Non-Chinese ethnicity was also found to be associated with overweight and obesity in our study with OR: 4.97, 95%CI: 2.13-11.62. Prevalence of overweight/obesity among non-Chinese ethnicity was 57.2% while Chinese was only 21.2%. Similarly with NHMS 2015 that reported the prevalence of overweight and obesity was highest among Indian population (62.1%), followed by Malay (52.1%) and Chinese (39.8%). Higher overweight/obesity prevalence among non-Chinese respondents suggests that the genetics might possibly influence the overweight/obesity. However, other external and environmental factors such as cultural and behavioural influences on food consumptions and preparation should also be considered.

Family income was found to be not significant in contributing to overweight/obesity. We found that the prevalence of overweight/obesity between those B40 (family income less than RM3860 per month) and M40/T20 (family income RM3860 and more) was almost similar (55.2 and 55.6% respectively) with OR: 1.02 and 95%CI: 0.72-1.45. However, our result was contrary to similar study done in Tanzania, where they found that higher socio-economic status has a significant association with overweight/obesity.¹⁴ Among our respondents, monthly average family income fell within a slightly narrow range (mean family income was RM6284.25 (SD +/- RM4231.84), which can be a good explanation why this factor did not have a significant association with BMI status of our respondents.

Meanwhile, prevalence of obesity and overweight was higher among married couples with the prevalence of 57.5% (other marital status was 43.3%) with OR: 1.77, 95%CI: 1.15-2.73. This

finding was similar with NHMS 2015 which stated that the prevalence of overweight and obesity was 47.9% among those married couple while only 40.4% among single individual. Obesity and overweight was strongly associated with married couples due to the tendency of eating together and thus affects on their body weight.¹⁶ Besides that, lack of motivation to reduce weight among married respondents might be due to the perception that nice and perfect body figure is not really important after marriage.¹⁷

We also found out that those respondents with family size five and more had higher prevalence of overweight/obesity than smaller family size (59.0% and 49.6% respectively with OR: 1.43, 95%CI: 1.07-1.99). This finding was supported by a study conducted in Brazil which reported that the increment of body weight among obese female population with two children was 1.21 kg as compared to women with three and more children (1.82kg).¹⁸

Sedentary lifestyle seemed to be significantly associated with overweight/obesity among healthcare workers. The prevalence of overweight/obesity among sedentary group was 57.9% while among physically active group was 47.5% with OR: 1.52, 95%CI: 1.07-2.17. Similarly with a study conducted among post-graduate students in University Putra Malaysia (UPM) that found out about 44% of their respondents had sedentary lifestyle and had double risk of overweight or obese compared to those physically active respondents.¹⁹

This finding of high overweight and obesity prevalence among healthcare workers may predispose them to non-communicable diseases such as hypertension, diabetes mellitus, cardiovascular diseases, dyslipidemia and cancers. Unhealthy healthcare workers may probably be unable to provide an optimal healthcare service. Issue of overweight and obesity has been proven to be associated with absence at the workplace and reduced work productivity.²⁰

Healthcare workers are expected to be role models in maintaining an ideal body weight and healthy lifestyle. By doing this, they not only will contribute towards maintaining their own health condition, but also will enhance healthcare services especially towards overweight and obese patients. There are many studies done regarding the effect of healthcare workers' healthy lifestyle and ideal Body Mass Index in which act as motivation to

their patients to maintain ideal body weight and adopt healthy lifestyle.²¹

The high prevalence of overweight/obesity among healthcare workers in Pejabat Kesihatan Daerah Melaka Tengah reported in this study requires effective intervention and further policy implementation. Amongst the urgent measures are implementations of a healthy environment at the work place by providing a gymnasium, encouraging to take the staircases and setting up a healthy pantry; routine health screening for healthcare workers and integration of healthy lifestyle at work place.

As for those healthcare workers who already engaged in an active lifestyle or any routine physical activities, we should encourage them to continue and give some appreciation. By doing this, it probably can reinforce their motivation and help in sustainability of a healthy lifestyle. Meanwhile, we need to encourage those healthcare workers who are leading a sedentary lifestyle to be more physically active. Some of the possible intervention that we can propose to our healthcare workers include going to the gymnasium, participating in any sports according to their interests, brisk walking, scheduled aerobic at work place, healthy food during departmental meeting, food diary and using mobile application to record their physical endurance. Furthermore, healthcare workers with co-morbidities such as hypertension, diabetes mellitus, dyslipidemia, cardiovascular diseases and cancers should be monitored and manage via holistic approach comprising pharmacotherapy and non-pharmacotherapy.

The strengths of our study include its large representative sample from multiple occupational and socio-demographic profiles. However, this study had a few limitations. Since our study design was a cross-sectional, the causal relationship between overweight/obesity and listed risk factors could not be established. Secondly, our study population was among healthcare workers. Therefore, our study findings cannot represent the general population, but only can represent those groups of people with similar socio-demographic and socio-economic characteristics.

CONCLUSION

In conclusion, we found a higher prevalence of overweight and obesity among healthcare workers in Pejabat Kesihatan Daerah Melaka Tengah as compared to NHMS 2015. Age, ethnicity, marital status, size of family, underlying NCD, family history of NCD and physical activity were found to be significant predictor for overweight and obesity

among the healthcare workers. Overweight and obesity among healthcare workers has a great implication in term of work capacity, sustainability, efficacy, quality of healthcare and patient safety.

As this problem has increased substantially in the past few years, there is an urgent need for strategy and intervention at national level aiming for reduction of overweight and obesity among healthcare workers. We recommend the implementation of work place intervention that aimed in reducing obesity and overweight, routine health screening for healthcare workers and integration of healthy lifestyle at work place.

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