

Artikel Asli/Original Articles**Obesity is Associated with More Sick Leave and Lower Quality of Life Among Malay Male Security Officers**
(Obesiti Dikaitkan dengan Lebih Banyak Cuti Sakit dan Kehidupan Berkualiti Rendah dalam Kalangan Pegawai Keselamatan Lelaki Berbangsa Melayu)

SE XIAN TAN, NORHAYATI IBRAHIM, NURULJANNAH JOHARI, ROSZANADIA RUSLI & ZAHARA ABDUL MANAF

ABSTRACT

Obesity is a risk factor for chronic diseases which can affect work productivity and physical function of employees particularly among those in security sector. The study aimed to determine the association between obesity with total days of sick leave and health related quality of life (HRQoL) among Malay male security officers. A cross-sectional study was conducted among Malay male security officers working in a Malaysian higher learning institution. Subjects were evaluated using anthropometric measurements, quality of life and number of sick leave taken within two months prior to the study. A total of 194 subjects (mean age 40.12 ± 11.41 years) were recruited. A total of 30.4% were obese, 39.7% were pre-obese and only 29.9% had normal body weight or underweight. Central obesity was observed in 57.7% of them and 87.1% shown excessive body fat percentage. Number of sick leave days was positively correlated with Body Mass Index (BMI) ($r = 0.162$, $p = 0.024$) and waist circumference ($r = 0.181$, $p = 0.012$). Score of the general health component was negatively correlated with BMI ($r = -0.161$, $p = 0.025$), waist circumference ($r = -0.194$, $p = 0.007$) and body fat percentage ($r = -0.191$, $p = 0.008$). Physical functioning score was lowest in obese subjects than normal and pre-obese subjects ($p = 0.046$). Score of the bodily pain component was positively correlated with waist circumference ($r = 0.156$, $p = 0.030$). Obesity is associated with number of sick leave days and quality of life in the studied group. Hence, body weight of the security staff should be monitored and appropriate intervention should be conducted to improve their work attendance and quality of life.

Keywords: Obesity; body weight status; sick leave; health related quality of life; security officers

ABSTRAK

Obesiti adalah faktor risiko bagi penyakit kronik yang boleh menjejaskan produktiviti kerja dan fungsi fizikal pekerja terutamanya pekerja di sektor keselamatan. Kajian ini bertujuan untuk menentukan hubungan antara obesiti dengan jumlah hari cuti sakit dan kualiti kesihatan yang berkaitan dengan kualiti hidup (HRQoL) dalam kalangan pengawal keselamatan Melayu lelaki. Satu kajian hirisan lintang telah dijalankan dalam kalangan pengawal keselamatan lelaki Melayu yang bekerja di sebuah institusi pengajian tinggi Malaysia. Subjek telah dinilai menggunakan kaedah antropometri, kualiti hidup dan bilangan hari cuti sakit dalam tempoh dua bulan sebelum kajian dijalankan. Seramai 194 subjek (min umur 40.12 ± 11.41 tahun) telah terlibat. Sebanyak 30.4% subjek adalah obes, 39.7% pra-obes dan hanya 29.9% mempunyai berat badan yang normal atau kurang berat badan. Sebanyak 57.7% subjek mempunyai obesiti sentral dan 87.1% mengalami berlebihan peratusan lemak badan. Bilangan hari cuti sakit berkorelasi positif dengan Indeks Jisim Tubuh (BMI) ($r = 0.162$, $p = 0.024$) dan lilitan pinggang ($r = 0.181$, $p = 0.012$). Skor komponen kesihatan adalah berkorelasi negatif dengan BMI ($r = -0.161$, $p = 0.025$), lilitan pinggang ($r = -0.194$, $p = 0.007$) dan peratusan lemak badan ($r = -0.191$, $p = 0.008$). Skor fungsi fizikal adalah paling rendah bagi subjek yang obes berbanding yang normal dan pra-obes ($p = 0.046$). Skor komponen kesakitan badan berkorelasi secara positif dengan lilitan pinggang ($r = 0.156$, $p = 0.030$). Obesiti didapati mempunyai hubungan dengan bilangan hari cuti sakit dan kualiti hidup dalam kalangan subjek kajian ini. Oleh itu, intervensi yang sesuai perlu dijalankan untuk meningkatkan kehadiran kerja dan kualiti hidup.

Kata kunci: Obesiti; status berat badan; cuti sakit; kualiti hidup berkaitan kesihatan; pengawal keselamatan

INTRODUCTION

Overweight and obesity are defined as abnormal or excessive fat accumulation in the form of adipose tissue to an extent that may pose risks to health. In 2008, more than 1.4 billion adults aged 20 years old and above were

overweight (WHO 2013a). In developing countries, more than 115 million people were estimated to suffer from obesity-related problems (WHO 2013a). The Malaysian National Health and Morbidity Survey (NHMS) 2011 reported that in every 100 adults, 29 persons are overweight

and 15 persons were obese (IPH 2011). The survey reported that 60.5% of adults were overweight or obese.

Obesity is the major risk factor for many diet-related non-communicable diseases such as diabetes mellitus, cardiovascular disease, hypertension and stroke and certain types of cancer (WHO 2013b). Obesity and its complications impair overall quality of life (Pan et al. 2011; Ray et al. 2011; Sirtori et al. 2012; Song et al. 2010) and may also reduce work productivity (Harvey et al. 2010; Howard & Potter 2014; Neovius et al. 2012). In Malaysia, the Malaysian Employers' Federation reported that the average wage paid for each employee who took sick leave was RM1.62 billion and the average overtime paid to each employees who cover those on sick leave was RM2.42 billion per year (Malaysian Employers' Federation 2010).

According to the Department of Statistic Malaysia (2014), until January 2014, a total of 13.99 million Malaysians are working in different sectors of the labour force. Among them, demand for security personnel is on the rise. This is in line with modernization, development of housing areas, shop lots and industrial areas. Security officers are responsible to patrol and inspect people, traffic, properties and building against any form of damage or chaos. Raised security concern among public has meant increased demand for private security and skillful security guards who work by shift across 24 hours of the clock to ensure safety and order in the surrounding areas. Shift workers were reported to have higher body weight, problem of sleep disturbance and depressive symptoms due to irregular working and resting pattern (Antunes Lda et al. 2010; Itani et al. 2011; Suwazono et al. 2008). In the local context, majority of the Malay male security officers in a local university were reported to be overweight with increased risk of co-morbidity and higher prevalence of diabetes mellitus and cardiovascular diseases compared to the national figures in NHMS-II (Moy & Atiya 2005).

In view of increasing demand for fit security officers, it is vital to investigate the body weight status among security officers and its association with sick leave occurrence and quality of life in local context. The main objective of this study was to determine the association between body weight status with number of days of sick leave and quality of life related to health (HRQoL) among Malay male security officers working in Malaysia.

The findings from this study are expected to benefit the security authorities concerned and help them to plan for appropriate actions to improve their workers' work productivity and quality of life.

MATERIALS AND METHODS

STUDY DESIGN

This cross sectional study was conducted in three campuses of a Malaysian higher learning institution in Selangor, Malaysia. All Malay male security officers ($n = 290$) were

invited to participate if they were aged between 18 to 60 years. Female and or non-Malay security officers were excluded from this study as their numbers are minorities. In addition, those on long sick leave were also excluded from this study.

STUDY PROCEDURE

Subjects who met the inclusion criteria and gave consent were included as subjects in this study. Prior approval from Universiti Kebangsaan Malaysia Medical Research Ethics Committee and permission from the security unit to conduct this study were obtained. Subjects were assessed using anthropometric measurements, health related quality of life (HRQoL) and number of sick leave days.

DATA COLLECTION

ANTHROPOMETRIC AND BODY COMPOSITION MEASUREMENTS

Anthropometric and body composition measurements were conducted based on the standard protocol of measuring height, weight, waist circumference and body fat percentage. Height was taken to the nearest 0.1 cm by using stadiometer Seca 213 (Seca, Germany). Weight and body fat percentage were obtained by using Tanita Body Composition Analyzer Model SC-330 (Tanita, Japan). Weight and body fat percentage were taken to the nearest 0.1 kg and 0.1%, respectively. Waist circumference was measured to the nearest 0.1 cm by using Lufkin Executive Thinline Model W606PM (APEX Tool Group, USA). BMI in unit kilogram per meters squared (kg/m^2) is defined as weight in kilogram (kg) divided by height in meters squared (m^2) and categorized into the WHO defined BMI categories, namely underweight ($< 18.5 \text{ kg}/\text{m}^2$), normal range ($18.5\text{-}24.9 \text{ kg}/\text{m}^2$), pre-obese ($25.0\text{-}29.9 \text{ kg}/\text{m}^2$), and obesity ($\geq 30.0 \text{ kg}/\text{m}^2$). For waist circumference measurement, reading equal to or above 90 cm was categorized as central obesity otherwise normal, according to the WHO/IOTF/IASO (2000) classification. Body fat percentage was categorized as low ($< 10\%$), normal ($10\text{-}20\%$) and high ($> 20\%$) (Abernathy & Black 1996).

HEALTH RELATED QUALITY OF LIFE (SF-12)

Health related quality of life was assessed using SF-12 questionnaire which evaluated various aspects of functioning. This questionnaire has been validated by Ware et al. (1996). It was a generic, self-completed questionnaire with eight dimensions that include physical functioning, role functioning (physical), bodily pain, general health, social functioning, emotion, mental health and vitality. This 12-item questionnaire comprised two domains namely the mental and physical domains, indicated as the Physical Component Summary (PCS) and Mental Component Summary (MCS) respectively. A higher score indicates better function, less pain or well-being. A zero

score indicates the lowest level of health while 100 score indicates the highest level of health.

SICK LEAVE

Record of number of sick leave days taken by subjects within two months prior to the data collection was obtained from the security unit office.

DATA ANALYSIS

All the data were entered and analyzed using the Statistical Package for Social Science (SPSS) version 20. Significant level was set at *p* value less than 0.05. Descriptive statistics were used to display and describe subjects' background. One way ANOVA and Mann Whitney test were used to compare means between variables while

Pearson correlation and Spearman-Rho correlation were used to determine correlation between two variables in this study.

RESULTS

A total of 194 Malay male security officers with mean age of 40.12 ± 11.41 years participated in this study. More than half (52.6%) were aged between 40 to 59 years old, 82.0% were married, 68.5% with highest education at secondary education and 67.0% had monthly household income between RM1500 to 3499 (Table 1). A total of 30.4% (*n* = 59) were obese, 39.7% (*n* = 77) were pre-obese and only 27.8% (*n* = 54) of subjects had normal BMI while 2.1% (*n* = 4) were underweight (Table 2).

TABLE 1. Socio-demographic profile of the study subjects (*n* = 194)

Demographic profile	Mean \pm SD	<i>n</i> (%)
Age (years)	40.12 \pm 11.41 years old	
20-39		92 (47.4)
40-59		102 (52.6)
Marital status		
Single/Divorcee		35 (18.0)
Married		159 (82.0)
Education level		
Primary/lower secondary school		49 (25.3)
Higher secondary school		133 (68.5)
Malaysian Higher School Certificate/Matriculation/ Malaysian Skills Certificate/Degree		12 (6.2)
Monthly household income (Ringgit Malaysia, RM)		
Less than 1500		44 (22.7)
1500-3499		130 (67.0)
3500-5000		20 (10.3)

TABLE 2. Subject distribution according to anthropometric parameters (*n* = 194)

Body weight status	Mean \pm SD	<i>n</i> (%)
BMI categories	28.06 \pm 5.34 kg/m ²	
Underweight (< 18.5 kg/m ²)		4 (2.1)
Normal range (18.5-24.9 kg/m ²)		54 (27.8)
Pre-obese (25.0-29.9 kg/m ²)		77 (39.7)
Obese Class I (30.0-34.9 kg/m ²)		40 (20.6)
Obese Class II (35.0-39.9 kg/m ²)		15 (7.7)
Obese Class III (\geq 40.0 kg/m ²)		4 (2.1)
Waist circumference categories	92.77 \pm 12.55 cm	
Normal (< 90 cm)		82 (42.3)
Central obesity (\geq 90 cm)		112 (57.7)
Body fat percentage categories	25.86 \pm 6.28 %	
Low (< 10 %)		4 (2.1)
Normal (10-20 %)		21 (10.8)
High (> 20 %)		169 (87.1)

A total of 57.7% ($n = 112$) of subjects were classified as central obesity and 87.1% ($n = 169$) of them had excessive body fat percentage. They had a mean waist circumference and mean body fat percentage of 92.77 ± 12.55 cm and $25.86 \pm 6.28\%$, respectively indicating state of central obesity and high body fat percentage among subjects.

Approximately 56.7% ($n = 110$) of the subjects did not take sick leave while 43.3% ($n = 84$) of subjects had taken at least a day of sick leave within two months prior to data collection. Median number of days of sick leave taken by subjects in this study was 1.11 days (range 0-14) (Table 3). Subjects who had taken sick leave at least a day within two months have higher BMI (29.18 ± 5.80 kg/m²) compared to subjects who have not taken any sick leave within the same duration (27.20 ± 4.82 kg/m²) ($p = 0.040$). In addition, subjects who had taken at least a day of sick leave within two months have higher waist circumference (95.60 ± 13.04 cm) than subjects who did not take any sick leave within the same duration (90.61 ± 11.76 cm) ($p = 0.020$) (Table 3).

The total score of mental health (MCS) ($63.97 \pm 8.97\%$) was higher than physical health (PCS) ($57.96 \pm 10.04\%$) (Table 4). The mean of physical functioning score was significantly different between BMI categories ($p = 0.046$)

of which mean score of physical functioning was lowest in obese ($63.56 \pm 22.63\%$) compared to pre-obese ($72.72 \pm 21.95\%$) and underweight or normal ($72.71 \pm 25.08\%$) subjects. Mean score of the other seven components were not significantly different across the three BMI categories.

Out of the eight components of HRQoL, score of the general health component was negatively correlated with BMI ($r = -0.161$, $p = 0.025$), waist circumference ($r = -0.194$, $p = 0.007$) and percentage of body fat ($r = -0.191$, $p = 0.008$). Score of the bodily pain component was positively correlated with waist circumference ($r = 0.156$, $p = 0.030$). No interaction was shown between BMI, waist circumference and body fat percentage with the other six components of quality of life. The score of mental health component was not statistically significant difference across the BMI categories.

The present study found that total days of sick leave was positively associated with BMI ($r = 0.162$, $p = 0.024$) and waist circumference ($r = 0.181$, $p = 0.012$) (Table 5). Subjects with higher BMI or higher waist circumference were more likely to take frequent sick leave than their counterparts with lower BMI and waist circumference.

TABLE 3. Mean of BMI, waist circumference and body fat percentage of subjects who have taken at least a day of sick leave and subjects who did not take any sick leave within two months prior to data collection (Mean \pm SD)

	Subjects who did not take sick leave	Subjects who have taken at least a day of sick leave	<i>p</i> value ^a
Number of subject (%)	110 (56.7)	84 (43.3)	-
BMI (kg/m ²)	27.20 \pm 4.82	29.18 \pm 5.80	0.040
Waist circumference (cm)	90.61 \pm 11.76	95.60 \pm 13.04	0.020
Body fat percentage (%)	25.08 \pm 6.51	26.87 \pm 5.83	0.210

^aMann Whitney test

TABLE 4. Mean scores of HRQoL domains and components across BMI categories (Mean \pm SD)

Domain and Component	Underweight/ Normal ($n = 58$) Mean \pm SD	Pre-obese ($n = 77$) Mean \pm SD	Obese ($n = 59$) Mean \pm SD	Overall ($n = 194$) Mean \pm SD	<i>p</i> value ^a
General health (%)	57.29 \pm 15.52	55.84 \pm 11.40	52.07 \pm 15.87	55.16 \pm 14.23	0.120
Physical functioning (%)	72.41 \pm 25.08	72.72 \pm 21.95	63.56 \pm 22.63	69.84 \pm 23.38	0.046
Physical role functioning (%)	66.78 \pm 20.38	65.71 \pm 21.18	65.69 \pm 23.63	66.03 \pm 21.60	0.951
Bodily pain (%)	38.96 \pm 16.83	39.66 \pm 17.77	44.41 \pm 18.96	40.82 \pm 17.85	0.177
Emotion (%)	76.44 \pm 18.27	75.33 \pm 17.14	75.17 \pm 19.67	75.62 \pm 18.18	0.917
Mental health (%)	61.55 \pm 11.96	62.73 \pm 12.21	60.85 \pm 11.93	61.80 \pm 12.02	0.655
Vitality (%)	40.68 \pm 17.01	44.15 \pm 16.01	38.62 \pm 17.11	41.44 \pm 16.73	0.150
Social functioning (%)	79.32 \pm 17.80	78.62 \pm 19.77	74.03 \pm 18.08	77.01 \pm 18.59	0.189
Physical Component Summary (%)	58.01 \pm 9.62	58.31 \pm 9.60	57.46 \pm 11.13	57.96 \pm 10.04	0.887
Mental Component Summary (%)	64.32 \pm 9.37	64.06 \pm 8.97	63.49 \pm 8.67	63.97 \pm 8.97	0.878

^aOne-way ANOVA test

TABLE 5. Correlation between BMI, waist circumference and percentage of body fat with total days of sick leave and score of each component in HRQoL

	BMI		Waist circumference		Percentage of body fat	
	<i>r</i> value	<i>p</i> value	<i>r</i> value	<i>p</i> value	<i>r</i> value	<i>p</i> value
Total days of sick leave taken within two months	0.162	0.024 ^a	0.181	0.012 ^a	0.106	0.143 ^a
General health	-0.161	0.025 ^a	-0.194	0.007 ^b	-0.191	0.008 ^b
Physical functioning	-0.122	0.090 ^b	-0.102	0.156 ^b	-0.090	0.213 ^b
Physical role functioning	-0.004	0.953 ^b	-0.015	0.836 ^b	-0.009	0.904 ^b
Bodily pain	0.136	0.059 ^b	0.156	0.030 ^a	0.118	0.100 ^b
Emotion	-0.008	0.911 ^b	-0.005	0.940 ^b	-0.001	0.985 ^b
Mental health	-0.001	0.989 ^b	-0.012	0.864 ^b	-0.010	0.887 ^b
Vitality	-0.076	0.291 ^b	-0.072	0.317 ^b	-0.055	0.449 ^b
Social functioning	-0.026	0.720 ^b	-0.054	0.452 ^b	-0.018	0.806 ^b

DISCUSSION

Percentage of overweight and obese subjects in this study is higher than 30.9% and 12.7% reported in the National Health and Morbidity Survey (NHMS) 2011 for male adults in Malaysian population. The mean of BMI in this study was 28.06 ± 5.34 kg/m², higher compared with 25.6 kg/m² among Malay adults in Malaysia (IPH 2011). Earlier, Moy et al. (2008) reported a lower mean of BMI among 186 Malay male security officers in a local public university (26.36 ± 3.63 kg/m²). Mean of BMI was also reported lower in 7179 male soldiers in Finland (26.03 kg/m²) (Kyrolainen et al. 2008).

In the present study, more than half of subjects were classified as central obesity with waist circumference of 92.77 ± 12.55 cm, indicating state of central obesity. In earlier study, Moy et al. (2008) reported a lower mean of waist circumference among 186 Malay male security officers in a local public university (91.5 ± 9.1 cm). In comparing with National Health and Morbidity Survey III results in males of similar age range, the mean waist circumference was 84.0 cm [confidence interval (95% CI): $83.8, 84.3$] (Kee et al. 2008) which is much lower than the present study.

The median number of days of sick leave taken by subjects in this study was 1.11 days, which is lower than the average number of sick day leave of 4.04 days per year reported by Malaysian employees (Malaysian Employers' Federation 2010). The subjects who had taken sick leave at least a day within two months have higher BMI and waist circumference compared to their counterparts who have not taken any sick leave within the same duration. This finding is consistent with the finding among respondents in Finland that those with higher BMI tend to take sick leave more frequently (Kyrolainen et al. 2008). Obese individuals are shown to be suffering a greater extent of complications such as musculoskeletal disorders, cardiovascular diseases and psychiatric disorders (Neovius et al. 2012). In addition,

obesity has also been found to be exerting heavy weight to the joints causing pain in the hip, knee, ankles and back (Andersen et al. 2003).

In this study, we found that mean of physical functioning was lowest in obese compared to pre-obese and underweight or normal subjects indicating obese subjects are facing difficulties in carrying out daily activities such as walking up staircase, washing car or moving a vehicle than their counterparts who were pre-obese. This finding is consistent with previous studies which also reported similar result (Pan et al. 2011; Ray et al. 2011; Sirtori et al. 2012; Wee et al. 2010). This can be explained by limited body movement due to excessive body mass exerting pressure on the joints and skeletal system (Badley & Ansari 2010).

In this study, waist circumference was negatively associated with bodily pain which is consistent with previous study showing abdominal obesity to be linked to the occurrence of higher pain score among obese individuals (Ray et al. 2011). We did not find any significant difference in mental health component across the BMI categories. It may be that individuals who were seeking treatment for overweight were more likely to have homogeneous levels of emotion status (Doll et al. 2000; Wee et al. 2010). Subjects recruited in the present study were based on volunteer basis which majority of them has interest to know their weight and may also want to lose weight. Mental health component was reported significant in overweight and obese individuals who have chronic illnesses which were related to obesity (Doll et al. 2000). In this study, we did not collect information on subjects' illnesses and only categorized subjects according to their BMI categories. Therefore, we could not analyze the difference in physical and emotional well-being according to their illness.

Ghazali and Turiman (1995) reported that majority of security guards at a public university were moderately or highly satisfied with their job due to low workload. However, according to Kass et al. (2001), such monotonous

and repetitive work may lead to low job satisfaction and boredom. Even though there were no interactions between weight and task; boredom significantly increases food consumption for both obese and normal person (Abramson & Stinson 1977). Shift workers are also at risk of chronic illness especially cardiovascular disease and metabolic syndrome (Ha & Park 2005; Karlsson et al. 2001; Wang et al. 2011).

This is a cross-sectional study hence, causal relationship between body weight status, quality of life and sick leave could not be defined. In addition, the present study was conducted among security officers in one learning institute which may not reflect all security officers in the other institutions due to possible difference in working hour and shift pattern. Despite this limitation, this study has highlighted the relationship between obesity with quality of life and number of sick leave days which may also reflect the work productivity of the workers.

CONCLUSION

Prevalence of excessive body weight, waist circumference and percentage of body fat among security officers working in the study location is high. High BMI and waist circumference are related to more frequent sick leave and lower level of physical well-being, while high waist circumference is associated with higher level of bodily pain. Therefore, weight reduction intervention program should be carried out to reduce obesity among the targeted group in this study. Weight reduction in this group may help to improve quality of life among workers and thus improve work productivity.

ACKNOWLEDGEMENT

The authors wish to thank the directors and staffs from the Security Unit in Universiti Kebangsaan Malaysia for their cooperation and participation in this study.

REFERENCES

Abernathy, R.P. & Black, D.R. 1996. Healthy body weights: An alternative perspective. *Am. J. Clin. Nutr.* 63(3 Suppl): 448S-451S.

Abramson, E.E. & Stinson, S.G. 1977. Boredom and eating in obese and non-obese individuals. *Addict. Behav.* 2(4): 181-185.

Andersen, R.E., Crespo, C.J., Bartlett, S.J., Bathon, J.M. & Fontaine, K.R. 2003. Relationship between body weight gain and significant knee, hip and back pain in older Americans. *Obes. Res.* 11(10): 1159-1162.

Antunes Lda, C., Jornada, M.N., Ramalho, L. & Hidalgo, M.P. 2010. Correlation of shift work and waist circumference, body mass index, chronotype and depressive symptoms. *Arq. Bras. Endocrinol. Metabol.* 54(7): 652-656.

Badley, E.M. & Ansari, H. 2010. Arthritis and arthritis-attributable activity limitations in the United States and Canada: A cross-border comparison. *Arthritis Care Res. (Hoboken)* 62(3): 308-315.

Department of Statistic Malaysia. 2014. *Labour Force Statistics*. Malaysia, January 2014

Doll, H.A., Petersen, S.E. & Stewart-Brown, S.L. 2000. Obesity and physical and emotional well-being: Associations between body mass index, chronic illness, and the physical and mental components of the Sf-36 questionnaire. *Obes. Res.* 8(2): 160-170.

Ghazali, H. & Turiman, S. 1995. Kepuasan kerja di kalangan pengawal keselamatan Universiti Pertanian Malaysia. *Pertanika J. Soc. Sci. & Hum* 3(1): 21-29.

Ha, M. & Park, J. 2005. Shiftwork and metabolic risk factors of cardiovascular Disease. *Journal of Occupational Health* 47(2): 89-95.

Harvey, S.B., Glozier, N., Carlton, O., Mykletun, A., Henderson, M., Hotopf, M. & Holland-Elliott, K. 2010. Obesity and sickness absence: Results from the chap study. *Occup. Med. (Lond.)* 60(5): 362-368.

Howard, J.T. & Potter, L.B. 2014. An assessment of the relationships between overweight, obesity, related chronic health conditions and worker absenteeism. *Obes. Res. Clin. Pract.* 8(1): e1-15.

Institute of Public Health. 2011. *National Health and Morbidity Survey 2011*.

Itani, O., Kaneita, Y., Murata, A., Yokoyama, E. & Ohida, T. 2011. Association of onset of obesity with sleep duration and shift work among Japanese adults. *Sleep Med.* 12(4): 341-345.

Karlsson, B., Knutsson, A. & Lindahl, B. 2001. Is there an association between shift work and having a metabolic syndrome? Results from a population based study of 27 485 people. *Occupational and Environmental Medicine* 58(11): 747-752.

Kass, S.J., Vodanovich, S.J. & Callender, A. 2001. State-trait boredom: Relationship to absenteeism, tenure and job satisfaction. *Journal of Business and Psychology* 16(2): 317-327.

Kee, C., Jamaiyah, H., Noor Safiza, M., Geeta, A., Khor, G., Suzana, S., Jamalludin, A., Rahmah, R., Ahmad, A., Ruzita, A., Wong, N. & Ahmad Faudzi, Y. 2008. Abdominal obesity in Malaysian adults: National health and morbidity survey III (NHMS III, 2006). *Mal. J. Nutr.* 14(2): 125-135.

Kyrolainen, H., Hakkinen, K., Kautiainen, H., Santtila, M., Pihlainen, K. & Hakkinen, A. 2008. Physical fitness, BMI and sickness absence in male military personnel. *Occup. Med. (Lond.)* 58(4): 251-256.

Malaysian Employers' Federation 2010. *MEF Surveys: Employess To Receive Higher Wage Increments*.

Moy, F. & Atiya, A. 2005. Lifestyle practices and prevalence of obesity in a community within a university. *Journal of the University of Malaya Medical Centre (JUMMEC)* 8(1).

Moy, F.M., Atiya, A.S. & Wong, M.L. 2008. framingham risk scores and anthropometric measurements in predicting cardiovascular risks among Malay men. *Malays. J. Nutr.* 14(1): 57-63.

Neovius, K., Neovius, M., Kark, M. & Rasmussen, F. 2012. association between obesity status and sick-leave in Swedish men: nationwide cohort study. *Eur. J. Public Health* 22(1): 112-116.

- Pan, H.J., Cole, B.M. & Geliebter, A. 2011. the benefits of body weight loss on health-related quality of life. *J. Chin. Med. Assoc.* 74(4): 169-175.
- Ray, L., Lipton, R.B., Zimmerman, M.E., Katz, M.J. & Derby, C.A. 2011. mechanisms of association between obesity and chronic pain in the elderly. *Pain* 152(1): 53-59.
- Sirtori, A., Brunani, A., Villa, V., Berselli, M.E., Croci, M., Leonardi, M. & Raggi, A. 2012. obesity is a marker of reduction in qol and disability. *Scientific World Journal* 2012.
- Song, H.R., Park, H.S., Yun, K.E., Cho, S.H., Choi, E.Y., Lee, S.Y., Kim, J.H., Sung, H.N., Kim, J.H., Choi, S.I., Yoon, Y.S., Lee, E.S., Han, J.H., Shin, C.I., Chang, H.M. & Bae, S.C. 2010. gender and age differences in the impact of overweight on obesity-related quality of life among Korean adults. *Obes. Res. Clin. Pract.* 4(1): e1-e82.
- Suwazono, Y., Dochi, M., Sakata, K., Okubo, Y., Oishi, M., Tanaka, K., Kobayashi, E., Kido, T. & Nogawa, K. 2008. a longitudinal study on the effect of shift work on weight gain in male Japanese workers. *Obesity (Silver Spring)* 16(8): 1887-1893.
- Wang, X., Armstrong, M., Cairns, B., Key, T. & Travis, R. 2011. shift work and chronic disease: the epidemiological evidence. *Occup. Med. (Lond.)* 61(2): 78-89.
- Ware, J., Jr., Kosinski, M. & Keller, S.D. 1996. A 12-item short-form health survey: construction of scales and preliminary tests of reliability and validity. *Med. Care* 34(3): 220-233.
- Wee, H.L., Wu, Y., Thumboo, J., Lee, J. & Tai, E.S. 2010. association of body mass index with short-form 36 physical and mental component summary scores in a multiethnic asian population. *Int. J. Obes. (Lond.)* 34(6): 1034-1043.
- WHO. 2013a. *Obesity and Overweight*. <http://www.who.int/mediacentre/factsheets/fs311/en/> [accessed in March 2013]
- WHO. 2013b. *Health Topics. Obesity*. <http://www.who.int/topics/obesity/en/> [accessed in March 2013]
- WHO/IOTF/IASO. 2000. *The Asia – Pacific Perspective: Redefining Obesity and Its Treatment*. Hong Kong: World Health Organization, International Obesity Task Force, International Association for the Study of Obesity.

Se Xian Tan
Nutrition Science Programme
School of Healthcare Sciences
Faculty of Health Sciences
Universiti Kebangsaan Malaysia
Jalan Raja Muda Abdul Aziz
50300 Kuala Lumpur, Malaysia

Norhayati Ibrahim
Health Psychology Programme
School of Healthcare Sciences
Faculty of Health Sciences
Universiti Kebangsaan Malaysia
Jalan Raja Muda Abdul Aziz
50300 Kuala Lumpur, Malaysia

Nuruljannah Johari
Roszanadia Rusli
Zahara Abdul Manaf
Dietetics Programme
School of Healthcare Sciences
Faculty of Health Sciences
Universiti Kebangsaan Malaysia
Jalan Raja Muda Abdul Aziz
50300 Kuala Lumpur, Malaysia

Corresponding author: Zahara Abdul Manaf
Email: zaharamanaf@ukm.edu.my
Telephone number: 603-92897677
Fax number: 603-26947621

Received: October 2014
Accepted for publication: January 2016

