Original Research Article

Smoking: The Prevalence and Association with Abdominal Obesity among Community of Mukim Sg. Pelek, Sepang, Selangor, Malaysia

Muhammad Amirrul Noor Affandi, Pua Hock Seng, Nurul Nabila Kamaruzzaman, Syamim Irdina Sharizal, Dhivya Kaliswary Panierselvam, Sabariah Abd Hamid

Faculty of Medicine, University of Cyberjaya, Malaysia

Corresponding Author: Sabariah Abd Hamid

ABSTRACT

Smoking has a huge threat to public health worldwide and associated with illness and death. Studies also shown that it is related with abdominal obesity which indicates risk for cardiovascular disease. Therefore, this study was conducted to determine the prevalence of smoking and the association with abdominal obesity among the community of Sg. Pelek, Sepang, Selangor.

A cross-sectional study was conducted among community who were selected through a simple random sampling. Malaysian, aged more than 18-year-old and fulfill the inclusion & exclusion criteria were interviewed using a set of validated questionnaire. The data were analyzed using SPSS.

Seventy-four percent of the respondents were not smoking. Majority were male (51.6 %), no formal education (33.3%) and single (27.7%). There was also a significant inverse association between smoking status and abdominal obesity ($p < 0.05$).

Therefore, more studies and awareness program should be focused on target group.

Keywords: smoking, abdominal obesity, waist circumference, prevalence, Selangor

INTRODUCTION

Cigarettes pose a huge threat to public health worldwide, killing more than eight million people each year, in which around 80% of the smokers worldwide come from low and middle income countries where the countries were burdened by tobacco-related illness and death. [1] In 2015, the prevalence of Malaysian current smokers aged 15 years old and above was 22.8%, [2] whereas another study conducted among residents in a rural area of Shanghai, reported the prevalence of smoking was 23.53%. [3]

Smoking has been related to abdominal obesity due to an increase in cortisol production which leads to fat deposition in the abdominal area. [4] Abdominal obesity is strongly associated with the increase in C reactive protein, which indicates risk for cardiovascular disease. [5]

A study which involved 283 respondents in Korea reported that there was a significant association between smoking and abdominal obesity ($p= 0.004$). [6] Whereas, another study in Japan stated that smokers tend to have greater abdominal obesity than non-smokers ($p= 0.005$). [7]

Thus, this study was designed to determine the prevalence of smoking and the association with abdominal obesity among the community of Mukim Sungai Pelek, Selangor.

MATERIALS AND METHODS

A cross-sectional study was conducted in a village area in Mukim Sg Pelek, Sepang, Selangor, which has 2000 residents with 450 houses. Majority of the residents were Chinese population.

A systematic random sampling has been used to select the houses and simple random sampling to choose the respondents in the house. Only Malaysian women aged 18 years old and above, had been the residents for at least six months were used as samples. Residents with mental disable, deaf and mute were excluded in this survey and those who refused to participate in the survey or were not there during the survey after three visits, will be considered as non-respondents.

Data were collected through face to face interview session using a questionnaire from National Health Morbidity Survey (NHMS) 2015. [8] The waist circumference was also calculated and classified based on NHMS as follow: Male ≥ 90 cm, Female ≥80 cm.

The data has been analyzed using descriptive statistics to get the frequency and relative frequency (percentage) for smoking and abdominal obesity status, and also sociodemographic variables. The association between smoking status and abdominal obesity was determined by Pearson chi-square test. The level of significance was set at p <0.05 and confidence level at 95%.

RESULT

A total of 200 participants participated in this study, giving an overall response rate of 100%. All respondents were Malays.

Table 1: Prevalence of BMI level among respondents

Smoking status	N	%
Current smoker	52	26.0
Previous smoker	12	6.0
Non-smoker	136	68.0
Total	200	100

Majority (74%) of the respondents are not smoking(Table 1).

The higher prevalence of smoking is in the age group of 40-49 (37.5%), male (51.6 %), no formal education (33.3%), government/semi-government employees (53.8%) not married (27.7%), and monthly household income less than RM 4,600 (26.8%) (Table 2).

Table 2: Smoking status bysocio-demographic (N=200)

Socio-demography	Smoking status		
	Yes n (%)	No n (%)	Total n (%)
Age*(p=0.264)*			
< 20	0 (0.0)	7 (100.0)	7 (100.0)
20 – 29	9 (26.5)	25 (73.5)	34 (100.0)
30 – 39	11 (33.3)	22 (66.7)	33 (100.0)
40 – 49	9 (37.5)	15 (62.5)	24 (100.0)
50 – 59	10 (27.8)	26 (72.2)	36 (100.0)
≥ 60	13 (19.7)	53 (80.3)	66 (100.0)
Gender*(p=0.001)*			
Male	48 (51.6)	45 (48.4)	93 (100.0)
Female	4 (3.7)	103 (96.3)	107 (100.0)
Education*(p=0.421)*			
No formal	6 (33.3)	12 (66.7)	18 (100.0)
Primary	12 (30.8)	27 (69.2)	39 (100.0)
Secondary	28 (26.4)	78 (73.6)	106 (100.0)
Tertiary	6 (16.2)	31 (83.8)	37 (100.0)
Occupation*(p=0.001)*			
Private	7 (28.0)	18 (72.0)	25 (100.0)
Government	7 (53.8)	6 (46.2)	13 (100.0)
Self employed	27 (41.5)	38 (58.5)	65 (100.0)
Unemployed	8 (12.5)	56 (87.5)	64 (100.0)
Retiree	2 (20.0)	8 (80.0)	10 (100.0)
Housewife	1 (4.3)	22 (95.7)	23 (100.0)
Marital status*(p=0.418)*			
Single	13 (27.7)	34 (72.3)	47 (100.0)
Married	38 (26.8)	104 (73.3)	142 (100.0)
Divorcee / widower	1 (9.1)	10 (90.9)	11 (100.0)
Monthly household income *(p=0.459)*			
< RM 4 600	51 (26.8)	139 (73.2)	190 (100.0)
≥ RM 4 601	1 (10.0)	9 (90)	10 (100.0)

Male smokers are significantly 27 times more likely to smoke compared to females [OR=27.45 (95% CI: 9.34, 80.76)]. Whereas, respondents who have no formal education are almost three times [OR=2.583 (95% CI:0.70, 9.61)] more likely to smoke compared to other education level groups in which the prevalence for smoking decreases as the education level increases.

Table 3: Prevalence of abdominal obesity

Abdominal obesity	n	%
Yes	99	49.5
No	101	50.5
Total	200	100

Table 4: Smoking trend among current smokers (n=52)

Smoking trend	n	%	P value
No. of cigarette /day			
1-5	12	23.1	0.009
6-10	14	26.9	
11-15	10	19.2	
16-20	13	25.0	
> 20	3	5.8	
Attempt to quit smoking			
Yes	24	46.2	0.317
No	28	53.8	
Money spent on tobacco (RM)			
< 500	38	73.1	0.001
≥ 500	14	26.9	

Almost 50% of respondents are obese abdominally (Table 3).

Majority of currents smokers significantly smoke six to ten cigarettes per day (26.9%) and spent less than RM500 per month on tobacco products (73.1%) (p < 0.05). Only 46.2% of them attempted to quit for the past 12 months.

Table 5: Association between smoking and abdominal obesity

| Smoking status | Abdominal obesity | | Total n (%) | Chi square (P value) |
	Yes n (%)	*No n (%)*		
Yes	14 (26.9)	38 (73.1)	52 (100)	0.714(0.006)
No	72(48.6)	76 (51.4)	148(100)	

Smokers have a lower prevalence of getting abdominal obesity (26.9%) compared to non-smokers and there is also a significant inverse association between smoking status and abdominal obesity (p < 0.05) (Table 5).

DISCUSSION

The prevalence of smokers in our study was higher as compared to the National Health and Morbidity Survey, 2015 and survey done in United States in 2018 (22.8% and 13.7%, respectively). [2][9] This may be due to the higher level of awareness in the population of a developed country such as in the United States, as levels of awareness can be represented by intention to quit smoking and previous quit attempts, [10] in which only 46.2% among our current smokers compared to 68% in the United States have attempted to quit smoking completely. [11] Warnings also may create an awareness for smokers to quit smoking as there was a significant finding by a study done in Lebanon, where those who have attempted to stop smoking was due to the warnings implemented on the packages (p < 0.05). [12]

The prevalence of smokers is highest in the 40-49 years old age group (37.5%) as compared to the other age groups. This corresponds to the study done by NHMS, in which the highest prevalence was in the 25–44 years old age group (59.3%) [2] Another study done in Canada in 2017, age group 45-54 has the highest prevalence of being

smokers (19.9%) [13] This probably due to them being of the working class group, in which the highest prevalence of smokers in our study are government or semi-government workers (53.8%). This is further supported by a study done in India where 79.1% of the smokers were from the employed group [14] A study done in Korea reported that office workers were more likely to smoke if they have co-workers who are smokers (β = 0.751, 95% CI = 0. 005-1.498). [15]

Twenty-six percent of our smokers came from low income groups (monthly income below RM 4600), and the result was consistent with the study done in Thailand (37.8%) and this might be due to low income group smokers needing nicotine to suppress appetite and manage hunger. [14] Men in the lowest income group were about two times more likely to continue smoking when compared to the highest income group [16] and the higher income level has significant association (P<0.05) with higher awareness toward the tobacco product. [17]

Education plays an important role for daily smoking [18] as respondents with tertiary education level might aware of the harmful effects of tobacco products, thus had the lowest prevalence of smoking as shown in NHMS and our study (14.9% and 16.2%, respectively).

The average amount of cigarettes per pack is 20 and 26.9% of our smokers' smoke 6-10 cigarettes per day, which means that they consume 1 pack of cigarettes for every two days. The less number of cigarettes they consume might be why most of them (73.1%) only spent less than RM 500 on buying tobacco products and a study done in 2015 on the illicit Trade of Tobacco in Malaysia claimed black market comprising large amounts of cigarettes sold at below market retail price and without tax (Tam, et al., 2015). [19]

The prevalence of smokers among our male respondents was consistent to the studies done in United States (30.4%), [20] China (12.3%) [21] and Malaysia (43%). [22] Men believe that smoking will make them

young and attractive; and they also believe that their parents/guardian will find smoking as an acceptable behavior. [23] A study done on smoking and abdominal obesity found that there was statistically significant association between smoking and abdominal obesity (p < 0.05) and this was consistent with our finding where there was a significant inverse association between smoking and abdominal obesity (p < 0.05). [6] This could be due to the effects of cigarette smoking which is mediated by nicotine resulting in decreased food intake. [24] Thus, there is low abdominal obesity among smokers.

The NHMS reported that 60.3% of smokers are unmarried, which was consistent with our finding (27.7%) [22] and a study in the United States (36.6). [25] This might be due to the increased of psychosocial stress caused by poor economic condition compared to married group which have much more stable household income. [26]

CONCLUSION
Majority of the respondents were non-smokers and they have higher prevalence on having abdominal obesity, compared to smokers.
Therefore, more studies and awareness program should be focused on target group of smokers and also risk of abdominal obesity.

REFERENCES
1. WHO. 2019. Report on the global tobacco epidemic. Geneva: *World Health Organization.*
2. National Health and Morbidity Survey (NHMS). 2015. Vol. II: Non-Communicable Diseases, Risk Factors & Other Health Problems. Kuala Lumpur: *Ministry of Health Malaysia*; 2015.
3. Wang, R., Jiang, Y., Yao, C., Zhu, M., Zhao, Q., Huang, L., Wang, G., Guan, Y., Michael, E., Zhao, G. 2019. Prevalence of tobacco related chronic diseases and its role in smoking cessation among smokers in a rural area of Shanghai, China: a cross sectional study. *BMC Public Health*. 19: 753.
4. Direk, N., Newson, R.S., Hofman, A., Kirschbaum, C., Tiemeier, H. 2011. Short and long-term effects of smoking on cortisol in older adults. *International Journal of Psychophysiology*. 80(2): 157-160.
5. Veigas, L., Pereira, P.C., Vicente, F., Mesquita, M.F. 2012. Overweight, obesity and abdominal adiposity effects in inflammatory proteins: C-reactive protein and fibrinogen. *Journal of Medical Sciences.* 12(3): 70-77.
6. Kim, J.H., Shim, K.W., Yoon, Y.S., Lee, S.Y., Kim, S.S., Oh, S.W. 2012. Cigarette smoking increases abdominal and visceral obesity but not overall fatness: an observational study. *PLoS ONE*. 7(9):5–9.
7. Fujiyoshi, A., Miura, K., Kadowaki, S., Azuma, K., Tanaka, S., Hisamatsu, T., Arima, H., Kadota, A., Miyagawa, N., Takashima, N., Ohkubo, T., Saitoh, Y., Torii, S., Miyazawa, I., Maegawa, H., Murata, K., Ueshima, H. 2016. Lifetime cigarette smoking is associated with abdominal obesity in a community-based sample of Japanese men: shiga epidemiological study of subclinical atherosclerosis (SESSA). *Preventive Medicine Reports*. 4(2016):225–232.
8. National Health & Morbidity Survey (NHMS). 2015. Vol I: Methodology and General Findings. Institute for Public Health, Ministry of Health, Malaysia. 1:290.
9. CDC. 2019. Current Cigarette Smoking Among Adults in the United States. National Center for Chronic Disease Prevention and Health Promotion, Department of Health and Human Services, United States
10. Milcarz, M., Polanska, K., Bak-Romaniszyn, L., Kaleta, D. 2018. Tobacco health risk awareness among socially disadvantaged people - a crucial tool for smoking cessation. Int J Environ Res Public Health. 15(10): 2244.

11. Babb, S., Malarcher, A., Schauer, G., Asman, K., Jamal, A. 2017. Quitting smoking among adults - United States, 2000-2015. Morbidity and Mortality Weekly Report. 65: 1457-1464.
12. Layoun, N., Hallit, S., Waked, M., Aoun Bacha, Z., Godin, I., Leveque, A., Dramaix, M., &Salameh, P. 2017. Predictors of past quit attempts and duration of abstinence among cigarette smokers. Journal of Epidemiology and Global Health. 7(3): 199–206.
13. CTADS. 2017. Canadian tobacco, alcohol and drugs survey. Health Canada, Canada.
14. Nargis, N., Yong, H.H., Driezen, P., Mbulo, L., Zhao, L., Fong, G.T., Siahpush, M. 2019. Socioeconomic patterns of smoking cessation behavior in low and middle-income countries: emerging evidence from the Global Adult Tobacco Surveys and International Tobacco Control Surveys. PLoS ONE. 14(9): 1–24.
15. Kim, Y-J. 2016. Impact of work environments and occupational hazards on smoking intensity in Korean workers. Workplace Health & Safety. 64(3): 103-113.
16. Leinsalu, M., Kaposávri, C., Kunst, A. E. 2011. Is income or employment a stronger predictor of smoking than education in economically less developed countries? A cross-sectional study in Hungary. BMC Public Health. 11.
17. Park, J., Lim, M.K., Yun, E.H., Oh, J.K., Jeong, B.Y., Cheon, Y., Lim, S. 2018. Influences of tobacco-related knowledge on awareness and behavior towards smoking. Journal of Korean Medical Science. 33(47): 1–10.
18. Pärna, K., Pürjer, M.L., Ringmets, I., Tekkel, M. 2014. Educational differences in cigarette smoking among adult population in Estonia, 1990-2010: does the trend fit the model of tobacco epidemic? BMC Public Health. 14(1): 1–8.
19. Tam, J., Fong, N., Sen, C.P., Harith, I. 2015. Study on the illicit trade of tobacco in Malaysia. Center for public policy studies. Tam, J. 2015. Center for public policy studies (online). https://cpps.org.my/wp-content/uploads/2018/11/CPPS-Report-Study-on-the-Illicit-Trade-of-Tobacco-in-Malaysia.pdf
20. Gorman, Bridget K., Lariscy, Joseph T., Kaushik, Charisma. 2014. Gender, acculturation and smoking behaviour among US Asian Latino immigrants. Social Science and Medicine. 106: 110-118
21. Xiong, P.S., Xiong, M.J., Liu, Z.X., Liu, Y. 2020. Prevalence of smoking among adolescents in China: an updated systematic review and meta-analysis. Public health. 182: 26-31.
22. NHMS. 2015. Report on smoking status among Malaysian adults. Institute of Public Health, Ministry of Health, Malaysia.
23. Chinwong D., Mookmanee N., Chongpornchai J., Chinwong S. 2018. A comparison of gender differences in smoking behaviors, intention to quit, and nicotine dependence among Thai university students. Journal of Addiction. 2018: 1-8.
24. Audrain-McGovern, J., &Benowitz, N. L. 2011. Cigarette smoking, nicotine, and body weight. Clinical pharmacology and therapeutics. 90(1): 164–168.
25. Michael, W., Ramsey, J., Chen-Sankey, J.C., Reese-Smith, J., Chia, K. 2019. Association between marital status and cigarette smoking: Variation by race and ethnicity. Preventive Medicine. 119: 48-51.
26. Lindström. M. 2010. Social capital, economic conditions, marital status and daily smoking: A population-based study. Public Health. 124(2): 71-77.

******