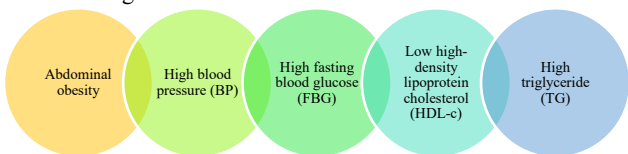




INTRODUCTION

- The double burden of abdominal obesity (AO) and metabolic syndrome (MetS) have become an emerging health threat in the worldwide population [1,2].
- AO is characterized by the accumulation of subcutaneous and visceral fat leading to an increase in waist circumference [1].
- MetS is a constellation of disorders that form in the human body and affects the human body's metabolism [2].
- MetS is characterized by the presence of at least three of the following risk factors [2].



- Although vegetarians are generally viewed as a healthier population, AO and MetS are both common issues encountered by vegetarian population.
- FADS1 gene is an important determinant for abdominal AO and MetS among general population [3,4].
- However, the associations of the genetic variant of rs174547 FADS1 gene with AO and MetS are not well established among vegetarians in Malaysia.

OBJECTIVE

- To identify the associations of rs174547 FADS1 gene with AO and MetS among Malaysian vegetarians.

ETHICAL APPROVAL

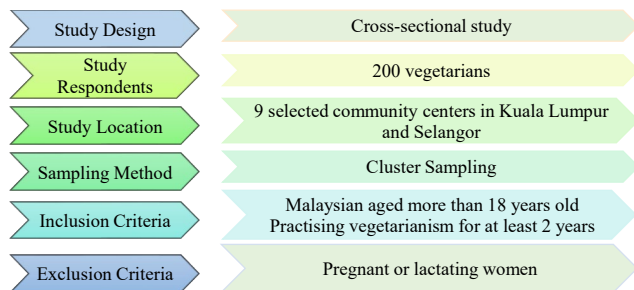
- Approved by the Ethic Committee for Research Involving Human Subjects, UPM [FPSK (FR16) P023].

REFERENCES

- Brisbois, T. D., Farmer, A. P., & McCargar, L. J. (2012). Early markers of adult obesity: a review. *obesity reviews*, 13(4), 347-367.
- Alberti KG, Eckel RH, Grundy SM, et al. Harmonizing the metabolic syndrome: a joint interim statement of the International Diabetes Federation Task Force on Epidemiology and Prevention; National Heart, Lung, and Blood Institute; American Heart Association; World Heart Federation; International Circulation. 2009;120(16)
- Chen, Y., Estamador, A. C., Keller, M., Poveda, A., Dalla-Riva, J., Johansson, L., Renström, F., Kurbasic, A., Franks, P. W., & Varga, T. V. (2019). The combined effects of FADS gene variation and dietary fats in obesity-related traits in a population from the far north of Sweden: the GLACIER Study. *International Journal of Obesity*, 43(4), 808-820.
- Ching YK, Chin YS, Appukutty M, Gan WY, Ramachandran V, Chan YM. Prevalence of metabolic syndrome and its associated factors among vegetarians in Malaysia. *Int J Environ Res Public Health*. 2018;15(20):1-46.
- Kagawa Y, Nishijima C, Nakayama K, Iwanoto S, Tanaka A, Kanachi K, et al. Nutrient-generics of Japanese vegetarians with polymorphism in the fatty acid desaturase. *J Nutr Food Sci*. 2016;06:1-15.
- Institute for Public Health I for PH. National Health and Morbidity Survey (NHMS) 2019: non-communicable diseases, healthcare demand, and health literacy - key findings. 2020.
- Rizzo NS, Sabatè J, Jaceldo-Siegl K, Fraser GE. Vegetarian dietary patterns are associated with a lower risk of metabolic syndrome: the adventist health study 2. *Diabetes Care*. 2011;34:1225-7.
- Kim MH, Bae YJ. Postmenopausal vegetarians' low serum ferritin level may reduce the risk for metabolic syndrome. *Biol Trace Elem Res*. 2012;149:34-41.
- Chiang JK, Lin YL, Chen CL, Ouyang CM, Wu YT, Chi YC, et al. Reduced risk for metabolic syndrome and insulin resistance associated with ovo-lacto-vegetarian behavior in female Buddhists: a case-control study. *PLoS One*. 2013;8:e71799.
- Chilton FL, Murphy RC, Wilson BA, Sergeant S, Ainsworth H, Seeds MC, et al. Diet-gene interactions and PUFA metabolism: A potential contributor to health disparities and human diseases. *Vol. 6, Nutrients*. MDPI AG; 2014.

METHODOLOGY

Study design



Study instruments

- Self-administered questionnaire**
 - Respondent's characteristics (sex, ethnicity, age)
 - Vegetarianism practice (types and years)
 - Lifestyle behaviour (alcohol consumption, cigarette smoking and physical activity level)
- Blood pressure measurement**
 - Systolic and diastolic blood pressure (mmHg) – Omron HEM7121
- Anthropometric assessments**
 - Body weight (kg)- TANITA HD 319
 - Height (cm) - SE CA 213
 - Waist circumference (cm) – Lufkin tape W606PM
- Laboratory assessments**
 - Fasting blood glucose (FBG)
 - Blood lipid profile (TG, HDL-c)
 - DNA extraction
 - Genotyping of rs174547

Data collection



IBM SPSS Statistics Version 24

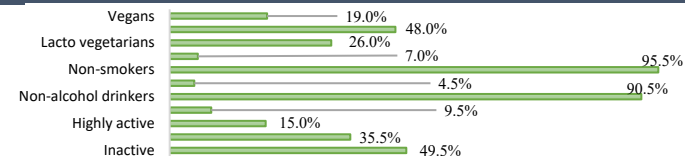
- Descriptive analysis (frequency, percentage, mean and standard deviation), chi-square analysis, logistic regression, significant difference set at $p < 0.05$

RESULTS

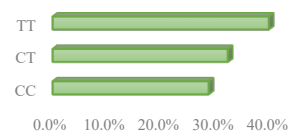
1. Socio-demographic background



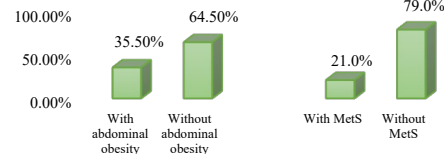
2. Vegetarianism practices and lifestyle behaviours



3. rs174547 FADS1 gene



4a & 4b. Prevalence of AO and MetS



5. Associations of rs174547 with AO and MetS

	Adjusted odds ratio (95% CI)	
	Abdominal obesity	MetS
CC	1.00	1.00
CT	3.84 (1.37 – 10.71)*	1.32 (0.47-3.74)
TT	4.66 (1.40 – 15.57)*	3.57 (1.02 – 12.47)*

Note: Logistic regression models were adjusted for age, sex and ethnicity.

DISCUSSION

- 1 & 2. A majority of the vegetarians were females (65.5%), Chinese (63.0%), lacto-ovo-vegetarians (48.0%), non-smokers (95.5%), non-alcohol drinkers (90.5%) and inactive (49.5%).
3. A majority of the vegetarians had TT genotype of the rs174547 FADS1 gene., which is similar to the Japanese population^[5].
- 4a & 4b. More than half of the vegetarians (64.5%) had AO, which is lower as compared to National Health and Morbidity Survey (NHMS) 2019 (52.6%)^[6]. The overall prevalence of MetS was 21.0%, which is higher than US and Korean vegetarians^[7,8] but higher than Taiwanese vegetarians^[9].
5. Vegetarians with TT genotype (wildtype) had higher adjusted odds of AO and MetS.
6. The interaction of rs174547 FADS1 gene and vegetarian diet could affect the regulation of fatty acid metabolism that significantly associated with AO and MetS^[10].

CONCLUSION

- AO and MetS were common among vegetarians.
- Longitudinal studies are needed to confirm the associations of rs174547 FADS1 gene with AO and MetS.
- There is an urgency to develop appropriate strategies for the prevention of AO and MetS among vegetarians in Malaysia.