Lifestyle as an indicator of Central Obesity in Coal Mining Workers from Indonesia

Setyaningrum R[1], Aziza Nisa M[1], Firdha Amalia G[1], Wati Rahmadani W[1], Firdaus MA[1]

[1]Department of Occupational Health and Safety, Public Health Study Program, Faculty of Medicine, Lambung Mangkurat University, Banjarbaru, Kalimantan Selatan, Indonesia

ABSTRACT

Introduction: Central obesity is an indicator of several non-communicable diseases, influenced by a lifestyle with low physical activity and foods consumption. Statistics in Indonesia showed that central obesity was 3.70% causing death in coal mining workers. However, few studies examine the risk factors for coal mining workers in Indonesia. Thus, this study aims to determine lifestyle indicators of central obesity in coal mining workers.

Methods: It was a cross-sectional study, measuring abdominal circumference with a tape measure, using a standard questionnaire for risk factors of central obesity (age, family history, smoking habits, exercise habits, drinking alcohol habits, and food frequency). The sample was 22 workers of a coal mining company in Indonesia and data collection was done in November 2021.

Results: All respondents were male, were not drinking alcohol, were less than 40 years old (55%), and most had no family history, but five percent (5%) had a family history of diabetes mellitus. Smokers (54.5%), light category smokers (33.3%) with a smoking duration of less than ten years (55.6%), having the habit of exercising less than two times a week, more than equal to 30 minutes per day. Among respondents, most of them consumed eating steamed rice (86.4%), chicken cooked 'habang' (40.9%), tofu (31.8%), kale (54.4%), apples (63.6%), and fried foods (45.5%). Lifestyles that have a relationship with central obesity are the length of exercise per day (0.003), the frequency of eating bread (0.033), and bananas (0.026).

Conclusion: Indicators of central obesity can be prevented by monitoring indicators of lifestyle factors (exercising habits, frequency of eating bread, and bananas).

Key words: Central obesity, Indicator, Lifestyle, Mining.

INTRODUCTION

More than 3.4 million adults die worldwide each year due to obesity. WHO reports 44% of deaths from diabetes, 23% from ischemic heart disease,

Corresponding Author

Mufatihatul Aziza Nisa,
Lecturer,
Department of Occupational Health and Safety,
Public Health Study Program, Faculty of Medicine,
Lambung Mangkurat University, Banjarbaru,
Kalimantan Selatan, Indonesia
E-mail: mufatihatul.nisa@ulm.ac.id
ORCID: https://orcid.org/0000-0002-1566-6476

and (7-41)% from cancer.[1] Central obesity is defined according to waist circumference ≥ 94 cm for men and ≥ 80 cm for women by WHO criteria. It is associated with all-cause mortality, illness, and disability resulting in an unhealthy life span with poor life quality and health care costs. Past studies have shown that central obesity predicts metabolic syndrome disease, type 2 diabetes, cardiovascular disease, and mortality better than body mass index (BMI).[2]

Risk factors for central obesity, according to research by Raimi et al. (2015), were age, gender, smoking habits, and alcohol drinking habits.[3] Lifestyle changes such as lack of exercise and smoking are considered factors that contribute to the onset of abdominal obesity.[4] Another study states a significant relationship

between fruits and vegetables intake and obesity.[5] In addition, other supporting factors from the family, such as a family history of the disease, may also lead to obesity for the offspring.[6] A lifestyle that affects obesity is also influenced by physical activity, which the type of work can illustrate.

In mining workers, several studies have shown that there are also risk factors that can be indicators of central obesity. In the Australian coal mining industry, poor nutrition is likely to be a key component in elevated levels of overweight and obesity.[7] There were significant differences in calorie expenditure, activity patterns, and the number of steps walked daily between the overweight and obese groups in South African Mining Employees.[8] However, there is very little research on lifestyle indicators among mining workers in Indonesia.

Based on statistics, the Occurrence of Labor Diseases/ Kecelakaan Penyakit Tenaga Kerja (KAPTK) 2020 in Indonesia showed 15 KAPTK incidents in the coal mining sector. The identified events included high cholesterol (18.52%), hypertension (18.52%), coronary heart risk (7.41%), and obesity (3.70%). It indicates the risk of non-communicable diseases (NCDs) in workers in the coal mining sector and obesity is also one of the indicators of non-communicable diseases.[9] Thus, indicators of central obesity need to be identified early to determine preventive measures that are sensitive to workers immediately.

METHODS

The study design was a cross-sectional study with abdominal circumference measurements with a tape measure conducted by a paramedic on sites. The data was collected using a standard questionnaire regarding risk factors for central obesity (age, family history of the disease, smoking habits, exercise habits, and food frequency (staple foods, animal dishes, vegetable dishes, vegetables, fruit, and other foods). The sample was 22 random respondents from 60 workers of a coal mining company in Indonesia, South Kalimantan province, in November 2021. The sample size was calculated using 95% confidence level and confidence

interval of 16.7% by sample size calculator. Data analysis was carried out descriptively and statistically using IBM SPSS Statistic 24. This research has passed the ethics board of the University of Lambung Mangkurat with the number of ethical clearance: 922/ KEPK-FK-ULM/EC/XI/2021.

RESULTS

This section presents the research results descriptively through the frequency distribution of the risk factor variables and central obesity, as well as the relationship between risk factors for central obesity.

All the respondents were male, with a total of 22 respondents where most of the respondents were less than 40 years old (55%). Most of the respondents did not have a family history of hypertension, cancer, heart disease, asthma, but 5% of the respondents had a family history of diabetes mellitus. Lifestyle risk factors showed that most of the respondents were smokers (54.5%), among them were light smokers (33.3%) with a duration of smoking less than ten years (55.6%). The majority of respondents have a habit of exercising less than two times a week, with most of the time exercising being more than equal to 30 minutes per day. All respondents did not have a habit of drinking alcohol. Among the total respondents, some respondents had the highest frequency of eating their staple food, which was steamed rice (86.4%), the non-veg dish consumed the most was chicken cooked 'habang' (40.9%), the highest frequency of consumption of vegetable side dish was tofu (31.8%), the highest frequency of vegetable consumption was kale (54.4%), the highest frequency of fruit consumption was apples (63.6%), and the highest frequency of consumption of other types of food was fried food (45.5%).

The results of statistical tests with the Pearson correlation test showed that there are several lifestyle risk factors associated with central obesity in coal mining workers respondents, including exercise habits with the length of exercise per day (0.003), frequency of eating staple foods, bread (0.033) and frequency of eating fruit apples (0.026).

Table 1: Individual characteristics and lifestyle toward central obesity

Variable	Central Obesity				p-value
	No		Yes		
	N	%	N	%	
Individual characteristics					
Age					
< 40 years old	11	78.8	3	21.4	0.058
≥ 40 years old	3	37.5	5	62.5	
Family History					
Family History (Diabetes mellitus)	0	0	1	100	1.99
Family History (Hyper-tension)	0	0	0	0	0
Family History (Cancer)	0	0	0	0	0
Family History (Heart Disease)	0	0	0	0	0
Family History (Asthma)	0	0	0	0	0
Lifestyle					
Smoking habit					
Smokers	7	58.3	5	41.7	0.592
Non smokers	7	70	3	30	
Smoking frequency					
Light smokers	3	75	1	25	0.198
Heavy smokers	4	66.7	2	33.3	
Duration of smoking					
Smoking < 10 tahun	12	70.6	5	29.4	0.167
Smoking 10-20 tahun	2	66.7	1	33.3	
Smoking >20 tahun	0	0	2	100	
Exercise habit					
Exercise frequency					
<2 per week	8	80	2	20	0.160
≥2 per week	6	50	6	50	
Duration exercise					
<30 minute/day	12	85.7	2	14.3	0.003*
≥30 minute/day	2	25	6	75	

Table 2: Food frequency

Variable Food Frequency	Central Obesity				p-value
	No		Yes		
	%	Most Eat Frequency	%	Most Eat Frequency	
Staple Food					
Steamed rice	68.4	>3 times per day	31.6	>3 times per day	0.405
Noodle	77.8	1-2 times per week	50	2 times per month	0.977
Bread	70	1-2 times per week	80	2 times per month	0.033*
Animal side dish					
Chicken (cooked in "habang")	66.7	1-2 times per week	3	1-2 times per week	0.271
Chicken (cooked in curry)	66.7	1-2 times per week	3	1-2 times per week	0.917
Meatball	88.9	1-2 times per week	60	2 times per month	0.853
Vegetable side dish					
Tofu	71.4	3-6 times per day	28,6	3-6 times per day	0.397
Tempe	85.7	3-6 times per day	75	3-6 times per day	0.428
Peanuts	66.7	2 times per month	33,3	2 times per month	0.379

Vegetable					
Kangkung	50	1-2 times per week	50	1-2 times per week	0.631
Carrot	63.3	1-2 times per week	36,4	1-2 times per week	0.183
Cucumber	60	2 times per month	40	2 times per month	0.395
Fruits					
Apple	57.1	2 times per month	42.9	2 times per month	0.197
Pear	63.6	2 times per month	36.4	2 times per month	0.310
Banana	80	3-6 times per day	57.1	3-6 times per week	0.026*
Other					
Fried food	60	1-2 times per week	40	1-2 times per week	0.189
Milk/sweet coffee	60	1 time/day	40	1 tim per day	0.336
Sweet tea	62.5	1 time per day	37,5	1 time per day	0.340

DISCUSSION

This study looks for lifestyle indicators that may cause central obesity in coal mining workers in Indonesia. Following the purpose of this study, our study shows a relationship between lifestyle and obesity which may be an indicator of obesity.

First, the lifestyle variable associated with central obesity was exercise habits, indicated by how long a person had exercised in one day. The number of workers who exercised more than 30 minutes a day was greater than those who exercised less than 30 minutes a day. It showed the lack of time for mining workers to exercise. This was due to the work of mining workers who mostly followed specific work shifts and worked 8-12 hours so that after work, they tended to rest. The result of this study was in line with research by Zulkarnain (2020), which found that half of the respondents who were mining employees did not fall into the category of active exercise or had low exercise intensity.[4] However, crosstab results showed that miners who exercised more than 30 minutes per day were found to be more centrally obese. It might be due to other factors that needed further identification and analysis.

Furthermore, our study showed an association between the frequency of bread intake and central obesity. Most of the respondents who were not obese had a frequency of eating bread 1-2 times a week. This frequency was classified as moderate frequency. Several literature reviews have similar results regarding the association of these risk factors. One of them stated that reducing white bread intake, but not whole-grain bread, consumption within a Mediterranean-style pattern setting was related to decreased weight and abdominal fat.[10] Another literature review stated that whole-grain bread did not positively influence weight gain and might be beneficial to ponderal status.[11] Hence, it is necessary to investigate further on types of bread consumed by mining workers. If the bread consumed was white bread, but not whole-grain bread, then the risk factor for low levels of white bread intake is associated with obesity.

In addition to the above two risk factors, the frequency of banana intake was another risk factor. Not only statistically related, but crosstab data also showed that the frequency of eating bananas was relatively high in the group with or without central obesity. Although we all know that consuming fruit is one way to reduce the risk of obesity, it is necessary to pay attention to the amount of intake and frequency of consumption of certain types of fruit that may contain high calories. It is supported by a literature review which found that there were quite contrasting results showing support for the pro-obesity effects of fruit, and a few mechanisms are thought to be responsible for generating obesity via fruit intake. Thus, fruit accumulates simple sugars rather than fat, but this can still be important particularly fructose. High fructose concentrations in food are directly associated with many metabolic disorders, especially obesity via de novo lipogenesis. In addition, fruit consumption in different forms other than whole fruit can increase calorific intake and positively influence energy homeostasis to promote obesity eventually.[12]

CONCLUSION

This study has shown that lifestyle risk factors, which are indicators of central obesity in coal mining workers in Indonesia were exercise habits, bread intake, and

banana intake. Based on the results of our study, further researchers who will research similar topics need to explore risk factor data more comprehensively. Such as, regarding the type of exercise that has been done and the range of criteria for the length of exercise in a day. Also, data collection techniques are needed by adding food recall and intake measures at each meal.

REFERENCES

1. World Health Organization (WHO). World Health Statistics. WHO technical report series. Geneva. 2013. [Cited on 2021;10:17]. Available from https://www.who.int/gho/publications/world_health_statistics/EN_WHS2013_Full.pdf

2. Goh LGH, Dhaliwal SS, Welborn TA, Lee AH, Della PR. Ethnicity and the association between anthropometric indices of obesity and cardiovascular risk in women: a cross-sectional study. *BMJ Open [Internet]*. 2014;4:e004702. Available from: https://pubmed.ncbi.nlm.nih.gov/24852299/.

3. Raimi TH, Odusan O, Fasanmade O. High prevalence of central obesity in rural south-Western Nigeria: Need for targeted prevention. *J. Diabetes Endocrinol[Internet]*. 2015;6(3):1218. DOI:10.5897/JDE2015.0084.

4. Zulkarnain A, Alvina A. "The relationship between exercise habits and smoking with abdominal obesity in productive age employees." Journal of Biomedicine and Health 3.1 (2020): 21-27. [Internet].DOI:https://doi.org/10.18051/JBiomedKes.2020.v3.21-27

5. Ghalaeh RS, Gholi Z, Bank SS, Azadbakht L. Fruit and vegetable intake, body mass index and waist circumference among young female students in Isfahan. J Edu Health Promot[Internet]. 2012;1:29. DOI: 10.4103/2277-9531.99969

6. Nielsen LA, Nielsen TR, Holm J. The Impact of Familial Predisposition to Obesity and Cardiovascular Disease on Childhood Obesity. Obes Facts[Internet]. 2015;8:319-28. DOI: 10.1159/000441375

7. Bezzina A, Austin EK, Watson T, Ashton L, James CL. Health and wellness in the Australian coal mining industry: A cross-sectional analysis of baseline findings from the RESHAPE workplace wellness program. PLoS ONE[Internet]. 2021;16(6): e0252802. Available from: https://doi.org/10.1371/journal. Pone.0252802

8. Currie S, Smit M, Linda M, Grace J. Effect of Obesity on the Work Health-Related Behaviors and Quality of Life of South African Mining Employees: A Pilot Study. Global Journal of Health Science[Internet]. 2017;9: 122. Available from: https://www.ccsenet.org/journal/index.php/gjhs/article/view/70570

9. Ministry of Energy and Mineral Resources of Indonesia. Annual Performance Report 2020. Jakarta; 2020.Available from: https://www.esdm.go.id/id/publikasi/laporan-kinerja

10. Bautista-Castaño I, Serra-Majem L. Relationship between bread consumption, body weight, and abdominal fat distribution: Evidence from epidemiological studies. Nutrition Reviews [Internet]. 2012;70:218-33.Available from: https://pubmed.ncbi.nlm.nih.gov/22458695/

11. Serra-Majem, L, Bautista-Castaño I. Relationship between bread and obesity. The British journal of nutrition[Internet]. 2015;113:S29-35. Available from: https://pubmed.ncbi.nlm.nih.gov/26148919/

12. Sharma SP, Chung HJ, Kim HJ, Hong ST. Paradoxical Effects of Fruit on Obesity. Nutrients{internet}. 2016;8(10):633.Available from: https://doi.org/10.3390/nu8100633