

Physical activity level and body mass index profile of the working-age population in Palembang City

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Abstract:

Physical activity levels have decreased during the Covid-19 pandemic because of the lockdown period and related social distancing measures. Although Indonesian government has gradually allowed people to do outdoor activities, there are still large-scale restrictions on doing activities in public places. Palembang is one of the biggest cities in Indonesia, in which students and workers have been learning and working from home during the pandemic. The purpose of this study was to analyse the physical activity levels and body mass index (BMI) profiles of the working-age population in Palembang, Indonesia, during the COVID-19 pandemic. In total, 735 participants (M: 416; F: 319) with a minimum age of 15 (26.14±9.46) participated in this study. The method of this study was a survey using an online Short-Form of the International Physical Activity Questionnaire (IPAQ-SF) to assess physical activity and energy expenditure levels based on Metabolic Equivalents of Task (MET). The data was collected for 4 weeks in February 2021 by measuring the height and weight and by observing the physical activity behaviour of the participants through the survey. The results of the BMI calculation showed that almost half of the participants were a combination of underweight, overweight, and obese, while participants in the normal category included only slightly more than half. The results of the physical activity level showed that more than half of the participants were in the low and medium category, while participants in the high category included slightly fewer than 40%. Thus, the working-age population in Palembang City needs to increase their physical activity and maintain their nutritional intake to improve their BMI levels during the COVID-19 pandemic.

Key Words: physical activity, BMI, COVID-19, pandemic

Introduction

Physical activity (PA) levels have decreased during the COVID-19 pandemic (Martínez-de-Quel et al., 2021) even though PA has an impact on general health and well-being (Shulruf et al., 2020) and has been stated as one of the preventive measures against viral infection (Burtscher et al., 2021). The main reasons for this problem were the lockdown period and related social distancing measures that have altered the daily lifestyles of people worldwide (Raiola & Domenico, 2021; Yang et al., 2021). Almost all people have been forced to do more activities at home and fewer activities outdoors during the pandemic. Moreover, there were restrictions on several public places, including sports facilities. Previous studies showed the association between PA and a number of health benefits, such as improving health-related quality of life, cognitive function, and academic achievement (Donnelly et al., 2016; Gu et al., 2016; Jakobsson et al., 2012). Despite these well-documented health benefits, some previous studies showed that workers failed to achieve the recommended PA guidelines (Biswas et al., 2018; Flahr et al., 2018).

Indonesian government has gradually allowed people to do outdoor activities, but there are still large-scale restrictions on doing activities in public places. In addition, the physical distancing or social distancing policy has reduced the practice of PA both at moderate and high intensity levels and increased sedentary behaviour (Narici et al., 2020; Pecanha et al., 2020), although good PA, by maintaining activity levels before and during the pandemic, is very important for maintaining health (Chen et al., 2020; Lippi et al., 2020).

Indonesian government actually had started to promote PA during the pandemic through the Ministry of Human Development and Culture with Healthy Living Community Movement (Germas), and the Ministry of Youth and Sports with some tutorials in various forms of community sports. Germas and the tutorials were designed to encourage people to do PA during this pandemic, but unfortunately, these campaigns have not spread massively throughout the Indonesian society, especially in Palembang.

A similar previous study (Katewongsa et al., 2020) showed that the lockdown in Thailand slowed the progress in achieving its PA goals, but moderate-to-vigorous PA in Thailand has increased. One of the contributing factors was possibly the Fit from Home campaign, which was distributed nationwide through various channels, including print and online media in Thailand. There are also some previous studies that

described physical activity during COVID-19 pandemic in several countries (Amini et al., 2020; Dunton et al., 2020; Orlandi et al., 2021), and Thailand is one of the countries that has some similarities with Indonesia (Kusmiatun & Liliani, 2020; Siagian & Tike, 2019). Different approaches to the pandemic can have different impacts on the PA levels in each country or maybe even in each region of each country.

Palembang is one of biggest cities in Indonesia, and its population, according to the Palembang City Central Bureau of Statistics in 2019, reached 1,662,893 people with 1,162,736 of them being of working-age. Similar to other cities throughout Indonesia, Palembang experienced the impact of the COVID-19 pandemic; thus, daily activities were mostly carried out at home. COVID-19 has had an impact on PA patterns of students and workers that have been limited by social / physical distancing (Silva et al., 2021; Srivastav et al., 2021). Previous studies show that 53.2% and 52.4% of Palembang population had low PA levels before the pandemic (Bonita et al., 2017; Ridwanmo et al., 2020). During the pandemic, students and workers in Palembang have been learning and working from home, which has led to behavioural changes. This statement is supported by previous studies that investigated the potential consequences of the COVID-19 pandemic on the life of students (Chaturvedi et al., 2021; López-Bueno et al., 2021) and behavioural changes of workers who work from home during the COVID-19 pandemic (Sato et al., 2021). These statements and studies generated further questions about the effects of PA levels of the working-age population in Palembang City who had to work or do activities from home during the pandemic.

The purpose of this study was to analyse the PA levels and body mass index (BMI) profiles of the working-age population in Palembang, South Sumatera, Indonesia, during the COVID-19 pandemic. One of the indicators to describe wellness and/or health risks for the working-age population is BMI, which has been used in several previous studies (Bulbrook et al., 2021; Hammer et al., 2019).

Materials and Methods

In total, 735 participants (M: 416; F: 319) with a minimum age of 15 (26.14±9.46) participated in this study. The data were collected for 4 weeks in February 2021 by measuring the height and weight and the observing PA behaviour of the participants using the survey. The summary of participant demography is shown in Table 1.

Table 1. Participant Demographics

Variable		Frequency	Percent
Gender	Male	416	56,60%
	Female	319	43,40%
Age	Max	59	
	Min	15	
	St. Deviation	9.6	
	Average	26,14	

The method used in this study was a survey using an online Short-Form of the International Physical Activity Questionnaire (IPAQ-SF) to assess PA and energy expenditure levels based on Metabolic Equivalents of Task (MET). PA variables were measured using the IPAQ-SF instrument, which has specifications for respondents 15 years old and over, has predictive validity, concurrent validity, convergent validity, criterion validity, and discriminant validity, these are suitable as research tools, and a good test-retest is a sign that the instrument is reliable (Craig et al., 2003; Papathanasiou et al., 2010). PA contents were calculated using the following formula:

$$MET = (3,3 \times \text{day} \times \text{light activity time}) + (4 \times \text{day} \times \text{moderate activity time}) + (8 \times \text{day} \times \text{vigorous activity time})$$

Note: the time unit is in minutes

The results of MET were then converted using the rule that MET<600 is in the low category, 600≤MET<3,000 is in the medium category, and MET≥3,000 is in the high category (*Guidelines for Data Processing and Analysis of the International Physical Activity Questionnaire (IPAQ)-Short Form*, 2004).

The BMI variables were measured using weight and height data calculated using the formula for height divided by body weight squared (Stienen et al., 2019). Furthermore, the calculation results were categorized based on the rules of underweight (BMI<18.5), ideal (BMI=18.5-24.9), overweight (BMI=25-29.9), and obese (BMI≥30) (WHO, 2020). The data analysis was performed via descriptive statistics for physical activity data and BMI. Meanwhile, Chi-square was used to determine the correlation between PA and BMI.

Results

The following Table 2 contains the descriptive statistics related to body anthropometry and physical activity (PA) of the participants in this study while Table 3 contains the frequency distribution of BMI and MET category.

Table 2. Body Anthropometry Descriptive Statistics

Categorize	Height	Weight	Body Mass Index (BMI)	Metabolic Equivalent of Task (MET)
Max	186	110	39.11	41676
Min	135	38	12.91	0
St. Deviation	8.21	12,83	3.97	5206
Average	163.87	62,55	23.21	3730

Table 3. Frequency Distribution of BMI and MET Category

Variable	Frequency	Percent
BMI Category	<i>Underweight</i>	95 12.93%
	<i>Ideal</i>	417 56.73%
	<i>Overweight</i>	162 22.04%
	<i>Obese</i>	61 8.30%
MET Category	Low	160 21.77%
	Moderate	288 39.18%
	High	287 39.05%

Table 2 shows an overview of the height, weight, BMI and MET values of the working-age population in Palembang City. The BMI profile of the working-age population in Palembang City in this study is shown in Table 3 as follows: 95 (12.93%) participants were in the underweight category, 417 (56.73%) were in the ideal category, 162 (22.04%) were in the overweight category and 61 (8.30%) were in the obese category. For the results of the PA levels, according to the MET of the participants, 160 (21.77%) participants were in the low-level category, 288 (39.18%) were in the medium level category, and 287 (39.05%) were in the high-level category.

Based on the BMI and MET values that were used as the categorical data, a cross tabulation analysis was applied to determine the correlation between BMI and PA. Table 3 shows the results of the analysis using the cross tabulation method by using the Chi-square value.

Table 3. Cross tabulation Analysis of the Correlation between BMI and PA

		<i>Metabolic Equivalent of Task</i>			Total	X ²	p
		<i>Low</i>	<i>Moderate</i>	<i>High</i>			
Body Mass Index	<i>Underweight</i>	23	35	39	97	4.443	0.617
	<i>Normal</i>	90	154	168	412		
	<i>Overweight</i>	30	72	57	159		
	<i>Obese</i>	17	27	23	67		
Total		160	288	287	735		

The cross tabulation analysis was performed for three categories of PA and four categories of BMI. In total, of the 160 participants who were in the low MET category, 23 were underweight, 90 were normal, 30 were overweight, and 17 were in the obese category. Of the 288 participants who were in the moderate MET category, 35 were underweight, 154 were normal, 72 were overweight, and 27 were in the obese category. Of the 287 participants who were in the high MET category, 39 were underweight, 168 were normal, 57 were overweight, and 23 were in the obese category. Based on the results of the analysis, there was no correlation between BMI and PA as determined by the MET formula ($X^2 [6, N: 735] = 4.443; p = 0.617 < 0.05$).

Discussion

This study reports the PA levels and BMI profiles of the working-age population in Palembang, South Sumatera, during the COVID-19 pandemic. Several previous studies have tested the PA of the Palembang population, which was associated with several health problems. The results of prior studies (Bonita et al., 2017; Ridwanmo et al., 2020) show that 53.2% and 52.4% of participants had a low PA level, while participants with a high PA level included 46.8% and 47.6%, respectively.

The current condition has certainly become worse with the existence of COVID-19, which has forced the population in Palembang to do their activities at home. The results of this study indicate that the PA levels of the working-age population in Palembang City were lower than in previous studies. The total participants in this study who were in the high PA level category did not even reach 40%.

The results of the BMI calculation showed that almost half of the participants were a combination of underweight, overweight, and obese, while the participants in the normal category included only slightly more than half. Moreover, the cross tabulation analysis results showed that there was no correlation between BMI and

PA, and many working-age people in Palembang City were not in the normal BMI category. This was driven by several factors, including the large-scale restrictions that were applied during the pandemic. (Mathur et al., 2009) showed that PA could not maintain BMI and body proportion, but it could reduce the risk of being overweight and a high proportion of body fat in the population.

(Grasdalsmoen et al., 2019) stated that most young adults failed to meet international recommendations for exercise, and the proportion of those who were overweight increased in both sexes and across all age groups. In contrast to what happened in the United States, there was a significant increase in BMI, PA of more than 60 min a day, consumption of fruits and vegetables every day, and breakfast on weekdays and weekend (Iannotti & Wang, 2013a, 2013b). Television viewing and consumption of sweet foods and drinks decreased during the same period, and the same pattern was seen across all racial/ethnic groups. This pattern indicates that public health campaigns and health education to improve obesity-related behaviour in US adolescents might be successful. As suggested previously (Fiori et al., 2020), maintaining BMI levels from early childhood is essential for promoting children's health and proper fitness development.

Palembang is one of the biggest cities in Indonesia, where, as with several big cities in developing countries, the use of vehicles, especially motorcycles, is very excessive (Buchari, 2015). Legally, motorcycles can only be used by people who are mostly in the working-age group because one of the requirements to get a driving license in Indonesia is being at least 17 years old. Use of public transport generally involves some PA (Rissel et al., 2012); thus, excessive use of motorcycles leads to PA deterioration. In addition, online transportation (such as GOJEK and GRAB), which becomes more popular in Indonesia (Nasution et al., 2020), is possibly one of the factors that further reduces the use of public transportation, which indirectly reduces PA. Furthermore, one of the factors that is often associated with BMI is nutrition (Corrales et al., 2019; Zimmerman et al., 2018). There has been a paradigm shift in the meaning of food in Palembang City. Food has no longer become a basic need that must be fulfilled, but rather refers to a lifestyle that is created by the people of Palembang. Many people in Palembang have started to choose fast food or fancy restaurants as self-actualization (Misnawati & Isnawijayani, 2017).

Some of the factors above still have to be proven empirically because this study was limited to the analysis of the PA levels and BMI profiles of the working-age population in Palembang. Future research could further explore the factors that contribute to PA levels and BMI profiles for specific ranges of ages and/or occupations.

Conclusions

PA of the working-age population in Palembang City has been decreasing because of the COVID-19 pandemic. Several previous studies have tested the PA of the Palembang population, which was associated with several health problems, and the existence of COVID-19 has worsened the current condition. PA levels of the majority participants in this study were not in the high category, and almost half of the participants were in a combination of underweight, overweight, and obese BMI category. The large-scale restrictions that were caused by the COVID-19 pandemic were likely a factor that caused this to occur; however, future research could further explore the factors that contribute to PA levels and BMI profiles of the working-age population in Palembang City. It is suggested that the working-age population in Palembang City needs to enhance their physical activity to be fit and maintain their nutritional intake to improve their BMI levels during the COVID-19 pandemic.

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