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# Relationship between Levels of Physical Activity and the Incidence of Constipation in Medical Students

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**ABSTRACT**

**Background:** Physical activity refers to all body movements produced by skeletal muscle contractions that substantially increase energy expenditure. Constipation is a gastrointestinal disorder characterized by infrequent bowel movements, hard stools, painful defecation, excessive straining, and a sensation of incomplete evacuation. Reduced physical activity is considered one of the contributing factors to constipation. **Objectives:** This study aimed to determine the relationship between physical activity level and the occurrence of constipation among medical students of Universitas Andalas, class of 2020. **Methods:** This quantitative study used a cross-sectional design involving 68 respondents conducted in September until October 2023 at the Faculty of Medicine, Universitas Andalas. Respondents were selected using simple random sampling. Physical activity levels were assessed using the Global Physical Activity Questionnaire (GPAQ), while constipation was evaluated using the Constipation Scoring System questionnaire. Data analysis was performed using the Pearson chi-square test to determine the relationship between physical activity level and constipation occurrence. **Results:** The results showed that nearly half of the respondents (45.6%) had a moderate level of physical activity. Constipation was more frequently observed among female respondents and was most common at the age of 21 years. Statistical analysis demonstrated no significant relationship between physical activity level and the occurrence of constipation among medical students of Universitas Andalas, class of 2020 (p=0.052).**Conclusions:** There was no significant association between physical activity level and constipation occurrence among medical students of Universitas Andalas, class of 2020.
**Keywords:** constipation scoring system; global physical activity questionnaire; physical activity

**ABSTRAK**

**Latar Belakang:** Aktivitas fisik merupakan seluruh gerakan tubuh yang dihasilkan oleh kontraksi otot rangka dan berperan dalam meningkatkan pengeluaran energi. Konstipasi adalah gangguan gastrointestinal yang ditandai dengan penurunan frekuensi buang air besar, tinja keras, nyeri saat defekasi, kesulitan pengeluaran tinja, mengejan berlebihan, rasa tersumbat pada area anorektal, serta sensasi evakuasi yang tidak tuntas. Kurangnya aktivitas fisik diduga menjadi salah satu faktor yang berkontribusi terhadap terjadinya konstipasi. **Tujuan:** Penelitian ini bertujuan untuk mengetahui hubungan antara tingkat aktivitas fisik dan kejadian konstipasi pada mahasiswa kedokteran Universitas Andalas angkatan 2020. **Metode:** Penelitian ini merupakan penelitian kuantitatif dengan desain cross-sectional yang melibatkan 68 responden dan dilakukan pada dari September sampai Oktober 2023 di Fakultas Kedokteran Universitas Andalas. Pengambilan sampel dilakukan menggunakan metode

simple random sampling. Tingkat aktivitas fisik diukur menggunakan kuesioner Global Physical Activity Questionnaire (GPAQ), sedangkan kejadian konstipasi dinilai menggunakan Constipation Scoring System. Analisis hubungan antara tingkat aktivitas fisik dan kejadian konstipasi dilakukan menggunakan uji chi-square Pearson. **Hasil:** Hasil penelitian menunjukkan bahwa hampir setengah responden (45,6%) memiliki tingkat aktivitas fisik sedang. Kejadian konstipasi lebih banyak ditemukan pada responden perempuan dan paling sering terjadi pada usia 21 tahun. Analisis statistik menunjukkan tidak terdapat hubungan yang signifikan antara tingkat aktivitas fisik dan kejadian konstipasi pada mahasiswa kedokteran Universitas Andalas angkatan 2020 (p=0,052). **Kesimpulan:** Tidak terdapat hubungan yang signifikan antara tingkat aktivitas fisik dan kejadian konstipasi pada mahasiswa kedokteran Universitas Andalas angkatan 2020.
**Kata Kunci :** aktivitas fisik; konstipasi; kuesioner aktivitas fisik global

## 1. Introduction

Difficulty in defecating is one of the health problems that people often complain about. There is are surveys conducted in the United States, Canada and England, generally difficulty in defecating does not occur in the elderly, but usually occurs at the age of 18-34 years..[1] This causes discomfort and can affect a person's quality of life. The medical term for difficulty in defecating is known as constipation.[2]

Constipation is a condition when the frequency of defecation is decreasing and a feeling of wanting to push excessively during defecation.[3,4] Constipation is also characterized by hardened stools, painful defecation, stools that are difficult to expel, and a feeling of incomplete defecation..[3,4] The number of constipation cases that occur in several Asian countries, such as Korea, China and Indonesia are estimated at 11% in men and 15-23% in women, then the incidence of constipation was obtained at 6.07% in the age range 18-70 based on a report. study in Beijing.[5] Based on data obtained from Rumah Sakit Cipto Mangunkusumo (RSCM) Jakarta, it shows that the ratio of constipation cases occurring in women to men is 60:40 with a total of 129 women and 87 men.[5] Constipation can be caused by various things, such as the habit of holding back bowel movements, anatomical causes, the influence of medication consumption, and metabolic disorders.[6] Other research states that constipation can also be caused by a lack of physical activity.[6] Physical activity is a body movement produced by skeletal muscle contractions that is influenced by a series of emotions,ideas, instructions, and substantially increases energy expenditure.[7] Physical activity levels can be divided into three groups based on the metabolic equivalent of task (MET) value.[8] The definition of MET is a physiological quantity used to indicate the amount of energy for physical activity and is obtained from comparing the metabolic rate during activity to a person's resting metabolic rate.[8] Light physical activity has a MET value of less than 600 MET-minutes per week, moderate physical activity has a MET value between 600-3000 MET-minutes per week, while heavy physical activity has a MET value of more than 3000 MET-minutes per week.[8] Heavy physical activity generally occurs in productive age, aged 15-64 years.[9]

*Global Physical Activity Questionnaire (GPAQ) and Constipation Scoring System (CSS) are questionnaires used to measure physical activity levels and the incidence of constipation.*[10] The GPAQ and CSS instruments are easy to apply to students because they are easy to do and do not require additional equipment or costs.[11] Students are one of the groups who are at a productive age with diverse activity and lifestyle tendencies.[12] One study found that someone who is experiencing a transition period to becoming a student will experience lifestyle changes in the form of a decrease in physical activity and an increase in a sedentary lifestyle. However, based on research conducted by Farradika (2019), 52.2% of students have medium and high levels of activity.[13] Based on research conducted by Yildirim et al. (2021) in Turkey stated that 46.6% of medical students experienced constipation.[14] Research conducted by Azzahra (2022) also stated that 40.3% of medical students in Makassar experienced constipation.[15] Constipation that occurs in students can disrupt students physical activities. Untreated constipation can cause complications, such as hemorrhoids and megacolon.[16] This can also lead to a decrease in productivity levels which will affect student satisfaction and quality of life.[16,17]

Final-year medical students at Universitas Andalas have more diverse and intensive learning activities than students in earlier years. In addition to lectures, tutorials, clinical skills, practicums, and exams, they participate in junior clerkships and thesis preparation. These academic and student activities may influence their physical activity levels.Based on the description above, researchers are interested in conducting research on the relationship between physical activity levels and the incidence of constipation in Universitas Andalas Medical students class of 2020.

## 2. Method

This research is a quantitative study with a cross-sectional approach to determine the relationship between physical activity levels and the incidence of constipation in 68 medical students at the Faculty of Medicine, Universitas Andalas. This research was conducted with guided interviews using Google forms from September 2023 to October 2023 at the Faculty of Medicine, Universitas Andalas. The population in this study were students of the Medical Study Program, Faculty of Medicine, Universitas Andalas, class of 2020. The sampling technique in this study was simple random sampling. The research instrument used to get to know the levels of respondents physical activity was the GPAQ. This instrument is a questionnaire developed by WHO which consists of 16 questions. This questionnaire contains 16 questions related to work, travel, recreation and sedentary behavior in one week.[18] This GPAQ instrument has been tested for validity and reliability in 9 countries, one of which is Indonesia, with results of a moderate level of validity ranging from 0.45 to 0.65.[19] Then, for the reliability test results, strong reliability values were obtained with Kappa results of 0.67 to 0.73; Spearman rho 0.67 to 0.81.

The instrument used to measure the quantity and quality of respondents' defecation was CSS.[20] This instrument consists of 8 questions and has been tested for validity on 232 people previously by Agachan (1996). The results were significant with $p < 0.05$.[20] In research conducted by Oktaviani (2016) and Valentina et al. (2019) stated that this instrument had also been tested for validity with a valid result of $r > 0.88$ and a reliability test with a reliable result of 0.97.[21,22] Data was obtained through distributing GPAQ and CSS questionnaires which had been translated into Indonesian to students of the Medical Study Program, Faculty of Medicine, Universitas Andalas, Class of 2020. These two questionnaires were distributed using the Google form platform to students of the Medical Study Program, Faculty of Medicine, Universitas Andalas, Class of 2020.

The data obtained in the form of GPAQ and CSS questionnaire results were processed using Microsoft Excel and grouped according to existing criteria. The processed data results in the form of respondents' physical activity levels starting from light, moderate, to heavy. Then there is also data in the form of results on whether the respondent experiences constipation or not. This data, along with gender and age data will be entered into a computer program. Then, a code will be provided to facilitate data analysis. After that, the data is checked again to ensure there are no errors in the data processing process.

In this research, analysis will be carried out in the form of univariate analysis to see the frequency of variables of physical activity level, gender, age and constipation. After that, bivariate analysis was carried out with the Pearson chi-square test to determine the relationship between physical activity level and the incidence of constipation. This research has been carried out in accordance with the ethical permission that has been issued by No. 517/UN.16.2/KEP-FK/2023. In table 1, the most common age of respondents was 21 years, 47 (69.1%) of the respondents. Based on gender, the number of female respondents (75%) was three times more than male respondents (25%).

**Table 1** Respondent Characteristic

| Respondent Characteristic Variables | (n=68) |
|---|---|
| Age | |
| 20 Years | 11 (16,2%) |
| 21 Years | 47 (69,1%) |
| 22 Years | 10 (14,7%) |
| Gender | |
| Male | 17 (25%) |
| Female | 51 (75%) |

Based on table 2, it shows that the majority of respondents had a moderate level of physical activity, 31 (45.6%) respondents and the least number of respondents had a light physical activity level, 14 (20.6%) respondents

**Table 2** Overview of Physical Activity Levels

| Activity Level | Frequency | Percentage (%) |
|---|---|---|
| Light | 14 | 20.6 |
| Moderate | 31 | 45.6 |
| Heavy | 23 | 33.8 |
| **Total** | 68 | 100 |

Based on table 3, it was found that the majority of respondents did not experience constipation, 53 (77.9%) respondents, while 15 (22.1%) respondents experienced constipation. Based on table 4, it was found that 15 students experienced constipation. Based on this table, the age of respondents who experienced constipation was at most 21 years old, 10 (66.7%) respondents. Then, the gender of the respondents who experienced the most constipation was women, 9 (60%) of the respondents.

**Table 3.** Overview of Constipation

| Occurrence of Constipation | Frequency | Percentage (%) |
|---|---|---|
| No | 53 | 77,9 |
| Constipation | 15 | 22,1 |
| **Total** | 68 | 100 |

**Table 4**. The Incidence of Constipation Based on Age and Gender

| Respondent Characteristics | Frequency (n=15) | Percentage (%) |
|---|---|---|
| Age | | |
| 20 Years | 3 | 20 |
| 21 Years | 10 | 66,7 |
| 22 Years | 2 | 13,3 |
| Gender | | |
| Male | 6 | 40 |
| Female | 9 | 60 |

Based on table 5, the test results obtained using the chi-square test showed an insignificant p value ($p > 0.05$) of 0.052 so there was no significant relationship between the incidence of constipation and the level of physical activity of Universitas Andalas Medical students class of 2020.

**Table 5.** Relationship Between Physical Activity Levels and The Incidence of Constipation

| Physical Activity Level | Occurrence of Constipation | | | | Total | | P value |
|---|---|---|---|---|---|---|---|
| | No Constipation | | Constipation | | | | |
| | n | % | n | % | N | % | |
| Light | 8 | 57,1 | 6 | 42,9 | 14 | 100 | |
| Moderate | 24 | 77,4 | 7 | 22,6 | 31 | 100 | 0,052 |
| Heavy | 21 | 91,3 | 2 | 8,7 | 23 | 100 | |
| **Total** | 53 | 77,9 | 15 | 22,1 | 68 | 100 | |

## 3. Discussion

Based on the results of this study, it was found that the highest level of physical activity was moderate physical activity with 31 respondents (45.6%), followed by heavy physical activity with 23 respondents (33.8%), and the lowest level of physical activity was light physical activity. as many as 14 respondents (20.6%). This is in accordance with research conducted by Dewi (2021) who examined the relationship between physical activity and constipation in 204 students at the Makassar College of Health Sciences.[12] The results of this study stated that the highest level of physical activity was moderate physical activity level with 164 respondents (80.4%) and the lowest level was light physical activity level with 40 respondents (19.6%) Based on the research results obtained, almost half of the student respondents had a moderate level of physical activity. This could be because the daily physical activity carried out by respondents is an activity that has value METs more than or equal to 600 METs, such as sweeping, mopping, cooking, washing dishes, cleaning windows, cycling leisurely, and walking fast (at least 10 minutes continuously).[8] These results are in line with the results of the International Conference on Health Since which stated that the teenagers who were respondents carried out routine physical activities such as sweeping, mopping, sometimes cooking and other cleaning activities.[23] Research conducted by Karlina (2022) shows that student respondents have healthy behavior such as maintaining the cleanliness of their living (boarding) environment by sweeping and throwing away rubbish regularly.[24]

The level of light physical activity is if someone does activities with energy expenditure of less than 600 MET minutes per week.[8] Examples of activities that are included in light physical activity are walking leisurely, making the bed, sitting working in front of the computer, washing hands, brushing teeth, and eating.[25] The results of this study showed that students who had a light level of physical activity consisted of 14 of the 68 respondent. Based on the curriculum, the class of 2020 class activity schedule consists of lectures, tutorial discussions, clinical skills, practicums, exams, thesis preparation, and junior clerkships. Class of 2020 students are also active students who can take part in various organizational activities and other committees. Therefore, this can cause the number of students with light physical activity levels to tend to be low. Light physical activity generally occurs in the elderly.[26] This is because at the age of 60 years, activity tends to decrease.[27] This is similar to the results of research conducted by Sari (2016) that the majority of elderly people (73.5%) had light physical activity levels.[27]
Based on the results of this research, there are several students whose physical activity levels fall into the heavy category. Heavy physical activity itself is activity that has a MET value of more than or equal to 3000 MET minutes per week.[8] Examples include running, playing tennis, football, playing basketball, swimming, karate and fast cycling.[25,28] Apart from a fairly busy schedule of lecture activities, there are several students who also routinely do strenuous exercise, as in the example above, every week. This causes students with quite diverse activities to have a heavy level of physical activity.

Based on the results of this research, it was found that the majority of respondents did not experience constipation. There were 53 respondents (77.9%) who did not experience constipation. Meanwhile, 15 respondents (22.1%) experienced constipation. This is in accordance with research conducted by Nainggolan (2021) that the majority of respondents (87%) did not experience constipation and only a small percentage of respondents (13%) experienced constipation.[29] Apart from that, in research conducted by Macedo (2020) to determine the relationship between overweight, physical activity, fat intake and constipation, it was found that the number of respondents who experienced constipation was less than those who experienced constipation, amounting to 24.9% of 386 respondents.[30]
Based on the results of this research, constipation was mostly experienced by female respondents, namely 60% and 66.7% of respondents aged 21 years. The results of this study show results that are in accordance with research conducted by Aulia (2022) that the prevalence of constipation in adolescent girls was 60.9%, whereas in adolescent boys it was 39.1%.[31] Research conducted by Budianto (2018) also showed that more women experienced constipation by 70.3%.[32] The higher incidence of constipation in women can be influenced by the menstrual cycle which is only experienced by women. During the luteal phase of menstruation, the hormone progesterone will increase. The increase in the hormone progesterone can cause bowel movements to slow down, thereby increasing the risk of constipation.[33]

The importance of education about nutrition such as fiber intake, fluid consumption, and lifestyle modifications to be more active can prevent constipation. Research conducted by Ozturk (2019) shows that there were positive changes for the group of patients who received educational intervention regarding consumption of a diet rich in fiber and hydration of body fluids.[34] Other education such as doing physical activity regularly, three times a week for a minimum of 60 minutes, with the aim of achieving 40-60% of the

target heart rate, has been proven to reduce symptoms of constipation.[35] Another way of education can be to provide understanding in the form of good bowel habits by not holding back when there is a feeling of wanting to defecate, avoiding straining, and avoiding drugs that have the potential to increase constipation such as opioids.[35,36]

In this study, to determine the relationship between physical activity level and the incidence of constipation, bivariate analysis was carried out using the Chi-square test. Bivariate analysis between the level of physical activity and the incidence of constipation using the Chi-square test obtained a value of p = 0.052. Because the p value is more than 0.05, it is found that the relationship between physical activity level and the incidence of constipation is not significant. Research conducted by Macedo (2020) concluded that there is no relationship between physical activity and constipation. This research was conducted on 386 samples of teenagers in Brazil and the results of statistical analysis showed a p-value of 0.051.[30] Similar results were also found by Sugiantoro (2023) who examined the relationship between physical activity and drinking water on constipation in medical students at Bandung Islamic University.[37]

These results are in accordance with research conducted by Moedjiono (2023) in Sidoarjo.[38] The research was conducted on 191 female students and female students aged 11-14 years. The results of this research showed that there was no significant relationship between physical activity and constipation.[38] The relationship that was not significant in this study was caused by other factors that were not studied, such as fiber intake and fluid intake, while both of these things can influence the occurrence of constipation.[36] This is caused by the nature of fiber which is able to bind water in the large intestine which results in an increase in fecal volume and stimulates the nerves in the rectal area, thus causing the urge to defecate immediately.[39] Apart from having water retention properties, fiber can also increase the production of good bacteria in the large intestine and speed up the transit time of the large intestine so that feces will not stay in the large intestine for long which can prevent constipation.[40] Apart from consuming fiber, consuming fluids also has an influence on the occurrence of constipation because fluids act as a lubricant which helps facilitate the movement of metabolic waste in the large intestine.[39]

The results of research conducted by Sitorus (2019) stated that there was no significant relationship between physical activity and constipation. This research was conducted on 57 respondents in Bandung and the results of statistical analysis obtained a p-value of 0.463[26] There are shortcomings in this research related to the focus on measuring constipation which only uses the Bristol Stool Chart. Accurately assessing the occurrence of constipation does not only measure the consistency of existing feces. However, you must also consider various other symptoms that have been described in the Rome IV criteria guidelines to identify the occurrence of constipation.[41] This insignificant relationship was also caused by other variables that were not studied, such as stress factors and poor sleep patterns. Stress is believed to modulate the gut-brain axis or HPA axis and affect intestinal motility.[40] Psychological stress is also associated with increased tension in the pelvic floor muscles.[40]

Research conducted by Nainggolan (2021) obtained results that were contradictory to this research. The results of research conducted on 100 medical students at the University of North Sumatra showed that physical activity was related to the incidence of constipation, namely with an r value of - 0.397.29 The r value in Nainggolan's (2021) research was 0.397, meaning that the strength of the relationship between these two variables is sufficient or moderate. Similar results were also obtained in research conducted by Dewi (2021), it was found that physical activity and constipation were related.[12] Heavy physical activity will trigger the gastrointestinal tract to push the contents of the large intestine and rectum, making it easier for a person to defecate.[42] Physical activity such as exercise can increase blood flow to the digestive tract and increase the strength of the diaphragm muscle.[43] Exercising can also stimulate the tone of the abdominal and pelvic muscles to increase the peristalsis of the smooth muscles of the large intestine and speed up colonic transit time so that feces will not stay in the large intestine for too long, allowing for more water absorption.[37,44]

**4. Conclusion**

Based on the results of research conducted on Universitas Andalas Medical students class of 2020, it can be concluded that the incidence of constipation is more common in women and occurs most often at the age of 21 years. Nearly half of students' physical activity levels have moderate or sufficient levels of physical activity, followed by heavy and light physical activity. There is no significant relationship between the level of physical activity and the incidence of constipation.

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