The Association Between Smoking Activity and Physical Fitness of Males Aged 18-22 Years at Udayana University

Angie Putri Camellia[1], I Dewa Ayu Inten Dwi Primayanti[2], Luh Putu Ratna Sundari[3], I Putu Adiartha Griadhi[4]

[1]Bachelor of Medicine, [2]Department of Physiology, [3]Department of Physiology, [4]Department of Physiology, Udayana University, Denpasar, Indonesia.

Corresponding Author: I Dewa Ayu Inten Dwi Primayanti

ABSTRACT

Background. Lack of movement activity in a person can lead to a decrease in physical fitness. There are many factors that affect physical fitness, one of which is smoking. Smoking has become a lifestyle in some developing countries, including Indonesia. The habit of smoking is easily found in various environments, including students. Therefore, researchers want to conduct further research to find the association between smoking habits and physical fitness in male aged 18-22 years at Udayana University.

Method. This research is a cross sectional method. The research subjects were males aged 18-22 years totaling 95 people. The research was conducted in direct and indirect ways. The direct way is used to measure the physical fitness of the respondents using the Multi Stage Fitness Test (MSFT). The indirect way (questionnaire) is used to determine the level of smoking habits of respondents. The research will be conducted at Udayana University for 3 months starting from January to March 2024.

Result. The results showed that 33 samples (34.7%) smoked with low intensity, 20 samples (21.1%) smoked with moderate intensity, and 42 samples (44.2%) smoked with high intensity. Based on MSFT, 41 samples (43.2%) had very poor physical fitness, 37 samples (38.9%) had poor physical fitness, and 17 samples (17.9%) had good physical fitness. This study showed a weak association between smoking activity and physical fitness (p = 0.01; r = -0.376).

Conclusion. The conclusion in this study is that there is a significant association between smoking habits and physical fitness in males aged 18-22 years at Udayana University with a value of p = 0.01. The correlation coefficient shows -0.376 which means there is a weak association between smoking activity and physical fitness. The minus value shows an inversely proportional association between smoking activity and physical fitness where if there is an increase in smoking frequency, the level of physical fitness will decrease.

Keywords: smoking, physical fitness, male

INTRODUCTION

In this modern age, technology and electronic media continue to develop, which has an impact on physical activity. Movement is an activity that is vital for humans from birth to adulthood. The development of movement is closely related to a person's physical, mental, social and emotional development. Lack of movement activity in a person can lead to a decrease in physical fitness. Physical fitness is a body condition that shows the potential and

physical ability to perform an activity with optimal results without showing significant fatigue.[1]

There are two factors that affect physical fitness, namely internal factors and external factors. Internal factors are something that is permanent in a person's body, such as genetic factors, age, and gender. External factors are things that come from outside the body, such as adequate rest, nutritional status, hemoglobin levels, and smoking habits.[2]

Smoking is a habit that has a serious impact on the health of individuals and society in general. The habit of smoking is easily found in various environments, including the academic environment. Based on a brief survey that the researcher conducted on several students, the researcher obtained some information related to the number of students who have a smoking habit. Smoking activities can negatively affect the physical and mental well-being of individuals, and interfere with academic and professional productivity.

Therefore, the researcher would like to conduct further research to find the association between smoking habits and physical fitness in males aged 18-22 years at Udayana University. The results of this study are expected to make an important contribution to improving the health environment and behavior of males at Udayana University.

LITERATURE REVIEW

Cigarettes are processed tobacco products made with the aim of being burned, smoked and inhaled.[3] Cigarettes are processed tobacco that is wrapped and cylindrical.[4] People who consume cigarettes are referred to as smokers. Smokers are generally divided into 2 types, namely active smokers and passive smokers. Active smokers are people who consume cigarettes regularly or not routinely by smoking cigarettes directly and exhaling smoke.[5] Meanwhile, passive smokers are people who do not consume cigarettes but inhale the smoke of other cigarettes.[6]

Smoking has become a way of life for people, both young and old. Based on RISKESDAS, Indonesia ranks third in the number of smokers after India and China.[7] Based on the survey results obtained by the Global Adult Tobacco Survey (GATS), there is a significant increase in the number of smokers, where from 60.3 million smokers in 2011 it increased to 69.1 million smokers in 2021.[6]

There are various substances in cigarettes. Nicotine, an organic chemical compound that is toxic to nerves. One of the side effects of nicotine that makes many people consume cigarettes is to make relax and calm, thus causing a sense of addiction for those who consume it. Consuming 4-6 mg of nicotine per day can already cause a sense of addiction to appear. In Indonesia, nicotine levels in cigarette sticks reach 17 mg per stick. Tar, a chemical substance that is a carcinogen, which can cause cancer in the respiratory tract of smokers. When smokers smoke cigarettes, tar will enter the oral cavity in the form of solid vapor. Then, the tar will increase in density to form brownish deposits that can stick to the surface of the teeth and lungs. Lead, a metal element that can cause metabolic disorders and damage to the brain. The lead content in one cigarette reaches 0.5 μg, whereas the threshold value of lead that can enter the body is only 20 μg per day. Carbon monoxide is an odorless gas that comes from incomplete combustion. Carbon monoxide has a strong binding power with hemoglobin in erythrocytes. Hemoglobin has an important role in cellular respiration when it binds to oxygen. Oxygen that is replaced by carbon monoxide can certainly disrupt the body's respiratory system.[4] The substances contained in cigarettes can cause various diseases such as: coronary thrombosis, bronchitis, coronary heart disease, and cancer.[8]

Physical fitness is the ability of an individual to carry out daily activities with physical excellence without experiencing significant fatigue and having the physical ability to carry out other additional activities.[9] The components of physical fitness can be

divided into two aspects, namely: physical fitness related to health and physical fitness related to skills. Physical fitness related to health consist of endurance, strength, flexibility. Physical fitness related to skills consist of speed, agility, balance, accuracy, power, coordination.[10] Several factors influence physical fitness, including genetics, age, gender, diet, and smoking habits. Smoking habit is related to the value of maximum oxygen volume (VO2Max). Maximal oxygen volume is the ability of an individual to inhale and use oxygen optimally. Cigarettes contain CO which if smoked can reduce the value of VO2Max which affects physical fitness.[11]

There are several kinds of measuring instruments that can be used to measure the physical fitness of an individual, one of which is the Multi Stage Fitness Test (MSFT) or beep test. Multi Stage Fitness Test is a measuring instrument that is generally used to assess individual VO2Max by measuring the ability to run back and forth for 20 meters and 1.5 meters wide by following the rhythm of the "beep".[12] VO2Max is the maximum amount of oxygen that can be consumed by a person during regular physical activity. It also reflects the body's fitness level at any given moment. The higher the VO2Max value, the lower the level of fatigue that will be felt when doing certain activities.[13] The following is a group classification related to the results of VO2Max scores.[14]

Table 1: Male VO2Max Category Score

Years	Very poor	Poor	Fair	Average	Good	Very good	Excellent
12-13	< 3/3	3/3-5/1	5/2-6/4	6/5-7/5	7/6-8/8	8/9-10/9	> 10/9
14-15	< 4/7	4/7-6/1	6/2-7/4	7/5-8/9	8/10-9/8	9/9-12/2	> 12/2
16-17	< 5/1	5/1-6/8	6/9-8/2	8/3-9/9	9/10-11/3	11/4-13/7	> 13/7
18-25	< 5/2	5/2-7/1	7/2-8/5	8/6-10/1	10/2-11/5	11/6-13/10	> 13/10
26-35	< 5/2	5/2-6/5	6/6-7/9	7/10-8/9	8/10-10/6	10/7-12/9	> 12/9
36-45	< 3/8	3/8-5/3	5/4-6/4	6/5-7/7	7/8-8/9	8/10-11/3	> 11/3
46-55	< 3/6	3/6-4/6	4/7-5/5	5/6-6/6	6/7-7/7	7/8-9/5	> 9/5
56-65	< 2/7	2/7-3/6	3/7-4/8	4/9-5/6	5/7-6/8	6/9-8/4	> 8/4

Physical fitness plays an important role in daily activities. Physical fitness can be influenced by various factors, one of which is smoking. The association between smoking and physical fitness has been supported by several studies conducted by other researchers. Based on research conducted by Yusup in on 96 adolescent boys at SMKN 03 Tangerang Regency in 2020, it was found that 65 people (67.7%) had light smoking habits and 31 people (32.3%) had heavy smoking habits. In addition, this study also obtained statistical test results with a P value = 0.020 which showed an association between smoking habits and physical fitness in adolescent boys at SMKN 03 Tangerang Regency.[15]

In addition, based on other research conducted by Kurniadi in 2019 on futsal extracurricular participants at SMA Negeri 1 Kepanjen, it was found that there was a significant association between smoking habits and physical fitness with a significance value of 0.010. Physical fitness in smokers is lower than non-smokers because hemoglobin has a stronger binding power with CO than oxygen.[1]

MATERIALS & METHODS

The study was conducted with an analytic approach with a cross sectional method. The analytic approach aims to find the association between smoking activity and physical fitness. The research was conducted in direct and indirect ways. The direct way is used to measure the physical fitness of the respondents using the MSFT. The indirect way (questionnaire) is used to determine the level of smoking habits of respondents. The research will be conducted at Udayana University for 2 months starting from January to February 2024. The inclusion

criteria in this study consisted of males aged 18-22 years at Udayana University who were willing to fill out a questionnaire and informed consent. Exclusion criteria in this study consisted of males aged 18-22 years at Udayana University who did not smoke. The sampling using consecutive sampling where respondents who meet the inclusion criteria will be included as research samples.

The variables in this study consisted of smoking habits and physical fitness. The research questionnaire consisted of informed consent, personal data, and smoking behavior questionnaire. The researcher used Azkitari's (2012) smoking behavior questionnaire which contained 21 questions about smoking behavior where respondents were given four answer options: always (score 4), often (score 3), sometimes (score 2), never (score 1).[16] The final results of respondents' scores were grouped into three categories, namely: respondents' scores ranged from 38-46, then smoking behavior was classified as low; respondents' scores ranged from 47-52, then smoking behavior was classified as moderate; respondents' scores ranged from 53-72, then smoking behavior was classified as high.

The MSFT is performed by running back and forth between two lines that have been measured using a meter, with boundaries marked by cones with a distance of 20 meters. As long as there is a "beep" sound from the test tone instrument, students must run from the initial cone to the second cone. If the "beep" sound is heard again, the student must run back from the second cone to the starting cone. This process is repeated until the student reaches a certain level and return, and if the student does not reach the cone before the "beep" sound is heard, it is considered unsuccessful. This test is considered to have good reliability and validity to be conducted.[17] The final results of the MSFT calculation are grouped into three categories, namely: the return obtained by the respondent is <5/2, so physical fitness is classified as very poor; the return obtained by respondents ranged from 5/2 – 10/1, so physical fitness was classified as poor; the

return obtained by respondents is > 10/1, then physical fitness is classified as good.

STATISTICAL ANALYSIS

In this study, researchers will distribute questionnaires online to males aged 18-22 years at Udayana University who smoke. After the minimum sample is met, the researcher will contact the respondent and provide a schedule for conducting the MSFT. After that, researchers will carry out data processing and data analysis using bivariate analysis. Bivariate analysis was carried out to determine whether there was an association between smoking habit variables and physical fitness variables. In this study, the correlation test was carried out using the Spearman's Rho test. If a p value ≤ 0.05 is obtained, the research results are significant so that H1 is accepted and H0 is rejected. Meanwhile, if a p value > 0.05 is obtained, the research results are not significant so H1 is rejected and H0 is accepted. After obtaining significant results, data analysis will continue by determining the level of correlation coefficient (r).

Table 2: Correlation Coefficient Level

r	Interpretation
0,0 - < 0,2	Very weak
0,2 - < 0,4	Weak
0,4 - < 0,6	Moderate
0,6 - < 0,8	Strong
0,8 - 1,00	Very strong

RESULT

Table 3: Research Sample Characteristics

Variable	N=95	%
Gender		
Male	95	100
Female	-	-
Age		
Median (min-max)	21 (20-22)	
Smoking Activity		
Low	33	34,7
Moderate	20	21,1
High	42	44,2
Physical Fitness		
Very poor	41	43,2
Poor	37	38,9
Good	17	17,9

This research was conducted at Udayana University by distributing questionnaires and asking respondents to do a beep test. This research was carried out for 2 months starting from January 2024 to February 2024. The characteristics of the entire sample can be seen in Table 3 where the total sample in this study was 95 people.

Based on Table 3, all samples in this study were males (100%). The age distribution in this study was not normally distributed with the majority aged 21 years (45.3%). The majority of the sample smoked with high frequency (44.2%). Apart from that, the frequency of physical fitness in this study had a similar frequency between levels of physical fitness which were divided into three categories, namely: very poor, poor, and good.

Table 4: Analysis of the Association between Smoking Activity and Physical Fitness using Spearman's Rho

Smoking Activity	Physical Fitness				p value	r
	Very poor	Poor	Good	Total		
Low	8	15	10	33	0,01	-0,376
Moderate	6	11	3	20		
High	27	11	4	42		
Total	**41**	**37**	**17**	**95**		

Analysis of the association between smoking activity and physical fitness was carried out using Spearman's Rho (Table 4). Research results are said to be significant if the p value is ≤ 0.05. The results of the Spearman's Rho analysis test show a p value = 0.01, which indicates there is a significant association between smoking activity and physical fitness. The results of the correlation coefficient (r) show a value of -0.376. This shows an inverse association between smoking activity and physical fitness, where if there is an increase in smoking frequency, the level of physical fitness will decrease. The correlation coefficient value in this study shows a weak association between smoking activity and physical fitness.

DISCUSSION

Smoking is a risk factor that affects physical fitness. Individuals who smoke generally experience decreased physical fitness due to decreased oxygen supply. This is because cigarette smoke contains toxins that are dangerous to health, such as: nicotine, tar and carbon monoxide. Tar can cause a decrease in physical fitness because it is sticky and sticks to the lungs. Carbon monoxide gas has the ability to bind to hemoglobin more strongly than oxygen. This causes a reduction in oxygen supply in the body.[15] Nicotine creates a pleasurable sensation and activates the dopaminergic system to release dopamine, which makes smokers feel calm, increased thinking power, and the feeling of hunger disappears. Apart from that, nicotine also activates the adrenergic system in the locus coeruleus of the brain, which releases serotonin, which causes feelings of pleasure and the desire to smoke again. After that, a person will become addicted to cigarettes, which is caused by the toxins contained in cigarettes. As a result, cigarettes contain many dangerous chemicals such as tar, carbon dioxide gas and very high levels of nicotine. These chemicals can interfere with heart and lung function, negatively impacting a person's physical fitness level, as well as reducing exercise habits. This will interfere with heart and lung function which will affect an individual's physical fitness level.

The results of this study indicate that there is a weak association between smoking frequency and physical fitness level. This is in accordance with other research conducted by Listyanto on 30 students at SMA Negeri 1 Pacet which showed a moderate association between smoking habits and physical fitness (r = -0.539).[18] Apart from that, there was a similar study conducted on 21 futsal extracurricular participants at SMA Negeri 1 Kepanjen. The research results also show an association between smoking habits and

physical fitness (p = 0.01).[1] Not only that, research conducted by Yusup on 15 male students at SMK Negeri 3 Tangerang Regency also showed a similar thing (p = 0.010). This shows that there is an association between smoking habits and physical fitness in young males. Based on the results of the correlation test for 2 variables, the OR value was 3.106. This shows that young males with heavy smoking habits have a 3.106 times chance of having worse physical fitness compared to young males with light smoking habits.[15]

CONCLUSION

The result of this study shows an association between smoking frequency and physical fitness levels in males aged 18-22 years at Udayana University with a value of p = 0.01. The correlation coefficient shows -0.376, which means there is a weak association between smoking activity and physical fitness. A minus value indicates an inverse association between smoking activity and physical fitness, where if there is an increase in smoking frequency, the level of physical fitness will decrease.

Declaration by Authors

REFERENCES

1. Kurniadi DAE, Wahyudi U, Heynoek FP. Hubungan Kebiasaan Merokok terhadap Tingkat Kesegaran Jasmani Peserta Ekstrakurikuler Futsal Putra. Sport Science and Health [Internet]. 2019;1(2):126–31. Available from: http://journal2.um.ac.id/index.php/jfik/article/view/10631/4793
2. Nurhasan. Petunjuk Praktis Pendidikan Jasmani [Internet]. 2005 [cited 2023 Feb 9]. Available from: https://scholar.google.co.id/citations?view_op=view_citation&hl=en&user=TTm1yWYAAAAJ&citation_for_view=TTm1yWYAAAAJ:u-x6o8ySG0sC
3. KemenkesRI. Permenkes RI No. 28 Tahun 2013. Kementrian Kesehatan Republik Indonesia. 2013;1–46.
4. Aji A, Maulinda L, Amin S. Isolasi Nikotin Dari Puntung Rokok Sebagai Insektisida. Jurnal Teknologi Kimia Unimal [Internet]. 2015;4(1):100–20. Available from: http://ft.unimal.ac.id/teknik_kimia/jurnal
5. Kemenkes Republik Indonesia. Apa itu Perokok Aktif? - Direktorat P2PTM [Internet]. 2019 [cited 2023 Feb 22]. Available from: https://p2ptm.kemkes.go.id/infographic-p2ptm/penyakit-paru-kronik/apa-itu-perokok-aktif
6. Kemenkes RI. Temuan Survei GATS: Perokok Dewasa di Indonesia Naik 10 Tahun Terakhir – Sehat Negeriku [Internet]. 2022 [cited 2023 Feb 22]. Available from: https://sehatnegeriku.kemkes.go.id/baca/umum/20220601/4440021/temuan-survei-gats-perokok-dewasa-di-indonesia-naik-10-tahun-terakhir/
7. RISKESDAS. HTTS 2022: Seberapa Besar Populasi Perokok di Indonesia? [Internet]. 2022 [cited 2023 Feb 9]. Available from: https://dinkes.jakarta.go.id/berita/read/htts-2022-seberapa-besar-populasi-perokok-di-indonesia
8. Nururrahmah. Pengaruh Rokok Terhadap Kesehatan Manusia. Jurnal Dinamika [Internet]. 2011;02(2):45–51. Available from: https://journal.uncp.ac.id/index.php/dinamika/article/view/11
9. Faqih A, Hartati S. Survei Tingkat Kebugaran Jasmani Siswa Kelas Iv Dan V Sekolah Dasar Segugus Selatan Kecamatan Plumpang Kabupaten Tuban. Jurnal Pendidikan Olahraga dan Kesehatan [Internet]. 2017;5(3):385–90. Available from: https://ejournal.unesa.ac.id/index.php/jurnal-pendidikan-jasmani/article/view/19597/17914
10. Widiastuti. Tes dan Pengukuran Olahraga [Internet]. Depok : Rajawali Pers. 2015 [cited 2023 Apr 2]. p. 257–9. Available from: https://opac.perpusnas.go.id/DetailOpac.aspx?id=1292166

11. Henjilito R. Hubungan status gizi dengan tingkat kesegaran jasmani siswa di sman 1 bangkinang kabupaten kampar. Jurnal penjakora. 2019;6(1):42–9.

12. Pribany MH, Sahri S. Pengaruh Program Pelatihan Fisik Militer Terhadap Peningkatan Vo2Max Siswa Pra Pendidikan Dasar Resimen Mahasiswa Universitas Negeri Semarang. Journal of Sport Science and Fitness. 2021;7(1):19–25.

13. Setiawan MR, Najat FZ, Farhan RV, Suhendan A. Analisis Faktor Kondisi Fisik Atlet Pencak Silat. Jurnal Olahraga dan Kesehatan Indonesia (JOKI) [Internet]. 2022;3(1):1–7. Available from: https://jurnal.stokbinaguna.ac.id/index.php/JOK/article/view/768

14. Tomkinson GR, Lang JJ, Tremblay MS, Dale M, Leblanc AG, Belanger K, Ortega FB, Léger L. International normative 20 m shuttle run values from 1 142 026 children and youth representing 50 countries. Br J Sports Med. 2017;51(21):1545–54.

15. Yusup M, Rochmani S, Yatsi Stik. The Relationship of Smoking Habits with Physical Fitness in Adolescent Boys at State Vocational High School 3 Tangerang Regency in 2020. Nusantara Hasana Journal. 2021;1(2):Page.

16. Azkitari AM. Hubungan Perilaku Merokok Dengan Harga Diri Remaja Laki-Laki Yang Merokok di SMK Putra Bangsa Skripsi. Skripsi. 2012;

17. Rohmah NM, Hamdani. Survei Kebugaran Jasmani Menggunakan Tingkat Vo2Max pada Peserta Ekstrakurikuler Pencak Silat SMKN 1 Kediri Pasca Pandemi. Jurnal Pendidikan Olahraga dan Kesehatan [Internet]. 2022;10(1):239–45. Available from: https://ejournal.unesa.ac.id/index.php/jurnal-pendidikan-jasmani/issue/archivehttps://ejournal.unesa.ac.id/index.php/jurnal-pendidikan-jasmani

18. Listyanto A. Hubungan Kebiasaan Merokok dengan Tingkat Kebugaran Jasmani. Jurnal Pendidikan Olahraga dan Kesehatan. 2015;3(1):208–10.

******