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VO_2Max of Volleyball Athletes Who Consume Cigarettes At The Porvos Club In Sidoarjo

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ABSTRACT

This study aimed to analyze the relationship between smoking behavior and VO_2max among volleyball athletes at PORVOS Volleyball Club, Sidoarjo. This study employed a quantitative approach with a correlational research design. The research subjects consisted of 30 male volleyball athletes selected using a total sampling technique. Smoking behavior was assessed using a questionnaire that classified athletes into light, moderate, and heavy smokers, while VO_2max was measured using the Multistage Fitness Test (beep test). Data analysis included descriptive statistics, the Shapiro–Wilk normality test, and the Spearman correlation test to determine the relationship between the two variables. The descriptive results indicated that most athletes were categorized as light smokers (56.7%) and had VO_2max values in the very poor category (56.7%). The Spearman correlation analysis revealed a significance value of $p = 0.848$ ($p > 0.05$) with a correlation coefficient of $r_s = 0.36$, indicating that there was no significant relationship between smoking behavior and VO_2max among volleyball athletes. Based on these findings, it can be concluded that smoking behavior does not have a significant relationship with VO_2max in volleyball athletes at PORVOS Sidoarjo Club. Nevertheless, smoking behavior should still receive attention, as it may have negative effects on athletes' health and performance in the long term.

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INTRODUCTION

Volleyball is one of the fastest growing and most popular team sports at various levels, from early age training to competitive levels (Destriana, 2023). This sport requires athletes to perform various high-intensity physical activities, such as jumping, hitting the ball hard, blocking, and repeated quick movements throughout the game (Sitti Maifa, 2021). These activities cause the cardiovascular and respiratory systems to work optimally to meet energy needs during the game. Volleyball athletes are required to maintain stable physical performance from the beginning to the end of the game. Suboptimal physical condition can cause faster fatigue and a decline in the quality of play. Therefore, physical fitness is an important aspect that needs to be considered in the training process of volleyball athletes.

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One component of fitness that plays an important role in supporting volleyball athletes' performance is aerobic endurance.

Aerobic endurance is closely related to the body's ability to absorb and utilize oxygen during high-intensity and relatively long-duration physical activities (Zulbahri, 2020). One of the main indicators used to assess aerobic endurance is the VO_2max value. The VO_2max value reflects the maximum capacity of the heart, lungs, and muscles in supporting sustained physical activity. Athletes with good VO_2max values tend to have good endurance.

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Smoking behavior remains a widespread health problem at various levels (Kasmad & Husnul, 2020). Physical activity is often seen as a protective factor against smoking. However, several studies show that athletes still have a fairly high prevalence of smoking (Narongkorn Saiphoklang, 2020). A study in Italy reported that 16.8% of young athletes were recorded as active smokers in both individual and team sports (De Nitto et al., 2020). Similar findings were also found among licensed athletes in Turkey, which showed high tobacco product use (Asar et al., 2025). This condition shows that the sports environment is not yet completely free from smoking behavior. Therefore, smoking behavior among athletes is still a phenomenon that needs to be further studied.

Volleyball requires athletes to be in excellent physical condition, especially in terms of endurance (Nasuka et al 2020). Volleyball athletes must be able to perform explosive movements repeatedly throughout the game. This activity requires optimal heart and lung function. One of the main indicators of cardiorespiratory fitness is the VO_2max value. VO_2max reflects the body's ability to absorb and utilize oxygen during intense physical activity (Firmansyah et al., 2023). Athletes with good VO_2max values tend to have higher physical endurance. Conversely, low VO_2max can lead to rapid fatigue and decreased performance (Cha et al., 2025).

Smoking is known to have a negative impact on lung function and the cardiovascular system. Carbon monoxide in cigarette smoke can inhibit the blood's ability to transport oxygen. This condition causes the supply of oxygen to body tissues to become suboptimal. Several studies show that smokers have lower lung function than non-smokers (Chaabane et al., 2016). This decline in lung function can directly impact aerobic capacity. In the context of sports, this condition has the potential to reduce an athlete's VO2max value. Therefore, smoking is a risk factor that can hinder an athlete's physical performance.

In addition, smoking behavior among athletes is influenced not only by individual factors, but also by the social environment, particularly peer interactions. In team sports

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such as volleyball, the intensity of interaction between athletes is relatively high, which has the potential to shape certain norms and habits, including smoking habits. Several studies show that social pressure and group conformity can encourage athletes to start or maintain smoking behavior. Therefore, peer interactions need to be examined as a contributing factor to athletes' smoking behavior in the context of club coaching.

Although the impact of smoking on health has been widely studied, research specifically linking smoking behavior to VO2max values in volleyball athletes is still limited. Most previous studies have been conducted on elite athletes or the general population, so they do not fully represent the conditions of club-level athletes. Coaching athletes at the club level plays an important role in shaping healthy lifestyle habits and character. To date, there have been few studies that specifically examine the relationship between smoking behavior and the aerobic capacity of volleyball athletes in the context of regional club training (Shabrina et al., 2024). This condition indicates a limitation in empirical data that can be used as a basis for formulating training and smoking prevention programs in sports clubs. Previous research on volleyball athletes shows that smoking habits are associated with a decline in athletes' physical condition, including aerobic endurance. A study conducted by Sandi (2018) on 15–16-year-old male volleyball athletes in Surabaya reported that non-smoking athletes had significantly higher Vo2max values than smoking athletes.

Based on this background, this study aims to analyze the relationship between smoking behavior and Vo2max values of PORVOS Sidoarjo Club volleyball athletes. This study is expected to provide an overview of the level of smoking behavior among athletes. In addition, this study also aims to determine the aerobic endurance of volleyball athletes. The results of this study are expected to show the relationship between smoking habits and the cardiorespiratory ability of athletes. The findings of this study can be used as a basis for coaches in developing healthier training programs. This study can also be used as evaluation material in efforts to prevent smoking behavior within the club environment. Thus, this study is expected to contribute to the development of sports science and athlete training.

This quantitative study used a correlational descriptive method through a survey technique to determine the relationship between smoking behavior and VO2max values in volleyball athletes at the PORVOS Sidoarjo Club. This research method was used to obtain a realistic picture of the conditions of the variables studied without providing treatment or manipulation through experimentation. The population in this study consisted of all athletes who were members of the PORVOS Sidoarjo Club, totaling 30 athletes, and all of them were used as research samples using total sampling techniques. Data collection was carried out at the PORVOS Sidoarjo Club training field. Before collecting data, the researcher explained to all athletes the purpose, objectives, and procedures of the study and distributed informed consent forms as a form of agreement to become respondents.

METHODS

This quantitative study used a correlational descriptive method through a survey technique to determine the relationship between smoking behavior and VO2max values in volleyball athletes at the PORVOS Sidoarjo Club. This research method was used to

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The instruments used in this study included a smoking behavior questionnaire and a Vo2max measurement test using the Multistage Fitness Test (Beep Test). The athlete smoking behavior questionnaire was based on several indicators, including smoking frequency, smoking intensity, smoking situations, and self-control over smoking habits. This instrument was adapted from Noviyeni (2017) and presented in the form of a four-point Likert scale with answer choices ranging from never to always. The peer interaction questionnaire was adapted from Fauziah (2016) using a Guttman scale. This instrument measures the influence of peers on smoking behavior, which includes indicators of smoking invitations, group conformity, and social support or pressure from peers. The answer choices consist of "yes" and "no." In addition, Vo2max values were measured through the Beep Test, which involves running back and forth 20 meters following a beep rhythm that increases until the participant is unable to keep up with the running rhythm, and the final level achieved is then converted into an estimate of Vo2max using a standard table.

The peer interaction questionnaire uses the Guttman scale, which consists of 10 questions with the following answer options: a: yes = 1 b: no = 0. A higher score indicates that peer interaction is more influential, while a lower score indicates that peer interaction is less influential. For descriptive purposes, peer interaction is categorized as follows: 1. Yes if the score is $\geq$ 4 2. No if the score is < 4. The smoking behavior questionnaire is scored using a Likert scale with a range of 1 to 4 for each statement item, where 1 indicates never and 4 indicates always. The total score is obtained by adding up all the values on the questionnaire items that have been filled in by the respondents. The total score is then categorized into four levels of smoking behavior, namely a score of 0–20 is categorized as a non-smoker, a score of 21–40 as a light smoker, a score of 41–60 as a moderate smoker, and a score of 61–75 as a heavy smoker. These categories can be further adjusted based on the distribution of research data, using the mean ± standard deviation approach to obtain a more representative classification according to the characteristics of the research sample.

The data obtained consisted of smoking behavior questionnaire scores and estimated Vo2max values from the Beep Test results. The raw data collected was then analyzed using descriptive and inferential statistics with the help of SPSS software version 25. Descriptive analysis was used to determine the distribution of smoking behavior categories and the Vo2max levels of athletes. Furthermore, to determine the relationship between the two variables, Pearson's correlation test was performed if the

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data were normally distributed, and Spearman's Rank test if the data were not normally distributed. The research results were considered significant if the p-value was < 0.05. This study was conducted with due regard for research ethics, including maintaining the confidentiality of respondents' identities, using data only for scientific purposes, and giving respondents the freedom to participate or not participate in the study.

Table 1.
Aerobic Endurance Norm Vo2max (ml/kg/min)

Age	Very Poor	Poor	Fair	Good	Exellent	Superior
13-19	Under-35.0	35.0-38.3	38.4-45.1	45.2-50.9	50.0-55.9	Over 55.9
20-29	Under 33.0	33.0-36.4	36.5-42.4	42.5-46.4	46.5-52.4	Over 52.4
30-39	Under-31.0	31.5-35.4	35.5-40.9	41.0-44.9	45.0-49.4	Over 49.4
40-49	Under-30.2	30.2-33.5	33.6-38.9	39.0-43.7	43.8-48.0	Over 48.0
50-59	Under-26.1	26.1-30.9	31.0-35.7	35.8-40.9	41.0-45.3	Over 45.3
60+	Under-20.5	20.5-26.0	26.1-32.2	32.3-36.4	36.5-44.2	Over 44.2

RESULTS AND DISCUSSION

Result

Based on the results of the peer interaction questionnaire presented in Table 1, it was found that all respondents (100%) stated that they had friends who were smokers. This finding shows that the social environment of PORVOS Sidoarjo Volleyball Club athletes is generally not free from smoking behavior. A total of 53.3% of respondents stated that hanging out with friends was often accompanied by smoking, and 53.3% of respondents admitted to often getting cigarettes from friends when they did not have any. This indicates the role of peers in facilitating smoking behavior. However, most respondents did not fully view smoking as a requirement for social acceptance. A total of 80% of respondents stated that smoking was not a factor in being accepted by friends, and 86.6% of respondents stated that there was no obligation to smoke in their group. In addition, 93.3% of respondents were not accustomed to taking turns smoking with friends, and 60% of respondents stated that they did not start smoking because of peer pressure.

Other findings show that 66.6% of respondents stated that they were able to refuse invitations to smoke from friends and believed that a person's masculinity was not measured by their smoking habits. Overall, these data show that although the peer environment has a high exposure to smoking behavior, the level of coercive social pressure is relatively low.

Table 2.
Peer Interaction Questionnaire

No	Question	Experienced		Presentation		Information
		Yes	No	Yes	No	
1	I have a friend who is a smoker	30	0	100%	0%	Influence
2	When we hang out with friends, we always smoke.	16	14	53.3%	46.6%	Influence
3	By smoking, I can be accepted by my friends	6	24	20%	80%	no effect
4	In my group, every member is required to smoke.	4	26	13.3%	86.6%	no effect

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5	My friend often shares cigarettes with me.	16	14	53.3%	46.6%	Influence
6	I smoke and smoke alternately with friends	2	28	6.6%	93.3%	no effect
7	I will refuse if any of my friends invite me to smoke.	20	10	66.6%	33.3%	Influence
8	A person's masculinity cannot be measured by smoking	20	10	66.6%	33.3%	Influence
9	The first time I smoked was because one of my friends invited me to.	12	18	40%	60%	no effect
10	If I don't have cigarettes, my friends give me theirs.	16	14	53.3%	46.6%	Influence

The distribution of peer interaction categories among volleyball athletes at the PORVOS Sidoarjo Club is presented in Table 2. The results of the analysis show that 16 athletes (53.3%) were included in the category of having peer interactions that influenced smoking behavior. Meanwhile, 14 athletes (46.7%) were classified as having peer interactions that did not influence smoking behavior.

These findings indicate that more than half of the respondents were in social environments that had the potential to influence smoking habits, although the proportion was not significantly different from the group that was not influenced.

Table 3.
Peer Interaction Category

Variable	Frequency (f)	Presentation %
Yes Peer interaction	16	53.3%
No peer interaction	14	46.7%
Total	**30**	**100%**

The results of the measurement of athletes' smoking behavior presented in Table 3 show that, in general, the majority of respondents fall into the category of never or occasionally smoking in various situations. In terms of frequency of consumption, most athletes (60–76.6%) stated that they never smoke in short periods of time, during travel, upon waking up, or outside of designated smoking areas.

In terms of self-control, more than half of the respondents stated that they were able to refrain from smoking for a day, not smoke when they did not have money, and not smoke when they were with their parents. This shows that some athletes have relatively good self-control over their smoking habits.

However, under certain psychological and social conditions, the frequency of smoking tends to increase. Most respondents stated that they often or always smoke more when facing problems, doing tasks, or in stressful situations. In addition, smoking when hanging out with fellow smokers is still quite common. Overall, these results indicate that athletes' smoking behavior is more influenced by specific situations than by consistent habits in their daily lives.

Table 3.
Smoking Behavior Questionnaire

No	Question	Never	Sometimes	Often	Always
1	I finished one cigarette in a short time	18 (60%)	11 (36.6%)	1 (3.3%)	0 (0%)
2	When I'm alone I'll spend time smoking	20 (66.6%)	7 (23.3%)	1 (3.3%)	2 (6.6%)

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No	Question	Never	Sometimes	Often	Always
3	I will continue to smoke as long as it is in my private space.	22 (73.3%)	5 (16.6%)	1 (3.3%)	2 (6.6%)
4	I smoked all the way to somewhere	21(70%)	6 (20%)	1 (3.3%)	2 (6.6%)
5	I will stop smoking if other people are bothered by my cigarette smoke	17 (56.6%)	3 (10%)	6 (20%)	4 (13.3%)
6	Every time I wake up I immediately smoke	21(70%)	7 (23.3%)	0 (0%)	2 (6.6%)
7	I smoke every time after eating	19 (63.3%)	7 (23.3%)	1 (3.3%)	3 (10%)
8	I smoke in the morning and at night	20 (66.6%)	5 (16.6%)	3 (10%)	2 (6.6%)
9	I smoke in the designated smoking area.	18 (60%)	4 (13.3%)	4 (13.3%)	4 (13.3%)
10	I smoke even though I am not in a designated smoking area.	23 (76.6%)	4 (13.3%)	1 (3.3%)	2 (6.6%)
11	I smoke whenever I feel cold	19 (63.3%)	6 (20%)	4 (13.3%)	1 (3.3%)
12	I smoke in a place where many people smoke.	18 (60%)	7 (23.3%)	4 (13.3%)	1 (3.3%)
13	I smoke every time I'm in trouble	17 (56.6%)	8 (26%)	1 (3.3%)	4 (13.3%)
14	I smoke whenever my mouth feels sour	19 (63.3%)	6 (20%)	3 (10%)	2 (6.6%)
15	I was able to survive not smoking for one day.	17 (56.6%)	9 (30%)	1 (3.3%)	3 (10%)
16	I smoke while I'm having a bowel movement	23 (76.6%)	3 (10%)	2 (6.6%)	2 (6.6%)
17	I still smoke while urinating	24 (80%)	4 (13.3%)	1 (3.3%)	1 (3.3%)
18	I don't smoke even when I'm relaxing.	18 (60%)	7 (23.3%)	2 (6.6%)	3 (10%)
19	I don't smoke when I don't have money	19 (63.3%)	8 (26%)	1 (3.3%)	2 (6.6%)
20	I smoke when I hang out with friends who smoke.	18 (60%)	6 (20%)	3 (10%)	3 (10%)
21	I don't smoke when I'm with my boyfriend	19 (63.3%)	6 (20%)	1 (3.3%)	4 (13.3%)
22	I smoke when my friend offers me a cigarette.	17 (56.6%)	7 (23.3%)	4 (13.3%)	2 (6.6%)
23	I smoke more than 10 cigarettes every day	22 (73.3%)	4 (13.3%)	2 (6.6%)	2 (6.6%)
24	I prepared the next cigarette in case the cigarette I was smoking was about to run out	22 (73.3%)	5 (16.6%)	2 (6.6%)	1 (3.3%)
25	I smoke more than before every time I fail at a task.	21(70%)	5 (16.6%)	3 (10%)	1 (3.3%)
26	I completely finished one cigarette, leaving only a small cigarette butt.	21(70%)	4 (13.3%)	2 (6.6%)	3 (10%)
27	I have a hard time finishing one cigarette.	1 (3.3%)	2 (6.6%)	23 (76.6%)	4 (13.3%)
28	While I was working on my assignment, I smoked more cigarettes than usual.	4 (13.3%)	1 (3.3%)	19 (63.3%)	6 (20%)
29	When I'm with friends, I smoke less than usual.	4 (13.3%)	1 (3.3%)	18 (60%)	7 (23.3%)
30	I smoke more cigarettes when I have a lot of problems	1 (3.3%)	4 (13.3%)	17 (56.6%)	8 (26%)
31	I smoke less cigarettes when I'm in a crowded place.	3 (10%)	2 (6.6%)	19 (63.3%)	6 (20%)
32	When I'm with my parents, I don't smoke even one cigarette.	1 (3.3%)	3 (10%)	17 (56.6%)	9 (30%)

The distribution of smoking behavior categories among PORVOS Sidoarjo volleyball club athletes is presented in Table 4. The analysis results show that most athletes are in the light smoker category, namely 17 athletes (56.7%). Furthermore, 9 athletes (30.0%) were classified as moderate smokers, while 4 athletes (13.3%) were classified as heavy smokers. These findings indicate that although smoking behavior was found among athletes, the intensity of cigarette consumption was relatively low to moderate among most respondents.

Table 4.
Frequency Distribution of Smoking Behavior in Athletes

Variable	Frequency (f)	Presentation %
Heavy	4	13.3%
Moderate	9	30.0%
light	17	56.7%
Total	**30**	**100%**

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The results of the VO₂max measurements of PORVOS Sidoarjo Club volleyball athletes using the Multistage Fitness Test are presented in Table 5. The VO₂max values of the athletes varied between 26.83 ml/kg/min and 44.29 ml/kg/min. Based on the VO₂max norm classification, some athletes were in the Very Poor, Poor, and Fair categories. Athletes in the Very Poor category were predominantly aged 15–18 years with VO₂max values below 35 ml/kg/min. Meanwhile, athletes who reached the Fair category had VO₂max values above 38 ml/kg/min and generally achieved higher levels and rounds in the test. These results indicate that the athletes' aerobic endurance abilities still vary and most have not yet reached the good or very good categories.

Table 5.
Vo2max results

No	Name	Age	Level	Shuttle	Vo2max (Ml/Kg.Min)	Information
1	M.R	15	7	6	38.49	Fair
2	AD	18	7	10	39.87	Fair
3	WT	17	7	10	39.87	Fair
4	SD	15	8	1	40.21	Fair
5	RF	15	5	3	30.63	Very Poor
6	M.Ro	16	6	3	34.04	Very Poor
7	AN	17	6	1	33.32	Very Poor
8	HY	17	5	5	31.39	Very Poor
9	EA	16	5	7	32.14	Very Poor
10	M.A	15	4	5	28.02	Very Poor
11	IR	16	5	2	30.25	Very Poor
12	RH	15	4	9	29.61	Very Poor
13	DR	15	4	2	26.83	Very Poor
14	AO	17	6	3	34.04	Very Poor
15	M.S	16	5	3	30.63	Very Poor
16	M.Re	16	5	2	30.25	Very Poor
17	M.Ra	17	7	3	37.45	Poor
18	RL	17	7	1	36.76	Poor
19	AL	18	7	1	36.76	Poor
20	AW	17	6	4	34.4	Very Poor
21	AM	18	7	8	39.18	Poor
22	M.A	16	7	8	39.18	Poor
23	M.I	17	7	10	39.87	Poor
24	M.Rb	17	8	1	40.21	Poor
25	SN	17	9	3	44.29	Poor
26	M.A	18	6	5	34.76	Very Poor
27	SR	18	4	4	27.62	Very Poor
28	M.Ri	18	4	4	27.62	Very Poor
29	MD	18	5	2	30.25	Very Poor
30	DRi	18	4	5	28.02	Very Poor

The frequency distribution of athletes' VO2max categories is presented in Table 6. The analysis results show that the majority of athletes, namely 17 people, are in the Very Poor category. Furthermore, 7 athletes are in the Poor category, and only 4 athletes are in the Fair category. These findings indicate that, in general, the aerobic endurance level of PORVOS Sidoarjo Club volleyball athletes is still relatively low.

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Table 6.
Vo2max Frequency Distribution

Variable	Frequency (f)	Presentation %
Fair	4	13.3%
Poor	7	23.3%
Very Poor	17	56.7%
Total	**30**	**100%**

The results of the analysis of the characteristics of the research subjects are presented in Table 7. The average age of the respondents was 16.67 ± 1.09 years, with an average height of 173.20 ± 6.80 cm and an average weight of 61.47 ± 8.16 kg. The average Vo2max value of the athletes was 34.20 ± 4.86 ml/kg/minute. Statistical test results showed that age and height had a p-value < 0.05, while weight, body mass index, and Vo2max showed a p-value > 0.05.

Table 7.
Test Subject Characteristics

Variable	N	Mean ± SD	p-value
Age (Years)	30	16.67 ± 1.09	0.001
Height (cm)	30	173.20 ± 6.80	0.021
Body Weight (kg)	30	61.47 ± 8.16	0.365
Body Mass Index (kg/m2)	30	20.59 ± 2.27	0.269
Vo2max (ml/kg/min)	30	34.20 ± 4.86	0.082

The results of the normality test using Shapiro-Wilk are presented in Table 8. The smoking behavior variable shows a significance value of p = 0.000, which means that the data is not normally distributed. Meanwhile, the Vo2max variable has a significance value of p = 0.082, so it can be stated that it is normally distributed. Based on these results, the analysis of the relationship between variables was performed using a non-parametric correlation test.

Table 8.
Normality Test

Variable	N	Shapiro-Wilk	Sig. (p)	Information
Smoking Behavior	30	0.820	0.000	Abnormal
V0Max	30	0.938	0.082	Normal

The results of the Spearman correlation test between smoking behavior and VO_2max in athletes are presented in Table 9. Based on the analysis results, a significance value of p = 0.848 with a correlation coefficient of 0.36 was obtained. This value indicates that there is no significant relationship between smoking behavior and VO_2max values in volleyball athletes at Club PORVOS Sidoarjo.

Table 9.
Correlation Test

Variable X	Variable Y	p(Spearman)	Sig. (p)	N	Information
Smoking Behavior	Vo2max	0.36	0.848	30	Not Significant

Discussion

Peer Interaction and Smoking Behavior Among Athletes

The results of the study show that all volleyball athletes at the PORVOS Sidoarjo Club are in a social environment where they are exposed to smoking behavior. All respondents stated that they had friends who were smokers, indicating that smoking

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behavior is a common phenomenon in the social environment of athletes. This finding is in line with previous studies which state that athletes, especially in team sports, still have a fairly high prevalence of exposure to smoking due to the intensity of social interaction (De Nitto et al., 2020; Asar et al., 2025). However, the results also show that peer influence is not always coercive. Most athletes stated that smoking is not a requirement for acceptance into the group, and there is no obligation to smoke in their social circles.

In addition, the majority of athletes also stated that they were able to refuse invitations to smoke from their peers. This shows that the influence of peer interaction on athletes at the PORVOS Sidoarjo Volleyball Club is more in the form of environmental exposure than normative or coercive social pressure. These findings support the view that peer interaction can play a supporting role in the emergence of smoking behavior, but is not always the dominant factor determining such behavior. (Merlin, 2021) explains that peer influence can be indirect, namely through the normalization of behavior within a group, so that individuals are more easily exposed without having to experience explicit pressure. In the context of volleyball athletes, this condition shows that the social environment becomes a space that allows smoking behavior to occur, even though the decision to smoke remains under the control of the individual athlete.

Characteristics of Athletes' Smoking Behavior

Based on the results of smoking behavior measurements, most athletes are classified as light smokers, with a smaller proportion falling into the moderate and heavy smoker categories. This distribution shows that the intensity of cigarette consumption among athletes is relatively low to moderate. These findings are in line with Sandi's (2018) research, which reported that volleyball athletes tend to have lower levels of cigarette consumption than the general population, although smoking behavior was still found in some athletes. The results of the per-item analysis show that athletes tend not to smoke regularly in their daily activities, such as when waking up, traveling, or in areas where smoking is not allowed. Athletes also demonstrated fairly good self-control, as evidenced by their ability to refrain from smoking when they did not have money or when they were with their parents.

This condition indicates that athletes' smoking behavior is not entirely addictive or compulsive. However, an increase in smoking frequency is still found in certain situations, especially when athletes face psychological pressure, personal problems, or are in a social environment dominated by smokers. This shows that athletes' smoking behavior is situational, where cigarettes are used as a coping mechanism for stress or as a form of social adjustment. These findings are in line with Kasmad and Husnul (2020), who stated that smoking behavior in athletes often arises as a response to psychological pressure, fatigue, or emotional factors.

Aerobic Endurance Level (Vo_2max) of Athletes

Vo_2max measurement results show that most volleyball athletes at Club PORVOS Sidoarjo are in the very low to low category, with only a small number of athletes reaching the adequate category. No athletes were found to be in the good or very good category. These findings indicate that, in general, the cardiorespiratory fitness level of athletes is

still not optimal. The low VO2max values in the majority of athletes may be influenced by various factors, including training intensity and quality, duration of aerobic training, and lifestyle factors. Nasuka et al. (2020) stated that volleyball requires good aerobic endurance capacity to support performance during long matches with repeated explosive activities. Therefore, low VO2max levels have the potential to affect athletes' ability to maintain their performance during games. In addition to training factors, lifestyle behaviors also have the potential to affect athletes' aerobic capacity. Firmansyah et al. (2023) state that smoking habits can contribute to a decline in lung function and cardiovascular system efficiency, which ultimately leads to low VO2max. However, in the context of this study, this effect was not statistically significant.

Relationship between Smoking Behavior and Vo2max in Athletes

The correlation test results show that there is no significant relationship between smoking behavior and Vo2max values in volleyball athletes at Club PORVOS Sidoarjo. These findings indicate that in the population of athletes studied, smoking behavior does not show a direct correlation with aerobic endurance capacity. The absence of a significant relationship may be due to several factors. First, the majority of athletes were light smokers, so the intensity of cigarette consumption was not high enough to have a significant physiological impact on the cardiovascular and respiratory systems. Chaabane et al. (2016) stated that a significant decline in lung function is generally found in individuals who smoke heavily over a long period of time.

Second, the relatively young age of athletes can act as a protective factor. During adolescence, the cardiovascular and respiratory systems are still in a phase of good adaptation to physical activity, so the negative effects of smoking on VO2max are not yet clearly apparent. These findings are consistent with a study (Narongkorn et al, 2020) which reported that in young athletes, the effects of smoking on lung function are not always significantly detectable. Third, the training program undertaken by athletes can also influence the research results. Regular physical exercise can help maintain aerobic capacity even if athletes have a habit of light smoking. This shows that the effects of exercise are still able to offset the negative effects of smoking to a certain extent.

Implications for Athlete Training

Although no significant relationship was found between smoking behavior and VO2max, the findings of this study still have important implications for athlete training. High exposure to smoking environments and the dominance of athletes with low VO2max indicate the need for a more comprehensive training approach, focusing not only on technical and physical aspects, but also on the formation of a healthy lifestyle. Coaches and club managers need to provide education on the long-term effects of smoking on health and athletic performance. In addition, aerobic endurance training programs also need to be systematically improved so that athletes' VO2max capacity can develop optimally. Thus, efforts to prevent smoking behavior and improve physical fitness can go hand in hand in the athlete training process.

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CONCLUSION

Based on the results of the study, it can be concluded that volleyball athletes from the PORVOS Sidoarjo Club are in a social environment with a fairly high exposure to smoking behavior. Most athletes are classified as light smokers, with smoking behavior that tends to be situational and not carried out routinely in daily activities. Vo2max measurements show that the majority of athletes have very low to low levels of aerobic endurance. Correlation tests show that there is no significant relationship between smoking behavior and athletes' Vo2max values. These findings indicate that in adolescent athletes who smoke lightly, smoking behavior does not yet show a direct correlation with aerobic capacity.

It is recommended that coaches and club managers improve physical fitness training, particularly in terms of athletes' aerobic endurance. Education on healthy lifestyles and the long-term effects of smoking should be provided to athletes on an ongoing basis. Athletes are expected to maintain self-control over smoking habits even when in social environments where they are exposed to cigarettes. Further research is recommended to involve a larger sample size and consider smoking duration and intensity as additional variables. In addition, the use of a longitudinal design is recommended to obtain a more in-depth picture of the impact of smoking behavior on VO2max.

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REFERENCES

A.Sandi Ghora Pradhana, A. R. (2018). Analisis Kondisi Fisik Atlet Perokok Dan Tidak Perokok (Studi Atlet Bola Voli Putra Nanggala Surabaya Usia 15-16 Tahun 2018). Jurnal Pendidikn Kepelatihan Olahraga, 06, 0–5. File:///C:/Users/User/Downloads/Adminjpo,+EJURNAL.Pdf

Alfarizi, A., Kardiawan, I. K. H., Chandra, K., & Kusuma, A. (2023). Tingkat Volume Oksigen Maksimal (VO2MAX) Pemain Sepakbola Intan Jaya U-23. 14, 61–68.

Asar, E., Bulut, Y. E., Dindar Badem, N., Orscelik, A., Sahin, C. E., Buyukluoglu, G., Kucuk, I., Kocahan, T., & Erguder, T. (2025). Tobacco Use And Second-Hand Smoke Exposure Among Athletes; Assessment By Urine Cotinine Level And Exhaled Carbon Monoxide: A Cross-Sectional Study. Healthcare, 13(2), 198. Https://Doi.Org/10.3390/Healthcare13020198

Cha, H., Choi, S., Jung, I., Kim, H., & Shin, H. (2025). RETOS : Resilient , Expandable , And Threaded Operating System For Wireless Sensor Networks. December. Https://Doi.Org/10.1145/1236360.1236381

Chaabane, Z., Murlasits, Z., Mahfoud, Z., & Goebel, R. (2016). Tobacco Use And Its Health Effects Among Professional Athletes In Qatar. Canadian Respiratory Journal, 2016, 1–5. Https://Doi.Org/10.1155/2016/2684090

De Nitto, S., Stefanizzi, P., Bianchi, F. P., Castellana, M., Ascatigno, L., Notarnicola, A., & Tafuri, S. (2020). Prevalence Of Cigarette Smoking: A Cross-Sectional Survey Between Individual And Team Sport Athletes. Annali Di Igiene : Medicina Preventiva E Di Comunita, 32(2), 132–140. Https://Doi.Org/10.7416/Ai.2020.2337

Destriana, D. (2023). Analisis Kebutuhan Pengembangan Aplikasi Tes Passing Bola Voli Berbasis Android. Journal Of Sport Sciences And Fitness, 8. Http://Journal.Unnes.Ac.Id/Sju/Index.Php/Jssf

Firmansyah, A. S., Masrikhiyah, R., & Ratnasari, D. (2023). Hubungan Tingkat Kecukupan Asupan Makan, Status Gizi, Dan Perilaku Merokok Terhadap Ketahanan Fisik Atlet Pencak Silat Inseba Brebes. Jurnal Ilmiah Gizi Dan Kesehatan (JIGK), 5(01), 9–14.

Kasmad, R., & Husnul, D. (2020). The Relationship Of The Insomnia Degree With Smoking Habit Overtraining. 481(Icest 2019), 227–229.

Merlin Hobertin Lewerissa, Frida Lina Tarigan, W. H. (2021). Determinan Perilaku Merokok Pada Siswa Smp Swasta Immanuel Kabanjahe Tahun 2020. Prepotif Jurnal Kesehatan Masyarakat, 5 No 2.

Narongkorn Saiphoklang, O. P. & S. S. (2020). Smoking Characteristics And Lung Functions Among University Athletes. Scientific Reports. Https://Doi.Org/NarongkornSaiphoklang1*,OrapanPoachanukoon2&SuchadaSoorapan3

Nasuka, Nasuka, Setiowati, Anies, Indrawati, F. (2020). Power, Strength And Endurance Of Volleyball Athlete Among Different Competition Levels. Dialnet, 15–23.

Oktian Firman Bryantara. (2016). Faktor Yang Berhubungan Dengan Kebugaran Jasmani (Vo2 Maks) Atlet Sepakbola. Jurnal Berkala Epidemiologi, 4 No. 2, 237–249.

Shabrina, V. S., Setiawan, O., K, B. A., H, M. R. D., Hidayat, M. R., M, A. K., A, B. H., & Nisa, P. S. (2024). Pengaruh Merokok Pada Performa Dan Kesehatan Olahragawan Mahasiswa. 3(2), 222–231.

Sitti Maifa. (2021). Analisis Komponen Fisik Terhadap Kemampuan Smash Bola Voli. Journal Pendidikan Jasmani Kesehatan & Rekreasi, 4, 62–68.

Zulbahri. (2020). Pelatihan Metode Interval Ekstensif Terhadap Kemampuan Daya Tahan Aerobik. Jurnal Abdidas, 1 No. 3, 109–118. Https://Abdidas.Org/Index.Php/Abdidas