



## Implementation of Physical Test Results Measurement Using a Volleyball Sports Web Application

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### Abstract

The objective of this study is to implement physical test measurements in volleyball using a web application. Key components of physical fitness in volleyball include strength, flexibility, and endurance. This research adopts a quantitative approach with a descriptive research design. The sample consists of 45 seventh-grade students from Indralaya 1 Public Junior High School, comprising 30 male students and 15 female students. Data collection involved the use of test instruments, including the 60-second squat thrust test, 60-second sit-up, and 60-second push-up test for strength, the v-sit and reach test for flexibility, and the 20-meter pacer test for endurance. The research was conducted at Indralaya 1 Public Junior High School. The findings from the study on seventh-grade students at Indralaya 1 Public Junior High School participating in volleyball indicate that the average physical condition falls into the following categories: very good (5%), good (1.2%), fair (14%), poor (46%), and very poor (20%). Overall, the average physical condition of these seventh-grade students at Indralaya 1 Public Junior High School is categorized as poor, constituting 46%. The intention behind this research is to serve as material for evaluation and to raise awareness among students, encouraging them to continually enhance and maintain their physical fitness for optimal performance.

### How to Cite

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## INTRODUCTION

Physical education is an educational process through physical activities aimed at enhancing physical fitness, developing motor skills, fostering sportsmanship, emotional intelligence, knowledge, and promoting a healthy and active lifestyle (Achmad Jayul 1, 2020). Within the school environment, particularly in Physical Education and Health (PJOK) subjects, the focus is on attitude, knowledge, and skills. PJOK is a crucial part of the 2013 curriculum, playing a significant role in achieving national education goals. Research suggests that PJOK positively impacts learning activities at school, significantly influencing student development. Additionally, PJOK has an irreplaceable influence on moral character formation, intellectual development, aesthetic achievement, and a healthy lifestyle. PJOK is an essential part of the overall education process with the goal of enhancing human performance through physical activities to develop and maintain the human body.

(Haryani et al., 2022) explain that PJOK is crucial for physical development and activities from childhood to adulthood. Thus, physical activities play a vital role in the growth and development of learners. PJOK is a mandatory and important subject in schools. Sports are a fundamental human need that significantly influences the formation of a strong spiritual and physical well-being. Regular engagement in sports contributes to better spiritual and physical health compared to those who rarely or never participate in sports (Widodo, 2018). In Indonesia, sports, especially volleyball, play a crucial role in human life. In modern life, humans cannot be separated from sports activities, whether to improve performance or maintain a healthy body. Volleyball is a popular sport among the public and students (Pasaribu, 2020).

According to Pratiwi et al. (2020), volleyball is a rapidly growing sport in Indonesia, played in schools, government institutions, private sectors, universities, and the general community. This popularity stems from the simplicity of the equipment required, making it accessible to people of all ages, genders, and backgrounds, whether in urban or rural areas (Ismail & Tunggul, 2020). Volleyball, being a team sport, requires players to collaborate and support each other to form a cohesive team (Kardiyanto et al., 2020).

To form a cohesive team in volleyball, players must individually master the basic techniques of the game. Achieving proficiency in these fundamental techniques requires regular and

well-structured training. Proper training methods can effectively reduce errors made by players (Destriana et al., 2021). In volleyball, there are several basic techniques that every player must master, including serving, passing, smashing, and blocking (Kardiyanto and Sunardi, 2020). These fundamental techniques serve as the foundation that athletes must learn before aiming for high performance. Neglecting these basic techniques can hinder an athlete's potential as they are interconnected in the game.

According to Juansyah, (2015), an application is a ready-to-use program designed to perform specific functions for users. For practical and efficient application functionality, supporting software is essential. A website, on the other hand, is a collection of web pages that display various information in the form of text, images, and sound within a related domain (Prayitno & Safitri, 2015:2). A web application can assist coaches and teachers in swiftly measuring students' physical test results, avoiding manual errors in physical test calculations.

Volleyball requires good physical condition. To assess a student's physical condition, physical tests are necessary. Physical test measurement involves the collection of data using specific measuring instruments. A test, as mentioned by Widiastuti (2015:2), is an instrument used to measure performance and collect data from individuals or groups. Coaches conduct tests to obtain measurement results, and measurement is the process of collecting data on involved properties or attributes. Technology has become an integral part of human life, directly and indirectly, and has significantly influenced various aspects, including sports. In sports, particularly volleyball, technology has been incorporated into every sporting activity, such as the development of application-based volleyball sports. Observations indicate a need for a physical analysis application for volleyball players, as coaches seek tools to enhance training effectiveness.

In the context of previous relevant research, scholars like Cholik, (2017) and Riwayadi, (2013) emphasize the integration of technology, information, and communication in the learning process. This integration fosters creativity among students. Within the realm of Physical Education, Sports, and Health (PJOK), advancements in technology have proven beneficial. Noteworthy research includes Pranata et al.'s (2019) development of a physical fitness test application for volleyball athletes, contributing to the measurement of their physical abilities. According to Hartati (2019), technological advancements in sports

have progressed, both in coaching sciences and physical testing and measurements. In the current era of globalization, physical test measurements should ideally use computer applications or software to record and calculate the entire series of tests participated in by athletes.

Other studies, such as Gumantan, (2020) research on a physical fitness test application, further showcase the impact of technology on sports education. Additionally, Tirta Dwi Budiarto's application for taekwondo athlete selection and Helfi Pangestu's application for monitoring and selecting basketball, football, and volleyball athletes contribute to the technological evolution in sports. Research on academic monitoring and student achievement systems, exemplified by Entin Sutinah's study, emphasizes the importance of accurate and integrated data storage for efficient school management. Furthermore, advancements in technology, such as the use of switches in laboratories, as discovered, highlight the potential of technology to aid students in learning.

Regarding network supervision systems, Prasetyaningsih & Kussyairi, (2021) emphasize their role in managing users and switches. Meanwhile, the use of software instruments allows coaches to assess athletes' maximum aerobic strength (VO2Max), as discussed by Gumelar et al., (2017). Rusdiana et al. (2020) also developed an infrared digital sensor-based Bleep Test, indicating consistent results. Given this background, it is essential to conduct research on students at Indralaya 1 Public Junior High School, titled "Implementation of Physical Test Measurement Using a Web Application for Junior High School Students in the Volleyball Sports Branch."

## METHODS

This research employs a Quantitative Descriptive research method, which involves describing, examining, and explaining a phenomenon as it is, and drawing conclusions from observable data using numerical values. The study employs tests and measurements, integral in various sports training, as they reveal an athlete's strengths and weaknesses, aiding decision-making (Hartati., 2019). Data is collected through questionnaires (surveys), observations, and interviews. The sample is a subset of the population, chosen to be representative of the entire population (Sugiyono, 2015). In this study, the sample is determined using purposive sampling, a technique based on specific considerations. The consideration for this research is 45 seventh-grade students at Indralaya

1 Public Junior High School.

Data collection involves standardizing the assessment of physical tests in volleyball sports.

### Squat Thrust Test

Participants in the test perform the Squat Thrust movement, and the count of perfect Squat Thrust movements is recorded as the test result for 60 seconds. The norm for assessing the Squat Thrust test is as follows:

**Table 1.** Squat Thrust Test Norms

Category	Score	Man	Woman
Excellent	5	≥ 16	≥ 12
Good	4	13 – 15	9 - 11
Adquate	3	9 – 12	6 – 8
Inadequate	2	5 – 8	3 – 5
Very Poor	1	≤ 4	≤ 2

Source:(Kemenpora 2022 pedoman pelaksanaan TKPN)

### Push-Up test

where participants perform perfect push-up movements counted for 60 seconds. The assessment norm for evaluating arm muscle strength in this test is as follows:

**Table 2.** Push Up Test Norms

Category	Score	Man	Woman
Excellent	5	≥ 16	≥ 12
Good	4	13 – 15	9 - 11
Adquate	3	9 – 12	6 – 8
Inadequate	2	5 – 8	3 – 5
Very Poor	1	≤ 4	≤ 2

Source: (Pasaribu, 2020)

### Sit Up Test

Participants in the test perform perfect sit-up movements, and the results are counted for 60 seconds. The assessment norm for evaluating strength in this test is as follows:

**Table 3.** Sit Up Test Norms

Category	Score	Man	Woman
Excellent	5	≥ 16	≥ 12
Good	4	13 – 15	9 - 11
Adquate	3	9 – 12	6 – 8
Inadequate	2	5 – 8	3 – 5
Very Poor	1	≤ 4	≤ 2

(Source: (Pasaribu, 2020))

### V Sit and Reach Test

Participants in the test perform the V sit and reach movement, and the results are recorded

as the furthest reach from 3 attempts. The assessment norm for evaluating flexibility in this test is as follows: d. No stepping forward is allowed during the upward jump.

**Table 4.** V Sit and Reach Test Norms

Category	Score	Man	Woman
Excellent	5	≥ 16	≥ 12
Good	4	13 – 15	9 - 11
Adquate	3	9 – 12	6 – 8
Inadequate	2	5 – 8	3 – 5
Very Poor	1	≤ 4	≤ 2

Source: (Pasaribu, 2020)

**Pacer Test**

Participants in the test perform the pacer test, and the results of the participants’ pacer test are recorded when they fail or are late twice. The norm for assessing endurance test is as **Table 5.**

Data analysis technique refers to a method used to manage data in order to draw accurate conclusions. In this research, the chosen technique is quantitative descriptive data analysis. The data obtained from each measurement represents raw data from the results obtained by students.

The normality test is conducted using com-

puter software such as SPSS, and the percentage is calculated using the formula:

$$P = \frac{N}{F} \times 100\%$$

Source: Rizaldi Setiawan (2017)

Information:

P: persentase

F: frequency

N: number of cases

The normality test aims to demonstrate that the sample data originates from a normally distributed population. In this study, the Shapiro-Wilk test is employed for normality testing, with the following criteria:

Significance level ( $\alpha$ ): 0.05

If the p-value >  $\alpha$ , then the sample is derived from a normally distributed population.

If the p-value <  $\alpha$ , then the sample does not originate from a normally distributed population.

**RESULTS AND DISCUSSION**

This research was conducted at Indralaya 1 Public Junior High School, South Sumatra, on December 7, 2023, from 08:00 to 13:00 WIB. Indralaya 1 Public Junior High School is located on Jl. Lintas Timur KM.35, Indralaya, Ogan Ilir, South Sumatra. t.

**Table 5.** Pacer Test Norms

Age	Gender	Very Low	Low	Fair	Good	Excellent
9 Years	M	≤ 13	14 – 30	31 – 40	41 – 50	≥ 51
	F	≤ 6	7 – 6	17 – 26	27 – 35	≥ 36
10 Years	M	≤ 23	24 – 36	37 – 49	50 – 60	≥ 61
	F	≤ 7	8 – 18	19 – 29	30 – 40	≥ 41
11 Years	M	≤ 23	24 – 39	40 – 55	56 – 71	≥ 72
	F	≤ 15	16 – 24	25 – 32	33 – 40	≥ 41
12 Years	M	≤ 32	33 – 47	48 – 63	64 – 71	≥ 72
	F	≤ 15	16 – 24	25 – 32	33 – 40	≥ 41
13 Years	M	≤ 41	42 – 58	59 – 75	76 – 81	≥ 83
	F	≤ 23	24 – 32	22 – 41	42 – 50	≥ 51
14 Years	M	≤ 41	42 – 58	59 – 75	76 – 81	≥ 83
	F	≤ 23	24 – 32	33 – 41	42 – 50	≥ 51
15 Years	M	≤ 51	52 – 69	70 – 86	87 – 93	≥ 94
	F	≤ 32	33 – 39	40 – 45	46 – 50	≥ 51
16 Years	M	≤ 61	62 – 72	73 – 87	88 – 93	≥ 94
	F	≤ 32	33 – 42	43 – 50	51 – 60	≥ 61
17 Years	M	≤ 61	62 – 77	78 – 92	93 – 105	≥ 106
	F	≤ 32	33 – 42	43 – 50	51 – 60	≥ 61
17+ Years	M	≤ 72	73 – 84	85 – 95	96 – 105	≥ 106
	F	≤ 41	42 – 52	53 – 62	63 – 71	≥ 72

Source : Kemenpora (2022), pedoman pelaksanaan TKPN



**Table 6.** Shapiro-Wilk Data Normality Test Results

	Test of Normality		
	Shapiro-Wilk		
	Statistic	df	Sig.
Squat Thrust	.920	45	.004
Push Up	.958	45	.107
Sit Up	.958	45	.105
Pacer Test	.949	45	.047
V Sit and Reach	.929	45	.009

Based on the data used in **Table 6**, a normality test was conducted using SPSS statistics. The results from the Shapiro-Wilk test table show that the data degree of freedom (df) is based on a sample size of 45 individuals. To determine whether the data in the Shapiro-Wilk output follows a normal distribution or not, it can be inferred by the rule that if the Significance value is  $> 0.05$ , the residual values are normally distributed. Conversely, if the Significance value is  $< 0.05$ , the residual values are not normally distributed. For a more detailed understanding, the normality test results for the physical test data are; Squat Thrust test was 0,004, push up test was 0,107, sit up test was 0,105, pacer test was 0,047 and v sit and reach test was 0,009.

The data analysis was obtained through the calculation of each norm category and data from each component of the physical test. This allows us to determine the average physical condition of seventh-grade students at Indralaya 1 Public Junior High School specializing in volleyball. For a clearer understanding, please refer to the following **Table 7**.

**Table 7.** Analysis Data Results

Indicator	Category				
	Excellent	Good	Ad-quate	Inade-quate	Very Poor
Squat Thrust	0%	0%	71,1%	28,9%	0%
Push Up	0%	0%	0%	100%	0%
Sit Up	0%	0%	0%	0%	100%
Pacer Test	0%	0%	0%	100%	0%
V Sit and Reach	24,4%	51,1%	22,2%	0%	0%
Average	5%	1,2%	14%	46%	20%

Based on **Table 7**, the data analysis results indicate the physical condition of seventh-grade students at Indralaya 1 Public Junior High School

specializing in volleyball. The distribution is as follows: the "excellent" category has an average of 5%, the "good" category is 1,2%, the "fair" category is 14%, the "poor" category is 46%, and the "very poor" category is 20%. From all the categories mentioned above, it can be concluded that the average physical condition of seventh-grade students at Indralaya 1 Public Junior High School falls into the "poor" category with a percentage of 46%.

The results of the physical test measurements for volleyball players at Indralaya 1 Public Junior High School, using the application for 30 male and 15 female students, include data from sit-ups, push-ups, bleep tests, and V sit and reach. The physical condition components are crucial to support the mastery of technical and tactical skills in a sports branch, particularly in volleyball. Training significantly influences physical condition related to coaching patterns, improvement, and achieving optimal performance. Physical training must be organized, planned, and executed well and systematically to enhance the required biomotor skills (Bompa and Buzzichelli, 2019).

Physical condition is a prerequisite for athletes to improve and optimize sports performance. Therefore, physical condition must be developed and enhanced according to the characteristics and needs of each sports branch. Physical condition is a comprehensive set of physical attributes possessed by an individual. Every volleyball player must exhibit good performance in physical condition factors to achieve maximal achievements. The strength component is crucial in sports, especially muscle strength, as athletes need to have good muscle strength and power to secure victories (Hanief, 2019).

Several physical components that need development include: 1) Flexibility, which reduces pain during sports and physical conditioning exercises Musumeci et al., (2015) Strength, closely related to muscle contraction processes, is essential for improving metabolism and maintaining organ function (Mashuda and Purnomo, 2013); and 3) Endurance, the body's ability to overcome fatigue caused by relatively prolonged stress (Ziv & Lidor, 2011). Aziz et al., (2020) highlights that arm muscle strength is the ability of muscles and nerves around the arm area to generate force during the application of a load. If a player lacks mastery of basic volleyball techniques during a match, the created volleyball game will be suboptimal, affecting the match's outcome.

Training arm muscle strength and improving the effectiveness of smashes in volleyball is

achieved through the push-up test. The push-up test helps enhance the strength of athletes in performing smashes. The push-up test is conducted to assess the arm muscle strength of seventh-grade students at Indralaya 1 Public Junior High School. The results of the push-up physical test measurements for both male and female students show different frequency categories. For males, the percentage distribution is excellent (0%), good (0%), moderate (58%), poor (42%), and very poor (0%). Meanwhile, for females, the percentage distribution is excellent (0%), good (0%), moderate (100%), poor (0%), and very poor (0%).

The results indicate that students need to maintain their arm muscle strength, as this plays a crucial role in volleyball, especially in performing smashes and serves, which require strong arm muscles. Abdominal muscle strength serves as the central power hub for other muscle strength components. It acts as a controller for other muscle strengths, ensuring that muscle movements are more efficient and aligned with the necessary requirements. In volleyball, abdominal muscle strength supports other muscle groups, such as arms, legs, and back, to work optimally as expected. Therefore, abdominal muscle strength is a crucial component for executing movements in volleyball.

According to Meiriawati (2013: 3), the sit-up movement is performed with the body positioned halfway reclined, knees bent (with knee folds and back stretch forming a 90o angle), hands behind the head, and then lifting the upper body until the elbows touch the knees. The physical test results for sit-ups in both males and females show the same frequency categories: excellent (0%), good (0%), moderate (0%), poor (100%), and very poor (0%). Given the crucial role of abdominal muscle strength in volleyball players, the results need to be improved to produce higher-quality volleyball athletes. Body flexibility is essential in daily life, reducing the risk of injury during movements. Flexibility is the ability to move within the joint's range of motion, determined not only by joint movement but also by the elasticity of muscles, tendons, and ligaments. In volleyball, various movements, such as spiking and challenging ball retrievals, require body flexibility.

Therefore, volleyball athletes need to possess good flexibility to control and return the ball efficiently, even in challenging situations. Recognizing the significance of flexibility for volleyball players, improving athlete flexibility is crucial to enhance overall athlete quality. One flexibility measurement tool is the V sit and reach test. The physical test results for V sit and reach in both

males and females show the same frequency categories: excellent (0%), good (0%), moderate (0%), poor (0%), and very poor (100%).

VO2Max, as described by Jatmiko et al (2013), represents an individual's maximum capacity to transport and use oxygen during high-intensity exercise. VO2Max serves as a benchmark for coaches to assess an athlete's physical fitness level. The ability to engage in continuous activities for an extended period is crucial. Volleyball, being a sport with prolonged and demanding physical activities, requires physical consistency (endurance) from players to sustain the game until its completion. Therefore, to play consistently throughout a match, players must have excellent endurance, increasing the likelihood of winning.

Recognizing the crucial role of endurance for volleyball players, it is essential to enhance students' endurance to enable them to unleash their full technical capabilities optimally until the end of the match. The physical test results for the bleep test in both males and females show the same frequency categories: excellent (0%), good (0%), moderate (0%), poor (100%), and very poor (0%). For students with physical conditions categorized as poor, it is recommended to supplement extracurricular training beyond the scheduled sessions. The percentage of physical endurance categories is a critical element and serves as the basis for developing techniques, tactics, and strategic abilities in playing volleyball. Physical condition is a prerequisite essential for the improvement of a player's performance, serving as the starting point for sports achievement.

## CONCLUSION

Based on the above description, the research results for sixth-grade students at Indralaya 1 Public Junior High School, specializing in volleyball, indicate an average physical condition in the excellent category with a percentage breakdown as follows: excellent (5%), good (1,2%), moderate (14%), poor (46%), and very poor (20%). From all the categories mentioned, it can be concluded that the average physical condition of seventh-grade students at Indralaya 1 Public Junior High School falls into the poor category with a percentage of 46%.

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