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Improvement of Physical Activity in Volleyball Using Outdoor Laboratory in University Education Park

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Abstract: This study aims to determine the physical activity of volleyball players at Indralaya Utara 2 Junior High School. This research is quantitative research with a descriptive research design. The subjects of this study were volleyball players at Indralaya Utara 2 Junior High School with a total of 30 players consisting of 22 boys and 8 girls. Data collection used a test. The research location was carried out in an outdoor laboratory in the University Education Park. The data analysis technique uses descriptive analysis, which is expressed in the form of a percentage. The results of the study found that the physical activity of volleyball players which included endurance, speed, arm muscle strength, abdominal muscle strength, and leg muscle explosive power was in the moderate category and there were 3 players in the very good category, 6 players in the good category, 11 players in the fair category, 9 players in the poor category, 1 player in the very poor category. It can be concluded that the physical activity of volleyball players at Indralaya Utara 2 Junior High School is in the sufficient category. some of the findings have implications for the results of the research, namely the emergence of awareness for both players and students to increase and maintain physical activity wherever and whenever to improve the physical condition of players who are still in the sufficient category and still not enough so they can get better.

Keywords: laboratory, outdoor, physical, university, volleyball

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INTRODUCTION

In playing volleyball, a volleyball player needs to do good physical activity to improve the quality of his technique. Players who master technique well, but whose condition and physical activity are not good will affect their game when competing. Players who have poor physical conditions and activity will not play optimally. Physical activity is one element that is no less important and forms the basis for developing techniques, tactics, and strategies that not only affect technical improvement but also improve tactics (Bachtiar & Sujarwo, 2019). So, physical activity in volleyball players includes endurance which functions so that they do not easily experience fatigue when competing, arm muscle strength functions to serve, block and smash, leg muscle power functions to jump, and abdominal muscle strength functions to increase strength. in smashing. According to Fatihin et al. (2021) that the physical activities in volleyball players need to be developed are endurance, muscle strength, abs, arm muscle strength, speed, explosive power and sufficient flexibility important for volleyball players (Kedo, 2014). So, it can be concluded that physical activity in volleyball includes strength, flexibility, agility, endurance, and explosive power (Kadafi & Irsyada, 2021) and can be measured using test instruments that apply according to the category.

Based on the observations of researchers conducted at Public Middle Schools together with physical education and health subject teachers, the researchers found several problems related to sports lesson activities, including volleyball players, both male and female, paid little attention to physical aspects, sports facilities and infrastructure were still limited, and do not meet the needs of facilities that are in accordance with the level of sports activity making it difficult to improve the quality of learning volleyball. So far, the physical education teacher at school has only emphasized learning technical training theory, such as smashes, underhand passing, and team cohesiveness during practice so the game of volleyball at North Indralaya 2 Public Junior High School is not well developed. Even though physical activity can have an impact on physical growth and optimal emotional development (Burhaein, 2017; Lisdiantoro & Utomo, 2022).

Thus, teachers must be able to direct students about the importance of physical activity. This activity can be done both indoors and outdoors. As has been proven in previous research using the socio-ecological model has made students more effective in carrying out physical activities in physical education in schools (Ardiyanto & Mustafa, 2021). Teachers must pay attention to the characteristics of each student, especially in carrying out volleyball activities (Pisa et al., 2022; Nugraha & Lily, 2022). So, teachers can carry out physical activity through a variety of training methods individually or in groups (Azhar, 2017), learning method using a multimedia tour (Hartati et al., 2018), or teachers can develop a model of exercise such as using a sponge ball

(Nugroho et al., 2022). Thus, volleyball players can jump to produce repulsion or the accuracy of hitting the ball (García-de-Alcaraz et al., 2020; Giustino et al., 2022; Lima et al., 2019; Piatti et al., 2022; Ramirez-Campillo et al., 2021).

From these findings, it can be understood that the form of volleyball training should not only train good basic techniques but also physical conditions that become the basis or foundation before moving on to technical training. If special attention is not given, the physical activity of students who are fond of volleyball will be low and will continuously have an impact on students' physical fitness problems in volleyball. To prove this condition, physical exercise is needed that can meet the needs of volleyball. To measure a person's physical activity, of course, facilities and infrastructure are needed that function to support the implementation of the measurement. However, the facilities and infrastructure at the school are inadequate, therefore in the educational park the Faculty of Teaching and Education, Sriwijaya University has an outdoor laboratory that functions as a facility and infrastructure to improve physical fitness or carry out physical activities that can be used for all groups, both students, lecturers and staff. So, the feasibility level of sports infrastructure should be a concern of teachers or educational institutions(Bhardwaj, 2017; Irawan & Prasetyo, 2019). Even the performance of teachers can also be affected by the environment and infrastructure (Riniati et al., 2023). Other research shows when students get more sports facilities, they are found to have higher achievement and performance at various levels (Singh, 2018). So, educational institutions must also pay attention to the needs of learning facilities and infrastructure so that learning activities are maximized (Rumia & Simorangkir, 2021).

Therefore, the researcher intends to test the existing facilities and infrastructure in the outdoor laboratory at the Teaching and Education Faculty of Sriwijaya University using a sample of students from Indralaya Utara 2 Junior High School even though the facilities and infrastructure are not yet 100% complete. Therefore, this study presents a focus on a problem that is different from previous research, in addition to focusing on variations in physical activity it also utilizes educational parks at universities that need facilities for physical exercise. So, this research aims to determine the physical activity of volleyball players in one of the public junior high schools in Indralaya. The components of physical activity studied include endurance, speed, arm muscle strength, abdominal muscle strength and leg muscle explosive power. The results of the research are expected to provide benefits and contribute to the understanding of Physical Education teachers about the importance of providing physical activity before learning volleyball so that their physical condition is ready to play volleyball.

METHODS

Research Design

This type of research is quantitative research using descriptive methods. This study examines phenomena in the field and solves problem findings through systematic, scientific, accurate and factual descriptions of the data that has been obtained by the focus of the problem (Creswell, 2012; Sugiyono, 2016). Based on this understanding, it can be concluded that descriptive research is carried out by seeking information related to existing symptoms, clearly explaining the goals to be achieved, planning how to approach them, and collecting various kinds of data as material for making reports. In this study, the authors wanted to know the description of the measurement of physical activity in volleyball for male and female players at Indralaya Utara 2 Junior High School with an outdoor laboratory at University Education Park.

Place and Time

This research consists of 2 stages, namely observation and research stage. It was conducted for six months at the Educational Park of the Teaching and Education Faculty, Sriwijaya University, South Sumatra.

Population and Sample

The population in this study were all volleyball players or students at North Indralaya 2 Public Middle School, both boys and girls. The sample of this study was male and female volleyball players consisting of classes VII, VIII and IX, totalling 30 people consisting of 22 male students and 8 female students.

Data Measurement Technique

This research has one variable, namely: the measurement of the physical activity of volleyball players as a single component of physical activity including arm muscle strength, abdominal muscle strength, endurance, leg muscle power, and speed. Operationally, the strength taken is hand muscle strength, abdominal muscle strength, and leg muscle strength. The type of test used is the 30-meter dash to measure speed. 30-second push-ups to measure arm muscle strength, 30-second sit-up test to measure abdominal muscle strength. Bleep test to measure endurance, vertical jump to measure leg muscle explosive power. The tools used are the tools in the university education park (running track, the place for push-ups and sit-ups and a place for measuring vertical jumps). The tests used for data collection are carried out by taking several units, groups, and individuals and then testing and measuring are carried out at the same time, so that the data or information obtained is accurate and can be accounted for.

Table 1. Run *Norma*

Norm	Male	Female
Very well	≥ 4.4	≥ 4.7
Good	4.6 - 4.5	5.5 – 4.8
Enough	4.8 - 4.7	6.3 – 5.6
Not enough	5.0 – 4.9	7.1 – 6.4
Once less	< 5.0	< 7.1

(Harsuki, 2017)

This table explained the role to assess students' run tests. The time is recorded up to tenths of a second (0.1 seconds), if possible it is recorded up to one-hundredth of a second (0.01 seconds); then the testee is carried out twice, and the runner performs the next test after an interval of at least one runner. The best running speed is calculated and the testee is declared a failure if he passes or crosses another track.

Table 2. Bleep test *norma*

Category (Male)	Age (years)					
	10 -14	**15-19**	**20-29**	**30-39**	**40-49**	**50-59**
Very well	≥ 51	≥ 48	≥ 43	≥ 36	≥ 31	≥ 26
Good	45-50	42-47	37-42	31-35	26-30	22-25
Enough	40-44	38-41	33-36	27-30	22-25	18-21
Not enough	35-39	33-47	29-32	22-26	17-21	13-17
Once less	≤ 34	≤ 32	≤ 28	≤ 25	≤ 16	≤ 12
Category (Female)	**Age (years)**					
	10 -14	**15-19**	**20-29**	**30-39**	**40-49**	**50-59**
Very well	≥ 48	≥ 42	≥ 36	≥ 29	≥ 25	≥ 19
Good	42-47	36-41	31-35	24-28	20-24	12-18
Enough	36-41	31-35	25-30	20-23	15-19	5-11
Not enough	33-35	27-30	21-24	15-19	7-14	3-4
Once less	≤ 32	≤ 26	≤ 20	≤ 14	≤ 6	≤ 2

(Harsuki, 2017)

This table has described the norm of endurance tests based on the age category. The bleep test is carried out by running for a distance of 20 m back and forth, which starts with running slowly gradually and gets faster and faster until the athlete is unable to keep up with the rhythm of the running time, so the maximum ability is at that alternating level.

Table 3. Sit-up test *Norma*

Norm	Male	Female
Very well	20 – an above	17 – and above
Good	18 < X > 19	15 < X > 17
Enough	16 < X > 17	13 < X > 14
Not enough	14 < X > 15	8 < X > 12
Once less	downward – 13	downward– 8

(Harsuki, 2017)

Table 3 describes the rules for scoring sit-up tests adjusted for gender categories. There are different ranges of achievement values between men and women and value categories. There are five categories with different ranges of scores to be achieved by male or female students.

Table 4. Vertical jump test *Norma*

	Norm	Male					Female				
	Age	**12**	**13**	**14**	**15**	**16**	**12**	**13**	**14**	**15**	**16**
1	Very well	≥55″	≥55″	≥55″	≥60″	≥60″	≥40″	≥40″	≥40″	≥42″	≥42″
2	Good	48″	48″	48″	57″	57″	36″	36″	36″	37″	37″
3	Enough	41″	41″	41″	47″	47″	30″	29″	29″	32″	32″
4	Not enough	34″	34″	34″	40″	40″	21″	21″	21″	27″	27″
5	Once less	34>	34>	34>	40>	40>	21>	21>	21>	27>	27>

(Harsuki, 2017)

Table 4 describes the assessment criteria for the vertical jump test according to age category. Male and female students have different ranges of values according to their age level.

Table 5. Sit-up test *Norma*

Norm	Male	Female
Very well	22 - an above	20 - an above
Good	18 < X > 22	17 < X > 20
Enough	15 < X > 18	14 < X > 16
Not enough	11 < X > 14	7 < X > 14
Once less	downward – 11	downward– 7

(Harsuki, 2017)

Table 5 is the scoring criteria for the sit-up test according to gender. There are five categories of values with different value ranges. The result of the validity and reliability of the test instrument is presented in the following table;

Table 6. The result of the validity and reliability of the test instrument

Norm	Validity	Reliability
30-meter run test	0,53	0,63
Endurance Test	0,915	0,868
Sit-up test	0,67	0,88
Vertical jump test	0,76	0,76
Push-up test	0,94	0,93

Table 6 presents the results of testing the validity and reliability of each test instrument to measure physical activity tests in volleyball games. Thus it can be concluded that the test is feasible to use.

Data Analysis

The data obtained for each test item is raw data from the results of each test achieved by students, and then these rough results are converted into T-Score values with the T-Score formula (Sudijono, 2015). Data that has been converted into t-scores are then categorized into 5 categories based on the obtained Mean value and standard deviation. The following is a standard score with an assessment of 5 categories used to describe data on the results of measuring the physical activity of volleyball players at Indralaya Utara 2 Junior High School. The score criteria use the Norm Reference Assessment in the following table (Azwar, 2016).

Table 7. Norm Reference Assessment

Interval	Category
$M + 1{,}5\ S < X$	Currently Good
$M + 0{,}5\ S < X \leq M + 1{,}5\ S$	Good
$M - 0{,}5\ S < X \leq M + 0{,}5\ S$	Enough
$M - 1{,}5\ S < X \leq M - 0{,}5\ S$	Less
$X \leq M - 1{,}5\ S$	Currently Less

RESULT AND DISCUSSION

The results of data processing are presented in tabular form for each physical activity test item. The results of physical activity tests between male and female students are presented in different tables as follows;

Table 8. The result of the physical activity test for male students

Category	30-meter run test		Endurance Test		Sit-up test		Vertical jump test		Push-up test	
	F	RF	F	RF	F	RF	F	RF	F	RF
Very well	1	5%	1	5%	3	14%	1	5%	2	9%
Good	8	36%	2	9%	6	27%	3	14%	3	14%
Enough	8	36%	15	68%	6	27%	11	50%	14	64%
Not enough	4	18%	4	18%	7	32%	7	32%	3	14%
Once less	1	5%	0	0%	0	0%	0	0%	0	0%

Note: F: Frequency; RF: Relative frequency

Data from table 8 illustrates that male students for the running test were considered good and sufficient, the results of the endurance test were considered sufficient, the sit-up test was considered insufficient, the vertical jump test was considered sufficient and the push-up test was considered sufficient. So, from the five physical activity tests of male students in playing volleyball as a whole it must be improved, especially in the sit-up test. While the results of the daughter's physical activity test are presented below.

Table 9. The result of physical activity test for female students

Category	30-meter run test		Endurance Test		Sit-up test		Vertical jump test		Push-up test	
	F	RF	F	RF	F	RF	F	RF	F	RF
Very well	0	0%	1	13%	1	13%	1	13%	1	13%
Good	4	50%	1	13%	2	25%	2	25%	1	13%
Enough	1	13%	3	38%	3	38%	2	25%	3	38%
Not enough	3	38%	3	38%	2	25%	3	38%	3	38%
Once less	0	0%	0	0%	0	0%	0	0%	0	0%

Note: F: Frequency; RF: Relative frequency

Data from table 9 illustrates that the female students for the running test were considered good, the results of the endurance test were considered sufficient and still lacking, the sit-up test was considered sufficient, the vertical jump test was considered insufficient and the push-up test was considered sufficient and still lacking. So, from the five physical activity tests, female students are also still low. From these data, it can be said that the physical activity of male and female students is still not good, especially in the four types of tests namely endurance tests, sit-up tests, vertical jump tests and push-up tests. Overall, only running physical activity is considered good. This means that the condition of student volleyball games is still low and not good enough because their physical condition is also inadequate. This can be seen from the results of physical activity tests which are still considered low as illustrated in the table below.

Table 10. The result of physical activity test for students

Norm Range			Category	Frequency	Relative frequency
	X ≥	283.58883	Very well	3	10%
261.18900	≤ X <	283.58883	Good	6	20%
238.78917	≤ X <	261.18900	Enough	11	37%
216.38935	≤ X <	238.78917	Not enough	9	30%
	X <	216.38935	Once less	1	3%
Total				30	100%

Based on all the results of a series of tests which included the bleep test, 30-meter run, 30-second push-up, 30-second sit-up, and vertical jump according to the research being tested, the results showed that overall the physical activity of volleyball players in Public Junior High School 2 North Indralaya is categorized as sufficient and lacking. Even though physical activity has an important role in volleyball players to produce a good game. In volleyball, physical activity is considered important besides helping to maintain body fitness and helping improve the physical condition of the players. In this case, it can be understood that physical activity with volleyball skills is related and has an impact on the game (Silva et al., 2014; Sozen, 2012). Other studies also showed that the level of specific physical fitness had an impact on the technical and tactical effectiveness of volleyball players (especially female players) studied players aged 16-18 years in competitive game situations (Boichuk et al., 2020; Hunchenko et al., 2021; Natali et al., 2019; Thiago et al., 2021). Thus it can be understood that the technical and tactical mastery of players has an influence on volleyball game activities. In addition, the physical condition of the players also has an impact on their technical and tactical implementation of playing volleyball.

Volleyball players at Indralaya Utara 2 Public Junior High School have not all carried out good physical activity and there are still many who are in the category of sufficient or even less and less due to the preparation of an inappropriate training program. Therefore, coaches or sports teachers must build programs to improve students' physical activity abilities so that volleyball games can be done very well. This has a positive impact on improving the game of volleyball (Dell'antonio et al., 2022; Pereira et al., 2015; Zhou et al., 2020). Other research has also conducted tests of the body fitness of volleyball players using the EUROFIT test: flamingo, plate tapping, sit and reach, standing broad jump, handgrip, sit-up, bent arm hang and 10 x 5m shuttle-run test to determine students' physical fitness. The results of the study concluded that volleyball training is needed which pays attention to physical fitness and can be applied to students together with physical education and sports lessons because it is easy to apply (Sozen, 2012).

Moreover, every male and female student has a different level of physical tests. These differences can be understood from various perspectives and can be analyzed in more depth, such as the results of performance tests (Ahmadi et al., 2019), or muscle coordination and movement strategies (Côté, 2012). In addition, the game performance and physical fitness of seated volleyball players depend on their anthropometric variables: arm reach, blocking position and spike (Molik et al., 2013; Van Dornick & Bell, 2014). From the data, it is known that female students have more deficiencies in their physical activity seen from the five test items given because 3 physical activity test items are considered insufficient, namely the endurance test, vertical jump test, and push-up test. So, differences in body composition between individual age groups are different (Krause et al.,

2018; Molik et al., 2017; Van Dornick & Bell, 2014). Therefore, regular volleyball practice can affect their body composition and also their physical fitness (Kutáč et al., 2020). Therefore, the physical education teacher or trainer is still focused on technique, player tactics, and the training environment. For example, outdoor education activities can provide a different value to the interests of physical exercise because OE gives nuances of social values that can build cooperation (Ma'mun et al., 2018).

CONCLUSION

From the results of the analysis of physical activity test data as a whole, it can be concluded that the students at Indralaya Utara 2 Junior High School are still in the not-good category. This can be seen from the results of the data presented in table 10 because it is dominated by sufficient and insufficient categories. Meanwhile, the results of tests that have been separated into categories between male and female students also show that they are still not enough. Of the five physical activity test items, only the 30M run test was considered good. While the other four physical activity tests, namely the endurance test, the sit-up test, the vertical jump test and the push-up test, are still insufficient. For male students, physical exercise that must be improved is sit-ups, while for female students is an endurance test, vertical jump test, and push-up test. So female students are still lower in their physical activity. Based on these conclusions, some of the findings have implications for the results of the research, namely the emergence of awareness for both players and students to increase and maintain physical activity wherever and whenever to improve the physical condition of players who are still in the sufficient category and still not enough so they can get better. Teachers, coaches and lecturers can use physical activity measurements, namely by selecting to enter the team so that the selected players have good quality. However, the results of this study do not guarantee generalization for volleyball players from other schools because everyone's physical condition is different. After all, the sample of this study was examined for their actual physical activity in their daily activities. So, the shortcomings of this research should be used as a form of consideration so that research is carried out many times over a long period. Therefore, this can be a concern for future researchers and can control the activities of students or volleyball players before tests starting from health and others, as well as carrying out tests and measurements using an outdoor laboratory that is ready for use so that research runs optimally.

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