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Analysis Endurance Profile (Vo₂max) of Women's Volleyball Athletes: Yo-yo intermittent test level 1

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Abstract

Study objectives. VO₂max endurance is needed in volleyball, because this sport has the characteristics of jumping and shifting in various directions quickly. This study aims to determine endurance (VO₂max) in female volleyball athletes at the Brojomusti club.

Materials and methods. This research is a quantitative descriptive type using a survey method, in this research there are tests and measurements. The research instrument used *the yo-yo intermittent recovery test level 1*. The subjects in this study were female volleyball athletes at the Brojomusti club, totaling 15 athletes.

Results. The results of the study obtained that there were athletes with a percentage of 26.7% in the less category, then 4 athletes in the moderate category with a percentage of 26.7% and there were 6 athletes in the good category with a percentage of 40%. Then there is 1 female athlete in the very good category with a percentage of 6.7%.

Conclusion. Results This study shows that the women's volleyball athletes at the Brojomusti club are in the good category, but some athletes are still relatively low. With these results, it is hoped that they can provide an overview to the trainer so that they can provide training to increase the athlete's VO₂max.

Keywords : Endurance, VO₂max, Volleyball

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Introduction

Sport is an activity that is often carried out to improve a better quality of life, and exercise can be done by everyone, both children and the elderly (Suryadi et al., 2022). It can be argued that someone will have strong endurance the more frequently they participate in sports. Being able to perform tasks for an extended period of time without feeling too exhausted to continue on with other tasks is a symptom of having good endurance. According to Solissa, (2016) The term endurance in the world of sports is the optimal physical condition of an athlete

to fight fatigue during sporting activities. According to Tengkudung and Puspitorini (2012) endurance can be interpreted as a state of being able to keep working for quite a long time. Furthermore, Bompa & Michael, (2015) maintain physical activity for a long time, often called endurance. Based on the statements made by experts, the researchers concluded that endurance is a condition in which a person is able to fight fatigue even after doing repetitive activities for a relatively long time.

Aerobic endurance is needed in volleyball, because this sport has the characteristics of jumping and shifting in various directions quickly, therefore good endurance is needed. A study conducted by Suryadi, Samodra, & Purnomo, (2021) said endurance is one of the most important aspects to improve performance, not only athletes or endurance athletes are also needed for non-athletes to maintain physical and spiritual health. Aerobic endurance is an energy system that works by requiring oxygen to get energy. Based on the opinion of Tengkudung & Puspitorini, (2012) aerobic means with oxygen and aerobic endurance means muscle work done using oxygen to release energy from muscle materials. This is in line with TO Bompa & Buzzichelli's statement, (2019) Aerobic endurance, sometimes called low-intensity exercise endurance, allows a person to perform activities continuously for long periods of time. Thus, increasing aerobic endurance can be done by running continuously, at low intensity for a long time, so that the lungs will expand so that more oxygen can enter.

Aerobic endurance is very important for endurance sports with the condition that oxygen must always be fulfilled in order to release energy from muscle materials. So to be able to do activities for a long time a person must have a good *VO₂ max*. this requires aerobic endurance training to be developed first and then anaerobic endurance training. One type of exercise to develop aerobic and anaerobic endurance is interval training. In addition, TO Bompa & Buzzichelli, (2019) said high-intensity interval training has been suggested to significantly improve running economy and *VO₂max*, which are usually associated with increased endurance performance. According to Østerås, Sigmundsson, & Haga, (2017) lack of physical activity is suspected as a risk factor for various health complaints and perceived stress, this will have an impact on decreasing athlete endurance (Suryadi, 2022; Suryadi & Rubiyatno, 2022) . With the existence of previous studies, this becomes a description related to endurance (*VO₂max*).

As TO Bompa & Buzzichelli said , (2019) All other training-related aspects are built on the foundation of physical training. This shows that physical activity also contributes to the health and well-being of students because of the physical, psychological and social benefits it provides” (Moreno-Quispe, Apaza-Panca, Tavara-Ramos, & Mamani-Cornejo, 2021) . According to Meo et al., (2021) the great benefits offered by exercise can reduce the risk of disease and can maintain a healthy body. Therefore, it is very important to know the *VO₂max level* and the appropriate needs in athletes who are always faced with a busy schedule, because an increase in *VO₂max* can bring positive factors to physical endurance.

The problem that occurs at this time is the result of observations at the Brojomusti club , which has never done a *VO₂max* endurance test . Based on the results of observations through interviews with the club trainers, the athlete's *VO₂max* was still not monitored. Where, endurance is one of the factors that influence motivation (Sahara et al., 2019)(Rahmad, 2016), thereby making it easier for trainers to provide training programs. According to Hardinata et al., (2021) one of the physical conditions that is very dominant and supports the performance of athletes when training or competing is the physical condition *VO₂max* which is basically the main asset for athletes. Therefore, efforts that can be made are by conducting tests and measuring endurance (*VO₂max*) on volleyball athletes. This study aims to determine the endurance (*VO₂max*) of women's volleyball athletes at the Brojomusti club.

Materials and Methods

Study participants.

The subjects in this study were female volleyball athletes at the Brojomusti club in Pontianak city. The sampling technique uses saturated sampling so that the sample in this study is the entire population of 15 female athletes who are used as samples.

Study organization.

This research is a quantitative descriptive type using a survey method. In this study, tests and measurements were given to determine VO₂max in athletes. The research instrument used the *yo-yo intermittent recovery test level 1*. According to Hutajulu, (2016) in his research *gu nana _ yo-yo intermittent recovery test (YIRT) to measure VO₂max values athlete*.

INTERMITTENT RECOVERY TEST

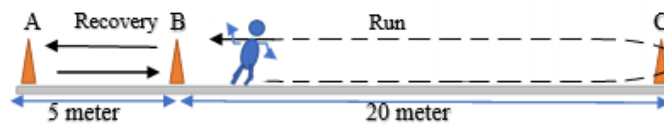


Figure 1. The *yo-yo intermittent recovery test* instrument

Statistical Analysis .

Data analysis in this study used descriptive percentages, the data obtained in the field was in the form of test results and *yo-yo measurements intermittent recovery test level 1*. The data obtained is then calculated by calculating the endurance according to the yo-yo intermittent recovery test level 1 according to the formula (Bangsbo, Iaia, & Krustup, 2008). After obtaining the criteria for physical fitness ability, then using the calculation process assisted by using Microsoft Excel 2016 software.

Table 1. Assessment Norms yo-yo intermittent recovery test levels 1 For Woman

<i>Ratings</i>	<i>Levels</i>	<i>Value Range</i>
<i>Elite</i>	>17.5	>49.8
<i>Excellent</i>	16.6-17.5	47.5-49.8
<i>good</i>	15.6-16.5	44.8-47.2
<i>Average</i>	14.6-15.5	42.1-44.5
<i>Below average</i>	13.1-14.5	39.1-41.7
<i>poor</i>	<13.1	<39.1

Source : (Hardinata et al., 2021)

Results

VO₂max level data revealed that 15 Brojomusti female athletes were given tests and measurements of *intermittent yoyo test level 1 measurements*. The data is described with descriptive and statistical data, this is intended to facilitate in understand the final results in clarifying the results of research.

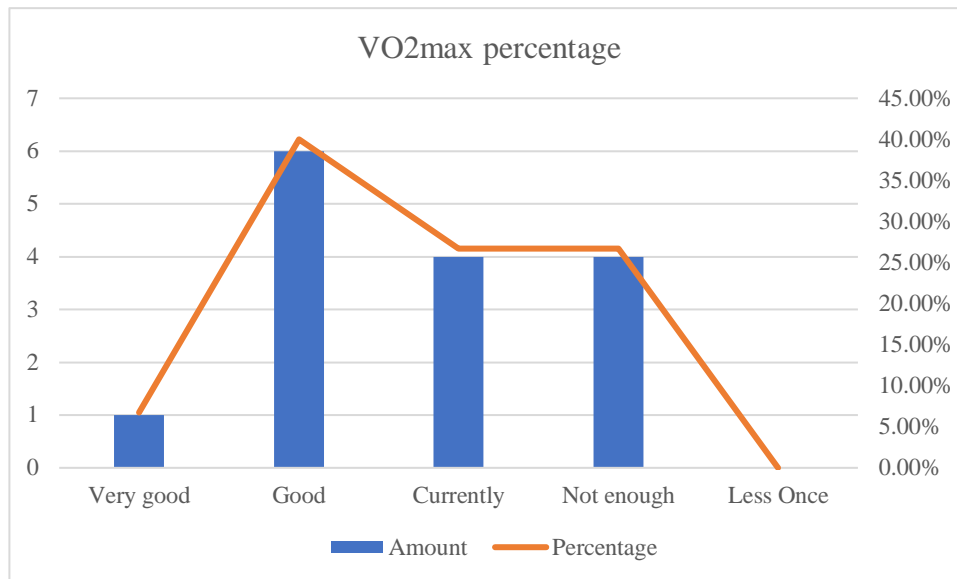
Table 2. *VO2max* Results in Female Athletes Brojomusti

No	<i>VO2max</i> results	Category
1	44,464	Currently
2	40,432	Not enough
3	43.12	Currently
4	43,792	Currently
5	46.48	Good
6	45,808	Good
7	46.48	Good
8	46,144	Good
9	42,112	Currently
10	45,136	Good
11	39,088	Not enough
12	40,768	Not enough
13	39,424	Not enough
14	46,144	Good
15	48.16	Very good

Table 3. *VO2max* Levels in Female Athletes Brojomusti

range Mark	Category	Amount	Percentage
47.5-49.8	Very good	1	6.7%
44.8-47.2	Good	6	40%
42.1-44.5	Currently	4	26.70%
9.1-41.7	Not enough	4	26.70%
<39.1	Less Once	0	0%
	Total	15	100%

Based on table 3, it shows that as many as 4 athletes have a percentage of 26.7% in the less category. There are 4 female athletes in the moderate category with a percentage of 26.7% and there are 6 athletes in the good category with a percentage of 40%. Furthermore, there is 1 female athlete in the very good category with a percentage of 6.7%. These results prove that the female athletes at the Brojomusti club are good, this result is evidenced by the percentage of athletes who are in the good category 40% and 6.7% in the very good category. For more details shown in the diagram in graph 1.



Graph 1. VO2max Percentage Results for Putri Brojomusti Athletes

Discussion

VO2max endurance of female volleyball athletes from the Brojomusti club. The results showed that the level of physical fitness of female volleyball athletes in brojomustit contained 6 athletes in the good category with a percentage of 40%. Based on these results, it can be concluded that *the VO2max* endurance of the women's volleyball athletes from the Brojomusti club is still partially lacking. Relevant research on volleyball extracurriculars shows a very poor category (Ihsanti & Haryoko, 2022) . Next, the *VO2max level* of wrestling extracurricular students is in the moderate category (Nesra Barus, 2020) .

Based on these results, these results can provide an overview so that coaches can prepare suitable exercises to increase the endurance of their athletes. According to TO Bompa & Buzzichelli, (2019) An athlete gets ready for the best performance possible through training. Based on this, endurance training needs to be done constantly, often, systematically, and for a considerable amount of time in order to get the best results. As mentioned by T. Bompa & Buzzichelli, (2015) The growth of endurance can benefit from planned exercise that lasts a long time or involves many repetitions.

The right training program or one that is tailored to the demands of the team has an impact on the training outcomes that will be attained later, in addition to the training process itself. The process of creating a training program involves the coach selecting the best exercises to employ with the goal of having those exercises have a good effect on players. As stated by Suryadi et al., (2021) Regular and planned exercise, as well as maintaining nutritional and vitamin consumption, are elements that affect improving physical condition. As a result, the training process becomes clearer and more focused with the help of the training program, the objective of peak performance (peak performance) may be attained at the time that has been planned in advance, and it is anticipated that the training effects will be at their best.

There are numerous strategies to enhance it, as evidenced by the process of physical condition training, particularly aerobic endurance. According to Mylsidayu & Kurniawan Febi, (2015) 1) Controlled speed polygon, 2) Square, 3) Quad, 4) Triangle run, and 5) Passing on the Right are activities that help improve endurance. Selecting workouts that are nearly identical to actions or conditions that are frequently used in sporting events is one of the keys to improving aerobic endurance. Based on the opinion of Pate, McClenaghan, & Rotella, (1993) claimed that the best aerobic exercise provides the appropriate level of intensity, is most akin to the activity being engaged in (in accordance with the sport), and is most enjoyed.

As a result, each player must possess aerobic endurance as a fundamental skill to assist performance when competing, so the coach must be able to offer suitable and varied training to improve aerobic endurance. According to this justification, exercise is required for athletes to enhance their VO_{2max} . The results of research conducted by Hardinata et al., (2021) Soccer players' endurance is increased by endurance training employing the triangle run technique. In addition, applying circuit training has an effect on endurance (Ashfahani, 2020; Handrizal et al., 2016; Iswahyudi et al., 2020; Kusumawati, 2013; Muzaki et al., 2020; Rahman, 2018; Solissa, 2018), and the need to also pay attention to body shape, because this tends to affect achievement (Samodra et al., 2023; Suryadi, Rubiyatno, et al., 2022). The triangular running training method improves the endurance of Bekasi men's cricket players; this improvement has happened as a result of more consistent and planned training schedules (Muhamad, Kusumawati, Haqiyah, & Rosadi, 2019). Therefore, it is necessary to design a program to increase athlete achievement in volleyball (Kumbara et al., 2022).

Conclusions

Based on the results of the analysis and discussion, it has a strong foundation based on previous research references. The results showed that the level of VO_{2max} endurance in women's volleyball athletes from the Brojomusti club was 6 out of 15 athletes with a percentage of 40% in the good category. So it can be concluded that the VO_{2max} endurance level of women's volleyball athletes at the Brojomusti club is partly still relatively low. Therefore, the existence of these results can provide an illustration that it is necessary to design specific exercises to increase VO_{2max} endurance. female volleyball athlete at the club. Recommendations for further research can develop specific training programs to improve volleyball endurance

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Conflict of interest

All authors declare that there is no conflict of interest whatsoever in this research

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