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Anaerobic Capacity Level Differences of Each Player Position in Volleyball

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Abstract

Volleyball is one of the most popular sports in the world. To be a professional volleyball player, a coach needs to know how to train their athletes. According to the physiological component, the most used energy of a volleyball player comes from ATP-PC and glycolysis. This study aimed to classify an anaerobic capacity standard of male volleyball athletes in Indonesia. In this study, 60 athletes participated in 2 levels: Junior 15-17-year-old High School student level and 18-25-year-old University student level. The samples were chosen according to their achievement in national-level competitions in the last few years. The measurement used the Running Anaerobic Sprint Test, Vertical Jump Test, and 5-Meter Multiple Shuttle Repeat Sprint Test. The analysis employed an ANOVA test using SPSS 16 and Tukey post hoc test. This study found differences in several anaerobic performance aspects of each position in the same level of competition and at the different levels of competition. In the junior-level athletes, a significant difference was found in the average power between outside hitter and libero, peak power vertical jump between middle blocker and libero, and total distance achieved among outside hitter, opposite hitter, and setter. Senior-level athletes showed a significance different in maximum power, average power, and fatigue index of outside hitters, middle blocker, opposite hitters, setter, and libero, peak power of vertical jump among hitters, setter, and libero, and total distance achieved by hitters, setter, and libero. In conclusion, senior-level athletes showed superiority shown by higher scores of anaerobic capacity than junior-level athletes. It is suggested to conduct more research on the characteristics of each position in volleyball to train athletes more effectively and efficiently according to their position.

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INTRODUCTION

Modern volleyball is known as a speed sports game which means at one point ended fast. Today, a typical rally in a men's or women's collegiate game lasts only about 10 to 15 seconds (Scates, Linn, & Kowalick, 2003). It makes a volleyball game demands athletes to move faster, jump higher, hit harder, and decide more quickly, yet accurate, individually influenced team works which most of the energy used by volleyball players is an anaerobic energy system. As a volleyball player, physiological attributes are involved in an athlete's performance; also, there are other physical and mental requirements. Moreover, victory in sport depends on a combination of many factors: technical and tactical actions and physiological, psychological, and anthropometric parameters(Ciemiński, 2017).

For volleyball players, the anthropometric aspect is the first aspect that decides which type of volleyball player is he/she. Height is the first anthropometric aspect determining the successful player; therefore, height is considered a core factor for playing at the highest levels (Vargas et al., 2018). Furthermore, height also decided what position he\she will be playing and focus for he/her volleyball career because there were essential differences concerning anthropometric characteristics and muscular strength and power test scores of players based on their specific position on a team (Marques, Van den Tillaar, Gabbett, Reis, & González-Badillo, 2009).

In modern volleyball, there are five positions, and different positions have their roles and characteristics. For example, five positions in volleyball are outside hitter, opposite hitter, middle blocker, setter, and libero. This specialization sometimes is determined by the coach when looking at the athlete's anthropometric aspect or by the athlete's experience. Therefore, as the players gain experience in the sport, they usually start to specialize in a certain position on the court, such as setter, libero, opposite hitter, middle blocker, or outside hitter (Education, 2011). Each player in volleyball needs to master every technique in volleyball, such as an attack, defense, block, setting, and service, because junior level athlete's coach will specialize the athlete by their unique skill or the best position they fit in, despite their anthropometric aspect.

The specialization in volleyball makes each position has its characteristics and role; for example, the middle blocker needs to be tall because their main job is to block the opponent's attack as the first defense, which makes the middle blocker need to move fast in the front line to jump in the right time and right position as the opponent attack; furthermore, the middle blockers are the players that execute the most blocks, so, in theory, they should have adequate anthropometric and/ or physical characteristics to fulfill this role (Palao, Manzanares, & Valadés, 2014); however, middle blocker seldom receiving service.

The next position is an outside hitter, which needs to be tall or have a high vertical jump; he/her job is to attack, block, defend, and receive service that they need to perform very well in every technique in volleyball. Moreover, the Outside hitter is called the number one spiker; therefore, the outside hitter's most prevalent attack is made for most volleyball teams, no matter the level of gender (Lenberg, 2006). Finally, another hitter is the opposite hitter, called opposite because it's the opposite position of the setter; their job is to attack, block, and defend; furthermore, the Opposite hitter needs to have great blocking skills and great hitting skills (Saxena, 2014).

The most critical position is the setter which is the center of attack strategy of the team; he/her main job is to arrange the ball for hitters; therefore, setters while many players on the team focus on defense, the setter is the foundation of a team offense (Saxena, 2014); however, the setter can get the point for the team by attacking (service, tip ball, spike) also they need to be ably performed block because setter participated in the front line as well as hitters and do defense in the back-line, despite they seldom receiving service because the setter usually touches the second contact of the ball. The setter is a position that isn't looked up to anthropometric aspect to specialization the athlete; moreover, the setter and the libero do not need to be as tall or strong (Fattahi, Ameli, Sadeghi, & Mahmoodi, 2012).

The position that focuses on improving the team's defense is the libero. Libero is a position that focuses on back-line defense; if setters are called the center of attack strategy, then libero is called a center of defense strategy; furthermore, there is one libero on a team, and they are the foundation of a team's defense (Saxena, 2014). The main job of the libero is to prevent the ball from touching the ground in the team's court, not only that but also to provide a good first contact of the ball

for the setter to arrange an attack. Libero is the one position that can't attack, block and service; they only stay on back-line defense as the second base of defense strategy. The anthropometric aspect does not need to be considered because, mostly, a libero is lighter and smaller than other positions.

The specialization in volleyball players makes volleyball athletes need to focus on their position technique mostly used. As explained above middle blocker is more focused on blocking the opponent's attack, the outside hitter needs to focus on attacking, blocking, defense, receive service, the opposite hitter needs to focus on blocking and attacking, setter needs to focus more on providing a good setting to hitters, and libero focus on digging and defense. Each technique has a different pattern and movement that makes the energy used to perform is different.

Volleyball is a sport in which the players' effort during the game is not constant but includes a variety of interrupted explosive movements (Kasabalis, Douda, & Tokmakidis, 2005). Explosive movements happened in a short time when an anaerobic energy system was used. Moreover, volleyball is rated as a dynamic or anaerobic sports activity where 95% of the required energy comes from ATP-PC and 5% from glycolysis (Kasabalis et al., 2005). Anaerobic energy systems are divided into two types: the alactic anaerobic system used for the first 10 seconds (short duration energy) and the lactic anaerobic system used for more than 10 seconds and last after 90 seconds (medium duration energy). The movement that uses an anaerobic energy system called anaerobic power and anaerobic capacity is defined as the average power and total work in the repeated same movement for a short time. Furthermore, the maximal rate of energy release for muscular work is known as anaerobic power. It is governed by the ability to rapidly recruit a large number of muscle fibers, and anaerobic capacity refers to the amount of energy released that is not accounted for by the uptake of oxygen (Reilly, Secher, Snell, Williams, & Williams, 2005).

Recently, researchers have found an anaerobic performance of volleyball athletes, such as anaerobic power in the vertical jump, spike, agility, etc. Most of them show the physical characteristics of volleyball athletes in each position. However, the attributes of physiology attribute shown in general.

As the recent study is more concerned about physical characteristics and anaerobic power, it also showed the general needs of volleyball players, not more specifically in each position. The author wants to show that anaerobic capacity is more critical than the aerobic profile for volleyball athletes. The information about the anaerobic capacity in each position and different levels of competition will help volleyball coaches to train the athletes more effectively and efficiently than just increasing the aerobic profile of volleyball athletes because the most energy used in volleyball is an anaerobic energy system. So author wants to analyze and classify the anaerobic performances of junior and senior volleyball athletes in each position.

METHODS

This research aims to classify the anaerobic performances of Indonesian male volleyball players with several measurements, and the data is numeric. In quantitative analysis, hypotheses and research questions are based on theories that researchers seek to test (Smith, 2010). Which research question here is how the difference in anaerobic capacity in different positions and levels in volleyball which makes this research method used quantitative research design is using descriptive research design whereas descriptive research focuses on what is happening rather than on why it happens (Andrew, Pedersen, & McEvoy, 2019).

Participants

The study required Indonesian male volleyball players who participated in the two different levels of national competition in the last few years. The first level of competition is junior-level athletes: high school students with 30 players (15-17 YO, six players in each position) and university students with 30 players (18-25 YO, six players in each position). The athletes had chosen by their representatives in national competitions from 2017 to 2021. The competitive playing experience of players ranged between 3 and 10 years. Players were grouped according to their specialization and level of competition.

Procedure

This research has conducted in Bandung. Because of conditions that couldn't have tested athletes simultaneously. The first section is for junior-level athletes and the second section is for senior-level athletes. The au-

thor and 7 Assistants have conducted the test as timekeepers and testers. The data for collected by three tests, and before the test 3 tests, athletes had physical attributes measurements such as height, body weight, and body part length; after finished measuring physical attributes, three athletes in the same position were called to do the first test conducted is Running-Based Anaerobic Sprint test, and after the first test, athletes should rest for 10-15 minutes to do the following test which is Vertical Jump Test, in this test athletes have three chance to do vertical jump. After the second test athletes have given rest for 5-10 minutes and need to be ready for the last test, which is the 5-Meter Multiple Shuttle Repeat Sprint Test.

The test result has been written in a scoring table for each test. After the test results have been collected, the data should be calculated by some calculation system for each test to collect the data needed. After the data has been collected, analyze the data by SPSS 16.

Instrument

Running Based Anaerobic Sprint Test

The Running Based Anaerobic Sprint Test was devised at the University of Wolverhampton in the UK. It involved six sprints over 35 meters with a 10-second recovery between each sprint. It provides measurements of peak power, average power, minimum power, and a fatigue index (Draper & Whyte, 1997). Furthermore, the running-based anaerobic sprint test output (i.e., peak, power, mean power, fatigue index, maximal speed, and mean speed) are similar to those determined in Wingate anaerobic test, showing high correlations with the same variables. Therefore, in recent studies, a running-based anaerobic sprint test has been used to determine athletes' anaerobic capacity in different types of sports (Santosa, Setiowati, & Indrawati, 2019).

Vertical Jump Test

The Vertical Jump test is designed to measure the research sample's lower body strength. The Vertec device is a simple, inexpensive, and portable device that can measure an athlete's vertical jump height. Vertical jump height has been shown to correlate with volleyball player performance. In addition, the Vertec is a reliable measure ($r = 0.906$) of vertical jump height (Schaal, Ransdell, Simonson, & Gao, 2013).

5-Meter Multiple Shuttle Repeat Sprint Test

5-Meter Multiple Shuttle Repeat Sprint Test measures anaerobic power and agility. This test was adapted from the Welsh Rugby Union shuttle run test (Pendleton, 1997). The 5 m-RST is reliable in female hockey and rugby players (interclass correlation coefficient; $r = 0.98$) (Durandt, Tee, Prim, & Lambert, 2006).

Data Analysis

To calculate each test result, there is a calculated system used in each test. Moreover, the data analysis was conducted using the SPSS version 16. First, the data were collected in each position and each level of competition. Then, validity, reliability, and homogeneity of the data were tested, and more statistical analysis was conducted one-way Anova to see the significant difference with $p < 0.05$. Furthermore, Tukey's posthoc test was conducted to check for each group's significant difference.

RESULT

Junior Level Athlete

Running-based anaerobic sprint test

Conducted one-way Anova on the measurement data and expressed the differences between junior-level athlete positions. Furthermore, Tukey post hoc test was performed to see which position has a significantly different p (<0.05) between positions. There's showed significant difference with p (0.043) in the average power of junior-level athletes. Moreover, Tukey's post hoc test found a significant difference in average power between Libero and Outside Hitter. The Tukey post hoc test showed that average power between positions in junior-level athletes showed a significant difference only between libero with a score of 340.17 and outside hitters with a score of 440.83. However, the other aspect that doesn't show a significant difference doesn't mean there's no difference, but still showed a different anaerobic performance, which below table 1 and fig. 1 show the result of the running-based anaerobic test in each position volleyball player of junior level athletes.

Those showed that the opposite hitter has the highest maximum power with a score of 666 in junior level athletes. On the other hand, the outside hitter has the highest minimum power with a score of 312.3 and an

average power of 440.8. For fatigue index, an opposite hitter with a score of 11.53; however, the highest fatigue index means the lower athlete's ability to maintain power over the six runs. So in the fatigue index, players who are superior in maintaining power in six runs to other positions are libero with a score of 6.87.

Table 1. The result of the running-based anaerobic test in each position volleyball player of junior-level athletes.

Position	Maximum Power	Minimum Power	Average Power	Fatigue Index
Outside Hitter	599.67	312.3	440.8*	8.3
Middle Blocker	544.67	264.83	358.3	7.15
Opposite Hitter	666	235.83	381.67	11.53
Setter	597.67	242.16	354.83	9.27
Libero	484.5	230	340.16*	6.87

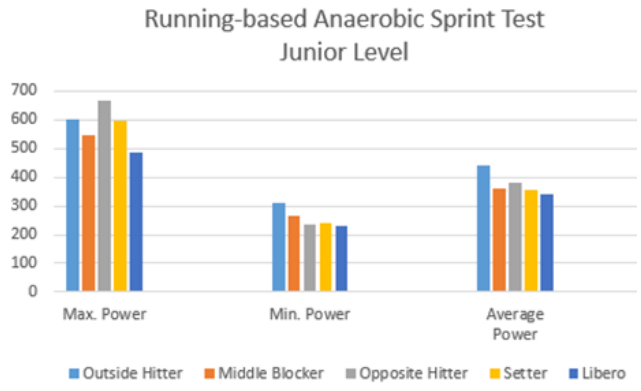

Fig. 1. The result of the running-based anaerobic test in each position volleyball player of junior level athletes

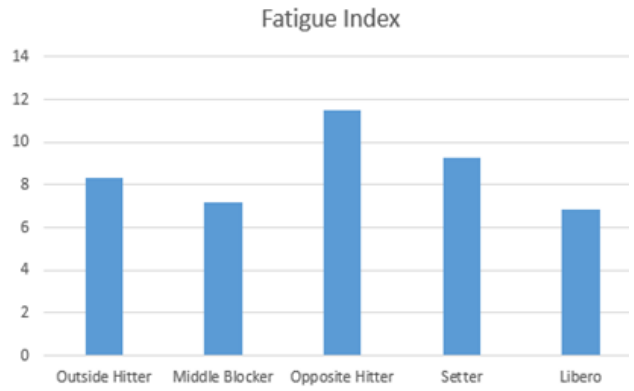

Fig. 2. Fatigue Index

Those showed that the opposite hitter has the highest maximum power with a score of 666 in junior level athletes. On the other hand, the outside hitter has the highest minimum power with a score of 312.3 and an average power of 440.8. Fig. 2 showed fatigue index, an opposite hitter with a score of 11.53; however, the highest fatigue index means the lower athlete's ability to maintain power over the six runs. So in the fatigue index, players who are superior in maintaining power in six runs to other positions are libero with a score of 6.87.

Vertical Jump

Conducted one-way Anova on the measurement data and expressed the differences in vertical jump scores between junior-level athletes. Furthermore, the Tukey post hoc test was performed to see which position has a significantly different p (0.05) from other positions. For example, there's showed a significant difference between the position in junior-level athletes with p (0.044), significant difference showed only between middle blocker with a libero. Moreover, table 2 show that the middle blocker is superior to the other position.

Table 2. The differences in vertical jump scores between junior-level athletes

Position	Peak Power
Outside Hitter	3521.725
Middle Blocker	3819.465*
Opposite Hitter	3355.155
Setter	3293.16
Libero	3036.99*

The results indicate that each position showed a different score, but only the middle blocker with libero showed a significant difference; the middle blocker showed a vigorous peak power. Peak power shows the athlete's lower body ability to perform anaerobic power, a vertical jump.

5-Meter Multiple Shuttle Repeat Sprint Test

Conducted one-way Anova on the measured data and expressed the differences between junior and senior -level athlete positions with a significant p (0.05). In addition, it showed a significant difference in the total distance achieved at each position. Moreover, a significant difference was found between the setter with opposite hitters and outside hitters with p (0.009). However, there's no-showed significant difference between each position in the fatigue index. Moreover, the table and 3 show the total distance and fatigue index result, which means the anaerobic performance of junior-level athletes.

Table 3. The total distance and fatigue index result for

Position	Total Distance	Fatigue Index
Outside Hitter	680.83*	12.54
Middle Blocker	657.5	12.99
Opposite Hitter	677.5*	12.74
Setter	642.5*	11.88
Libero	654.16	13.14

From the table 3, we can see that the outside hitter has achieved the highest score in the total distance, which is 680.83 meters, the opposite hitter in second place with a total distance of 677.5 meters, and the setter has the lowest score, which means distance achieved by setter 642.5 meter is the shortest; however, setter showed a superior of fatigue index with a score 11.8 which means the ability to maintain anaerobic performances is better than others position, also in fatigue index libero (13.14) showed poor ability to maintain anaerobic performance than other position.

Senior Level Athlete

Running-based anaerobic sprint test

Here's showed a significant difference in maximum power, average power, and fatigue index. Moreover, the Tukey post hoc test showed that in maximum power, there's a significant difference with p (0.00) between outside hitter, middle blocker, and opposite hitter with libero; in average power showed a significant difference with p (0.00) between outside hitter and opposite hitter with libero and setter, and middle blocker with libero; in the fatigue, the index showed significant different with $p<0.05$ between outside hitter, middle blocker, opposite hitter, and setter with a libero. Moreover, the table 4 showed the running-based anaerobic sprint test result in senior-level athletes to show which position is superior to others in each aspect.

Table 4. The result of the running-based anaerobic test in each position volleyball player of senior-level athletes.

Position	Maximum Power	Minimum Power	Average Power	Fatigue Index
Outside Hitter	819*	479.3	654.83*	10.91*
Middle Blocker	885.83*	466	633.5*	12.95*
Opposite Hitter	889.3*	467.5	655.83*	13.18*
Setter	794.67	436.83	583.67*	11.02*
Libero	700.83*	456.16	557.3*	7.95*

It showed that outside hitter, middle blocker, and opposite hitter have similar anaerobic performance; therefore, Anova's analysis showed no significant difference between each position. However, from the table 4, we can see in maximum power opposite hitter with a score of 889.3 is superior to others, the outside hitter is superior in minimum power with a score of 479.3, for average power seems outside hitter and opposite hitter in the top two, yet fatigue index libero with score 7.95 showed a good ability in maintaining anaerobic power than other position and an opposite hitter who showed vigorous maximum power has the highest score of fatigue index.

Vertical Jump

Conducted one-way Anova on the measurement data and expressed the differences between senior-level athlete positions. Furthermore, the Tukey post hoc test was performed to see which position has a significant difference p (0.05) than the other position. The table 5 showed vertical jump test results of senior-level athletes.

Table 5. The differences in vertical jump scores between senior-level athletes

Position	Peak Power
Outside Hitter	4278.8*
Middle Blocker	4390.62*
Opposite Hitter	4584.24*
Setter	4201.932*
Libero	2948.7*

The table 5 show a significant difference with $p<0.05$ between positions in senior-level athletes. A significant difference was found in the outside hitters, middle blockers, and opposite hitters with a libero. Furthermore, the table and graphic below showed that the opposite hitter has the highest peak power with a score of 4584.24 than other positions, and the libero, with a score of 2948.7, showed the lowest score of peak power.

5-Meter Multiple Shuttle Repeat Sprint Test

The third test showed that a significant difference was only found in the total distance achieved by senior-level athletes. The table 6 show the test results for senior-level athletes. From table 5 showed a significant difference with $p<0.05$ in total distance achieved. Moreover, there are significant differences between outside hitter, middle blocker, and opposite hitter with setter and libero. However, athletes don't show significant differences in the fatigue index with $p<0.05$.

Therefore, in total distance, the opposite hitter gets the highest score with a score of 770.83 for the other position even though the score is close to the outside hitter and middle blocker; for libero showed the lowest score with a score of 710.83 means achieving the shortest distance. Moreover, in the fatigue index, the score is closely similar. However, the setter showed the lowest fatigue index score (8.61), which means the setter's ability to maintain anaerobic performance is better than other positions. Also, in the highest score, the fatigue index was found in libero with 10.67.

Table 6. The total distance and fatigue index result for senior-level athletes

Position	Total Distance	Fatigue Index
Outside Hitter	767.5*	9.28
Middle Blocker	767.5*	9.6
Opposite Hitter	770.83*	8.95
Setter	748.3*	8.61
Libero	710.83*	10.67

Analyzes differences between each position at a different level of competition

Running-based anaerobic sprint test

To analyze two different levels of competition also conducted one-way Anova on the measured data and expressed the differences between positions in junior level and senior level athletes with the level of significant $p<0.05$. The opposite hitter setter and libero showed significant differences in maximum power and minimum power for the outside hitter. Also, average power with p (< 0.05); for middle blocker showed significant differences in maximum power, minimum power, average power, and fatigue index (figure 3). Fatigue index only middle blocker of junior-level athletes and senior-level athletes showed a significant difference in the ability to maintain anaerobic performance (figure 4). Moreover, the figure 3 shows the result of the running-based anaerobic sprint test in each position between junior-level and senior-level athletes.

Therefore, we can see the difference between each position of volleyball players in the different levels of competition. Of course, there's a big difference in every aspect; however, even in maximum power, minimum power, and average power, senior-level athletes showed superior to junior-level athletes, yet in fatigue index, junior-level athletes showed lower results means have a good ability to maintain anaerobic performances.

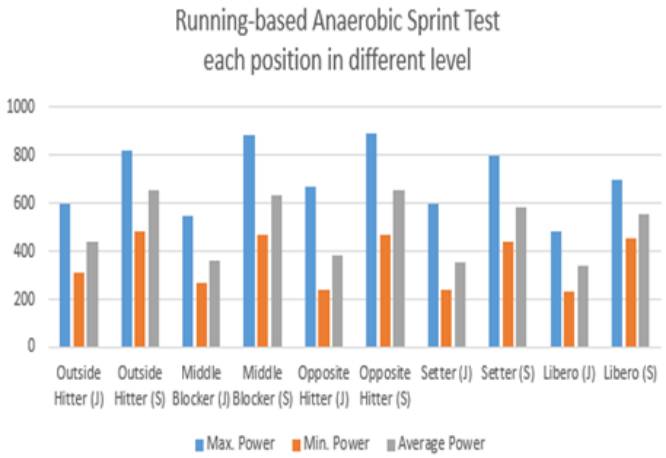

Fig. 3. The result of the running-based anaerobic sprint test in each position between junior-level and senior-level athletes.

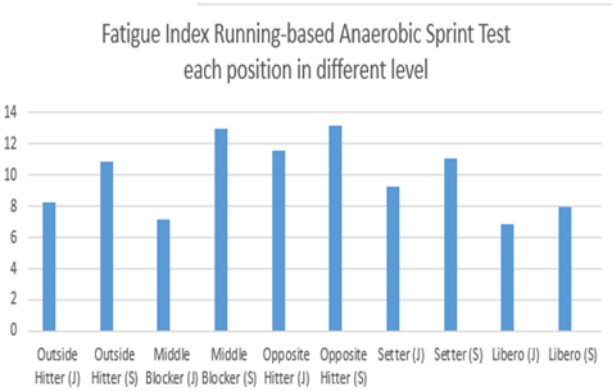

Fig. 4 The fatigue index result in each position between junior-level and senior-level athletes.

Vertical Jump

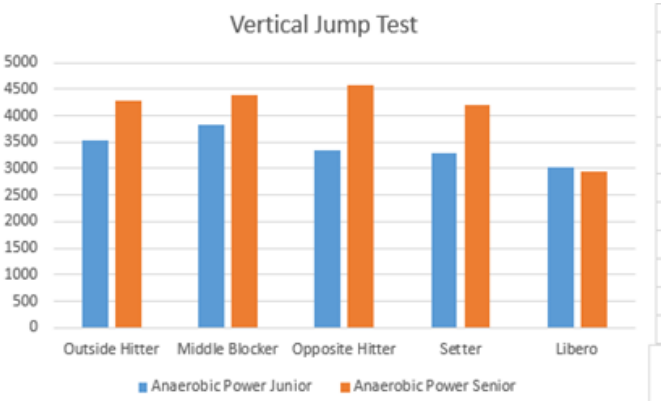

Fig. 5. The vertical jump scores in each position between junior-level and senior-level athletes.

Figure 5 showed a significant difference in outside hitter $p<0.05$, middle blocker $p<0.05$, opposite hitter $p<0.05$, and setter $p<0.05$, however, libero doesn't show significant difference with $p>0.05$. Moreover, the graphic below shows results of different peak power in each position of different levels of competition. Figure 5 showed that senior-level athletes in each position are superior in peak power except for libero. Here's influenced by characteristics of each position that demand to jump high in some volleyball technique, yet libero only in the court for defense. Back-line defense and digging don't need vigorous power to jump high.

5-Meter Multiple Shuttle Repeat Sprint Test

Here's showed the significant difference in total distance achieved by each position of different level athletes. However, the fatigue index showed no significant difference in middle blocker, setter, and libero. The differences in the result of the 5-Meter Multiple Shuttle Repeat Sprint Test in different levels of competition.

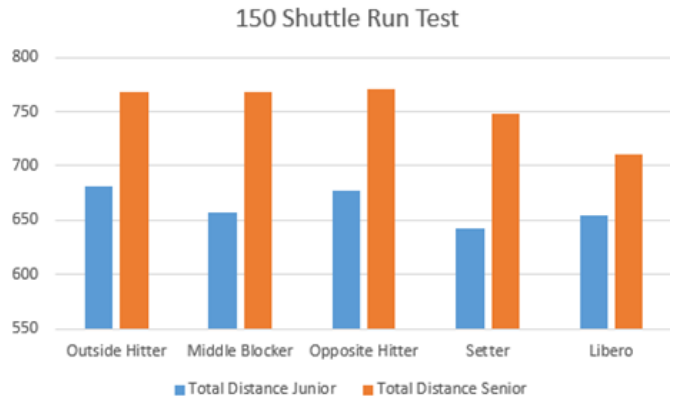

Fig. 6. The total distance result for senior-level athletes in each position between junior-level and senior-level athletes.

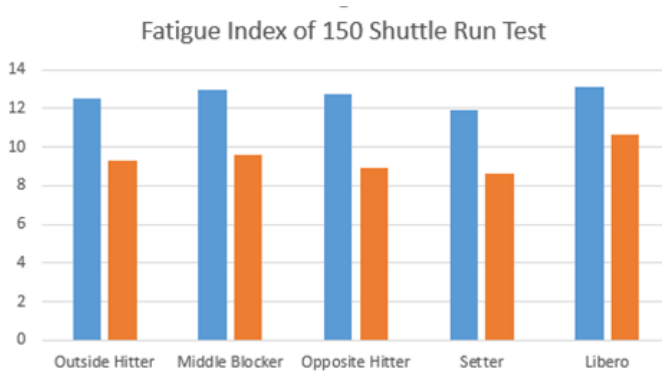

Fig. 7. The fatigue index result for senior-level athletes in each position between junior-level and senior-level athletes.

The figure 6 shows that senior-level athletes have achieved farther distance which means higher scores than junior-level athletes. Moreover, here's revealed that in each position, senior-level athletes showed a lower fatigue index than junior-level athletes, which means the senior-level athlete has achieved a farther distance and also good ability in maintaining anaerobic performances (figure 7).

DISCUSSION

Running-based anaerobic sprint test is a test to measure the capacity of the anaerobic athlete (Santosa et al., 2019). Running-based anaerobic sprint tests can describe maximum and minimum power and the fatigue index of athletes. Anaerobic capacity is influenced by long-time training in endurance athletes. In this study, the anaerobic capacity is shown by volleyball athletes in different positions and at varying levels of competition. The anaerobic capacity of each position at different levels showed different results. In junior-level athletes, the opposite hitter showed the highest power value, the outside hitter in the second place, the setter in the third place, the middle blocker in the fourth place, and the libero showed the lowest power value. However, libero showed the highest ability to maintain anaerobic performances in the fatigue index, outside hitter in the second place, setter in the third place, middle blocker in the fourth place, and opposite hitter showed the lowest ability to maintain anaerobic performances. It explained that the highest power value showed the most inferior ability to maintain anaerobic performances.

Recent research by Santosa et al. (2019) showed that Sprinter has the highest power and fatigue index values. Senior-level athletes showed that the opposite hitter still has the highest power value, middle blocker in the second place, outside hitter in the third place, setter in the fourth place, and libero has the lowest power value. However, the libero still showed the highest ability to maintain anaerobic performance, the outside hitter in the second place, the setter in the third place, the middle blocker in the fourth place, and the opposite hitter who showed the highest power value showed the lowest ability to maintain anaerobic performances. There's only a significant difference between junior-level athletes because their way of training influences them. Physical attributes aspect still in the first places in specialized athletes, and Norkowski (2001) found that

Individual genetic potential, which might have played a role in selection for specific games and specificity and intensity of training loads, might have contributed to the observed differences between groups.

However, senior-level athletes showed a significant difference between positions because the anthropometric aspect will not improve significantly, such as height. Hence, coaches in senior-level athletes are much more concerned with enhancing athletes' physiological aspects with the characteristics of each position. Moreover, Nikolaidis, Ziv, Arnon, & Lidor (2012) found that in anaerobic power, lower values were found in the 14–18 age group. However, the author suggests that coaches adopt an individual approach to improve the physical and physiological attributes of the players. Therefore, specific training programs should be developed to address the specialization's unique physical and physiological needs.

The second test is vertical jump because volleyball is also called a "jump" sport, which jump could be an important factor for a volleyball team to win a competition. The vertical jump is a standard field test used to evaluate the explosive anaerobic power of the legs (Young, 1995). This study showed middle blocker has the highest anaerobic power value in junior level athletes, with the outside hitter in the second position, the opposite hitter in the third position, the setter in the third position, and the libero having the lowest anaerobic power value. However, only the middle blocker and libero showed a significant difference. This cause of the middle blocker is a position that is decided by height for the first. Therefore, coaches can focus more on training middle blockers in junior-level athletes, which improves middle blocker vertical jumps to block the opponent's attack more effectively and efficiently.

Senior-level athletes showed a significant difference between positions, with opposite hitter having the highest anaerobic power value, middle blocker in the second place, outside hitter in the third place, setter in the fourth place, and libero having the lowest anaerobic power value. As the author already explained before, this is caused by the specification training of each position with their characteristics. However, middle blockers show significant differences with a libero in senior-level athletes. Still, other positions such as the outside hitter, opposite hitter, and setter showed a significant difference in anaerobic power value with a libero. This is because the high-level competition in senior-level athletes has been training more focus on their job and mostly used technique in their specialization. For example, the setter not only needs to set the ball for an attack yet needs to do to defend as receive attack or block the opponent's attack, so a significant difference between other positions in libero is founded. On the other hand, respectively to the libero, their job is only to defend the ball which receives serving the ball, back row defense, and digs, and rarely jump to setting the ball from the back row only if the setter got the first touch, so in the vertical jump test libero didn't show a tremendous anaerobic value with others position.

Furthermore, senior-level athletes are not only influenced by their physiological aspect, but recent research showed that the anthropometric aspect is vigorous. For example, Schaal, Ransdell, Simonson, & Gao (2013) found that The NCAA Division-I female volleyball players were older, taller, and heavier than their high school counterparts. They also indicated that hitters are taller than back row defensive specialists, and hitters and setters are heavier than back row defensive specialists.

The third test is 5-Meter Multiple Shuttle Repeat Sprint Test, which this test is to measures anaerobic performances. At the junior level, athletes showed outside hitter achieved the longest distances, with the opposite hitter in the second place, middle blocker in the third place, libero in the fourth place, and setter in the fifth place. This test showed a significant difference between the setter with the outside hitter and the opposite hitter. However, in the fatigue index, even the setter achieved the shortest distances. Still, the setter showed the highest value in maintaining anaerobic performances, with the outside hitter in the second place, opposite hitter, in the third place, middle blocker in the fourth place, and libero in the last place.

Furthermore, this test doesn't like the running-based anaerobic test that used bodyweight in the calculating system. This test only used the result which distance the research samples achieved, so it can't be compared. At the senior level, athletes showed opposite hitters had achieved the longest distance, with the outside hitter and middle blocker in the second place, setter in the third place, and libero in the last place. However, unlike junior-level athletes, the shortest distance achieved libero showed the highest value of fatigue in-

dex. Yet, the lowest value of fatigue index showed by setter, opposite hitter in the second place, opposite hitter in the third place, and middle blocker in fourth place. Furthermore, unlike in the running-based anaerobic sprint test, where senior-level athletes showed a higher value of fatigue index, in the 5-Meter Multiple Shuttle Repeat Sprint Test senior-level athletes showed a lower value of fatigue index.

CONCLUSION

This research concludes that the specific position in volleyball needs a different energy source related to motion or technique used depending on the characteristics of each position volleyball player in the competition. The study results help establish baseline data and provide a means to test the effectiveness of various training programs designed to enhance volleyball performance. The information reported in this study makes test values available to male volleyball athletes across age/competition levels or player positions in Indonesia. These specific comparative values create baseline anaerobic performance measures for coaches at the junior level and senior-level athletes to create programs that can address deficits in volleyball player performance. Specifically, this study's results indicate that high school athletes showed inferior anaerobic power.

Based on these findings, it is recommended that junior-level athletes' training programs address anaerobic power (lower-body power) and anaerobic fitness as performance components. Hence, these athletes are more prepared to compete at the senior level (college), particularly if they aspire to compete in high-level competition. This increased anaerobic power in senior-level athletes provides a tactical and mechanical advantage because an increased stature and a higher vertical jump and lower-body power enable an attacker to achieve an optimal position with the ball when attacking, middle blocker and front-row defense to block the opponent's attack in such a same high jump. The author also concludes that senior-level athletes showed no better ability to maintain anaerobic performances while senior-level athletes focus more on improving their anaerobic power and need to be more concerned in training to maintain anaerobic power.

CONFLICT OF INTEREST

The authors declared no conflict of interest.

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