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ANALYSIS OF THE LEVEL OF AEROBIC ENDURANCE (VO2MAX) ON THE PERFORMANCE OF BANDUNG CITY HOCKEY ATHLETES

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ABSTRACT

Aerobic endurance level (VO2max) is an important part of a hockey athlete's performance. It is very important to reduce fatigue and fatigue when playing, while it can be an advantage in game tactics. Therefore, the purpose of this researcher is to prove that there is a relationship between the level of aerobic endurance (VO2max) and the performance of hockey athletes. This research method uses descriptive quantitative with correlation technique research design. The sample used was 24 Bandung City hockey athletes including 12 male athletes and 12 female athletes and, sampling using total sampling techniques. The instruments used are the Multistage Fitness Test and GPAI (Game Performance Assessment Instrument) for the performance level of hockey athletes. The results of the study analyzed using the Spearman's Rho test on SPSS stated that the data from the average value of the aerobic endurance level (VO2max) of room hockey was 50.00 with a standard deviation value of 10.01 and the lowest score was 37.52, the highest score was 65.82 and the total score was 1200. Meanwhile, the average value of athlete performance is 0.77 with a standard deviation value of 0.074 and the lowest score of 0.67, the highest score of 0.94 and a total score of 18.40. The correlation coefficient of the two variables is unidirectional which is positive 0.567 in the interpretation of moderate correlation. So the results of this study there is a relationship between the level of aerobic endurance (VO2max) on the performance of hockey athletes.

Keywords: Aerobic Endurance Level (VO2max); Performance of Hockey Athletes; Room Hockey; GPAI

Introduction

Hockey is a team sport, where players use a tool called a stick to hold, carry and hit the ball in accordance with the rules set. This sport is played indoors (indoor) and in the field (field). According to Yudianti, (2016) that "hockey is a game between two teams where each player holds a bent stick (stick) to move a ball. With the aim of creating as many goals as possible into the opponent's goal and keeping his own goal from conceding the ball". Hockey requires a variety of good physical factors for players to achieve higher results, besides that athletes must master techniques, tactics and strategies. When talking about fitness development, we need to recognize the specific elements of fitness that need to be worked on. The game of hockey requires a good level of endurance because the game of hockey requires high intensity (Gemser et al, 2006). The aerobic ability can also be said to be aerobic endurance, regarding this matter explained by Sukadiyanto & Muluk, (2011, p. 65) that good aerobic ability will be able to recover itself quickly, so that it can perform high intensity for a long time. These physical demands, namely aerobic endurance, are not optimally trained to be improved for athletes. Hockey is one of the sports that has several technical skills that must be mastered including push skills (pushing the ball), hit (hitting the ball), stop (holding the ball), dribble (dribbling), flick (carving the ball), jab (reaching the ball), tackle (grabbing the ball), and scoop (lifting the ball) which are basic skills in the sport. The goal of the hockey game is to put the ball into the opponent's goal as much as possible through the use of techniques and

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the application of strategies and keep your own goal from being conceded by the opponent. Therefore, it requires cooperation between players, units and teams. Every game sport must have its own game objectives, as well as the sport of hockey which has the aim of entering as many balls into the opponent's goal through a game that uses sticks and balls as a medium, within a predetermined time. In the game of hockey the goal that a player or team wants to achieve in a game sport is how to create a score, point or goal to his opponent, this is only one part of physical education learning.

Hockey is a sport that requires a lot of aerobic endurance. Someone who has good aerobic endurance can be sure that an athlete will have a good VO2max too, a good VO2max is very important because a good VO2max will determine the fitness and performance of athletes when competing. High and low VO2max will affect the high and low endurance of a person, especially aerobic endurance, because aerobic endurance requires adequate oxygen supply for aerobic energy metabolism. Therefore, if someone wants to have high aerobic endurance, they must have a high VO2max level as well and to get something like that, we must have an effort first, especially we must do exercises that can affect VO2max. These demands can be met by players if the player has a good physical condition, especially the aerobic endurance component. This is based on because if the aerobic capacity is good, the energy released is also maximum so that the player is able to do physical work optimally (Suharjan, 2013, p. 52).

A very important physical component that hockey players have is cardiorespiratory fitness or what is often called the maximum oxygen volume level (VO2max). Physical fitness gives a person the ability to carry out daily activities without excessive fatigue. This also means that a person still has energy reserves to enjoy their leisure time to do sudden work well. The fitter or fresher a person is, the greater their physical work ability and the less likely fatigue is to occur (Khayan et al., 2018). Gürses et al., (2018) stated VO2Max is an important factor for success in hockey games. It is stated that aerobic capacity is very important for the performance of hockey games and plays an important and active role in the ATP reproduction period. The above opinion explains that VO2Max is the most important thing to achieve the best performance in a hockey game. If Vo2Max is fulfilled well then, the athlete's movement activity will perform a match will be good too. If Bandung City hockey athletes always maintain VO2Max with continuous programmed training, then VO2Max and endurance will be better and fitter.

In previous research conducted by Aggarwala et al., (2017) which shows that Performance has a significant negative correlation with VO2Max. Low performance categories will show better VO2Max values and can reduce the quality of athletes and mortality due to low performance. There are several factors that can contribute to increasing oxygen uptake. An athlete who has an aerobic endurance level (VO2max) must be maximized in competition because it will determine the fitness and performance of athletes when competing. This is a reference for athletes, coaching teams and officials to evaluate that the level of aerobic endurance (VO2max) must be increased again in order to have a better physical condition.

Method

This study uses a quantitative descriptive method, attempting to analyze the condition of aerobic endurance (VO2max) on the performance of Bandung City Hockey players. Research using quantitative according to accuracy, persistence and a critical attitude in capturing data, namely population and sample, because the data from this study are in the

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form of numbers that must be processed statistically, then between the variables proposed by the object of research must be clear links (correlation) so that it can be determined which statistical approach will be used as data processing which in turn is the result of reliable analysis (validity and reliability), thus it is easy to generalize so that the recommendations produced are used as a reference. In this study the population chosen by the researcher was all 24 Bandung City Hockey players. The reason the researchers chose this population was because the players had good performance and had participated in championships or competitions at the regional and national levels.

The sampling technique in this study was total sampling. According to Sugiyono, (2010, p. 124) states that "Total sampling is a sampling technique where all members of the population are used as samples". Total sampling is done by taking subjects not based on strata, random or regional but based on a specific purpose (Arikunto, 2006, p. 139). Where in this study the sample was 24 Bandung City Hockey players. The instruments in this study consisted of 2 instruments. First, an instrument to determine the level of aerobic endurance (VO2max) using the bleep test. Second, an instrument to determine the performance of Bandung City Hockey athletes using GPAI to determine the description of player performance in the field. In this study the procedure used is first, the research took data on this match with a total of 24 athletes, then the researcher recorded after recording, the recording was given to the assessor in this case the assessor was a licensed person totaling 3 people, after obtaining the value that data processing was carried out using GPAI.

Discussion

In this study, the test used was Shapiro-Wilk. Data is said to be normally distributed if the significance value for each variable is> 0.05. Vice versa, if the significance value for each variable is <0.05, the data is said to be not normally distributed. The following are the results of the orality test in table 1 below:

Table 1. Shapiro Wilk Normality Test

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
VO2max	,223	24	,003	,859	24	,003
Performa	,309	24	,000	,763	24	,000

From the table above, it can be seen that the data from the two variables, namely the level of aerobic endurance (VO2max) with performance through the Shapiro Wilk test, obtained a sig. probability value of 0.003 and 0.000 <0.05 so that it is not normally distributed. The results of this normality test will determine statistical tests using parametric and non-parametric tests. Statistical testing uses parametric tests if the data has a normal distribution, while statistical testing uses non-parametric tests if the data is not normal. Because the prerequisite assumption test is not fulfilled by not normalizing the data, researchers will test whether there is a correlation using a non-parametric approach.

The following results of the calculation of the Spearman Rank correlation using the Spearman's Rho test using the help of SPSS version 25 are contained in Table 3.2.

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Table 2. Spearman's Rho Correlation Test

			VO2max	Performa
Spearman's rho	VO2max	Correlation Coefficient	1,000	,564**
		Sig. (2-tailed)	.	,004
		N	24	24
	Performa	Correlation Coefficient	,564**	1,000
		Sig. (2-tailed)	,004	.
		N	24	24

**. Correlation is significant at the 0.01 level (2-tailed).

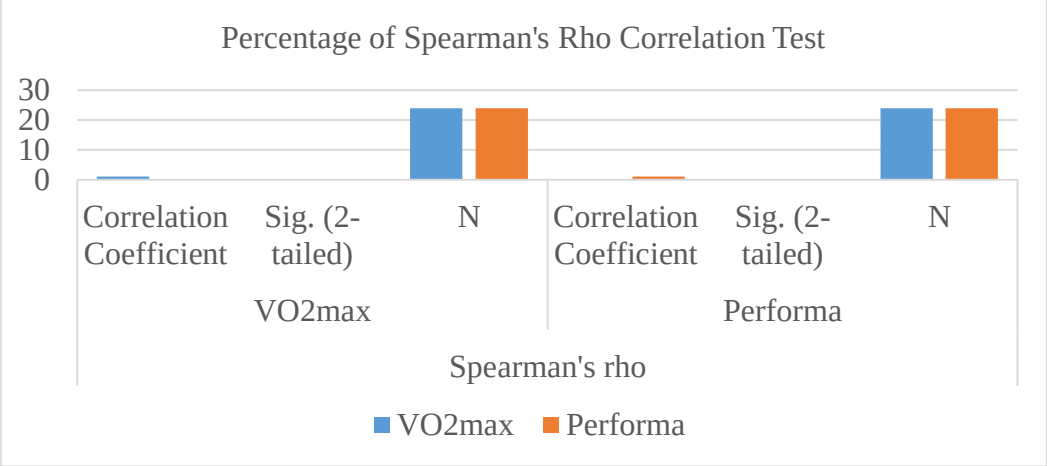

Figure 1. Diagram of the Percentage Results of the Spearman's Rho Correlation Test

Based on the table above, there is a significant relationship between the level of aerobic endurance (VO2max) and the performance of Bandung City Hockey athletes and from the table above the correlation coefficient value is 0.564, meaning that the interpretation of the effect is moderate and the two-star sign on the correlation coefficient value indicates that the significance level is 0.01.

The correlation coefficient number in the table above is positive so that the relationship between the two variables is unidirectional, thus it can be interpreted that if the level of aerobic endurance (VO2max) is increased, it can affect the athlete's performance when competing. So referring to the discussion above, the conclusion in this study is that there is a significant relationship that is moderate and unidirectional between the variable level of aerobic endurance (VO2max) and the performance of Bandung City Hockey athletes.

Based on the results obtained in processing data analysis from the research subject that for the level of aerobic endurance (VO2max) of athletes on the performance of Bandung City Hockey athletes with the results of the correlation coefficient value of 0.564, meaning that the interpretation of the effect is moderate. Based on the results of the study, the level of aerobic endurance (VO2max) on the performance of Bandung City Hockey athletes in this study is that there is a significant relationship that is moderate and unidirectional. Because aerobic endurance is one component in physical condition, the overall physical condition of athletes must be trained intensively. Nirwandi, (2017) explains someone who has good endurance if he is able to do physical work continuously for a long time.

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The athlete's energy will also increase with that. With that athletes will become more excited. Plus there is a peace within the athlete after the performance he displays because the effort during the competition will be maximized. According to Smith et al., (2013) explains that VO2max is the body's ability to accommodate oxygen when an exercise process occurs, as well as the body's ability to accommodate oxygen maximally to be able to maintain high work output. The fast or slow fatigue of an athlete can be estimated from the athlete's body capacity, according to Bosak, (2018) explains that the body's movement capacity shows the maximum capacity of oxygen used by the body (VO2max) where oxygen is the body's fuel needed by muscles in carrying out every heavy or light activity.

In another study conducted by Aggarwala et al., (2017) which showed that Performance has a significant negative correlation with VO2Max. Low performance categories will show better VO2 Max values and can reduce the quality of athletes and mortality due to low performance. Farrell et al., (2002) VO2max values that describe the level of cardiorespiratory endurance are a function of the maximum ability of the heart to pump blood (maximal cardiac output) and the ability of skeletal muscles to extract and use oxygen (maximal arterial-venous O2 difference). There are several factors that can contribute to increasing oxygen uptake. An athlete who has an aerobic endurance level (VO2max) must be maximized in competition because it will determine the fitness and performance of athletes when competing. This is a reference for athletes, coaching teams and officials to evaluate that the level of aerobic endurance (VO2max) must be increased again in order to have better physical conditions. Other aspects or variables that can affect the performance of hockey athletes are those that must be considered and trained carefully by athletes, namely 1) physical exercise, 2) technical training, 3) tactical training and 4) mental training according to Harsono, (2017, p. 39). These factors come from inside and outside the athlete itself which includes physical, psychological, technical, tactical, coach, training facilities and infrastructure, training, social, and so on. According to Alderman in Sudibyo Setyobroto, (1993, p. 19) states that the appearance of athletes can be viewed from four dimensions, namely:

1. Dimensions of physical fitness include, among others, endurance, explosive power, strength, speed, flexibility, agility, reaction, balance, accuracy, and so on.
2. The skill dimension includes, among others: kinesthetics, sport-specific skills, coordination of movement, and so on.
3. The dimension of physical aptitude includes, among others: physical condition, height, weight, body shape, and so on.
4. Psychological dimensions include: motivation, self-confidence, aggressiveness, discipline, anxiety, intelligence, courage, talent, intelligence, emotions, attention, will, and so on.

Conclusio

This study produces a significant relationship between the level of aerobic endurance (VO2max) and the performance of hockey athletes, the correlation coefficient of the two variables is unidirectional which is positive 0.564 in the interpretation of correlation is moderate. This is closely related to the results of the GPAI analysis, if the level of aerobic endurance (VO2max) is increased, it can have a very good effect on athlete performance. So from these results that there is a percentage contribution of the aerobic endurance level variable (VO2max) of 5.64% to the performance of hockey athletes.

This study produces a significant relationship between the level of aerobic endurance (VO2max) and the performance of hockey athletes, the correlation coefficient of the two variables is unidirectional which is positive 0.564 in the interpretation of correlation is moderate. This is closely related to the results of the GPAI analysis, if the level of aerobic endurance (VO2max) is increased, it can have a very good effect on athlete performance. So from these results that there is a percentage contribution of the aerobic endurance level variable (VO2max) of 5.64% to the performance of hockey athletes.

The results above can be concluded that, one of the variables that can support athlete performance is the level of aerobic endurance (VO2max). An athlete is very important to have aerobic endurance (VO2max), this is to avoid fatigue and fatigue so that it can harm yourself and the team. Fatigue and fatigue can reduce the athlete's performance when playing which makes the athlete unfocused and not concentrated in the match. It is hoped that further research will further improve the quality of research by using better instruments or adding a wider scope of research, by increasing the number of samples to be studied and adding other variables that can support athlete performance, for example physical, psychological, technique, tactics, coaches, training facilities and infrastructure, training, social, and so on. As for hockey athletes, they will further improve the aerobic endurance (VO2max) of indoor hockey or field hockey which will benefit athletes by having good aerobic endurance (VO2max), so that the aerobic endurance of hockey athletes will increase. Thus the conclusions, and suggestions that the authors convey after conducting research on the influence between the level of aerobic endurance (VO2max) with the performance of hockey athletes, hopefully this research is useful and becomes a reference for all students, especially final year students.

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