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Effect of frequency and duration of training on PHV between Swiss and Indonesian football clubs aged 9-11 years

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ABSTRACT

The aim of this research is to determine 1) the condition of Peak Height Velocity in La Sagne Groupement athletes and Tugumuda Semarang U9-U11 athletes, 2) is there an effect of frequency and duration on Peak Height Velocity, 3) is there a difference in Peak Height Velocity between Swiss and Indonesia clubs. The research used a quantitative descriptive research type with a comparative research design. The results showed that 1) Peak Height Velocity conditions for La Sagne Groupement FC athletes were 16.3 ± 1.3 (Mean ± SD) and Peak Height Velocity conditions for SSB Tugumuda were 14.0 ± 0.5 (Mean ± SD). 2) There is an effect of frequency and duration on Peak Height Velocity with the results of multiple regression analysis for frequency and duration. 3) There is a difference in PHV between the La Sagne de Groupement and SSB Tugumuda groups. The conclusion from this research there are differences PHV condition, there is an effect of duration and frequency of training on the PHV, and there are differences PHV value between La Sagne Groupement and SSB Tugumuda football clubs.

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Introduction

Sport has always been a useful physical activity, especially for improving health status (Ginanjar et al., 2023). Sports are well known to the general public such as children, teenagers, adults and the elderly. Sports have a very broad impact, including as a hobby, as a form of recreation, or competition (Wasserbauer, 2023). One very popular sport is football. Football is the most popular sport in the world, especially for children(Uebersax et al., 2020). 58% of soccer players are 18 years old and almost 1/3 are players under 14 years old (Rössler et al., 2018). Switzerland is a European country that is very familiar with football (Koller, 2017). In Switzerland, almost 30% of all boys and 17% of girls aged 10 to 14 play football (Lamprecht et al., 2015). One of the countries in Asia with survey results Nielsen, (2022) In Indonesia itself, 69% of the Indonesian population is very interested in the sport of football. The popularity of football itself is because it has various functions (Pratama et al., 2022). Currently, many soccer schools have emerged for children or young athletes (Ihsan et al., 2022). Football is a team or team sport that requires skills related to physical fitness, namely muscle strength, speed, flexibility, agility, balance and good coordination (Anggitasari et al., 2019). Football is considered an intermittent and high intensity sport that requires match details which can be an important factor, of which body composition is linked as an important parameter of football performance (Ribeiro-Silva et al., 2018; Soalheiro et al., 2021).

Physical activity is very different from exercise (Elmagd, 2016; Surprenant & Cabot, 2023). Maintaining a daily exercise routine can bring many benefits to everyone (Caspersen et al., 1985; Syed Ali, 2018).

Recommendation from World Health Organization, (2010) recommends that children and adolescents aged 5-17 years should do moderate to vigorous intensity physical activity for at least 60 minutes every day. Soccer training definitely has a certain frequency and duration that has been determined by the coach based on the athlete's abilities. Soccer training is traditionally expressed by the duration of the training session and the coach's subjective assessment of intensity (Varley et al., 2023). Whereas Cao et al., (2023) explains that modern football has an aggressive nature, high volume, intensity, long duration and complex physical requirements. Soccer players use both anaerobic and aerobic training systems during training and matches (Costin SĂNDOI et al., 2023; Macuh et al., 2023). The theoretical basis of training continues to evolve as basic scientific knowledge of how the body responds to various stimuli develops (TO Bompa & Haff, 2009). T. Bompa & Buzzichelli, (2015) explains in the book that there are training units which are 45 minutes of exercise in one session. The dominant physical components in football are moving, running and jumping (Rössler et al., 2018; Womsiwor et al., 2020).

In the case of sports biological growth is very important for selection, talent identification and even for adjusting training and planning (Mercê et al., 2021; Zhang, 2022). The adolescent growth spurt refers to the period of height increase that occurs simultaneously with the development of secondary sexual characteristics (Boys, 2022; Jin et al., 2023). Puberty describes all the changes that begin to occur when a child becomes an adult (Yao et al., 2022). Skills or physical performance are related to biological maturity during adolescence. The adolescent growth spurt varies greatly in time, tempo and duration between individuals (Philippaerts, Vaeyens, Janssens, Renterghem, et al., 2006). Proper exercise should be able to have a good impact on the body, as explained by Sumartiningsih et al., (2021) that appropriate physical activity and involvement in sports can help increase accelerated growth in children. Athletes also participate in intensive training and conditioning in an effort to maximize fitness and develop body size and body composition appropriate for performance (Anzell et al., 2013). The growth rate accelerates until it reaches a peak (Peak Height Velocity) and then slows down until height growth stops at the end of adolescence (Malina et al., 2023).

Body composition is closely related to anthropometry. The use of anthropometry does not always end with monitoring training adaptations (Conde-Pipo et al., 2023). Age at Peak Height Velocity varies according to gender, approximately 2 years and 1.5 years after puberty (Higuchi et al., 2023). Peak Height Velocity is an indicator that is widely used in investigating the maturation process in adolescents (Higuchi et al., 2023; Hobold et al., 2017). When an individual reaches PHV can be estimated by monitoring the growth of the structure. Physical performance is closely related to biological maturity during adolescence (Philippaerts, Vaeyens, Janssens, Van Renterghem, et al., 2006). Among these factors, body composition is considered an important parameter of football performance (Soalheiro et al., 2021).

There is previous research written by Fauzi & Sumartiningsih, (2023) entitled Physical Activity and Injury Affect Peak of Height Velocity in Children Aged 9-14 Years, it was found that Peak of Height Velocity is the peak of height growth in children, physical activity in children at low - high levels which is at risk of injury can hinder the child's growth period, however Does high activity and injury also affect Peak of Height Velocity? To find out the difference in Peak Height Velocity between Football Athletes and non-athletes. Research data was taken from 57 respondents consisting of 14 SSB S3 athletes, 21 SSB Tugu Muda athletes and 22 Karangjati Elementary School students. The variables studied were physical condition and injury as independent variables and PHV as the dependent variable. The data obtained were analyzed using multiple regression analysis and t test. The research results show that the size of the sports activity value is not followed by changes in the PHV value, as evidenced by the significance value for the PAQ variable of $0.441 > 0.05$. The significance value of the injury variable is $0.736 > 0.05$, which means that there is no significant relationship between injury and PHV value. The average PHV for SSB reached 13.94 while for non-SSB it was 14.17 with a significance value of $0.070 > 0.05$, which means that there is no difference in PHV between SSB and non-SSB. In previous research, it was explained that there was no influence between sports activities and PHV.

Previous research from the International Journal of Environmental Research and Public Health with the title "Structure, Intensity and Player Duels in Under-13 Football Training in Switzerland" written by Uebersax et al., (2020) In fact, the overall research findings show that training includes 33.4% games, 29.5% training, 28.4% inactive time, and 8.7% athletics. The highest heart rate was achieved in the game form compared to the other two activities. Each player has 12.8 duels and 0.6 headers per training. Overall, most of the duels were fought from the anterior direction. This form of play induces a higher cardio-circulatory load as well as a better learning environment. Potentially dangerous situations such as contact with another player or headbutting occur on average to one player every six minutes during a training session. From the results of this research, the highest results were found in the game form with a result of 33.4%. In Switzerland, foorball clubs for young children are not taught with a focus on good skills and physical endurance, but every football club in Switzerland introduces what football is and how to play it in simple way. In contrast to research conductes by Uebersax et al., (2020), research conducted by Nybakken & Falco, (2022) shows that for children the important training pattern is

passing and receiveing the ball. Therefore, football especially for children they don't need hard and rough training, the most important thing is that children can know how the game of football works.

Research on the Effect of Frequency and Duration of Training on PHV between Swiss and Indonesian Football Clubs Aged 9-11 Years must be carried out to find out whether there is an effect of frequency and duration of training on PHV which is used to determine the maximum age difference for the development of children from continents. The differences are in Switzerland and Indonesia. The temporary hypothesis in this study provides an effect on Peak High Velocity on 2 Swiss and Indonesian football clubs.

Method

The research used in this research is a quantitative descriptive research type with a comparative research design. Descriptive research is research that attempts to explain solutions to current problems based on data, so it also presents data, analyzes and interprets (Narbuko & Achmadi, 2021). Descriptive research is also comparative and correlative. The targets in this research were children aged 8-11 years. To determine PHV, researchers used the Mirwald Gender-Specific Regression Algorithms method by knowing chronological age, height, sitting height, body weight and leg length and then analyzing it using Maturity Offset and Peak Height Velocity and Microsoft Excel. The independent variables in this study are the frequency and duration of exercise, while the dependent variable is Peak Height Velocity. There are two groups, namely from football club children and Sekolah Sepak Bola (SSB).

The sample criteria in this study: 1) Exclusion Criteria (Exclusions in this study were: a) Children aged 8-11 years who were sick, b) Children who had mental disorders, c) Children who could not understand research procedures); 2) Inclusion Criteria (Inclusions in this study were: a) Children aged 8-11 years who are physically and spiritually healthy, b) Children from soccer clubs and schools who actively participate in soccer training).

The sampling technique in this research uses a purposive sampling technique. The sample in this research is children from La Sagne Groupement FC and SSB Tugumuda and was carried out on January 20 2023 and had an Ethical Clearance permit at No. 427/KEPK/EC/2023 with a total of 11 respondents for La Sagne Groupement FC located in Terrain de Gouttes, Switzerland and using previous research data for SSB Tugumuda. This study consisted of male and female soccer players. Participants aged 8-12 years totaling 32 people. From the Swiss football club there were 11 players with details of 9 men and 2 women (age 9.5 ± 0.4 years (M ± SD) age range 8 – 10 years) from La Sagne Groupement FC and 21 male players (age 11.3 ± 0.6 (M ± SD) age range 10-12 years). All research subjects actively participated in routine soccer training activities every week. Participants come from club and school football levels, including beginners.

The research instrument used text interview questions, a Fujifilm T-200 camera to record interviews with trainers, anthropometric tools, and Peak Height Velocity processing software. In the research procedure, researchers first carried out field observations in the Terrain des Gouttes field, Switzerland. Researchers and trainers gathered a total of 11 children as participants for anthropometric measurements. Anthropometric measurements consisted of place and date of birth, weight, height, leg length and sitting height. After the data was obtained, it was processed using SPSS Statistics 22 software. The data was processed and compared with previous research entitled Physical Activity and Injury Affect Peak of Height Velocity in Children Aged 9-14 Years written by (Fauzi & Sumartiningsih, 2023) as soccer club data Indonesian Football. The data that has been obtained is analyzed and compared to obtain research results.

Results and Discussions

The table 1 shows data related to age at La Sagne Groupement FC reaching 9.5± 0.4 years with a minimum age of 8 years 9 months and a maximum age of 10 years, while SSB Tugu Muda showed results of 11.3 ± 0.6 years with a minimum age of 10 years 2 months and a maximum age of 12 years 2 months. The two research groups had a difference of 1.8 ± 0.2 years with an average of 10.3 ± 1.4 with a minimum age of 8 years 9 months from La Sagne Groupement Fc and a maximum age of 12 years 2 months from SSB Tugumuda.

Weight on La Sagne Groupement had an average result of 30.5 ± 6.0, with the lowest body weight of 24 Kg and the highest body weight of 45 Kg. Meanwhile for SSB Tugumuda it was 35.1 ± 8.0, with the lowest body weight being 24 Kg and the highest body weight being 52 Kg from the two data having a difference of 4.6 ± 2.0 with an average of 32.8 ± 3.2 from the data obtained that SSB Tugumuda's body weight was heavier than La Sagne Groupement.

Table 1. Description of Research Data

	La Sagne (N= 11)	SSB TM (N=21)
Data	**Mean + SD**	**Mean + SD**
Age (years, months)	9.5 ± 0.4	11.3 ± 0.6
Body Weight (kg)	30.5 ± 6.0	35.1 ±8.0
Height (cm)	138.3 ± 7.4	145.4 ± 3.9
Body Mass Index (kg/m2)	17 ± 2.2	16.3 ± 3.1
PHV (Year, Month)	16.3 ± 1.3	14.0 ± 0.5
Frequency (Week)	3 ± 0.0	4 ± 0.0
Duration (Minutes)	270 ± 0.0	360 ± 0.0

Table Description: 1) N: Number of Samples, 2) SD: Standard Deviation, 3) PHV: Peak Height Velocity

Data height shows that La Sagne Groupement got a result of 138.3 ± 7.4 with the shortest height of 124 cm and the highest of 146 cm, while for SSB Tugumuda the result was 145.4 ± 3.9, the shortest height was 136 cm and the highest was 152 cm. The two data have a difference of 7.1 ± 3.5 with an average of 141.8 ± 4.9 with the result that SSB Tugu Muda has a higher height than La Sagne Groupement FC.

The Body Mass Index at La Sagne Groupement FC reached 15.8 ± 2.2 with the smallest body mass index being 13.30 and the highest being 21.70, while at SSB Tugu Muda it was 16.6 ± 3.5 with the smallest body mass index being 11.40 and the highest being 23.80 having a difference of 0.7 ± 0.9 with an average of 16.65 ± 0.5. From body mass index data, the results from La Sagne Groupement FC have higher results than SSB Tugumuda.

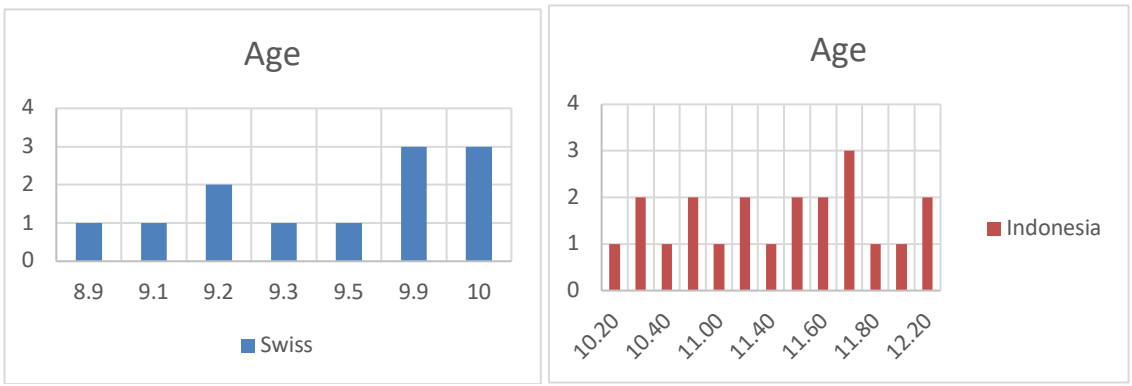

Figure 1. Difference in Age of Swiss and Indonesian Clubs

In Football body size and competitive performance are related to age (Domingues, 2013; Ivanov et al., 2022). In general, the age of SSB Tugu Muda with 21 players is higher with an average of 11 years 3 months, the lowest age is 10 years 2 months and the maximum age is 12 years 2 months, while for the Swiss Club with 11 players the average is The average age is 9 years 5 months, the lowest age is 8 years 9 months and the maximum age is 10 years. Age in PHV really refers to the tempo and level of progress of maturation in maturity in football (Cronin et al., 2010).

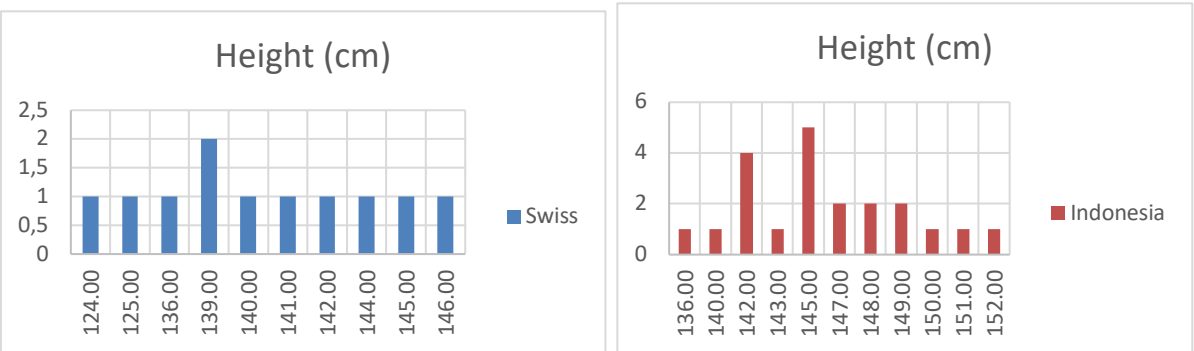

Figure 2. Difference in height between Swiss and Indonesian clubs

Determining body composition is one of the main measures for assessing health and capacity for both athletes and general people (Brito et al., 2010). For athletes themselves, anthropometric and physiological factors are one of the topics most frequently researched for identification (Kalčíková & Přidalová, 2023; Staśkiewicz-Bartecka et al., 2023). From the height data, the Swiss club has the shortest data of 124 cm and the highest data of 146 cm, while for SSB Tugumuda the shortest data is 136 cm and the highest data is 152 cm.

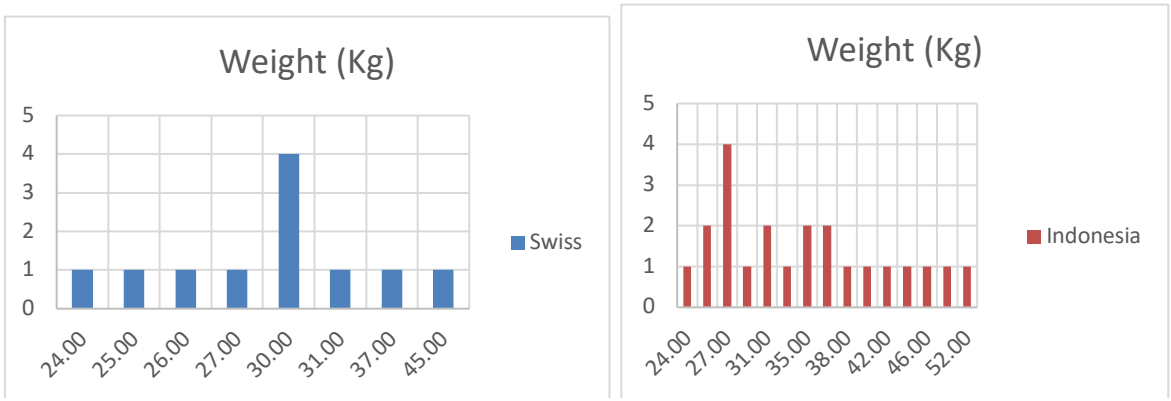

Figure 3. Difference in Body Weight of Swiss and Indonesian Clubs

Muhammed et al., (2017) explained in his research that there is a relationship between body composition and physical performance. Body composition itself includes height and weight (Conde-Pipo et al., 2023). In the graph there are the smallest and largest body weights, for the Swiss club the smallest body weight is 24 kg and the largest is 45 kg, while for SSB Tugumuda the smallest body weight is 24 kg and the largest is 54 kg.

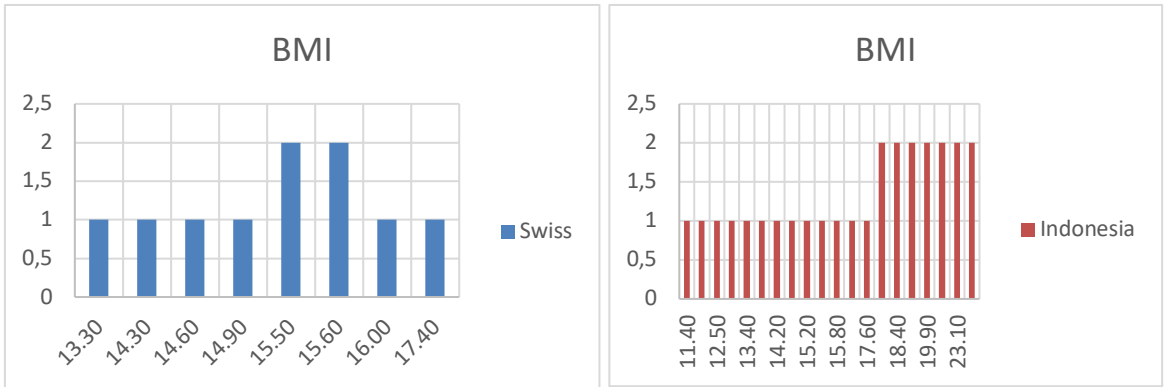

Figure 4. Difference in BMI of Swiss and Indonesian Clubs

Body Mass Index (BMI) is a value obtained from a person's mass and height, which indicates whether the person has the right weight for his height (Biswas et al., 2021). The body mass index based on data from Swiss clubs is lowest at 13.30 and highest at 17.40, while for SSB Tugu Muda the lowest data is 11.40 and the highest is 23.80.

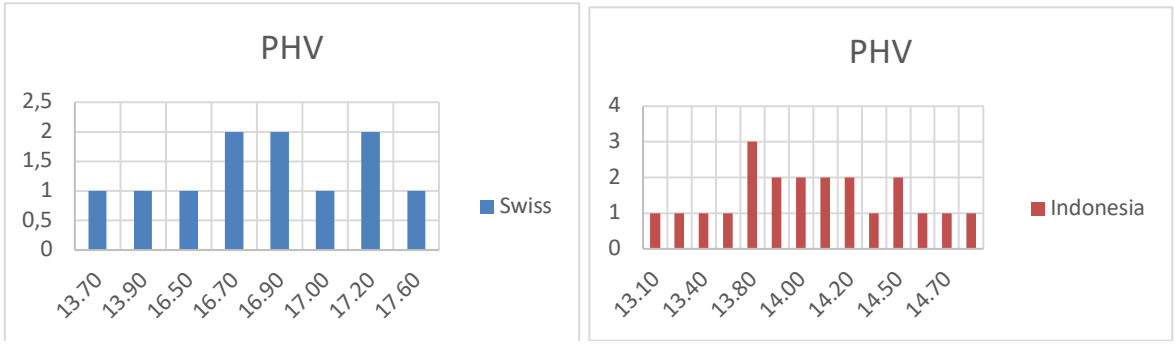

Figure 5. Differences between Swiss and Indonesian Clubs

Philippaerts, Vaeyens, Janssens, Van Renterghem, et al., (2006) hypothesized in his research that the age at peak high velocity and the time of development of physical work performance relatively occurred in adolescent

soccer players compared to general adolescent boys. In the PHV data for Swiss clubs, the lowest data was obtained at age 13.70 and the highest at age 17.60, while for SSB Tugumuda the lowest data was at age 13.10 and the highest was 14.80.

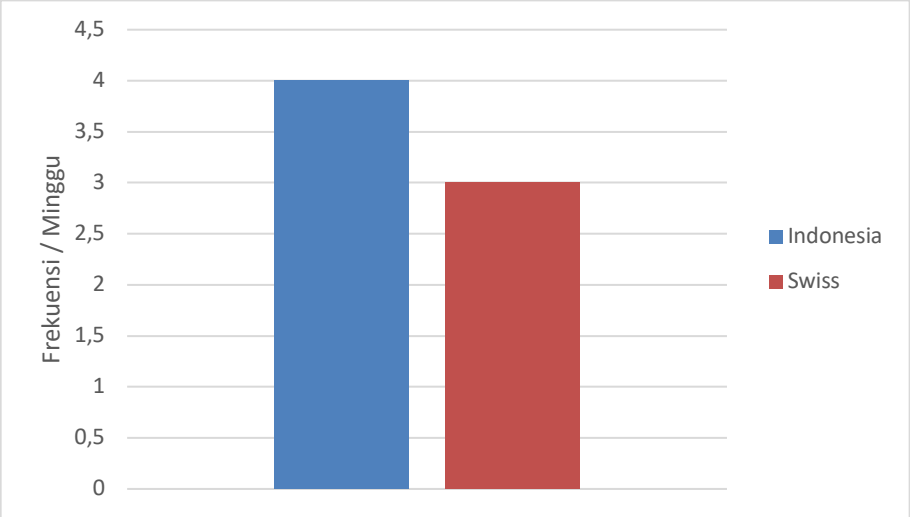

Figure 6. Difference in Training Frequency for Swiss and Indonesian Clubs

A useful analysis in the application of football does not involve the amount of physical activity carried out by the player, but what is most important is the frequency and duration of each exercise (Konefa et al., 2019). In terms of training frequency, the Swiss club and SSB Tugumuda only have a difference of 1 practice per week.

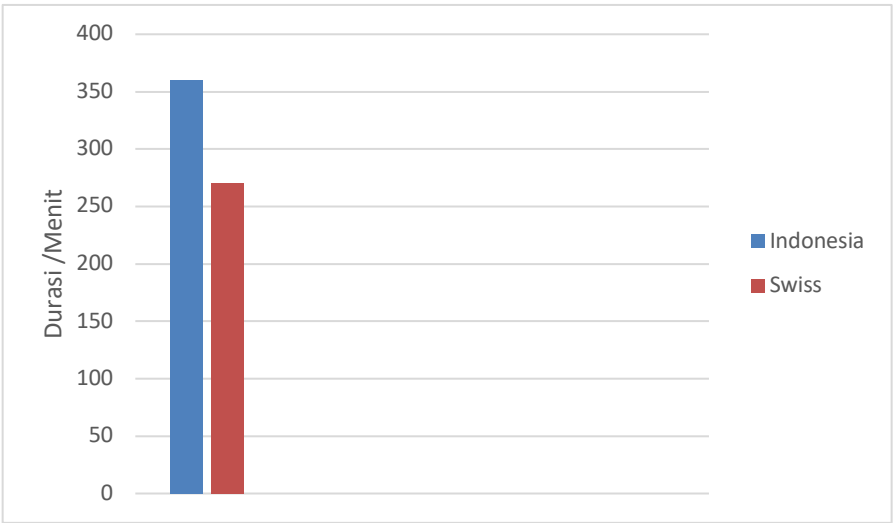

Figure 7. Difference in Training Duration for Swiss and Indonesian Clubs

In the training process, the duration really determines the goal and direction of the practice. Optimization in the training process must be based on a training model characteristic of the level of performance in the real potential possessed by the player (Ionut, 2023). The duration of training between Swiss and Indonesian clubs has the same time for each practice, namely an effective time of 1 hour 30 minutes.

Peak High Velocity Conditions

Table 2. Peak High Velocity Conditions

Data	La Sagne N=11 MEAN±SD	SSB TM N =21 MEAN±SD
PHV	16.3 ± 1.34	14.03 ± 0.5
Maximum	17.6	14.8
Minimum	13.7	13.1

The data shows that for 11 samples of La Sagne Groupement the average is 16.3 with a standard deviation of 1.34 with maximum data of 17.6 and minimum data of 13.7, while for SSB Tugu Muda the average is 14.03 and standard deviation of 0.5 with maximum data of 14.8 and minimum data of 13.1.

Prerequisite Analysis Test

Normality test

Table 3. Normality Test

Data	Group	Sig (p)	Information
Age	Switzerland	0.052	Normal
	Indonesia	0.081	Normal
Height	Switzerland	0.023	Abnormal
	Indonesia	0.052	Normal
Weight	Switzerland	0.026	Abnormal
	Indonesia	0.936	Normal
BMI	Switzerland	0.006	Abnormal
	Indonesia	0.077	Normal
PHV	Switzerland	0.001	Abnormal
	Indonesia	0,000	Abnormal

The Shapiro-Wilk table shows that the significance value for the Indonesian group is more than 0.05 from all aspects of calculation so that the data is normally distributed, whereas for the Swiss group the data is normally distributed only in the age aspect, while for the other aspects the significance value is less than 0.05 so that the data not normally distributed. So it can be concluded that the data is not normally distributed and data analysis continues with non-parameter analysis.

Non Parametric Test

Table 4. Non-Parametric Whitney-U Test

Variable	P value	Information
Age	0.000a	H1 Accepted
Height	0.001a	H1 Accepted
Weight	0.081a	H1 Rejected
BMI	0.667a	H1 Rejected
PHV	0.000a	H1 Accepted

Hypothesis
H0: There is no difference between Swiss and Indonesian clubs.
H1: There are differences between Swiss and Indonesian clubs.

From the data description, it shows the age distribution of the Swiss and Indonesian groups with a significance value of .000a. H0 is rejected and Ha is accepted because .000a is smaller than the probability of 0.05.

The height distribution value of the Swiss and Indonesian groups has a significance value of .001a, so H0 is rejected and H1 is accepted because .001a is smaller than the probability of 0.05.

The weight distribution value of the Swiss and Indonesian groups has a significance value of .081a, so H0 is accepted and H1 is rejected because the significance value is greater than the probability of 0.05.

The BMI distribution value of the Swiss and Indonesian groups has a significance value of .667a, so H0 is accepted and H1 is rejected because the significance value is greater than the probability of 0.05.

The height distribution value of the Swiss and Indonesian groups with a significance value of .000a means that H0 is rejected and H1 is accepted because .000a is smaller than the probability of 0.05.

Multiple Regression Analysis

Table 5. Multiple Regression Analysis

Independent Variable	Analysis	Sig (p)
Frequency	Multiple Regression	0,000
Duration	Multiple Regression	0,000

The significance value for the frequency and duration variables is 0.000 < 0.5, meaning there is a relationship between frequency and duration and PHV. This proves that the frequency and duration of exercise affects the PHV value.

T test

Table 6. T test

Data	F	Sig (2-Tailed)	Mean Difference	Sig
Age	1,511	0,000	-1,7	0.229
		0,001	-1.7	
Height	3,491	0.001	-7.1	0.71
		0.011	-7.1	
Weight	2,554	0.99	-4.6	0.120
		0.74	-4.6	
BMI	5,264	0.533	-0.7	0.29
		0.471	-0.7	
PHV	8,164	0.000	0,000	0.008
		0.000	0,000	

The T-test is a statistical method used to test whether there are significant differences between two groups, so it is used to find out whether the two groups have the same average. The T-test is used to determine whether two groups are different from each other or not. .Basis for decision making for data if the Sig value. (2-tailed) < 0.05, then there is a significant difference between Switzerland and Indonesia. And if the Sig value. (2-tailed) > 0.05, so there is no significant difference between Switzerland and Indonesia.

Age data shows that the Sig (2-tailed) value between Switzerland 0.000 and Indonesia 0.001 means with the significance value of 0.229 > 0.05 which means that there was no difference in age between Switzerland and Indonesian clubs. Height data shows that the Sig (2-tailed) value between Switzerland 0.001 and Indonesia 0.011 means with the significance value of 0.71 > 0.05 which means that there was no difference in height between Switzerland and Indonesian clubs. Weight data shows that the Sig (2-tailed) value between Switzerland 0.99 and Indonesia 0.74 means with the significance value of 0.12 > 0.05 which means that there was no difference in weight between Switzerland and Indonesian clubs. BMI data shows that the Sig (2-tailed) value between Switzerland 0.533 and Indonesia 0.471 means with the significance value of 0.29 > 0.05 which means that there was no difference in BMI between Switzerland and Indonesian clubs. PHV data shows that the Sig (2-tailed) value between Switzerland 0.000 and Indonesia 0.000 means with the significance value of 0.008 > 0.05 which means that there was difference in PHV between Switzerland and Indonesian clubs.

Training Frequency

Based on the results of frequency analysis, it affects the PHV value with a significance value of 0.000 < 0.5. Frequency of training in two groups, namely La Sagne Groupement FC and SSB Tugumuda Semarang. The two groups train every week with a frequency of three times for La Sagne Groupement FC with details on Tuesday, Thursday and Saturday for match sessions against other football clubs in the Neuchâtel area, training is held at 17.00 European time. SSB Tugumuda itself has a training frequency of four times a week with details of Monday, Tuesday, Thursday and Friday which are always held at 14.00 WIB with details of three technical skills training and one light physical training.

The two clubs have their own training frequencies based on the two football management clubs. The reseracher sees that children who join soccer clubs are required to be able to understand how to play the basics of soccer. The frequency of practice must be adjusted to the child's needs in understanding football, whether during the practice process they have a different level of understanding from their peers. In this research, the author realized that details of training frequency were still insufficiently reviewed for each football club in order to obtain relevant detailed data. The results of this research on training frequency show that the training frequency value is quite high for the two football clubs.. In previous research examined by Ruch et al., (2013) explained that the classification of activities in investigating type, duration and frequency must have appropriate procedures in research because children's activities are different every day, especially on weekdays and on weekends.

Duration of training for two groups, namely La Sagne Groupement FC and SSB Tugumuda Semarang. Based on the results of the duration analysis, it affects the PHV value with a significance value of 0.000 < 0.5. The two groups carry out training every week and have their own duration for each training session. La Sagne de Groupement FC has a duration of 90 minutes for each training session with details of 15 minutes for the warm-up session, 60 minutes for the core training session, and 15 minutes for the cool-down session. Meanwhile,

SSB Tugumuda Semarang has a training time of 120 minutes but the effective training time is 90 minutes for each session based on a statement from the management of SSB Tugumuda Semarang.

Based on the results above, we can see that the two groups had almost the same training duration, with each group taking 90 minutes for each training session. Recommendations from the World Health Organization (2010) state that children and adolescents aged 5-17 years can do vigorous aerobic activity for one hour at least three times every week. From the results, the two groups carried out vigorous aerobic activity for 90 minutes every week, doing it 3-4 times. Same with exercise frequency, exercise duration should also be private and should be handled personally. Researchers can describe that there is a difference in the training duration of the two clubs in minutes. In fact, the data actually equals 90 minutes of net time, but at SSB Tugu Muda there is 30 minutes of unused time which is used to prepare the children to enter the field. Both clubs have followed WHO recommendations, namely carrying out physical activity in the high category for 90 minutes. It's just that there is still a lack of time efficiency at Tugumuda SSB which wastes 30 minutes for preparation. If the time wasted can be put to good use then the Tugumuda SSB children will be able to focus on the training they are carrying out. Factors that prevent time efficiency include, perhaps children being late in doing the exercises so that the duration is cut short. In this case, the researcher was not thorough and detailed in recording the time spent in each training session personally.

Peak Height Velocity

The results of the research data found that the average Peak Height Velocity of the 32 samples experienced peak height acceleration at the age of 14.8 years. From the results of research data analysis, there is an effect of frequency and duration on Peak Height Velocity. In accordance with research by Shahidi et al., (2023), anthropometric measurements can be used to measure and control soccer players performance data according to the biological needs used in the training process.

The results of Peak Height Velocity (PHV) themselves are very different between Swiss and Indonesian clubs. Researchers suspect that there are body composition factors between Switzerland and Indonesia. European people tend to be taller than Asian people. Height is the main factor in differences in PHV measurements. Rush et al., (2005) explained that Asian Indians have more abdominal fat deposits than Europeans. Based on the results of research data, it was found that the average PHV of 32 samples experienced peak height acceleration at the age of 14.8 years, which means that it is in line with research by Sherar et al., (2005) that for boys and girls, the average age PHV is around 14.0 years. In research conducted by Achmad & Sumartiningsih, (2020), it was found that there was a relationship between nutritional adequacy and physical activity on Peak Height Velocity in the two groups studied. Based on the results above, we can see that the two groups carry out routine training every week at each agency at a predetermined time.The limitation in measuring PHV is the lack of samples that need to be studied considering that the number of samples at the Swiss club is only 11 people and there are 10 different samples from SSB Tugumuda.

For further research, it is hoped that it will be more detailed in recording all the time and activities carried out by the sample and looking for the same number of samples so that they have the same comparison to get complete research results.

Conclusion

Peak High Velocity conditions for La Sagne Groupement FC athletes were 16.3 ± 1.3 (Mean ± SD) and Peak Height Velocity conditions for Tugumuda SSB 14.0 ± 0.5 (Mean ± SD). There is an effect of frequency and duration on Peak Height Velocity with the results of multiple regression analysis for frequency and duration of 0.000 < 0.05.The PHV value for La Sagne Groupement FC is16.3 and SSB Tugumuda is 14.03 with a significance value of 0.008 < 0.05, there is a difference in PHV between the La Sagne de Groupement and SSB Tugumuda groups.

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