

Analysis Of Roundhouse Kick Movement In Xx Pon Athlets In Muay Thai Aceh 2021

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Abstract

Muaythai is a hard martial arts sport that teaches fighting techniques with bare hands where the feet are the dominant attack tool used by fighters. kick roundhouse is the most dangerous attack to destroy the opponent (Young, 1991). Therefore, this research is interesting to do research. The purpose of this study was to determine the linear instep speed, strength and power of the roundhouse kick in PON Muay Thai Aceh XX athletes in 2021. The method used in this study was descriptive analysis method. The population in this study were athletes of the PON Muaythai Aceh in 2021, totaling 7 people who were also used as research samples (total sampling). The instruments used were the EOS 600D camera, Camera Tripod, labtop, roundhouse kick software Pasco Capstone strength testing roundhouse kick using a force plate. The research data were then analyzed according to the research design. The results showed that the linear velocity of the instep of the roundhouse kick in the high aspect was 3 samples. The results of the strength of the roundhouse kick on the high aspect were 2 samples. kick result Power roundhouse on the high aspect as many as 2 samples. The result of the analysis is that the linear velocity of the instep roundhouse kick that was tested using the Pasco Capstone averaged 12.11 m/s. In addition, the strength of the roundhouse kick was tested using a force plate with an average of 479.71 N. Meanwhile, the strength of the roundhouse kick obtained by the time between strength and average speed was 615.86 Kg.m/s.

Keywords: *Movement Analysis, Roundhouse kick, Muaythai, Aceh XX PON Athletes*

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I. Introduction

Martial arts are now increasingly popular in Indonesia, one of the oldest martial arts in Indonesia is Pencak Silat, then many martial arts outside Indonesia have begun to enter the country and are growing rapidly, such as karate, kempo, judo from Japan, muaythai from Thailand and so on. Martial arts outside Indonesia continue to develop in society, one of which is Muay Thai. Muay thai is a tough traditional martial art originating from Thailand. This martial art is famous for the variety of attacks used: punches, elbows, knee punches, and various kicks. It can be interpreted directly, namely, the art of self-defense using the hands, elbows, knees and feet.

The development of muaythai has gone global into various continents, from America, Europe, Africa and Asia, as well as Indonesia, the development of muaythai in Indonesia is getting better, starting from Indonesian muaythai athletes competing in multi-event events, such as the Sea Games. Muay thai has been officially competed under KONI (Indonesian National Sports Committee) as well as tiered events starting from PORA, PORWIL, to the most prestigious national event PON (National Sports Week), while existence in the international muaythai scene has touched all applicable aspects. , starting from the World Championship Muay

Thai and Sea Games, of course this has made the sport of muaythai more and more popular with the general public, muaythai has various techniques such as fighting, wai crew arts, muay boran dual arts, with the variety of techniques in muaythai making it even more interesting. Interestingly, the Muaythai coaching system is carried out with a competition or championship in Indonesia.

In the process of improving sports performance or performance, athletes must have several 5 factors in martial arts such as in muay thai. There is energy capacity, anaerobic and aerobic parts, tactics, technique and motivation. All of these factors contain all the functional systems that occur during competition and these interactions determine the quality of sports performance. The formation of achieving and superior athletes as expected there are many influencing factors such as physical fitness, intellectual intelligence, emotional intelligence and strong motivation of these athletes, Harsono (1988: 100) states that there are four aspects of training that need to be considered and trained carefully by athletes, namely (1) physical training, (2) technical training, (3) tactical training, and (4) mental training.

In combat sports such as muay thai, in addition to technical and tactical training, physical and physiological features such as aerobic and anaerobic, strength, speed, endurance, body fat, flexibility, coordination, and skills are features influencing success (Zabukovec and Tiidus, 1995, 1995). Akgün, 1993) and that they require regular intensive training because combat sports require maximum activity and supramaximal intensity and short recovery during competition (Crisafulli et al., 2009; Siegler JC and Hirscher K, 2010) Kicking

techniques are often used during combat, The kick that is often used is the *roundhouse kick*. The *roundhouse kick* is the most dangerous weapon to destroy the opponent (Young, 1991). The *roundhouse kick* is broken down into four important components: hip rotation, support leg twist, arm swing, and strike with the lower shin or instep (Young, 1991). There are three main targets of the *roundhouse kick* attacking the thigh area, body and head. In order to get more power on the target, several components that need to be considered in the *roundhouse kick*, namely the linear speed and angle of rotation of the sole of the foot are very important to get high power from the *roundhouse kick*.

II. Research Prosuder Research

A. Approach This

type of research uses evaluation research. According to (Sugiyono, 2005) "evaluation research is a research conducted aimed at making decisions by comparing an event, activity and product with standards and programs that have been set based on the phenomenon."

The approach used in this research is a quantitative approach. A quantitative approach is used to obtain in-depth and comprehensive evaluation results, this approach is used to handle quantitative data (numbers).

B. Population and Sample

The population in this study was the Muaythai PON Aceh athletes in 2021 as many as 7 athletes. The sample is the smallest part of the population or that represents the population. In accordance with Arikunto's opinion, S (2010: 184) said "Total sampling is a sampling technique that is carried out because the entire population is sampled". Data collection techniques are an important part of the research process.

The data collected in this study is data obtained directly from the object of research, namely the Muaythai PON Aceh athletes in 2021. Weight tests, leg length tests, *roundhouse kick*.

C. Roundhouse Kick

During the initial (ready) position, participants are asked to face the instructor holding the kick target, with the knees slightly bent, and the leg that will kick the trial should be in front of the other (Figure 1a). After receiving the starting instruction, the participant takes a step forward before taking a *roundhouse kick* to the target kick as hard and as fast as possible (Figure 1e). Each participant takes five execution kicks for each leg.

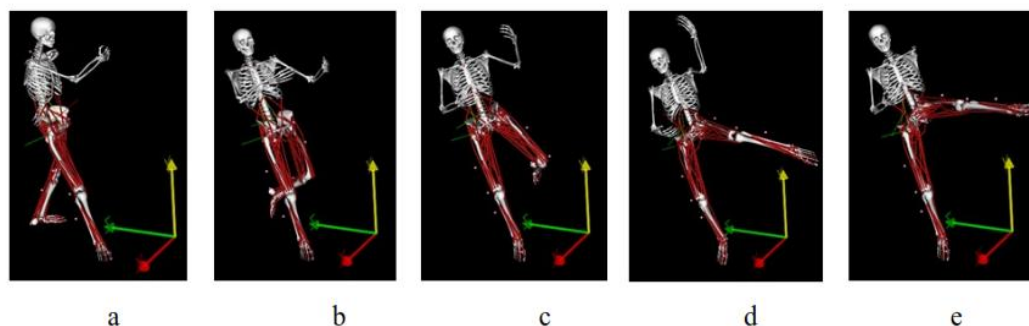


Figure.1

III. Research Results And Discussion

Based on the research design that has been made by the researcher, three research data were obtained, for each variable, namely: roundhouse kick linear speed ,roundhouse *kick* and *power*. The data in this study were obtained through the *pasco capstone* to measure acceleration, while the *force plate* to measure pressure or force. This research was conducted on the Muaythai PON Aceh athletes in 2021, totaling 7 people.

Furthermore, the acceleration data obtained from the *Pasco Capstone* will be analyzed for the linear velocity of the instep movement of the *roundhouse kick* using the video file analyzer facility. Video *analyzer* facility *analyzer* software *Pasco Capstone* that can analyze movement, which is focused on analyzing the linear velocity of the instep. These movements are broken down into several stages of movement, each movement is shown the sequence of movements and the time they occur. While the value of Speed *Power* (SP) is the value of force (*Force*) multiplied by speed (V), and the value of *Force* (F) is obtained through the strength plate test equipment.

IV. Research Results

The results of this study were analyzed according to the needs of researchers. There are three aspects that are analyzed in this study, namely linear speed of the instep, strength and *power roundhouse kick*. From these three aspects, velocity is calculated using units of m/s (meters/second), *Newton (N)*, and Power Kg.m/s (kilogram-meter/second). The results of the analysis can be seen in the following table.

Table 4.1 Results of Analysis Using *Pasco Capstone*

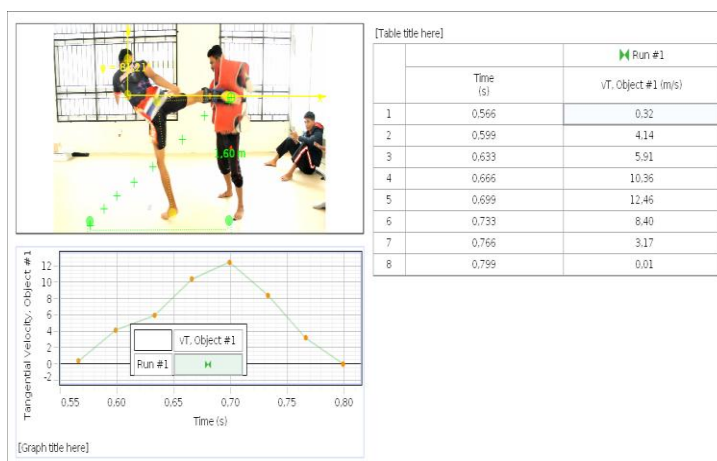
No	Name	Weight (Kg)	Linear Speed (m/s)		
			Early	Middle	Impact Impact
1	YPM	53	0.32	12.46	0.01
2	BCA	66	0.17	13.77	0.27
3	WA	58	0.44	10.36	0.61
4	KU	60	0.55	14.91	3.59
5	DSH	48	0.64	10.56	2.36
6	DS	48	0.28	11.63	0.93
7	PN	52	0.21	11.08	0.38
Average			0.37	12.11	1.16

Table 4.2 Analysis Results Through Force Plate

No	Name	Strength Using Foot Protector and Body Protector (N)	Strength Without Using Foot Protector and Body Protector (N)	Power (Kg.M/S)
1	YPM	402	565.85	718.94
2	BCA	254	417.85	586.72
3	WA	156	319.85	337.89
4	KU	712	875.85	1.331.63
5	DSH	246	409.85	441.33
6	DS	301	464.85	551.27
7	PN	140	303.85	343.30
Mean		315	479.71	615.86

Of the seven subjects analyzed the average linear velocity of the instep before *impact* is 0.37 m/s. Average instep linear velocity midfoot before *impact* is 12.11 m/s. Average instep linear velocity to the foot of *impact* is 1.16 m/s. Average *power roundhouse kick* is 479.71 N. Average *power roundhouse kick* is 615.86 Kg.m/s

The description of each sample that has the following influence (1) YPM has a weight of 53 Kg and when doing a *roundhouse kick* speed instep linear the initial foot before the *impact* is 0.35 m/s, the middle of the foot before the *impact* is 8.89 m/s, until the foot affected by the *impact* is 1.02 m/s with a foot reach distance of 1.6 m, the force generated when wearing leg protectors and body armor attached to impact 402 N, the maximum strength produced without wearing leg protection and body armor attached to impact 565.85 N and produces a *power* of 718.94 Kg.m/s when doing a *roundhouse kick*. YPM athletes use the left foot as a support while the right foot is used to perform the *roundhouse kick*.



Picture. 4.1 Analysis of linear movement roundhouse kick from YPM

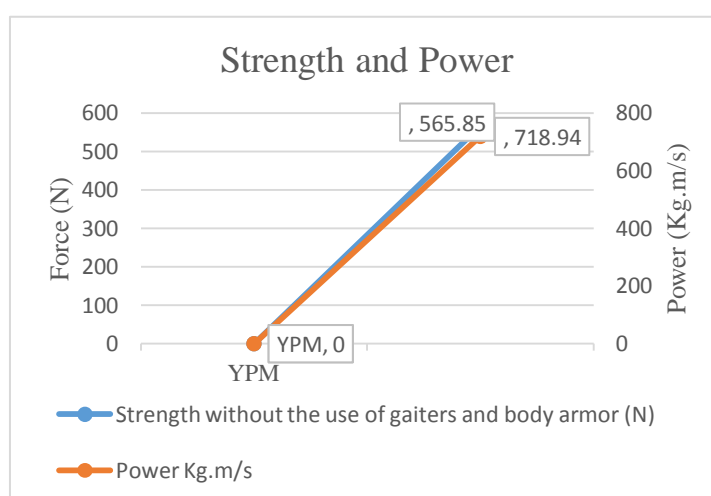
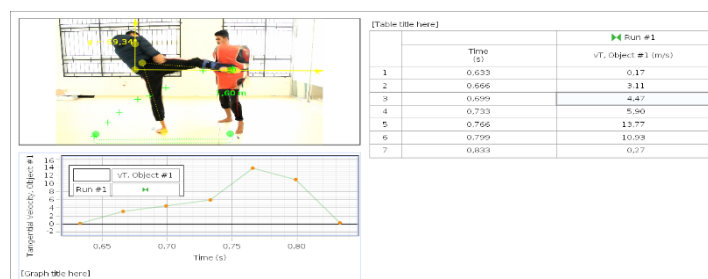


Fig. 4.2 Graph of Strength and Power from YPM

(2) BCA has a weight of 66 Kg and when doing a roundhouse kick with a linear speed of the instep before the impact of the foot before the impact of 0.17 m/s, the mid-foot before the impact of the impact 13.77 m/s, up to the feet affected by the impact of 0.27 m/s with a foot range of 1.6 m, the force generated when wearing leg protectors and body armor attached to the impact is 254 N, on the other hand the maximum strength generated without wearing leg protectors and body armor which is attached to the impact of 417.85 N and produces a power of 586.72 Kg.m/s when doing a roundhouse kick. BCA athletes use the left foot as a support while the right foot is used to perform the roundhouse kick.



Picture. 4.3 Analysis of linear motion roundhouse kick from BC

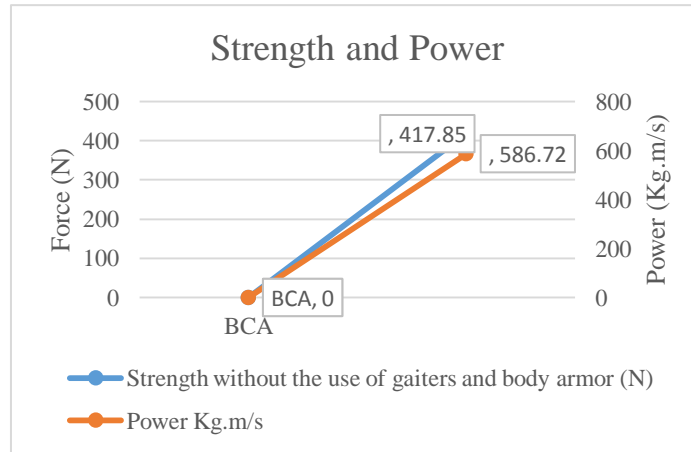
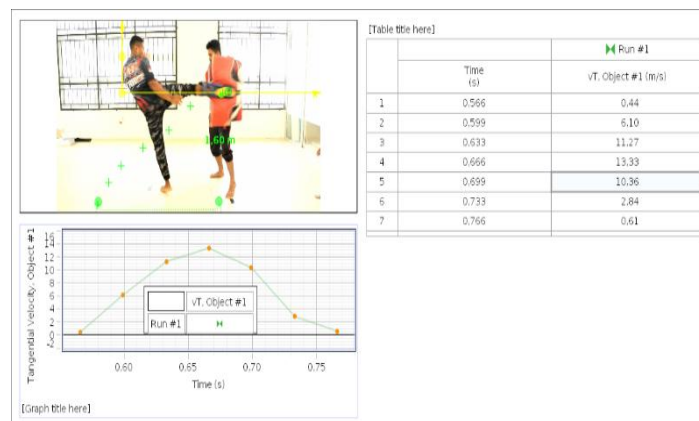


Fig. 4.4 Graph of strength and power from BCA

(3) WA performs a *roundhouse kick* speed instep linear the start of the foot before the *impact* 0.44 m/s, the middle of the foot before the *impact* 10.36 m/s, until the foot is hit by the *impact* 0.61 m/s with a foot reach distance of 1.6 m, the force generated when wearing gaiters and body armor attached to the impact is 156 N, on the other hand the maximum strength generated without wearing gaiters and body armor attached to the impact 319.85 N and produces a power of 337.89 Kg.m/s when doing a *roundhouse kick*. WA athletes use the left foot as a support while the right foot is used to perform the *roundhouse kick*.



Picture. 4.5 Analysis of linear movement roundhouse kick from WA

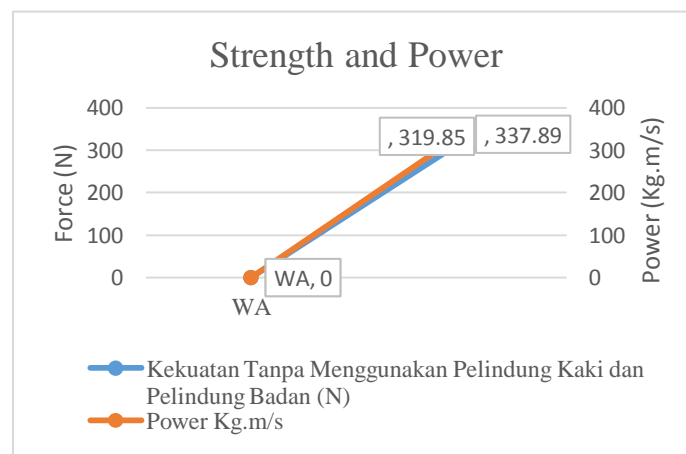
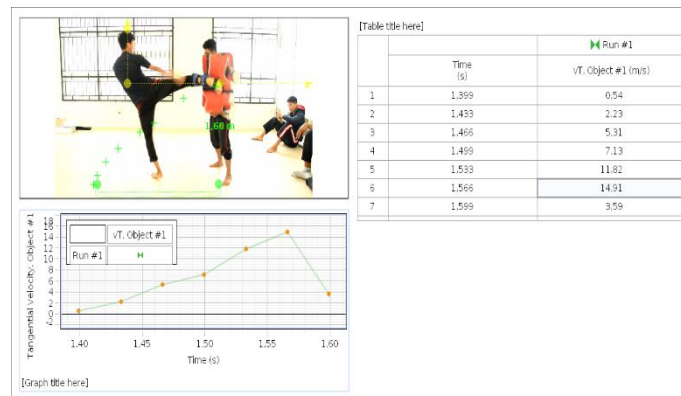


Figure 4.6 Graph of strength and power from WA

(4) KU has a weight of 60 Kg and at the time of doing a roundhouse kick with a linear speed of the instep before the impact of the foot is 0.55 m/s, mid the foot before impact is 14.91 m/s, until the foot is impacted 3.59 m/s with a distance of 1.6 m, the force generated when wearing leg protectors and body armor attached to impact is

712 N, on the other hand The maximum strength produced without wearing leg protectors and body armor attached to the impact is 875.85 N and produces a power of 1,3331.63 Kg.m/s when doing a roundhouse kick. KU athletes use the left foot as a support while the right foot is used to perform the roundhouse kick.



Picture. 4.7 Analysis of linear of roundhouse kick from KU

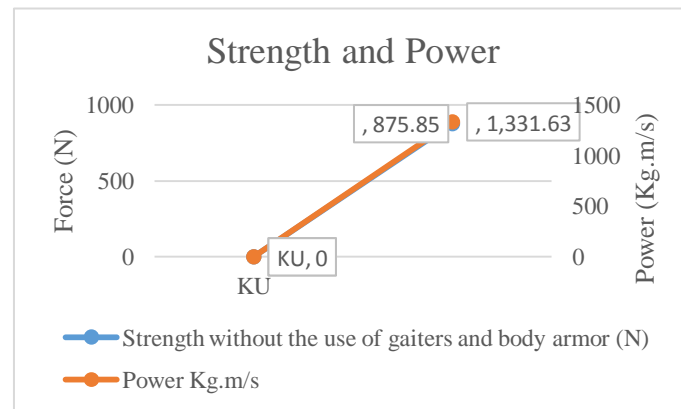


Figure 4.8 Graph of strength and power from KU

(5) DSH weighs 48 Kg and when doing a roundhouse kick speed instep linear the prefix of the foot before the impact 0.64 m/s, the middle of the foot before the impact is 10.56 m/s, until the foot is hit by the impact 2.36 m/s with a walking distance of 1.6 m, the force generated when wearing gaiters and body armor attached to impact is 246 N, on the other hand the maximum force generated without wearing leg guards and body armor attached to impact 409.85 N and produces a power of 441.33 Kg.m/s when doing a roundhouse kick. DSH athletes use the left foot as a support while the right foot is used to perform the roundhouse kick.

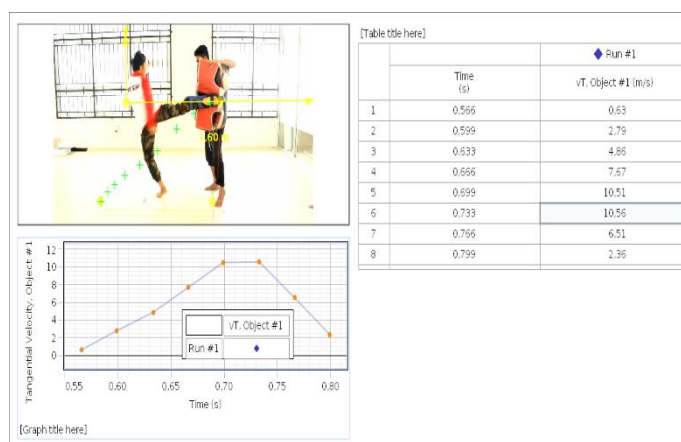


Figure 4.9 Analysis of linear movement roundhouse kick from DSH

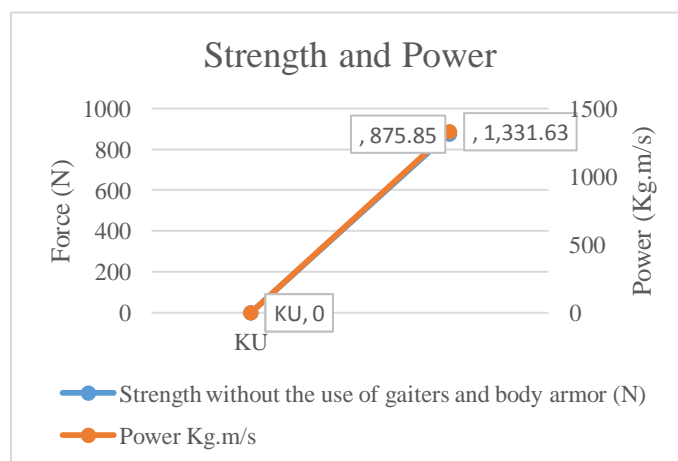


Figure 4.10 Graph of strength and power of DSH

(6) DS has a weight of 48 Kg and when doing a *roundhouse kick* speed instep linear the start of the foot before the *impact* 0.28 m/s, the middle of the foot before the *impact* 11.63 m/s, until the foot is hit by the *impact* 0.93 m/s with a foot-reach distance of 1.6 m, the force generated when wearing gaiters and body armor attached to impact is 301 N, on the other hand the maximum strength generated without wearing leg guards and body armor attached to impact 464.85 N and produces a power of 551.27 Kg.m/s when doing a *roundhouse kick*. DS athletes use the left foot as a support while the right foot is used to perform the *roundhouse kick*.



Figure 4.11 Analysis of linear of roundhouse kick from DS

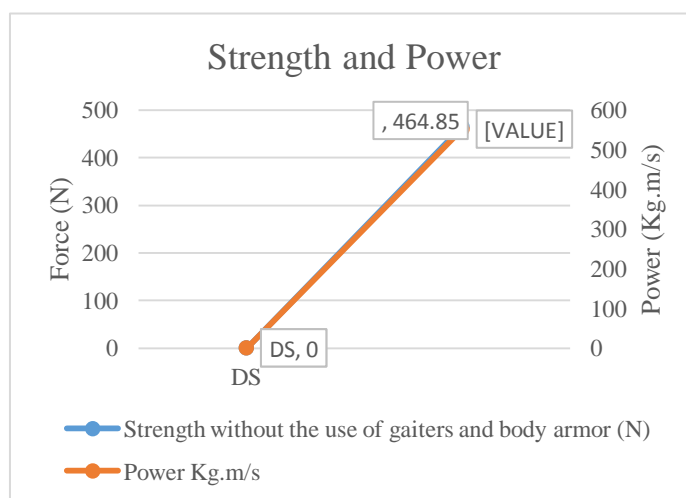


Figure 4.12 Graph of strength and power from DS

(7) PN has a weight of 52 Kg and when doing a *roundhouse kick* speed instep linear the initial foot before the *impact* 0.21 m/s, the middle of the foot before the *impact* 11.08 m/s, until the foot is hit by the *impact* 0.38 m/s with a toe distance of 1.6 m, the force generated when wearing gaiters and body armor attached to impact is 140

N , on the other hand the maximum force generated without wearing gaiters and body armor attached to impact 303.85 N and produces a *power* of 343.30 Kg.m/s when doing a *roundhouse kick*. PN athletes use the left foot as a support while the right foot is used to perform the *roundhouse kick*.

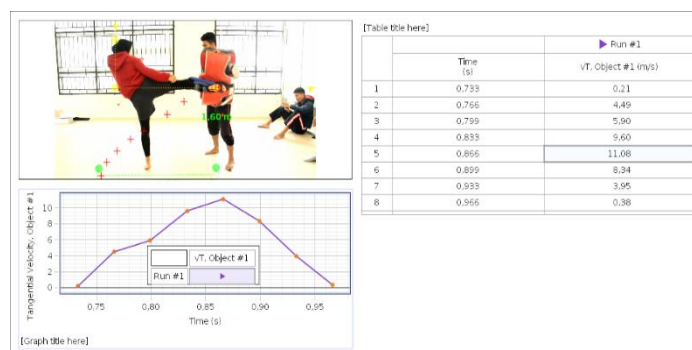


Figure 4.13 Analysis of linear of roundhouse kick from PN

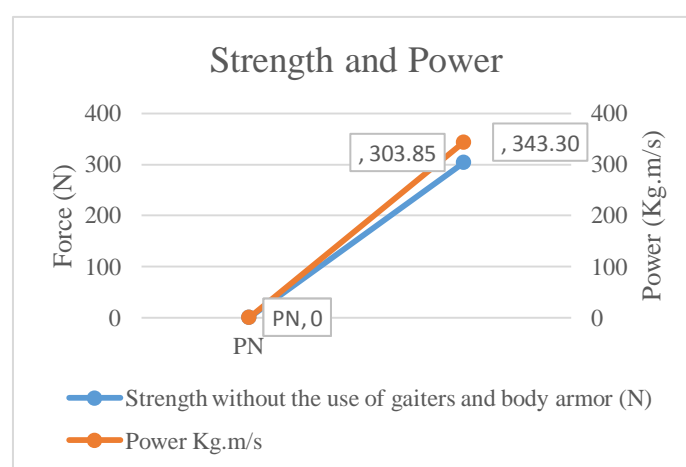


Figure 4.14 Graph of strength and power from PN

V. Discussion

The purpose of this study was to measure the speed, strength and power of roundhouse kick in muay thai. Strength analysis requires measuring the force generated by the roundhouse kick motion. A feature in this study is the use of a force plate tool and pasco capstone software to measure speed and strength when performing a roundhouse kick on a target. An important requirement of this methodology is to validate the force measures derived from the acceleration data. The first attempt to validate this measure used a force transducer mounted on the front of the target target. This force plate can be attached to the target place of the kick target. The force plate attached to the target must not swing because it will change the result of the score rather than the strength of the roundhouse kick. The problem that occurs in this study is that the force plate that produces the roundhouse kick movement value is much less because the target swings when kicked and the value results in this study are the results of the values that occur during the fight where the strength received by the opponent causes a shift effect on target. To get an accurate measure of the strength of the roundhouse kick movement on the force plate tool, the sensor surface must be perpendicular to the target target point and should not swing so that the roundhouse kick movement is right on the target target.

The roundhouse kick movement speed section in muay thai sports from this study requires the use of a camera to use roundhouse kick movement analysis. The data collection method used is the roundhouse kick system. This system tracks the reflective markers attached to the anatomical markers of the subject's body. The downside is that the roundhouse kick in muay thai involves rotating the body segment in such a way that it is impossible for the camera to track all the markers. The real problem here is that when the roundhouse kick technique is performed there are some movements that the camera frame cannot capture. This issue resulted in some data limiting motion analysis. For future research, we should be able to overcome this problem by choosing a camera that can capture all movements from start to finish when analyzed using Pasco Capstone software and so on.

To measure power, when the athlete performs a roundhouse kick from the start to the hit on the target. Then there will be a power resulting from the combination of speed and strength when doing a roundhouse kick.

The results of this study can be compared with previous studies involving martial arts with roundhouse kicks. This study found that the peak strength range of the roundhouse kick movement in XX PON athletes in muay thai sport in 2021 (303 N to 875 N) showed a lower level of strength than the peak strength of the roundhouse kick movement of Thai athletes (2000 N to 14000 N) (Sidthilaw, 1996:75). KU obtained the value of the strength of the roundhouse kick using foot protectors and body armor attached to the force plate 712 N, and the strength value without using a protector is 875.85 N. In comparing this study, it should be seen that both martial arts are the same and use elite athletes, but the level of different categories of athletes used in this study were amateur athletes and Thai athletes compared were professional athletes.

For the roundhouse kick movement speed analysis, comparisons are limited due to the previously discussed data collection issues. However, the linear speed of the instep when performing a roundhouse kick can be compared to the linear speed of the instep of a professional muay thai athlete. The linear speed of the XX PON athletes in muay thai in 2021 is the average athlete who has an instep linear speed before hitting the target (0.37 m/s). The average mid-foot instep linear velocity before hitting the target was (12.11 m/s). The average linear velocity of the instep to the foot of the target hit is (1.16 m/s). shows the average value of the maximum linear speed of the foot in Thai athletes (13.24 m/s) (Collin JG. et al. 2017). In comparing these studies, it should be noted that both studies used subjects who already had high match ratings. In addition, the speed of the foot before hitting the target is directly proportional to the distance of the foot before hitting the target, meaning that when the athlete does a roundhouse kick with a longer range of feet but does not have a good instep linear speed, the power will not be maximized and vice versa when the distance is reached. the athlete's leg is too short, the linear speed of the instep will not be maximized so that the power will not be large. Before doing the roundhouse kick, the athlete must build momentum to place the correct position and estimate the time.

VI. Conclusion

This study discusses the analysis of the *roundhouse kick* XX Aceh XX muaythai athletes in 2021. This certainly shows that the *roundhouse kick* of the 2021 PON Aceh XX muaythai athletes all have the same steps and movements. The data analysis based on the analysis of the *roundhouse kick* the research subjects were 7 athletes of XX PON Aceh. The results are as follows:

1. Analysis of the *roundhouse kick* on the linear speed of the instep using the *Pasco Capstone* has different results, but overall the *roundhouse kick* is carried out 5 times and the best results are taken the average athlete does it with the right foot reaching a speed of 12.11 m/s. The fastest speed is in KU with a mass (60 Kg) with a speed of 14.91 m/s. movement technique *roundhouse kick* slowest
2. The measurement of the *roundhouse kick* on strength using a *force plate* has different results, but overall the *roundhouse kick* was carried out 5 times and the best results were taken, the average athlete doing it with his right foot reached a maximum strength of 479.71 N. Strength movement *roundhouse kick* is KU with a strength of 712 N using leg protectors and body armor and KU strength without using a protector is 875.85 N. The *roundhouse kick* is PN with a strength of 140 N using leg protectors and body armor and KU strength without using protector 303.85 N.
3. The results of measuring the explosive power of the Roundhouse kick by multiplying the speed and strength have *power*, but overall the *power* is carried out 5 times and the best results are taken the average athlete performs with the right foot reaching *power* 615, 86 Kg.m/s. The fastest and strongest power is in KU with a mass (60 Kg) with a power of 1331.63 Kg.m/s. The *roundhouse kick* with the smallest strength was in WA with a mass (58 Kg) with a power of 337.89 Kg.m/s.

From these results it can be concluded that the *roundhouse kick* is the most efficient during the match. This analysis shows that PON XX athletes in the muaythai sport must improve their *roundhouse kick*. According to Sidthilaw, (1996:80) revealed "Training for muaythai athletes should concentrate on good kicking technique and possibly other biomechanical factors".

References

- [1]. Arikunto, S. 2010. Research Procedures A Practical Approach. Jakarta: Rineka Cipta.
- [2]. Jogiyanto, H. M. (1999), Analysis and Design of Information Systems, Yogyakarta: Andi.
- [3]. Mohamad, et al. (2017). Sports science-based research on the sport of muaythai A review of the literature. Walailak Journal of Science and Technology, 14(8), 615-625.
- [4]. Sidthilaw, S. (1997). Kinetic and Kinematic Analysis of Thai Boxing Roundhouse Kicks. Unpublished Doctoral Thesis, University of Oregon.
- [5]. Sugiyono. 2005. Understanding Qualitative Research. Bandung: CV. Alfabeta.
- [6]. Ruerngsa, et al. (2012). Muay Thai. Book
- [7]. Young, R. W. (1991) Muay Thai Roundhouse Kick. Black Belt, 29:61-63