The Contribution of Hand Reaction Speed and Arm Muscle Strength to Tsuki Chudan's Gyaku Punch Speed on Karateka Inkanas UNM Twigs

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ABSTRACT

This study aims to determine the contribution of hand reaction speed and arm muscle strength in karate. This research belongs to the type of correlational research. The population of this study was the entire karateka of the UNM Inkanas branch. The sampling technique in this study used a purposive consecutive sampling technique so that 30 qualified male novice athletes were obtained. The data analysis technique used is a correlation analysis technique using the SPSS Version 16 system at a significant level of 95% or α0.05. Based on the results of data analysis, this study concluded that: (1) The speed of hand reaction has a significant contribution to the stroke of gyaku tsuki chudan on the karateka of the Inkanas UNM branch, a correlation value (r) of 0.682 was obtained with a probability level (0.000) < α0.05, where the speed of hand reaction contributed 46.6%; (2) arm muscle strength has a significant contribution to the gyaku tsuki chudan punch on the Inkanas UNM branch karateka, obtained a correlation value (r) of 0.604 with a probability level of (0.000) < α0.05, where arm muscle strength contributed 36.5%; (3) Hand reaction speed and arm muscle strength together have a significant contribution to the gyaku tsuki chudan punch on the UNM Inkanas branch karateka, obtained a regression value (R) of 0.727 with a probability level of (0.000) < α0.05, where the hand reaction speed and arm muscle strength together contribute 52.9%.

Keywords: Reaction Speed; arm muscle strength; Gyaku Tsuki's punch; Karate

INTRODUCTION

Karate is a sport that is currently starting to be in demand by many people, both children, teenagers, and adults. Practising martial arts from an early age can get many benefits including motor skills becoming stronger, a body fitter and healthier, trained courage, released negative energy, increased discipline and commitment and improved social skills. Today the sport of karate has begun to develop widely, karate groups have

The Contribution of Hand Reaction Speed and Arm Muscle Strength to the Speed of Tsuki Chudan's Gaku Punch on UNM's Inkanas Twig Karateka
Irmayanti, Muh. Said Hasan, Hikmad Hakim
Journal of Sport Education, Coaching, and Health (JOCCA) ‖ 4(1), 2023, pp.044-053

been found in various regions. Both in the city and in the village. Currently, karate has developed into an achievement sport that demands the highest quality so the development and coaching of karate sports in the country must always receive great attention so that its development is wider and can produce new athlete seeds to support the improvement of achievement.

To be able to excel, a karateka must master the techniques in karate and be supported by good physical condition. Every number of karate matches must be supported by excellent physical condition. Success in sports often demands the impeccable skill of physical condition in enhancing the athlete's achievements. The ability of an athlete's achievement is influenced by two factors, namely internal factors and external factors. Internal factors are factors that are determined by the circumstances that exist in him such as interest, desire to achieve, tenacity, perseverance in facing various challenges that may arise, and motivation. Then external factors, namely factors that are outside and determined by environmental conditions such as the physical environment, training ground environment, family environment, and school environment.

The currently thriving karate college at UNM is Inkanas (National Karate-do Institute). Inkanas UNM was founded by Prof. Dr. H. Heri Tahir, SH., MH, karateka Dan III who at that time served as Assistant Director II Postgraduate UNM. The trainers involved in building this college are Senpai Dahlan, S.Pd., M.Pd., and Karateka Dan II who is also a lecturer at FIK UNM. Then the assistant coach named Irfan Yunus, Karateka Dan II, one of the karate athletes who at that time was a student of FIK UNM class of 2010. In the Kapolda Cup karate championship held at GOR Andi Mattalatta in 2012, the UNM Inkanas karateka team won 4 gold and 3 bronze. The four golds were won by the team kata competition number, then the bronze medal was won by the men's kumite number 61 kg, and the women's attack kumite number. Of course, this is something to be proud of for UNM, because of the 58 teams that participated, the UNM team managed to rank sixth in the medal tally.

In the sport of karate, there is a foundation or basic reference which in Japanese is called Kihon. Kihon is the smallest element that forms the basis for forming a technique which is usually a series of several smallest techniques. Nakayama quoted by Abdul Wahid (2007: 50) mentions seven elements that play a very important role in forming the perfect Kihon possible, namely: 1) Correct form, 2) Eye-hand coordination, energy and speed, 3) Proper concentration and relaxation, 4) Muscle strength training, 5) Rhythm and timing in a movement, 6) Contributive and efficient breathing, 7) The role of the hip is as optimal as possible. The essence of the karate technique is decisive motion or kime, which is an attack or deflection that explodes into the maximum target in the shortest time. Kime can be done with hands to hit or parry, and feet to kick or parry.

In every karate match the most commonly used technique is the punching technique. This is because attacks using punches are more likely to get points compared to using other techniques (kicks). The gyaku tsuki chudan punch is the dominant punch by a karate athlete in the committee among other punches such as Oi-Tsuki Chudan, Oi-Tsuki Jodan and Uraken. It takes intensive stages and training processes with a variety of exercises to help master the skills of gyaku tsuki punches well.

From the problems found in the UNM Inkanas Branch which carries out training twice a week, namely on Wednesday and Saturday at the Phinisi Tower of Makassar State University, the average karateka can perform the correct gyaku tsuki chudan punch movements. However, the form of movement in the punch cannot be said to be a perfect form of blow, which is considered still not optimal, including speed and accuracy in hitting the target. This is seen when the karateka does kumite from some of the punches made by

The Contribution of Hand Reaction Speed and Arm Muscle Strength to the Speed of Tsuki Chudan's Gaku Punch on UNM's Inkanas Twig Karateka
Irmayanti, Muh. Said Hasan, Hikmad Hakim
Journal of Sport Education, Coaching, and Health (JOCCA) ‖ 4(1), 2023, pp.044-053

the karateka still show things like; 1) Gyaku tsuki punches are often ushered in (no jerks), 2) Gyaku tsuki punches do not hit the target, 3) Gyaku tsuki punchesnot quickly withdrawn. Therefore, there needs to be a study to find out what factors can still be improved to be able to maximize the speed of the gyaku tsuki chudan punch.

Speed is one of the elements of physical. Hitting in karate must have a good speed because faster strokes are a very decisive factor in getting points. In general, speed contains the notion of a person's ability to perform a motion or series of movements as quickly as possible in response to stimuli. Speed depends on several factors that influence it, namely strength, reaction time and flexibility.

Reactions in karate are not only used for quick actions but also when making punches so that fast actions will produce fast blows to opponents. When performing fast actions, a karateka must have good reaction skills to be able to perform constant speed when making punches so that it can produce good gyaku tsuki chudan punches. The reaction in karate is needed to achieve a very fast action thoroughly, so the reaction will help the speed of the body when hitting to reach the desired punch target.

The strength of the arm muscles is also very influential on the results of the blow. When going to hit, the strength of the arm muscles will provide power that is important for the success of the blow, because great strength will allow someone to have a stronger and faster punch so that it is easy to get points.

METHODS

The method is a simple procedure, while research is a scientific effort made to solve problems in scientific activities, the research method is a procedure for solving problems in scientific activities that are needed to systematically plan to obtain objective and rational data in knowledge development activities. This study used a descriptive method with a correlation type of study. The independent variables in this study are hand reaction speed, and arm muscle strength, while the dependent variable in this study is the speed of gyaku tsuki chudan punches. This research design will be used as a reference in conducting research analysis so that it can determine the results of the research achieved. Therefore, the research design used as follows:
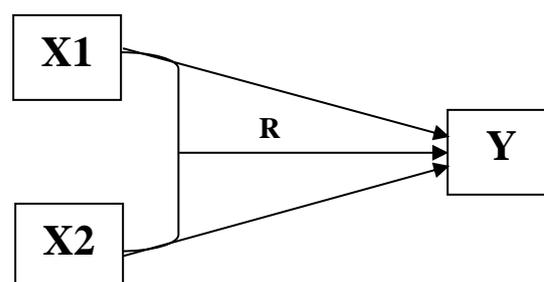
Figure 1.
Research Design

This population is the entire Karate-ka Branch Inkanas UNM which amounts to 164 people. In this study, the target population was the entire karateka of the UNM Inkanas Branch. The sampling technique in this study is a purposive consecutive sampling technique. The criteria in determining this sample are male karateka aged 18-20 years. The sample in this study amounted to 30 sons. The source of data in this study concerns the results of hand reaction speed tests and arm muscle strength tests on the speed of gyaku tsuki chudan punches on UNM Inkanas karatekas. Data collection is carried out using test items that

The Contribution of Hand Reaction Speed and Arm Muscle Strength to the Speed of Tsuki Chudan's Gaku Punch on UNM's Inkanas Twig Karateka
Irmayanti, Muh. Said Hasan, Hikmad Hakim
Journal of Sport Education, Coaching, and Health (JOCCA) ‖ 4(1), 2023, pp.044-053

correspond to the variables involved. For the variables measured to obtain valid and reliable data, the collection is carried out in a systematic and planned manner following the provisions of the measurement technique of the type of test used. Before the implementation of data collection, a data collection committee was formed. This data collection committee is a researcher who knows the measurement techniques of research variables, the data to be collected in this study according to the variables involved, namely hand reaction speed data, arm muscle strength and gyaku tsuki chudan punch speed data.

After all these assessment data were collected, namely hand reaction speed data, arm muscle strength and gyaku tsuki chudan punch speed data on UNM Inkanas karate-ka, to test the hypothesis proposed in this study, the data was compiled, processed and analyzed using descriptive and inferential statistical analysis. Descriptive statistics are intended to get an overview of research data. Inferential statistics to test hypotheses using multiple regression and person correlation *analysis techniques*. Analysis of analytical requirements was also carried out, namely data normality test with Kolmogorov-Smirnov test. The entire series of data analyses used in this study used computer facilities through the SPSS 16 static data processing program with a significant level of 95%.

RESULTS AND DISCUSSION
Descriptive Analysis

Descriptive data analysis is intended to get an overview of research data. Descriptive analysis was conducted on data on hand reaction speed, arm muscle strength and gyaku tsuki chudan punch speed on UNM Inkanas branch karateka. Descriptive analysis includes, total value, mean, standard deviation, range, maximum and minimum. These statistical values, it is expected to give a general idea of the state of the data on hand reaction speed, arm muscle strength and gyaku tsuki punch speed. The results of descriptive analysis of each research variable can be seen in **Table 1**.

Table 1.

Results of descriptive analysis of each variable

	N	Sum	Mean	Stdv.	Range	Min.	Max.
Hand Reaction Speed	30	410	13.67	3.155	10	9	19
Arm Muscle Strength	30	939	31.30	5.676	20	20	40
Gyaku Tsuki's Punch Speed	30	710	23.67	4.505	16	14	30

The results of **Table 1** above which is an overview of hand reaction speed data, arm muscle strength and gyaku tsuki chudan punch speed on UNM Inkanas branch karateka can be stated as follows:

 a. For hand reaction speed data from 30 samples, a total value of 410 cm was obtained and an average of 13.67 cm with a standard deviation of 3,155 from a data range of 10 cm between the minimum value of 9 cm and 19 cm for the maximum value.

 b. For arm muscle strength data from 30 total samples, a total value of 939 times was obtained and an average of 31.30 times with a standard deviation of 5,676 from the data range of 20 times between the minimum value of 20 times and 40 times for the maximum value.

 c. For the gyaku tsuki chudan punch speed data from 30 samples, a total value of 710 times was obtained and an average of 23.67 times with a standard deviation of 4.505 from the data range of 16 times between the minimum value of 14 times and 30 times for the maximum value.

The Contribution of Hand Reaction Speed and Arm Muscle Strength to the Speed of Tsuki Chudan's Gaku Punch on UNM's Inkanas Twig Karateka
Irmayanti, Muh. Said Hasan, Hikmad Hakim
Journal of Sport Education, Coaching, and Health (JOCCA) ‖ 4(1), 2023, pp.044-053

Data normality testing

To determine the distribution of data on hand reaction speed, arm muscle strength and gyaku tsuki chudan punch speed on the Inkanas UNM branch karateka, a data normality test was carried out using the Kolmogorov Smirnov Test (KS-Z). The results of the normality analysis can be seen in the following summary of **Table 2**:

Table 2.

Results of normality analysis

Variable	K-SZ	Probability	α	Information
Hand Reaction Speed	0.750	0.628	0,05	Usual
Arm Muscle Strength	0.729	0.662	0,05	Usual
Gyaku Tsuki's Punch Speed	0.856	0.456	0,05	Usual

Based on table 2 above, shows that the results of normality testing data on hand reaction speed, arm muscle strength and gyaku tsuki chudan punch speed using the Kolmogorov Smirnov Test shows the following results:

a. In testing the normality of hand reaction speed data on the Inkanas UNM twig karateka, a Kolmogorov-Smirnov Test value of 0.750 was obtained with a probability level (P) of 0.628 greater than the value of α0.05. Thus, the hand reaction speed data on the UNM Inkanas branch karateka obtained follows a normal distribution or normal distribution.

b. In testing the normality of arm muscle strength data on the Inkanas UNM twig karateka, a Kolmogorov-Smirnov Test value of 0.729 was obtained with a probability level (P) of 0.662 greater than the value of α0.05. Thus, the arm muscle strength data on the UNM Inkanas branch karateka obtained follow a normal distribution or normal distribution.

c. In testing the normality of the gyaku tsuki punch speed data on the Inkanas UNM twig karateka, a Kolmogorov-Smirnov Test value of 0.856 was obtained with a probability level (P) of 0.456 greater than the value of α0.05. Thus, the gyaku tsuki punch speed data on the UNM Inkanas branch karateka obtained follows a normal distribution or normal distribution.

Hypothesis Test (Inferential Analysis)
The contribution of hand reaction speed to the speed of gyaku tsuki chudan punches on UNM's Inkanas karateka.

The results of the data obtained from the study aim to find out between independent variables and dependent variables and prove existing hypotheses. Therefore, the results of hypothesis testing based on data processing through correlation and regression analysis from the SPSS program on the contribution of arm muscle strength to the speed of gyaku tsuki Geri punches in the UNM Inkanas branch karateka according to the following **Table 3** summary:

Table 3.

Results of correlation and regression analysis for the first hypothesis

Variable	r/R	Rs	F	T	Sig
Hand reaction speed (X1) Gyaku tsuki punch speed (Y)	0.682	0.466	24.412	13.380	0.000

Based on the results of the test analysis, correlation and regression data between the speed of hand reaction to the speed of gyaku tsuki punches on the UNM Inkanas branch karateka. A correlation value of 0.682 was obtained with a probability level (0.000) of <

The Contribution of Hand Reaction Speed and Arm Muscle Strength to the Speed of Tsuki Chudan's Gaku Punch on UNM's Inkanas Twig Karateka
Irmayanti, Muh. Said Hasan, Hikmad Hakim
Journal of Sport Education, Coaching, and Health (JOCCA) ‖ 4(1), 2023, pp.044-053

α:0.05, for a value of R squared (coefficient determination) of 0.466. This translates to 46.6% of the gyaku Tsuki's punch speed explained by the hand's reaction speed. From the ANOVA test or F test, the F count is 24,412 with a significance level of 0.000. Since the probability (0.000) is much smaller than α:0.05, regression models can be used to predict the speed of gyaku tsuki punches on UNM Inkanas branch karateka (applicable to populations where samples are taken). From the t-test obtained 13,380 with a significance level of 0.000. Because the probability (0.000) is much smaller than α:0.05 then Ho is rejected and H1 is accepted or significant regression coefficient, or hand reaction speed has a significant effect on the speed of gyaku tsuki punches on the UNM Inkanas branch karateka. Thus, it can be concluded that there is a significant contribution between the speed of hand reaction to the speed of gyaku tsuki punches on the UNM Inkanas branch karateka, as evidenced by the observation correlation value (ro) 0.682 with the probability level (0.000) < α:0.05.

The contribution of arm muscle strength to the speed of gyaku tsuki chudan punches in UNM's Inkanas karateka.

The results of the data obtained from the study aim to find out between the independent variable and the dependent variable and prove the existing hypothesis. Therefore, the results of hypothesis testing based on data processing through correlation and regression analysis from the SPSS program on the contribution of hand reaction speed, arm muscle strength and gyaku tsuki chudan punch speed on the UNM Inkanas branch karateka were obtained according to the following **Table 4** summary:

Table 4.

Results of correlation and regression analysis for the second hypothesis

Variable	r/R	Rs	F	T	Sig
Hand reaction speed (X1) Gyaku tsuki punch speed (Y)	0.604	0.365	16.089	4.011	0.000

Based on the test results, correlation analysis and regression data between arm muscle strength and gyaku tsuki punch speed on UNM Inkanas branch karateka. A correlation value of 0.604 is obtained with a probability level (0.000) of < α:0.05 for a value of R squared (coefficient determination) of 0.365. This means that 36.5% of the speed of gyaku tsuki punches on UNM's Inkanas twig karateka is explained by arm muscle strength. The ANOVA test or F test, obtained an F count of 16.089 with a significance level of 0.000. Therefore the probability (0.000) is much smaller than 0.05. Therefore, regression models can be used to predict the speed of gyaku tsuki punches on UNM Inkanas branch karateka (applicable to populations where samples are taken). The t-test obtained 4,011 with a significance level of 0.000. Therefore the probability (0.000) is much smaller than α:0.05. So Ho was rejected and H1 was accepted or significant regression coefficient, or arm muscle strength had a significant effect on the speed of gyaku tsuki punches on the UNM Inkanas branch karateka. Thus, it can be concluded that there is a significant contribution between arm muscle strength and gyaku tsuki punch speed in Inkanas UNM branch karateka, proven by the observation correlation value (ro) 0.604 with a probability level (0.000) < α: 0.05.

The contribution of hand reaction speed and arm muscle strength to the speed of gyaku tsuki chudan punches in UNM Inkanas karateka.

The results of the data obtained from the study aim to find out between independent variables and dependent variables and prove existing hypotheses. Therefore, the results of

The Contribution of Hand Reaction Speed and Arm Muscle Strength to the Speed of Tsuki Chudan's Gaku Punch on UNM's Inkanas Twig Karateka
Irmayanti, Muh. Said Hasan, Hikmad Hakim
Journal of Sport Education, Coaching, and Health (JOCCA) ‖ 4(1), 2023, pp.044-053

hypothesis testing based on data processing through regression analysis from the SPSS program on the relationship between hand reaction speed and arm muscle strength to the speed of gyaku tsuki chudan punches in the UNM Inkanas karateka were obtained according to the following **Table 5** summary:

Table 5.

Regression analysis results for the third hypothesis

Variable	r/R	Rs	F	T	Sig
Hand reaction speed (X1) Arm Muscle Strength (X2) Gyaku tsuki punch speed (Y)	0.727	0.529	15.153	3.964	0.000

Based on the results of regression analysis testing and data correlation between hand reaction speed and arm muscle strength to the speed of gyaku tsuki chudan punches in Inkanas UNM karateka, a regression value of 0.727 was obtained with a probability level (0.000) of < α:0.05, for a square R-value (coefficient of determination) of 0.529. This means that 52.9% of the speed of gyaku tsuki chudan punches on UNM Inkanas karateka is explained by hand reaction speed and arm muscle strength. From the ANOVA test or F test, the F count is 15.153 with a significance level of 0.000. Since the probability (0.000) is much smaller than α:0.05, regression models can be used to predict the speed of the gyaku tsuki chudan punch at the UNM Inkanas karateka (applicable to the population in which the sample was taken). The t-test obtained 3,964 with a significance level of 0.000. Therefore the probability (0.000) is much smaller than α:0.05. So Ho was rejected and H1 was accepted or significant regression coefficient or hand reaction speed and arm muscle strength affected the speed of gyaku tsuki chudan punches in UNM Inkanas karateka. Thus, it can be concluded that there is a significant contribution between hand reaction speed and arm muscle strength to the speed of gyaku tsuki chudan punches in Inkanas UNM karateka, proven to be the value of the observation correlation coefficient (Ro) 0.727 with a probability level (0.000) < α:0.05.

Discussion
The contribution of hand reaction speed to the speed of gyaku tsuki chudan punches on UNM's Inkanas karateka.

The results of statistical analysis showed that there was a significant contribution between There was a contribution of hand reaction speed to the speed of gyaku tsuki chudan punches in UNM Inkanas karateka, the rest of the gyaku tsuki punch speed was influenced by other factors not contained in this study. However, the coefficient of determination shows that the speed of hand reaction plays an important role in performing gyaku tsuki punches. The results obtained are associated with existing frameworks and theories. Reactions in karate are not only used for quick actions but also when making punches so that fast actions will produce fast blows to opponents. When performing fast actions, a karateka must have good reaction skills to be able to perform constant speed when making punches so that they can produce fast gyaku tsuki punches. Thus, it can be argued that the reaction in karate is needed to achieve a very fast speed action as a whole so that the reaction will help the speed of the body when hitting to reach the desired punch target. So it can be ascertained that the role of hand reaction speed also determines. So it is reasonable to conclude that the speed of hand reaction contributes significantly to the speed of gyaku tsuki chudan's punches in karate.

The Contribution of Hand Reaction Speed and Arm Muscle Strength to the Speed of Tsuki Chudan's Gaku Punch on UNM's Inkanas Twig Karateka
Irmayanti, Muh. Said Hasan, Hikmad Hakim
Journal of Sport Education, Coaching, and Health (JOCCA) ‖ 4(1), 2023, pp.044-053

The contribution of arm muscle strength to the speed of gyaku tsuki chudan punches in UNM's Inkanas karateka.

The results of statistical analysis showed that there was a significant contribution between arm muscle strength and gyaku tsuki chudan punch speed in UNM Inkanas branch karate-ka, the rest of the gyaku tsuki chudan punch speed was influenced by other factors not contained in this study. However, the coefficient of determination shows that arm muscle strength plays an important role in performing gyaku tsuki chudan punches. The results obtained are associated with existing frameworks and theories. Muscle strength is the ability of a muscle or group of muscles to perform one contraction maximally against resistance or load. Thus, it can be argued that arm muscle strength is one of the physical components that play a role in performing gyaku tsuki chudan punch movements. The main exterior muscles of the arm produce the curved shape of the arm on the inside and outside. When going to hit, the strength of the arm muscles will provide power that is important for the success of the blow, because great strength will allow someone to have a stronger and faster punch so that it is easy to get points.

The contribution of hand reaction speed and arm muscle strength to the speed of gyaku tsuki chudan punches in UNM Inkanas karateka.

The results of statistical analysis showed that there was a significant contribution between hand reaction speed and arm muscle strength to the speed of gyaku tsuki chudan punches in UNM's Inkanas branch karate-ka, the rest of the gyaku tsuki chudan punch speed was influenced by other factors not contained in this study. However, the coefficient of determination shows that the reaction speed of the hand and the strength of the arm muscles play an important role in performing the gyaku tsuki chudan punch. If the results of this research are associated with the underlying theory and frame of mind, then basically this research supports and strengthens existing theories. Gyaku tsuki is a hard punch straight ahead, with maximum use of power to one midpoint towards the front. Tsuki's gyaku punch is very powerful and powerful so it has the potential to knock out the opponent. If we look at the movement pattern of gyaku tsuki punches, which is a fast movement, and the punches launched from strong and stable horses require a combination of hand reaction speed and arm muscle strength, ultimately arriving at the motion of placing the punch on the intended target and pulling it as quickly as possible. Therefore, gyaku tsuki punches need great reaction speed and strength to achieve fast and precise punches on target. Thus, it can be concluded that if the reaction speed of the hand and the strength of the arm muscles are combined harmoniously in performing a fast gyaku tsuki punch movement pattern, it is expected to realize a better level of gyaku tsuki punch speed.

CONCLUSION

Based on the results of data analysis and discussion, the results of this study can be concluded as follows:

1. There is a contribution of 46.6% of the speed of hand reaction to the speed of gyaku tsuki chudan punches in the UNM Inkanas karateka.
2. There is a contribution of 36.5% of arm muscle strength to the speed of gyaku tsuki chudan punches in UNM's Inkanas karateka.
3. There is a contribution of 52.9% of hand reaction speed and arm muscle strength together to the speed of gyaku tsuki chudan punches in UNM Inkanas karateka

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The Contribution of Hand Reaction Speed and Arm Muscle Strength to the Speed of Tsuki Chudan's Gaku Punch on UNM's Inkanas Twig Karateka
Irmayanti, Muh. Said Hasan, Hikmad Hakim
Journal of Sport Education, Coaching, and Health (JOCCA) ‖ 4(1), 2023, pp.044-053

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The Contribution of Hand Reaction Speed and Arm Muscle Strength to the Speed of Tsuki Chudan's Gaku Punch on UNM's Inkanas Twig Karateka
Irmayanti, Muh. Said Hasan, Hikmad Hakim
Journal of Sport Education, Coaching, and Health (JOCCA) ‖ 4(1), 2023, pp.044-053

53