

The Relationship Between Wrist Flexibility and Hand Reaction with Drive Stroke in Table Tennis

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Authors' contribution:

A. Conception and design of the study; **B.** Acquisition of data; **C.** Analysis and interpretation of data; **D.** Manuscript preparation; **E.** Obtaining funding

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ABSTRACT

This study aims to determine the relationship between wrist flexion and hand reaction with drive strokes in tennis games. This research is a type of descriptive research. The population of this study is all students of SMP Negeri 40 Makassar with a research sample of 80 male students selected by random sampling. The data analysis technique used is a correlation and regression analysis technique using the SPSS Version 21.00 system at a significant level of 95% or α 0.05. Starting from the results of data analysis, this study concludes that: There is a significant relationship between wrist flexion and drive stroke in tennis games, it is proven that the value of $r_o = 0.845$ ($P < \alpha$ 0.05); There was a significant relationship between hand reaction and drive stroke in tennis, it was proven that the value of $r_o = 0.865$ ($P < \alpha$ 0.05); There was a relationship between wrist flexion and hand reaction with drive strokes in tennis, proving the value of $R_o = 0.910$ ($P < \alpha$ 0.05).

Keywords : Flexibility; Reaction; Drive Punch; Tenismeja.

INTRODUCTION

Table tennis is a game that is very popular among people ranging from children to adults (Sari & Antoni, 2020). The penchant for playing table tennis is shown by the number of table tennis courts that are deliberately made to play in the yard of the house or the column of the house (Rozy, 2015). Table tennis is a sport that knows neither age nor gender (Santoso, 2015). This means that it can be played by every age group, both men and women (Wibowo, 2015). It can be considered a recreational game, it can also be a sport that has a technique (Suryati et al., 2020) that must be studied and tackled seriously to be trained (Paksi, 2016).

Table tennis is a game that requires fast movements according to the speed of the ball (Aprianto, 2016) so it requires precise movement control, quick reaction, and punch accuracy (Suhendro, 2016). If it can be done, it will appear that the punch movement is efficient (Ruslan, 2017). The movements made in playing table tennis are motor reactions



resulting from the auditory stimulation process (Suwo, 2018), and command nerves through information processing on the nervous system (Asri et al., 2017). The process of movement to hit the ball in anticipation of the opponent's blow begins with hearing the bounce of the ball (Syamsuddin et al., 2018), attention or vision to the ball being hit (Sari, 2017), then a command arises from the spinal nerve to respond in the form of wrist reaction movements (Irawan, 2019) to hit the ball in an attempt to return the ball to the opponent's field (Sahabuddin, 2023b).

Another physical ability that is very important for table tennis players (Syamsuddin et al., 2020) is the ability to hit the punch in an elastic or non-rigid manner (Jusran S Maifa, 2018). So that it can do various variations of strokes such as, serve, forehand, backhand, topspin, backspin, drive, loop, and so on (Sahabuddin, 2023a). The element of flexibility plays a very big role in determining the quality of movement in table tennis (Falupi, 2018). Wrist flexion will give players the ability to hit with the correct technical movements, the right hit, the right direction of the ball, and be ability to hit the ball quickly and hard (Sutari & Syahara, 2019). Wrist flexion plays a role in expanding the space of motion of the wrist joint or arm joint and the muscles of the arm and wrist are more elastic (Sahabuddin et al., 2022). Thus, the movement in hitting the ball in a table tennis game will be more flexible and the movement will not be stiff (Suparman & Hasbillah, 2021). If the movement of hitting the ball is carried out with elastic and flexible movements, it can provide the ability to control movement and coordinate movements precisely (Atmaja & Tomoliyus, 2015) So that the contact of the ball with the bat and the direction of the shot made is following the target.

Table tennis players who have a good hand reaction speed will be able to make various types of strokes with varied spins (Yarmani et al., 2019). In addition, it will be able to direct the ball in difficult positions of the opponent (Setyawan et al., 2018). When the ball is touched with the bat, the movement will be smoother (Sari & Antoni, 2020) and will be able to deflect the direction of the blow suddenly because the ability to move the foot and hand is wider (Irawan, 2019), so that different types of leg direction and arm movements (according to the possible joint motion) to hit the ball can be developed (Dahrial, 2021).

METHODS

The method used in this study is the descriptive method. The research design or research design used in this study is correlational. The population in this study is all students of SMP Negeri 40 Makassar. The sample is a part of the population that is the object of the study. The reason for the use of samples is the limitation of time, manpower and the large number of populations. Thus, the sample used was male students of SMP Negeri 40 Makassar with a total of 80 people. The data collected in this study include wrist flexion measurements, hand reaction tests, and drive stroke tests in tennis games. The collected data needs to be analyzed statistically, descriptively, as well as incorrectly to test research hypotheses.

RESULTS AND DISCUSSION

Result

Descriptive Data

The descriptive analysis of the research data consisting of wrist flexion values and hand reaction with drive strokes in table tennis games can be seen in the summary of the



results of the descriptive analysis listed in the table, while the complete results are in the appendix.

Based on the summary of the results of the descriptive analysis of the data in the table above, it can be described as follows:

- a. For wrist flexion data, from 80 samples, a total value of 3998.00 was obtained. The average value obtained = 49.9750 with a standard deviation result = 9.33887. For the range = 42.00, the number is obtained from the difference between the minimum value = 34.00 and the maximum value = 76.00.
- b. For hand reaction data, from 80 samples, a total value of 4000.00 was obtained. The average value obtained = 50,000 with the standard deviation result = 9.95305. For the range = 39.00, the number is obtained from the difference between the minimum value = 27.00 and the maximum value = 66.00.
- c. For the data of drive strokes in table tennis games from 80 samples, a total score of 4011 was obtained. The average value obtained = 50.1375 with the result of standard deviation = 9.97686. For the range number = 45.00 is obtained from the difference between the minimum value = 28.00 and the maximum value = 73.00.

Analysis requirements test results

Research data to be analyzed statistically must meet the requirements for analysis. For this reason, after the data on leg length, hand reaction and drive stroke in table tennis in this study were collected, before statistical analysis was carried out for hypothesis testing, a requirement test was first carried out, namely normality with the Kolmogorov-Smirnov Test. From the results of the Kolmogorov-Smirnov Test that was carried out, the following results were obtained:

- a. In the normality test of wrist flexion data, the value of K-Sz = 0.731 was obtained with a probability level = 0.659 greater than α 0.05 or at a significant level of 95%. Thus, the wrist flexion data obtained is normally distributed.
- b. In the normality test of hand reaction data, the value of K-Sz = 1.271 was obtained with a probability level = 0.079 greater than α 0.05 or at a significant level of 95%. Thus, the hand reaction data obtained is normally distributed.
- c. In the normality test of drive stroke data in table tennis games, the value of K-Sz = 0.890 was obtained with a probability level = 0.407 greater than α 0.05 or at a significant level of 95%. Thus, the drive stroke data in the table tennis game obtained is normally distributed.

Hypothesis testing

Hypothesis testing was carried out using correlation coefficient analysis (r) at a significant level of 95% or $\alpha = 0.05$. This is intended to determine the relationship between wrist flexion and hand reaction with drive strokes in table tennis games in SMP Negeri 40 Makassar students. The hypotheses that are tested for truth in this study are as follows:

There is a relationship between wrist flexion and drive strokes in table tennis games among students of SMP Negeri 40 Makassar.

Based on the results of the test analysis of the correlation of wrist flexion data with drive strokes in table tennis games in SMP Negeri 40 Makassar students. The correlation value (r_0) = 0.845 with a probability of $(0.000) < \alpha = 0.05$, for the determination coefficient value = 0.714. This means that 71.4% of drive strokes in table tennis are explained by wrist



flexion. While the rest ($100\% - 71.4\% = 28.6\%$) is explained by other causes. So H_0 was rejected and H_1 was accepted. Thus there was a significant relationship between wrist flexion and drive strokes in table tennis games in SMP Negeri 40 Makassar students.

There is a relationship between hand reaction and drive stroke in table tennis games in SMP Negeri 40 Makassar students.

Based on the results of the test analysis of the correlation of hand reaction data with drive strokes in table tennis games in SMP Negeri 40 Makassar students. A correlation value (r_o) = 0.865 was obtained with a probability of $(0.000) < \alpha = 0.05$, for the coefficient value of determination = 0.748. This means that 74.8% of drive strokes in table tennis games are explained by hand reactions. While the rest ($100\% - 74.8\% = 25.2\%$) is explained by other causes. So H_0 was rejected and H_1 was accepted. Thus there was a significant relationship between hand reaction and drive stroke in table tennis games in SMP Negeri 40 Makassar students.

There was a relationship between wrist flexion and hand reaction with drive strokes in table tennis games in SMP Negeri 40 Makassar students.

Based on the results of the regression analysis of wrist flexion data and hand reaction with drive strokes in table tennis games in SMP Negeri 40 Makassar students. The regression value (R_o) = 0.910, for the R Square value (coefficient of determination) = 0.828. This means that 82.8% of drive strokes in table tennis are explained by wrist flexion and hand reaction. While the rest ($100\% - 82.8\% = 17.2\%$) is explained by other causes. From the ANOVA test or F test, the F count was 184,740 with a significance level of 0.000. Since the probability (0.000) is much smaller than 0.05, the regression model can be used to predict drive strokes in table tennis (applicable to the population in which the sample is taken). As for the t-test to test the significance of constants and dependent variables (drive strokes in the game of tennis). The tcal value obtained of 5.083 can be seen in the attachment of the Sig/significance column as 0.000, or the probability is far below $\alpha = 0.05$. So H_0 was rejected and H_1 was accepted or coefficient regression was significant, or wrist flexion and hand reaction had a significant effect on the drive stroke in tennis. Thus there was a significant relationship between wrist flexion and hand reaction with drive strokes in table tennis games in SMP Negeri 40 Makassar students.

Discussion

There was a significant relationship between wrist flexion and drive strokes in table tennis games of SMP Negeri 40 Makassar students. It is evident from the results of the analysis that the observation correlation value = 0.845 ($P < 0.05$). This proves that a table tennis athlete must have wrist flexion. In the game of tennis, the movements of the arms to hit the ball require flexibility. If the flexibility in the wrist is not good, it allows the blows to become stiff or less flexible so that the movements made are slightly hindered by the space for movement. This can cause the blow to be aimless, stuck in the net or out of the playing field. The quality of flexibility in the arm allows the muscles of the arm or a group of muscles in the arm to extend or shorten (contract) in making maximum use of the joint space of motion to hit the ball precisely, directionally, and harder. A person with good flexibility is a person who has a large space of motion in his joints and has elastic muscles. Thus, table tennis players who have good wrist flexibility will certainly have a wide range of movement abilities in the elbow joints (elbow), wrist joints, and joints on the fingers of the hand as well as elastic muscles on the wrist or arm as a whole.



There was a significant relationship between hand reaction and drive strokes in table tennis games in SMP Negeri 40 Makassar students. It is evident from the results of the analysis that the observation correlation value = 0.865 ($P < 0.05$). This proves that in the drive stroke technique in the game of tennis, the physical condition of the hand reaction will play a role. Hand reaction is the ability to make movements with a high response, coming and going from a ball to a blow as a result of hand reaction. Table tennis players who have a good hand reaction speed will be able to make various types of strokes with varying spins. In addition, it will be able to direct the ball in difficult opponent positions. When touching the ball with the bat, the movement will be smoother and will be able to deflect the direction of the stroke suddenly because the ability of the hand is faster, so various types of hand movements (according to the possible joint movement) to hit the ball can be developed.

There was a significant relationship between wrist flexion and hand reaction with drive strokes in table tennis games of SMP Negeri 40 Makassar students. It is evident from the results of the analysis that the observation correlation value = 0.910 ($P < 0.05$). This proves that wrist flexion and hand reaction are supportive factors in performing the drive stroke technique in the game of tennis. In the game of tennis, the movements of the arms to hit the ball require flexibility. If the flexibility in the wrist is not good, it allows the blows to become stiff or less flexible so that the movements made are slightly hindered by the space for movement. This can cause the blow to be aimless, stuck in the net or out of the playing field. The quality of flexibility in the arm allows the muscles of the arm or a group of muscles in the arm to extend or shorten (contract) in making maximum use of the joint space of motion to hit the ball precisely, directionally, and harder. A person with good flexibility is a person who has a large space of motion in his joints and has elastic muscles. Thus, table tennis players who have good wrist flexibility will certainly have a wide range of movement abilities in the elbow joints (elbow), wrist joints, and joints on the fingers of the hand as well as elastic muscles on the wrist or arm as a whole.

Table tennis is a game that requires fast movements according to the speed of the ball so it requires precise movement control, quick reactions, and accuracy of shots. If it can be done, it will appear that the stroke movement is carried out efficiently. The movements made in playing table tennis are motor reactions resulting from the process of auditory stimulation, the command nerve through the information process in the nervous system. The process of movement to hit the ball in anticipation of the opponent's blow begins with hearing the bounce of the ball, attention or vision to the ball being hit, then commands arise from the spinal nerves to respond in the form of wrist reaction movements to hit the ball to return the ball to the opponent's field.

CONCLUSION

After researching the problem of the relationship between wrist flexion and hand reaction with drive strokes in table tennis games in SMP Negeri 40 Makassar students, the following conclusions were drawn:

1. There was a significant relationship between wrist flexion and drive strokes in table tennis games of SMP Negeri 40 Makassar students.
2. There was a significant relationship between hand reaction and drive punch in the table tennis game of SMP Negeri 40 Makassar students.
3. There was a significant relationship between wrist flexion and hand reaction with drive strokes in table tennis games of SMP Negeri 40 Makassar students.

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