

Development of smash accuracy instruments in table tennis

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Article Information:

Submitted: 7 September 2024; Accepted: 30 October 2023; Published: 17 November 2024

ABSTRACT

Problem: The problem in this study is that there is no new smash instrument in table tennis. **Purpose:** The purpose of this research is to develop smash instrument in table tennis. **Methods:** This research method is Research and Development (R&D). The population and sample in this study were 20 PTM Pasir Pengaraian table tennis athletes. The data collection methods in this study included questionnaires and measurement tests. Questionnaires were distributed to material and media experts to assess the feasibility of the table tennis smash test instrument. The tests were conducted to determine the validity and reliability of the smash test instrument. Reliability was assessed by correlating the results of the first smash test with those of the second, while validity was established by correlating the results of the first smash test with the criterion test. The criterion test involved field judges' evaluations using a smash assessment matrix. Data analysis was performed using the product-moment correlation formula. **Results:** The results of the study were obtained from material experts 82% and 85% (appropriate), media experts 88% and 86% (decent). Validity 0.89 and reliability 0.84, indicating valid and reliable based on the Kirkendall category. **Conclusion:** This study successfully developed a new smash test instrument for table tennis, which was deemed appropriate and feasible by experts. The instrument demonstrated high validity (0.89) and reliability (0.84), making it suitable for assessing smash performance.

Keywords: smash test instrument, table tennis, validity, reliability, research and development

 <https://doi.org/10.24036/patriot.v%vi%i.1006>



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Introduction

Sports is a physical activity that can make a person's body physically and spiritually healthy which will eventually form a quality human being. Table tennis is a very fast ball game so to practice and match in table tennis games, we should know the things that table tennis sports have and the factors that determine its success. Sports is one of the movement activities that are always carried out by humans such as walking, running, jumping and throwing (Almanar et al., 2018). The current development of sports in Indonesia is very rapid, moreover the Ministry of Youth and Sports has prepared a method to prepare advanced sports in Indonesia, namely making a grand design of national sports that has been prepared directly by the Minister of Youth and Sports, this big design was made in for a short-term target to prepare Indonesia towards the 2032 Olympics which Indonesia itself is as a candidate to host the Olympics itself which is Ministry of Youth and Sports on March 24, 2021, in addition to that Sports is a need in life that is periodic (Khairi et al., 2022). Sports activities are not only in urban areas, but have been carried out by the wider community. The community is increasingly aware and understands the importance of sports activities, both for recreational, health, and sports purposes that are carried out for the purpose of improving achievement (Anggara, 2021). With exercise, a person can achieve a feat and improve his physical and spiritual fitness. In sports itself, it consists of various sports that are classified from team and individual sports. One of the sports that is widely loved by the community is table tennis or "ping pong".

Table tennis is one of the most popular online game sports (Annisa et al., 2022). Table tennis is a branch of sports that knows no age limits. Table tennis or "ping pong" is a game sport that uses bats as a tool that is played by two people for singles and two pairs of doubles players, both men's, women's doubles and mixed doubles which is carried out on a table as a court which is limited by a net (Andriani & Widodo, 2019). Table tennis sports can be done for recreational purposes as well as for achievement (Paksi, 2016). Table tennis is played on very small courts, the players play short-distance matches during

rallies (Le Mansec et al., 2018). Table tennis is a sport of achievement that is very popular with the community and is often competed in various events, both at the regional, national and international levels. Table tennis is a sport that increases the level of concentration, speed of reaction and coordination, arm and body muscles such as when doing a movement or playing table tennis always coordinates between the muscles of the arms and eyes who must see how quickly the ball is coming and must return quickly to return it. Table tennis also provides many other benefits, namely in good physical, mental and social growth. The complexity of playing requires mental and tactical readiness. A good player in the game of table tennis is a player who understands and can perform the technique of the game of table tennis itself (Suryapranata et al., 2020).

The training process in learning technical skills in table tennis games is of course through observation methods and is studied repeatedly by using examples of table tennis games that have reached the highest level in the match (Yulianto, 2015). With a good training program, it will result in a successful process and effective training quality (Apriyanto & S, 2022). In table tennis, various aspects and techniques are needed so that a match can be won in order to achieve better achievements in the future. How to train basic techniques yourself must be really mastered because, basic techniques are an initial capital for a player to develop talent in the sport he is interested in (Julianena & Abdul, 2018). There are several types of strokes that a player must master in a table tennis game, including: (1) Drive, (2) Block, (3) Chop, (4) Lob, (5) Top Spin (Loop Stroke), (6) Smash, (7) Servis, (8) Push, (9) Flat, (10) Counter Hitting, dan (11) Drop Shot (Sasmita, 2018). In table tennis, there are 4 basic techniques that must be mastered by players so that achievement can be maximized, namely stroke, grip, stance and footwork. Among these techniques are stroke/stroke techniques that have types such as serve, smash, drive, flick, block and chop. The stroke technique is one of the basic techniques in the game of table tennis in addition to other basic techniques that must be mastered by table tennis players (Budiman, 2017). Table tennis is a game that has a lot of variations of strokes (Ewan, 2019). One of the dominant techniques used in playing table tennis is the smash technique.

One of the striking strokes that is often done in the game of Table Tennis is the smash punch. Smash punches in Table Tennis can be used when in practice or in matches. A good smash punch is a punch with very hard movements to anticipate the opponent so that it cannot hold and restore the speed of the ball and requires good coordination in the implementation process (Sariul et al., 2022). Smash punch is one of the mainstay techniques and is an attack in the game of Table Tennis, by making a good and precise smash stroke then the opponent will find it difficult to return the ball (Marziani, 2019). The forehand smash hit is to hit the ball with the ball landing field on the front of the bet and the direction of movement from right and left for the player holding with the right hand and produce a hard, sharp and swooping round of the ball (Ilham et al., 2022). Smash is the fastest shot on table tennis and is almost impossible to return, reaching speeds of around 60 mph to over 100 mph USATT (Ramadhan et al., 2020)

Measuring smash ability in table tennis players can not only be seen from the game played in the match or the game during training, but players must be tested or tested first in order to get an assessment in accordance with the test results in the field of measurement (Indrawan et al., 2020). The domain of table tennis games should be the narrowest game, the speed of the ball in which the pair of players also hit the ball in about 0.50 - 1.75 seconds, the spin, and the direction of the ball should be predicted, and the optimal position of the ball and the posture of the ball for the ball should be taken (Kumar, 2018). The basic technique often used in table tennis games is the block smash technique (Sudrajat et al., 2019). To see from the smash ability of table tennis athletes/players, a new measuring tool is needed so that athletes or coaches can find out the accuracy of table tennis smash.

This condition when the author made observations and interviewed the coach of PTM Pasir Pengaraian that the problem that occurred when athletes competed in smash punches was less efficient and effective and the coach did not have a smash measuring tool used to see the extent of each athlete's chop ability. Therefore, a solution is needed on how to make smash instruments in table tennis. In addition, the formulation of the problem in this study is (1) whether this test instrument is valid, (2) whether this test instrument is reliable.

Method

This research uses the Research and Development (R&D) method. The research and development method is a research method used to produce a specific product and test its effectiveness (Purnama, 2016). The population in this study was 20 athletes from PTM Pasir Pengaraian consisting of 20 men and the sample in this retest test was 20 men, which was carried out for the first smash test and the second smash test. The first test was conducted on March 5, 2023 and the second test was conducted on March 7, 2023. The technique for determining the test sample in this study is to use the saturated sample method.

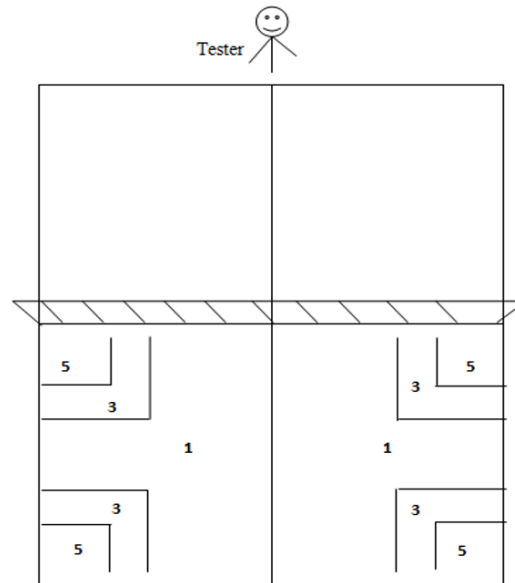


Figure 1. Table tennis smash instrument design

Test Name : Table tennis smash test
 Objective : To measure the smash ability of table tennis
 Equipment : Table tennis table, net, bet, 15-piece ball, chalk, ATK.
 Score size:

1. For a score of 5 with the size of the box from the edge of the back table and the net side, which is 30 cm.
2. For a score of 3 with a box size from the edge of the score line of 5, which is 15 cm.
3. For a score of 1 with the size of the box from the edge of the score line 3, which is 10 cm.

Implementation:

1. Testee stands on the right side of the back desk
2. When the whistle sounds, the feeder gives the ball to the testee as many as 15 pieces in stages
3. Testee did it with a smash punch to the side of the table that had been marked with a score.
4. When you're done with 15 smashes, count your score.
5. The test is done only one repetition (15 strokes)
6. When the ball does not go in/out/concerns the net, then it does not get a score.

Assessment: Calculate the score obtained by the testee when he has finished doing 15 smash strokes.

The data collection technique in this study uses questionnaires and measurement tests. A questionnaire was given to material experts and media experts to validate whether the smash test instrument on table tennis was feasible or not. Meanwhile, the test was carried out to collect data to obtain whether the smash test instrument on table tennis was valid and reliable. To obtain the reliability of the test by correlating the results of the first smash test with the results of the second smash test, and to find the validity of this instrument by correlating the results of the first smash test with the results of the criterion test. The criterion test referred to here is a test using the field Judges assessment using a smash assessment matrix. The data analysis technique in this study uses the product moment correlation formula (Effendi et al., 2018).

Results

1. Expert Validation

In the validation of the first material expert, the percentage obtained was 82% of the maximum score. It can be stated that according to experts of this material, smash instruments in table tennis by content validation get the category of "Feasible. In the validation of the second subject matter expert, the percentage obtained was 85% of the maximum score. It can be stated that according to this material expert, the smash instrument in table tennis by content validation gets the category of "Worthy".

In the validation of the first media expert, the percentage obtained was 88% of the maximum score. It can be stated that according to this media expert, the smash instrument in table tennis by content validation gets the "Feasible" category. In the first validation of media experts, the percentage obtained

was 86% of the maximum score. It can be stated that according to this media expert, the smash instrument in table tennis by content validation gets the "Feasible" category.

2. Validity and Reliability of Smash Instruments

The validation of the test in this study was carried out by correlating the first smash test with the criterion test. Based on the data obtained, the validity of this smash instrument is 0.89. So the smash instrument on table tennis is declared valid based on the interval of Kirkendall's validity coefficient which states that 0.89 is included in the "High" category. The reliability of the test in this study was carried out by correlating the results of the first smash test and the results of the second smash test. Based on the results of the data above, the reliability of this test can be 0.84. So this table tennis smash test instrument is reliable based on the Kirkendall coefficient interval of 0.84 belonging to the "High" category.

3. Norms of Smash Test in Table Tennis

Table 1. Table Tennis Smash Test Norms

Score	Category
≥ 42	Excellent
37-41	Good
33-36	Fair
29-32	Poor
≤ 28	Very Poor

Discussion

Initially, the development of the smash instrument in table tennis was designed and produced as a measure of the smash ability of table tennis athletes. The development process goes through research and development procedures. Through several planning, production and evaluation. This instrument was composed by various parties who supported the development of smash instruments in table tennis, this initial instrument received a lot of advice from coaches, material experts and media experts. After this instrument is validated by experts, retests are carried out to find the reliability of this test and for its validity, namely by correlating the results of the first test with the results of the criterion test.

The validation process of material experts and media experts produces data that can be used as the validity of the content of the smash instrument in table tennis. Meanwhile, the empirical validity is the validity obtained from the first test of the smash with the criterion test. The quality of this "Development of Smash Instruments in Table Tennis Sports" in terms of the validity of the content includes the category "Very Feasible". Coaches and athletes are happy and enthusiastic about the existence of this smash instrument in table tennis and this instrument can be disseminated as a measuring tool in seeing the smash ability in table tennis. The advantages of this product include the need for equipment that is easy to obtain and the weaknesses in this product include the area used in this instrument does not use technology (sensors) on the score line. From these weaknesses, it is hoped that attention and further development efforts will be made to obtain better product results.

Sports are all systematic activities to encourage, foster, and develop physical, spiritual, and mental potential (Ninglan et al., 2020). Table tennis is considered one of the most demanding sports games when viewed in terms of its structural complexity compared to other sports disciplines (Munivrana et al., 2015). As can be seen from watching the table tennis matches of the elite players, they are capable of a very fast rally (Inaba, 2017). One technique in the game of table tennis is a crushing forehand shot (Prabowo et al., 2021). The main purpose of using smash is to attack the opponent's attacks hard and hard and quickly (Podungge et al., 2023). Another supporting element in a smash is the good coordination of all movements. If the power and speed that the player has without good support for movement coordination, it will be difficult to produce high explosive power in making a smash (Winata et al., 2021). The principle of motor performance mechanics is an important component that must be used in planning the training process to be more effective and successful (Alwan, 2016)

Conclusion

The results of the research development of smash instruments in table tennis sports are categorized as valid and reliable as a measure of the chop test in table tennis. This can be seen from the results of the study which has a test validity of 0.89 and a test reliability of 0.84, that the smash instrument in table tennis is valid and reliable. Meanwhile, in the validity of the content, in the first material expert 82% and

the second material expert 85%, this shows that in terms of content according to the material expert, this test instrument is "Feasible". In the first 88% of media experts and 86% of the second media experts, this shows that according to media experts, this test instrument is "Feasible".

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