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The Construction of Leg Muscle Explosive Power Measurement Tools For Volleyball Athletes

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Abstract
This research is designed based on the need of tools to measure the leg muscle explosive power for volleyball athletes suitable to the jump movement in volleyball games. In order to help coaches or volleyball players to determine the explosive power of the basic leg muscle in volleyball players and to be one of the benchmarks for the given training achievements. This research aims to determine the construction procedure of the explosive power of volleyball athletes' leg muscle measurement tools, examine the validity of the power explosive of leg muscle measurement tools construction for the volleyball athletes, calculate the reliability of the leg muscle explosive power for volleyball athlete measurement tools' construction, examine the objectivity of the construction of volleyball athletes' explosive power leg muscle measurement tools. The type of research is development research. The population in this study were volleyball players who live in Banda Aceh, and the sample in this study was 30 athletes. In this study, questionnaire sheet and a leg muscle explosive power test were used as data collection techniques. The data analysis techniques include testing the mean and standard deviation, testing the validity and reliability of the study. The research results obtained are: (1) The results of the validity of the field trial with the analysis of the explosive power of the left leg muscle of 0.872 and the explosive power of the right leg muscle of 0.880. Both have a very good validity value. (2) The results of the small group r-count reliability test are 0.62 ≥0.57 from the r-table while the reliability test in large groups at different times shows consistent results, the r-count value is 0.57 ≥, 0.36 of the r-table. Therefore, it can be said that the measuring instrument is reliable or will produce relatively the same value even though the measurement is performed at different times. 3) The results of the objectivity test show the r-count value of 0.57 ≥, 0.36 from the r-table. It can be said that the research is proven to be objective. As the conclusion, the construction of the instrument for measuring explosive power of the leg muscles of volleyball athletes is valid and reliable, therefore the measuring tool is feasible to use.

Keywords: *power explosive measurement tools, leg muscle, volleyball athlete.*

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I. Background

Nowadays, sports are inseparable with the development of science and technology. Utilizing advances in science and technology greatly facilitates the development and coaching of athletes to get achievements. Many countries continue to develop science and technology in the field of sports in order to continue to compete

with other countries. With the progress of today's era, it is very inappropriate to continue to maintain conventional methods in the athlete coaching process.

To have a high achievement athlete requires excellent and mature preparation. There is no an instant way to achieve it, there must be processes, programmed and structured training. Athlete coaching is a long term process. Creating high achievement athletes cannot be solely relied on experience in the coaching process, appropriate steps are also needed in preparing training programs. Before doing the training, it is suggested that the coach test and measure the athlete's basic ability. This is to determine the increase in the athlete's ability before and after being given a training program.

To find out the extent to which the ability of the physical condition and the ability of an athlete's sports skills, a measuring device for the athlete's ability is needed. Many measuring devices have been created to measure the ability of the physical components of athletes. Sit up test, for example, is used to measure abdominal muscle endurance. Medicine balls, in addition, is used to measure arm muscle power in which the medicine ball is thrown with designated rules during the measurement. Many other measurement tests are also available to measure the physical ability of athletes.

In this modern era, the measurement tools used to measure athlete's capabilities are improving and advancing continuously. It is done to ease the athletes to achieve their peak performances. Most of the existing measurement tests are general in nature and can be used to measure the physical condition of athletes regardless of the particular sport. In measuring the explosive power of the leg muscles, the Vertical Jump test and the Standing Board Jump test are commonly used. These measurement tests have long been used to measure the explosive power of the leg muscles of athletes in various sports. With the applied rules and norms in those tests, the test aims to determine the explosive power of an athlete. However, in the implementation of the measurements, there were several points found by the researchers when the two tests were used to measure the explosive power of the leg muscles of volleyball athletes. In volleyballs, *smash* is one of the ability that the athlete must excel in. The smash technique in volleyball plays a very vital role because the smash aims to get points by dropping the ball in the opponent's field of play. The explosive power of the leg muscles is dominantly used when performing the smash technique in volleyball.

In addition, vertical jump test also has its weakness. For example, when the test is performed, the sample stands beside a measurement board which results in the limited movement of the athlete. Another weakness that the researcher saw when using the measurement board in vertical jump was that when the hand hit the board it was not at the highest point of the jump itself, this was because the fingertips moved slightly to the side to touch the Vertical Jump board.

Measuring the explosive muscle power of volleyball athletes' leg using the standing board jump test will get relatively less optimal results. In standing board jump test, the sample jumps forward as far as possible then the measurement will be conducted on how far the jump is. It is therefore very different compared to the jumping principle in volleyball in which the jump is as high as possible.

Based on this phenomenon, a test tool for measuring leg muscle explosive power for volleyball athletes is required in order to make it easier for a researcher or coach to analyze the jump by utilizing science and technology as well as updating the construction of a leg muscle explosive power measurement test tool that is able to provide flexibility when the athlete is jumping.

Seeing a phenomenon that occurs like this requires a test tool for measuring leg muscle explosive power for volleyball athletes that can make it easier for a researcher or coach to analyze jump results by utilizing science and technology as well as updating the construction of a leg muscle explosive power measurement test tool that is able to provide flexibility athlete jumping. This is needed to get maximum leg muscle explosive power results. It is hoped that it can help in the process of coaching volleyball athletes to get higher achievements.

II. Research Procedure

Based on the explained problem, that is the construction of explosive power leg muscle measurement tools of volleyball athletes, the type of this research is included in the development research. Research designed in a research is defined as a process of research data collection and analysis. Basically the research design is a measuring tool as follows:

1. Planning the product to be constructed
a. Survey and measurement of leg muscle explosive power of volleyball athletes.
b. Studying the measurement tool model for measuring explosive power of volleyball athletes' leg muscle
c. Determine the type, sequence and purpose of the test and determine the appropriate group and strategy.
2. Designing the prototype or initial model
a. Analysis of the objectives and the character of the product.
b. Analysis of the motoric character of the players.

c. Formulating and setting goals to be achieved so that volleyball athletes can utilize these measuring tools as expected.
d. Developing a model of measuring leg muscle explosive power that is suitable for volleyball athletes.
e. Measuring the explosive power of leg muscle of the volleyball athletes using the created measuring tools.
f. Documenting as an input material for evaluation in the further stage of the research.
3. Expert Validation (Expert Test)

Expert validation in the construction of a product must be conducted from the beginning or before the product is tested on a small scale group until the testing of the initial product at the actual scale. The purpose of expert validation is to review the initial product in order to provide input and follow up through improvements for a better product.

An expert is someone who is considered a trusted source of certain techniques or expertise who has the talent to judge and decide things correctly, well, or reliably in accordance with the rules and status by his fellow or audience in a particular field. Experts or validation experts or what are termed validators are expected to provide input or suggestions for improvement of the developed product.

4. Field trials
a. Small group field test. After a limited field trial, revisions are carried out and validation with expert lecturers so that it is suitable for use in a wider field test.
b. A wider field trial or test on a greater group is a field trial involving more subjects. This stage is also tested on the effectiveness and objectivity of the product being constructed. After conducting a wider field test, a revision was made to reduce the level of weakness of the product being constructed.
5. Product revision

Revision is conducted based on the result of the initial validation and result of test or field trials on the volleyball athlete groups. Meanwhile, with the aim of determining the level of success of the product, information collection and objective achievements of this product revision are carried out if there are deficiencies in the repair.

In the trial use, the product manufacturer should always evaluate the product performance. In this case, it is a work system or the continuity of instrument products, product revisions are carried out according to input from competent or experts.

The population in this research is the volleyball players living in Banda Aceh and Aceh Besar. The research population is determined by cluster random sampling technique. Based on Maksum (2012:57), "in cluster random sampling, the sample is chosen not based on its individual by based on the group or area which later refers to cluster such as province, district, sub-district and etc."

Craswell (2009:20) also explained that "cluster random sampling procedure is an ideal sample when the researcher finds it impossible to collect a list of all the elements that make up the population. In clustering procedure, the researcher first defined the clusters and then identified the name of the individuals in each cluster and then sampled the individuals".

According to Sugiyono (2009:118), sample is part of the number and characteristics possessed by the population. Considering that this research is a product trial, the sample is volleyball players living in Banda Aceh and Aceh Besar totaling 30 athletes.

III. Results

The results of validation test on the measurement tools of leg muscle explosive power on the volleyball athletes using Ms. Excel showed that the left leg muscle explosive power of the small group is 0.9355 and the right leg muscle explosive power is 0.8618. the explosive power of left leg muscle of bigger group is 0.8723 and right leg muscle explosive power is 0.8800. Based on the interpretation of validation table, the instrument validity value of the explosive power leg muscle of the athletes is in 'very high' criteria.

The results of the single test showed a very good level of reliability for the test with r_{count} $(0.573) \geq (0.361) r_{table}$, therefore, it can be said that there is a significant correlation in significant level of 0.05. The correlation shows consistent results, therefore the measuring instrument used is considered reliable or will produce the same value even though it is carried out at different times.

IV. Conclusion

Based on the data analysis and research explanation section of the construction of measurement tools on the explosive power of leg muscle for the volleyball athletes, the conclusions are as follows:

1. The measurement tool of explosive power of leg muscle for the volleyball athletes is considered a valid instrument for volleyball players because this instrument only measures one factor.
2. The instrument of explosive power of leg muscle measurement for the volleyball athletes tested on respondents is declared to have a very high validity level.

3. The instrument of explosive power of leg muscle of the volleyball athletes measurement tool tested on respondents is declared to have a high reliability level. The reliability is measured from a significant positive correlation coefficient.
4. The objectivity of the instrument through correlation test showed that the test items of explosive power leg muscle of the volleyball athletes are having a positive correlation because the $r\text{-}_{count} > r\text{-}_{table}$. The utilized instrument of volleyball athletes' leg muscle explosive power measurement tool is objective, precise and sharp in measuring components.

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