

Content Validity and Reliability Test of Balance Training Program for Archery

Moch. Septian Resi Wibowo^{1,*}, Endang Rini Sukamti¹, Yudik Prasetyo¹, Paryadi²,
Muhammad Ramli Buhari², Maftukin Hudah³, Dewangga Yudhistira⁴, Noralisa⁵,
La Ode Adhi Virama⁶

¹Faculty of Sport Science, Universitas Negeri Yogyakarta, Colombo Street No.1, Yogyakarta 55281, Indonesia

²Faculty of Teacher Training and Education, Mulawarman University, Indonesia

³Faculty of Sport Science, Universitas PGRI Semarang, Indonesia

⁴Faculty of Sport Science, Universitas Negeri Semarang, Sekaran, Gunungpati, Kota Semarang, Jawa Tengah 50229, Indonesia

⁵SMP Negeri 4 Tarakan, Kalimantan Utara, Indonesia

⁶Faculty of Tarbiyah and Teacher Training, Islamic State Institute of Kendari,
Sultan Qaimuddin Street No.17, Kendari 93563, Indonesia

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Abstract Background: Archery is a sport in which arrows are shot using a bow. The most important physical aspect of archery is balance. **Purpose:** This research aimed to test the content validity and reliability of the balance training program. **Methods:** The participants involved in this study were 5 physical trainers and 2 nationally licensed archery trainers. Some documents were also used in this research. The approach used was a mixed qualitative and quantitative approach. This research was divided into four stages: (1) analyzing e-books, textbooks, and pertinent articles qualitatively, (2) evaluating the program using the Delphi technique, which involves experts assessing questionnaires on a 1 to 5 scale until a consensus is obtained, (3) testing the content validity using the CVR formula, (4) testing the reliability using Cronbach alpha and ICC. **Results:** The content validity and Cronbach alpha values were found to be $0.754 > 0.6$ and $0.71-1.00$, respectively, based on the findings. In addition, the ICC single measurement value was 0.1191 with a mean measurement value of $0.486 > 0.75$. **Conclusion:** Based on the content validity and reliability test findings, it can be

stated that the balance training program has a good score, indicating that it can be applied during archery athlete training.

Keywords Training Program, Balance, Archery

1. Introduction

Archery is a sport in which arrows are shot using a bow. Other theories suggest that archery is a precision sport, given that the primary purpose is to shoot arrows with a bow on the arrow's surface [1]. Some theories back up this claim, stating that an archery athlete's ability to shoot the target determines whether or not he/she wins a competition [2][3]

Archery is considered a sport that includes movements that involve fine and gross motor skills [4]. The ability to shoot consistently and accurately to the target determines the winner in this sport [2]. Accuracy in archery has to do with body balance. However, the sport of archery, with a

training pattern that uses only one side of the body (unilateral) and maintains a consistent body position with asymmetry, can cause injury or decrease the athlete's performance. In other words, the physical imbalance will disrupt the balance, which will affect the performance of most athletes [5]. As stated in previous research, most archers have an unbalanced body posture [6]. In archery, postural stability is a critical variable that must be managed to get good results [7]. When one hand dynamically pulls the string in archery, the other hand must push the bow with the elbow extended toward the target and hold it statically until the arrow is discharged. In this case, an athlete tries to maintain the maximum possible postural stability by maintaining the posture of the arms and body while drawing the bow and aiming at the target.

Based on a recent study, archery requires good body control and posture stability, therefore balance is a crucial physical feature to have to get the best results [9]. Furthermore, it was also stated that balance is one of the most crucial characteristics of archery [10] [11].

However, there is a gap, particularly in the application of physical training for archery athletes, in which the dominant muscle exposure is not prioritized, which leads to less optimal results. Besides, the balance training plan continues to only emphasize isometric muscle movement or contraction, with little variety in isotonic muscle contraction exercises. Good range of motion exercises are defined as static exercises that require proper strength, upper body strength, and balance skills [12]. Balance training is the foundation of excellent muscle strength therefore when muscle strength is good, your balance will be as well. On the other hand, there is an inaccurate impression that archery does not necessitate strong physical condition and is a minor activity [13]. Archery, however, requires high physical condition and a rigorous physical training program for archery performance to improve. This theory is reinforced by the opinion of Spencer et al. That the component of physical condition is very important for good results for archery [14]. Currently, many exercise methods have been developed to improve core physical stabilization. Advanced core stability training is well-known for its effectiveness in strengthening muscles, increasing flexibility, and improving balance [15] [16] [17].

The suggested solution to the problem is consistent with the theoretical study, which states that physical training in archery emphasizes eye-hand coordination and muscle strength. As a result, before competing, core muscle training is required. The core muscles consist of the spine, abdomen, and pelvis where the muscles that allow the legs and arms to move freely and work functionally [5]. The core muscles provide support, and the body moves independently, activating first as the legs and arms move to

maintain movement, improving the pelvic muscles' ability to balance. Static balance (in a static position) and dynamic balance (in a moving position) are the two types of balance. The dominant balance required in archery is static [18]. Muscle training, on the other hand, has been shown to improve dynamic balance [19]. In other words, archery necessitates both static and dynamic balance to maintain torso alignment [20].

As shown in the explanation, organizing and developing a proper training program is very important [21]. The Effect of Pilates Exercises on the Performance of Basic Archery Skills was a study on this topic that focused on experimental testing [22]. Since the goal of this study is to create a balanced training program for archery, the development process must include content validity and reliability assessments conducted by qualified specialists before the program can be used by athletes. Thus, the purpose of this study is to see how accurate and reliable the material of the training program that has been compiled and developed is.

2. Materials and Methods

This study involved 2 nationally licensed physical conditioning experts and 5 nationally licensed archery trainers with the required documents. The method used was research and development in which this type of method develops, modifies, and validates existing models to provide solutions [23]. This study used a mixed qualitative and quantitative approach [24]. There were four stages carried out in this study. The first step was the stage where researchers reviewed articles, e-books, and textbooks to create a balanced training program for archery athletes. The second step was a quantitative program assessment stage [25][26] with the Delphi technique by seven experts based on the results of a questionnaire with a rating scale of 1 to 5 until consensus was established. The researcher used the Content Validity Ratio (CVR) formula [27] to calculate the results of the expert's assessment to determine the value of the produced program's content validity in the third stage. In the last stage, the researcher used SPSS 23 to perform a reliability test utilizing Cronbach alpha [28] and inter-rater [29].

3. Results

Based on the results of document analysis by 7 experts in textbooks, e-books, and related articles, an archery balance training program was produced with CVR results from 0.71 to 1.00. The results of the program development and analysis are presented as follows:

Table 1. Results of Balance Training Program Development

Week	Meeting	Training Material	Training Dosage
1-6	1-18	<ul style="list-style-type: none"> • Procedures and equipment a) Athletes are guided to jog and do dynamic static stretching b) Indoor/outdoor field equipment, mats, 1-2 kg dumbbells, wobble balance, and training partner 	Coaches guide the training
		<ul style="list-style-type: none"> • Warm-up a) Jogging b) Static and dynamic flexibility 	Warm-up/stretch for 5-10 minutes
		<ul style="list-style-type: none"> • Main Workout 1 a) Triceps down dog b) Forearm plank c) One-arm dumbbell row (right) d) One-arm dumbbell row (left) e) Sit up f) Plank Shoulder Taps g) Cat with arm and leg extension (right hand and left leg) h) Cat with arm and leg extension (left hand and right leg) i) dumbbell side raise 	Repetitions: 8-10-12-15 Set: 2-3-4-5-6 Frequency: 3 times Intensity: low-medium Rhythm: slow-medium Interval: 10 seconds Full recovery: 3-4- 5 minutes
		<ul style="list-style-type: none"> • Main Workout 2 a) Stand on two feet on a wobble board, wiggle it back and forth b) Stand with feet on the wobble board, wiggle right and left c) Stand on two feet on the wobble board, wiggle it around d) Stand on one foot on the wobble board e) Stand with one foot on the wobble board, wiggle it back and forth f) Stand on two feet on a wobble board and hold a bow g) Stand with two feet on the wobble board, draw the bow and hold it 	Working time: 5-10-20 seconds Frequency: 3 times Intensity: low-medium Interval: 5-10 seconds Full recovery: 1-2- 3 minutes
		<ul style="list-style-type: none"> • Cooling down Dynamic static flexibility and evaluation	Cooling down/evaluation for 5-7 minutes

Table 2. The Content Validity Results of the Balance Training Program

No	Indicator	Expert Number							CVR
		1	2	3	4	5	6	7	
1	The intensity applied is following the objectives for balance training	0	1	1	1	1	1	1	0,71
2	The number of repetitions applied is following the aim of improving balance	1	1	1	1	1	1	1	1,00
3	The frequency of exercise applied is following the balance training guidelines	1	1	1	1	1	1	1	1,00
4	The rhythm applied is following the purpose of balance training	1	1	1	1	1	1	0	0,71
5	The number of sets applied is following the purpose of balance training	1	1	1	1	1	1	1	1,00
6	The intervals applied are following the objectives for balance training	1	1	1	0	1	1	1	0,71
7	The recovery applied is following the recovery of the energy system	1	1	1	1	1	1	1	1,00
8	The type of exercise is quite programmed and easy for athletes to do	1	1	1	1	1	1	0	0,71

Based on the analysis using the content validity ratio (CVR) formula, it was revealed that all the values indicate essential or important with values of 0.71-100. Thus, the program that has been arranged can be stated to have good content validity.

Table 3. The Results Analysis of Cronbach Alpha Reliability

N	r-table 5%	Status	Cronbach Alpha
7	0,754	Reliable	0,486

Table 4. The Reliability Analysis Results of the Interclass Correlation Coefficient (ICC)

	Interclass correlation	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	Df1	Df2	sig
Single Measures	0.1191 ^a	0,038	0,513	1,946	7	42	0,086
Average Measures	0.486 ^c	0,340	0,881	1,946	7	42	0,086

Table 3 shows that the data has a value of $0.486 > 0.6$. This result indicates that the seven experts' responses are consistent, implying that the content of the balance training program is reliable.

The analysis using the reliability of the interclass correlation coefficient (ICC) shows that the agreement value of single measures is 0.1191 and the average agreement value is 0.486. The results are consistent with the criteria that state that if the agreement value is more than 0.75, then the data is reliable [29].

4. Discussion

It is stated in the National Sports Law Number 3 of 2005 article 4 that the purpose and function of sport are to improve and maintain fitness, health, and human quality, disciplines, maintain national unity and integrity, instill values, strengthen national defense and increase dignity and honor [30]. Therefore, all aspects to widen sports achievement must be programmed.

Most sports require an adequate physical condition to achieve high performance. The previous study has explained that a good level of physical fitness is needed by athletes regardless of the type of sport [31][30]. Although archery is not a physical sport, it does require a high level of physical fitness. It is the coach's responsibility to establish a physical training program that adheres to the principles of training.

Athletes regard their coaches as superheroes and idols. The coach, on the other hand, has the responsibility of managing the athlete's mental state and developing a good training program. Coaches are sometimes thought of like parents who play an essential role in helping athletes improve their performance [32]. Other studies back this notion, stating that the best way to develop sports and attain the maximum level of accomplishment is to use a structured and graded training program. Balance is one of the most crucial physical characteristics of archery.

Balance is closely related to strength. The stronger the muscles of the upper extremities and core muscles of archery athletes, the better the balance will be. Strength correlates with balance where low functional strength can

affect balance and the quality of body coordination [32]. Hence, good posture balance depends on the level of muscle strength [33]. Therefore, a combination of strength training interspersed with balance training specifically needs to be well arranged to maximize archery performance.

Planning an exercise program is similar to administering medication, with the dose being adjusted to each individual. This is similar to how coaches in sports must know the appropriate level of movement for each athlete. Furthermore, the degree of heterogeneity in training is significant. The athlete will be more excited to execute the exercise if the training program is planned with a good variety of motions. It is important to note the fundamentals of exercise, such as the amount of regularity, individual rules, and the loading principle [34]. The key to physical exercise is the same as the administration of medication whose dosages must be adjusted so that supercompensation can be achieved [34].

It has previously been explained that the physical aspect of balance is needed by archery athletes to shoot arrows on target. The stability of upper extremity strength and excellent core muscles is also influenced by balance. Thus, coaches must plan or arrange an exercise program to enhance the archery athletes' balance. It is necessary to validate the content of the exercise program that has been prepared and see the level of reliability of the exercise program based on the expert assessment before making an exercise program.

The content validity and reliability Cronbach alpha, as well as inter-rater reliability, were employed in this study. The purpose is to determine how accurate measuring equipment or model is at measuring something [35]. All indicators scored in the range of 0.71 to 1.00 based on the results of content validity testing using the Content Validity Ratio (CVR) algorithm. This indicates that the compiled program's content has good validity. These findings are consistent with Yudhistira et al, [25], who claim that a measuring instrument is reliable if at least half of the experts consider the indicator to be essential. It is regarded to be essential or have strong content validity if the CVR score is greater than 0. The Cronbach alpha reliability test yielded a result of $0.486 > 0.6$, indicating

that the program created is reliable. The single measure value is 0.1191 and the average size is 0.486, according to the findings of the dependability of the correlation coefficient between classes. Experts stated that if the value is > 0.75 , then a measuring instrument can be said to have good reliability [30]. The program that was compiled has been proved to be valid. However, 6 weeks of trials with the workout program are required to see the improvements that could be made.

5. Conclusions

As shown in the findings obtained, the balance training program in archery has strong content validity and reliability. Thus, this training program is recommended for archery players at the early-intermediate level. In other words, archery athletes can use the training program to improve their balance. However, it must be empirically validated before coaches may use the compiled program to train balance in early intermediate stage athletes.

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