

The Development of the Kick *Abhorigi Chagi* Instruments of *Kyorugi* Taekwondo Athletes

Ayub Tatya Admaja
 Master Program in Sport Sciences
 Yogyakarta State University
 Yogyakarta, Indonesia
 ayub.tatya2016@student.uny.ac.id

F.X. Sugiyanto
 Faculty of Sport Sciences
 Yogyakarta State University
 Yogyakarta, Indonesia
 fxsugiyanto@uny.ac.id

Abstract—this research stems from the dominance and effectiveness of the kick *Abhorigi Chagi* in the era of the Protector Scoring System (PSS), the most effective kick to the head with a 60.26% chance in every game. The purpose of this research is to create assessment instrument skills of kick *Abhorigi Chagi* in athlete's *kyorugi* of taekwondo. The data will be used as a guideline for the coach to know and determine the best exercise program Judging from the data obtained through research, observation, interviews, literature reviews and discussions with coaches, the research and development of assessment instrument skills kick *Abhorigi Chagi* is important to do. The method used was a research and development method. The first step was to review the expert judgment in order to determine the content validity, the second step to determine the construct validity, the reliability of the test and to determine the norms of reference of assessment, which will then be carried out by using test-retest. Product testing was done two times, namely feasibility tests with the subject of the trials being 10 beginner athletes and 10 professionals' athletes while trials of the effectiveness with the subject of the trial being 35 beginner athletes and 35 professionals athletes of UKM Taekwondo UNY and PUSLATDA DIY. The third step was to determine the interclass correlations coefficient then the required test process assessment instruments kick *abhorigi chagi* consisting of 4 raters. The results of the research is an assessment instrument which have the construct validity ($r = 0.85$). The reliability test beginner class of the stances front right ($r = 0.83$) and the stances front left ($r = 0.95$). Reliability test professional class of the stances front right ($r = 0.82$), and the stances front left ($r = 0.80$). Reliability Interclass Correlation Coefficient the stances front right ($r = 0.614$) and the stances front left ($r = 0.608$) as well as the reference norm ratings. While the results of the development is assessment guidebook-kick *abhorigi chagi* in athletes *kyorugi* of taekwondo. From these data then the test is said to be valid and reliable with high category, and deserved to be used.

Keywords—measurement, assessment, skills, taekwondo.

I. INTRODUCTION

The origins of the Korean martial art of Taekwondo dates back to 1500 years ago. Taekwondo was originally taught for warfare, self-defense, and physical fitness [1, 2]. Taekwondo is a sport that can be used to attack and defend, referring to the meaning of the word “*tae*” which means ‘to attack by using legs’, “*kwon*” that is to hit or attach by using hands, and “*do*” that is discipline or art [3,4]. Taekwondo has two match classes; *kyorugi* (the fight category) and *poomsae* (the art/movement category) [5]. *Kyorugi* is continuously developing in either its technological aspects or rules.

Taekwondo is a martial art with a highly significant development, one of these factors being because “Taekwondo is a martial art of Korean origin, which in recent years has developed into an Olympic combat sport” [6]. In the 2012 London Olympiad, the technology of Protector Scoring System (PSS) was used to automatically display scores on the scoring board when the sensor at the foot protector and body protector or head protector collide to each other in a technically correct way [7]. It obliged coaches to alter playing styles in order to make athletes able to play more effectively and easily to earn points. The results of our observation, supported by the research findings, prove that the kick leading to the head with the highest percentage is the *abhorigi chagi* kick or front leg-axe kick or *ap hurigi*. This is where the kicking foot is swung up across the body high into the air, and then it is brought straight down on to the target with the percentage of 60.26%. The *abhorigi chagi* kick is the most frequently used kick as it has three points [8, 9].

The result of interviews and observations revealed that the coaches did not have a standard assessment instrument in order to assess the *abhorigi chagi* kick skill of the athletes. It caused inadequate data of on the skill. Besides, coaches did not have any parameters or data of the level of *abhorigi chagi* kick skill owned by athletes. Accurate data helped coaches to determine what training program would be suitable. Complaints of some coaches and minimum taekwondo research and references were the reasons why there were no standard assessment instruments of taekwondo.

In 2015, the researchers had conducted research on the model of the *abhorigi chagi* kick skill [10]. The test model was accustomed to the predominant energy system of taekwondo. Based on the research of the taekwondo energy system, the predominant energy system was the *alactic* anaerobic energy system. Taekwondo a sport with high intensity and the system was useful in the healing process between such high intensity [11,12]. The system was also explosive and demanded a very brief time. In ATP, it only took two-three seconds, followed by PC for seven-ten seconds. The theory could be argued to be in accordance with an attack or counter attack during the match. The test model was also accustomed to the basic biomotor components of taekwondo. These were strength, speed, power, endurance, and flexibility as the taekwondo athletes who have top levels of speed, strength, endurance and flexibility, shorter reaction time and accurate techniq [13,14]. The test model was also aimed to train and improve an athletes' durability. Depending

on how coaches designed a correct training program for the athletes, this test would present data in accordance with their ability as long as the tests were done correctly by referring to standard guidance.

The problem arose when researchers couldn't finish their research and development as there were only reaching validity and reliability processes of a test model. If accustomed to principles of designing an instrument, then it should have further developed. A good instrument should have had basic properties, namely having test equipment, being able to do calculation, having an assessment instrument, and being able to be used as evaluation material. However, this research still lacked particularly on the absence of assessment instruments containing assessment indicators and norms because one of the sport assessment functions was to gain information of muscles, speed, balance, skill, flexibility, and VO_2Max level [15].

This development research aims to continue and redevelop the research of test model for the *abhorigi chagi* kick until the final stage, hence meeting the requirements of good test making that is to have a good assessment instrument and have content validity, construct validity, test reliability, inter-rater reliability, assessment norms, and standard guidance in order to know processes and results of an assessment [16]. Based on such observations and problems, an instrument of *abhorigi chagi* kick assessment for *kyorugi* athletes of taekwondo are needed to be made. The research product is a guidance book of *abhorigi chagi* kick skill assessment for *kyorugi* athletes of taekwondo.

Therefore, it is important to perform research and development for the *abhorigi chagi* kick's assessment instruments (ATA test) for *kyorugi* athletes of taekwondo.

II. METHOD

A. Research Design

This research generated a guidance book for the *abhorigi chagi* kick assessment that had validity and reliability, containing: 1) explanation about the *abhorigi chagi* kick, 2) standard guidance, 3) instrument outlines, 4) assessment method description, 5) assessment norm, 6) assessment rubric, and 7) assessment sheets. Furthermore, I applied the research and development method in accordance with the procedures of the sport skill test by Strand and Wilson explained in James R. Morrow's books.

B. Steps of Research

There were ten steps that were: 1) to review the criteria for a good test. In this early stage, we observed, interviewed, and studied some previous research in order to determine correct test criteria for the *abhorigi chagi* kick; 2) to analyze the sport to be tested. In this stage, we had a discussion with taekwondo experts and several coaches in order to determine steps that are needed to conduct the *abhorigi chagi* kick, its indicators, description, and for assessment scores to work; 3) to review literatures. In this stage, we studied some literary works that an instrument of the *abhorigi chagi* kick's assessment should have included basic bio motor components and referred to predominant systems of energy for *kyorugi* athletes of taekwondo; 4) to select test items; and 5) to establish procedures, to determine model tests, design assessment

instruments, determine assessment indicators and description, and to design assessment steps; 6) to do peer reviews. In this research, we worked with the experts in order to determine the content validity that was to determine the test feasibility. We used four expert judgments from two taekwondo experts, biomechanical sport experts, and measurement text experts; 7) to perform a pilot study. After the test feasibility was determined, the test-retest was conducted in two stages. The first stage was the front, right stance and the second one was the front, left stance. In each stage, there were two trials. The feasibility trial assessment, which was performed by involving ten athletes from the beginner class and ten athletes from the achievement class. The effectiveness of the trial assessment was conducted to 35 athletes from the beginner class and 35 athletes from the achievement class. Furthermore, the assessment process involved four taekwondo coaches that assessed the objectiveness of inter-rater agreement; 8) to determine validity, reliability, and objectiveness from the data. We processed the data to determine the construct validity and test reliability by using moment product correlation test and objectiveness of assessment instrument by conducting interclass coefficient correlation reliability tests; 9) to develop norms or standards. Test result data were used to design assessment norms used as the assessment reference or standards; 10) to construct manual tests. In this stage, guidance books for *abhorigi chagi* kick assessments were produced for taekwondo coaches. We expected that they could use this book as one of the references for assessing athletes [16].

C. Research Sample and Population

The research population consisted of all taekwondo athletes and coaches in the Special Region of Yogyakarta. The sample was divided into two since we performed two data sampling that resulted the assessment with the sample of 35 athletes from the beginner class and 35 athletes from the achievement class and process assessment involving four rater classes consisting of four taekwondo coaches.

D. Data Collection Technique

The result of feasibility testing conducted for students joining UKM Taekwondo UNY. The result of effectiveness testing or assessment done to regional athletes of the Special Region of Yogyakarta. This testing was performed to investigate construct validity and reliability of a test and design a reference of assessment norms. Coaches were assessed by using the available assessment instrument. This assessment was a process assessment used to observe inter-rater reliability.

III. FINDINGS

The results of the research is a assessment instrument which have the construct validity ($r = 0.85$). Reliability test beginner class of the stances front right ($r = 0.83$) and the stances front left ($r = 0.95$). Reliability test professional class of the stances front right ($r = 0.82$), and the stances front left ($r = 0.80$). Reliability Interclass Correlation Coefficient the stances front right ($r = 0.614$) and the stances front left ($r = 0.608$) as well as the reference norm ratings.

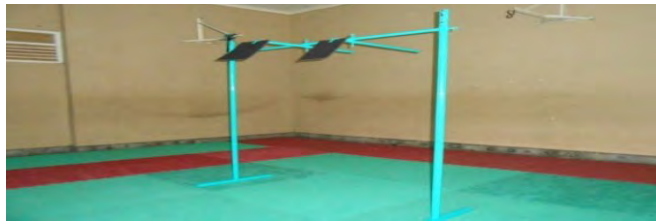


Fig. 1. Skills test media of *aborigi chagi*

TABLE I. RELIABILITY TEST FOR TESTING THE EFFECTIVENESS OF ASSESSMENT RESULT STAGE 1 FRONT, RIGHT STANCES BY THE BEGINNER CLASS

Maximum Score	5,79	5,84	5,84	5,53	6,21	6,4	6,4	6,21
Minimum Score	3,38	3,17	3,44	3,17	3,32	3,01	3,32	3,01
Mean	4,33	4,17	4,42	4,08	4,21	4,10	4,29	4,04
Standard Deviation	0,66	0,63	0,64	0,62	0,97	0,75	0,73	0,67
Moment Product Correlation (r)	Result of front right correlation $r = 0.83$ Result of front right correlation $r = 0.95$							

TABLE II. RELIABILITY TEST FOR TESTING THE EFFECTIVENESS OF ASSESSMENT RESULT STAGE 2 FRONT, RIGHT STANCES BY THE ACHIEVEMENT CLASS

Maximum score	4,52	4,58	4,58	4,5	5,4	4,31	5,4	4,31
Minimum score	3,26	2,99	3,26	2,99	3,17	3,01	3,17	3,01
Mean	3,75	3,67	3,84	3,58	3,87	3,63	3,93	3,57
Standard Deviation	0,34	0,39	0,35	0,34	0,49	0,36	0,48	0,32
Moment Product Correlation (r)	Result of front, right correlation $r = 0.82$ Result of front, left correlation $r = 0.80$							

TABLE III. RESULTS OF INTER-RATER RELIABILITY PROCESS ACESSEMENT FOR TESTING THE EFFECTIVENESS STAGE 1 FRONT, RIGHT STANCES BY THE BEGINNER CLASS

	Intraclass Correlation ^b	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df 1	df 2	Sig
Single Measures	.285 ^a	0,008	0,655	2,591	10	30	0,021
Average Measures	.614 ^c	0,031	0,883	2,591	10	30	0,021

TABLE IV. RESULTS OF INTER-RATER RELIABILITY PROCESS ACESSEMENT FOR TESTING THE EFFECTIVENESS STAGE 2 FRONT, RIGHT STANCES BY THE ACHIEVEMENT CLASS

	Intraclass Correlation ^b	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df 2	Sig
Single Measures	.280 ^a	0,004	0,651	2,554	10	30	0,023
Average Measures	.608 ^c	0,017	0,882	2,554	10	30	0,023

IV. DISCUSSION

The research findings indicated that the *aborigi chagi* kick was performed with 60.26% of the total kicks in the match. The data showed that the *aborigi chagi* kick was the most efficient kick to get the three areas of head point while the athletes were using the Protector Scoring System (PSS). It became one of our rationalizations to create a test of *aborigi chagi* kick skill. Besides, we also conducted field observations, interviews with several coaches, and did literary reviews.

During the research process, we applied some research and development methods of several experts. The research process consisted of processes of expert validation, feasibility testing, effectiveness testing to determine the validity and reliability, and arrangement of norms derived from the data results. The results of data recapitulation indicated the best time recording of front, right stance was 2.99 seconds; while that of front, left stance was 3.01 seconds. We processed the data to classify guidance of assessment norms in accordance with the PAP formula. Furthermore, the research finding showed that an assessment instrument with the construct validity $r = 0.85$ suggested a high validity testing. The reliability test conducted by the beginner class, the front, right stance was $r = 0.83$; while that conducted to the beginner class, the front, left stance was $r = 0.95$. The reliability test conducted by the professional class, the front, right stance was $r = 0.82$; while that conducted to the professional class, the front, left stance was $r = 0.80$. The inter-rater reliability testing of front, right stance was $r = 0.614$; while that front, left stance was $r = 0.608$ and the reference of assessment norms. Based on the series of the research that had been done, we concluded that the research product that was the instrument of *aborigi chagi* kick skill assessment for *kyorugi* athletes of taekwondo could be used by all taekwondo athletes. It was observed from the test results revealing high validity, reliability, and inter-rater agreement.

Meanwhile, the development result was an assessment guidance book of *aborigi chagi* kick for *kyorugi* athletes of taekwondo. Based on the data, this test was proven as valid, reliable with a high category, and feasible.

V. CONCLUSION

The product of the development research was the assessment guidebook of *aborigi chagi* kick for *kyorugi* athletes of taekwondo that had validity and reliability containing explanation of *aborigi chagi* kick, guidelines, instrument outlines, and description of assessment method, assessment norms, assessment rubric, and assessment sheets.

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