C11-artikel -The Contest Validation of Circuit Training Design to Improve Biomotor Components in Table Tennis Performance

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The Contest Validation of Circuit Training Design to Improve Biomotor Components in Table Tennis Performance

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***Abstract*—Power, agility and endurance are the important biomotor components when evaluating performance in table tennis. The objective of the study is to examine the validation of the contents of the circuit training design with linear loading in the pre-competition period to improve power, endurance, and agility in the performance of table tennis. The research method used the qualitative and quantitative mixed methods. The research subject used was documents. The evaluation techniques with experts were used as data collection method. The Lawshe's formula of Content Validity Ratio (CVR) was used for data analysis. The results of the study showed that there was high content validity. The conclusion from the program circuit training design with linear loading in the pre-competition period to improve power, endurance, and agility in table tennis performance is feasible to use.**

***Keywords*—circuit training, endurance, agility, power**

I. INTRODUCTION

Power, agility and endurance are very important components in table tennis performance [1, 2]. Therefore, it is necessary to improve the biomotor components of power, agility and durability with accurate periodization of time of training design. Training periodization is preferred when training power, agility, and endurance rather than not using the training periodization [3, 4, 5, 6, 7]. Training periodization is an important part in the preparation of the design of a physical training program [3, 8, 9, 10, 11] to achieve a peak performance and reduce the risks of injury and overtraining [12, 13, 14, 15, 16]. Training periodization is divided into two stages, pre-competition stage and competition stage [4, 17]. The pre-competition is a stage that focuses on physical power, agility and endurance (15, 17) in table tennis performance. The pre-competition periodization with linear loads is safer for beginners and adult athletes to prevent overtraining than undulatory periodized pre-competition [5, 6, 10, 14].

Circuit training is one of the average progressive linear loading resistance training methods designed to train and improve the biomotor component including power, agility and endurance [17, 18]. Some of the research results with low and high intensity of the circuit training program can increase power, agility and endurance [19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29], but the result of the circuit training program with low and high intensity is not still optimal to improve power, agility and endurance for beginners and adult athletes of table tennis in the pre-competition stage especially in table tennis performance. Hence, the researcher aims to develop a circuit training program of linear loading with average intensity on the pre-competition stage to improve power, agility and endurance in table tennis performance.

Validity is a central issue in the process of the product design development. Validity illustrates the extent to which the design of circuit training program is accurate to improve power, agility and endurance. There are three types of validity which are; content validity, criterion validity, and construct validity [30]. The content validity tests are often used in the early stages of the process of the product design development.

The objective of this study is to examine the validation of the contents of the circuit training design with linear loading in the pre-competition period to increase power, agility and endurance in table tennis performance.

This article will present research methods, results, discussion, and conclusions while focusing on validating the contents of the circuit training design with linear loading to improve biomotor components of table tennis performance.

II. METHOD

The Qualitative and quantitative mixed methods were applied during the research. Documents were used as the research subject. The evaluation techniques with experts were used as the data collection method. Lawshe's formula of Content Validity Ratio (CVR) was used for data analysis.

CVR = (ne–N/2) / (N/2), where CVR is the content validity ratio, ne is the number of panelists who answered "important," N is the total number of panelists.

III. RESULT

Based on the study of journal documents and textbooks, drafts of circuit design with linear loading have been performed on pre-competition periodization of power, agility and endurance in table tennis performance. Then the draft circuit training program is assessed by five CVR experts. The results are shown on table 1.

TABLE I. EXPERT ASSESSMENT RESULTS ON THE LINEAR LOADING OF CIRCUIT TRAINING DESIGN.

No	Factor assessed	Expert					CVR Value
		1	2	3	4	5	
1	The circuit training intensity corresponding with the ability of the beginner athletes	1	1	1	1	1	1.00
2	Training volume corresponding with the ability of the child	1	1	1	1	1	1.00
3	The physical movement of each post corresponding with the power, endurance and speed	1	1	1	1	1	1.00
4	Increasing linear load corresponding with the ability of athlete	1	1	1	1	1	1.00
5	Resting time between circuits corresponding with training objectives	1	1	1	1	1	1.00
6	The number of posts corresponding with the purpose of the exercise	1	1	1	1	1	1.00
7	The time of each post corresponding with the purpose of the exercise	1	1	1	1	1	1.00
8	Time periodization of training is 8 weeks	1	1	1	1	1	1.00

Based on the result in table 1, the CVR has a value of 1.00. The content validation value is high. In other words, the five assessors have a strong similarity in assessing the circuit training design with linear loading on pre-competition periodization to improve power, agility and endurance in table tennis performance. Based on the training programs seen below in table 2.

TABLE II. CIRCUIT TRAINING DESIGN WITH LINEAR LOADING

Week	Meeting	Volume	Circuit Activity (Distance between post 2 meters)	Intensity
1-2	1-6	2 X circuit Rest between circuits 3 minutes	Pos 1 Physical activity: Shuttle run; Time on (s): 30; Time off (s): 15; Circuit: 2 Pos 2 Physical activity: Push up; Time on (s): 30; Time off (s): 15; Circuit: 2 Pos 3 Physical activity: Back up; Time on (s): 30; Time off (s): 15; Circuit: 2 Pos 4 Physical activity: Sit up; Time on (s): 30; Time off (s): 15; Circuit: 2 Pos 5 Physical activity: Lunge; Time on (s): 30; Time off (s): 15; Circuit: 2 Pos 6 Physical activity: plank; Time on (s): 30; Time off (s): 15; Circuit: 2 Pos 7 Physical activity: Slide defense; Time on (s): 30; Time off (s): 15; Circuit: 2 Pos 8 Physical activity: Squat trust; Time on (s): 30; Time off (s): 15; Circuit: 2	Medium
3-4	7-12	3 X circuit Rest between circuits 3 minutes	Pos 1 Physical activity: Shuttle run; Time on (s): 30; Time off (s): 15; Circuit: 2 Pos 2 Physical activity: Push up; Time on (s): 30; Time off (s): 15; Circuit: 2 Pos 3 Physical activity: Back up; Time on (s): 30; Time off (s): 15; Circuit: 2 Pos 4 Physical activity: Sit up; Time on (s): 30; Time off (s): 15; Circuit: 2 Pos 5 Physical activity: Lunge; Time on (s): 30; Time off (s): 15; Circuit: 2 Pos 6 Physical activity: plank; Time on (s): 30; Time off (s): 15; Circuit: 2 Pos 7 Physical activity: Slide defense; Time on (s): 30; Time off (s): 15; Circuit: 2 Pos 8 Physical activity: Squat trust; Time on (s): 30; Time off (s): 15; Circuit: 2	Medium
5-6	13-18	4 X circuit Rest between circuits 3 minutes	Pos 1 Physical activity: Shuttle run; Time on (s): 30; Time off (s): 15; Circuit: 2 Pos 2 Physical activity: Push up; Time on (s): 30; Time off (s): 15; Circuit: 2 Pos 3 Physical activity: Back up; Time on (s): 30; Time off (s): 15; Circuit: 2 Pos 4 Physical activity: Sit up; Time on (s): 30; Time off (s): 15; Circuit: 2 Pos 5 Physical activity: Lunge; Time on (s): 30; Time off (s): 15; Circuit: 2 Pos 6 Physical activity: plank; Time on (s): 30; Time off (s): 15; Circuit: 2 Pos 7 Physical activity: Slide defense; Time on (s): 30; Time off (s): 15; Circuit: 2 Pos 8 Physical activity: Squat trust; Time on (s): 30; Time off (s): 15; Circuit: 2	Medium

IV. DISCUSSION

The validation of content is carried out to ascertain whether the contents of the circuit training program design are appropriate and relevant to the training objectives. The validation of content indicates the full attributes range studied and performed by the expert [9]. The estimation of validity can be obtained completely and systematically in assessing items to determine the extent to which they reflect and do not reflect content domains [31, 32].

The validation of content is important to be used as a first step in product design development. Validation is often found through [7, 33] toward the agreement of assessors and also analyzed quantitatively with the formula of Content Validity Ratio [34, 35].

The results of the quantitative content validity test with Lawshe's formula found that all the items of the five assessors of the circuit training program with linear loading showed the CVR value of 1.00. According to Lawshe [34], the Content Validity Ratio (CVR) through single indicator ranges from -1 to 1. If the CVR value is closer to 1.00, the

value of content validity will be higher. Hence, it can be said that the training with linear loading has an adequate validation or a high validation.

V. CONCLUSION

Based on the research results and discussion, it can be concluded that the components of the training program compilation have shown or already has high validation content. Hence, it can be said that the circuit training design with linear loading in the pre-competition period developed is feasible to be used to improve power, agility and endurance in table tennis performance.

The program of the circuit training design with linear loading on periodization is feasible for power, agility and endurance in table tennis performance. To make it more empirically valid, the circuit training design needs to be field tested to determine the effectiveness of the circuit training design.

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