



THE DEVELOPMENTS OF MOTOR ABILITY EXERCISE MODELS FOR CEREBRAL PALSY FOOTBALL PLAYERS WITH CIRCUIT METHOD

Fadilah Umar¹ⁱ,

James Tangkudung²,

Moch. Asmawi³

¹Sebelas Maret University, Jl. Ir. Sutami No. 36,
Surakarta, Indonesia

^{2,3}State University of Jakarta, Jl. Rawamangun Muka,
Jakarta Timur, Indonesia

Abstract:

This research and development aims to: (1) Produce a product of motor ability exercise models for cerebral palsy football players with circuit method; and (2) Testing the effectiveness of the motor ability exercise models for cerebral palsy football players with circuit method. The design of this study refers to the R&D model (Research & Development) of Borg and Gall. Broadly speaking, the development steps for the purposes of this research are carried out in 4 stages, namely: (1) first stage is preliminary research; (2) the second stage is the model development plan; (3) the third stage is the validation, evaluation and revision of the model; and (4) fourth stage is model implementation. The effectiveness of model was figured out by using motor ability test with t-test formula at significance level $\alpha = 0,05$. The results of this research and development is a motor ability exercise model of cerebral palsy football players with circuit method in the form of motion exercises such as: (a) 32 forms of flexibility training, (b) 8 shapes of strength training, (c) (D) 8 forms of coordination exercises, (e) 8-speeds of exercise form, (f) 8 shapes of power exercises, (g) 8-forms of agility, and (h) 8 shapes of endurance training. Flexibility exercises are designed as forms of exercise during warming ups as well as cooling down, while other forms of component training are designed as forms of practice in every circuit model. Each designed circuit model consists of 7 consecutive exercises consisting of strength, balance, coordination, speed,

Corresponding author: fadilahumarcpsfootball@gmail.com

power, agility, and endurance. The product of circuit training model is named "Umar Motor Ability Circuit-Cerebral Palsy Football abbreviated UMAC-CPF". The UMAC-CPF model consists of 8 circuit models: (1) UMAC-CPF1, (2) UMAC-CPF2, (3) UMAC-CPF3, (4) UMAC-CPF4, (5) UMAC-CPF5, (6) UMAC-CPF6, (7) UMAC-CPF7, and (8) UMAC-CPF8. Based on the effectiveness test results, it is empirically proven that the results of the products in the form of motor ability exercise models for cerebral palsy football players with circuit method (Model UMAC-CPF) have a very good effectiveness.

Keywords: development, model, motor ability, circuit

1. Introduction

An important aspect of sports coaching in Indonesia is the aspect of increasing achievement. Talking about improvement of achievement, so the problem of the guidance and the development of sportsmanship / athlete's becomes the center of attention with all its supporting components which are related to each other. As stated in Act No. 3 of 2005 on the National Sport System article 20 paragraph 3 which stated as *"Achievement sports carried out through the process of development and development in a planned, tiered, and sustainable with the support of science and technology sport."*

The coaching of sports achievements should be systematic, tiered and sustainable. Sports coaching in Indonesia should always be improved along with the application of various developments in science and knowledge in sports. Utilization of the exercise models and the various uses of research results should have been applied by the coach. Along with that, the government always strives to implement sustainable development by taking into account of several very vital sectors.

The training and development of sporting achievements in Indonesia is not only aimed at improving the performance of normal athletes but also concerning "Paralympic athletes" (as athletes with disabilities). Act No. 3 of 2005 article 30 states paragraph 1:

"Training and development of disabled sports is implemented and directed to improve health, self-confidence, and sporting achievements" and paragraph 2 stated: *"Training and development of disabled sports carried out by the organization of Disabled sports concerned through upgrading, training and tiered and sustainable competition at the regional, national and international levels"*, especially in the development of soccer games in cerebral palsy (CP).

CP Football is an excellent team sport, fun and can be played as a recreational activity, as well as a sport of achievement and provides an athlete's chance to play at club, national and international level. Eligible players in a team's playing field consist of seven athletes with cerebral palsy from 5th to 8th grade. Totally, there are fourteen players who can be included in the list of teams. The completed CP Football rules are detailed in the IFCPF Games Rules Manual. The benefits of CP Football are to: 1) Improve the health by participating in routine activities. 2) Participate with other soccer players in team sports with equal abilities. 3) Learning the team skills and individual CP soccer 4) Gain the future opportunities to compete at a high level of sport.

Athletes who are competing in Paralympic sports have the disruption leading to competitive losses in sport. Consequently, a system must be put in place to minimize the impact of disruptions on sport performance and to ensure an athlete's success which is determined by skill, fitness, power, endurance, tactical ability and mental focus. Systems that can provide a structure for a competition are called classifications. The classification will determine who qualifies to compete in Paralympic sports and athletes who are eligible in the sport class according to their limited activity in a particular sport.

Requirements to become a player in CP Football are classified into 4 classes, namely FT5, FT6, FT7 and FT8. The explanations of the classes are as follows: (1) Class FT 5 is an athlete who has hypertonia or spasticity or stiffness in both lower limbs and to some degree in both upper limbs. The players have difficulty in walking, turning and stopping because of limited activity in the lower limb. (2) Class FT 6 is an athlete who is affected by coordination and balance problems in all four limbs and torso. FT6 players usually have difficulty in dribbling the ball when walking, accelerating and stopping. (3) The FT7 class is a hemiplegia player/ athlete, meaning that only one side of their body is affected, it causes the player to walk and run with a limp. In addition to these disorders the athlete may have a balance problem, so often their legs are disrupted when they are used to shoot the ball. (4) The FT8 class is an athlete who meets the minimum requirements for disorder in Football CP. There is no significant impact of the decline when watching athletes run or control the ball. However, unconscious and hesitant muscle contractions before explosive movements are a limitation of activity compared to able-bodied players.

In an effort to approach science and technology to improve the ability of CP Football players, so the researchers will do a research and development about the improvement of motor skills. Motor ability is suspected as a person's ability to master a variety of motor activities including sports. A person's ability to display the various sports numbers that he or she was taught and signify general skills. For CP Football

players, the classification of motor ability deficiency becomes the dominant physical factor in their activities. So, it takes a method and models of exercise that can be used to improve the motor ability.

Based on this background, the problem in this research focuses on "*Development of Motor Ability Exercise Model for Cerebral Palsy Football with Circuit Method*". Through the Ability Motor Exercise Model is perceived to improve motor ability / movement of Cerebral Palsy Football players.

2. Research Methods

The research focuses on development of motor ability exercise model for cerebral palsy football with circuit method, the approach and method used in this research is mixed methods research that combines qualitative and quantitative methods. It is intended to reach or process all data or information to obtain a comprehensive explanation. While research method used in this research is research and development method from Borg and Gall, with consideration of research development stage which is stated clearly.

Development of motor ability exercise model for cerebral palsy football players which are arranged and developed in the form of new models that are packed in circuit training methods. The exercise model consists of 88 models exercises consisting of 32 flexibility training models packed for heating & cooling, and 56 model exercises packed into 8 circuit training models which each of them contains 7 forms of strength, balance, coordination, power, Speed, agility, and endurance.

Broadly speaking, the development steps for the purposes of this research are carried out in 4 stages, namely: (1) first stage is preliminary research; (2) the second stage is the model development plan; (3) the third stage is the validation, evaluation and revision of the model; and (4) fourth stage is model implementation.

3. Research Results

The motor skills training model developed is a model that contains various forms of motor skills that are packed with circuit methods such as flexibility, strength, balance, coordination, power, speed, agility and durability, which can be used to develop the motor skills of a cerebral Palsy football players.

Research and development has resulted a model of motor skills training for cerebral palsy football players in the form of motion exercises such as: (1) 32 forms of flexibility training model (2) 8 forms of strength training model (3) 8 forms of balance training model, (4) 8 forms of coordination exercise (5) 8 forms of feed exercise (6) 8

forms of power training model, (7) 8 forms of agility training model, and (8) 8 forms of endurance training model.

Flexibility training is designed as forms of training during warming up and cooling down. While other forms of component training are designed as forms of training in each model circuit. Each circuit model is designed to consist of 7 exercises in sequence consisting of strength, balance, coordination, speed, power, agility, and endurance. During circuit training, each exercise form of each motor ability component sequentially occupies at each workout post, such as strength training (post-1), balance exercise (post-2), coordination training (post-3), speed training (Post-4), power exercises (post-5), agility drills (post-6), and endurance exercises (heading-7).

The training forms of motor ability components designed in the circuit resulted in 8 models of circuit motor ability exercises for cerebral palsy football and the researchers named "Umar Motor Ability Circuit-Cerebral Palsy Football (UMAC-CPF)" model consisting of UMAC (1) models UMAC-CPF2, (5) UMAC-CPF5, (6) UMAC-CPF6, (7) UMAC-CPF7, and (8) UMAC -CPF8.

Based on expert validation and test results, a motor skills product has been produced for cerebral palsy football players which in general are very feasible to be used in motor skills training process for players of cerebral palsy football. This is based on the discussion of the results of product trial analysis, which includes the exercise program factors (easy to do, varied, suitability and benefits) and the method of implementation (effectiveness and attractiveness). Product development model is also poured in the form of guidebooks that facilitate the trainer in delivering motor skills training program related to circuit method.

Result of effectiveness test using t-test, from the difference motor ability test results developed by researchers according to requirement of cerebral palsy football player between pretest with posttest, it is obtained the value of $t_{\text{value}} = 22,656$ is bigger than the value of $t_{\text{table}} = 2,201$ (at the significant level 0,05), then the null hypothesis is rejected. So it can be concluded that, there is a significant difference between pretest and posttest on the results of motor ability test that have been developed by researchers in accordance with the needs of cerebral palsy football players. In addition, the average value of pretest result is 432.25, it is smaller than the average result of posttest that is 502.33. Thus, it can be stated that the motor ability training model of football players with circuit method (UMAC-CPF) is effectively used to improve the motor ability of cerebral palsy football players.

Based on the results of model effectiveness test, it is empirically proven that the result of the product in the form of model exercise motor ability for cerebral palsy football players with circuit method (UMAC-CPF) has a very good effectiveness. This is

based on motor ability test results that have been developed by researchers which show that the average score of posttest results is greater than the pretest result. So it can be stated that the motor ability model for cerebral palsy football players is effective to be used in improving the motor ability of cerebral palsy football players.

4. Discussion

Based on the results of trials to small groups, trials to large groups and effectiveness test results that have been described previously, it is figured out that the product of Motor Ability Exercise Models for Cerebral Palsy Football Players with Circuit Method (UMAC-CPF) which has been developed in this study is considered as eligible and Feasible product to used and intregtrted in the training program, especially on improving motor ability of cerebral palsy football players. Results of the reserch also shows the differences in motor ability test results after given treatment in the form of application of motor ability exercise models for cerebral palsy football players with circuit method for Indonesia *Pelatnas* CP Football team players of Asean Paragames 2017 in Malaysia. When referring to the average score between before and after treatment then there is an excalation in the average score of motor ability test that is 70.08, it is acquired from the pretest score 432.25 and posttest score 502.33. Enhancement of motor ability cerebral palsy football players can also be seen from the motor ability category as follows.

Tabel 1: Summary of Motor Ability Exercise Models for Cerebral Palsy Football Players with Circuit Method Categories

No.	Hasil Tes	Kategori	Frekuensi	Persentase
1	Pretest	Baik	0	0%
		Cukup	5	41.67%
		Kurang	7	58.33%
2	Posttest	Baik	6	50.00%
		Cukup	6	50.00%
		Kurang	0	0%

Table 1 shows that there are increase in the number of cerebral palsy football players who fall into "good" motor skills category which previously there was no player in this category at all or by 0%, yet it then increases into 6 athletes in this category or by 50%. In addition, in the "fair" motor skills category which previously has 5 cerebral palsy players or 41.67% then it increases into 6 players or by 50%. Besides, in "less" motor ability category, it is also occurred a significant reduction in "less" motor skills category,

it previously has 7 cerebral palsy football players or equal to 58.33%, then after conducting some exercises using motor skills model ability, it is found that there is no one entered in this category or by 0%. The result of motor ability test before and after being treated by using motor ability model of player cerebral palsy football with circuit method (UMAC-CPF) can be seen in the following graph.

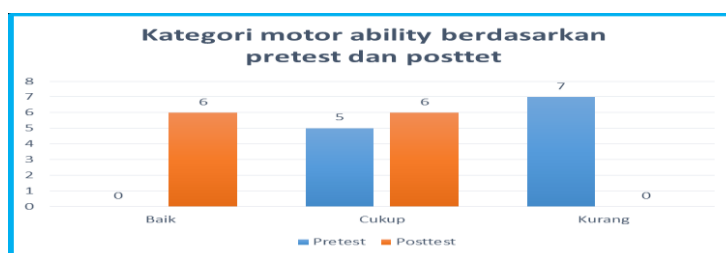


Figure 1: Motor ability test result category

Based on the test results and motor ability test measurements that have been developed by researchers in accordance with the needs of cerebral palsy football players show that the motor ability exercise models for cerebral palsy football players with circuit method helps to improve motor ability which is related to achievement, however there are essentially many factors that affect Exercises include: intensity, frequency, specificity, players condition and motivation in following the training process.

Another advantage of motor ability exercise models for cerebral palsy football players with circuit method compared with the previously developed model can be described as follows.

Table 2: Differences conditions prior to after developed model exercise motor ability cerebral palsy football players with circuit methods

No.	The undeveloped model	The developed motor ability exercise models for cerebral palsy football players with circuit method
1	Cerebral palsy football players are not actively participated in the training process or it is kind of coach centered	Provides the opportunity for cerebral palsy football players to engage directly in various training experiences through the activity of motion and play systematically or oriented to cerebral palsy football players (athlete centered). The briefing of the training experience is also directed to fostering and forming lifelong healthy and active lifestyles and forming a partnership among players.
2	The coach has not been planned, managed and presented the exercise material which accordance with characteristic players.	The content of the exercise is aligned with the growth and development of players. Many activities are characterized by an atmosphere of freedom to express themselves and freely to get to know the environment in practice situations.

No.	The undeveloped model	The developed motor ability exercise models for cerebral palsy football players with circuit method
3	Prioritize the targeted exercise without any other companions impact.	In addition, besides the objectives that are subjected to the exercise, there is also a positive companion impact concerning the development of reasoning and other traits such as discipline, honesty and others.
4	Lack of elements in the process of creativity	Be fun (recreational) and encourage the trainer to be more creative in developing the training process to make the cerebral palsy football player active during the exercise so it is hoped to more effective in achieving the goal of the exercise.
5	The training process are less enjoyable and varied for cerebral palsy players .	Developed models can make cerebral palsy football players active in the exercises, fostering the creativity of thinking of cerebral palsy football players and take place in a pleasant atmosphere. Besides, modifications are also made to the exercise, which includes modification of infrastructure, training objectives and rules in the exercise.
6	There are less media to be used as sources of learning.	The use of media in an integrated way both in print (book) and in the form of training videos to facilitate the coach and cerebral palsy football players in the process of training, so that cerebral palsy football players are more interested and active in training activities.
7	The exercises are less structured and it only tends to one aspect.	The exercises are done in structured, from easy steps to difficult ones and accommodate the affective, cognitive and psychomotor spheres.

Disadvantages of motor ability exercise models for cerebral palsy football players with circuit method (UMAC-CPF) are: (1) models for cerebral palsy football players with circuit method developed by the researchers only presents the form of motor ability activities which is related to physical components. Whereas, in the motor ability there are still many aspects that can be developed such as skill aspects; (2) this model only presents the same form of exercises to all players who have different cerebral palsy disability, whereas there are 4 stages of classification in cerebral palsy football.

5. Conclusion

Based on the results of research and discussion, it can be drawn into some conclusions as follows:

1. Research and development has produced in a motor ability training for cerebral palsy football players related to circuit method in the form of motion exercises such as: (1) 32 forms of flexibility training (2) 8 forms of strength training model (3) 8 forms of balance training model (4) 8 forms of coordination training model, (5) 8 forms of speed training model, (6) 8 forms of power training model, (7) 8 forms of agility training model (FUMAR-CPF Agility), and (8) 8 Form of endurance training model. The training forms of motor ability components designed in the circuit resulted in 8 models of circuit motor ability exercises for cerebral palsy football and the researchers gave the name "Umar Motor Ability Circuit-Cerebral Palsy Football (UMAC-CPF)" model consisting of: Model UMAC-CPF1 , UMAC-CPF2 Model, UMAC-CPF4 Model, UMAC-CPF4 Model, UMAC-CPF5 Model, UMAC-CPF6 Model, UMAC-CPF7 Model, and UMAC-CPF8 Model.
2. Based on the expert validation and test results, the researchers have produced a motor ability product for cerebral palsy football players that turned out to be entirely feasible to use in the process of motor skills training for cerebral palsy football players. This is based on the results discussion of product trial analysis which includes the exercise program factors (easy to do, varied, suitability and benefits) and the method of implementation factors (effectiveness and attractiveness). This product development model is also poured in the form of guidebooks that facilitate the trainer in delivering motor skills training program related to circuit method.
3. Based on the results of the model effectiveness test, it is empirically proven that the results of the product in the form of motor ability model for cerebral palsy football players have a very good effectiveness. This is based on motor ability test results that have been developed by the researchers which show that the average score of posttest results is greater than the pretest result. So it can be stated that the motor ability model for cerebral palsy football players is effective to be used to improve motor ability cerebral palsy football players.

References

1. Berker, Nadire., & Yalcin, Selim. *The Help Guide to Cerebral Palsy*. Istanbul,Turki: Global Help Publication, 2005.
2. Biro Humas, Hukum dan Kepegawaian. *Undang-Undang Republik Indonesia Nomer 3 Tahun 2005 Tentang Sistem Keolahragaan Nasional*. Jakarta: Kemenpora, 2011.
3. Bompa,Tudor O., & Haff, G. Gregory. *Periodization Theory and Methodology of Training*, New York: Kendall/Hunt Publishing Company: 2009.
4. Borg, Walter R. and Gall, Meredith Damien. *Educational Research: An Introduction, Fifth Editional* (New York: Longman Inc,1989).
5. _____. *Educational Research. Fourth Edition* (New York: Longman Inc, 1983).
6. Ferrari, Adriano., Dan Cioni, Giovanni.The *Spastic Forms of Cerebral Palsy: A Guide to Assessment of Adaptive Fuctions*. Milan: Springer, 2010.
7. Gall, Meredith D., Gall Joyce P., & Borg Walter R., *Educational Research*. United States of America: Person Education, Inc., 2007.
8. Gallahue, David L., & Ozmun, John C. *Understanding Motor Development Infans, Children, Adolescents, Adults*. New York: McGraw-Hill Companies, Inc., 2006.
9. Govindasamy, Mohan., dan Abdullah, Nagor Meera. *Melatih Atlet Orang Kurang Upaya "OKU"*. Kuala Lumpur; Utusan Publications & Distributors Sdn Bhd, 2011.
10. Hamzah, Sofyan, dan Candiasa. *Pengembangan Instrumen Penelitian*. Jakarta: Delima Press, 2001.
11. Harsono.*Kepelatihan Olahraga Teori dan Metodologi*. Bandung; PT Remaja Rosdakarya, 2015.
12. International Federation of CP-Football. *Classification Rulebook*. Worcester, South Africa: IFCPF, Januari 2015.
13. International Paralympic Comitee. *Layperson's Guide to Paralympic Classification*. Bonn, German: IPC, 2014.
14. Lakshmikrishnan, R Dan Silvakumar, K. Effect Of Weight Training And Plyiometric Training On Strength Endurance And Leg Strength. *International Journal of Health, Physical Endurance and Computer Science in Sport*. 2013. Vol. 11. No. 1. pp. 152-153.
15. Magill, Richard A. *Motor Learning and Control: Consepts and Applications, Ninth Edition*. New York: McGraw-Hill companies, Inc., 2011.
16. Miller, Freeman. *Physical Therapy of Cerebral Palsy*. New York: Springer Science+Business Media, Inc., 2007.

17. Munawir, Y. dkk. *Pembelajaran Pendidikan Jasmani Adaptif Bagi Peserta Didik SMPLB/MTsLB Tuna Daksa*. Surakarta: UNS Press, 2014.
18. Nagarajan, S. Damodharan, C. Praven, A. *Effeck of aerobic circuit training and parcours Training on Selected Physiological Variables Among college Men Student*, *Jornal International*, 2013. Vol. 11, 1 PP 149-151.
19. Pasurney, Paulus. *Latihan Fisik Olahraga* (terjemahan: *Konditionstraining*, Grosser, Starischka, Zimmermann). Jakarta: KONI Pusat, 2006.
20. Rahyubi, Heri. *Teori-Teori Belajar Dan Aplikasi Pembelajaran Motorik*. Majalengka: Referens & Nusa Media, 2014.
21. Reilly, T. *Training Specificity for Soccer*. *International Journal of Applied Sports Sciences*, Vol. 17, No. 2, 17-25. 2005.
22. Salim, A. Choiri & Yusuf, Munawir. *Pendidikan Anak Berkebutuhan Khusus Secara Inklusif*. Surakarta: Yuma Pustaka & LRC FKIP UNS, 2009.
23. Slaich, Veena. *Cerebral Palsy*. New Delhi: Jaypee Brothers Medical Publishers, 2009.
24. Syarif, Hidayat. *Pelatihan Olahraga Teori dan metodologi*. Yogyakarta: Graha Ilmu, 2014.
25. Sukadiyanto dan Muluk, Dangsina. *Pengantar Teori dan Metodologi: Melatih Fisik*. Bandung: Lubuk Agung, 2011.
26. Tangkudung, James & Puspitorini, Wahyuningtyas. *Kepelatihan Olahraga Pembinaan Prestasi Olahraga*. Jakarta: Cerdas Jaya, 2012.
27. _____. *Paragames Paralympic*, Jakarta: Intermedia Publishing, 2012.
28. Tangkudung James. *Kepelatihan Olahraga“Pembinaan Prestasi Olahraga”*. Jakarta : Cerdas jaya, 2006.
29. Widiastuti, *Tes dan Pengukuran Olahraga*. Jakarta: PT RajaGrafindo Persada, 2015.
30. Winnick, Joseph P., & Short, Francis X. *Brockport Physical Fitness Test Manual: A Health-Related Assessment for Youngsters With Disabilities*. United States: Human Kinetic, 2014.

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