THE EFFECT OF SIX WEEKS CoBAgi TRAINING ON COORDINATION, DYNAMIC BALANCE & AGILITY OF ADOLESCENT HANDBALL PLAYERS

MOHAMAD HASIF BIN MOHAMAD PUZI

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

FACULTY OF SPORTS SCIENCE AND COACHING
SULTAN IDRIS EDUCATION UNIVERSITY
2021

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

THE EFFECT OF SIX WEEKS CoBAgi TRAINING ON COORDINATION, DYNAMIC BALANCE & AGILITY OF ADOLESCENT HANDBALL PLAYERS

MOHAMAD HASIF BIN MOHAMAD PUZI

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

DISSERTATION SUBMITTED IN FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF MASTER OF SCIENCE
(MODE BY RESEARCH)

FACULTY OF SPORTS SCIENCE AND COACHING
SULTAN IDRIS EDUCATION UNIVERSITY
2021

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

UNIVERSITI PENDIDIKAN SULTAN IDRIS
SULTAN IDRIS EDUCATION UNIVERSITY

Sila tanda (√)
Kertas Projek
Sarjana Penyelidikan
Sarjana Penyelidikan dan Kerja Kursus
Doktor Falsafah

INSTITUT PENGAJIAN SISWAZAH

PERAKUAN KEASLIAN PENULISAN

Perakuan ini telah dibuat pada ..16....(hari bulan) Februari ..... (bulan) 20.21....

i. Perakuan pelajar :

Saya, MOHAMAD HASIF BIN MOHAMAD PUZI, M20171000818, FSSKJ (SILA NYATAKAN NAMA PELAJAR, NO. MATRIK DAN FAKULTI) dengan ini mengaku bahawa disertasi/tesis yang bertajuk THE EFFECT OF SIX WEEKS CoBAgi TRAINING ON COORDINATION, DYNAMIC BALANCE & AGILITY OF ADOLESCENT HANDBALL PLAYERS

adalah hasil kerja saya sendiri. Saya tidak memplagiat dan apa-apa penggunaan mana-mana hasil kerja yang mengandungi hak cipta telah dilakukan secara urusan yang wajar dan bagi maksud yang dibenarkan dan apa-apa petikan, ekstrak, rujukan atau pengeluaran semula daripada atau kepada mana-mana hasil kerja yang mengandungi hak cipta telah dinyatakan dengan sejelasnya dan secukupnya

_____

Tandatangan pelajar

ii. Perakuan Penyelia:

Saya, ASSOCIATE PROF. DR. LEE AI CHOO (NAMA PENYELIA) dengan ini mengesahkan bahawa hasil kerja pelajar yang bertajuk THE EFFECT OF SIX WEEKS CoBAgi TRAINING ON COORDINATION, DYNAMIC BALANCE & AGILITY OF ADOLESCENT HANDBALL PLAYERS

(TAJUK) dihasilkan oleh pelajar seperti nama di atas, dan telah diserahkan kepada Institut Pengajian Siswazah bagi memenuhi sebahagian/sepenuhnya syarat untuk memperoleh Ijazah MASTER SCIENCE (SPORTS COACHING) (SLA NYATAKAN NAMA IJAZAH).

_____ _____

Tarikh Tandatangan Penyelia

INSTITUT PENGAJIAN SISWAZAH /
INSTITUTE OF GRADUATE STUDIES

BORANG PENGESAHAN PENYERAHAN TESIS/DISERTASI/LAPORAN KERTAS PROJEK
DECLARATION OF THESIS/DISSERTATION/PROJECT PAPER FORM

Tajuk / *Title*: THE EFFECT OF SIX WEEKS CoBAgi TRAINING ON COORDINATION, DYNAMIC BALANCE & AGILITY OF ADOLESCENT HANDBALL PLAYERS

No. Matrik /*Matric's No.*: M 20171000818

Saya / *I* : MOHAMAD HASIF BIN MOHAMAD PUZI

(Nama pelajar / *Student's Name*)

mengaku membenarkan Tesis/Disertasi/Laporan Kertas Projek (Kedoktoran/Sarjana)* ini disimpan di Universiti Pendidikan Sultan Idris (Perpustakaan Tuanku Bainun) dengan syarat-syarat kegunaan seperti berikut:-
acknowledged that Universiti Pendidikan Sultan Idris (Tuanku Bainun Library) reserves the right as follows:-

1. Tesis/Disertasi/Laporan Kertas Projek ini adalah hak milik UPSI.
   The thesis is the property of Universiti Pendidikan Sultan Idris
2. Perpustakaan Tuanku Bainun dibenarkan membuat salinan untuk tujuan rujukan dan penyelidikan.
   Tuanku Bainun Library has the right to make copies for the purpose of reference and research.
3. Perpustakaan dibenarkan membuat salinan Tesis/Disertasi ini sebagai bahan pertukaran antara Institusi Pengajian Tinggi.
   The Library has the right to make copies of the thesis for academic exchange.
4. Sila tandakan (√) bagi pilihan kategori di bawah */ Please tick (√) for category below:-*

☐	**SULIT/*CONFIDENTIAL***	Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia seperti yang termaktub dalam Akta Rahsia Rasmi 1972. / *Contains confidential information under the Official Secret Act 1972*
☐	**TERHAD/*RESTRICTED***	Mengandungi maklumat terhad yang telah ditentukan oleh organisasi/badan di mana penyelidikan ini dijalankan. / *Contains restircted information as specified by the organization where research was done.*
☑	**TIDAK TERHAD / *OPEN ACCESS***	

(Tandatangan Pelajar/ Signature)

(Tandatangan Penyelia / *Signature of Supervisor*)
& (Nama & Cop Rasmi / *Name & Official Stamp*)

Tarikh: _____

Catatan: Jika Tesis/Disertasi ini **SULIT @ TERHAD**, sila lampirkan surat daripada pihak berkuasa/organisasi berkenaan dengan menyatakan sekali sebab dan tempoh laporan ini perlu dikelaskan sebagai **SULIT** dan **TERHAD**.

Notes: If the thesis is CONFIDENTAL or RESTRICTED, please attach with the letter from the organization with period and reasons for confidentiality or restriction.

ACKNOWLEDGEMENT

I would like to express my gratefulness to the Almighty for his blessing and gift, the research entitled The Effect of Six Weeks CoBAgi Training on Coordination, Dynamic Balance & Agility of Adolescent Handball Players has been successfully conducted. This research would not be completed without supports and strong assistance from all parties.

A million of thanks given to my respectful supervisor, Assoc. Prof. Dr. Lee Ai Choo who is responsible to lead, guide, motivate and advices me for all related works throughout the process to complete this research. Her willingness and sincerity for accepting me as her student plus with her persistent effort in delivering knowledge to me is the main key in completing this research successfully.

I also would like to reward my very special thanks to the school principal, school principal assistants, physical education teachers and handball coaches of Sekolah Menengah Kebangsaan Lahat which giving me the permission and opportunity to conduct this study. Thanks also to all the adolescent handball players of Sekolah Menengah Kebangsaan Lahat who involved in conducting this study.

Not to forget to all my colleagues especially, Miss Azira Iqlima Razali, Mr Mohamed Syafik Bin Mohamed Salleh, Miss Pavithra Gangaraju and others who are very helpful in helping me during the course of the research process. Besides that, a deepest appreciation to my lovely parents and family and other individuals who helped me directly or indirectly during this period. I pray to ALLAH for all the kindness being rewarded with a goodness for their entire life.

Wassalam.

ABSTRACT

The purpose of this study was to investigate the effectiveness of six weeks CoBAgi Training on coordination, dynamic balance and agility of adolescent handball players in order to improve performance. Quasi-experimental design with pretest and posttest evaluation was used for this study. A total of 30 adolescent handball players from SMK Lahat were chosen as participants using purposive sampling methods. The participants were assigned randomly into two groups consists of control group (CG: N=15) and experimental group (EG: N=15). The EG undergone CoBAgi Training three times per week for six weeks while the CG continue with their normal standard training program. Carioca Test was used to measure coordination, Star Excursion Balance Test (SEBT) was used to measure dynamic balance and L-Run Test was used to measure agility. Pretest and posttest of SEBT Test score, Carioca Test score and L-Run Test score were recorded for both EG and CG. The data were analyzed using Independent Samples t-test with $p<0.05$. The study findings indicated a significant difference between EG and CG for coordination ($t=-2.290$, $P=0.030^*$), dynamic balance ($t= 4.802$, $P=0.000^*$) and agility ($t=-3.202$, $P = 0.003^*$) after six weeks CoBAgi Training. This study revealed that the six weeks CoBAgi Training could improve coordination, dynamic balance and agility of adolescent handball players, thus, it could be suggested to include in handball training regime to improve performance parameters.

KESAN LATIHAN CoBAgi TERHADAP KOORDINASI, KESEIMBANGAN DINAMIK & KETANGKASAN DALAM KALANGAN PEMAIN BOLA BALING REMAJA

ABSTRAK

Kajian ini bertujuan untuk mengkaji keberkesanan Latihan CoBAgi selama enam minggu terhadap koordinasi, keseimbangan dinamik dan ketangkasan dalam kalangan pemain bola baling remaja bertujuan meningkatkan prestasi permainan. Kaedah kuasi-eksperimen dengan penilaian melalui ujian pra dan ujian pasca digunakan untuk kajian ini. Seramai 30 pemain bola baling remaja dari SMK Lahat telah dipilih sebagai peserta kajian dengan menggunakan teknik persampelan bertujuan. Peserta telah dibahagikan secara rawak kepada dua kumpulan yang terdiri daripada kumpulan kawalan (CG: N = 15) dan kumpulan eksperimen (EG: N = 15). EG menjalani latihan CoBAgi tiga kali seminggu selama enam minggu sementara CG meneruskan program latihan mereka seperti biasa. Ujian *Carioca* digunakan untuk mengukur koordinasi, ujian *Star Excursion Balance Test* (SEBT) digunakan untuk mengukur keseimbangan dinamik dan ujian *L-Run* digunakan untuk mengukur ketangkasan. Skor ujian pra dan ujian pasca untuk ujian SEBT, ujian *Carioca* dan ujian *L-Run* dicatatkan bagi kedua-dua kumpulan EG dan CG. Analisis data dibuat menggunakan ujian-t sampel tidak bersandar dengan tetapan $p < 0.05$. Hasil kajian menunjukkan terdapat perbezaan yang signifikan di antara EG dan CG untuk koordinasi ($t = -2.290$, $P = 0.030$ *), keseimbangan dinamik ($t = 4.802$, $P = 0.000$ *) dan ketangkasan ($t = -3.202$, $P = 0.003$ *) setelah enam minggu menjalani Latihan CoBAgi. Kajian menunjukkan bahawa Latihan CoBAgi selama enam minggu dapat meningkatkan koordinasi, keseimbangan dinamik dan ketangkasan pemain bola baling remaja, oleh itu, latihan ini boleh disarankan untuk diguna sebagai rejim latihan bola baling bagi membantu meningkatkan parameter prestasi pemain.

TABLE OF CONTENT

CHAPTER 2

LITERATURE REVIEW

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

CoBAgi	-	Coordination, Dynamic Balance, Agility
SEBT	-	Star Excursion Balance Test
EG	-	Experimental Group
CG	-	Control Group
COG	-	Center of Gravity
ACL	-	Anterior Cruciate Ligament
OA	-	Osteoarthritis

LIST OF APPENDICES

CHAPTER 1

INTRODUCTION

1.1. Background of the Study

Sport is a part of practicing lifestyle where performances are an important element for athletes and is largely depending upon their physical fitness (Prabhu & Swamy, 2013). Weak in fitness levels will reduce the player's performance because according to Fujii et. al. (2015), the outcome of a game in a competitive sport is determined by the athlete's relationship with the unpredictable and uncontrolled opponent. That is why it is necessary to strengthen the performance parameters so that the player's physical fitness will be well prepared. A good training method is crucial to develop the athlete performance. In this study, the researcher develops a new approach that may be used to enhance the performance of adolescent handball players for the targeted parameters i.e. coordination, dynamic balance, and agility. In achieving this purpose, coordination,

dynamic balance, and agility (CoBAgi) training is designed and used. This training is an integrative method designed with specificity and complexity based on the sports elements.

Handball needs highly skilled players because, it is one of the fastest team sports where players need to have an excellent level of physical fitness (Karcher & Buchheit, 2014). Dynamic balance, coordination, and agility are three fundamental physical fitness that has high influence in this game. Also, since the changes and amendments in handball rules made in 1999, the focus specifically limiting the duration of the attack (the passive play) where players need to have quick passes, sudden and frequent changes in the direction (Bojić & Pavlović, 2015). This change increased the intensity of the sport where demand excellent physical fitness. Because of this, the players need to be jumper, thrower, sprinter all in one, and able to execute the skills with precision and speed (Karadenizli et. al., 2014). Thus, the training improvement should help to improve motor ability, sprinting, jumping, flexibility, and throwing velocity and need great joint accelerations from jump landings and cutting maneuvers, and so, this help the players to perform.

Handball is an Olympic modality characterized by complex movement i.e. repeated jumps, sprints, changes in direction, body contact at high speed, and specific technical movement patterns. This game possesses special physical requirements such as power, speed, agility, endurance, balance, flexibility, accuracy, and coordination (Badr, 2013) wherein different study mentioned coordination, agility, explosive strength, stamina, as well as technical and tactical readiness of players are the utmost vital motor abilities in this sport (Bojić & Pavlović, 2015). Both studies highlight the

required fitness elements for handball. Besides, players expose to high collision, and report from Brazilian championships identified 312 injuries were in 201 athletes, with ankle and knee being the most affected regions (Oliano et. al. 2017). However, this effect could be reduced when dynamic balance, coordination, and agility being improved, hence the performance also being improved.

To improve dynamic balance, coordination, and agility, a holistic training approach is needed, then only performance could be enhanced. Dynamic balance needs for body stability in a dynamic situation while coordination is vital in complex motor exercise. Besides, agility is needed for a good reaction towards obstacles or challenges. These three elements contribute to the smoothness and success of handball skills performance. Therefore, there is a need to perform specific training to enhanced the fitness level of those parameters. Based on numerous studies, neuromuscular training is the most of the selective training method to be used (Steib et. al. 2016; Mulcahy & Crowther, 2013; Zech et. al. 2010; Paterno, 2004; Holm et. al. 2004; Harris and Dudley, 2000). This training helps to improve proprioceptor performance, thus, the neuromuscular system able to generate musculoskeletal movement patterns that suitable for the situation. Proprioceptors will memorize the trained situation and this how the handball players could improve.

As quoted by Baker et. al. (2003), sport settings require mastery of a wide range of skills from very general to very specific elements, and developmental issues should be attended in the sense of the specific nature of the play and practice activities. This highlights how crucial the training especially in adolescence. According to Brown et. al. (2017), the growth of muscle mass occurs in the adolescence period in both males

and females, associated with a direct increase in muscle strength. Rapid changes in physical growth and motor skills, as well as the emergence of special skills and talents, occur during early adolescence (10-13 years old) while in the mid-adolescence (14-16 years old) period, gross motor skills continuously hone as they experience sustained increases in muscle mass, strength, and cardiopulmonary endurance and indeed, agility skills, motor coordination, power, and speed continue to improve as well (Brown et. al. 2017).

These indicate the significant advantage of training that focuses on handball skills development among adolescents. Numerous studies highlighted the need for implementation of a specific training program which mimics the requirements of the game skills that help to improve players's abilities in dynamic balance, coordination, and agility (Florin & Adrian, 2017; Olena et. al. 2017; Sitti et. al. 2015; Gabbett & Abernathy, 2013; Tsetseli et. al. 2010). Specific training makes the body adapt to the intensity and the circumstances in which it can stimulate a better response. Besides, the present study reported the need for reinforcement to design high intensity, short-duration, and short-time recovery exercises e.g. repeated sprints, jumps, pulling/drift actions, and contacts thru both conditioning and mixed (tactical and physical-based) training sessions (Póvoas et. al. 2014). Based on this suggestion, CoBAgi Training is designed to be integrative and specific to the nature of the movement in handball specifically to improve performance of dynamic balance, coordination, and agility which indirectly will influence the performance of the handball players. However, how is the effect is still unknown. Thus, this study was intended to explore the training effects specifically on dynamic balance, coordination, and agility on adolescent

handball players. If it could bring positive impacts, the training could be suggested to be part of the training regime among adolescent handball players.

1.2. Problem Statement

Weakness in physical fitness lead to a poor performance especially in high-intensity sports such as handball. As previously stated, neuromuscular training is a widely used training option in improving coordination, dynamic balance, and agility (Taylor, 2011; Zech et. al., 2010). with the main purpose to increase the performance abilities. This training is a multicomponent program based on combination of balance training, plyometric training, and resistance training. Part of the advantages are improvement in vertical jump height, power output, agility, speed, and strength (Mulcahy & Crowther, 2013). Achievment in peformance coulb be influenced by weak coordination, harmful joint loading, fatigue, and weak reaction time as the result of weak dynamic balance. The ability to balance the body specifically in a dynamic situation will help the players to coordinate their skills performance properly. Coordination needs an integration framework of multiple actions in a time such as throwing the ball while jumping or jumping from one place to another place. Thus if dynamic balance is weak, the disturbance in information processing will occur that disturb the coordination and perform poor agility.

The next fact is regarding the relationship between dynamic balance and joint loading. The contraction of muscle during loading will be at a high amplitude where it requires coordination of power and strength. Both components will help to reduce the

impact by limiting the excess movement of the involved joint. Since it is in motion, dynamic balance is required i.e. weakness on it allowing excessive body sway in which, during this time, the muscles failed to coordinate efficiently and suddenly triggered to work excessively on shock environment. This situation lead will flaw the performance. Furthermore, if there is the occurrence of neuromuscular fatigue or brain becoming fatigued, the nervous system will be working at a slow pace which directly slowing down the information delivering (Taylor, 2011) and as the consequences, when players facing a situation which need to be aggressive, the task accomplishment will be poor and vulnerable.

Other than that, agility and reaction time also required an excellent dynamic balance. Reaction time defined as the speed at which a person moves in response to a stimulus (Chaabene et. al. 2012). The skills articulation will be fast manner since it is the nature of the high-intensity game, that should happen within millisecond i.e. the fastest is the best. Good reaction time also will have enhanced the ability in agility performance. However, a player who possesses good reaction time with a weak dynamic balance has a difficulty to perform well especially for sport with explosiveness. When players react to stimulus, the unpredictable challenges e.g. direct blow, landing on uneven space, or hit by sports equipment will make them lost their body balance. Even though they react accordingly, but by weak information on proprioception, balance will be disturbed and affected the landing capabilities, as well as coordination abilities, lead to a perverse effect on performance.

A development of good sport components should start during the early age stage of training exposure. Myer et. al. (2011) stated that it is necessary to develop age-

appropriate guidelines to begin a well-planned integrative training activity since the active participation of children and adolescents in sports and recreational activities either in schools, fitness centers, and private clubs. The guidelines are therefore to increase neuromuscular function, muscle strength, and specific ability to activities such as sports. It shows how active the involvement of the adolescence in sporting activities. Thus, the main purpose of that is to inculcate and reinforce the performance progressively as preparation for the maturity in physical development and sports performance since some of them might be the future national players someday.

In addition, at these periods adolescents begin to develop abstract thinking, analytic abilities, problem-solving skills, and transitional skills and in future progress, they will able to determine what needs to change, develop action plans, formulate and implement new approaches, and begin the process again (Brown et. al. 2017). Thus, it is a good time for adaptation to occur. For that, the solid strategy and guideline will help to develop the performance-based since adolescence in which focused on the core foundation. In this study, the researcher has identified that dynamic balance, coordination, and agility are the core foundation that integrates the excellent performance of sporting gesture and therefore the manipulative specific-like training is anticipating to enhance the performance. Hrysomallis (2007) clarify that balance training is a single intervention and not as effective as when it is part of a multifaceted intervention. It is believes that neuromuscular training is the best method to develop balance and also hike up the players' performance especially in terms of coordination and agility.

Perturbation training is one of the best manipulation methods in training balance and coordination. Since the nature of the handball game is vigorous, adolescence players needs a good the dynamic balance ability. Fitzgerald et. al. (2002) reported that perturbation training activities are to expose people with activities that challenge knee stability and balance in a controlled manner and it is a strategy that may allow them to develop motor skills adequately to protect the knee from potentially harmful loads during functional activities and as such, the performance will be better. Fitzgerald et. al. (2002) reported that the use of perturbation techniques is among the community with knee ligament injuries may return those individuals to higher levels of physical activity without recurrent episodes of knee instability. A result of perturbation-based training identified a greater reduction in the frequency of multi-step reactions and foot collisions in older adults (Mansfield et. al., 2010). Hence, it would be effective among a healthy community, especially at the adolescent age to enhance their performance.

Based on the facts above, since perturbation training indicates an improvement in the injured community (Mansfield et. al. 2010; Fitzgerald et. al. 2002), the researcher believes that it would be useful in the athletic community especially at the development stages. There are little published studies that demonstrate perturbation effect among healthy, athletic population (Paterno et. al., 2004) especially during adolescence stage. This situation remarks the needs to explore the effect of mix training method by incorporating perturbation elements. For that, perturbation training translated into combination with neuromuscular training and sport specific movement called CoBAgi Training intentionally to develop dynamic balance, coordination and agility performance among adolescence handball players. Thus, this study aimed to investigate

the effect of CoBAgi training among SMK Lahat adolescent handball players for performance improvement.

1.3. RESEARCH OBJECTIVE

Generally, the objective of this research is to develop and to investigate a complex training program that been anticipated could help in improving coordination, enhancing dynamic balance, and increase agility as well as encourage the performance of SMK Lahat adolescent Handball players. A combination of coordination, dynamic balance, and agility (CoBAgi) training will be tested. Therefore, the researcher presumes the effectiveness of CoBAgi Training will help to improve and enhance the performance. The specific objective of this investigation are listed below:

i) To determine the effectiveness of six weeks CoBAgi Training program on coordination among SMK Lahat Adolescence Handball players in improving performance.

ii) To determine the effectiveness of six weeks CoBAgi Training program on dynamic balance among SMK Lahat Adolescence Handball players in improving performance.

iii) To determine the effectiveness of six weeks CoBAgi Training program on agility among SMK Lahat Adolescence Handball players in improving performance.

1.4. RESEARCH HYPOTHESIS

The researcher has formulated the hypothesis for this study which briefs the expected result and correlation between intervention and research aspects of the research. The hypotheses are as follow:

Ho1: There is no significant difference in dynamic balance after completing the six weeks CoBAgi Training.

μ PreDB = PostDB

HA1: There is a significant difference on dynamic balance after completing the six weeks CoBAgi Training

μ PreDB < PostDB

Ho2: There is no significant difference in agility after completing the six weeks CoBAgi Training.

μ PreA = PostA

HA2: There is a significant difference in agility after completing the six weeks CoBAgi Training.

μ PreA < PostA

Ho3: There is no significant difference in coordination after completing the six weeks CoBAgi Training.

μ PreC = PostC

HA3: There is a significant difference in coordination after completing the six weeks CoBAgi Training.

μ PreC < PostC

1.5. SIGNIFICANCE OF THE RESEARCH

Coordination, dynamic balance, and agility performance are remarks as an important portion for team or individual success in handball. There are selections of training methods that can be utilized to train the parameters such as plyometrics and circuit training. Those training may be effective if the implementation is with the right volume and duration. CoBAgi Training was designed specifically to focus on handball skills pattern which couples with the implementation of perturbation that seldomly used to gain performance. This mechanism has a big potential to enhance performance since it mimics on specific play situation which prepared the adolescent players with sufficient situation reflect and action required in the game. Thus, the significance of this study will define to identify the effectiveness of CoBAgi Training on performance improvement among adolescent handball players. Therefore, the significances of this study are:

i. A development of a complex training program which could speed up the optimum acquisition of specific skills performance for adolescent handball players at the early stage of training exposure. Thus, the development from an early age may enhance the adaptation effects of the proprioceptors.

ii. Performance improvements regime strategy for handball players and coaches.

iii. Provide an awareness for coaches on the use of an appropriate training program to improve, enhance, or pre-rehabilitation (prehab) on dynamic skills performance.

iv. Suggest the selection of a good training program that beneficial to improve the complex sports components i.e. dynamic balance, coordination, and agility.

1.6. LIMITATION OF THE RESEARCH

This research is looking for the effect of CoBAgi Training program for dynamic balance, coordination, and agility among SMK Lahat Adolescence Handball players. This research conducted with the limitations listed below:

i. Research was executed in SMK Lahat at "Kinta Utara" district, in Perak Darul Ridzuan.

ii. The research respondents were randomly choosing from male and female players within age 13 to 15 years old only.

iii. Only healthy non-injured or free from injuries at least twelve months been selected as participants.

iv. Research instruments were only consisting of Carioca Test test coordination, Star Excursion Balance Test (SEBT) to test the dynamic balance, and L-Run Test to test the agility.

1.7. DELIMITATION OF THE RESEARCH

For specific deliverables, the researcher delimited the finding of the research data only from SMK Lahat Adolescence Handball players. This research scheduled to complete in six weeks. Delimitation of the research set to be as follow:

i. Focus on the effect of intervention CoBAgi Training program on Dynamic Balance improvement among adolescent handball players.

ii. Focus on the effect of intervention CoBAgi Training program on Agility improvement among adolescent handball players.

iii. Focus on the effect of intervention CoBAgi Training program on Coordination improvement among adolescent handball players.

iv. Focus on score different for Carioca Test, SEBT Test and L-Run Test only. This study is not to determine on lean body mass and percentage of body fat.

1.8. OPERATIONAL DEFINITION

Lots of terms and concepts being used for this research. The listed terms will be applicable throughout this research. The terms are:

1.8.1 Adolescent Handball Players

According to Jaworska & MacQueen (2015) adolescence refers to the period marking the transition from childhood to adulthood and historically this typically spans from 12 to 18 years of age. Therefore, adolescent handball players refer to players within the age of 12 to 18 years old. However, for this study, the researcher will consider adolescent handball players as players ranging from age of 13 – 15 years old.

1.8.2 Agility

Ability to rapid, whole-body, change of direction or speed in response to a sport-specific stimulus where agility is fundamental in handball skills execution either for pivoting, cutting activities, or anticipating on the situation (Gabbett & Sheppard, 2013).

1.8.3 CoBAgi

This term is a short abbreviation combination of word which refer to Coordination, Dynamic Balance, Agility.

1.8.4 Coordination

A skill-related component of physical fitness that relates to the ability to use the senses, such as sight and hearing, together with body parts in performing motor tasks smoothly and accurately (Corbin et. al. 2000).

1.8.5 Dynamic Balance

Dynamic balance is the ability of an individual to maintain the stability of the center of mass during movement and it is an essential component of many sports activities (Ozmen, 2016).

1.8.6 Perturbation

Perturbation has been defined as incidents that change a system state from a stable (invariant) to an unstable (variant) situation or vice versa (James et. al. 2012).

1.8.7 Proprioception

The process by which the body can vary muscle contraction in immediate response to incoming information regarding external forces, by utilizing stretch receptors in the muscles to keep track of the joint position in the body (Kumar, 2014).

1.8.8 Star Excursion Balance Test (SEBT)

Star Excursion Balance Test is a reliable measure and a valid dynamic test to predict the risk of lower extremity injury, to identify dynamic balance deficits in patients with lower extremity conditions, and to be responsive to training programs in healthy participants and those with lower extremity conditions (Filipa et. al. 2010).

1.9. SUMMARY

This study clarified that coordination, dynamic balance, and agility are the key roles for sports performances. Coaches need to consider implementing specific programs that specifically focus on the development of coordination, dynamic balance, and agility in skills pattern motion for the performance improvement. Since neuromuscular training coupled with perturbation manipulation has shown the improvement among the injured community, it is believed that it would contribute to significant improvement among the healthy population. However, less study demonstrates these combinations and their potential in a healthy, athletic population, especially in Handball players. Therefore, this study aimed to investigate the effectiveness of six weeks of intervention for coordination, dynamic balance, and agility among adolescent handball players to improve performance.