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Physical and motor characteristics in basketball to children and youth

[1]Natasha Dako, [1]Ledina Koçi, [2]Ervin Koçi
[1]Sport University Tirana Albania
[1]Faculty Movement Sciences
[1]Department Individual Sports
[2]Physical education teacher Tirana, Albania
Correspondence: Natasha Dako (e-mail: dako.natasha@gmail.com)

Abstract

Basketball is a sport that requires basic and motor characteristics such as strength, speed, endurance and coordination, high-intensity activities such as jumping, dribbling, shooting, blocking and sprinting. It is also a sports discipline that requires aerobic and anaerobic energy processes as well as including intense activities such as jump shooting, blocking shots, movements with rapid changes of direction and high speed. In this discipline, there are many characteristics that affect performance and proper execution of technical and tactical elements according to the positions of the game. The purpose of this paper literature review is to investigate and research the impact of training programs on physical parameters in basketball in age groups. To successfully realize this review paper we studied and analyzed contemporary scientific literature. In this literature review, basic principles of selection in several stages of literature by means keywords are used based on works. Major databases were used through the Jab Ref program such as Cross Ref, DOAJ, Inspire, Web of Science, Scopus, and Sport Discus in the last 10 years. In the literature used, one can clearly see importance of understanding that, higher quality level of sportsman movement culture, higher level of mastery of teaching tasks and higher level of movement skills education.

Keywords: physical parameters, movement, skills, strength, speed, endurance, coordination.

Introduction

Participating in physical activity from an early age helps create a healthy physical structure, while contributing to psychological and social improvement. Having a sports life from childhood is very important for their future in society. If a child is deprived of physical activity, then he will have an inhibited psycho-motor development. For this reason, at this stage, various factors such as a healthy body, socialization, recreational goals play an important role for participation of individuals in sports activities. For many children, their families become stimulus for their participation in physical activity while some other families become a barrier by not knowing importance of physical activities in their lives. Such restrictions create basis for a sedentary life, posing a risk to their health. Therefore, orienting children towards physical activity is very important and a good alternative is basketball, which has anaerobic power in foreground *(Bilim A et al., 2016)*

Development is a complex phenomenon or a type of behavior that integrates many structures and functions related to real life. As a consequence of this integration, earlier stages affect the future stages. The development of a person is a continuous and regular process that comes through life, maturation and learning *(Galan Y et al., 2018).*

Investigating symbols of the environment that surrounds us using emotions, perception and thoughts are part of the developmental process. Psychomotor is science that actions/movements that require coordination of different parts of the body. Controlling execution of these movements and actions helps improve the coordination of different parts of the body. According to researcher psychomotor is composed of combination of cognitive skills, perception and physical skills. Motor development is closely related to mental health and physical abilities *(Harris G et al., 2000).*

Motor development is influenced by physical growth and central nervous system. Understanding psychomotor development helps improve performance and movement skills. These improvements help to increase the self-esteem and emotional stability of people *(Kirichenko V et al., 2015).*

Motor skills such as aerobic endurance, speed and agility are improved in this period. Children's involvement in sports or physical activities should start at an early age. According to *Koval V 2015,* childhood is a period that covers education and play. Childhood is conceived not only as a preparatory period for life but also as a part of life that has its own goals and objectives. Mental retardation in children is divided into two categories according to: 1. Physical and 2. Cultural/familial causes.

Physical causes include chromosomal and genetic disorders as a result of brain damage from congenital infections, malnutrition and drug exposure in prenatal period, while in the post-natal period damage occurs as a result of accidents and diseases. Cultural-familial causes do not come as a result of brain damage but as a result of unstimulating environment and life events. Factors are very important for early brain development. Today's studies are focused on development of motor skills and their improvement. One of the most important sports for development of coordination skills and reaction time speed in children is basketball. Some benefits sport of basketball are: it helps to increase self-confidence, build muscle mass, self-discipline, develop coordination, increase flexibility, dexterity and speed as well as concentration *(Jakovljević S et al., 2017).*

Basketball is a sport that requires basic and motor characteristics such as strength, speed, endurance and coordination, high-intensity activities such as jumping, dribbling, shooting, blocking and sprinting. It is also a sports discipline that requires aerobic and anaerobic energy processes as well as including intense activities such as jump shooting, blocking shots, movements with rapid changes of direction and high speed. In this discipline, there are many characteristics that affect performance and proper execution of technical and tactical elements according to the positions of the game. Depending on playing position of basketball players, physiological and physical demands are different. These study report that offensive and defensive players have higher speed and agility than center players. In this framework, it is necessary that training programs of basketball players are determined according to position of the game *(Vázquez-Guerrero et al., 2019).*

The researcher *Hoffman et al. 1996,* mentioned that 64%-81% of the overall performance is used in lower limb strength, agility, speed and vertical jump. Basketball is a competitive team sport and has its own technical and tactical characteristics, taking into account the limits of athletes. Basketball performance depends on anthropometric characteristics and physical fitness (jumping strength, dexterity with and without the ball, etc.) as well as technical, tactical and psychological characteristics. In recent years, monitoring of sports performances as well as monitoring and evaluation of physical and motor development of young athletes has been considered very important. For this reason, physical and motor tests are also used.

Basketball, like all team sports, requires motor characteristics such as strength, speed, endurance, coordination, as well as technical, tactical, psychological and anthropometric characteristics. For this reason, monitoring physical and motor characteristics of athletes in this age group (12-18 years old) helps to achieve a high performance. Through performance testing and physical testing, coaches monitor athletes' performance objectively. To monitor

performance of athletes, coaches need quantitative data on the development of different ages *(Tessitore A et al., 2006).*

Agility is another important trait in sports performance for three main reasons:

1. Consists of a concrete basis in the neuromuscular system for control of motor skills.

2. Changing directions quickly causes injuries, improving agility reduces the risk of injuries.

3. Improved agility improves performance in both the defensive and offensive phases *(Skurvydas A., 2013).*

Speed is ability of a person to move with a very high level of speed. The most important speed segments are: starting, acceleration and reaction speed. The reaction speed develops from the age of 10-12 years while the start and acceleration develops after puberty because their improvement is related to development of strength. The energy source used in speed is ATP and CP. In children, this source is scarce *(Delextrat A et al., 2009).*

The role of basketball and games in physical education

According to researchers, physical education in school system today does not provide the appropriate level of physical and intellectual capacity required by labor market and necessary for further professional activity. This fact is also reflected by low level of physical fitness, which is a serious problem for society *(Osipov et al., 2018).*

Scientific research to find efficient methods and tools for development of motor qualities and coordination skills for improvement of physical education system is a promising task for coming years. For the development of coordination ability in physical education classes, formation of new methods is required that promote improvement of coordination that a person needs during everyday life and in sports activities *(Bakayev et al., 2018).*

The results of numerous studies conducted in recent decades show that most suitable age for development of coordination skills is the age of 7-12 years due to several psychological and physiological factors. The physical improvement of 12-year-old students of different levels of physical and motor fitness depends on the skills of physical education teacher and their motivation to learn. For development of coordination ability in physical education classes, formation of new methods is required that promote improvement of coordination that a person needs during everyday life and in sports activities. The most used tool for development of physical education for entire population are sports games, which help form foundations of physical education and improve general state of human health. Systematic participation in sports games contributes to general development of students, an obvious positive effect is observed in development of physical skills such as speed, strength endurance, speed, dexterity and coordination of movements. The school program for physical education includes hours of

sports games, mainly football, volleyball and tennis. Basketball also occupies an important place in physical education curriculum for classes 5-9. Despite the use of sports games in school physical education, analysis of research and methodological literature shows the lack of research on the use of basketball as a tool for formation of coordination skills in high school children. *(Kozina et al., 2013).*

The importance of general and specific coordination skills in age groups in basketball

In elite basketball, demands at high levels for physical, technical, tactical and psychological skills from players are very necessary. Speed, agility and power are essential components of specific fitness for basketball players. During a basketball game there are reported to be 44-46 jumps, 1000 movements of different directions and 100 sprints. Players must be able to perform specific technical skills sport of basketball such as dribbling, passing, shooting under conditions of physical fatigue and emotional stress. Technical skills are closely related to movement coordination. With passage of age and participation in sports activities, we also improve coordination skills, for example, adolescents who engage in physical activity have better orientation in space, reaction speed, attention and learning of movements than adolescents who do not engage in physical activity *(Drinkwater et al., 2008).*

Skilled players have shown correct execution of technical movements even under conditions of fatigue and emotional stress. General coordination is capacity to perform different motor skills repetitions regardless of sport specialization while specific coordination is continuous repetition of specific sports movements during training sessions. There are only a small number of studies that assess and study specific and general coordination skills, because most studies focus on the assessment of basketball players' capacities in order to identify new talents and investigate the level of differences in these capacities with age *(Fort A et al., 2016)*

Few studies investigate coordination indices in relation to age, and to the author's knowledge no studies have investigated the relationship of specific coordination to fitness variables. This fact is strange because basketball requires different coordination skills such as spatial orientation, movement coordination and movement rhythm, as well as high sport-specific skills. It is a known fact that elite players have a high level of coordination and fitness. It has also been proven that there is a strong relationship between coordination and physical fitness in basketball players of all ages. However, it has been hypothesized that players with a high level of general coordination find it easier to acquire sport-specific skills because general coordination is closely related to the mastery of new movements According to this assumption, novice players with good general coordination skills will acquire specific skills faster *(Bompa, 1999).*

General coordination plays an important role until acquisition of specific skills of a certain sport, after this moment importance of general coordination declines. This fact supports hypothesis that general coordination changes during development of specific basketball skills. Coaches are aware that skills of a sport must be mastered before puberty begins, e.g. basketball players must practice dribbling before this stage. Moreover, above study confirms that improvement of motor capacities occurs after age of 12-13 years and this improvement comes as a result of sports experience in training sessions *(Köklü Y et al., 2011).*

Effects of training on motor skills in young basketball players

As in all sports, development of basic motor skills in basketball is an essential part of training sessions. The development of basic motor skills is a prerequisite for success in sports. Moreover, it is a fact that the development of basic motor skills helps facilitate application of technical-tactical exercises. Despite the fact physical ability of basketball players varies according to positions, again change of directions, speed and vertical jump are specific performance criteria of all athletes *(Bishop, & Wright, 2006).*

Basketball is a sports discipline that includes different physical features, psychological capacity of players and 4000-5000 m distance described through movements such as running, jumping and dribbling. To cope with this load, basketball players do not need to have an extraordinary physiological capacity. Superior players perform faster, more agility and with better jumps *(Jakovljević S et al., 2017).*

Purpose of the paper

Review is to analyze literature review is to investigate and research the impact of training programs on physical parameters in basketball in age groups.

Methods

In this literature review, basic principles of selection in several stages of literature by means keywords are used based on works. (Moher et al., 2015; Nakagawa S, & Cuthill, 2007). Major databases were used through the Jab Ref program such as Cross Ref, DOAJ, Inspire, Web of Science, Scopus, and Sport Discus in the last 10 years.

Keywords were used in first stage of selection, such as: basketball, training, motor skills. The electronic control resulted in a search of 80 scientific works. Further, in the next stage of selection were added, some additional keywords such as effects, kids, youth, intervention. After the literature search, 47 scientific papers were found which were taken into consideration in this paper.

Conclusions

From this literature review, we drew conclusions about theories that will help us in most efficient design of intervention program that will be carried out in discipline of basketball as follows:

1. In study of sports performance improves during adolescence and young adulthood using appropriate training programs and also helps in a successful career in adulthood.
2. Monitoring physical and motor characteristics of athletes in this age group (12-18 years old) helps to achieve a high performance. Also, monitoring sports performance and monitoring physical and motor development of young athletes is very important for specialization in right position in game. Although there is a large number of scientific researchers who study physical and motor characteristics according to position of game in superior category. The number of studies that compare these characteristics according to playing position in adolescent basketball players is limited (Pion et al., 2018).
3. The influence of parameters such as speed and agility is very important in basketball performance, for this reason players who are not fast enough cannot succeed in modern high-level basketball (Castagna, C. 2009).
4. Players with well-developed speed and agility can execute elements of modern basketball technique and tactics more efficiently (Harley, Doust, & Mills, 2008).
5. Improving motor skills to an appropriate level depends on motivation, opportunities and training sessions. Training is a very good tool for improving personality traits, which helps to create relationships with people and surrounding environment (Ziv, G., & Lidor, R. 2009).
6. Acquiring sports skills requires a long training time and best period of motor skill development is between 8-13 years. (Gencer, Y. G., & Asma, M. B. 2017).

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