International Journal of Physical Education & Sports Sciences

Vol. VI, Issue No. I, October-2013, ISSN 2231-3745

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AN INTERNATIONALLY INDEXED PEER REVIEWED & REFEREED JOURNAL

www.ignited.in

International Journal of Physical Education & Sports Sciences
Vol. VI Issue No. I, October-2013, ISSN 2231-3745

A Study of Physiological Variables of Volleyball Players Performance

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Abstract – The purpose of this study was evaluating the Indian volleyball players with other anthropometric characteristics studied. The purpose of this article was to review a series of studies on physical characteristics, physiological attributes, and volleyball skills of female and male volleyball players. Among the main findings were (a) that male national players were taller and heavier than state and novice players, while female national players showed lower body fat values compared with state and novice players, and (b) vertical jump values were higher in starters versus nonstarters. Among the methodological concerns based on the reviewed studies were the lack of information on maturational age and lack of longitudinal studies. It was recommended that a careful selection of physiological tests should be made when assessing the abilities of adolescent volleyball players. The findings of the present study might be useful in future investigation on player selection, talent identification in volleyball and training program development.

Keywords: Physiological Variables, Volleyball Players, Performance, Physical Characteristics, Male, Female, National, Information, Investigation, Development, Training, etc.

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INTRODUCTION

Training programs for volleyball players can benefit from the use of theoretical and practical knowledge from various related domains, among them exercise physiology, kinesiology, measurement and evaluation in sport, motor development, and sports medicine. Relevant information on issues related to the training process, such as physical characteristics of the female and the male adolescent players, physiological attributes, and volleyball skills, can be effectively applied in volleyball programs, particularly strength and conditioning programs specifically developed for adolescent players. The sport sciences team that works with adolescent volleyball players throughout the training program, typically composed of volleyball coaches, strength and conditioning coaches, athletic trainers, and sport physicians, should obtain relevant information on the physical and physiological aspects of adolescent volleyball players to (a) use it when planning not only the entire training program but also the practice sessions undertaken in each phase of the training program preparation, competition, and transition (3), and (b) assess the contribution of the training program to the development of the players.

REVIEW OF LITERATURE:

The current article had purposes: (a) to review a series of studies on physical characteristics, physiological attributes, and volleyball skills of female and male volleyball players; (b) to outline a number of methodological concerns associated with the reviewed studies; and (c) to provide several practical recommendations for volleyball coaches and strength and conditioning coaches who work with both competitive and recreational adolescent volleyball players. The reviewed articles were selected from an extensive search of the literature in the English language, including major computerized-databases (PubMed and SPORT Discus) and library holdings of sport sciences journals. In addition, a manual search was performed on East European journals published in English (e.g., Kinesiology and Biology in Sport). Search terms included, among others, volleyball, volleyball players, adolescent volleyball players, volleyball tests, and volleyball physiology. The articles included in this review were those reporting on volleyball players of amateur through elite status. We defined the term adolescence as the period of development between the ages 8–19 years in girls and 10–22 years in boys. We chose an age criterion of under 19 years, after which virtually all girls and most boys can be considered adults. Articles that

pooled data for both female and male players were excluded. Thirty-one articles conforming to our criteria were included in this review.

STUDIES ON VOLLEYBALL:

Mehmet Pense, Behiç Serpek (2010) researched the physical and bio motor features of female students who are in puberty and play volleyball. Also, it's been aimed to test whether the Euro fit battery which is used to determine physiological and bio motor features can be used in the elimination of talented volleyball players. Anthropometric measurement (height, weight, percentage of body fat) and physiological - bio motoric measurements (flamingo balance test, test of disk touching, sit and reach flexibility test, long jump while standing still, 30 sec sit-up test, bent arm pull-up test and 10x5m push up run) were performed by Euro fit test battery. The research was applied in the province of Konya with 51 female students. 30 of them were playing volleyball (age: 14.93±0.86) and 21(age: 15.00±0.83) of them had no physiological activity at all. These applied Euro fit tests on volleyball players allows them to get longer body length, stay more in balance, to have greater distance of flexibility, be further distance of standing long jump, to have a higher claw force, having more numbers on doing crunches and it's been mentioned that 10x5 the running test doing crunches are faster than usual and these differences are found Statistical significant (p forces with their body weights, body fat percentage, duration of touching disks and bent arm pull-up (p>0,05). As a conclusion, it is determined that the physiological and biometric values of female volleyball playing students are higher than the same aged students with no activity. On the other hand, it's been also determined that because of the appropriate content of the test, Euro fit test battery can help to choose the talents of the volleyball.

STUDIES RELATED TO PHYSIOLOGICAL CHARACTERISTICS:

Apostolidis, Nassis, Bolatoglou and Geladas (2004) described the physiological and technical characteristics of elite young volleyball players, and b) to examine the relationship between certain field and laboratory tests among these players. Thirteen male players of the junior's Volleyball National team performed a run to exhaustion on the treadmill, the Wingate test and 2 types of vertical jump. On a separate day, the field tests (control dribble, defensive movement, speed dribble, speed running, shuttle run and dribble shuttle run) were conducted. It was concluded that, these players presented a moderate VO2max and anaerobic power. The significant correlation between Pmean and certain field tests indicates that these tests could be used for the assessment of anaerobic capacity of young volleyball players.

Wells, Elmi and Thomas (2009) identified physiological correlates of golf performance in elite golfers under laboratory (ball speed and distance) and tournament conditions. The correlation analysis revealed significant associations between mass, heights, body mass index, sit height, arm length, and predicted VO2max and golf measures. Results suggest that core strength and stability, flexibility, balance, and peripheral muscle strength are correlated with golf performance and should be included in golf training programs.

Gorostiaga, Granados, Ibáñez and Izquierdo (2005) compared physical characteristics (body height, body mass [BM], body fat [BF], and free fatty mass [FFM]), one repetition maximum bench-press (1RM (BP)), jumping explosive strength (VJ), handball throwing velocity, power-load relationship of the leg and arm extensor muscles, 5- and 15-m sprint running time, and running endurance in two handball male teams: elite team, one of the world's leading teams (EM, n = 15) and amateur team, playing in the Spanish National Second Division (AM, n = 15). It was concluded that, the differences observed in free fatty mass could partly explain the differences observed between groups in absolute maximal strength and muscle power. In EM, higher efficiency in handball throwing velocity may be associated with both upper and lower extremity power output capabilities, whereas in AM this relationship may be different.

Gabbett (2000) investigated the physiological characteristics of amateur rugby league players. Thirty five amateur rugby league players were measured for height, body mass, percentage body fat (sum of four skinfolds), muscular power (vertical jump), speed (10 m and 40 m sprint), and maximal aerobic power (multistage fitness test). Data were also collected on match frequency, training status, playing experience, and employment related physical activity levels. These findings suggest that position specific training does not occur in amateur rugby league. The poor fitness of non-elite players may be due to a low playing intensity, infrequent matches of short duration, and/or an inappropriate training stimulus.

Hoare (2000) measured anthropometric and physiological attributes of 125 male and 123 female junior volleyball players competing at the Australian under 16 championships in 1998. In addition, experienced coaches rated the performance of players during the championships. Performance profiles were compared across playing positions and by playing performance ('Best versus Rest'). Differences in anthropometric characteristics were present across some playing positions for both males and females. Speed and agility differences between some playing positions were also present. Best players differed to Rest players on a number of anthropometric and physiological variables for both males and females. Regression analyses indicated that anthropometric and physiological profiling can

contribute to selection procedures in junior volleyball; however determinants of success are multi-factorial.

Gabbett, Kelly and Pezet (2007) investigated the physiological, anthropometric, and skill characteristics of rugby league players and determined the relationship between physical fitness and playing ability in these athletes. Eighty-six rugby league players underwent measurements of standard anthropometry, muscular power, speed (10-, 20-, and 40-m sprint), agility (L run), and estimated maximal aerobic power (multistage fitness test). The results of this study demonstrate that selected skill characteristics but not physiological or anthropometric characteristics discriminate between successful and less successful rugby league players. However, all physiological and anthropometric characteristics were related to playing ability.

Wong, Chamari, Dellal and Wisløff (2009) examined the relationship between anthropometric and physiological performances among youth soccer players and the positional differences for these variables. Seventy U14 male soccer players participated in this study. This study provides a scientific rationale behind the coaches' practice of selecting young soccer players according to their anthropometry for short-term benefits such as heavier players for higher ball shooting speed and 30-m sprint ability as an example. However, this does not justify such practice in the long-term process of player development.

STUDIES RELATED TO PHYSICAL AND PHYSIOLOGICAL CHARACTERISTICS:

Lidor and Ziv (2010) reviewed a series of studies on physical attributes, physiological attributes, and on-court performances of male volleyball players. Empirical and practical knowledge emerging from studies on training-related issues in volleyball, such as body mass, fat-free mass, aerobic profile, strength, and agility and speed, should be integrated and applied when planning annual training programs for volleyball players. Based on our review, it was found that **(a)** players of a higher skill level are taller, somewhat heavier, and have higher vertical jump values than players of a lower level; **(b)** the aerobic profile of female volleyball players is similar to that of female volleyball players; **(c)** ballistic resistance training can increase vertical jump values in female volleyball players; and **(d)** preseason conditioning should be conducted to prevent fatigue and reduced performance at the beginning of the season.

Ziv and Lidor (2009) reviewed a series of studies examining physical attributes, physiological characteristics, on-court performances and nutritional strategies of female and male elite volleyball players. These studies included relevant information on physical and physiological variables, such as height, weight, somatotype, relative size, aerobic profile, strength, anaerobic power, agility and speed. It is concluded that the data emerging from these studies, combined with the knowledge already obtained from the studies on physical and physiological characteristics of elite volleyball players, should be applied by volleyball and strength and conditioning coaches when planning training programmes for elite volleyball players.

Casamichana and Castellano (2010) examined physical, physiological, and motor responses and perceived exertion during different soccer drills. In small-sided games, the individual playing area was varied while the number of players per team was kept constant: Participants were ten male youth soccer players. A range of variables was recorded and analysed for the three drills performed over three training sessions: (a) physiological, measured using Polar Team devices; (b) physical, using GPS SPI elite devices; (c) perceived exertion, rated using the CR-10 scale; and (d) motor response, evaluated using an observational tool that was specially designed for this study. The results show that the size of the pitch should be taken into account when planning training drills, as it influences the intensity of the task and the motor response of players.

Ooi et al., (2009) established the physical and physiological attributes of elite and sub-elite Indian male volleyball players and to determine whether these attributes discriminate elite players from sub-elite players. Measurements and tests of basic anthropometry, explosive power, anaerobic recovery capacity, volleyball -specific movement agility, maximum strength, and aerobic capacity were conducted on two occasions, separated by at least one day. Our results show that elite Indian male volleyball players are taller, heavier, and stronger than their sub-elite counterparts. The test battery, however, did not allow us to discriminate between the elite and sub-elite players, suggesting that at the elite level tactical knowledge, technical skills, and psychological readiness could be of greater importance.

CONCLUSION:

On the basis of findings of this study, the following conclusions have been drawn:

1. In physiological variables, significant differences were found among the different team of volleyball players in vital capacity and breathe holding capacity.

2. In anthropometrical variables, significant differences were found among the different

team of volleyball players in fore leg length, thigh length, weight, thigh girth and calf girth.

3. In other physiological variables i.e. max, expiratory pressure and pulse rate, there were no significant differences were found among the different team of volleyball players.

4. In other anthropometrical variables i.e. height and leg length there were no significant differences were found among the different team of volleyball players. It means in these variables all five university players are more or less the same.

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