

# Relationship between flexibility of spinal column and volume of chest expansion among volleyball players

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## Abstract

Concerning specific nature of some sports and their need for some particular movements to catapult the performance of athletes, and also more professionalism in sport world, some muscles face over strengthening. This leads to weakening of neighbor muscles, improper composition and reduction of life cycle of athletes. The present study tries to consider the relation between sagittal curves in vertebra column in volleyball players with body composition and volume of chest expansion & flexibility. The main aim was to assess relationship between flexibility of spinal column and volume of chest expansion and curvature of spinal column and level of flexibility among volleyball players. Tests such as Mean, Standard Deviation, Percentage, t-ratio will be used to comprise the data and to classify the kind and character, position, side, reason of damage, season, work out, position etc, deploying SPSS was used for the analysis of data and desired results were obtained.

**Keywords:** Curvature, Spinal column, flexibility, chest expansion and volleyball players

## Introduction

In many sports, physical features, anthropometry characteristics, body composition and related components to physical readiness are important predictors of competitive performance of athletes (Gabbett, 2000; Bourgeois et al., 2000). Data shows that in most of sport fields, there is a direct and close relation between anthropometric characteristics, body composition and physiology of athletes. In few studies concerning morphological features of female players, some limitations are visible in generalizability of anthropometric measurements, body composition or morphology. This means that some studies concerned height of limbs and body mass (Spence et al. 1980), some indices of body composition (Fleck et al, 1985; Alfredson, Nordstrom & Lorentzon, 1997; Geladas N, Maridaki, 1996) and some described morphological variables (Geladas and Maridaki, 1996; Kowalski et al, 1980; Viviani and Baldin, 1993; Papadopolo et al., 2002b). Very few studies considered anthropometric data, body composition and morphology simultaneously (Bayios et al, 2006; Kowalski et al., 1980; Geladas and Miridaki 1996; Malousaris et al., 2008; Viviani and Baldin, 1993). Low number of participants (19 to 25 players) put doubts on generalizability of these studies, especially unclear information regarding gender differences and level of competition. Therefore, more studies are required to have a clear picture of anthropometric, physiological and physical characteristics of volleyball players.

Also, in spite of access to results of international studies, limited information is in hand about characteristics of native players of Iran.

Reports of physiological and physical capacities of elite volleyball players along with other morphological and anthropometric features can provide a standard for coaches in the process of selecting competent players and appropriate exercise plans based on gender and age differences. In most of studies out of Iran, body composition, physiology, physical structure and anthropometry of volleyball players were considered descriptively, with no attention to individual differences. So, identifying individual differences of elite volleyball players and presenting a complete profile of body composition, physiology, physical structure and anthropometry of volleyball players can be the innovative aspects of this study. This helps coaches and officials in discovering talented persons and directing them towards championships. Meanwhile, coaches can arrange more appropriately and accurately specific trainings of volleyball players, control performance of players and implement necessary improving measures. Because the present study is about elite volleyball players, results will deliver good information about body composition, physiology and physical readiness in volleyball. This method is capable of increasing the output of talent selection systems, which finally contributes in preventing waste of time and energy and spending available facilities for competent persons.

### **Significance of the Study**

Preventing back injuries can be grouped in primary and secondary ones. Primary prevention is trying to prevent initiation of backache; while secondary prevention confers restricting inability and controlling symptoms. Scholars believe that investing in primary prevention is worthier and more cost-effective than secondary prevention. Lack of balance or deformation of body can be influential in performing accurate moves. Generally, in evaluating body balance, a normal body is seen when all parts of body like head, torso and legs have moderate balance to each other (Goodman et al, 2000).

It is believed that an appropriate posture is a muscular-skeletal balance which poses the least stress on body. Although a good posture can be ideally satisfying, most of people lack this posture. Many of muscular-skeletal problems are related to stress caused by repetitive wrong posture people have in daily life. Injuries in joints, muscles and tissues may cause abnormal posture. In contrast, improper posture leads in injuries in joints, muscles and tissues as well as symptoms like pain. Among improper postures in spinal cords, forwarded head, kyphosis and lordosis can be included (Maigne, 1996).

Therefore, in case of proving any relation between above issues, a clear instruction is prepared for people to prevent back pains, and helps coaches in designing and developing training programs.

## Objectives of the Study

- 1) To assess the level of flexibility of spinal column, body composition curvatures of spinal column & volume of chest expansion among volleyball players
- 2) To find out the relation between flexibility of spinal column and volume of chest expansion among volleyball players
- 3) To find out the relation between curvature of spinal column and level of flexibility among volleyball players

## Research Hypotheses

**Null hypothesis H<sub>01</sub>:** There is a significant relation between flexibility of spinal column and volume of chest expansion among volleyball players

**Null hypothesis H<sub>02</sub>:** There is a significant relation between curvature of spinal column and flexibility among volleyball players

## Flexibility

Flexibility refers to maximum momentum of joint's movement, including static and dynamic. Flexibility in normal form is considered among features of healthy joint, but in over-flexibility is known as laxity (Jacobs & Jacobs, 2004).

Flexibility refers to ability of a person in moving all or parts of his or her body in the broadest spectrum, with no injury to joints or muscles. Usually, flexibility is shown in moving spectrum of a specific muscle. Generally, stretching ability of soft tissues, ligaments and especially muscles as well as anatomical position of a joint determine extent of flexibility. Extent of flexibility is different between people, a feature can be considered a unique joint ability (Hadavi, 2004).

Lack of exercise will finally lead in decrease in flexibility, from childhood to youth. Growth studies show that boys and girls lose their flexibility after 10 and 12 years old, respectively. As a whole, girls possess more flexibility than boys. One of the principle roles of flexibility is preventing muscular and joint injuries while performing many of sport skills. Studies confirm reduction of muscular pain and injuries due to stretching exercises. Muscles with constant experience of stretching exercises are of higher flexibility. In fact, these kinds of exercises prevent from muscular damages. Studies executed in 1981 concerning relation between stiffness of muscles and stable flexibility suggested that a relation exists between improper flexibility and muscular injuries (Haywood, 2005). Various studies showed physical changes affecting on flexibility through ages, including (Pour Sabet and GhorbaniVafa, 1994):

- 1) Increase in calcium stores
- 2) Increase in the level of water
- 3) Increase in abnormal viscosity
- 4) Real change in tissues' structure
- 5) Displacement of muscular cords with fat and collagen cords

**Joint flexibility:** it refers to effective power of joint in normal movement (Schneider et al, 1992).

## Procedures

Statistical society consisted of national athletes of volleyball in Iran. Volleyball players, having two years of participating in national & international competitions were recruited in this study. None of them have records of operation in spinal cords, chronic backache, deformity, asthma, smoking, special disease or fracture. To determine sample volume, 30 persons were selected using convenient and purposeful method for every sport field. First, an invitation was sent to all persons, and tester explained method of testing and physical examination. The tastes were assured about confidentiality.

## Design

The method of study is comparative-causative. Moreover, it is applicational in purpose and retrospective in time. The reason of using this method was identifying age, gender and task differences in terms of body composition as well as physiological, physical and anthropometric characteristics.

## Statistical Tests of the Study

In these process to find the incidence and prevalence of injuries data was summarized, and statistical techniques i.e. Mean, Standard Deviation, Percentage, t-ratio was used to comprise the data and to classify the kind and character, position, side, reason of damage, season, work out, position etc. likewise appropriate statistical software like Microsoft office excel and SPSS was used for the analysis of data.

## Data Analysis and Interpretation

**First hypothesis: There is a significant relation between flexibility of spinal column and volume of chest expansion among volleyball players**

Table 1: Results of Pearson correlation coefficient (relation between flexibility of spinal column and volume of chest expansion among volleyball players)

Measured item	frequency	r	Level of significance
flexibility of spinal column and volume of chest expansion	30	0.22	0.03

According to results, observed r at  $\alpha = 0.05$  represents a positively significant correlation between flexibility of spinal column and volume of chest expansion among volleyball players.

## Second hypothesis: There is a significant relation between curvature of spinal column and flexibility among volleyball players

Table 2: Results of Pearson correlation coefficient (relation between curvature of spinal column and flexibility among volleyball players)

Measured item	frequency	r	Level of significance
curvature of spinal column and flexibility	30	-0.33	0.03

According to results, observed  $r$  at  $\alpha = 0.05$  represents a negatively significant correlation between curvature of spinal column and flexibility in volleyball players.

### Conclusion

Today, physical education scholars emphasize on elements such as cardiovascular function, strength, physical fitness and flexibility, in order to get physical fitness in relation to well-being and better performances. Although these elements are of equal importance, the limits of development vary from one person to another. Also, the goals that individuals may pursue at different levels are not the same. Considering that one of the most important factors in the success of the sports competition is the physiological capacities and special physical characteristics. It should be noted that the findings of this study are consistent with Ghaffari Nejad (2000), suggesting that spinal cords of athletes haven't natural curvature. The study of Volleyball players indicates that Volleyball players have more curvature. As previously mentioned, the probable cause of this can be lumbar lordosis in Volleyball players. The degree of statistical similarity observed in spine measurements is helpful in showing more effectiveness of Volleyball.

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