

Is plantar vault shape an influencing factor on ankle sprain epidemiology in volleyball? A pilot study

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Abstract

The aim of the research was to identify correlations between the different morphologies of the vault with the risk of ankle sprain. 150 volleyball players enrolled in the Italian National Volleyball Federation (F.I.P.A.V.) were randomly recruited.

A podoscopic exam was performed to assess the morphology of the plantar vault. Anthropometric measures, data regarding sports activities, weekly training time and ankle injuries were collected.

Although players with cavus and flat foot and setter role showed a slight increase number of ankle sprains, there were no statistically significant associations between the risk of ankle sprain and vault shape or players' role.

Keywords: Ankle sprain, plantar vault, volleyball.

Introduction

Ankle sprain is the most common volleyball injury^{1,2,3,4,5}. Technical or proprioceptive training, ankle taping or bracing are commonly adopted to prevent ankle sprain recurrence.

Ligamentous laxity of the lower limb, knee or foot misalignment could be ankle sprain risk factors. Plantar vault shape could also influence the incidence of this injury⁶.

The aim of this research was to study the relation between plantar vault shape and ankle sprain epidemiology in a group of volleyball players.

Materials and Methods

Sample

150 volleyball players (38 men and 112 women) were randomly recruited among athletes playing in Italy (A, A2, B1, B2, C, D, 1 division). Anthropometric data (body weight, height, body mass index) were recorded. To obtain data about history of ankle sprain, training and competitive activities, players' role (libero, hitter, middle blocker and setter), all athletes completed a questionnaire.

Riassunto

Scopo della ricerca è individuare eventuali correlazioni tra le diverse morfologie della volta plantare e il rischio di distorsione del collo piede.

Sono stati reclutati in modo randomizzato 150 pallavolisti iscritti alla Federazione Nazionale Pallavolo (F.I.P.A.V.). Su di loro si sono effettuate misure antropometriche e si sono raccolte informazioni riguardanti eventuali traumi del collo piede e l'attività sportiva. A ciascun giocatore è stata effettuata una podoscopia per valutare la morfologia della volta plantare.

Sebbene i giocatori con la volta cava e piatta e quelli che giocano nel ruolo di palleggiatore hanno mostrato un lieve incremento del numero di distorsioni di collo piede rispetto agli altri, non sono state rilevate associazioni statisticamente significative del rischio di distorsione di collo piede con la morfologia della volta plantare o con il ruolo di gioco.

Parole chiave: Distorsione di collo piede, volta plantare, pallavolo.

Procedures

Using a polarized light plantoscope a podoscopic exam was performed to all players and the vault shapes were discerned according to Denis^{7,8}. Foot was normal when the central zone (isthmus) was between a third and half of the metatarsal support, flat when the isthmus was greater than half of the metatarsal support, and cavus if the isthmus was less than a third of the metatarsal support.

Statistical analysis

All data were initially entered into an Excel database (Microsoft, Redmond, Washington – United States) and the analysis was performed using the Statistical Package for the Social Sciences Windows, version 13.0 (SPSS, Chicago, Illinois, USA). Descriptive statistics consisted of the mean \pm standard deviation (SD) for parameters with gaussian distributions (after confirmation with histograms and the Kolmogorov-Smirnov test). Comparison among groups was performed with the ANOVA one-way for continuous parametric variables or the Chi-Square test or Fisher's exact test (if cells < 5) for frequencies variables. A *p* value of < 0.05 was considered statistically significant.

Results

Seventy-three percent (110) of the subject showed normal foot, 3% (4) flat and 24% (36) cavus (Chart 1).

Forty-nine percent of volleyball players reported at least one ankle sprain injury. Forty-six percent of players with normal foot had ankle sprain injuries, while 56% of players with cavus foot and 67% with flat foot reported ankle sprain injuries. Seventy percent of men and 52% of women with cavus vault reported ankle sprain injuries. One male players reported till 4 ankle sprains in the same side: no female player reported more than 2 sprain events in the same side.

Player specialization showed no influence in causing ankle sprain, even if the setter role showed a slightly increasing risk of ankle sprain (chi-square; $p = 0.27$).

Discussion

In this preliminary study the prevalence of normal, cavus, and flat foot, showed values similar to those previously reported in adults⁹.

Results suggested that female players were slightly more exposed to ankle sprain than male; however male had more individual sprain events in the same side (four): no women had more than two ankle sprains in the same side. There were no difference in sprains events among player roles considered: this result was similar to that reported by Bahr et al¹: this rules out a relationship between number of jumps (greater for the central) and ankle sprains.

The great setter mobility carries a risk of ankle sprain, which counterbalances the risk associated with the high-

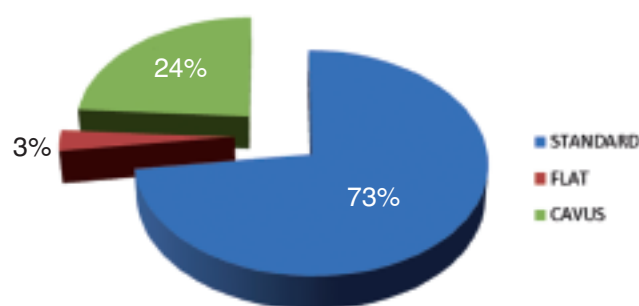
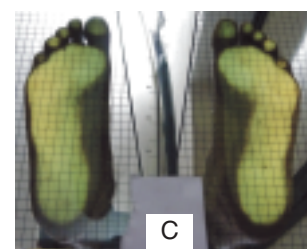
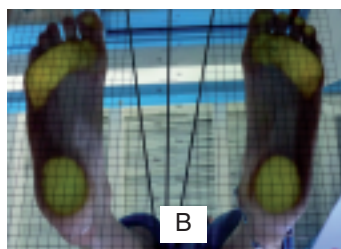
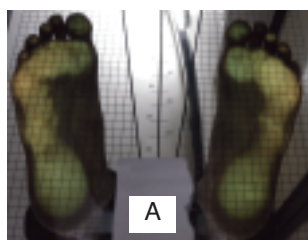


Chart 1. Vault shape prevalence of the examined subjects

Podoscopic exams showing standard (A), cavus (B) and flat vault (C)



est number of jumps usually done by athletes playing in other player' role. Data showed no statistical association between ankle sprains and years of sports career. Certain young players have had several ankle sprains; other player had long sporting career but no history of ankle sprain: this suggested some individual predisposition towards ankle sprain.

The risk of ankle sprain was uniformly spread among the volleyball categories; it showed no association with athlete's category. However, considering the great differences among elite (Series A) and inferior category of athletic skills and techniques, some difference could be found in a study with a larger sample.

Among the elite players, however, the risk of ankle sprain could not be negligible: Augustsson et al.¹⁰, studying 158 players of the highest Swedish Volleyball category, found 28 ankle injuries in just one competing season.

The results did not show a relationship between the number of distortions and years of sports career. This

would suggest that there is a predisposition to the event distortion of some individuals than others, on the contrary, while exposing themselves to the risk for a greater number of years of sporting career, are not affected by distorting events. The risk of distortion is evenly distributed among the categories of level of play demonstrated its independence from the level of skill and training of athletes. One must consider, however, that considerable differences of athletic skills and techniques are found in higher classes to those which militate the volleyball players recruited for this study, (eg. Series A). Players with cavus and flat plantar vault show a slightly incremented risk of ankle sprain injury when compared to players with a standard plantar vault.

Compare to libero, Middle blocker and hitter, the setter is a player specialization that, in this report, seems to exposures players to a higher risk of ankle sprain: maybe this is due to the greater mobility of those players in the court.

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