

lizar la relación existente entre la resistencia de la musculatura extensora del tronco y la presencia de dolor lumbar en alumnos de Educación Secundaria Obligatoria y post-obligatoria.

Método. La muestra estuvo compuesta por 69 estudiantes de 12 a 18 años (35 chicos y 34 chicas) de un instituto de la Región de Murcia. Para la toma de datos se emplearon dos instrumentos: una prueba para determinar la resistencia muscular de los extensores del tronco (Test de Biering-Sorensen) y un cuestionario para valorar la incidencia y factores de riesgo asociados con el dolor de espalda denominado "Encuesta sobre el dolor de espalda en adolescentes".

Resultados. Los resultados mostraron que las chicas mantenían más tiempo la posición horizontal en la realización del test que los chicos con una media de $183,35 \pm 72,32$ segundos y $135,74 \pm 65,23$ segundos, respectivamente. Con respecto a la presencia de dolor de espalda en relación con la resistencia de la musculatura extensora del tronco, se observó en todos los casos una mayor duración del test en los estudiantes que declararon no padecer dolor con una media de $172,65 \pm 93,495$ segundos frente a los que presentaban dolor con una media de $154,70 \pm 62,742$ segundos. Aunque, las diferencias no fueron estadísticamente significativas.

Conclusión. Los chicos y las chicas tienen diferentes perfiles de resistencia en la musculatura extensora del tronco, presentando las chicas una mayor resistencia que los chicos. Los estudiantes que declararon padecer dolor de espalda durante el pasado año aguantaron menos tiempo en la realización de Test de Biering-Sorensen.

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Association of health-related physical fitness with total and central body fat in preschool children aged 3 to 5 years

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Aim. To investigate whether health-related physical fitness components are associated with total and central body fat in preschool children.

Methods. A total of 403 preschool children aged 3 to 5 years (57.8% boys; $n = 71, 133$ and 199 for 3, 4 and 5 years-olds respectively) participated in the study. Health-related physical fitness was measured by means of the handgrip strength, the standing long jump tests (i.e. muscular strength); the 4x10m shuttle run and the one-leg stance tests (i.e. motor fitness); and the PREFIT 20m shuttle run test (i.e. cardiorespiratory fitness). Body mass index (BMI) and waist circumference (WC) were measured and used as markers to total and central body fat, respectively.

Results. There was an association between all health-related physical fitness test and BMI ($\beta = -7.892 \pm 1.117$, $\beta = -0.020 \pm 0.006$, $\beta = 0.154 \pm 0.065$, $\beta = -0.034 \pm 0.011$ for the handgrip strength/body weight, standing long jump, 4x10m shuttle run and PREFIT 20m shuttle run tests, respectively, all $P \leq 0.019$), except for one-leg stance ($\beta = -0.007 \pm 0.004$, $P = 0.06$) after adjusting for sex and age. Similarly, there was a significant association of handgrip strength/body weight ($\beta = -18.972 \pm 2.563$), standing long jump

$P \leq 0.001$), except for one-leg stance ($\beta = -0.012 \pm 0.009$, $P = 0.156$) after adjusting for sex, age and height.

Conclusions. The present study extends previous findings in older children and adolescents showing an association of health-related physical fitness components, mainly muscular strength, cardiorespiratory fitness, and the 4x10m shuttle run test (i.e. motor fitness) and total and central body fat in preschool children. Fitness assessment should be introduced in future epidemiological and intervention studies in preschool children because it seems to be an important factor determining health.

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Does playing surfaces influence the bone geometry and strength indexes in young male soccer players?

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Keywords: Bone mass; Peripheral computed tomography; Body composition; Soccer; Artificial turf; Grass

Background. It has been shown that impact loading in sporting activity is highly associated with bone quality. However, information regarding the osteogenic effects of a sport such as football performed on different playing surfaces is scarce. Therefore, the main purpose of this study was to compare variables of bone geometry and strength indexes between male football players by playing surface.

Methods. A total of 74 male soccer players (12.7 ± 0.6 y) from different regional teams of Aragón (Spain) volunteered to participate in the study. 25 participants were training and playing on 2nd generation artificial turf (2AT), 18 on a 3rd generation artificial turf, 13 on a non-grass ground surface and 18 on natural grass (NG).

Peripheral quantitative computed tomography (pQCT) measurements were taken at 38% of the distal tibia using a Stratec XCT-2000 L pQCT scanner. Bone geometry variables such as cortical thickness and endosteal (ENDO) and periosteal circumferences were measured, and different bone strength indexes such as stress strain index and resistance to fracture load were calculated in X and Y axis and polar moment.

Analysis of covariance (ANCOVA) with Bonferroni post-hoc test controlling for the length of the tibia (Tibiale mediale - sphyrion tibiale length) was used to compare pQCT measurements by playing surface.

Results. Those playing in 2AT showed lower pQCT values than NG soccer players (all $p < 0.05$) except for ENDO. No differences in any bone variables were found between other groups (all $p > 0.05$).

Conclusion. Soccer players training and playing in NG pitch showed better values in bone geometry and strength indexes than those on 2AT. Despite previous studies presented similar bone mass accretion in prepubescent footballers independently of the surface on which they practiced football. Our results suggest that the type