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Research Paper

Comparison of Strength and Jumping Ability Characteristics Between Pre Teenage Soccer Players and Pre Teenage Non Players

Physical Education

KEYWORDS : Strength, jumping ability, Maximum isometric force, vertical jump (SJ), Vertical drop jumps (DJ20).

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ABSTRACT

The aim of this study was to investigate the efficiency level of pre-teenage soccer players and non-players in characteristics of strength and jumping ability. The sample consisted of two groups (n = 40) (age 12,6 ± 0,82, height 171,67 ± 5,59, weight 65,67 ± 7,26). The first group (n = 20) were students with no participation in soccer training and the second group (n = 20) were students who competed in soccer academies. The samples were tested in the maximum isometric force (Fmaxiso), the vertical jump from a fixed starting position (SJ) and in the vertical jump after falling 20 cm (DJ20). For recording tests of vertical jumps (DJ20 and SJ), and the maximum isometric force (Fmaxiso), used a uniaxial load cell force plate with formula (AMD CO., LTD, LC4204-K600). For the evaluation of data recorded was used MATLAB (special program). Statistical analysis was performed with SPSS 15 which was independent test samples (independent t-test). The results showed that there was a statistically significant difference in the maximum isometric force (fmaxiso) with p = 0,004, in f100 with p = 0,049, in f200 with p = 0,030, in f300 with p = 0,030, in f400 with p = 0,017 and the index relative strength (DSD) with p = 0,049. In conclusion the students involved in the sport of soccer, outweigh students not involved with soccer in the above variables.

INTRODUCTION

Soccer is a sport dominated by very dynamic and explosive movements in a positive and negative way of work (acceleration and deceleration of movement). Typical examples of such movements in the game is shoot, jump on it and the little sprint in the straight or directional changes (Bissanz & Gerisch, 1996). During the game the player many times uses the head with a jump both in defense and in offensive actions. Header with a jump, which is a vertical jump is one of the key elements of his technique footballer and could be seen as a crucial element for his performance (Kotzamanidis et al., 2005).

To improve muscle strength many different training methods used causing chronic adaptations. Those adaptations due to the different response of the neuromuscular and endocrine system and depend on factors such as maturing, and training experience. In studies observed improvement in muscle strength in children and adolescents after exercise with weights also covering even and biological maturation, followed a different methodological approach, which led in differences in degree of improvement of power. Also, studies have investigated the effect of weight training on athletic performance and fitness parameters except the power is limited by conflicting even results. Some of them reported significant improvement in physical abilities such as running speed and jumping ability (Hetzler et al., 1997; Williams, 1991), while others do not indicate similar adjustments (Faigenbaum et al., 1996)

According to Apor (1988) the players have more anaerobic power than what the athletes basketball and volleyball, and considerably outweigh compared to long distance runners. High-priced professional footballers were measured at Wingate test (13.5-15.0 W / kg body weight), (Barthelemy et al. 1992). The players also show higher values in the vertical jump athletes compared with other team sports except volleyball athletes (Kirkendal 1985). The jumping ability players between 48-58 cm when measured by the vertical jump with swing (Foehrenbach et al. 1991, Islegen and Akguen 1988, Mathur and Igbove 1983, Tumilty et al. 1988, Sebert et al. 1990). Geese et al., (1990) found a positive correlation between the training level and the height of the vertical jump without wobbling (increasing jump ability as you climb the competitive level) and takes values greater than 45 cm satisfactory for professional footballers.

The aim of this study was to investigate the efficiency level of pre-teenage soccer players and non-players in characteristics of strength and jumping ability.

MATERIAL & METHODS

Participants

The sample consisted of a total of 40 high school students (aged 12,6 ± 0,82, height 171,67 ± 5,59, weight 65,67 ± 7,26) were divided into two groups. The first group (group 1, n = 20) of students who had no involvement with football, while the second group (group 2, n = 20) consisted of students who actively participated as athletes football academies in parts

Forceplate and load cell

For the measurement, recording and evaluation of preferred variables used, uniaxial force plate for recording the vertical forces when performing vertical jumps (load cell, AMD co. Ltd, LC4204 - k600) and uniaxial load cell for measuring the strength of the legs (900 in the knee joint) (load cell, AMD co. ltd, LC4204 - k600) where a computer with special software for recording and evaluation of variables Analog / Digital Card (National Instruments AT-MIO L16).

For the analysis of dynamic data using the programm Mat lab (R2007b, version 7.5.0.342) and specifically relevant metrics program was used myos which was created in collaboration DAC TEFAA Serres with the Faculty of Engineering, Aristotle University of Thessaloniki (Department of Electrical Engineer-

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Test Protocol
The test runs the following test package:

1. Test in Uniaxial load cell (load cell, AMD co. ltd, LC4204 - k600)
   a) Maximum isometric force of the lower limbs (Fmaxiso),
2. Tests on the force plate (load cell, AMD co. Ltd, LC4204 - k600)
   a) Maximum vertical jumps (DJmax) after falling from a height of 20 cm,
   b) Maximum vertical jump (SJmax), from a fixed position (knee joint 900)

Procedure
Assays were performed in the following order: a) maximal isometric push the lower extremities (knee joint 90th) b) maximum vertical jump from a fixed position (knee joint at 90th), c) vertical drop jumps. Between individual tests intervening five (5) minute break. The first test in the series was the maximal isometric force test (knee joint at 900). Second was the test Drop Jump where total were two (2) attempts to vertical jump, fall from height 20 cm. Between jumps there was 30sec break. We stress tested achieves maximum vertical jumps.

Finally followed test Squat Jump, vertical jump from a fixed initial position angle in the knee at 90 °. there were two (2) attempts, always aiming to achieve maximum vertical jump.

During vertical jump but also the maximum isometric effort hands of the test was to mediate. This hand position was chosen so as to avoid participation of the arms during the jump. (Bobbert et al., 1987) and to exclude the transfer of the thrust of the swinging arms (Frick et al 1991).

Variables

Symbol	Variable
fmax	Maximal isometric force
f100	Maximal isometric force in100ms
f200	Maximal isometric force in 200ms
f300	Maximal isometric force in 300ms
f400	Maximal isometric force in 400ms
DSD	Index of

Table 1. Variable

Statistical analysis
For the statistical analysis of selected variables used in the statistical package SPSS 15, where a comparison of independent samples (independent t-test) between the variables, with an index of significance p <0.05

RESULTS
The following tables presents the total effects of the variables of which our analysis showed that there were statistically significant differences.

Fmax
Regarding the maximal isometric force Fmax significant differences observed between group1 (fmax=1.415,3800) and group2 (fmax=2.429,5400) *με* p=0,004 *και* f=9,334.

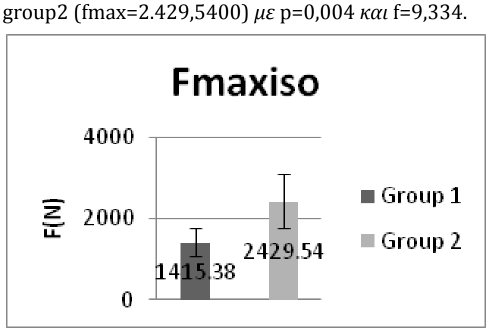

Table 2. : Results Fmax

F100
Statistically significant differences between group 1 (F100 = 670,9) and group2 (F100 = 1278,73) observed in the maximal isometric force at the 100ms p=0,049 *και* f=4,152.

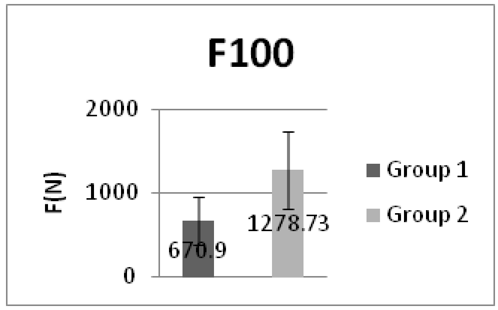

Table 3. : Results F100

F200
In maximal isometric force at the 200ms, statistically significant differences observed between group 1 (f 200 = 973,83) and group 2 (f 200 = 1722,04) p=0,030 *και* f=5,088.

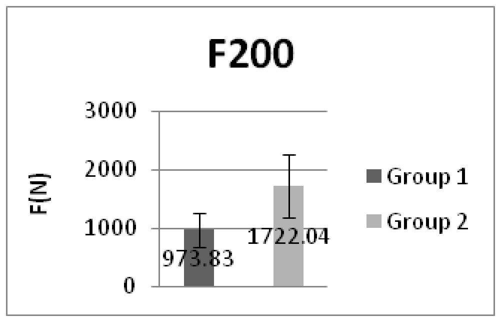

Table 4. : Results F200

F300
In maximal isometric force at the 300ms, statistically significant differences observed between group 1 (f300=1111,76) *και* group2(f300=1942,96) *με* p=0,030 *και* f=5,063

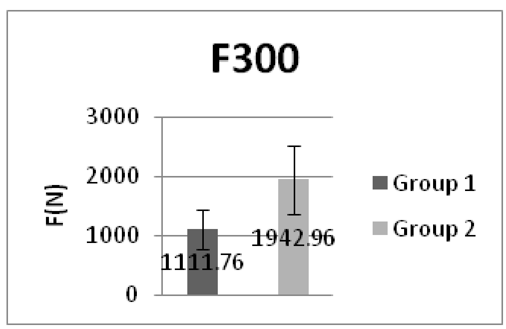

Table 5 : Results F300

F400
In maximal isometric force at the 400ms, statistically significant differences observed between group1 (f400=1196,82) and group2(f400=2104,14) p=0,017 *και* f=6,230.

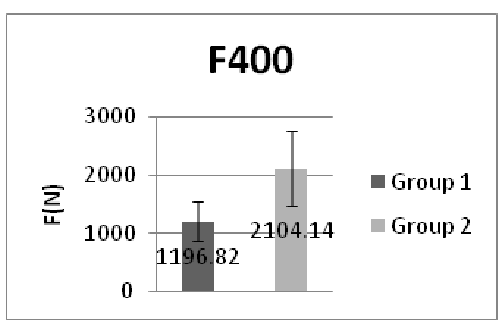

Table 6 : Results F400

DSD
Statistically significant differences observed in DSD between group1 (dsd=2,2959) and group2(dsd=3,8196) *με* p=0,049 *και* f=3,796.

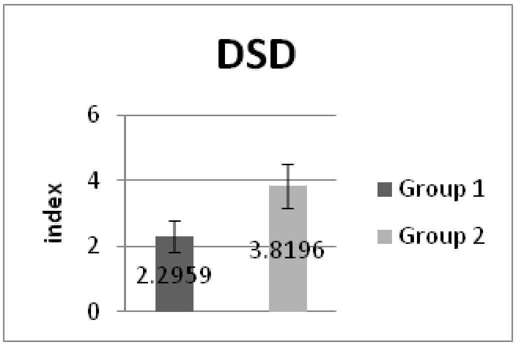

Table 7 : Results DSD

DISCUSSION
In the present study the level of return to characteristics that relate to the strength and jumping ability, players and non-players prepubertal.

Maximal isometric force
Regarding the maximum isometric force the legs there was statistically significant difference between group1 (fmax = 1.415,3800) and group2 (fmax = 2.429,5400) with p = 0,004 and f = 9,334. which observe in the literature in sports performance place term, an increase in power up to 300% Such prospects but uncorrelated with all the qualities of strength. The explosive force cannot have so large increases (Letzelter, 1978). The maximum power is important for the quality of the power efficiency, because the power is a product of force and speed. Consequently an increase in 1RM (maximum output power) is usually associated with an increase in the strength (Rutherford, et al., 1986).

Rate of force development
Observed that there was a statistically significant difference between group 1 (f100 = 670,9) and group2 (f100 = 1278,73) in maximal isometric strength of the lower limbs in 100/1 milisecond with p = 0,049 and f = 4,152, the maximum isometric force of the lower limbs in 200/1 milisecond with group1 (f200 = 973,83), and group2 (f200 = 1722,04) with p = 0,030 and f = 5,088,. and maximal isometric strength of the lower limbs in 300/1 milisecond with group1 (f300 = 1111,76) and group2 (f300 = 1942,96) with p = 0,030 and f = 5,063

The maximal isometric strength of the lower limbs in 400/1 milisecond showed a statistically significant difference between group1 (f400 = 1196,82) and group2 (f400 = 2104,14) with p = 0,017 and f = 6,230. The rate of force development (RAD), which is the ability to develop strength, plays a very important role for athletes in their sport containing explosive movements (tae kwon do, sprinting, jumping, etc) (Hakinnen & Komi, 1981). Also plays an important role for the rest of the population, such as the elderly, where quick development of muscular force reduces the risk of falls, which is associated with the disruption of the balance (Bellew, 2002).

Vertical jump and force idex
Statistically significant difference was seen in the relative strength index between group1 (dsd = 2,2959) and group2 (dsd = 3,8196) with p = 0,049 and f = 3,796.

The jumping ability is affected by the type of sporting activity (Kyrolainen & Komi, 1995; Vitasalo, Salo, & Lahtinen, 1998), the hardness of the musculotendinous system (Bojsen-Moller, Magnusson, Rasmussen, Kgaer, & Aagaard, 2005), some of the anthropometric characteristics (Silvestre, West, Maresh, & Kraemer, 2006) and of course the implementation of a training program. Football is a sport that t is the maximum power of extensor muscles of the lower limbs and vertical jumping ability are very important parameters in the performance of athletes and their development has a very important part of the training of athletes from the early years involvement with the sport. The relationship between the two and how that affects the power vertical jumping ability causes a research interest (Blackburn & Morrissey, 1998).

The vertical jumps are explosive movements that require fast response speed and maximum power mainly extensor muscles of the lower limbs. The players also show higher values in the vertical jump athletes compared with other team sports except volleyball athletes (Kirkendal 1985). The jumping ability players between 48-58 cm when measured by the vertical jump with swing (Foehrenbach et al. 1991, Islegen and Akguen 1988, Mathur and Igbove 1983, Tumilty et al. 1988, Sebert et al. 1990). Geese (1990) found a positive correlation between the training level and the height of the vertical jump without wobbling (increasing jump ability as you climb the competitive level) and takes values greater than 45 cm satisfactory for professional footballers. However, in Greek players found low values for jumping ability 38.9 ± 3.9 cm.

CONCLUSION
From the present investigation it was found that children who during the prepubertal participate as athletes in soccer teams outweigh significantly the evaluation indices of speed and jumping ability compared to peers who do not participate in such athletic activity.

The speed and short field jumps occur very often in a football game and therefore subject training of young players which is why toward outweigh their peers who are not involved with the sport of football.

The results of this research will not be able to generalized because the population sample was small and specific (amateur footballers) and requires additional searching, while further research is needed to ascertain the mechanisms that led to adjustments in the current investigation

REFERENCE

[1] APOR, P. Successful formulae for fitness training. In: Science and football, Reilly T., Less A., Davids K., Murphy J. (eds), E. & F.N. Spon, London, p. 95-107, 1988. | [2] BARTHELEMY, L., P. SEBERT, Y. VANDER-MARQUERS, and Y. GUILLODO. Qualites athletiques et adaption a 1'effort de jeunes footballeurs du Centre de Formation de Brest. Medicine du sport. 66, 2: 60-65, 1992. | [3] Bizanz, G., & Gerisch (1996): Fussball, training – Technic – Taktik. Hamburg, | [4] Bobbert M.F., Huijing P.A, van Ingen Schenau G.J (1987). Drop jumping II. The influence of dropping height in the biomechanics of drop jumping. Med Sci spoExerc. 19(4):339-46 | [5] Faigenbaum, A.D., Westcott, W.L., Micheli, A.R., Outerbridge, C.J., Long, C.J., LaRosa-Loud, R., & Zaichkowsky, L.D. (1996). The effects of strength training and detraining on children. Journal of Strength & Conditioning Research, 10, 109-114. | [6] FOEHRENBACH, R., U. FRICK, and M. GOEBEL. Dauerlauf -versus Intervalltraining bei Fussballspielern. Deut. Zeit. Sponmed. 4:136-144, 1991. | [7] GEESE, R. Konditions diagnose im Fussball, Leistungssport 4:23-28, 1990. | [8] Hetzler, R., DeRenne, C., Buxton, B., Ho, K., Chai, D., & Seichi, G. (1997). Effects of 12 weeks of strength training on anaerobic power in prepubescent male athletes. Journal of Strength & Conditioning Research, 11, 174-181. | [9] ISLEGEN, C. and N. AKGUEN. Effects of 6 weeks pre- seasonal training on physical fitness among soccer players. In: Science and football, Reily T., Less A., Davids K., Murphy J. (eds), E. & F.N. Spon, London, 1988, pp. 125-128. | [10] KIRKENDALL, T. The applied sports science of soccer. Phys. Sportsmed. 13:53-59, 1985. | [11] Kotzamanidis, Cr., Chatzopoulos, D., Michailidis, Cha,, Papaiakovou, G., & Patikas,D. (2005): The effect of a combined high-intensity strength and speed trainingprogram on the running and jumping ability of soccer players. Journal of Strength and Conditioning Research, 19(2), 369–375. | [12] LETZELTER, M.: Trainingsgrundlagen. Reinbeck 1978 | [13] MATHUR, D., and N. IGBOVE. Physiological profile of varsity soccer players. J. Res. Sport, 6:23-29, 1983. | [14] Rutherford, OM., Greig, CA., Sargeant, AJ., & Jones, DA. (1986). Strength training and power output: transference effects in the human quadriceps muscle. J Sports Sci, 4: 101–107. | [15] SEBERT, P., L. BARTHELEMY, Y. DIETMAN, C. DOUMUET, and J. BOULAY. A simpledevice for measuring a vertical jump. Eur. J. Appl. Physiol. 3/4:271-273, 1990. | [16] TUMILTY, D., A. HAHN, R. TELFORD, and A. SMITH. Is lactic acid tolerance an important component of fitness for soccer. In: Science and football, Reily T., Less A., | [17] Williams, D. (1991). The effect of a weight training on performance in selected motor activities for preadolescents children [Abstract]. Journal Applied Sport Scienc e esearch, 5, 170. |