Volume : 4 | Issue : 6 | June 2015 • ISSN No 2277 - 8179

Research Paper

Physical Education

Effects of Training on the Lepidemic Profile of Young Soccer Players

KEYWORDS : soccer , high-density lipoprotein, triglycerides,VO2 max

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ABSTRACT

The aim of the current study is to examine the effects of soccer on the lipidemic profile of young males. Specifically the researcher examined how the anthropometric characteristics, the weekly exercise frequency and the level of aerobic capacity affect players' cholesterol (TC), triglycerides (TG), high-density lipoprotein (HDL-C) and low-density lipoprotein (LDL-C) levels.128 males, who were divided into three groups based on their weekly frequency and kind of physical exercise, participated in this study. One-way ANOVA analysis was used for the differences between the three groups while post hoc Bonferroni test was used for the comparisons between the groups. The significance level was defined at p<0,05.This study concludes that 2-3 soccer training sessions per week benefits TG and HDL-C levels. In addition, VO2max levels positively affect HDL-C values. On the other hand, body mass index and body fat percentage was not related with any parameter of lepidemic profile.

Introduction

Nowadays many changes positive or negative have influenced the lifes of adolescents and children. Anxiety, nutrition, obesity, sedentary life and reduced physical activity are the main factors that develop many diseases. The atherosclerosis, hypertension, cardiovascular disease, ypercholisterenaimia, diabetes, cancer and obesity are diseases that occur not only in adults but also in children and adolescents. Although risk factors for developing cardiovascular diseases appear clinically in adulthood, it is recognized that these behaviors derive from childhood and adolescence (Twisk, Kemper, Van Mechelen, & Post, 2001). According to Boreham&Riddoch (2001) young people have reduced their participation in sports. They also concluded that nowadays young people spend about 600 kcal fewer than the past. The consequences of the reduction in energy expenditure and exercise on health and the lipidemic profile of adults is well established (Duscha, Slentz, Johnson, Houmard, Bensimhon, Knetzger, &Kraus, 2005; Halverstadt, Wilund, Goldberg, Hagberg, 2007; Hwahyung Lee, Jeong-Euy Park, Inho Choi & Kyung-Hyun Cho, 2009). Aerobic exercise is considered as a therapeutic intervention that changes the lifestyle and improves the levels of lipids and lipoproteins in adults (Kelley, G. A. & Kelley, K. S., 2006). Despres, Lamarche, Bergeron, Gagnon, Leon, Rao, Skinner, Wilmore & Bouchard (2001), added that lipidemic profile improvements are depended by the sport nature (aerobic/anaerobic). Regarding childhood, some studies have focused on the influence of various forms of exercise on lipidemic profile of children. Boyle,Tkacz&Davis (2008) showed that aerobic daily exercise in overweight children with an average intensity close to 165 p/min in various sports did not result in statistically significant differences in cholesterol, triglycerides, HDL-C and LDL-C although their weight increase rate reduced. They concluded that more than 3 months of exercise are required to observe significant changes. On the other hand it was found a significant negative relationship between HDL-C after exercise period and body mass index. ItaloQuenni Araujo de Vasconcelos, Antonio StabeliniNeto, Luís Paulo Gomes Mascarenhas, Rodrigo Bozza, Anderson ZampierUlbrich, Wagner de Campos, RenataLabroniciBertin (2008) found that children (12-16 years old) with higher physical activity (greater daily calorie expenditure) had lower triglycerides (TG) and cholesterol (TC) compared to their peers with lower physical activity. However the most popular aerobic exercise for youngsters is soccer. Though which are the benefits of soccer exercise on the health of young people? Some studies (Bekris, Gissis, Sambanis, Anagnostakos, Sotiropoulos,2012) examined the effects of a specific soccer program on cardiovascular indexes. The researchers concluded that soccer training has a positive effect on total antioxidant capacity (TAC), fibrinogen (Fib), and CK-MB levels, thus reducing the risk of thrombosis and cardiovascular disease. However the question is how soccer practice affects the lipidemic profile of young soccer players.

The aim of the current study is to examine the effects of soccer on the lipidemic profile of young males. Specifically the researcher examined how the anthropometric characteristics, the weekly exercise frequency and the level of aerobic capacity affect players' cholesterol (TC), triglycerides (TG), high-density lipoprotein (HDL-C) and low-density lipoprotein (LDL-C) levels.

Methods and materials:

Participants:

In the current study participated 128 males who were divided into three groups based on their weekly frequency and kind of physical exercise. The first group (**G** ^{1}) was consisted by 41 males aged 10,33±0,88 years old for which participated only to the school physical exercise program for about 45 minutes twice a week. The second group (**G** ^{2}) was consisted by 42 males aged 10,62±0,21 who participated in both the school physical exercise program, as well as a soccer practice of about 90 minutes per session twice a week. Finally the third group (G^{3}) consisted of 45 males aged 11,68±0,11 years old who participated in both the school physical exercise program as well as a soccer practice of about 90 minutes per session three times per week.

Groups of physical activity N=128	Age	Training age	Height	Weight	Body fat percentage	Body Mass Index (B.M.I)
G ^{1} N=41	10,33±0,88	0	151,33±8,11	44,93±6,86	10,75±2,06	19,32±1,25
G ^{2} N=42	10,62±0,21	2±0,8	144,90±1,95	40,02±1,28	12,79±1,06	19,02± 0,57
G^{3} N=45	11,68±0,11	3±0,7	154,94±3,15	46,27±2,40	11,89±2,48	19,30±0,98

Table 1: Mean values and standard deviations of the anthropometric values of the sample (n=128).

Data collection

All the parents or the guardians of the young athletes were informed about the protocol of the measurements as well as the risks and the benefits of the study before signing the informed consent. They could also terminate the participation of their son on the study whenever they desire. A university Research Ethics Committee granted approval for the study. We have also to emphasize that the participants did not take part in any training program for about 36 hours before the measurements and the tests of the study. The measurements were performed in the middle of the school and competitive season.

Anthropometric characteristics

Height identification: Regarding the measurements of anthro-

Volume : 4 | Issue : 6 | June 2015 • ISSN No 2277 - 8179

pometric characteristics, a cursor was used on each participant's head so as to measure their height (cm).

Body mass identification: Body mass (B.M) was measured by a calibrated precision weighting scale (Salus, Milano, Italy) in milligrams (kg) at 0.1 kg accuracy while the players had their urinary bladder empty as well as they did not participate in any physical activity before.

Identification of body composition: Mayhew method (Mayhew et al., 1981) was applied for the assessment of the body composition (fat mass and body mass percentage) which includes the thickness measurement by two skinfolds of the middle femoral and yperlagonias thigh on the middle of the distance of tibia trochanter and parallel to the longitudinal axis of the femur.The top of the right anterior iliac spine directed inward and slightly upward. It relies on the measurement on the thickness of subcutaneous fat which is included between two skin corrugations. The Lafayette dermatoptychometro was used to measure the subcutaneous fat. This tool provides a pressure equal to 10 g/mm2. This measurement also includes the double skin layer.The calculation equation of fat mass (FM) is FM=(0,1215 . Weight) + (0,2605 . yperlagonia) + (0,2754 . anterior femoral) – 7. Then the exported value of fat mass is converted in % of the total weight.

Blood sampling:
During the experimental process specialized researchers performed also the blood sample. Blood sampling was performed in the same time for all the participants. The blood sampling determined the concentration levels of the following biochemical parameters: cholesterol (TC), triglyceride (TG), high density lipoprotein (HDL-C), low density lipoprotein (LDL-C). The blood sampling performed in all the teams in the morning after an overnight fast of 12 hours. The participants were sitting when the researchers were taking the blood from the royal and middle vein. 9 ml of blood were taken, with a syringe type Cliss without anticoagulant for receipt serum.

VO2max estimation
VO2max was measured using a 20m continuous progressive track run test (Léger, Mercier, Gadoury, & Lambert, 1988). This test took place between two parallel lines of 20m distance between which the players had to run back and forth. A beep sound was played each time a player reached the 20m line. The first stage was set at 8,5 km/h with subsequent increments of 0.5 km/h per 1-min stage. When a player was unable to reach the line before the sound for two times in row the test finished for him. The last completed stage indicated the maximal aerobic speed which was used to calculate the maximal oxygen uptake. Matsuzaka and colleagues (2004) also confirmed the validity of the test.

Statistics-Results
Data were analysed using the statistical package SPSS 15. One-way ANOVA analysis was used for the differences between the three groups while post hoc Bonferroni test was used for the comparisons between the groups. The significance level was defined at p< 0, 05 for all the analyses. Linear regression and Pearson (r) correlations were used to identify the parametric relationships between physiological and biochemical indexes.

Groups	VO2max (ml/kg/min)	TG mgr%.	HDL-C	LDL-C	TC
G^1	43,58±0,58	55,33±5,81	60,33±3,48	98,33±8,68	169,66±8,11
G^2	48,76±1,28	38,22±4,06	71,88±5,10	93,66±7,74	173,22±8,41
G^3	54,94±1,02	49,50±3,83	69,50±3,74	102,83±12,29	182,16±13,43

Table 2: Descriptive statistics, mean values and standard error of the lipidemic variables and VO2max.

Concerning TG, the Bonferroni test (figure1) showed the significant difference between groups G^1andG^2(p = 0,001<0.5) as the G^1 indicates higher level of triglycerides (22,57mgr%). Furthermore, significant differences were found between groups G^1 and G^3(p =0,073<0.5)as G^1 reports higher level of triglycerids (14,70mgr%).

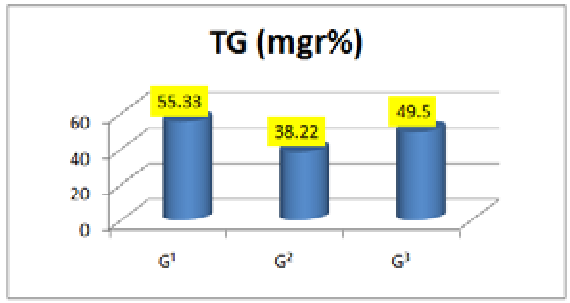

Figure 1: TG levels of the three groups.

Youngsters who participate in soccer (G^1 and G^2) perform statistical significant lower levels of TG compared to the ones with a sedentary life (G^1).
As far as the HDL-C the analyses (figure 2) showed a significant difference between groupsG^1 and G^2 (p = 0,060<0.5). Specifically G^1 indicated lower level of HDL-C (16,83mgr%) than G^2. Moreover, there is a significant difference between G^1 and G^3 (p = 0,091<0.5), as G^1 showed lower HDL-C level (16,53mgr%).

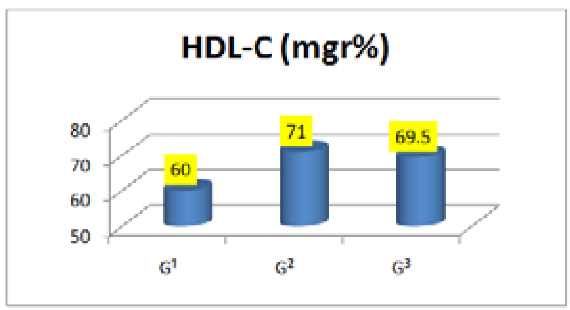

Figure 2: HDL-C levels of the three groups. Youngsters who participate in soccer teams (G^1 and G^2) indicates statistical significant higher values of HDL-C compared to the ones with a sedentary life (G^1).

Finally the analyses showed a significant relationship between VO2max and HDL-C (r= 0,230). Thus, when the VO2max improves the HDL-C also increase (Figure 3).

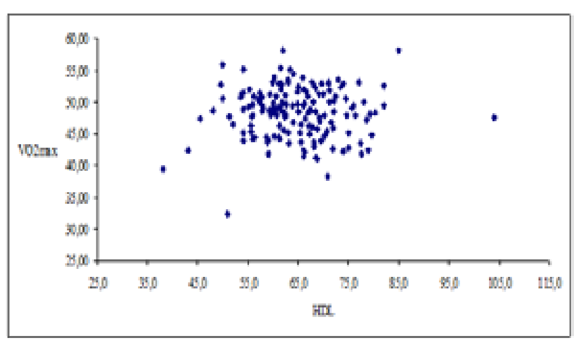

Figure 3: Positive relationship between VO2max and HDL-C.

The study showed that there were not any significant differences between LDL-C and TC. Furthermore, no significant relationship was found between body fat percentage either body mass index with the parameters of the lipidemic profile.

Discussion-Conclusions

According to the results it is obvious that extra soccer practice would reduce triglycerides more compared to the school physical activity. Thus young athletes present better TG profile than youngsters who do not participate in any extra exercise except from school sport activities. Similarly adult soccer players indicate better TG profile than the ones who do not exercise (Mougios, 2008). ItaloQuenni Araujo de Vasconcelosand colleagues (2008) concluded that high-exercised kids aged 12 to 16 years old indicate lower TG levels than low-exercised kids with a sedentary lifestyle. They measured exercise level by the daily calorie expenditure. The TG reduction of young boys with regular aerobic exercise was also confirmed by Kelley and colleagues (2006). According to Thompson, Crouse, Goodpaster, Kelley, Moyna, &Pescatello (2001), the influence of greater energy expenditure and exercise resulted on reduction of intramuscular TG.Thus it is possible all these differences are due to the greater energy expenditure, as it is obvious in studies with adult samples. For example exercise in moderate intensity and energy expenditure of 1200-2200 kcal per week would reduce TG concentration level (Mougios, 2008). Leon & Sanchez (2001) concluded 51 studies which revealed instabilityof TG reduction because of differences in energy expenditure.In the current study it is obvious that TG levels did not differ significantly between G^2 and G^3 groups, while G^2 presented lower levels although the youngsters exercised less than the other groups.If we combine this with the fact that no correlation was found between body fat percentage and body mass index with the TG, we conclude that the type of diet that players consume in order to maximize the beneficial effects of exercise might play an essential role.Ben Ounis, Elloumi, Ben Chiekh, Zbidi, Amri, Lac &Tabka (2008) support this view as they concluded that a 2-month combined exercise program of moderate exercise and appropriate diet reduce TG levels. Concerning HDL-C it is clear that soccer practice (G^2 και G^3) present beneficial effects on HDL-C levels and even considerably higher compared to children who are engaged solely in the physical education classes at school. The current study showed that the increase of HDL-C value of young players reached 11-12% while it could reach 20-30% in adults (Kotsovassilis&Bei, 2003). Eisenmann (2002) found that young athletes have higher HDL-C value than their peers who did not participate in sports. Therefore the current study adds that aerobic exercise benefits HDL-C values of young soccer players and not only adults (George A. Kelley et al., 2006; Leon &Sanchez, 2001; Hwahyung Lee et al., 2009).Furthermore, it was found that group G^3 which practiced more (3 sessions per week) indicated similar HDL-C values with G^2. Thus extra training does not affect more HDL-C value. An interesting finding of the current study was that the greater aerobic capacity is associated with higher levels of HDL-C. Eisenmann (2002) similarly found that VO2max is an important preventive factor of HDL-C. Thus the intensity of an aerobic training session affects HDL-C values of young players.The current study showed that the higher prices of HDL-C are not associated with body fat percentage and BMI. Similarly, Mougios (2008) found that the increase in HDL-C of trained players is independent of changes in the physical or fat mass.Finally, there were no statistically significant differences between the groups for TC and LDL-C.

Conclusions

The current study concludes that soccer is a sport activity that positively affects the lepidemic profile of youngsters. Specifically it was found that 2-3 training sessions per week benefits TG and HDL-C levels. The little difference of the weekly training sessions is not a determining factor that significantly affects the lepidemic profile of soccer players. In addition, VO2max levels positively affect HDL-C values. On the other hand, body mass index and body fat percentage was not related with any parameter of lepidemic profile.

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