The Level of Damage Caused by Football Matches on Players

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Abstract: Football is a team game requiring high level of athletic performance such as resistance, strength, flexibility, speed and promptness. The goal of this study is to determine the level of muscle damages of players caused by football matches. The study enrolled male football players of the local leagues, whose age, weight and height averages, body-mass indexes, and sport ages were 22.01±0.63 (years), 71.06±1.50 (kg), 177.67±0,06 (cm), 22.42±0.39 (kg)/[weight(m^2)], 8.50±0.49 years, respectively. Within the scope of the study, blood samples have been taken from the subjects at the amount of 5 cc each time for 4 times as "Before the Match", "During the Match", "After the Match" and "24 Hours After the Match". Over the blood samples, Creatine Kinase, Creatine Kinase Myocardinal Band, Lactate Dehydrogenase, Alanin aminotransferase, Aspartat aminotransferase and Gamma Glutamyl Transferase parameters have been analyzed. While statistical differences have been observed between Creatine Kinase Myocardinal Band and Lactate Dehydrogenase parameters, no statistical difference has been identified among the measurements of Creatine Kinase, Alaniamnotransferase, Apartaminotransferase and Gamma Glutamil Transferase. In conclusion, when all data are evaluated together, it can be claimed that while a football match increases the enzyme values of Creatine Kinase Myocardinal Band and Lactate Dehydrogenase, it can be overcome with 24 hours of resting and no statistical difference occurs among Creatine Kinase, Alaninaminotransferase, Apartaminotransferase, Gamma Glutamyl Transferase parameters and players adapt to the occurring damage during the match as a result of adaptation to the exercise.

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1. Introduction

Football is the most popular sports type both in our own country and in the world, and it appeals to large masses of people in the society (Köklü et al., 2009). Success in the football is based on the increase of players' performances. A football game consists of runs with several severities and distances. Football is a sports branch, in which aerobic and anaerobic exercises are performed together and respectively, and it requires some factors such as strength, speed, resistance, flexibility, promptness at the same time (Eniseler, 2010). The players having close contacts with each other, very rapid and frequent actions, press phenomenon - a very important matter in today's football -, consecutive and maximum efforts in especially 1-3 seconds with short brakes have become essential elements of football (Taşkın, 2006). These factors causing fatigue reveal themselves in the decrease of strength, flexibility and speed levels of skeletal muscles (Stupka et al., 2001; Friden and Lieber, 2001). While the muscles that take part in the action, produce strength during the sports activities, they have to contract eccentrically and concentrically (Proske and Morgan, 2007; Tskhovrebova and Trinick, 2002). Performing the exercises excessively and repeatedly may cause the muscle damage on the muscle which is exposed to eccentric contraction (Komi, 2000; Komi, 1984). In order to determine the skeletal muscle damage, differences in serum concentrations of Creatine Kinase (CK), Creatine Kinase Myocardinal Band (CK^{MB}), Lactate Dehydrogenase (LDH) (Clarkson and Hubal, 2002; Totsuka et al., 2002), Aspartat aminotransferase (AST), Alanin aminotransferase (ALT), Gamma Glutamil Transferase (GGT) (Brancaccio et al., 2010) have been examined. It has been determined that while metabolic and non-metabolic factors have a role in post-exercise concentrations and the muscle damages may be effective during the fatigues of 24 hours (Clarkson and Hubal, 2002; Jones et al., 1989), performing the exercises continuously and repeatedly may decrease the muscle and tissue damages (Balnave and Thompson, 1993; Nosaka et al., 1991).

The object of the study we have conducted is to examine the changes caused by a 90-minute football game on serum enzymes of football players having regular exercises and the reactions of these enzymes that are considered as related to the muscle damage.

2. Materials and Methods

2.1. Subjects

The study has included volunteer male football players of local leagues. At the beginning of the study, the subjects have been made to fill informed consent forms, and signed consents have been obtained. The age, weight and height averages, body-mass indexes, and sport ages were 22.01±0.63 (years), 71.06±1.50 (kg), 177.67±0.06 (cm), 22.42±0.39 (kg)/[weight(m^2)], 8.50±0.49 years, respectively. They have been weighed barefoot while wearing a t-shirt and pair of tights with a 0.01 kg sensitive bath type scale, and their heights have been measured barefoot with a 0.001 cm sensitive metal tape measure while standing upright and eyes looking opposite. Body mass index has been calculated with the formula weight (kg)/[height(m^2)]. Only the players who have had no injuries and taken place in the whole match of 90 minutes have been included in the study. The players included in the game afterwards and excluded from the game have not been integrated in the scope of the study.

2.2. Determination of Serum CK, CK ^{MB}, LDH, AST, ALT, GGT Parameters

Within the research, blood samples have been drawn from the subjects in the amount of 5 cc each time for 4 times as Before the match, During the match, Just after the match and 24 hours after the match. The serums of these blood samples have been separated by centrifuging for 10 minutes on 3000 rpm. The analyses (CK, CK ^{MB}, LDH, AST, ALT, GGT) have been performed in Biochemistry Laboratory of using Roche/Hitachi Modular P 800 autoanalyzer device.

2.3. Statistical Evaluations

SPSS 15.0 package program has been used for the statistical evaluation of the results. All data have been given as Average±Standard Error. After the descriptive statistics of all the variables have been performed, the effects of measuring time on impedance and reactance have been tested with ANOVA on repeated measurements. The times of the differences have been determined with Bonferroni Multiple Comparison Test in the cases where F has been statistical. The level of error has been determined as $p<0.05$.

3. Results

In the study, it has been found out that the highest CK ^{MB} levels have been determined After the Match, there has been a statistical difference between Before the Match and 24 Hours After the Match, and there have been differences between Before the Match and During the Match levels ($p=0.003$). As for the LDH data, it has been found out that the highest level is After the Match and there have not been any differences between After and During the Match. On the other hand, there has been a difference between 24 hours After the Match and there has been a statistical difference between During the Match and 24 Hours After the Match ($p=0.006$, $p<0.05$, Table 1)

No remarkable difference has been observed among Before the Match, During the Match, After the Match and 24 Hours After the Match when the CK ($p=0.140$), AST ($p=0.493$), ALT ($p=0.618$), GGT ($p=0.506$) levels of players have been examined in our study ($p>0.05$, Table 1).

Table 1. Comparison of blood CK, CK MB, LDH, AST, ALT, GGT results.

Parameters (n=12)		BM	DM	AM	24HAM
CK	**(U/L)**	407.43±73.22	533.75±89.65	605.66±88.42	795.92±21.58
CK ^{MB}	**(U/L)**	22.68±1.97^{cb}	27.01±1.52^{abc}	36.39±4.51^{a}	23.96±1.97^{b}
LDH	**(U/L)**	420.06±19.08^{abc}	461.43±12.47^{b}	519.93±28.03^{ab}	408.61±12.15^{c}
AST	**(U/L)**	27.93±2.52	31.50±2.43	32.73±2.34	31.61±2.49
ALT	**(U/L)**	21.62±1.53	21.75±1.87	20.40±1.02	20.53±0.81
GGT	**(U/L)**	11.68±0.80	11.56±0.74	11.06±0.74	12.23±0.67

a,b,c: In the same line differences among averages which have different letters are important ($p<0.05$).
BM: Before Match, DM: During Match, AM: After Match, 24HAM: 24 Hours After Match

4. Discussion

There is an increase in some enzyme activities after exercise and the level of damage can be determined with the determination of these increases (Garry and McShane, 2000; Hood et al., 1991). In this study, the highest CK ^{MB} and LDH enzyme activities of the football players who have been included in the match have been recorded just after the exercise. CK ^{MB} and LDH levels have returned to normal values After 24 hours of resting (Table 1). Studies over CK ^{MB} and LDH which have been used for defining Acute Myocardium Infarct (AMI) have indicated that enzyme level rises with exercise (Wang et al., 2011; Rahnama et al., 2011) and this rise is stabilized on high levels for a long time (48-72 hours) and giving a brake for having a rest is necessary by all means (Ispirlidis et al., 2008). As for our study, CK ^{MB} and LDH levels have returned to normal values at the end of 24 hours. Although statistical increases have been observed in CK ^{MB} and LDH levels of players during normal and intense exercise, it is important in terms of supporting our study that CK ^{MB} and LDH levels have been close to normal values with the blood samples which have been drawn 12 hours after the exercise

(Saengsirisuwan et al., 1998; Wu et al., 1992) and this a proof for the players adjusting to the occurring damage (Garry and McShane, 2000).

When CK, AST,ALT,GGT levels of the players have been examined in our study, no statistical difference has been observed among Before Match, During Match, After Match and 24 Hour After Match periods (Table 1). Although some studies have shown that intense exercise increases these parameters (Lippi et al., 2011), it is important to consider the intensity of the exercise as a reason for this increase (Hurley et al., 1995). Studies about the effect of exercise level on CK have declared that low or middle level exercises make no changes on enzyme levels within 24 hours but intense exercise have a great effect on it (Stansbie et al., 1983). It has been stated that CK levels of training players reach the peak level by doubling the normal level one day after the exercise and return to normal value 2 days later (Evans et al., 1986). It is important in terms of supporting our study that the findings of our study and previous researches are similar, though we cannot provide noticeable information about how long CK levels keep high after the exercise (Hayward et al., 1998). An important point in our study is that although there is a noticeable increase in CK parameter, a statistically important difference is not obtained. When pre-exercise data are evaluated, it is observed that only CK parameter is above normal levels while all the other parameters are normal. Thus, it may be inferred that CK parameter increases because of over-load to the players in the last 48 hours before the game or over-load to some players during the tactical exercise, and it does not return to the pre-game levels. Moreover, the studies conducted state that the exercised individuals have higher CK levels than normal levels and it is a chronic situation (Coutts et al., 2007).

As a result, when the data we obtained in this study are evaluated in accordance with the literature information above, it is observed that CK^{MB} and LDH enzyme values in a football game is high, this increase can be compensated with a 24-hour resting period. No significant difference has been observed in CK, AST, ALT, GGT parameters. It is inferred that the main reason behind the absence of difference and return of (CK^{MB}, LDH) parameters to normal levels with a 24-hour resting period is adaptation for the exercise as a result of the training.

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