HOMEOSTATIC, GLUCOLYTIC AND LIPOLYTIC PRESENTATIONS BEFORE AND AFTER SOCCER GAME

Abstract

Soccer is world-wide game played for health, entertainment and economic purposes. The effect of soccer activities on homeostatic, glucolytic and lipolyticbiochemical parameterswere estimated before and after 90 mins of full-time game. A total of twenty-two (22) male soccer players of a second-division soccer team participated in the study. The biochemicals parameters were analyzed using standard WHO approved methods. Biochemical parameters analyzed included serum electrolyte, plasma glucose, serum proteins and lipids. The statistical analysis was performed using student-t test on SPSS 22 version. The study showed that there was significant increase ($p<0.05$) in concentration of glucose & a decrease in potassium after the soccer game. The other parameters analysed were not significant. In conclusion, glucose and potassium concentrations should be monitored before and after regular exercise to avoid possible undesirable conditions.

1.0.Introduction

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Soccer is one of the most popular sports in the world. It is valuable economically and health wise. Economically, it supports creation of employment, and enhances commercial activities. Similarly, its participation improves health status by increasing expected life span (Seabra*et al.*, 2016). Due to the enormous economic value attached to soccer, patronage is on geometric increase. During a soccer match, players must perform many different body events that consist of jumps, walking, short to long runs, multiple turns with sudden stops, diving for tackles and other specific movements associated with the sport (Russel*et al.*, 2016). A lot of physiological alterations have been shown to be associated with soccer activities(Gravina*et al*, 2011; Kaufman &Lamster, 2002; Perrea*et al.*, 2014).

The metabolic and mechanical stress imposed on soccer players might induce physiologic disturbances that could be exacerbated during periods of prolonged or intense exposure. There are reports of alterations in the anabolic and catabolic hormonal environments (Kraemer et al. 2004; Handziski et al. 2006), muscle damage markers (Heisterberg et al. 2013; Meister et al. 2011), and immunologic (Rebelo et al. 1998) and redox states after periods of high-intensity soccer training and competition (Magalhães et al. 2010; Andersson et al. 2010).However, this study focused on the effect of soccer on the homeostatic, glucolytic and lipolytic mechanisms of the body.

Homeostatic biochemical parameters ensure that fluid content is optimally maintained within the various cellular components of the body. Electrolytes such as sodium, potassium, chloride and bicarbonate play critical role in maintaining physiological water balance in the body. The lipolytic parameters are majorly involved in maintaining cellular tensile strength and limiting transportation of molecules optimally. Cholesterol, triacylglycerol, HDL and LDL are the major lipid parameters evaluated routinely in the laboratory. Glucolytic parameters such as glucose is utilized in the evaluation of glucose tolerance, which is the major source of energy. The body ensures glucose concentrations are maintained within the physiological range. Physiological range varies between 2.5 mmol/L to 5.6 mmol/L.

Soccer is an energy demanding venture that has the preponderances of triggering physiological alterations that could be beneficial or deleterious. A lot of soccer players have collapsed on the pitch and died due to metabolic compromise and other idiopathetic reasons (Wikipedia, 2022). .

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There is dearth of literatures on the aspect of homeostatic, lipolytic and glucolytic alterations associated with soccer activities.This gap if empirically evaluated could added value to sport medicine and reduce the increasing collapses and deaths associated with soccer. This study was therefore designed to examine, for the first time, homeostastic, lipolytic and glucolytis alterations in soccer players in Bayelsa State. The findings could be of optimal use in sport and preventive medicine especially as it concerns soccer in Bayelsa State and Nigeria at large.

2.0. Materials and Method

2.1. Study Area

The study was carried out in Yenagoa, the capital of Bayelsa State, Nigeria. Samples for the study were collected from soccer players in Yenagoa Local Government Area of Bayelsa State.

2.2. Ethical Clearance

The ethical approval was obtained from the Bayelsa State Ministry of Health. Prior to the study, all participants underwent a health-screening procedure. The subjects also received a detailed description of the study procedures. For the duration of the study, all participants were advised to follow a balanced diet. On the days for evaluation, the participants followed their typical pre-training dietary pattern of a breakfast. This research was carried out in accordance with the

Ethical Principles for Medical Research involving human subjects as outlined in the Helsinki Declaration in 1975 (revised in 2000).

2.3. Subjects

Twenty-two (22) players were present during the course of this study. The players were of a second-division soccer team. Samples were taken before and after 90 minutes play. The participants were within the age range of 24 to 30 years. Using aseptic technique, 6ml venous blood samples was collected into the appropriate containers and processed before sending the laboratory for the biochemical analysis.

2.4. Laboratory Analysis

Randox reagent was used for the analysis of plasma glucose using the Glucose Oxidase-peroxiase method. The Bromocresol green method was used for the determination of serum albumin. Serum cholesterol, triacyglycerol, and HDL were estimated enzymatically with the aid ofAgape Diagnostics Switzerland reagent. Serum LDL was derived mathematically as posited by Burtis et al (2003). Serum electrolytes concentrations were estimated with the Ion Selective Electrode (ISE) (Analyzer ISE 4000, France).

2.5. Statistical Analysis

The statistical package for social sciences (SPSS), version 23 (SPSS Inc., Chicago, IL, USA) and Microsoft excel version 2010 was used for all analyses. Results were expressed as mean±standard deviation while comparisons were made between before and after the activities using the students *t*-test The level of statistical difference was set at $p<0.05$ at 95% confidence interval.

3.0. Results

Table 1 shows the comparison between the concentrations of samples collected before & after soccer game for Glucose, HDL, TG, Albumin, Cl, Na, K, HCO_3^-. The analysis revealed a significant increase in plasma glucose concentration after soccer, whereas serum potassium decreased.

Table 1: Mean comparison of studied biochemical parameters between before and after soccer activities

PARAMETERS	BEFORE EXERCISE	AFTER EXERCISE	T-VALUE	P-VALUE
Glucose (mmol/dL)	4.32±0.945	5.27±0.89	-2.908	0.007*
Total cholesterol (mmol/L)	4.119±0.449	3.983±0.383	0.924	0.363
TG (mmol/L)	1.12±0.776	1.078±0.633	0.175	0.862
HDL (mmol/L)	1.119±0.449	0.983±0.383	0.924	0.363
Total protein (g/dL)	45.681±3.139	48.034±4.092	-0.825	0.078
Albumin (g/lL)	45.681±3.139	48.034±4.092	-0.825	0.078
Chloride (mEq/L)	114.515±26.191	113.923±24.008	0.067	0.947

Sodium (mmol/L)	**134.454±42.364**	**136.942±10.138**	**-0.228**	**0.821**
Potassium (mmol/L)	**4.437±0.649**	**3.727±0.781**	**2.795**	**0.009***
Bicarbonate (mmol/L)	**21±3**	**24±5**	**1.189**	**0.301**

*Key: * indicate significant difference (P<0.05) between the compared mean values.*

4.0. Discussion

This study revealed a significant increase in concentration of plasma glucose and a decrease inserum potassium concentration after soccer match when compared to before the game (Table 1). Other parameters were significantly not different. Glucose concentration is a measure of glucolyticcapacity, whereas potassium functions both as homeostatic and neural molecule.

Glucogenic capacity is a function of the rate of glucose entering the circulation balanced by the rate of removal. This significant increase in glucose concentration is an indication of high energy expenditure required for an exercise such as soccer to be successfully executed. Due to the high energy requirement the body could source for glucose from other sources of the body to ensure glucogenic capacity is maintained. Glucose could be sourced from stored glycogen and/or other non-glucose sources to maintained glucogenic tendencies. This has affirmed that exercise such as soccer should the executed by only persons that are healthy and energetic. The stance of this study is in line with the suggestion that during exercise, the rate of glucose release from the liver is high enough to compensate for the use of blood glucose throughout a game (Krustrup*et al.*, 2005).

Potassium concentration also shows significant reduction. This significant change is indicative of dehydration owing to loss of water through sweating during the exercise. Similarly, the resultant hypokalemia could be due to the involvement of potassium in the breakdown of glycogen to supply energy for the body. When glycogen breaks down to supply energy for exercise, muscle cells are depleted of potassium. This basis of hypokalemia was also advanced by handful of other authors (Emenike et al., 2014; Armstrong and Epstein,1999; Armstrong et al.,1985).

The alterations observed could be reversible after the period of exercise, however, intake of diets containing potassium could be helpful in maintaining its optimal concentrations. Furthermore, checks on potassium concentration amongst athletes and other involved in exercise should be encouraged as to avoid hypokalemia.

Conclusion

In conclusion, the increase in glucose concentration and the fall in potassium concentration immediately after soccer exercise is the significance of this work to body of literature, These parameters are essential to health and should be integrated as baseline investigations amongst athletes and other involved in exercise.

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Comment [MF2]: Arrange sources according to the journal system
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