Research Article

Magnesium Level of Young Saudi Soccer Players

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Abstract

Background: Hypomagnesaemia may occur during training and competition as a result of poor dietary intake and excessive sweat loss. No study has yet explored serum magnesium (serum Mg) levels among Saudi athletes. **Aim:** To assess levels of serum Mg in young Saudi soccer players. **Methods:** A cross-sectional design was used in this study. A total of 34 young Saudi soccer players were included in the sample, and the height, weight, and skinfold measurements of each player were recorded. A single blood sample was taken from each player on a day on which they had participated in a training session, and the serum magnesium in the samples was then analyzed. A descriptive data analysis was used. **Results:** The data show that the mean of serum magnesium concentration was 0.83 ± 0.20 mmol/L, and concentration varied between a minimum of 0.23 and a maximum of 1.41 mmol/L. **Discussion:** The results of this study show that Mg concentration in the sampled athletes' blood was normal. Further research should take blood samples on several days where the athletes are either between competitions or engaged in competitions, or are exercising at different levels of intensity.

Keywords: Serum magnesium; Hypomagnesaemia; Hypermagnesemia; Electrolytes

Introduction

Soccer is famous worldwide. New techniques in the sport have led players to focus on training load and dietary intake. Soccer players are very much aware of the importance of a healthy diet in fueling the body with optimal nutrients, and that insufficient minerals in the body may lead to impaired performance. [1] Magnesium (Mg) is involved in physiological processes related to general health and performance. [2] Therefore, Mg is one of the most important minerals for the human body. It is considered to be the fourth rich mineral and the second copious intracellular divalent cation in human body. [3] Some food and dietary supplements contain Mg. Moreover, Mg has been classified as a cofactor for more than 325 enzyme systems, which means that it is involved in biochemical processes in the body. [4-6] Deficiency of Mg increases muscle fatigue during exercise and affects recovery. [7,8] The reference range of serum Mg is between 0.65 and 1.05 mmol/L. [9-11]

Intensive exercise leads to increase sweat and urine volume loss that can cause a loss of 10%-20% of the Mg in the body. [12] Due to these functions and effects, Mg can be considered to be a fundamental mineral of the body which is present in 50%-60% of soft tissues and bones. [13] The normal reference range of serum Mg is between 0.75 and 0.95 mmol/L. [14] For athletes, Mg is particularly important due to the role it plays in muscle contractions and regulating heart rhythm. It is involved in the activation transport of potassium and calcium ions in cell membranes, and is classified as ergogenic aid for athletes. [3,15]

Measuring serum Mg concentration in soccer players can be useful for recovery efficiency. [5] A prospective study has found that professional soccer players have a lower range of serum Mg levels than the normal range. [16] In another study, Siquier et al. found that soccer players' serum Mg was in the normal range and no differences were observed in Mg concentration pre- and post-exercise. [17]

Noda et al. assessed the Mg intake of soccer players by measuring the frequency and type of their daily dietary intake, revealing that soccer players had lower Mg intake than the recommended dietary intake. [18] Another study has also found a similar outcome where athletes in the study did not consume the optimal amount of Mg. [19] Córdova et al. found an interesting outcome: Serum Mg concentration was lower in basketball athletes during high-intensity exercise and during competitions. [1] This suggests that exercise, heat and performance intensity might play a role in Mg concentration due to excessive fluid loss or low dietary intake of Mg. [20] No study has yet investigated the level of serum Mg among Saudi athletes. The current study aims to assess the level of serum Mg among young Saudi soccer players.

Methods

A cross-sectional design was used for the current study. The study has been approved by the ethical committee at King Saud University to conduct the study (4/67/352673). All participants were informed of the purpose and procedure of the current study. Consent forms were signed by all players who agreed to participate in this study.

Participants

A total of 34 young Saudi soccer players were recruited to participate in the study (mean ± age 20.2 ± 0.84 y, body weight 66.0 ± 5.25 kg, height 1.75 ± 0.04 m and body fat 6.7% ± 1.66%).

Anthropometric measurement

Measurements of body weight were obtained to nearest 0.1 kg

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Table 1: Characteristics and serum Mg of Saudi soccer players Mean ± SD, minimum (Min) and maximum (Max).

Variable	Mean ± SD	Min/Max
Age (years)	20.2 ± 0.8	(19-22)
Body weight (kg)	66 ± 5.3	(55.1-73.7)
Height (cm)	1.75 ± 0.03	(1.63-1.82)
Body Fat (%)	6.67 ± 1.66	(3.90-13.70)
Serum magnesium (mmol/L)	0.83 ± 0.20	(0.23-1.41)

using a digital scale (Seca, 813, Germany) before the training session started, and height measured to the nearest 0.01 cm by stadiometer (Seca, 213 Germany). Four-site skinfold thickness was measured from the suprailiac, triceps, abdominal and thigh using a Holtain skinfold caliper (Holtain Ltd., Crymych, UK) in order to calculate body fat percentage. The sum of skinfold measurements was used in Jackson and Pollock equation to determine total body fat, as follows:

Total body fat=(0.29288 × sum of skinfolds)-(0.0005 × square of the sum of skinfolds)+(0.15845 × age)-5.7637721.

Blood samples

On the day of measurement, a single blood sample was taken from each soccer player in the team. Blood samples were obtained approximately 30 minutes prior to training. Serum tubes of 5 ml capacity which contained a clot activator (BD vacutainer system, Plymouth, UK) were used to collect samples. The blood samples were transported immediately after collection to a laboratory for analysis. The tubes were left in the laboratory for about 30 minutes under normal room temperature. They were then were centrifuged for 15 min at 1500 g, and serum Mg was measured using a siemens integrated multisensor.

Statistical analysis

A descriptive data analysis used in this study and is presented as mean and standard deviation. All data analysis was carried out using IBM's SPSS version 27 (version 27 SPSS, Inc. Chicago, Illinois).

Results

A summary of the players' characteristic (e.g. age, weight, height, body fat %, and Mg). The 34 Saudi soccer players were aged between 19 and 22 years old, and their mean serum Mg concentration was 0.83 ± 0.20 [Table 1].

Discussion

This study aims to assess the level of serum Mg among Saudi young soccer players. Serum Mg concentration was analyzed in order to detect whether soccer players had an optimal level of serum Mg on a day in which they were training. Our results demonstrate that serum Mg concentration in the Saudi soccer players' blood was normal: Serum analysis of Mg concentration was 0.83 mmol/L, which is within the normal range. [9-11] Moreover, Mg concentration ranged between 0.23 and 1.41 mmol/L; this shows a variation among the players.

A state of hypermagnesemia is a condition in which Mg concentration in the blood exceeds the normal range, whereas hypomagnesaemia refers to a low concentration of Mg. [21,22] It has been shown that hypermagnesemia is very rare compared to hypomagnesaemia. [23] Poor dietary intake and excessive sweat loss can cause hypomagnesaemia during periods of training and competition. [24] It has been demonstrated that vigorous exercise affects Mg concentration, [25] and thus it is important to consider how exercise intensity affects mineral levels in athletes.

The variation in serum Mg noted in our study has also been found in other studies of soccer players. [5,26] Based on this agreement between studies, the role of Mg in metabolic function and in specific glucose availability must be considered. [4] Normal Mg concentration can be restored 24 hours after exercise, [27] but this depends on optimal dietary intake.

Conclusion

The results of this study show that Mg concentration in the sampled athletes' blood was within the normal range. However, exercise intensity and competition time during the season may affect Mg concentration in the long term. Frequent measurements could detect differences and deficiencies of electrolytes in athletes. In addition, dietary and fluid intake and loss assessments should be carefully considered before planning nutritional strategies for athletes. Mg supplements can help athletes to enhance performance, especially if not enough Mg is being consumed in meals.

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