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Seminal Plasma Magnesium and Premature Ejaculation: a Case-Control Study

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ABSTRACT

Introduction: Our aim was to determine the relationship between genuine premature ejaculation and serum and seminal plasma magnesium.

Materials and Methods: In a case-control study carried out between January 2002 and December 2003, 19 patients with premature ejaculation were evaluated and compared with 19 patients without premature ejaculation. Patients with organic and psychogenic causes were excluded. Seminal plasma and serum magnesium levels were measured using atomic absorption spectrophotometery.

Results: Seminal plasma magnesium levels in study patients (94.73 ± 10.87 mg/L) were significantly lower than they were in controls (116.68 ± 11.63 mg/L, $P < 0.001$), but there were no such differences regarding serum magnesium levels (study patients, 20.26 ± 2.66 mg/L; controls, 20.73 ± 2.80 mg/L). Semen-to-serum-magnesium ratio was significantly lower in patients with premature ejaculation ($P < 0.001$). Also, a reverse relationship between body mass index and genuine premature ejaculation was found ($P = 0.027$).

Conclusion: Genuine premature ejaculation has a significant relationship with decreased levels of seminal plasma magnesium. Further studies are needed to clarify the actual role of magnesium in the physiology of the male reproductive tract, especially its association with premature ejaculation.

KEY WORDS: genuine premature ejaculation, seminal plasma magnesium, plasma magnesium

Introduction

Premature ejaculation is the most common sexual dysfunction in men.[1] Magnesium is one of the elements present in human semen, and it is required for enzymes that act on phosphate-containing substrates. A decrease in magnesium level will result in an increase of thromboxane A2 (TxA2), and this will lead to a rise in endothelial intracellular calcium, and subsequently, a decline in nitric oxide (NO).[2,3] Since NO is a vascular smooth-muscle-relaxing factor,[4] cavernosal smooth muscle contraction, resulting from decreased NO, may be a contributing factor to premature ejaculation.[5] Few studies have been performed that assess the possible relationship between semen magnesium levels and genuine premature ejaculation. Our objective was to evaluate factors that may contribute to premature ejaculation, with special consideration given to the role of magnesium.

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Materials and Methods

In a case-control study carried out between January 2002 and December 2003, 19 patients with premature ejaculation were evaluated and compared with 19 patients without premature ejaculation. The patients were randomly selected from among the patients referred to our clinic at Sina Hospital, in Tehran, Iran. Premature ejaculation was defined based on criteria of the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (DSM-IV).[6] Each patient's history was taken, and a systemic physical examination was performed. Duration of being sexually active, smoking (pack-years), coital habits, level of education, and the history of psychiatric problems were also assessed. The patient's weight and height were recorded. Special attention was paid to the presence of gynecomastia, genital abnormalities, and secondary sexual characteristics. Laboratory studies included complete blood count, fasting blood sugar, blood urea nitrogen, serum creatinine, cholesterol, thyroid function tests, liver function tests, testosterone, prolactin, LH, and FSH.

Inclusion criteria were duration of marriage longer than 6 months, history of premature ejaculation for more than 6 months, and the lack of response to sex therapy. Patients were excluded if they had organic disorders such as diabetes mellitus, hypertension, vascular disorders, endocrine disorders, renal failure, previous genitourinary surgery, premature ejaculation for less than 6 months, intermittent premature ejaculation, abnormal mental status, or history of psychiatric disorder.

Nineteen patients complaining of premature ejaculation and fulfilling the inclusion criteria were selected as study patients, and 19 persons with nephrolithiasis and other normal parameters were chosen as control patients. Duration of marriage, smoking habits, level of education, history of drug abuse, and body mass index (BMI) were compared between the two groups. The demographic characteristics of all patients are shown in Table 1.

Semen analyses were performed according to WHO guidelines.[7] After 3 to 5 days of abstinence, semen was collected by masturbation (without using any lubricant gel) into a sterile acid-wash container. Specimens were centrifuged within 30 minutes of collection at 100 rpm for 10 minutes at 4°C. Aliquoted samples were stored at -80°C until they were assayed. Blood samples were taken at the same time. Serum magnesium levels were measured using atomic absorption spectrophotometry (AA670, Shimadzu, Japan). The supernatant samples were liquefied at room temperature and diluted 1:10 in deionized water. Phosphate ions were eliminated by lanthanum chloride. The magnesium stock standard was obtained from Tetrazol (Sigma, St Louis, MO). Semen samples contaminated with blood or pus, in addition to those with pH < 7 or pH > 8, were excluded.

Statistical Analyses

Data are expressed as means ± standard deviation. SPSS software (Statistical Package for the Social Sciences, version 9.05, SSPS Inc, Chicago, Ill, USA) was used for data analyses. The Kolmogorov-Smirnov test was used to determine that magnesium levels had normal distribution. The relationships between parameters were analyzed using Student *t* and chi-square tests. A value for *P* less than 0.05 was considered significant.

Results

Analyses of the clinical variables are presented in Table 1. A statistically significant relationship was found only between BMI and genuine

TABLE 1. *Demographic characteristics of the pateints*

	Case	Control	*P* value
Number	19	19	-
Age (year)	31.37 ± 3.84	34.1 ± 8.81	0.22
Duration of marriage (year)	3.13 ± 3.53	7.10 ± 9.39	0.93
Smokers (number)	8	7	0.74
Smoking (Pack-year)	13.89 ± 26.59	14.78 ± 28.83	0.92
BMI (kg/m2)	23.12 ± 210	24.73 ± 2.22	0.027
History of drug abuse	3	1	0.29

TABLE 2. *Semenal plasma and serum magnesium*

	Case	Control	*P* value
Serum magnesium (mg/L)	20.26 ± 2.66	20.73 ± 2.80	0.597
Semenal plasma magnesium (mg/L)	94.73 ± 10.87	116.68 ± 11.63	< 0.001
Semenal magnesium / serum magnesium	4.71 ± 0.58	5.68 ± 0.66	< 0.001

premature ejaculation (P = 0.027), corresponding to a slightly lower BMI in patients with premature ejaculation. A similar relationship was found between seminal plasma magnesium levels (Table 2) and premature ejaculation; magnesium levels were higher in the seminal fluid of the study patients (P < 0.001). It was also found that seminal-plasma-magnesium-to-serum-magnesium ratio was significantly higher in study patients (P < 0.001). There was no significant correlation between serum magnesium levels and genuine premature ejaculation (P = 0.597).

Discussion

The magnesium ion has an essential role in enzyme activation in the body. It is known that seminal plasma magnesium in each person (> 70 mg/L) is much higher than its serum levels (17 mg/L to 24 mg/L).[8] There is tremendous evidence that a long duration of physical effort in men leads to a decrease in extracellular magnesium due to a transient shift between extracellular and intracellular magnesium components and a simultaneous increase in urinary excretion.[9,10] This transient hypomagnesaemia may be manifested by uncontrolled contractility of the male genital tract, causing emission and ejaculation.

Hypomagnesaemia stimulates angiotensin-induced aldosterone synthesis and TxA2 overproduction by phospholipase A2. Engagement of TxA2 results in Ca^{++} influx.[2,11] Elevated cytosolic Ca^{++} in endothelial cells promotes phosphodiesterases and decreases G-cyclase activity,[3,4] resulting in decreased NO production and its release from the endothelium.[2] This causes decreased cGMP, which in turn results in decreased NO production. Since NO is a vascular smooth muscle relaxing factor,[4] decreased levels of NO consequently lead to vasoconstriction. This could be responsible for the lack of tumescence associated with premature ejaculation. Decreased prostaglandin I2 (PGI2) production associated with magnesium decline is another mechanism (Figure 1).[3]

In a study by Omu and coworkers, levels of magnesium, zinc, copper, and selenium were evaluated in serum and seminal plasma of 3 groups, consisting of 15 men with normal sperm parameters, 15 with oligoasthenospermia, and 9 with genuine premature ejaculation. Serum and semen levels of all elements in the 3 groups were normal, except for seminal plasma magnesium levels, which were lower in men with premature ejaculation.[5]

The association between low seminal

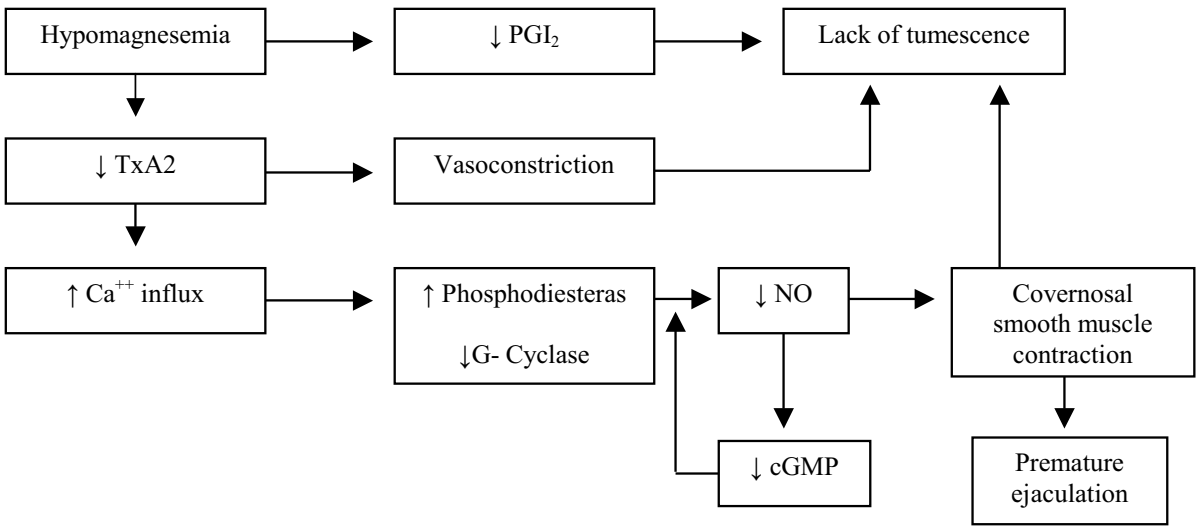

FIG. 1. The suggested machanism of hypomagnesemia effect on premature ejaculation

magnesium levels and genuine premature ejaculation found in our study is of clinical significance and accordingly, 3 hypotheses can be suggested: 1, seminal magnesium decline could be a consequence of a defect in the active transport system that transports magnesium from blood to semen; 2, there may be a magnesium-diminishing factor like chelating factors in the semen of persons with premature ejaculation; and 3, hypomagnesaemia in the past, caused by low consumption of magnesium, may contribute to seminal plasma magnesium decline. Epidemiologic studies have reported that the amount of magnesium consumption in most individuals is 20% to 30% less than the recommended dietary allowance during prolonged periods.[12] Thus, it is probable that the consumption of higher amounts of magnesium leads to an increase in seminal levels of magnesium.

BMI in our study patients may have been a confounding factor. We found that a sedentary lifestyle and higher BMI may decrease the incidence of premature ejaculation. More studies are required to elucidate this.

Conclusion

Genuine premature ejaculation has a significant relationship with decreased levels of seminal plasma magnesium and semen–to–serum-magnesium ratio. Also, there is a relationship between the BMI and genuine premature ejaculation. However, more studies are warranted to determine the role of magnesium in the physiology of the male reproductive tract and especially its association with premature ejaculation. Interventional studies with magnesium supplements seem to be useful as well.

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