THE ROLE OF BIOELEMENTS
IN IMPROVING THE QUALITY OF LIFE
OF PATIENTS SUFFERING FORM THE PREMENSTRUAL SYNDROME (PMS)

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Abstract

The Premenstrual Syndrome (PMS) is described as a cyclical disorder related to the hormonal changes during a menstrual cycle, which affects the emotional and physical health of many women during their reproductive period of life. The PMS can obviously change the quality of life. The syndrome is characterized by a complex group of symptoms, such as depression, irritability, mood swings, anxiety, abdominal discomfort. These signs occur during the luteal phase of a menstrual cycle and disappear after the onset of menses.

Some studies suggest that a variety of nutrients may play an important role in the mood swings which occur cyclically during the course of the premenstrual syndrome and that some can have a beneficial impact, especially on the estrous phase of a menstrual cycle.

The aim of the paper is to review the results of some studies concerning the role of bioelements in patients with the PMS.

Concentrations of magnesium, zinc, selenium and manganese are the highest during menses and the lowest in the ovulatory phase.
Fluctuations of the magnesium concentration during a menstrual cycle and the involvement of this element in many cellular pathways and neuromuscular activities obviously affect the incidence or intensity of the PMS symptoms. However, we lack firm evidence that magnesium supplementation can have a positive effect on alleviating the PMS-related ailments.

Some relationship between the PMS and bone demineralization or depressed calcium concentration in blood has been identified. However, further studies are necessary to examine how the calcium concentration in a human body can decrease the intensity of the PMS symptoms.

Key words: premenstrual syndrome (the PMS), bioelements.

INTRODUCTION

The Premenstrual Syndrome (PMS) is described as a cyclical disorder related to the hormonal changes in the menstrual cycle, which affects the emotional and physical health of many women during their reproductive
period of life. The syndrome is characterized by a complex group of symp-
toms that occur during the luteal phase of the menstrual cycle but disap-
ppear soon after the onset of menses (Thys-Jacobs 2000).

The symptoms are limited to the luteal phase of the menstrual cycle, abate shortly after the onset of menses, and commonly include depression, irritability, mood swings, bloating, breast tenderness and abdominal discom-
fort. Women with predominant affective symptoms may also meet the crite-
ria for the premenstrual dysphoric disorder, a more severe form of the PMS associated with significant impairment of normal functions; recent studies estimate that 5 to 8% of premenopausal women meet the criteria set for
the premenstrual dysphoric disorder (Bertone-Johnson et al. 2005).

Because of the number and diversity of the symptoms, many theories
and mechanisms have been proposed to explain this syndrome, with an
array of therapeutic approaches offered. Most of these approaches have proven disappointing and scientifically unfounded (Thys-Jacobs 2000).

There are some studies that suggest that a variety of bioelements may
play an important role in the phase when mood swings and behavioural
disturbances of the premenstrual syndrome appear, and some of these mi-
cronutrients can even level their cyclic fluctuations during the estrous and
menstrual cycles.

The aim of the paper is to review the results of some studies concern-
ing the role of bioelements in patients with the PMS.

There is some firm evidence that the PMS is related to hormonal fluc-
tuations during a menstrual cycle and occurs only in women with ovulatory
cycles. The PMS does not occur prepubertally or during a menopause (Ferrin et al. 1993).

The ovarian activity is cyclical and variations in the metabolism of bio-
elements may accompany hormonal fluctuations during a normal menstrual
cycle and may help explain some characteristics of the PMS. Cyclical fluctu-
ations during the estrous cycle have been demonstrated in a few animal
investigations. The cyclic hormonal changes can affect a variety of physio-
logical and biochemical processes. It has been reported that oestrogen in-
duces hypercalcemia through the action of the parathyroid gland. Withdraw-
al of oestrogen is reported to cause a significant loss of bone calcium. It has
been observed that an increase in the basic metabolic rate and oxygen con-
sumption during the luteal phase is associated with increased carbohydrate
utilization. This elevated metabolism requires magnesium ions and oxida-
tive enzymes, which have been found to increase significantly during the
luteal phase. It has also been found that the phosphate concentration falls
more rapidly than the calcium rise after administration of the parathyroid
hormone. This decline in the phosphate concentration is caused by a strong
effect of the parathyroid hormone on the kidney, causing renal phosphate
excretion (Dullo, Vedi 2008). Pandya et al. (1995) have reported that serum
inorganic phosphorus levels were higher in the menstrual phase as com-
pared to the other phases. These ions are regulated by various hormones but predominantly by the sex hormones.

Concentrations of magnesium, zinc, selenium and manganese are the highest during menses and the lowest in the ovulatory phase. There is a rise in ionized magnesium and selenium levels, with a fall in zinc and manganese during the luteal phase. Muneyyirci-Delale and Nacharaju (1999) noted a significant increase in the serum Ca<sup>2+</sup>/Mg<sup>2+</sup> ratio both in the ovulatory and luteal phases in healthy women.

In thirty-two women with the PMS, supplementation with 360 mg day<sup>–1</sup> of magnesium (during the second half of a menstrual cycle) significantly reduced the general PMS symptoms and especially those related to mood changes. It should be noted that the experimental design resulted in the placebo group receiving only two months of supplementation at crossover, whereas the magnesium group received the supplement for four months (Facchinetti et al. 1991a). In 20 patients with premenstrual migraine, prophylactic supplementation with magnesium (360 mg day<sup>–1</sup> or placebo during the second half of a menstrual cycle) significantly reduced the number of days with a headache (Facchinetti et al. 1991b).

Chuong and Dawson (1994) in their trial determined that the level of zinc in blood in patients with the PMS was significantly lower during the luteal phase than during the follicular phase, whereas in the controls zinc values were not significantly different between the follicular and the luteal phases. Copper levels were noted to be higher during the luteal phase in the PMS patients compared with the controls. Because copper competes with zinc for intestinal absorption and serum protein binding sites, the zinc/copper ratio can reflect the availability of zinc in the body. The calculated values of this ratio revealed that it was significantly lower during the luteal phase in treated patients than in the controls.

Thus, fluctuations in the metabolism of bioelements, especially calcium and the calciotropic hormones, have been observed during both the menstrual and estrous cycles, and these cyclical changes may help explain some of the features of the PMS.

Magnesium fluctuates throughout a menstrual cycle and is involved in many cellular pathways and neuromuscular activities which affect the PMS. The clinical evidence on magnesium supplementation, although promising, remains limited. A double blind randomized study examined the effect of magnesium (360 mg day<sup>–1</sup>) compared to placebo during two cycles. Magnesium was administered during the luteal phase of a menstrual cycle until the onset of menstrual flow. Although magnesium was found to reduce total symptom scores and the negative group of symptoms, the baseline symptom scores between the treatment groups was significantly different and the expected placebo effect was lacking in this trial. In another study, benefits of magnesium supplementation for the PMS patients were investigated in a double blind crossover trial over four menstrual cycles (Thys-Jacobs 2000).
Magnesium is an important element that helps to form bones, relaxes muscle spasms, activates cellular enzymes, regulates nerve and muscle function (including the heart) and acid-alkaline balance. It is often referred to as an anti-stress element. Deficiency of magnesium is known to cause many symptoms usually associated with the PMS, such as irritability, depression, confusion and muscle aches. However, determining if a woman is deficient in magnesium can be a challenge.

Many sources of food that are thought to contain magnesium according to old nutrient charts (grains, legumes, vegetables, nuts and seeds) are actually low due to magnesium deficit in soil and its depletion during processing and cooking. Measuring magnesium levels in the blood plasma will often fail to demonstrate low levels, although erythrocyte magnesium levels have been shown to be low in the PMS patients (Rosenstein, Elin 1994). Therefore, woman who want to have a true picture of their magnesium levels should be encouraged to have an erythrocyte magnesium level test done. Oestrogen enhances the utilization of magnesium. However, if oestrogen levels are high, which is often the case in the PMS, and magnesium intake is less then optimal, oestrogen-induced shifts of magnesium can be deleterious, leading to muscle spasms, migraine, and other PMS disorders. In one study, serum levels of magnesium were inversely related to the serum level of oestrogen (Seelig 1993).

Magnesium supplementation can help to alleviate many measurable parameters of the PMS, including cramps, irritability, fatigue, depression and water retention. Magnesium citrate, gluconate, and lactate are better absorbed than magnesium oxide. Magnesium glycinate is a well absorbable form of magnesium, with minimum laxative effects (Walker, De Souza 1998).

Two investigations have identified a relationship between the PMS and bone loss, further indicating a derangement in calcium metabolism in the PMS as a potential biologic trigger. In 1994, Lee and Kanis (1994) examined the relationship of premenstrual and postmenopausal symptoms with vertebral osteoporosis by means of a retrospective case control questionnaire.

Three calcium trials have demonstrated the efficacy of calcium treatment. Another randomized, double blind crossover trial was conducted to assess the effectiveness of calcium in women with the PMS (Thys-Jacobs et al. 1998).

Continuing Survey of Food Intakes by Individuals (Cleveland et al. 1996) shows that among menstruating women (ages 12 to 50 years) the mean daily intake of calcium ranged from 607 to 809 mg, suggesting that most of the population at risk of the PMS are not receiving the recommended intake levels. Therefore, since most women consume far less than 1.0 mg day\(^{-1}\) of calcium from food, they would not exceed the safety limit if they added 1.0-1.2 mg day\(^{-1}\) of supplemental calcium to their normal dietary intakes. Calcium, unlike some other supplements tested for the PMS relief efficacy, is safe even to women who may become pregnant. It is also relatively inexpensive, especially in comparison with prescription medications.
The PMS shares many of the features of depression, anxiety and the dysphoric states. Recent evidence has suggested that the PMS may be associated with some disorder in calcium homeostasis and parathyroid hormone dysregulation. In addition to the abnormalities in calcitropic hormones and the clinical response observed on calcium supplementation in the PMS, a relationship between the PMS and bone loss has been identified, further supporting a derangement in calcium metabolism occurring during the PMS. Clinical illness such as the PMS could be a reflection of an important physiological disruption in calcium regulation, while an adequate treatment of the PMS could help to restore bone mineral homeostasis and reverse the associated neuropsychiatric disturbances (Thys-Jacobs 2000).

REFERENCES


