

Primary Dysmenorrhea and Serum Magnesium In Young Girls A Pilot Study

Chhabra S^{1*}, Gokhale S² and Yadav S³

¹Department of Obstetrics Gynecology

*Corresponding author: Dr. Chhabra S, Mahatma Gandhi Institute of Medical Sciences Sevagram, Wardha 4420102, Maharashtra, India; Email: schhabra@mgims.ac.in

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Abstract

Background: *Dysmenorrhea or painful menstruation is one of most common gynecological complaints, leading cause of periodic morbidity in adolescents. Almost every young girl, experiences this pain at some or other time in her life. In spite of an overall high prevalence, disorder continues to be paid scant attention. There is scarce visible research, though dysmenorrhea, premenstrual tension affects millions of girls globally. Magnesium, because of its nutrient action on body systems might be playing some role.*

Objectives: *To study correlation between primary dysmenorrhea and serum magnesium*

Material Methods: *In pilot study serum magnesium estimation was carried out in 50 girls who volunteered to be part of study. Five ml of venous blood was withdrawn on first day of menses, around 10 – 11 Am. Twenty girls did not have dysmenorrhea (13 medical, 7 nursing students), 30 girls had dysmenorrhea (17 medical, 13 nursing students of same campus). Serum magnesium levels were estimated by atomic reabsorption and results were analyzed.*

Results: *When presence or absence of dysmenorrhea and serum magnesium levels were compared, the mean serum magnesium level was 1.502±0.476mg/dl in girls who had dysmenorrhea and it was 1.750±0.451mg/dl in girls without dysmenorrhea, difference of 0.248±0.025 mg/dl (significant). This did get affected with some variables, (age, weight, economic status), but all girls with dysmenorrhea had lower levels of magnesium than those who had dysmenorrhea*

Conclusion: *Further studies are needed for better understanding of management of dysmenorrhea in young girls.*

Keywords: *Primary dysmenorrhea, Adolescents, Magnesium*

Background

Decades back, in a study conducted by Abraham, it was found that women who exhibited symptoms of anxiety, nervousness, depression during premenstrual period, consumed five times more dairy products and three times more refined sugar than those who did not exhibit these symptoms (Abraham 1983). Dairy products and calcium are known to interfere with magnesium absorption. Refined sugar increases the urinary excretion of magnesium. A combined excess intake of dairy products and sugar would result in chronic magnesium deficiency. Facchinetti et al (1991) reported that oral magnesium supplementation relieved negative affective symptoms of menstruation. Though dysmenorrhea and premenstrual tension affect millions of girls around the world, there is little visible research.

Magnesium deficiency can mimic many disorders, including fatigue, irritability, weakness and dysmenorrhea (Lavin 1986, Ghamid 1994). Magnesium influences the contractility, tone and relaxation of the uterine smooth muscle; and may inhibit the synthesis of prostaglandin based on inhibition of biosynthesis of prostaglandin (Walker 1977). Study by Abass (2012) showed that magnesium level in primary dysmenorrhea group was lower than control women, in accordance with other studies (Hentrotte 1973, Klaiber 1990, Seifert et al 1989). BMI too has association with primary dysmenorrhea (Montero 1996). Results of study by Abass (2012) showed significantly lower BMI in dysmenorrhic women when compared with control women, similar to the study by Koebnick (1999). Practicing good nutrition, containing magnesium throughout the month may help lessen the symptoms of dysmenorrhea (Matte 2015).

Objectives

To study correlation between dysmenorrhea and serum magnesium in young girls

Material Methods

Present pilot study was conducted at a rural medical institute in central India after consent from volunteers. Study subjects comprised of nursing and medical students studying and staying in the same campus, quite a lot of time in the same building. In addition to interview and physical examination of 100 girls who volunteered to be part of the study, serum magnesium estimation was carried out in 50 girls who volunteered to be part of the study. Five ml of venous blood was withdrawn on the first day of menses, around 10 – 11 Am. Twenty girls did not have dysmenorrhea (13 medical and 7 nursing students) and 30 girls had dysmenorrhea (17 medical and 13 nursing students). Serum magnesium levels were estimated by atomic reabsorption (Facchinetti 1991) and results were analyzed.

Results

When presence or absence of dysmenorrhea and serum magnesium levels were compared, the mean serum magnesium level was 1.502 ± 0.476 mg/dl in girls who had dysmenorrhea and 1.750 ± 0.451 mg/dl in girls without dysmenorrhea, difference of 0.248 ± 0.025 mg/dl (significant). The serum magnesium values were 1.544 ± 0.711 mg/dl and 1.763 ± 0.260 mg/dl for girls of upper economic class with dysmenorrhea and without dysmenorrhea respectively. The values

were 1.620 ± 0.467 mg/dl and 1.762 ± 0.314 mg/dl respectively in girls who had dysmenorrhea and avoided spicy/oily food and those without dysmenorrhea, difference insignificant 0.142 to 0.248mg/dl. Between <18-18yrs there were only 4 girls, none had dysmenorrhea. The mean serum magnesium was 1.750 ± 0.451 mg./dl. In the 4 girls of 21-22 yrs who had dysmenorrhea, the mean serum magnesium was 1.502 ± 0.476 mg/dl (Table I). In 4 girls who were from upper class and had dysmenorrhea the mean serum magnesium level was 1.544 ± 0.711 mg/dl and in 2 girls from same economic class without dysmenorrhea, it was 1.763 ± 0.260 mg./dl (Table II). Of girls with 41-45 kg weight, 9 girls with no dysmenorrhea, the serum magnesium was 1.811 ± 0.414 mg/dl. And in 8 girls with no dysmenorrhea, it was 1.736 ± 0.421 mg./dl (Table III). Mean serum magnesium level was 1.480 ± 0.354 mg/dl in girls who had dysmenorrhea and avoided non-vegetarian food, compared to 1.670 ± 0.00 mg/dl in those without dysmenorrhea. Serum magnesium level was 1.726 ± 0.314 mg/dl in 14 girls who avoided spicy and oily food and did not have dysmenorrhea compared to 1.620 ± 0.467 mg/dl in 3 girls who had dysmenorrhea (Table IV). Mean serum magnesium was 1.749 ± 0.374 mg/dl in 14 girls who had no dysmenorrhea and used more of vegetables and fruits during menstruation and it was 1.732 ± 0.369 mg/dl in 4 girls who had dysmenorrhea and ate more of vegetables and fruits. (Table V).

Discussion

Dysmenorrhea or painful menstruation is the most common of all gynecological complaints. Primary dysmenorrhea is usually first experienced some months or even one or two years following the menarche. It is the leading cause of periodic short term morbidity in adolescents. Almost every young girl, experiences pain at some or the other time in her life. In spite of an overall high prevalence, this disorder continues to be paid scant attention. Clinicians tend to adopt a nihilistic attitude, regard it as physiological and may sometimes dub the girls as neurotic. More pronounced magnesium deficiency presents with symptoms of increased neuromuscular excitability such as tremor, carpopedal spasm, muscle cramps, tetany and generalized seizures (Grober 2015). Benassi (1992) reported that in Mg-treated cycles compared with the control one, first day dysmenorrhea progressively decreased from the 1st to the 6th cycle.

With the understanding that dysmenorrhea is likely to be related to the presence of myometrium hyper contractility and arteriolar vasoconstriction [Sultan 2004, Sultan 2012], the potential role for magnesium in the treatment of dysmenorrhea has been investigated in three placebo-controlled studies included in a Cochrane review publication [Proctor 2001]. One small parallel trial showed that magnesium was significantly more effective than placebo after six months of daily treatment [Seifert 1989]. This datum was further confirmed in another small trial enrolling 21 patients treated for five months [Klaiber 1990, Proctor 2001], but not in the third analysis carried out in a four-months trial [Davis 1992]. Fourth open trial found that magnesium therapy greatly reduced symptoms compared with the pretreatment control cycles. The mechanism of action of magnesium in this setting has not been fully elucidated [Benassi 1992].

Decades back Abraham (1981) found significant difference between serum magnesium levels of normal women compared to women suffering from premenstrual tension. In his study, red cell magnesium values had shown a significant difference with reduced red cell magnesium in women with premenstrual tension. In another double blind randomized study by Facchinetti et al (1991) researchers were able to document a definite decrease in the magnesium cation content in both lymphocytes and polymorph nuclear cells and an increase in the cation content after oral therapy with magnesium. Magnesium supplementation relieved negative affective symptoms. However they could document no changes in serum and erythrocyte magnesium contents. There are very few studies comparing beneficial effects of oral magnesium supplementation as against placebo. Although the physiological role of magnesium is primarily intracellular, the majority of experimental data is from extracellular sources, primarily blood. So the understanding of magnesium metabolism and assessment of magnesium status needs a lot of more research. Studies (Abraham 1983, Facchinetti 1991) have documented the decrease in dysmenorrhea and also have proved the beneficial effects of magnesium supplementation compared to placebo in double blind studies. Harel (1996) suggested that dietary supplementation with omega-3 very long polyunsaturated fatty acids was effective in alleviating the symptoms of dysmenorrhea in adolescents. Fish oils are a rich source of omega-3 fatty acids. Eggs and fruits might be protecting from dysmenorrhea due to their magnesium and calcium content. Girls change items, eggs and fruits used might be protecting from dysmenorrhea due to their magnesium and calcium content.

Magnesium is thought to relieve cramping in many different ways, such as by helping relax muscles and increasing the absorption of calcium. Foods high in magnesium include halibut, mixed nuts, soybeans, and yogurt. Dark-green leafy vegetables such as spinach are another good source of magnesium, as are whole grain breads, cereals and brown rice (Mortensen 2015). One of magnesium's many roles is a muscle relaxant. This is especially important for women who suffer from dysmenorrhea because cramps are caused by excessively strong contractions of the uterus. Magnesium helps the powerful uterine muscles relax, reducing cramping (Kerryg 2017).

In the present pilot study girls with or without dysmenorrhea, a difference between magnesium levels was observed between two groups with lower levels in girls with dysmenorrhea and higher levels in girls without dysmenorrhea though the difference was not significant in all categories. The numbers are small but useful for directions for future studies including reverse pharmacology. More studies about dysmenorrhea and presence and absence of dysmenorrhea with larger numbers with more comprehensive information about diet are needed with reverse pharmacology. Further studies are needed to merit the effects of oral magnesium supplementation on reducing dysmenorrhea. In the meanwhile girls need to be encouraged to eat food especially rich in magnesium like nuts, green vegetables, soya beans, chocolate and whole cereal grains, most of which are readily available. In general, a holistic approach to management should be taken, with attention to diet and lifestyle as well as prescription of medication. Practitioners need to become more proactive in its detection and management (Davis 2011). Research needs to continue so that the girls are helped in such a way that they have quality life and working hours are not lost.

Table I

*AGE, DYSMENORRHOEA and SERUM MAGNESIUM

AGE (YRS)	SERUM MAGNESIUM (MEAN+/-SD)			
	NO	DYSMENORRHOEA PRESENT	NO	DYSMENORRHOEA ABSENT
<18-18	0	---	4	1.692+/-0.307
19-20	7	1.727+/-0.322	12	1.768+/-0.398
21-22	19	1.502+/-0.476	4	1.750+/-0.451
23-24	4	1.878+/-0.305	0	---
TOTAL	30		20	

Table highlights the levels of serum magnesium in different ages, though numbers are small.

Table II

*SOCIO-ECONOMIC STATUS, PRESENCE OR ABSENCE OF DYSMENORRHOEA SERUM MAGNESIUM

SES	SERUM MAGNESIUM (MEAN+/-SD)			
	NO	DYSMENORRHOEA PRESENT	NO	DYSMENORRHOEA ABSENT
UPPER	4	1.544+/-0.711	2	1.763+/-0.260
UPPER-MIDDLE	12	1.723+/-0.302	7	1.868+/-0.056
MIDDLE	10	1.496+/-0.458	6	1.598+/-0.332
MIDDLE- LOWER	4	1.913+/-0.195	5	1.967+/-0.232
TOTAL	30		20	

Table highlights the lower levels of serum magnesium in cases of dysmenorrhoea in all economic categories, though the numbers are small.

Table IV

MODIFICATIONS IN MEALS, DYSMENORRHOEA, SERUM MAGNESIUM

FOOD ITEMS AVOIDED	SERUM MAGNESIUM (MEAN+/-SD)			
	NO.	DYSMENORRHOEA PRESENT	NO.	DYSMENORRHOEA ABSENT
NONE	24	1.591+/-0.453	4	1.715+/-0.673
NONVEG	2	1.480+/-0.354	1	1.670+/-0.00
OILY FOOD	1	2.120+/-0.00	0	---
SOUR FOOD	0	---	1	1.780+/-0.00
SPICY+OILY FOOD	3	1.620+/-0.467	14	1.762+/-0.314
TOTAL	30		20	
FOOD ITEMS PREFERRED				
NONE	12	1.470+/-0.399	0	---
VEG	1	1.020+/-0.00	0	---
MILK	0	---	1	1.670+/-0.352
SWEETS	9	1.832+/-0.452	0	---
VEG+FRUITS	4	1.732+/-0.369	19	1.749+/-0.374
SPICY	4	1.600+/-0.494	0	---
TOTAL	30		20	

Table highlights low levels of serum magnesium in girls with dysmenorrhoea with different diet though numbers are small

Table III***WEIGHT, DYSMENORRHOEA AND SERUM MAGNESIUM LEVELS**

WEIGHT	SERUM MAGNESIUM (MEAN+/-SD)			
	NO.	DYSMENORRHOEA PRESENT	NO.	DYSMENORRHOEA ABSENT
≤L0-40	2	1.520+/-0.125	3	1.749+/-0.374
41-45	9	1.811+/-0.414	8	1.983+/-0.321
46-50	12	1.592+/-0.431	9	1.736+/-0.421
51-55	4	1.800+/-0.268	0	---
56-60	1	1.120+/-0.00	0	---
66-70	1	1.380+/-0.00	0	---
71-Hi	1	1.020+/-0.00	0	---
TOTAL	30		20	

Table highlights levels of magnesium with weight; higher weight had lower serum magnesium and dysmenorrhea though numbers are small.

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