International Journal of Clinical Obstetrics and Gynaecology

ISSN (P): 2522-6614
ISSN (E): 2522-6622

www.gynaecologyjournal.com
2020; 4(4): 139-141
Received: 06-05-2020
Accepted: 08-06-2020

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Serum magnesium levels in natural menopausal women and surgical menopausal women: a comparative study

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DOI: https://doi.org/10.33545/gynae.2020.v4.i4c.635

Abstract
Aim: Comparison of serum magnesium levels in natural menopausal women with surgical menopausal women.
Methods: The present analytical cross sectional study was conducted on patients (out patients and in patients) in Department of Obstetrics and Gynecology, Kamla Nehru Hospital, attached to IGMC Shimla. Group 1 (N=60): Women who had undergone hysterectomy with bilateral salphingoophorectomy at least 6 month ago. Group 2 (N=60): Women who have attained natural menopause at least 1 year ago. Serum magnesium was estimated by magnesium by Xylidyl blue colorimetric assay in mg/dl after the relevant quality control checks.
Results: In the present study maximum number of the patients 26 (43.3%) were in the age group of 46-50 years for the post surgical menopausal group and in the natural menopausal group maximum number of the patients were in the age group of 51-55 years 23 (38.3%). Maximum numbers of patients are multiparous in both groups. Hypomagnesemia was observed in 29 (48.3%) natural menopausal group and 17 (28.3%) were postsurgical menopausal. Hypermagnesemia was observed in 1 (1.7%) postsurgical menopausal group.
Conclusions: The prevalence of osteoporosis is very high in this part of India. Both natural and post-surgical menopausal women have lower levels of serum magnesium.

Keywords: Postmenopausal women, Osteoporosis, Serum Magnesium

Introduction

Menopause is defined as permanent cessation of menses resulting from reduced ovarian hormone secretion that occurs naturally or is induced by surgery [1].

At menopause the ovarian follicles lose their function and thus results in decreased production of estradiol and other hormones. Decreased estrogen also affects the serum and urinary level of magnesium indirectly at various levels. Decreased estrogen also alters the intestinal absorption, bone resorption and renal reabsorption of magnesium [2].

Reduced ovarian hormone secretion is mainly suggested by early development of osteoporosis in women who attained premature menopause either due to natural or surgical causes [3]. All the changes take gradual course of time after natural onset of menopause.

However after surgical menopause the blood supply to the ovaries are affected, thus the women who have surgical menopause at early age have changes in their endocrinological status early and attain menopause 3.7 years earlier than the women who attain the natural menopause. The onset of endocrinological changes after surgical menopause is very sudden unlike natural menopause.

Magnesium (Mg) is an essential intracellular cation, a cofactor of many basic cellular processes, particularly those involving energy metabolisms. Epidemiologic studies have demonstrated a positive correlation between dietary Mg intake and bone density and an increased rate of bone loss with low dietary intake suggesting that dietary Mg deficiency may be a risk factor for osteoporosis [4].

Very few studies have been conducted to see the effect of sudden decrease and early onset of decreased oestrogen levels (endocrinological changes) associated with surgical menopause on serum levels of magnesium in north Indian women. Hence the present study is aimed at comparing and treating the levels of magnesium among surgical and natural menopausal women of north Indian women.

Materials and methods

The present analytical cross sectional study was conducted on patients (out patients and in patients) in Department of Obstetrics and Gynecology, Kamla Nehru Hospital, attached to IGMC Shimla.

Ethical approval and Informed consent

The study protocol was reviewed by the Ethical Committee of the Hospital and granted ethical clearance. After explaining the purpose and details of the study, a written informed consent was obtained.

Inclusion criteria

- Women who had undergone hysterectomy with bilateral salphingoophorectomy at least 6 month ago.
- Women who have attained natural menopause at least 1 year ago
- Women who had signed the informed consent

Exclusion Criteria

- Women on HRT therapy
- Women with other endocrine and metabolic disease which affect magnesium levels
- Chronic use of drugs such as steroid therapy

Grouping

Group 1: Women who have attained natural menopause at least 1 year ago

Group 2: Women who had undergone hysterectomy with bilateral salphingoophorectomy at least 6 month ago

Methodology

Blood samples of all patients of study groups were collected in a plain vacutainer tubes under all aseptic precautions. Serum was separated after twenty minutes of collection by centrifuging the sample. After that serum was stored in a vial at 4 degree celsius. All the estimations were done within two days of storage by fully automated chemistry auto-analyser. Serum magnesium was estimated by magnesium by Xylidyl blue colorimetric assay in mg/dl after the relevant quality control checks.

Statistical Analysis

The recorded data was compiled and entered in a spreadsheet computer program (Microsoft Excel 2010) and then exported to data editor page of SPSS version 20 (SPSS Inc., Chicago, Illinois, USA).

Descriptive statistics included computation of percentages, means and standard deviations were calculated. The statistical tests applied for the analysis was chi-square test. For both the tests, confidence interval and p-value were set at 95% and ≤ 0.05 respectively.

Results

Table 1: Shows distribution of women according to age in comparison groups

Age	Natural menopausal women	Post surgical menopausal women
40- 45 years	0	25 (41.66%)
46- 50 years	19 (31.7%)	26 (43.3%)
51 – 55 years	23 (38.3%)	9 (15%)
56-60 years	13 (21.7%)	0
61-65 years	3 (5%)	0
>65 years	2 (3.3%)	0
Total	60	60
Mean Age	53.40	46.00
Mean Age at Menopause	48.87	47.09

Test applied: chi-square test, $p \leq 0.05$ Significant

Table 2: Shows distribution of women according to parity in comparison groups

Parity	Natural menopausal women	Post surgical menopausal women
Nulliparous	1 (1.0%)	2 (3.0%)
Primipara	4 (6.0%)	6 (10%)
Multipara	28(46.7%)	34 (56.7%)
Grandmultipara	27(45%)	18 (30%)
Total	60	60
p-value	0.001 (Sig.)	

Test applied: chi-square test

Table 3: Shows distribution of women according to BMI in comparison groups

BMI	Natural menopausal women	Post surgical menopausal women
< 18.5 (Underweight)	1 (1.7%)	0
18.5-24.9 (Normal)	27(45.0%)	22(36.6%)
25- 29.9 (Overweight)	28(46.6%)	28(46.6%)
>30 (0bese)	4 (6.7%)	10 (16.6%)
Total	60	60
p-value	0.002 (Sig.)	

Test applied: chi-square test

Table 4: Shows distribution of women according to magnesium levels in comparison groups

Serum magnesium	Natural menopausal women	Post surgical menopausal women
<1.7 mg/dl (Hypomagnesemia)	29(48.3%)	17(28.3%)
1.7-2.4mg/dl (Normal range)	31(51.7%)	42(70.0%)
>2.4 mg/dl (Hypermagnesemia)	0	1(1.7%)
Total	60	60
p-value	0.001 (Sig.)	

Test applied: chi-square test

Discussion

In the present study, 120 women were included having natural menopause and surgical menopausal group, attending the OPD of Obstetrics and Gynaecology department of Kamla Nehru Hospital for Mother and Child attached to Indira Gandhi Medical College Shimla. These patients were evaluated for serum magnesium in menopausal status have been conducted in various countries but still there is limited data available in our population hence this study was undertaken. It is fact the world population is getting older, this issue brought osteoporosis to the attention as it is known to be the disease of elderly. It increases morbidity among menopausal women. We studied the post surgical menopausal women 6 months earlier as compared to the natural menopausal women for early detection of decreased levels of serum magnesium so that we can treat them earlier and prevent osteoporosis/osteopenia in them.

Mean serum magnesium level in natural menopausal group of present study is identical to finding of Sasmita *et al*. [4] While Sreekantha *et al*. [5] study result shows mean serum magnesium less than our study.

In our study serum magnesium concentrations in the natural menopausal and post surgical menopausal group were on lower limit levels. The decreased level of magnesium explained to be due to the uncoupling of bone formation as a result of loss of bone mass in post menopausal women, it may also be related to increased renal loss and is exacerbated by dietary element deprivation and gastrointestinal losses.

Also in the present study serum magnesium concentration 1.92 mg/dl in surgical menopausal group was slightly more than natural menopausal women which is 1.85 mg/dl indicating a decrease in magnesium levels with time of onset of menopause [6].

Conclusion

The prevalence of osteoporosis is very high in this part of India. Both natural and post- surgical menopausal women have lower levels of serum magnesium. Our study suggests that postmenopausal women should take Magnesium rich foods like whole grains, legumes, fruits and vegetables (especially dark-green, leafy vegetables) every day which will help to provide recommended amount of magnesium, maintaining normal storage levels of this mineral. If these foods are not available or serum levels are too low supplementation can be given in the form of tablets. Recommended daily dose of magnesium in post menopausal women is 300-500mg / day.

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