Magnesium And Calcium Levels In Early Surgical Menopause

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ABSTRACT

Background and objectives: Many endocrinal and metabolic changes were observed in our patients after hysterectomy (surgical menopause), leading to osteoporosis and many other systemic complications and hence, the levels of magnesium, calcium and phosphorus were measured. **Materials and Methods:** 34 early hysterectomy patients with 32 late hysterectomy patients and 28 normal healthy controls were included in the study. All parameters in blood were measured by using a Hitachi 917 chemistry auto analyzer (disc model). The statistical analyses were done by ANOVA. **Results:** The levels of magnesium and calcium were significantly decreased ($p<0.001$) and the level of phosphorus was significantly increased ($p<0.001$) in both early and late hysterectomy patients as compared to the controls. **Conclusion:** After hysterectomy, the levels of magnesium, calcium and phosphorus were found to be dysregulated, which might be due to a hormonal imbalance.

Key Words: Hysterectomy, Magnesium, Calcium, Phosphorus.

Key messages:

- It is very important to supplement Magnesium and Calcium along with multivitamins in early hysterectomy as well as in late hysterectomy patients.

INTRODUCTION

Hysterectomy is a commonly performed, gynaecological surgical procedure involving the partial (removal of the body, leaving the cervix) or complete (removal of the body, the fundus and the cervix) removal of the uterus. Hysterectomy is done at an early age if the patient is suffering from endometrial cancer, endometriosis, placenta praevia, developmental abnormalities, multiple fibroids, idiopathic uterine bleeding, etc. The removal of the uterus changes the hormonal status of the females [1]. Hysterectomy patients are associated with a greater risk of developing osteoporosis and cardio vascular, neurogenic and mental disorders due to hormonal imbalance [2]. Oestrogen has an influence over the calcium (Ca) metabolism; after hysterectomy, a drop in the oestrogen levels causes hypocalcaemia [3]. Magnesium (Mg) is an essential transitional element in the biological system, which is required as a cofactor for all energy yielding reactions involving ATP and it has a key role in nucleic acid synthesis. Hypomagnesaemia is observed after a major surgery in the human body. Low levels of Mg are associated with the development of diabetes mellitus, asthma, osteoporosis, etc [4].

Parameter	Normal (Mean±Sd)	Early Hysterectomy (Mean±Sd)	Late Hysteectomy (Mean±Sd)	P-Value
	N=28	N=34	N=32	
Mg mg/dl	2.0136 ±0.3323	0.784±0.1167	1.3147±0.1154	0.001
Ca^{2+} mg/dl	9.8725±0.6879	6.8432±0.3396	7.7897±0.3641	0.001
P mg/dl	3.789±0.4068	5.2571±0.4443	4.969±0.0933	0.001

[Table/Fig 1]: Comparison of magnesium, calcium and phosphorus among early and late hysterectomy patients with controls.

[SD- Standard Deviation, N=number of samples]

So, the present study was undertaken to estimate the levels of Mg, Ca and Phosphorus (P) in early and late hysterectomy patients.

MATERIALS AND METHODS

The study group involved 34 early hysterectomy (from 30 years to menopause) and 32 late hysterectomy (after menopause) patients and 28 normal, healthy female controls. While selecting the test group, the patients suffering from cardiovascular disease, asthma, musculoskeletal disorders, genitourinary tract disorders, menstrual cycle disorders and endocrinal disorders were excluded from the study. The samples were collected from the KMC group of hospitals in the Dakshina Kannada district of Karnataka state. 5ml of blood was collected from the median cubital vein under strict aseptic precautions. The samples were analysed by using a Hitachi 917 chemistry auto analyzer. Mg [5], Ca [6] and Phosphorus [7] were measured by a colourimetric end point determination, with sample blanking respectively. A clear written informed consent was taken from the patients.

STATISTICS

The statistical analysis was done by using ANOVA and the correlation was done by using the Pearson's correlation coefficient.

RESULTS

The levels of Mg and Ca were found to be decreased significantly ($p<0.001$) both in the early and the late hysterectomy patients, but the decrease was more significant in the early hysterectomy patients [Table/Fig 1].

The levels of phosphorus were found to be increased significantly ($p<0.001$) in both the early and the late hysterectomy patients,

but the increase was more significant in the early hysterectomy patients.

We found a significant ($p<0.01$) negative correlation ($r = -0.616$) between phosphorus and magnesium in the early hysterectomy patients.

DISCUSSION

The uterus is the target site for the action and the regulationof the female hormones, especially oestrogen. The presence of a functional uterus is essential for the normal physiological functioning of the cardiovascular system (CVS),the central nervous system (CNS) and the musculoskeletalsystem. Some studies have noted a three times greater risk of cardiovascular disease and also an increased risk of weakened bone when only the uterus was removed [8,9].Hysterectomy is a surgically created menopause in which theuterus is removed due to various pathological conditions. In surgically created menopausal patients, many physiologicaland metabolic conditions are altered due to the decreased oestrogen concentration [2]. In our study, we observed analteration in Mg and Ca metabolism, as decreased Mg and Ca levels with increased phosphorus level. Alteration in all theparameters was highly significant in the early hysterectomy patients as compared to the late hysterectomy patients andthe controls.

The reduced Mg concentration in the hysterectomy patient smight be due to surgical trauma to the tissues and the removal of the uterus, which increases the aldosterone levelswhich interfere with Mg homeostasis [10,11,12]. Evenin normal healthy women, the Mg concentration decreases with increasing age [13] and hypomagnesaemia isprecipitated by hysterectomy.

Hypocalcaemia is observed in hysterectomy patients becausethe oestrogen concentration is reduced after the removal of theuterus. Oestrogen has a modulatory effect on the Ca metabolism.It is responsible for the entry of calcium into the bone matrix.A drop in the levels of oestrogen after hysterectomy can causean excessive loss of calcium, leading to the wasting of bone and hence osteoporosis. An increased risk for bone fracturewas observed in the post hysterectomy patients [14], [15], [16],[17], [18]. Mg deficiency also results in low levels of calcium,since Mg interferes with calcium absorption. Hence, a directly proportional relationship exists between Mg and Ca in the earlyand late hysterectomy patients. An increase in the phosphate levels interferes with the absorption of Mg and Ca. When the phosphate levels increased, the absorption of Mg and Ca was decreased [19, 20, 21, 22]. Thus, hysterectomy patients areat a risk of developing osteoporosis and altered physiological functions of CVS and CNS due to hypomagnesaemia and hypocalcaemia.

CONCLUSION

To conclude, the adequate supplementation of Mg and Ca with multivitamins can prevent the development of osteoporosis andother related complications in both early and late hysterectomy patients.

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