ISSN: 0975-3583, 0976-2833 VOL15, ISSUE4, 2024

# SERUM ELECTROLYTES PATTERN DURING PRE AND POSTMENSTRUAL PHASES IN FEMALES WITH PREMENSTRUAL SYNDROME

**Dr. Kirti Vijaykumar Verma (first and corresponding author),** Assistant Professor, Dept. of OBG, Abhishek Mishra Memorial Medical College and Research, Durg, CG
**Dr. Manish Bhandari[2] (second author),** Consultant Pathologist, SJM Maternity and Diagnostic Centre, Durg

## ABSTRACT

**Introduction**
Physical, psychological, and behavioral symptoms are present in premenstrual syndrome (PMS), a chronic illness. It disappears after menstruation and happens during the luteal phase of the menstrual cycle. Eight to fifteen percent of women who are of reproductive age experience PMS.
**Aim and Objectives**

a) To estimate and compare the serum levels of sodium and potassium in females with and without PMS.
b) To compare the levels of sodium and potassium during pre and post menstrual phases in PMS.

**Methodology**
Young females aged between 18-25 years with a regular menstrual cycle of 28±3 days for at least 6 months with and without PMS willing to give informed consent were included Participants were divided into two groups equally, 40 women in each group. Group A (Non-PMS group) was the young females woman without premenstrual syndrome, and Group B (PMS group) was the young females with premenstrual syndrome for at least 3 consecutive symptomatic cycles before starting treatment. 3 ml venous blood sample was collected before and after the onset of menstruation during pre-menstrual and post menstrual phases in females with and without PMS. The sample was centrifuged for the separation of serum, used for the estimation and sodium and potassium levels using ISE metho in the Biochemistry Laboratory.
**Results and Discussion**
In the present study, it is seen that the mean levels of sodium were decreased in subjects with PMS compared to the subjects without PMS, this was statistically highly significant. Similarly, the potassium levels were reduced in patients with PMS compared to the subjects without PMS, this was statistically highly significant. The electrolytes levels were compared between pre and post menstrual phases in PMS subjects, it is evident that there were significant differences between the two phases in PMS subjects.

**Conclusion**
In the present study, it is evident that the serum electrolytes were significantly altered in subjects with PMS and had a significant change during pre and post menstrual phases in PMS subjects, signifying the potential role of these electrolytes in subjects with PMS symptoms.

**Key-words:** sodium, potassium, premenstrual syndrome, estrogen and progesterone.

## INTRODUCTION

Physical, psychological, and behavioral symptoms are present in premenstrual syndrome (PMS), a chronic illness. It disappears after menstruation and happens during the luteal phase of the menstrual cycle. Eight to fifteen percent of women who are of reproductive age experience PMS. [1-3] Between ovulation and the onset of menstruation, the postovulatory phase of the cycle contains significant quantities of progesterone. Because progesterone is thought to have a natriuretic effect, there appears to be a compensatory rise in aldosterone concentration following the increase in progesterone following ovulation. [4,5] According to the research, ovarian hormones may have an impact on potassium, sodium, calcium, and magnesium metabolism at various phases of the menstrual cycle. [2, 6-8] The level of serum sodium was significantly decreased but no significant difference in potassium was found in the luteal phase as compared to those follicular and menstrual phases. [2, 9, 10] Again, the level of serum sodium was significantly decreased, whereas serum potassium was significantly increased in the secretory phase. [6,11] PMS is a common, mild to moderate psychological and physical symptoms that develops in the menstrual cycle's late luteal phase. [12] It can be diagnosed if the patients report at least 1 affective symptom (depression, angry outbursts, irritability, anxiety, confusion, or social withdrawal) and somatic symptom (breast tenderness, abdominal bloating, headache, or swelling of the extremities) during the 5 days before menstruation in each of the 3 prior menstrual cycles. These symptoms are relieved within 4 days of the onset of menstruation. More severe symptoms include irritability, dysphoria and mood liability. [13] The present study was undertaken to explore the potential of electrolytes as biomarkers in females with PMS.

## AIM & OBJECTIVES

c) To estimate and compare the serum levels of sodium and potassium in females with and without PMS.
d) To compare the levels of sodium and potassium during pre and post menstrual phases in PMS.
e)

## METHODOLOGY

### Study design and settings

This cross-sectional study was done to find out the association of serum electrolytes of young females with premenstrual syndrome in the Department of OBG at our tertiary care hospital.

### Sampling method

Purposive sampling

### Sample size

80 (40 with PMS and 40 without PMS)

**Inclusion criteria**

Young females aged between 18-25 years with a regular menstrual cycle of 28±3 days for at least 6 months with and without PMS willing to give informed consent were included Participants were divided into two groups equally, 40 women in each group. Group A (Non-PMS group) was the young females woman without premenstrual syndrome, and Group B (PMS group) was the young females with premenstrual syndrome for at least 3 consecutive symptomatic cycles before starting treatment.

**Exclusion criteria**

The woman who had a history of having any chronic or systemic diseases, known thyroid dysfunction, adrenocortical dysfunction, any other gynaecological disorder, psychiatric disorder and prescribed medicine user (Diuretics, Calcium, Magnesium, and OCP) was excluded from this study.

**Sample collection and analysis**

3 ml venous blood sample was collected before and after the onset of menstruation during pre-menstrual and post menstrual phases in females with and without PMS. The sample was centrifuged for the separation of serum, used for the estimation and sodium and potassium levels using ISE metho in the Biochemistry Laboratory.

**Statistical analysis**

Statistical analysis was performed using student t test to compare the electrolyte levels between the two groups.

## RESULTS

In the present study 40 females with PMS and 40 females without PMS in the age group 18-25 years were included in the study.

**Table 1: Descriptive statistics of control group and premenstrual syndrome (PMS) group**

| Variables | Control Group (no=122) | PMS Group (no=122) | t-test | P – Value | Significance |
|---|---|---|---|---|---|
| **Age** | 24.4 ± 1.33 | 20.72 ± 2.12 | 5.218 | 0.00001 | S |
| **Systolic blood pressure** | 118.41 ± 6.97 | 116.13 ± 8.76 | 0.173 | 0.86311 | NS |
| **Diastolic blood pressure** | 63.84 ± 8.97 | 64.89 ± 7.28 | -0.726 | 0.46945 | |
| **Body mass index** | 19.9 ± 1.80 | 20.21 ± 0.74 | -0.069 | 0.94514 | |

**Table 2: Comparison of Electrolytes between control group and premenstrual group**

| Variables | Control Group | PMS Group | P – Value | Significance |
|---|---|---|---|---|
| **Sodium (Na+) ( mEq/L)** | 142.56 ± 6.10 | 134.23 ± 4.87 | 0.00001 | HS |
| **Potassium (K+) ( mEq/L)** | 4.07 ± 0.23 | 4.92 ± 5.43 | 0.00001 | HS |

The results were analysed using Independent student t-test, HS: highly significant, NS: Nothing significant

| Table 3: Comparison of Electrolytes during pre and post menstrual phases in PMS | | | | |
|---|---|---|---|---|
| **Variables** | **Pre-menstrual phase** | **Post menstrual phase** | **P – Value** | **Significance** |
| **Sodium (Na+) ( mEq/L)** | 134.23 ± 4.87 | 137.23 ± 4.87 | 0.00001 | HS |
| **Potassium (K+) ( mEq/L)** | 4.92 ± 5.43 | 4.65 ± 4.32 | 0.00001 | HS |
| The results were analysed using Independent student t-test, HS: highly significant, NS: Nothing significant | | | | |

**DISCUSSION**

In the present study, it is seen that the mean levels of sodium were decreased in subjects with PMS compared to the subjects without PMS, this was statistically highly significant. Similarly, the potassium levels were reduced in patients with PMS compared to the subjects without PMS, this was statistically highly significant. The electrolytes levels were compared between pre and post menstrual phases in PMS subjects, it is evident that there were significant differences between the two phases in PMS subjects. The premenstrual syndrome's origin is still unknown. It has been linked to hypoglycemia, antidiuretic hormone, vitamin deficiencies, "menotoxin," the renin-angiotensin system, prolactin, aldosterone, and an imbalance in ovarian hormones. None of these theories are particularly supported by the evidence. It is improbable that an aldosterone-related mechanism exists, according to a recent study. Research on prolactin levels has shown contradictory results, and many additional theories have not received enough attention. Despite contradicting data, the notion of progesterone insufficiency has been widely accepted for a while. Progesterone concentrations in patients with the syndrome have been found to be decreased in certain research, but in only 30% of patients, according to other investigations.

os Santos LA, de Azeredo VB, Barbosa DE, de Sá SA. Seric ion level and its relationship with the symptoms of premenstrual syndrome in young women. Nutricion Hospitalaria. 2013;28(6):2194-200.

2. Lanje MA, Bhutey AK, Kulkami SR, Dhawie UP, Sande AS. Serum electrolytes during different phases of menstrual cycle. International Journal of Pharma Sciences and Research. 2010;1:435-7.

3. Sims ST, Rehrer NJ, Bell ML, Cotter JD. Endogenous and exogenous female sex hormones and renal electrolyte handling: effects of an acute sodium load on plasma volume at rest. Journal of Applied Physiology. 2008;105(1):121-7.

4. Oelkers W, Schoneshofer M, Blumel A. Effects of progesterone and four synthetic progestagens on sodium balance and the renin-aldosterone system in man. The Journal of Clinical Endocrinology & Metabolism. 1974;39(5):882-9 os Santos LA, de Azeredo VB, Barbosa DE, de Sá SA. Seric ion level and its relationship with the symptoms of premenstrual syndrome in young women. Nutricion Hospitalaria. 2013;28(6):2194-200.

2. Lanje MA, Bhutey AK, Kulkami SR, Dhawie UP, Sande AS. Serum electrolytes during different phases of menstrual cycle. International Journal of Pharma Sciences and Research. 2010;1:435-7.

3. Sims ST, Rehrer NJ, Bell ML, Cotter JD. Endogenous and exogenous female sex hormones and renal electrolyte handling: effects of an acute sodium load on plasma volume at rest. Journal of Applied Physiology. 2008;105(1):121-7.

4. Oelkers W, Schoneshofer M, Blumel A. Effects of progesterone and four synthetic progestagens on sodium balance and the renin-aldosterone system in man. The Journal of Clinical Endocrinology & Metabolism. 1974;39(5):882-9

## CONCLUSION

In the present study, it is evident that the serum electrolytes were significantly altered in subjects with PMS and had a significant change during pre and post menstrual phases in PMS subjects, signifying the potential role of these electrolytes in subjects with PMS symptoms.

## REFERENCES

1. dos Santos LA, de Azeredo VB, Barbosa DE, de Sá SA. Seric ion level and its relationship with the symptoms of premenstrual syndrome in young women. Nutricion Hospitalaria. 2013;28(6):2194-200.
2. Lanje MA, Bhutey AK, Kulkami SR, Dhawie UP, Sande AS. Serum electrolytes during different phases of menstrual cycle. International Journal of Pharma Sciences and Research. 2010;1:435-7.
3. Sims ST, Rehrer NJ, Bell ML, Cotter JD. Endogenous and exogenous female sex hormones and renal electrolyte handling: effects of an acute sodium load on plasma volume at rest. Journal of Applied Physiology. 2008;105(1):121-7.
4. Oelkers W, Schoneshofer M, Blumel A. Effects of progesterone and four synthetic progestagens on sodium balance and the renin-aldosterone system in man. The Journal of Clinical Endocrinology & Metabolism. 1974;39(5):882-90.
5. Szmuilowicz ED, Adler GK, Williams JS, Green DE, Yao TM, Hopkins PN, Seely EW. Relationship between aldosterone and progesterone in the human menstrual cycle. The Journal of Clinical Endocrinology & Metabolism. 2006;91(10):3981-7.
6. Das B, Prasanna Chandra M, Samanta S, Mallick AK, Sowmya MK. Serum inorganic phosphorus, uric acid, calcium, magnesium and sodium status during uterine changes of menstrual cycle. International Journal of BioMed Research. 2012;3(4):209-13.
7. Devisetty A, Kambar C, Hanumanth N. Study of effect of serum calcium levels on autonomic nervous system in pre-menstrual syndrome. IOSR Journal of Dental and Medical Sciences. 2005;14(3):50-5.
8. Sharma G, Tandon P. Luteal phase serum calcium and serum magnesium levels in causation of premenstrual syndrome. The International Journal of Basic & Applied Physiology. 2015;4(1):126.
9. Mira M, Stewart PM, Gebski V, Llewellyn-Jones D, Abraham SF. Changes in sodium and uric acid concentrations in plasma during the menstrual cycle. Clinical Chemistry. 1984;30(3):380-1.
10. Malipatil BS, Patil S. Hematological modulation in different phases of menstrual cycle. International Journal of BioMed Research. 2013;4(2):89-93.
11. Mishra A. Variation's serum electrolyte level during different phases of menstrual cycle in healthy female medical students. International Journal of Biomedical Research. 2015:6(7):504-08.
12. Biggs WS, Demuth RH. Premenstrual syndrome and premenstrual dysphoric disorder. American Family Physician. 2011;84(8):918-24. 9

13. Shushan A. 2013, Complications of menstruation and abnormal uterine bleeding. Current Diagnosis and Treatment: Obstetrics and Gynecology, 11th edition. McGraw-Hill Education. 2013. 10