Original Research Article

Study on electrolytes and antioxidants in premenstrual syndrome

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ABSTRACT

Introduction: Premenstrual syndrome (PMS) is the most common disorder experienced by women during the menstrual years. Up to 90% of women's are affected to some degree. Electrolytes and antioxidants imbalance may act as contributory factor towards the worsening of PMS. The present study was conducted to investigate serum electrolytes and antioxidants Vit C, Vit E, and uric acid.

Materials and Methods: The study population grouped into 50 patients of age group 18 to 42 years (Group A) and 50 without PMS (Group B) non menstrual days. Patients with Diabetes, Hypertension, tuberculosis, leprosy or any chronic illness where excluded from study. Electrolytes were measured in Roche electrolyte analyser and other antioxidants by manual methods.

Result: There was significant decrease in level of serum sodium for Group A as compared to Group B (p<0.001) where assignificant increase in level of serum potassium for Group A as compared to Group B (p=0.003). In the present study, it was found that, all antioxidants parameters (Vitamin C, Vitamin E & Uric acid) level significantly decreased in Group A as compared to Group B (p=0.001).

Conclusion: In conclusion, serum sodium and potassium with decreased level of antioxidants are closely related to PMS.

1. Introduction

Premenstrual syndrome (PMS) is the most common disorder experienced by women during the menstrual years. Around the world, a critical health issue among women was PMS symptoms. Upto 90-92% of women are affected to some degree. Most of the women have just mild symptoms but others suffer severe discomfort which adversely affects their quality of life. The syndrome is characterized by lot of Physical, behavioral and psychological starting initial stage 7 to 14 days i.e. before ovulation and ends in the menstrual cycle. Now a day's PMS is increasing in younger population especially in city life. The major symptoms which are experienced with PMS includes anxiety, hyper hydration, fatigue, headache, migraines, palpitation, irritability, crying bouts, insomnia, confusion, depression, acne etc. The symptoms occur 7 to 6 days before the period begins may experience during the periods and gradually decrease with cessation of periods.[1]

Majority of researchers and gynaecologists concluded that an increased ratio of estrogen to progesterone with a mild to moderate excess of estrogen and deficiency of progesterone is causative factor of PMS. It is also noted that imbalance in prolactin, thyroid & adrenal hormones are also contributing for PMS. The overall symptomatology can be sum up by concluding imbalance in electrolytes & antioxidants such as vitamin C & E, uric acid are baseline factors contributing to PMS.[2,3] Paucity of data for study of electrolytes and antioxidants in PMS and hence the present study was designed to analyse the levels of serum

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electrolytes along with antioxidants such as vitamins E & C and uric acid.

2. Materials and Methods

The study was conducted in department of biochemistry and central lab of RIMS Raichur (Karnataka, India) during February 2018 to October 2019 (over period of 18 months). Fifty subjects with PMS (Group A) and fifty without PMS (Group B) both group comprising around 18-42 years aged subjects without any symptoms. Patients with Diabetes, Hypertension, tuberculosis, leprosy or any chronic illness where excluded from study. The ethics clearance was taken from the Institute Ethics Committee. All subjects were explained about research work and informed consent was obtained from the study participants. All the data forms were kept securely under lock and key. Data entry was performed without having personal identification details of the study participants; and all the information will be kept confidential.

The blood sample of 3 to 6ml was drawn in plain vacutainers from anterior cubital vein under aseptic precautions. Parameters of sodium and potassium were analyzed using AVL 9180 Roche Electrolyte analyzer by ISE direct method under are maintained in strict quality control. Antioxidants vitamin C determined by Natelson method[4] vitamin E was done by Baker & frank method.[5] Uric acid was done by standardized Uricase method. Reference range for parameters are Serum sodium 135‑145 (mEq/L), Serum Potassium 3.5‑5.0 (mEq/L), vitamin C 0.4-2.0(mg/dL), vitamin E 5-17 (μg/mL) and Uric acid 2.5–6.0 (mg/dL).

2.1. Statistical analysis

The data were expressed as mean $\pm$ SD. Comparisons of parameters between groups were evaluated by student t test. $P<0.05$ was considered as statistically significant. Statistical analysis was done using SSPS 20 software.

3. Results

In Table 1 significant difference between groups was observed for height (p=0.0001), weight (p=0.003) and SBP (p=0.045). For age and DBP, the present study was not found significant difference between groups (p=0.063, p=0.167).

In Table 2 significant decrease in level of serum sodium for group A as compared to group B (p<0.001) where as significant increase in level of serum potassium for group A as compared to group B (p=0.003). In short, the level of Sodium is significantly decreased and the level of Potassium is significantly increased.

In Table 3 present study, it was found that, all antioxidants parameters (Vitamin C, Vitamin E & Uric acid) level significantly decreased in group A as compared to

Table 1: Demographic profile of study subjects.

Variables	Group A (with PMS)	Group B (Without PMS)	p value
Mean age (yrs)	36.68±7.18	30.08±5.84	0.063
Height (cms)	150.42±8.24	147.28±7.75	0.0001
Weight(kg)	55.06±10.12	58±11.37	0.003
SBP (mm of Hg)	132.8±14.02	127.04±10.50	0.045
DBP (mm of Hg)	84.08±9.66	81.75±5.49	0.167

Note: P value less than 0.05 is considered as statistically significant

group B (p=0.001).

4. Discussion

In our study we have studied the relationship between electrolytes and antioxidants in subjects with PMS. We have observed a significant decrease in antioxidants such as vitamin C, vitamin E & Uric acid.

All the symptoms related to PMS are mainly due to hormonal imbalance especially increased ratio of estrogen to progesterone and deficiency of progesterone.[3] The adrenal hormones aldosterone & cortisol are slightly elevated in PMS. In the Luteal phase, there is increase in concentration of anti diuretic hormone and progesterone antagonistic effect in the aldosterone system. Hence resulting in decrease in sodium and causing oedema. This is the main which has direct link to anxiety and neuropsychiatric symptoms relating to PMS. There is direct relationship between decrease in sodium and slight increase potassium levels with the symptoms of PMS especially the oedema, anxiety, irritability, confusion and mood swings with PMS.[6–8] Several studies concluded that role of oxidative stress (increased oxidants & decreased antioxidants) in development of PMS. Highly decreased parameters of antioxidants such vitamin C, vitamin E, Uric acid, Glutathione, Superoxide dismutase etc. and high increased levels of Malondialdehyde are noted in PMS. This mainly due to increased production of free radicals and decreased antioxidants defences. The imbalance in hormones levels especially increase estrogen and decreased progesterone triggers the oxidative stress.[3,9–12]

In our study we have observed decreased sodium, slight increase potassium due to adrenal hormone imbalance due to the disturbed ratio of estrogen to progesterone and the same is responsible for triggering of oxidative stress and hence we report the significant decreased level of vitamin E & C.

We also suggest the Oral supplementation of vitamin C through medication and citrus fruits and juices during PMS and vitamin E medication or supplementation of almonds,

Table 2: Mean of Electrolytes parameters (sodium, potassium) in both groups.

S. No	Variables	Group A (with PMS)	Group B (Without PMS)	P value
1.	Serum sodium (mEq/L)	126.2±2.7	139.3±0.4	<0.001
2.	Serum Potassium (mEq/L)	5.73±0.007	4.22±0.03	0.003

Note: P value less than 0.05 is considered as statistically significant

Table 3: Mean of antioxidants parameters (vitamin C, vitamin E, & Uric acid) in both groups

S. No	Variables	Group A (with PMS)	Group B (Without PMS)	P value
1.	vitamin C (mg/dL)	5.12±0.12	6.06±0.31	0.001
2.	vitamin E (μg/mL)	6.05±0.22	7.74±0.33	0.001
3.	Uric acid (mg/dL)	2.47±0.05	5.45±0.95	0.001

Note: P value less than 0.05 is considered as statistically significant

peanuts, hazelnuts or green veggies.

5. Conclusion

Oral supplementation of sodium and antioxidants vitamin C& E may reduce the symptoms during PMS in reproductive age females. Improving the body's antioxidant status by eating a diet rich in fruits such as fresh fruits and vegetables with exercise can improve symptoms.

6. Source of Funding

None.

7. Conflict of Interest

All authors of study declare no conflict of interest in this study.

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