

Effect Of Anemia On Premenstrual Syndrome In Adolescent Girls

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Abstract: Background: Medical definitions of PMS (Pre Menstrual Syndrome) are limited to a consistent pattern of emotional and physical symptoms occurring only during the luteal phase of the menstrual cycle that are of "sufficient severity to interfere with some aspects of life. A number of medical conditions are subject to exacerbation at menstruation which leads the patient to believe that she has PMS, while the underlying disorder may be some other problem, such as anaemia, hypothyroidism, eating disorders and substance abuse. The aim of the study is to find the effect of anaemia on severity of symptoms of PMS. We would like to formulate a screening test to differentiate if the patient is having PMS or the symptoms are just an exacerbation of anaemia. Method: For this we have taken 40 females of age group 16-20 who have reported symptoms of PMS. Haemoglobin of each subject was measured and a questionnaire containing 15 symptoms were given to each one of them and asked to fill the severity of symptoms. During Period A at least 4 days before menstrual period and the first couple of days of starting of menses and Period B during rest of the month. The students in anaemic group were given dietary and iron supplements for 2 months and were again asked to fill the questionnaire. Result: The severity of symptoms of PMS in anaemic group (9.1, S.D. 0.91) is found to be more than non-anaemic group). (12.3, S.D. 0.86). Increase in symptoms severity was 127% among girls with anaemia while in non-anaemic group was 586% from period B to period A. After supplements for 2 months to anaemic subjects decrease in severity was profound in period B. In subjects whom the increase in severity from period B to A was less than 100%, experienced 73% decrease in severity score after supplements. Conclusion: Many symptoms of anaemia and PMS are similar. Anaemia can lead to increase in severity of PMS. In some girls anaemia can be confused with PMS. We observed that subjects having anaemia, symptoms were present throughout the month. Decrease in severity of symptoms after supplements suggest anaemia as an aggravating factor in PMS. Lesser the increase in symptoms from period B to A, more are the chances that the symptoms are caused due to anaemia rather than PMS. This can be used as a screening method to prevent misdiagnosis of PMS.

Key Words: PMS (Pre Menstrual Syndrome), Anaemia, Screening, Iron supplements

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Introduction: Premenstrual syndrome (PMS) is a cyclic recurrence of distressing somatic and affective symptoms in the luteal phase of menstrual cycle and in the few days (1- 3 days) of the next follicular phase. The most important somatic symptoms are feeling overwhelmed, food craving, insomnia or hypersomnia, headache, pelvic pain and discomfort, breast tenderness, joint pain, bloating, and the most common and distressing affective symptoms are irritability, anxiety, depression, mood swing, hostility, poor concentration, confusion, social withdrawal and interpersonal conflicts¹⁻³

The significant appearance of these symptoms starts from the teen years and worsen through the process of aging^{4, 5}. During the childbearing age, up to 40% of women have some form of PMS. Related studies show that about 60% of

adolescent girls suffer from PMS^{6, 7}. Emerging of PMS symptoms during the teen years complicate the process of puberty and will affect their interpersonal relationships, social and educational performance in a negative way, resulting in poor self-esteem and a sense of dissatisfaction and inadequacy⁸.

More than 200 different symptoms have been associated with PMS, but the three most prominent symptoms are irritability, tension, and dysphoria (unhappiness)⁹. Common emotional and non-specific symptoms include stress, anxiety, difficulty in falling asleep (insomnia), headache, fatigue, mood swings, increased emotional sensitivity, and changes in libido. Formal definitions absolutely require the presence of emotional symptoms as the chief complaint; the presence of exclusively physical

symptoms associated with the menstrual cycle, such as bloating, abdominal cramps, constipation, swelling or tenderness in the breasts, cyclic acne, and joint or muscle pain—no matter how disruptive these physical symptoms are—is not considered PMS.

A number of medical conditions are subject to exacerbation at menstruation, a process called menstrual magnification. These conditions may lead the patient to believe that she has PMS, when the underlying disorder may be some other problem, such as anaemia, hypothyroidism, eating disorders and substance abuse. While these symptoms are often blamed on PMS, headaches, trouble concentrating, lack of energy and grumpiness might actually signal a different health problem

Symptoms of anaemia may include fatigue, decreased energy, weakness, shortness of breath, light-headedness, palpitations (feeling of the heart racing or beating irregularly), and looking pale. Apart from this anaemia, can affect mental health and mood swings. More recently, haemoglobin (Hb) concentration was observed to be significantly related to depression and fatigue in mothers despite the fact that they were of high socioeconomic status¹⁰. This observation is consistent with a general association between improved iron status and the ability to concentrate as well as a reduction in fatigue with iron therapy.

So through this study we would like to evaluate the effect of anaemia on PMS and to formulate a screening test to differentiate if the patient is having PMS or the symptoms are just an exacerbation of anaemia.

Materials and Method: The study was conducted among girls studying in BPT at Govt. Physiotherapy college, Ahmedabad. We have taken 60 girls in age group 16-20 and detailed menstrual history was taken. Patient having history of depression, thyroid disease, eating disorders or substance abuse were excluded. Out of them 40 were found to have symptoms of PMS on the diagnostic criteria of University of California at San Diego⁴. i.e. At least one of the following affective and somatic symptoms during the five days before menses in each of

the three previous cycles. Affective symptoms such as depression, angry outbursts, irritability, anxiety, confusion, social withdrawal and somatic symptoms as breast tenderness, abdominal bloating, headache, swelling of extremities. The symptoms relieved from days 4 through 13 of the menstrual cycle.

Haemoglobin of each subject was measured using Hemocue (AB Leo Diagnostics, Helsingborg, Sweden) which is a simple bedside method. The subjects were divided into anaemic and non-anaemic on the basis of their Hb content. Non Anaemic group (18 subjects) with Hb content more than 10gm/dl and anaemic group (22 subjects) with Hb less than 10gm/dl.

All the subjects were asked to fill a self reported questionnaire containing 15 symptoms and were asked to fill the severity of symptoms as 0-3 with 0 as none, 1 as mild (doesn't interfere with activity), 2 as moderate (interfere with the activity but is not disabling), 3 as severe (disabling) during two different periods in menstrual cycle. Period A from 4 days before menstrual period to first couple of days of starting of menses and Period B during rest of the month. The symptoms must have been present in at least 3 of the last 6 cycles.

All the responses were tallied and responses in all 15 questions were added. The students were classified as having mild, moderate or severe PMS on score less than 15, 15-30 and more than 30 respectively.

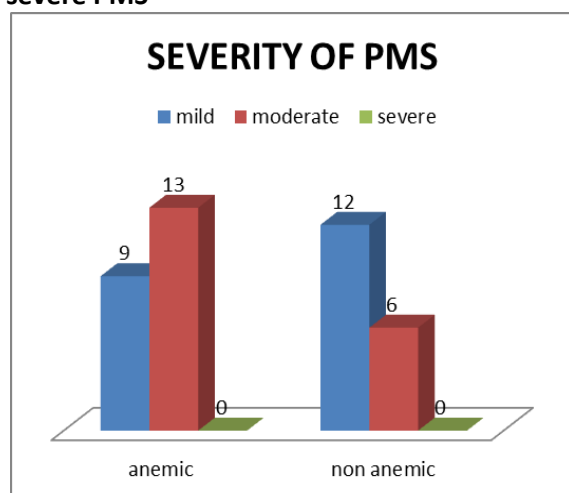
The students in anaemic group were given dietary and iron supplements for 2 months and were again asked to fill the questionnaire.

The responses were tallied and the test was found to be statistically significant using unpaired t test ($p=0.0001$).

Result: The average age in non-anaemic group was (18.2 ± 0.89) and anaemic group was (18.1 ± 0.91) . The Hb concentration in subjects not having anaemia was (12.3 ± 0.86) and in subjects with

anaemia was (9.1 ± 0.91). The subjects were divided on the basis of score obtained in the questionnaire as having mild, moderate or severe PMS on score less than 15, 15-30 and more than 30 respectively. In the anaemic subgroup out of 22, 9 subjects had mild PMS while 13 had moderate PMS. Whereas in non-anaemic subgroup 12 out of the 18 subjects had mild PMS and 6 had moderate PMS. None of the subjects in our study showed signs of severe PMS (Fig 1).

Fig 1: No. of subjects with mild, moderate and severe PMS



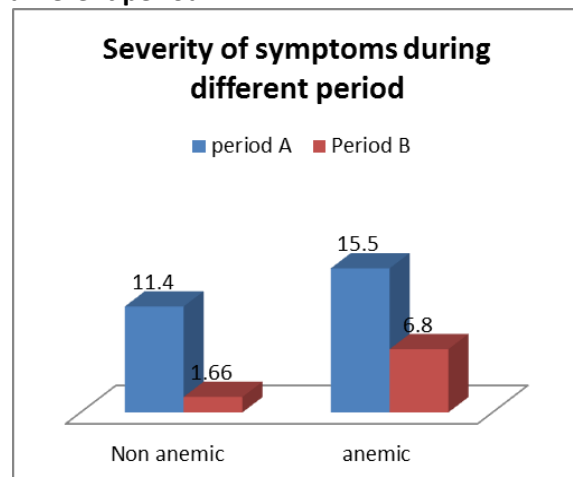
If we compare the severity of symptoms during Period A that is 4 days before menstrual period to first couple of days of starting of menses and Period B during rest of the month we found that severity score during period A was (11.4 ± 4.3) and (15.5 ± 3.9) in non-anaemic and anaemic subjects respectively. While during Period B it was (1.66 ± 1.3) in non-anaemic and (6.8 ± 2.1) in anaemic subjects. (Fig 2) From here increase in severity of symptoms from Period B to Period A was calculated by formula

$$\% \text{ increase} = \{(\text{Score in Period A} - \text{Score in Period B}) / \text{Score in Period B}\} \times 100$$

In anaemic group % increase in severity was 127% and in non-anaemic group was 586%. In the anaemic group on the basis of increase in symptom from Period B to Period A the subjects were categorized into three groups, group A with increase less than 100% (5 subjects), group B with increase between 100- 200% (14

subjects) and group C with increase more than 200% (3 subjects).

Fig 2: Severity of symptoms during different period



After dietary and iron supplements for 2 months to subjects in anaemic group response were tallied. Decrease in symptoms severity score was calculated by formula

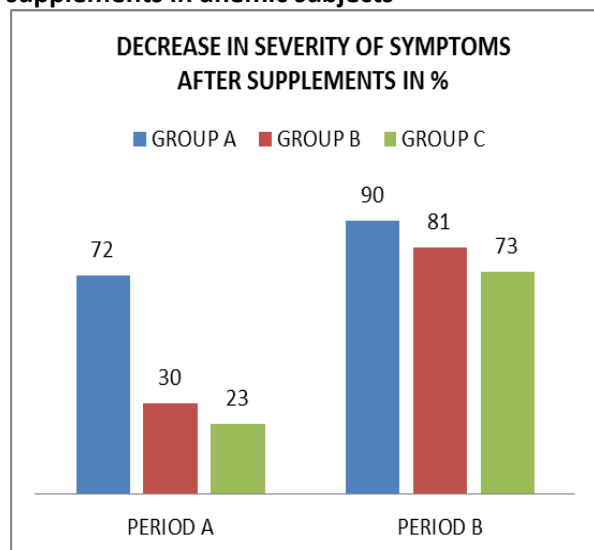
$$\% \text{ decrease} = \{(\text{Score before supplements} - \text{Score after supplements}) / \text{Score before supplements}\} \times 100$$

There was a lot of improvement in severity of symptoms during period B with 90% decrease in severity in group A, 81% in group B and 73% in group C. During period A that is during 4 days before menstrual period to first couple of days of starting of menses the decrease in severity in group B and C were 30% and 23% respectively but in group A 3 out of 5 subjects did not report any affective or somatic symptoms in their last cycle and decrease in severity score was 72%. (Fig 3)

Discussion: Many of the symptoms of PMS are very similar to those of anaemia, and anaemia itself can act as an exaggerating factor for PMS. The severity of symptoms in the anaemic subjects was higher than the severity of symptoms in the non-anaemic subjects. But the increase in severity from rest of the cycle to that in the luteal phase was much higher in non-anaemic subjects (586%) than anaemic subjects (127%) suggesting that non anaemic subjects

were having sparse symptoms in period B of the menstrual cycle, but in anaemic subjects the symptoms were prominent throughout the cycle both in period A and period B. So anaemia tends to cause symptoms in the subject similar to PMS and sometime subject can be confused with having PMS while the symptoms are just due to anaemia.

Fig 3: Decrease in severity of symptoms after supplements in anemic subjects



Iron and dietary supplements is required to improve Hb in anaemic patients. On giving dietary and iron supplements for 2 months increase in Hb was found in the anaemic group. After intervention symptoms in period B were reduced considerably in all the subjects having anaemia suggesting that the symptoms in period B were mainly due to effect of anaemia. In period A subjects whose increase in symptoms severity from period B to A was less than 100% showed decrease in symptoms by 73% with 3 out of 5 showed no symptoms of PMS after intervention while in subjects whose increase in symptoms severity from period B to A between 100- 200% and more than 200% showed decrease in symptoms only by 30 and 23% respectively. This data suggest that lesser the increase in symptoms from period B to A, more are the chances that the symptoms are caused due to anaemia rather than PMS.

The etiology of PMS remains unknown and may be complex and multifactorial. The role of

ovarian hormones is unclear, but symptoms often improve when ovulation is suppressed.¹¹ Changes in hormone levels may influence centrally acting neurotransmitters such as serotonin,¹² but circulating sex hormone levels are typically normal in women with PMS. Some evidence suggests that the disorder is related to enhanced sensitivity to progesterone in women with underlying serotonin deficiency.^{13, 14, 15} This mechanism may not explain all cases, because some patients do not respond to treatment with selective serotonin reuptake inhibitors (SSRIs).¹⁴

Recent studies of developmental iron deficiency suggest that transporters for serotonin, and norepinephrine are decreased.¹⁶ This may cause decrease serotonin level in iron deficiency anaemia and cause symptoms of PMS in some subjects.

Conclusion: The most systematically studied treatments have been the elimination of hormonal fluctuations with ovulation suppression treatments or the “correction” of neurotransmitter dysregulation with antidepressant or anxiolytic medications. Other treatments include putative vitamin or mineral deficiencies & symptomatic treatment.

Currently SSRI such as Fluoxetine, Sertraline etc. are more opted as choice for management of PMS. Such drugs have lot of unnecessary side effects. So if a screening method is formulated on the basis of increase in PMS symptoms severity from rest of the cycle to luteal phase it might become easy to differentiate that the symptoms are caused due to PMS and if anaemia is an aggravating factor or anaemia is a root cause of the symptoms and rationale treatment can be given accordingly.

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