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Original Research Article

Analysis of causes and management of pubertal menorrhagia requiring hospitalization

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ABSTRACT

Background: Puberty menorrhagia, characterized by excessive menstrual bleeding in adolescents between menarche and 19 years of age, poses a significant clinical challenge. It frequently results from an immature hypothalamic-pituitary-ovarian (HPO) axis but may also indicate underlying systemic or endocrine disorders. Prompt evaluation and management are critical to preventing anaemia and long-term reproductive health issues. To assess the clinical presentations, etiological factors and treatment outcomes of adolescent girls presenting with puberty menorrhagia in a tertiary care setting.

Methods: A retrospective record-based study was conducted in the Department of Obstetrics and Gynaecology, Mysore Medical College and Research Institute, from January 2019 to December 2023. Data from 80 adolescent girls aged between menarche and 19 years, who were admitted for the management of menorrhagia, were analysed. Clinical parameters, laboratory investigations including haemoglobin, thyroid profile, pelvic ultrasound findings and treatment modalities were reviewed.

Results: The majority of cases (40%) were in the 15–17-years age group, with 55% attaining menarche between 12–14 years. Most presentations occurred within 6 months of symptom onset. Anaemia was prevalent, with 43.75% having moderate and 17.5% severe anaemia. The most common presenting symptom was heavy menstrual bleeding alone (65%). Ultrasound findings were normal in 72.5%, with PCOS being the most common abnormality. Hypothyroidism was noted in 24.25% of cases. The primary treatment modality was parenteral iron and blood transfusion (67.5%), while hormonal therapy was administered to 32.5% of patients.

Conclusions: Puberty menorrhagia is predominantly due to anovulatory cycles associated with HPO axis immaturity. Early recognition and individualized management, including correction of anaemia and hormonal regulation, are essential to prevent long-term morbidity. Strengthening adolescent health education and ensuring consistent follow-up remain critical components of care.

Keywords: Adolescent gynaecology, Anovulatory cycles, Anaemia, Hypothyroidism, HPO axis, Puberty menorrhagia

INTRODUCTION

Puberty marks the normal physiologic transition from childhood to sexual and reproductive maturity. Although the timing, sequence and pace of pubertal maturation vary among individuals, the sentinel events of puberty generally follow a predictable pattern. The age of onset of puberty in girls ranges from 8.5-13.3 years.¹ Adrenarche describes the activation of adrenal androgen secretion that begins

before puberty and stimulates pubarche, the appearance of pubic hair. Gonadarche describes the activation of the hypothalamic-pituitary-gonadal axis, which stimulates the pubertal growth spurt and stimulates thelarche, the appearance of breast tissue and finally menarche, the onset of menses.² Menstruation is the cyclical shedding of the endometrium which occurs due to action of the sex hormones on the endometrium of the uterus. It denotes an intact HPO axis, functioning ovaries, presence of

responsive endometrium to the endogenous ovarian steroids and the presence of a patent uterovaginal canal.³ It is ovulation and the organized sequence of endocrine signals that gives menses regularity, predictability and consistency.²

Menstrual cycles often are irregular for the first 12-18 months after menarche, due to immaturity of the HPO axis. Cycles remain relatively long for the first 5-7 years after menarche, thereafter decreasing gradually in length and becoming more regular. The prevalence of anovulatory cycles is higher in girls under age 20 and women over age 40, which reflect the differences in the length of the follicular phase of the ovarian cycle.²

Puberty menorrhagia is defined as excessive bleeding more than 80 ml and duration more than 7 days between menarche and 19 years, although in 5% of the individuals it is heavier, but causes no trouble.^{1,4} Diagnosis is usually by exclusion and majority of patients will return to regular menstrual pattern by 3-4 years.

One-fourth of the population in developing countries comprises girls under the age of 20 and in India, children under the age of 15 make up around 40 per cent of the total population.⁵ It is also recorded that in adolescent girls, irregular uterine bleeding accounts for around 50 percent of gynaecological visits.⁶ Menorrhagia has a significant effect on the adolescent quality of life, daily school activity and peer relationship. Many adolescents come late to gynecologists making them more vulnerable to complications such as severe anemia and hypoproteinemia.⁷

Thus, in our country, puberty menorrhagia is a common gynaecological disorder that leads to significant morbidity among adolescent age group and menstrual cycle evaluation should be considered a vital event to be examined in every female adolescent coming to the hospital. Our study hereby aims to determine the various clinical presentations, etiological factors and treatment outcomes in patients with puberty menorrhagia in our setup.

METHODS

This retrospective and record-based study was conducted in the Department of Obstetrics and Gynecology, Mysore medical college and research institute, Mysore, from January 01, 2019 to December 31, 2023. Data of all adolescent girls with history of excessive bleeding per vagina of age between menarche and 19 years admitted for its management, fulfilling all the inclusion criteria and none of the exclusion criteria, were included in the study.

The permission to use the data for research purpose was taken from the medical records department. All the care was taken to keep the personal information of the adolescents confidential. Eighty adolescent girls were included in the present study.

Inclusion criteria

Adolescent girls from the age of menarche and 19 years, history of excessive bleeding during menstruation and adolescent girls whose information is available for the study were included in the study.

Exclusion criteria

Married girls presenting with excessive bleeding, age more than 20 years and adolescents whose information is not available, were excluded from the study.

Data regarding their age at menarche, duration since menarche, menstrual pattern, investigations performed and the management modality were obtained from the hospital records. Duration and severity of symptoms were assessed. Menstrual history and past history were obtained. Patients were examined for pallor, lymphadenopathy, gum bleeding, purpura, acne and other features of hyperandrogenism, abdominal examination for hepatosplenomegaly and other mass.

Baseline investigations were done including USG abdomen and pelvis, morphology of uterus and ovaries. The management protocol depended on the underlying cause. Treatment given was recorded.

Statistical analysis

The collected data were entered and analysed using Microsoft Excel and IBM SPSS Statistics (version 2408). Descriptive statistics were used to summarize the demographic and clinical variables. Categorical variables such as age groups, symptoms, BMI categories, haemoglobin levels, thyroid status, ultrasound findings and treatment modalities were expressed as frequencies and percentages.

No inferential statistics were applied due to the retrospective observational nature of the study and absence of control or comparison groups. However, trends over the 5-years period were visually assessed through cross-tabulation and comparison of proportions across years. Graphs and tables were used to facilitate interpretation of patterns in clinical presentation, severity of anaemia and treatment responses.

RESULTS

A total 40% of the case encountered in our study were in the age group 15-17 years (Table 1). Around 65% of the cases came with only the complaint of heavy menstrual bleeding while the rest came with complains of irregular cycles also (Table 2).

Most girls in our study attained menarche by 14 years of age i.e., around 55% (Table 3). Maximum cases were seen to have symptoms less than 6 months since the time of menarche (around 45%) (Table 4). Majority of the

adolescents were underweight owing to poor nutritional habits (Table 5). Most adolescents were detected with moderate anaemia thereby allowing us to treat them at an earlier stage and prevent further complications arising due to anaemia (Table 6). Most of the adolescents were Euthyroid and only 24.25% of the 66 subjects, whose data was available, were shown to have hypothyroidism. But there was no data regarding the further evaluation done in view of the same (Table 7).

Normal ultrasound findings were noted in around 72.5% of the subjects and around 27.5% had abnormal findings most of which showed PCOS pattern (Table 8). In the hospital, hormonal therapy was given only to those subjects who were literate enough to understand its essentiality and thereby follow up at regular intervals, hence allowing us to successfully manage around 32.5% of the subjects (Table 9).

Table 1: Incidence in specific age groups.

	2019	2020	2021	2022	2023	%
<11	0	0	2	3	1	7.5
12-14	5	3	7	9	4	35
15-17	3	3	5	12	9	40
>18	0	2	4	4	4	17.5

Table 2: Analysis of symptoms.

	2019	2020	2021	2022	2023	%
Only HMB	7	6	11	16	12	65
HMB with irregular cycles	1	2	7	12	6	35

Table 3: Age at menarche.

	2019	2020	2021	2022	2023	%
<12	0	0	1	4	3	10
12-14	7	5	12	13	7	55
15-17	1	3	5	10	8	33.75
>17	0	0	0	1	0	1.25

Table 4: Duration since menarche.

	2019	2020	2021	2022	2023	%
<6 months	3	5	7	14	7	45
6 months to 2 years	4	2	5	8	6	31.25
>2 years	1	1	6	6	5	23.75

Table 5: BMI.

	2019	2022	2021	2022	2023	%
<18.5 Underweight	6	5	6	14	10	51.25
18.5-24.9 Normal	0	1	7	7	5	25
25-29.9 Overweight	0	0	2	4	1	8.75
30-34.9 Class 1 obesity	2	1	3	3	2	13.75
35-39.9 Class 2 obesity	0	0	0	0	0	0
>40 Class 3 obesity	0	0	0	0	0	0

Table 6: Haemoglobin levels (ICMR grading).⁸

	2019	2020	2021	2022	2023	%
Mild (10-11)	6	2	6	11	5	37.5
Moderate (7-9.9)	2	4	7	14	8	43.75
Severe (4-6.9)	0	2	4	3	5	17.5
Very severe (<4)	0	0	1	0	0	1.25

Table 7: TSH values (Normal - 0.5-5.5 mIU/l).⁹

	2019	2020	2021	2022	2023	%
Euthyroid	5	3	10	19	12	74.25
Hypothyroid	1	2	2	7	4	24.25
Hyperthyroid	0	0	0	0	1	1.5

Table 8: USG findings.

	2019	2020	2021	2022	2023	%
Normal	8	7	14	18	11	72.5
Abnormal (PCOS, fibroid, hyperplasia)	0	1	4	10	7	27.5

Table 9: Treatment received.

	2019	2020	2021	2022	2023	%
Only parenteral iron and blood transfusions	5	6	12	20	11	67.5
OC pills with blood transfusions	3	2	6	8	7	32.5

DISCUSSION

Menarche is a hallmark event in adolescent life. It marks a transformation from childhood to adulthood. During this time, the maturation of the HPO axis plays a vital role. Immaturity of this HPO axis causes menorrhagia, which is most common in the immediate post menarchal age.¹⁰

The incidence of AUB at our hospital is 34.72% of which approximately only 10% account to adolescents. In this study, around 40% girls lie in the age group between 12-14 years which can be correlated with similar studies conducted by Deepthi et al, and Sujatha et al. The incidence increased in girls less than 12 years of age in the study Reethu et al.^{5,11,12} Menstruation occurs when the bone age is 13-14 years and it is unusual for it to occur before 12.5 years and after 14.5 years of age.¹⁰ Average age of menarche in India is 12.5 years.¹³ the same has been seen in our study with maximum girls attaining menarche between 12-14 years. These findings are similar to studies conducted by Manaswini et al.¹⁰ Majority of the girls in our study were underweight unlike observations made in a study conducted by Deepthi et al and Lakshmi et al, where most girls with puberty menorrhagia were having normal BMI.^{5,6}

With rapid economic development in our country, most adolescents in this age group are starting to have a higher BMI contrary to the observations made in our study. Excessive fat in obese children can elevate estrogen levels in the body and promote the occurrence of central precocious puberty, bringing down the mean age at menarche.¹⁴ A study by Rajesh et al showed an increased incidence of precocious puberty in overweight and obese girls, showing the occurrence of the same even before the start of our study period i.e., 2019.¹⁵ Most girls in our study presented to us within 6 months of starting of symptoms, similar to studies done by Reethu et al, and Manaswini et

al, while most of the girls in studies by Sujatha et al, and Khosla et al, presented late i.e., after 2 years of start of symptoms and have attributed it to the unawareness of the condition and low literacy rates in their areas. Early recognition of the condition has thus helped us to treat our subjects faster and prevent setting in of further complications.^{10-12,16} Around 65% of girls in our study presented only with heavy menstrual bleeding and absence of irregular cycles, which is comparable to studies conducted by Deepthi et al, and Lakshmi et al.^{5,6}

The best way to establish whether the child truly has menstrual loss that is medically significant is by measuring the haemoglobin levels. If the haemoglobin levels are more than 12 then the mother and child must be reassured and explained about the physiology of menstrual establishment. In cases with haemoglobin less than 12, blood transfusions and iron therapy are indicated followed by treatment with oral contraceptive pills which have been proven to control menstrual loss by direct effect on HPO axis.¹⁷ In our study most of the girls were noted to have moderate anemia similar to a study conducted by Manaswini et al.¹⁰ This reflected the presence of pre-existing anemia which was aggravated by acute menstrual blood loss in excessive amount or prolonged period.

The adolescent age group is one of the major beneficiaries of the Anaemia Mukta Bharat scheme, which was started in the year 2018 to provide a preventive and curative mechanism through a 6×6×6 strategy to the vulnerable age groups such as women, children and adolescents. It Aims to not only correct the anaemia but to prevent its complications in the future owing to the increased prevalence of iron deficiency anaemia which already exists among most Indian women, thus reducing the burden of anaemia in pregnancy.¹⁸ Thyroid hormones play an important role in normal reproductive physiology through direct effects on the ovaries and indirectly by

interacting with sex hormone binding globulin. Thyroid dysfunction can lead to menstrual irregularities and infertility. In our study hypothyroidism was seen in 24% of the girls with puberty menorrhagia, though a positive correlation could not be made between the same. A study conducted by Nangia et al showed menorrhagia as the major complaint in patients with thyroid disorders, both hypo or hyper.⁸

Most of the ultrasonography findings in our study were normal which is same as in studies conducted by Sujatha et al, Deepthi et al and Lakshmi et al.^{5,6,11} All of them have attributed this to having anovulatory cycles due to an immature HPO axis, which was also found to be the major cause in a study conducted by Archana et al and Ratan Chandra et al to evaluate causes for common gynecological problems of adolescent girl.^{19,20}

Blood transfusions and parenteral iron therapy had to be given to almost all cases in our hospital setting as in patient admission was given only to those with anemia. Mainstay treatment of Deepthi et al were blood transfusions and haematinics along with antifibrinolytics as most of them responded well to the same. This mode of management was similar to that of our study.⁵ Though the recommended definitive therapy is by hormonal therapy and was adapted by most researchers like Reethu et al Manaswini et al and Prachi et al our study had only 31% of the subjects treated with hormones due to loss to follow up.^{2,12,10,21,22}

A notable limitation of this study is the exclusion of outpatient cases, as it only included adolescent girls who were admitted for the management of puberty menorrhagia, which represented only the tip of the iceberg. This may have led to an overrepresentation of more severe cases requiring hospitalization, while milder or moderate presentations managed in outpatient settings were not captured. Consequently, the findings may not fully reflect the broader clinical spectrum, prevalence or treatment approaches of puberty menorrhagia in the general adolescent population. This selection bias limits the generalizability of the results to all adolescents experiencing abnormal uterine bleeding.

CONCLUSION

Puberty occurs when a carefully orchestrated cascade of events unfolds in the neuroendocrine system. At this time a varied number of problems arise in the adolescent girl. Of these, the one most crippling to the young adolescent is menorrhagia which has shown an increasing incidence over the last few years. These adolescent girls need to be evaluated thoroughly earlier rather than later with the onset of symptoms, so that effective management can be started and anemia along with its consequences can be prevented. Individualization of each case, detailed history, physical examination, baseline workup and timely hospitalization are critical to handling each case. Though timely iron and blood transfusions prevent complications, health education, promotion of healthy lifestyle, yoga and diet

plays a major role in management. Above all, regular follow up, which was a major drawback of our study, is thus mandatory to provide an uneventful reproductive lifespan.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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