

# Assessment of various etiological factors of puberty menorrhagia in rural central India

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## ABSTRACT

**Background:** Puberty menorrhagia is characterized by bleeding of long duration anywhere between menarche and 19 years. It takes 5-8 years for development of regular menstrual cycle from menarche and during this period the adolescents experience menstrual abnormalities. **Objective:** The present study was conducted to evaluate the etiologies of puberty menorrhagia in adolescent girls of rural India. **Methodology:** Retrospective, observational study was carried out over a 2 years period on adolescents presenting with bleeding per vaginum. Permission to use medical records was taken from the medical records. BMI, duration of symptoms, menstrual pattern, ultrasonographic findings, diagnosis, treatment etc. were captured and analysis carried out. **Results:** The commonest etiology was immaturity of hypothalamic-pituitary ovarian axis, followed by PCOS, endocrine or hematological disorders. Only 25% were treated with hormonal therapy. Reassurance therapy of adolescent and her parents was found to be of utmost importance. **Conclusion:** The commonest cause of abnormal bleeding in adolescents is hypothalamic-pituitary ovarian axis immaturity which results in anovulation and then followed by PCOS, endocrine and other disorders requiring diagnostic testing.

**Keywords:** Puberty menorrhagia, abnormal uterine bleeding, menstruation, hormonal therapy, hypothalamic-pituitary ovarian axis, PCOS.

The term puberty refers to the entire span of time during which a human being changes secondary sexual attributes, menstruation starts in the females and changes seen in psychosexual outlook.<sup>1</sup> There are five major physical characteristics of puberty in females: breast development, pubic hair development, axillary hair growth, height increase and menstrual onset (menarche), through which menarche is a hallmark occurrence throughout the lives of most teenage girls. This marks the change from infancy to puberty. While mechanisms that cause puberty and menarche remain unknown, they depend on the genetics, diet, body weight,

and hypothalamic pituitary-ovarian axis maturation.

It can take up to 2 years for the axis to completely mature. It is normal for adolescents to show signs of menstrual irregularities during this period. Puberty menorrhagia is characterized as prolonged bleeding between menarche and 19 years.<sup>2</sup> The initiation of menstruation does not indicate that ovulation has occurred; early menstrual periods are anovulatory in the majority of cases. Before ovulation, unopposed estrogen results in endometrial proliferation, with resulting menstrual bleeding being severe. The length of the cycle often varies for many years after

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menarche, and it can take around 5-8 years to develop a regular menstrual cycle. Adolescent girls typically experience menstrual abnormalities during this time.<sup>3</sup>

For all cases of puberty menorrhagia, the exclusion of pregnancy, especially an incomplete abortion or ectopic pregnancy, is obligatory. Coagulation disorders and leukemia should be ruled out of chronic anomalous bleeding. For a patient with coagulation disorders, menorrhagia is the only symptom presented with.

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.<sup>4,5</sup> It is also recorded that in adolescent girls, irregular uterine bleeding accounts for around 50 per cent of gynecological visits.<sup>6</sup> Thus in our country, puberty menorrhagia is a common gynecological disorder that leads to morbidity and often mortality in adolescent girls, and menstrual cycle evaluation should be considered an additional vital sign that should be examined in every female adolescent patient coming to hospital.<sup>7</sup>

The prognosis is usually stronger when the abnormal uterine bleeding starts after a time of normal menstruation than when it starts at menarche. For this rural region of central India there are very few studies on puberty menorrhagia and all of the studies have very few participants. The objective of the present study was to examine different etiologies of puberty menorrhagia in rural India adolescent girls.

#### **Materials and methods**

The present retrospective record based study was conducted in the Department of Obstetrics & Gynaecology, Index Medical College Hospital and Research Centre, Indore (M.P.) from April 1, 2017 to December 31, 2019. Data of all adolescent girls with history of excessive bleeding per vaginum of age between menarche and 19 years either seen on Outpatient basis or were admitted, 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. Seventy adolescent girls were included in the present study.

All the adolescent girls fulfilling the following inclusion criteria were included in the study:

- Adolescent unmarried girls from age of menarche to 19 years.
- History of excessive bleeding during menses.

- Adolescents girls whose complete information as per the requirement of the study was available in the Records.

Adolescent girls fulfilling the following exclusion criteria were excluded from the study:

- All married adolescent girls attending OPD with obstetric causes of menorrhagia.
- Girls of age more than 20 years with menorrhagia.
- Adolescents girls whose complete information as per the requirement of the study was not available in the records.

Data regarding their age, socioeconomic status, education, age at menarche, menstrual pattern and body mass index were collected from the medical records. Duration and severity of symptoms and severity of anemia was assessed from their available investigations. Menstrual history was recorded in detail which included age at menarche, regularity of cycles in past and present, duration of flow, passage of clots, number of pads used per day, dysmenorrhea and last menstrual day. Complaints of menorrhagia, metrorrhagia and polymenorrhagia were also recorded. Detailed medical history like diabetes mellitus, hypertension, tuberculosis, asthma, bleeding disorders, drug intake and family history also noted. History of other hormonal disorders like hypothyroidism, hyperthyroidism, treatment of PCOS, bleeding disorders was recorded. Information regarding their general physical and clinical examination was noted from the available medical records. Complete blood count, blood group, bleeding and clotting time, random blood sugar level, thyroid and other hormonal levels were also recorded. Findings of ultrasonography of abdomen and pelvis were taken into record. All the data required was captured in the customized proforma designed for the purpose of the study. Age of the adolescent girl, age at menarche, socioeconomic status, education of adolescent girl and her parents, body mass index, menstrual pattern, duration of symptoms, hemoglobin level, ultrasonographic findings, diagnosis and treatment prescribed formed the outcome measures of the study.

The descriptive statistics was presented in the form of number and percentages. Association between duration of symptoms and hemoglobin level and age of adolescent girl and final diagnosis was calculated using Pearson Chi-square test. A p value of <0.05 was taken as statistically significant. For the present study, online statistical software graphpad was used for calculating the p values.

**Results**

Majority of the adolescent girls i.e. 48.6% were in the age group 17-19 years (Table 1). Approximately 71% of the

**Table 1 : Age wise distribution of adolescent girls**

Age distribution	No. of girls	Percentage (%)
11-<14	7	10.0
14- <17	29	41.4
17 - <19	34	48.6
Total	70	100.0

adolescent girls were having symptoms of menorrhagia of more than 1 year since attainment of menarche (Table 2).

**Table 2 : Relation to menarche**

Duration since Menarche	No. of girls	Percentage (%)
< 6 month	9	12.9
>6 month – 1 year	11	15.7
>1 year – 2 years	20	28.6
>2 years	30	42.9
Total	70	100.0

84% of the adolescents in our study belonged to upper lower and lower socioeconomic strata (Table 3). Only 2.8% of the

**Table 3: Socio-economic status of adolescent girls**

Socio-economic status	No of patients	Percentage (%)
Upper Class	0	0.0
Upper Middle	3	4.2
Lower Middle	8	11.4
Upper Lower	31	44.3
Lower Class	28	40.0
Total	70	100.0

adolescent girls were illiterate while the rest were from just primary educated to graduates (Table 4). Only 5.7% of the

**Table 4 : Education of adolescent girls**

Education Level	No. of Girls	Percentage (%)
Illiterate	2	2.8
Primary Schooling	7	10.0
Secondary schooling	58	82.9
Graduation	3	4.3
Professional	0	0.0
Total	70	100.0

fathers had done their graduation, while rest of them was just literates, while 35.7% mothers were illiterate and 64.3% mothers were just literates (Table 5). 84.3% of the adolescent

**Table 5 : Education of the parents of adolescent girls**

Education Level	Father		Mother	
	No.	(%)	No.	(%)
Illiterate	0	0.0	25	35.7
Primary Schooling	51	72.9	35	50.0
Secondary schooling	15	21.4	10	14.3
Graduation	04	5.7	0	0.0
Professional	0	0.0	0	0.0
Total	70	100.0	70	100.0

girls were having normal body mass index (Table 6). Menorrhagia the commonest menstrual pattern was seen in 78.6% adolescent girls, meno-metrorrhagia was seen in 12.9% adolescent girls and polymenorrhagia was seen in 8.6% adolescent girls (Table 7). Majority of the adolescent girls (48.6%) had duration of symptoms for more than 1 year (Table 8). In the present study, 21 (30%) adolescent girls were having severe anemia (Hb < 7 gm%) and 42 (60%)

adolescent girls were having moderate anemia (Hb 7 to 9 gm%). Moderate to severe anemia was seen in majority of

**Table 6 : Body Mass Index**

BMI	No. of Girls	Percentage (%)
< 18.5 kg/m <sup>2</sup>	5	7.4
18.5 – 25 kg/m <sup>2</sup>	59	84.3
>25 kg/m <sup>2</sup>	6	8.6
Total	70	100.0

the adolescent girls whose duration of symptoms was more than 6 months. These adolescent girls were given 1-2 units of blood transfusions. There was no statistically significant

**Table 7: Menstrual Pattern**

Menstrual pattern	No. of Girls	Percentage (%)
Menorrhagia	55	78.6
Meno-metrorrhagia	9	12.9
Polymenorrhagia	6	8.6
Total	70	100.0

association seen between duration of symptoms and hemoglobin levels (p=0.07), showing that the hemoglobin

**Table 8 : Duration of symptoms**

Duration of symptoms	No. of Girls	Percentage (%)
<3 months	7	10.0
3 to 6 months	6	8.6
>6 months to 1 year	23	32.9
More than 1 year	34	48.6
Total	70	100.0

levels are not dependent on the duration of symptoms (Table 9). Ultrasonography showed PCOD in 12.9%

**Table 9 : Association between hemoglobin level and duration of symptoms**

Duration of symptoms	Hemoglobin level (gm %)				Total
	<4	4-7	7-9	>9	
< 3 months	0	2	4	1	7
3 to 6 months	0	1	2	3	6
>6 months to 1 year	2	5	13	3	23
>1 year	3	8	23	0	34
Total	5	16	42	7	70

χ<sup>2</sup> value = 15.80, df=9, p value = 0.07, Not significant

adolescent girls, fibroid in 4.3% girls, functional cyst of ovary in 5.7% girls and endometrial hyperplasia was seen in 2.9 % girls ( Table 10 ). Final diagnosis of primary

**Table 10 : Ultrasound Finding**

USG finding	No. of Girls	Percentage (%)
Normal	52	74.3
PCOD	9	12.9
Fibroid	3	4.3
Functional cyst of ovary	4	5.7
Endometrial hyperplasia	2	2.9
Total	70	100.0

dysfunctional uterine bleeding was made in 72.9% adolescent girls, PCOD in 12.9% adolescent girls, fibroid in 4.3% adolescent girls and hypothyroidism in 10.0% adolescent girls (Table 11). In our study higher incidence of dysfunctional uterine bleeding seen in the adolescent girls of age between 11-14 years and 14-17 years, while higher incidence of PCOD was seen in 17-19 years. There was a statistically significant association seen between age of the adolescent girls and final diagnosis (p=0.001), showing that

the final diagnosis is dependent on the age of the adolescent girls ( Table 12 ). The adolescents having fibroid and

**Table 11: Final Diagnosis**

Final diagnosis	No. of Girls	Percentage (%)
Primary DUB	51	72.9
PCOD	9	12.9
Fibroid	3	4.3
Hypothyroidism	7	10.0
Total	70	100.0

hypothyroidism (total n=10) were included in dysfunctional uterine bleeding making the total adolescents in this group

**Table 12: Association between age and final diagnosis**

Final Diagnosis	Age of Adolescent Girls (years)			Total
	11 - <14	14 - <17	17 - <19	
DUB	25	29	7	61
PCOD	-	2	7	9
Total	25	31	14	70

$\chi^2$  value = 22.06, df=2, p value = 0.001, Significant

equal to 61. Majority of patients were treated by non-hormonal treatment by reassurance, hematinics and tranexamic acid (approximately 65%) while 25% were treated by hormonal treatment. 10% adolescent girls who were diagnosed with hypothyroidism were treated with thyroid supplementation (Table 13).

**Table 13: Treatment received**

Type of treatment given	No. of Girls	Percentage (%)
Reassurance & Hematinic	15	21.4
Hematinic & Tranexamic Acid	30	42.9
Hematinic, Tranexamic Acid & Progestorone	2	2.9
Hematinic, Tranexamic Acid & OCP	16	22.9
Hematinic, Tranexamic Acid & Thyroxine	7	10.0
Total	70	100.0

## Discussion

WHO describes adolescence as a time between 11-19 years of age. It is the period of human growth which extends from childhood immaturity to adult physical and psychological maturity. Menarche is a seminal occurrence in young girls' lives. Occasionally menarche accompanied by irregular uterine bleeding that lasts until 19 years is called menorrhagia of puberty.

Majority of the adolescent girls (48.6%) in our study are in the age group 17-19 years, followed by 41.4% adolescent girls in the age group 14-17 years. The results of our study corroborate with the studies done by Khosla et al (2010)<sup>8</sup> who reported that 55% of their study participants belonged to mid to late adolescence and the study done by Joshi et al (2012)<sup>9</sup> also reported that 92% of their participants were in the mid to late adolescence. This shows the puberty menorrhagia is more common in adolescent girls more than 14 years. In majority of the adolescent girls in our study (71.5%) the duration of symptoms is more than 1 year since their attainment of menarche.

In our study 44.3% adolescent girls belonged to upper lower class and 40.0% belonged to lower class. Majority of the adolescent girls belong to upper lower and lower class strata of the society. Studies done by Rao et al (2004)<sup>2</sup> and Koranne et al (2014)<sup>10</sup> reported that there majority of the adolescent girls also belonged to lower socioeconomic status, which is comparable to our study findings. This shows that adolescent girls belonging to these two socioeconomic strata have higher incidence of puberty menorrhagia.

Only 2.8% adolescent girls were illiterate, 4.3% had done their graduation, while 92.9% adolescent girls were just literates. Majority of the adolescent girls in our study are just literates. Study done by Gottapu et al (2014)<sup>11</sup> reported literacy rate of 54% in their study which is comparatively lower in Gottapu et al (2014) study in comparison to the present study. 94.3% fathers and 64.3% mothers had done their primary and secondary education, while 35.7% mothers were illiterate. Poor educational status could be cause for late presentation of adolescent girls with symptoms of menorrhagia to the hospitals.

84.3% adolescent girls were in the normal BMI group, while 8.6% were in the overweight BMI group. Majority of the adolescent girls in our study are in the normal BMI group. According to the study done by Peter et al (2017)<sup>12</sup> menorrhagia was found to be highest in the normal BMI group adolescent girls, which is comparable to our study results.

In our study, menorrhagia seen in 78.6% adolescent girls is the most common menstrual pattern, followed by menometrorrhagia and polymenorrhagia. Study by Kazi et al (2014)<sup>13</sup> reported an incidence of menorrhagia in 50% of the adolescent girls. Our study results are in concordance with the results of Kazi et al (2014). In the present study, 32.9% adolescent girls had duration of symptoms between 6 months to 12 months and 48.6% adolescent girls had duration of more than 1 year. Majority of the adolescent girls in our study are having duration of symptoms more than 1 year. Our study results are in corroboration with the study done by Gillani et al (2012)<sup>1</sup> who reported that 58% adolescent girls had duration of symptoms of more than 1 year and also study done by Khosla et al (2010)<sup>8</sup> supports our study, who reported that 44% had symptoms of duration more than 1 year in their study. While the study done by Rao et al (2004)<sup>2</sup> reported that 62% of the adolescent girls in their study had a duration of symptoms of less than 6 months, which is contrary to our findings. The reason for late presentation in

our study could be due to unawareness about puberty menorrhagia, this could be due to lack of education.

In the present study, 60% adolescent girls had moderate anemia and 30% had severe anemia. Only 10% adolescent girls in our study are having normal hemoglobin level. Our study results are comparable with the study done by Rao et al (2004).<sup>2</sup> Our study found no significant association between hemoglobin level and the duration of symptoms of menorrhagia ( $p=0.07$ ). PCOD was seen in 12.9% adolescent girls, fibroid in 4.3%, functional cyst of ovary in 5.7% and endometrial hyperplasia in 2.9% adolescent girls. PCOD and functional cyst of ovary is the commonest USG findings in our study. Similar findings were reported by the studies done by Gillani et al (2012)<sup>1</sup> who reported an incidence of PCOD to be 8.6%, Joshi et al (2012)<sup>9</sup> reported it to be 14% and Kazi et al (2014)<sup>13</sup> reported it as 9% in their study. In the present study primary dysfunctional uterine bleeding was seen in 72.9% adolescent girls, PCOD in 12.9%, fibroid in 4.3% and hypothyroidism in 10%. Majority of the adolescent girls are having primary dysfunctional uterine bleeding. Study done by Chaudhury et al (2007)<sup>14</sup> found dysfunctional uterine bleeding in 71% adolescent girls. Rao et al (2004)<sup>2</sup> found dysfunctional uterine bleeding in 80%, PCOD in 2.8% and hypothyroidism in 5.7% adolescent girls. Roychowdhury et al (2008)<sup>15</sup> found dysfunctional uterine bleeding in 61%, PCOD in 3%, fibroid in 3% and hypothyroidism in 9.3% adolescent girls. Our results of dysfunctional uterine bleeding are comparable with the studies done by Chaudhuri et al (2007),<sup>14</sup> Rao et al (2004)<sup>2</sup> and Roychowdhury et al (2008).<sup>15</sup> While our study results of PCOD are much higher than reported by these authors. In adolescents 95% of cases of anovulation are due to the immaturity of HPO axis.<sup>9</sup> These adolescents lack the positive feedback mechanism necessary to initiate an LH surge and subsequent ovulation despite normal follicular estrogen level. In our study we did not come across bleeding diathesis. In our study, we found a significant association between age and final diagnosis ( $p=0.001$ ), showing the final diagnosis is dependent on the age of the adolescent girls.

42.9% adolescent girls received hematinic and tranexamic acid, 22.9% received hematinic, tranexamic acid and OCP, 21.4% received reassurance and hematinic. Majority of the adolescent girls have received hematinic and tranexamic acid in our study. 63% in this study group responded well with use of tranexamic and mefenamic acid during menstruation along with oral iron therapy. Our study results are in corroboration with the study done by Royal

College Of Obstetrician and Gynaecologist (1999)<sup>16</sup> also recommended tranexamic acid and mefenamic acid as first line drugs for menorrhagic women who either do not need contraception, or choose non-hormonal treatment. The aim of treatment in these adolescent patients is to regulate menstruation by stabilizing the endometrium and treating the hormonal alterations. The main stay treatment is reassurance that it is a self-limiting problem, followed by hematinics, tranexamic acid and NSAIDS during the menstrual cycle.

In our study menorrhagia due to PCOS was 12.85%, while study done by Rao et al (2004)<sup>2</sup> and Roychowdhury et al (2008)<sup>15</sup> found incidence to be 2.8%, and 3.07% respectively, which is comparatively low in comparison to the present study. COCP's were chosen as first line therapy along with hematinics in 22.85% while progesterone alone given in only 2.85 % patients. In Roychowdhury et al (2008)<sup>15</sup> study, 44.61% had received non-hormonal and 26.15% had received hormonal therapy. In the present study 10% were found to be hypothyroid and responded well to thyroid supplementation. Mukherjee et al (1986)<sup>17</sup> in their study of 70 cases of pubertal menorrhagia found the incidence of hypothyroidism to be 7.15%. Hypothyroid teenagers have milder symptoms than older patients. The cause of the excessive bleeding remains the subject of speculation in them. Although rare, uterine pathology such as fibroids and polyps may lead to abnormal uterine bleeding.<sup>17</sup> In our study, 4.28% was having uterine fibroid on ultrasonography, was treated conservatively with hematinics, tranexamic acid and analgesics without any surgical interventions. Two patients had relief from menorrhagia and one patient was treated with GnRH agonists to which she responded well.

### **Conclusion**

The most common etiology of abnormal bleeding in adolescents is immaturity of the hypothalamic-pituitary ovarian axis that results in anovulation followed by PCOS, endocrine, or hematological disorders that require targeted diagnostic testing. If abnormal uterine bleeding begins after a period of regular menstruation, the prognosis is better than when it begins at menarche. Individualization of each case, detailed history, physical examination, base line workup and timely hospitalization are critical to handling each case. To treat puberty menorrhagia, reassurance, therapy of adolescent girls and their parents about menstruation physiology is of utmost importance. Progesterone-only or combination hormone therapy with OCP is important treatment when patients do not respond to standard, supportive care. Regular

follow-up, healthy diet, and iron therapy needed in all menorrhagic puberty patients.

**Conflict of interest:** None. **Disclaimer:** Nil.

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