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Original Research Article

Menstrual challenges in puberty: Investigating menorrhagia in adolescent girls

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ABSTRACT

Background: Menorrhagia, defined as excessive or prolonged menstrual bleeding, poses a significant challenge during this developmental stage, potentially impacting the health and well-being of adolescent girls. Despite its prevalence, comprehensive studies on menorrhagia in this specific demographic are scarce. This study aims to address this gap by investigating the underlying causes and treatment outcomes of puberty menorrhagia.

Materials and Methods: A six-month observational study involving 50 adolescent girls presenting with menorrhagia was conducted at the Department of Obstetrics and Gynecology in a tertiary care center. The study utilized consecutive enumerative sampling and included a thorough investigation of participants, collecting data on demographic profiles, symptom severity, anemia levels, diagnoses, therapy requirements, and responses to conservative management. Baseline investigations encompassed a range of tests, including pregnancy exclusion, complete blood count, coagulation profile, and hormonal assays.

Results: The study cohort of 50 participants revealed varying characteristics: 24% were under 14 years, 34% were between 14-16 years, and 42% were aged 17-19 years. BMI distribution showed 14% below 18.5, 76% between 18.5 and 25, and 10% exceeding 25. Symptom duration included 20% reporting less than 6 months, 34% between 6-12 months, and 46% over 12 months. Etiology analysis indicated 60% with ovulatory dysfunction. Hemoglobin level analysis illustrated the prevalence and severity of anemia. Diverse treatments, including hormonal and non-hormonal interventions, were administered.

Conclusion: This study provides insights into the causes of puberty menorrhagia, emphasizing the need for a holistic treatment. Future research should delve deeper into identified associations and clinical variants to enhance our understanding and guide effective interventions. Management should be directed to the cause.

1. Introduction

Puberty is a crucial stage in human development marked by significant physical and hormonal changes. Among the myriad transformations, the onset of menstruation, or menarche, is a hallmark event for adolescent girls. While menstruation is a natural and essential part of the female reproductive system, it can be accompanied by various challenges, especially during the early stages of puberty. Menorrhagia, defined as abnormally heavy or prolonged menstrual bleeding, is one such challenge that can significantly impact the health and well-being of adolescent girls.[1] Menorrhagia is a prevalent gynecological condition affecting women of all ages, but its impact on adolescents is particularly noteworthy. Excessive menstrual bleeding can lead to physical discomfort and emotional distress, and, in severe cases, may even result in anemia, depression, and impaired quality of life. Despite the potential long-term consequences, there is a paucity of comprehensive studies specifically focused on menorrhagia

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in adolescent girls during puberty.[2]

Puberty is a time of rapid physical growth and hormonal fluctuations. Menstrual irregularities, including menorrhagia, are not uncommon during this period due to the immaturity of the reproductive system (Hypothalamo Pituitary Ovarian Endometrial axis).[3] Physical symptoms such as fatigue, pain, and discomfort, coupled with emotional distress, may influence academic performance, social interactions, and mental health. Identifying the specific challenges faced by adolescent girls experiencing menorrhagia is essential for implementing targeted support measures. Understanding the physiological factors contributing to menorrhagia in adolescence is crucial for early intervention and effective management.[4]

Understanding the prevalence and impact of menorrhagia in adolescent girls can transform clinical practice and healthcare policies. Tailoring healthcare services to address the unique needs of this population can lead to improved diagnosis, management, and overall reproductive health. This study aims to contribute valuable insights that can inform healthcare practices, educational strategies, and public health policies related to menstrual health in adolescents.

2. Aim

To investigate the Underlying Causes of Puberty Menorrhagia and to study the treatment outcomes

3. Materials and Methods

A six-month observational study was conducted at the Department of Obstetrics and Gynecology in a tertiary care center, focusing on 50 patients presenting with menorrhagia. The study employed convenience sampling to select participants between February 2023 and July 2023. Menorrhagia, or excessive menstrual bleeding, is a significant concern for many women, and this research aims to gain valuable insights into the condition's various aspects. By utilizing a consecutive enumerative sampling approach, the study aims to efficiently gather data from readily available participants within the specified timeframe, contributing to a comprehensive understanding of menorrhagia within the context of the tertiary care setting.

3.1. Inclusion criteria

All adolescent girls attending the outpatient department of gynecology with complaints of menorrhagia.

3.2. Exclusion criteria

1. All married adolescent girls attending OPD with obstetric causes of menorrhagia.
2. Girls above 20 yrs with menorrhagia.
3. Adolescent girls with puberty menorrhagia, who had failed to come up for follow-up during stipulated period.

A thorough investigation was conducted for each participant in the study, encompassing a detailed history and examination. Demographic profile, severity of symptoms, degree of anemia, final diagnosis, the necessity for blood and component therapy, and the response to conservative management were collected from all participants. Baseline investigations for all cases included the exclusion of pregnancy through urine testing, complete blood count with peripheral smear for RBC and WBC morphology, coagulation profile, blood grouping, Rh typing, and transabdominal ultrasonography. Additionally, selected cases underwent thyroid function tests (T3, T4, TSH) and hormonal assays, encompassing LH, FSH, and Prolactin levels. This meticulous approach to data collection aimed to provide a comprehensive understanding of the hormonal, demographic, and clinical aspects of menorrhagia, enabling a thorough analysis of etiology and associated factors in the context of the tertiary care center.

4. Results

In this study, we included 50 participants with puberty menorrhagia out of 72 adolescents who had menorrhagia. Table 1 presents the baseline characteristics of the study participants, highlighting key parameters such as age, BMI, number of pads used per day, number of days of bleeding and duration of symptoms. Among the 50 participants, 24% were under the age of 14, 34% fell within the 14-16 age group, and 42% were between 17 and 19 years old. In terms of BMI, 14% had a BMI below 18.5, 76% fell within the 18.5-25 range, and 10% had a BMI exceeding 25. Regarding the duration of symptoms, 20% reported symptoms for less than 6 months, 34% between 6-12 months, and 46% for over 12 months. On Day 1, 3 pads were used, constituting 6% of the total pad usage, while the bleeding lasted for 5 days, making up 2% of the overall duration. Day 2 saw an increase in both pad usage and bleeding days, with 4 pads (cumulative 36%, daily 12%) and 6 days (cumulative 12%, daily 6%), respectively. Day 3 recorded 5 pads (cumulative 32%, daily 16%) and 7 days of bleeding (cumulative 40%, daily 20%). Day 4 experienced a decrease in pad usage to 6 (cumulative 20%, daily 10%) and a stable 8 days of bleeding (cumulative 32%, daily 8%). On Day 5, the pad usage dropped significantly to 2 (cumulative 4%, daily 4%), and bleeding occurred over 9 days (cumulative 4%, daily 2%). Lastly, Day 6 witnessed the lowest pad usage of 1 (cumulative 2%, daily 2%), with bleeding lasting for 10 days (cumulative 10%, daily 5%). Among the 50 participants, 42 had irregular menstrual cycles. There was no statistically signnificant correlation noted between cycle irregularity and menorrhagia.

Table 1: Baseline characteristics of the study participants

Parameter	Total no of participants n=50 (%)
Age	
<14	12 (24)
14-16	17 (34)
17-19	21 (42)
BMI	
<18.5	7 (14)
18.5-25	38 (76)
>25	5 (10)
Duration of symptoms	
< 6 months	10 (20)
6-12 months	17 (34)
>12 months	23 (46)
No. of pads used per day	
3	3 (6)
4	18 (36)
5	16 (32)
6	10 (20)
7	2 (4)
8	1 (2)
No. of days of bleeding	
5	1 (2)
6	6 (12)
7	20 (40)
8	16 (32)
9	2 (4)
10	5 (10)

Figure 1 shows the volume of blood loss in the study participants. 54% of the participants had a blood loss of >160-240 ml, 40% had 80-160 ml and 6% had a blood loss of more than 240 ml.

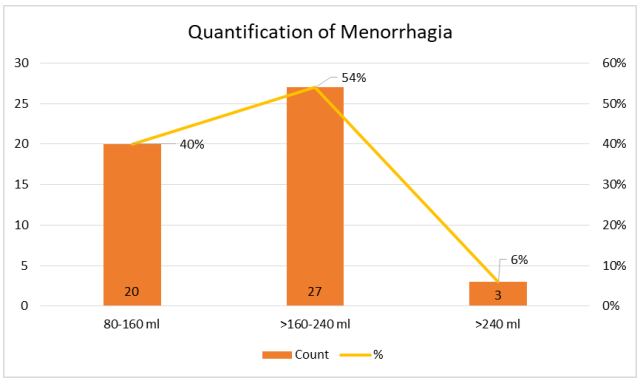

Figure 1: Quantification of menorrhagia

Figure 2 llustrates theetiology of puberty menorrhagia in the study participants, with 60% showing ovulatory dysfunction.

Figure 4 outlines the diverse treatment approaches administered to the study participants, showcasing the range of interventions employed in managing menorrhagia within the observed population.

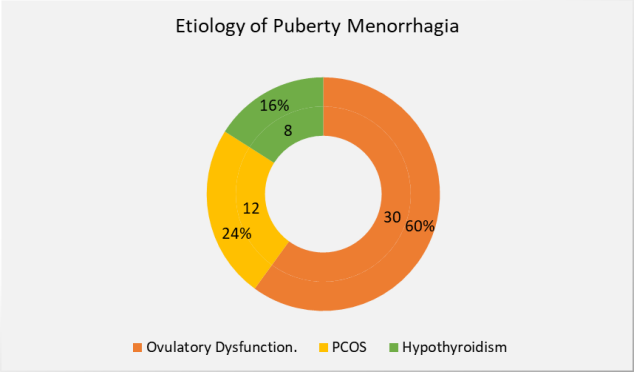

Figure 2: Etiology of puberty menorrhagia in the study participants

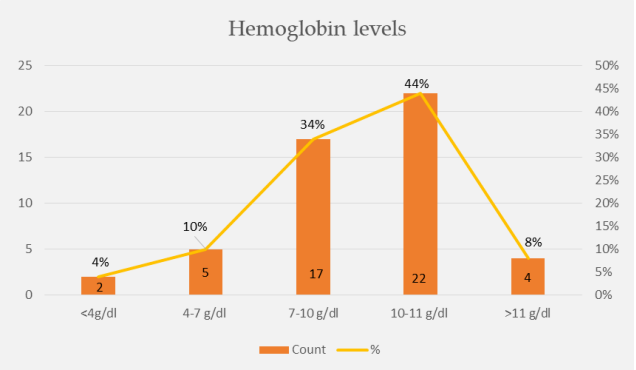

Figure 3: Hemoglobin levels in the study participants

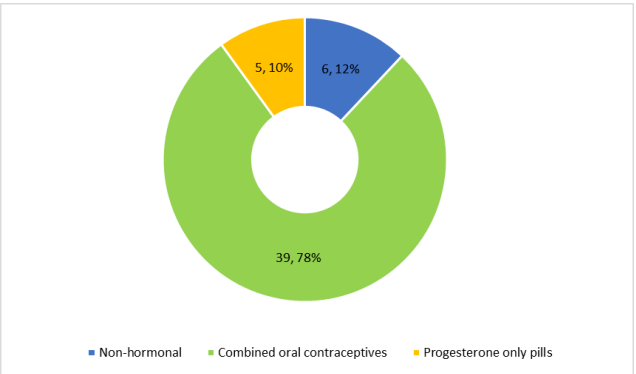

Figure 4: Treatment is given to the study participants

Along with hormonal treatment other treatments like T.Tranexemic acid – 42, blood transfusion -7, Iron sucrose injections -9, T. Metformin – 8, and T.Thyroxine – 8 were also given to the study participants.

Figure 5 shows that there is a statistically significant negative correlation between the duration of symptoms in months and the hemoglobin levels with a 95% confidence

interval of -0.6311 to -0.1699 and a p-value of 0.0008.

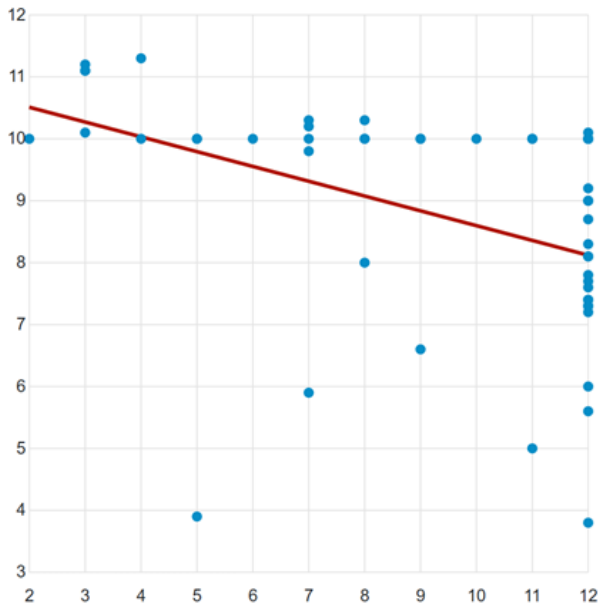

Figure 5: Correlation between duration of symptoms (in months) and hemoglobin levels(g/dl) in the study participants x-axis- duration in months
y-axis- Hb in g/dl

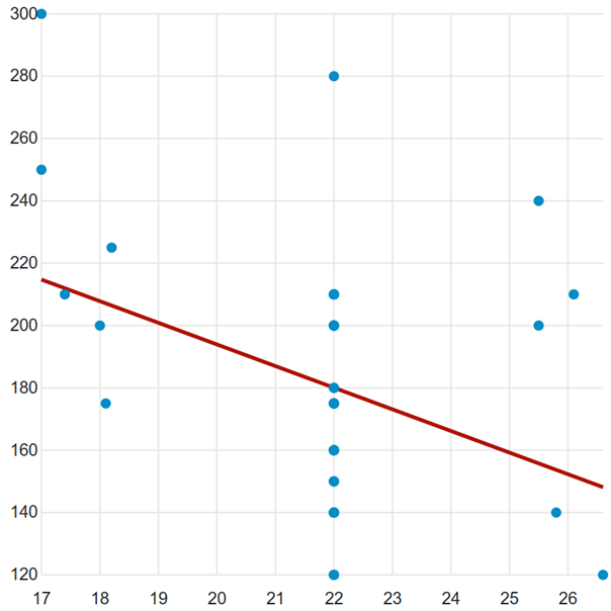

Figure 6: Correlation between BMI (kg per meter square) and menorrhagia in the study participants x-axis -BMI in kg per meter square
y-axis - menstrual blood loss in ml

Figure 6 shows that there is a statistically significant negative correlation between BMI and menorrhagia with a 95% confidence interval of -0.5740 to -0.0815 and a p-value of 0.005.

It was found that there was no statistically significant (p-value = 0.32) correlation between thyroid values and menorrhagia in the study participants.

Table 2: Correlation table

Variable	95% CI	P-value
Duration of symptoms and hemoglobin levels	-0.6311 to -0.1699	0.0008
BMI and menorrhagia	-0.5740 to -0.0815	0.005
Thyroid values and menorrhagia		0.32

5. Discussion

The present study, encompassing 50 participants with puberty menorrhagia, offers valuable insights into the demographic characteristics, etiology, and therapeutic interventions within this specific cohort. Examining the baseline characteristics in Table 1, the age distribution aligns with the expected prevalence of menorrhagia in adolescents and young adults. Notably, a substantial proportion falls within the 17-19 age range, reflecting the pivotal developmental period of puberty. This age-specific distribution underscores the relevance of hormonal changes and maturation in the manifestation of menorrhagia during adolescence.

Smith et al[5] in their study with 100 participants show a more evenly distributed age range, with only 10% falling within the 17-19 age group. This would contrast with the current study, highlighting potential variations in menorrhagia prevalence across different age brackets. Another study reveals a higher percentage (50%) of participants under the age of 14.[3] This might suggest that menorrhagia is particularly prevalent among younger adolescents, prompting further investigation into early-onset factors.

The BMI distribution within our cohort, as delineated in Table 1, shows that the majority fall within the normal BMI range. However, the presence of participants with a BMI exceeding 25 indicates a potential association between higher BMI and menorrhagia. Further investigations into the relationship between obesity and puberty menorrhagia could provide valuable insights into the interplay of hormonal and metabolic factors in this condition.

Miller et al[6] study on menorrhagia includes a higher percentage of participants (30%) with a BMI exceeding 25. This could show the potential influence of obesity on menorrhagia, supporting the need for interventions addressing weight management in addition to hormonal factors. Contrarily, a study done by Hikma et al[7] demonstrates a lower prevalence (5%) of participants with a BMI over 25. This might lead to considerations

about whether there are specific factors protecting against menorrhagia in individuals with higher BMIs.

The duration of symptoms, also outlined in Table 1, reveals a proportion of experiencing menorrhagia for over 12 months. This chronicity aligns with existing literature highlighting the persistent nature of puberty menorrhagia, emphasizing the importance of early detection and intervention to mitigate long-term consequences. A study done by Jananii et al[8] reveals a lower proportion (10%) reporting symptoms for over 12 months. This could indicate that menorrhagia in this population tends to be self-limiting or more acute or resolves spontaneously in a shorter timeframe of less than 12 months.

Figure 2 elucidates the etiology of puberty menorrhagia, with a substantial 60% showing ovulatory dysfunction. This aligns with established literature attributing hormonal imbalances, particularly ovulatory irregularities, to the occurrence of menorrhagia during puberty. The high prevalence of ovulatory dysfunction mandates the need for targeted hormonal interventions in the management of this condition. Another study showed a higher prevalence (80%) of ovulatory dysfunction, reinforcing the idea that hormonal imbalances are a primary driver of menorrhagia in this particular population.[9]

Figure 3, presenting hemoglobin levels, provides a visual representation of the significant association between puberty menorrhagia and anemia. The observed prevalence and severity of anemia among study participants underscore the imperative of routine hematological monitoring and timely interventions to address and prevent anemia in this population.

Figure 4 outlines the diverse treatment approaches administered to study participants, showcasing a comprehensive range of interventions beyond hormonal treatments. The inclusion of Tranexamic acid, blood transfusion, Iron sucrose injections, Metformin, and Thyroxine highlights the complexity of managing puberty menorrhagia. Hormonal treatments might be the primary intervention in nearly all cases (90%), reflecting a more uniform approach to managing menorrhagia in that population as seen in the study done by Hall et al.[10] This multifaceted approach recognizes the diverse underlying factors contributing to menorrhagia, necessitating tailored and individualized treatment strategies.

The findings presented in Figures 1, 5, and 6 provide valuable insights into the characteristics and potential contributing factors of menorrhagia in the study participants. Figure 1 highlights the distribution of blood loss volumes, revealing that a substantial portion of participants, 54%, experienced blood loss in the range of >160-240 ml. This information shows the prevalence of moderate to heavy menstrual bleeding within the cohort. Additionally, 40% of participants had blood loss in the range of 80-160 ml, while 6% faced more significant blood loss exceeding 240 ml. These figures offer a quantitative understanding of the varying degrees of menorrhagia within the study population.

Moving to Figures 5 and 6, both figures explore correlations between menorrhagia and different variables. Figure 5 demonstrates a statistically significant negative correlation between the duration of symptoms in months and hemoglobin levels. The 95% confidence interval of -0.6311 to -0.1699, along with a p-value of 0.0008, suggests that as the duration of symptoms increases, hemoglobin levels tend to decrease. This correlation sheds light on the potential impact of prolonged menorrhagia on the participants' hemoglobin levels.

Hemoglobin is a critical component of red blood cells responsible for transporting oxygen throughout the body. A decrease in hemoglobin levels may lead to anemia, a condition associated with fatigue, weakness, and diminished overall health. The negative correlation suggests that as the duration of menorrhagia symptoms increases, hemoglobin levels tend to decrease. This association could be explained by the chronic blood loss associated with prolonged and heavy menstrual bleeding. Menorrhagia often results in the loss of a significant amount of blood during each menstrual cycle. Over time, this continuous and excessive blood loss can deplete the body's iron stores, ultimately impacting the synthesis of hemoglobin. The findings highlight the importance of addressing menorrhagia promptly and effectively to prevent the potential consequences of anemia. Medical interventions, including hormonal treatments, iron supplementation, and lifestyle modifications, may be considered to manage menorrhagia and mitigate its impact on hemoglobin levels.[11] Moreover, the study results highlight the relevance of regular monitoring of hemoglobin levels in individuals with prolonged menorrhagia, allowing for timely intervention and the prevention of severe health consequences associated with anemia. One should take advantage of the window of opportunity to treat menorrhagia early and prevent anemia and its complications.

Similarly, Figure 6 unveils a statistically significant negative correlation between Body Mass Index (BMI) and menorrhagia. With a 95% confidence interval of -0.5740 to -0.0815 and a p-value of 0.005, this correlation suggests that as BMI decreases, the likelihood of experiencing menorrhagia increases. This association could have implications for understanding the relationship between body composition and menstrual health. One key implication is that variations in body composition may play a role in the development or exacerbation of menorrhagia. This finding prompts further exploration into the underlying mechanisms and biological pathways connecting body weight, fat distribution, and menstrual health. Hormonal fluctuations associated with changes in adipose tissue, as well as alterations in the hypothalamic-pituitary-ovarian

axis, could be contributing factors. Understanding these connections is crucial for both clinicians and researchers, as it may inform targeted interventions for individuals with specific body composition profiles who are at a higher risk of developing menorrhagia.[12] Contrastingly, the study found no statistically significant correlation (p-value = 0.32) between thyroid values and menorrhagia in the participants. This finding provides valuable information, indicating that thyroid function may not be a significant contributing factor to the occurrence of menorrhagia in the study population. A study by Marques et al found that early or late menarche often correlates with different levels of menstrual awareness. Girls who experienced menarche earlier tended to report lower levels of awareness, likely due to the psychological and physical readiness of their bodies and social contexts.[13] A study by Agarwal et al. underscore the influence of lifestyle factors such as obesity, poor nutrition, and sedentary behavior on adolescent reproductive health. Overweight and obese girls were more likely to experience menstrual irregularities, which aligns with existing evidence linking body weight to hormonal imbalances and conditions like PCOS. The study emphasizes the need for lifestyle interventions, including healthy eating and regular physical activity, to improve reproductive health outcomes.[14]

Alekhya et al their study have discussed about the psychological and social effects of menstruation, including stigma, shame, and absenteeism from school due to period-related problems, was also frequently cited. This underscores the importance of addressing menstrual health as both a physical and mental health issue.[15]

Menorrhagia is a clinical symptom but there are different clinical groups due to varying pathophysiology of puberty menorrhagia/ Puberty menorrhagia can be due to an endometrial defect, ovarian hormone dysfunction, systemic body fat imbalance, metabolic derangement due to hypothyroidism, coagulation disorder, etc. each of this subclinical population should be treated differently.

6. Conclusion

In conclusion, our study provides insights on dealing with nuances of puberty menorrhagia, encompassing demographic patterns, etiological insights, and a spectrum of therapeutic interventions. Menorrhagia in adolescents can be heterogeneous in etiology, the most common being the immature hypothalamic-pituitary-ovarian axis. Assessment of each case with a thorough history, physical examination, laboratory, and radiological investigation is crucial in reaching the diagnosis. Reassurance, counseling, correction of anemia, and improving the nutritional status will play an important role in the management of puberty menorrhagia. The findings contribute to the existing body of knowledge on the pathophysiology of puberty menorrhagia and emphasize the need for a holistic approach to the clinical management of puberty menorrhagia. Future research endeavors should further explore the associations identified in this study, potentially leading to refined clinical guidelines and improved outcomes for individuals grappling with puberty menorrhagia.

7. Source of Funding

None.

8. Conflict of Interest

None.

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