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RESEARCH ARTICLE

CLINICAL SPECTRUM AND EMERGING TRENDS OF GYNAECOLOGICAL DISORDERS IN ADOLESCENTS: INSIGHTS FROM A TERTIARY CARE CENTER

Puneeta Jaishwal[1], Madhu Agrawal[2] and Deepak Kumar Garg[2]

1. Senior Consultant, Department of Obstetrics and Gynaecology, Park Hospital, Faridabad, Haryana.
2. Senior Consultant, Department of Paediatrics, Park Hospital, Faridabad, Haryana.

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Abstract

Background: Adolescence (10 19years) is a pivotal phase characterized by rapid hormonal and physiological changes that predispose girls to a wide spectrum of gynaecological disorders. The pattern of morbidity is shifting, with lifestyle-related conditions emerging alongside traditional menstrual abnormalities.

Aim: To evaluate the clinical spectrum and emerging trends of gynaeco logical disorders among adolescents attending a tertiary care hospital in northern India.

Methods: This cross-sectional study included 308 adolescent girls aged 10 19 years presenting with gynaecological complaints to the Departme nt of Obstetrics and Gynaecology, Park Hospital, Faridabad, from Janu ary 2024 to June 2025. Data on menstrual, clinical, and biochemical profiles were analysed. Disorders were categorized into menstrual abnormalities, polycystic ovary syndrome (PCOS), infections, ovarian cysts/tumours, and congenital anomalies. Associations with age and BMI were assessed using the chi-square test.

Results: Menstrual disorders were most frequent (57.1%), followed by PCOS (20.1%), infections (13.0%), ovarian cysts/tumours (6.5%), and congenital anomalies (3.2%). PCOS showed a strong association with higher BMI ($p = 0.002$), while menstrual irregularities were more common among underweight and normal-weight girls. The association between presenting complaints and final diagnosis was highly significant ($p < 0.001$).

Conclusion: Menstrual disorders remain the leading cause of adolescent gynaecological morbidity; however, the rising prevalence of PCOS associated with obesity reflects a changing disease landscape. Early lifestyle interventions and adolescent-friendly reproductive health services are crucial to improve outcomes.

Corresponding Author:- Puneeta Jaishwal
Address:- Senior consultant, department of obstetrics and gynaecology, park hospital, faridabad, haryana.

Introduction:-

Adolescence, spanning 10–19 years, is a critical period of physical, hormonal, and psychosocial transformation [1]. This age group represents nearly one-sixth of the global population, with India contributing 253 million adolescents, the largest worldwide [2].Adolescent girls comprise about 10% of India's total population and 20% of its female population, underscoring the importance of addressing their reproductive health needs [2].Gynaecological disorders are a major cause of morbidity in this age group. The most common presentations include menstrual abnormalities such as irregular cycles, dysmenorrhea, heavy menstrual bleeding, and amenorrhea followed by polycystic ovary syndrome (PCOS), ovarian cysts, and genital infections [3,4,5]. Congenital anomalies such as imperforate hymen and Müllerian agenesis, though less frequent, contribute significantly to primary amenorrhea [6,7]. Endocrine disorders like hypothyroidism and hyperprolactinemia may also present with menstrual irregularities [8]. Adolescent pregnancy, still prevalent in many low- and middle-income countries, is associated with adverse maternal and neonatal outcomes [9].

Recent studies indicate a changing pattern of adolescent gynecological problems. While menstrual disorders remain predominant, lifestyle-related conditions such as PCOS are rising, paralleling increasing rates of adolescent overweight and obesity [3, 10]. Infections including vulvovaginitis and urinary tract infections continue to be common, particularly where menstrual hygiene is inadequate [11]. Additionally, adolescents with chronic diseases show higher rates of delayed menarche and menstrual irregularities, adding to the burden of care [12]. Despite this, many adolescents delay seeking medical help due to embarrassment, stigma, or lack of adolescent-friendly clinics, leading to under-reporting and delayed diagnosis [13].Although several hospital-based studies from India and other countries have described gynecological morbidity among adolescents, most are limited by sample size or geographic scope [3,4,11]. Data on the interplay of emerging lifestyle disorders with traditional gynecological problems remain sparse. There is thus a need to generate updated evidence on the clinical spectrum of adolescent gynaecological disorders to inform clinical practice and public health interventions.The present study was conducted to evaluate the clinical spectrum of gynaecological disorders among adolescents presenting to a tertiary care hospital, with the aim of identifying common patterns, emerging trends, and their implications for adolescent reproductive health.

Material and methods:-

Study Design and Setting:

This was a hospital-based cross-sectional observational study conducted in the Department of Obstetrics and Gynaecology at Park Hospital, Faridabad, a tertiary care center in northern India. The study was carried out over a period of 18 months, from January 2024 to June 2025. Ethical clearance was obtained from the Institutional Ethics Committee of Park Hospital, Faridabad. Written informed consent was obtained from participants aged 18 years and above, while assent along with parental or guardian consent was taken for those under 18 years. Confidentiality of all information was ensured throughout the study.

Study Population:-

The study population comprised adolescent girls between 10 and 19 years of age, defined according to the World Health Organization classification [1]. Girls presenting with at least one gynaecological complaint to the outpatient or inpatient department were considered for inclusion.

Inclusion and Exclusion Criteria:-

Adolescent girls with complaints such as menstrual irregularities, dysmenorrhea, amenorrhea, vaginal discharge, or abdominal pain were included. Those with known chronic systemic illnesses such as diabetes, renal disorders, or congenital heart disease were excluded. Girls who were unwilling to participate, refused investigations, or had incomplete records were also excluded.

Sample Size and Sampling Technique:-

A total of 308 adolescent girls were enrolled using consecutive sampling, where all eligible participants presenting during the study period were approached and included after meeting the criteria.

Data collection:-

Data were collected using a structured proforma. Sociodemographic variables (age, marital status, educational background, socioeconomic status) and menstrual history (age at menarche, cycle length, duration, flow, dysmenorrhea) were documented.

A detailed clinical history was taken regarding abdominal pain, urinary symptoms, vaginal discharge, obesity, and features suggestive of PCOS. General examination included anthropometric measurements, BMI calculation, assessment of secondary sexual characteristics, pallor, and thyroid enlargement. Gynaecological examination was conducted where indicated, ensuring privacy and comfort of the adolescent.

Investigations:-
Investigations were performed as clinically indicated. Laboratory tests included complete blood count (CBC), coagulation profile, thyroid function tests (TFT), serum prolactin, luteinizing hormone (LH), and follicle-stimulating hormone (FSH). Pelvic ultrasonography was used to detect ovarian cysts, congenital anomalies, PCOS, or pelvic masses. Additional hormonal assays or imaging studies were ordered in select cases where required [8].

Outcome Measures:-
The primary outcome was to describe the clinical spectrum of gynecological disorders among adolescents. Disorders were categorized into menstrual abnormalities, PCOS, infections (vulvovaginitis, urinary tract infections, leucorrhea), ovarian tumors or cysts, congenital anomalies, and miscellaneous conditions such as Bartholin's cyst or fibroadenoma of the breast.

Statistical Analysis:-
All data were coded and entered into Microsoft Excel and analysed using SPSS software version 29.0 (IBM Corp., Armonk, NY, USA; released 2023). Descriptive statistics were used to summarize the data. Continuous variables were expressed as mean ± standard deviation (SD) or median (interquartile range, IQR), depending on distribution. Categorical variables were presented as frequencies and percentages. Comparisons across early (10–13 years), mid (14-16 years), and late adolescence (17-19 years) were made using the chi-square test, with $p< 0.05$ considered statistically significant.

Results:-

Table 1: Age distribution of study participants (n = 308)

Age group (years)	Number of participants	Percentage (%)
10–13 (Early adolescence)	64	20.8
14–16 (Mid adolescence)	118	38.3
17–19 (Late adolescence)	126	40.9
Total	308	100

Table 2. Body Mass Index (BMI) distribution of study participants (n = 308)

BMI category (kg/m²)	Number of participants	Percentage (%)
<18.5 (Underweight)	78	25.3
18.5–22.9 (Normal)	170	55.2
23.0–24.9 (Overweight)	34	11.0
≥25.0 (Obese)	26	8.4
Total	308	100

Table 3. Presenting complaints among adolescents (n = 308)

Presenting complaint	Number of participants	Percentage (%)
Menstrual irregularities	128	41.6
Dysmenorrhea	64	20.8
Amenorrhea (primary/secondary)	32	10.4
Abdominal pain (non-cyclic)	28	9.1
Vaginal discharge / leucorrhea	36	11.7
Ovarian cyst / pelvic mass	12	3.9
Total	308	100

Table 4. Distribution of menstrual disorders among adolescents

Type of menstrual disorder	Number of participants	Percentage (%)
Irregular cycles	58	32.9
Heavy menstrual bleeding	42	23.9
Dysmenorrhea	46	26.1
Primary amenorrhea	12	6.8
Secondary amenorrhea	10	5.7
Puberty menorrhagia	8	4.6
Total	176	100

Table 5. Clinical spectrum of gynaecological disorders among adolescents (n = 308)

Disorder category	Number of participants	Percentage (%)
Menstrual disorders	176	57.1
Polycystic ovary syndrome (PCOS)	62	20.1
Infections (vaginitis/UTI)	40	13.0
Ovarian cysts / tumors	20	6.5
Congenital anomalies	10	3.2
Miscellaneous (e.g., breast lump, Bartholin's cyst)	0	0.0
Total	308	100

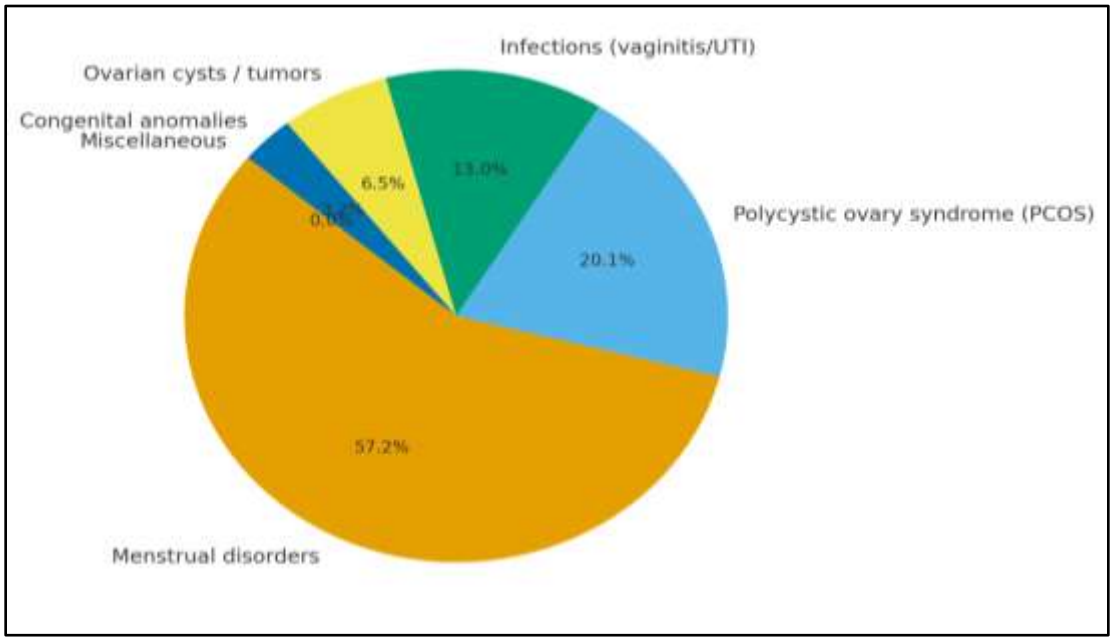

Figure 1: Clinical spectrum of gynaecological disorders

Table 6:Association between age groups and gynaecological disorders (n = 308)

Disorder type	10–13 yrs (n=64)	14–16 yrs (n=118)	17–19 yrs (n=126)	Total
Menstrual disorders	38	66	72	176
PCOS	4	22	36	62
Infections (vaginitis/UTI)	12	18	10	40
Ovarian cysts / tumors	6	8	6	20
Congenital	4	4	2	10

anomalies				
Total	64	118	126	308
Chi-square (χ^2)				19.65
P-value				0.012

The overall distribution of gynecological disorders differed significantly across age groups (χ^2 = 19.65, df = 8, p = 0.012).

Table 7: Association between BMI category and gynaecological disorders (n = 308)

Disorder type	Underweight (n=78)	Normal (n=170)	Overweight (n=34)	Obese (n=26)	Total
Menstrual disorders	52	92	18	14	176
PCOS	4	28	18	12	62
Infections (vaginitis/UTI)	14	20	4	2	40
Ovarian cysts / tumors	6	10	2	2	20
Congenital anomalies	2	4	0	4	10
Miscellaneous	0	0	0	0	0
Total	78	170	34	26	308
Chi-square (χ^2)					27.84
P-value					0.002

- The distribution of gynecological disorders differed significantly across BMI categories (χ^2 = 27.84, df = 12, p = 0.002). PCOS was strongly associated with overweight and obese adolescents, whereas menstrual disorders were more frequent in underweight and normal BMI categories.

Table 8: Association between presenting complaints and final diagnosis (n = 308)

Presenting complaint	Menstrual disorders	PCOS	Infections	Ovarian cysts/tumours	Congenital anomalies	Total
Menstrual irregularities	108	12	4	2	2	128
Dysmenorrhea	44	12	4	4	0	64
Amenorrhea(primary/ secondary)	8	6	0	2	16	32
Abdominal pain (non-cyclic)	6	2	4	16	0	28
Vaginal discharge/leucorrhea	4	2	28	2	0	36
Ovarian cyst/pelvic mass	2	6	0	4	0	12
Total	172	40	40	30	18	308
Chi-square (χ^2)						55.31
P-value						<0.001

***The association between presenting complaints and final diagnosis was statistically significant (χ^2 = 55.31, df = 20, p < 0.001).**

Results:-

A total of 308 adolescent girls presenting with gynecological complaints at Park Hospital, Faridabad, were included in the study conducted from January 2024 to June 2025.

Demographic Profile:-

The age distribution is shown in Table 1. The largest group comprised late adolescents aged 17–19 years (40.9%), followed by mid adolescents aged 14–16 years (38.3%) and early adolescents aged 10–13 years (20.8%). Nutritional status varied considerably (Table 2). More than half of the participants (55.2%) had a normal BMI, whereas 25.3% were underweight. Overweight and obese adolescents together accounted for nearly one-fifth (19.4%), underscoring the dual challenge of undernutrition and emerging lifestyle-related risks in this population.

Presenting Complaints:-

The distribution of presenting complaints is summarized in Table 3. Menstrual irregularities were the leading complaint (41.6%), followed by dysmenorrhea (20.8%) and amenorrhea (10.4%). Vaginal discharge (11.7%), abdominal pain (9.1%), and ovarian cyst/pelvic mass (3.9%) were less frequent. These findings highlight that menstrual concerns remain the predominant cause of gynecological consultation during adolescence.

Menstrual Disorders:-

Among the 176 adolescents presenting with menstrual disorders (Table 4), irregular cycles were the most common (32.9%), followed by dysmenorrhea (26.1%) and heavy menstrual bleeding (23.9%). Amenorrhea was observed in 12 cases (6.8% primary and 5.7% secondary), while puberty menorrhagia was seen in 4.6%. Though less frequent, these abnormalities represent clinically significant conditions requiring timely evaluation.

Overall Clinical Spectrum:-

The consolidated spectrum of gynecological disorders is presented in Table 5 and illustrated in Figure 1. Menstrual disorders accounted for the majority (57.1%) of cases, followed by PCOS (20.1%) and infections such as vaginitis and urinary tract infections (13.0%). Ovarian cysts/tumors (6.5%) and congenital anomalies (3.2%) were less frequent but clinically important.

Association with Age:-

As shown in Table 6, the distribution of disorders varied significantly across age groups ($\chi^2 = 19.65$, df = 8, $p = 0.012$). PCOS demonstrated a sharp rise in prevalence with advancing age, being most common among late adolescents (28.6%). Congenital anomalies were detected more often in early adolescents, whereas menstrual disorders were widespread across all age categories.

Association with BMI:-

A statistically significant association was observed between BMI and type of gynecological disorder (Table 7). PCOS was strongly associated with overweight and obese adolescents, while menstrual irregularities were more frequent in underweight and normal BMI groups ($\chi^2 = 27.84$, df = 12, $p = 0.002$). These findings emphasize the critical interplay between nutritional status and reproductive health.

Association between Presenting Complaints and Final Diagnosis:-

The correlation between presenting complaints and final diagnoses is detailed in Table 8. A highly significant relationship was observed ($\chi^2 = 55.31$, df = 20, $p < 0.001$). Menstrual irregularities at presentation were overwhelmingly associated with menstrual disorders. Vaginal discharge most often corresponded to infections, while abdominal pain was frequently linked with ovarian cysts/tumours.

Discussion:-

In this tertiary-care cohort of 308 adolescents, menstrual disorders predominated while polycystic ovary syndrome (PCOS) emerged as a substantial contributor, with clear variation across age and BMI strata. These patterns mirror observations from recent hospital-based series and systematic reviews, highlighting the dual burden of persistent menstrual morbidity and rising lifestyle-related conditions, and underscore the urgent need for integrated, adolescent-friendly reproductive health services [3,5,14,15]. Late adolescents constituted the largest group in this cohort, followed by mid and early adolescents, a pattern consistent with previous hospital-based studies where health-seeking peaks after mid-puberty as menstrual cycles stabilize and PCOS-like features become more evident

[4,8,16]. This age-related gradient highlights the importance of addressing congenital and pubertal anomalies in younger adolescents while ensuring timely recognition and management of menstrual and lifestyle-related disorders in older age groups. Nutritional status varied widely in our cohort, with undernutrition persisting in one-fourth of adolescents while nearly one-fifth were overweight or obese. This dual burden, increasingly documented in Indian adolescents, reflects the nutritional transition and its close links to reproductive morbidity [10,14,17]. Menstrual irregularities were the leading presenting complaint, followed by dysmenorrhea and amenorrhea, whereas infections and abdominal pain were less frequent. Similar patterns have been reported across recent tertiary-care and multicentric studies, where menstrual concerns dominate consultations and often mask underlying endocrine or nutritional imbalance [3,4,15,16,18]. These findings highlight the need for adolescent services that integrate menstrual health evaluation with nutritional screening and early lifestyle interventions.

Menstrual disorders constituted the majority ofgynecological morbidity in this cohort, with irregular cycles, dysmenorrhea, and heavy menstrual bleeding being the most frequent patterns. These findings are in line with newer hospital-based studies that continue to show menstrual problems as the foremost cause of consultation during adolescence [19,20]. The consolidated clinical spectrum also revealed a notable burden of PCOS, followed by infections and ovarian cysts, consistent with emerging data that link lifestyle and hormonal transitions with rising adolescent morbidity [14,18,21]. Together, these patterns emphasize the dual challenge of managing traditional menstrual concerns while responding to the increasing prevalence of endocrine and metabolic disorders in this age group.

The distribution of gynecological disorders varied significantly across age groups, with congenital anomalies clustered in early adolescence, menstrual disorders spread across all ages, and PCOS showing a sharp rise in late adolescence. This age-linked pattern has been echoed in recent multicenter studies, where structural anomalies often present with primary amenorrhea in younger girls, while endocrine disorders such as PCOS become more apparent after mid-puberty [19,22,23]. These findings highlight the importance of age-sensitive screening strategies, ensuring that congenital and developmental conditions are addressed early, while metabolic and lifestyle-related disorders are recognized promptly in older adolescents.

A clear association was observed between BMI and gynecological morbidity, with PCOS clustering in overweight and obese adolescents, while menstrual irregularities predominated in those underweight or of normal BMI. Recent evidence confirms that both extremes of BMI disturb hypothalamic–pituitary–ovarian function, predisposing to reproductive disorders [14,17,24,25]. These findings emphasize the importance of incorporating routine nutritional screening into adolescent gynaecology services.

Presenting complaints showed a strong correlation with final diagnoses, with menstrual irregularities overwhelmingly linked to menstrual disorders, vaginal discharge to infections, and abdominal pain often signaling ovarian pathology. This pattern has been consistently observed in recent hospital-based series, where initial symptoms serve as reliable indicators of underlying conditions [4,18,26]. Such associations highlight the value of structured history-taking and early recognition at the primary care level to ensure timely referral and management.
The strength of this study lies in its relatively large sample size, systematic categorization of disorders, and use of standardized diagnostic criteria, offering a comprehensive snapshot of adolescent gynaecological morbidity in a tertiary-care setting. However, the hospital-based and cross-sectional design may limit generalizability, and community-level prevalence could be under- or over-estimated due to referral bias and under-reporting of sensitive concerns. Future multicentric and longitudinal studies are needed to validate these trends and assess long-term outcomes.

Conclusion:-

In conclusion, menstrual disorders continue to dominate the gynecological profile of adolescents, but the rising prevalence of PCOS and its strong association with higher BMI reflect a shifting landscape of adolescent morbidity. By linking reproductive complaints with nutritional and metabolic health, this study highlights the urgent need for adolescent-friendly services that integrate menstrual health care, early screening for endocrine disorders, and lifestyle interventions to improve long-term reproductive and metabolic outcomes.

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