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**ORIGINAL ARTICLE****Incidence of ovarian cysts in adolescents' girls complaining of lower abdominal pain and/or menstrual disturbance in Zagazig University Hospital**

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**Email:**[daliasafwat159@gmail.com](mailto:daliasafwat159@gmail.com)**Submit Date: 12-03-2024****Accept Date: 20-03-2024****ABSTRACT**

**Background:** Ovarian cysts are a common gynecological problem that affects a high percentage of females, particularly during puberty. While majority of ovarian cysts are asymptomatic and frequently resolve spontaneously, some may become large causing several complications. The use of ultrasound is considered the best method for early detection of ovarian cysts, which is critical in determining whether early intervention is necessary.

**Aim:** To assess Incidence of ovarian cysts in adolescent girls complaining of lower abdominal pain and /or menstrual disturbance in Zagazig University Hospital. **Methods:** This cross-sectional prospective study was conducted at Ultrasound and Fetal Medicine Unit and Gynecology Outpatient Clinic at Zagazig University Hospital on 150 adolescent girls presented to either outpatient clinic or emergency unit with the following inclusion criteria age started from 10 to 19 years, with lower abdominal pain and /or menstrual disturbance. **Results:** Lower abdominal pain was presented in 60.7% of cases and associated symptoms of the studied patients were fever in 4.4%, 1ry Amenorrhea (imperforate hymen) in 1.1% and vaginal discharge and itching in 23.08%. Among studied patients, ovarian cyst was detected in only 25 (16.67%) patients. Simple cyst was detected in 56% of cases. **Conclusion:** The incidence of ovarian cysts in adolescent girls presenting with lower abdominal pain and/or menstrual disturbances was 16.67%. These cysts were associated with various symptoms, including dysmenorrhea, lower abdominal pain and menstrual irregularity. The most common type of cyst observed was a simple cyst. Fortunately, most patients experienced resolution of their symptoms, indicating a favorable outcome.

**Keywords:** ovarian cysts, adolescents girls, lower abdominal pain, menstrual disturbance.

**INTRODUCTION**

Ovarian cysts fall into two basic categories: normal and pathological. They are a common gynecological issue. Follicle and luteal cysts are examples of physiological cysts. Ovarian tumors, of which pathological cysts are a subtype, can be malignant, benign, or borderline. Younger women are more likely to have benign tumors, whereas older women are more likely to have malignant ones [1].

Most benign ovarian cysts in teenagers are basic, functioning cysts, accounting for 60% of all cysts. When ovarian follicles do not involute and mature into the corpus luteum, this condition develops.

They are believed to be caused by the developing pituitary gland's irregular production of gonadotrophin. The majority of functional cysts are self-resolving. A common adnexal finding is a simple ovarian cyst rupture. Cysts should be managed laparoscopically whenever possible if they are large or the patient is in pain [2].

Complex cysts are less common and are not associated with the normal menstrual cycle. It may be dermoid cyst a sac-like growth that appears at birth and contains hair, fluid, teeth, or skin glands. Cystadenomas which are classified according to their structure as serous cystadenoma, mucinous cystadenoma, or cystadenofibroma. Additionally, mature cystic

teratoma and gonado-blastoma are two types. They are frequently asymptomatic and are discovered by chance during an ultrasound scan [3].

Most ovarian cysts are painless and spontaneously disappear. When ovarian cysts reach a certain size, they can cause abdominal pain. When the bladder is compressed, it may also result in increased urination frequency. Pelvic pain, dysmenorrhea, and dyspareunia are all possible signs and symptoms of ovarian cysts. Additionally, nausea, vomiting, or breast tenderness may occur, as well as abdominal fullness and heaviness, as well as frequent and difficult bladder emptying. Torsion, haemorrhage, cyst rupture, malignant transformation (rarely), and precocious puberty are all complications of ovarian cysts due to increased gonadotropin secretion [4].

Differentiation of malignant from benign ovarian cysts is recommended using sonography, magnetic resonance imaging (MRI), and computed tomography (CT) imaging. Although pelvic ultrasound is considered the most effective method for early detection of ovarian cysts, it requires a full bladder to visualise the ovaries. If an ultrasound scan identifies a complex ovarian cyst, pelvic magnetic resonance imaging (MRI), tumor markers will be necessary [5].

The majority of ovarian cysts in adolescents are self-limited. Surgery is indicated when ovarian cysts persist or when malignancy is suspected. In the event of a large ovarian cyst, surgery may be required. These cysts could be managed safely via laparoscopic or robotassisted laparoscopic techniques [6].

## PATIENTS AND METHODS

This cross-sectional prospective study was conducted at Ultrasound and Fetal Medicine Unit and Gynecology Outpatient Clinic at Zagazig University Hospital from September 2022 to March 2023 on 150 adolescent girls presented to either outpatient clinic or emergency unit with the following Inclusion criteria age started from 10 to 19 years, with lower abdominal pain and /or menstrual disturbance.

Written informed consent was obtained from all participants, the study was approved by the research ethical committee of Faculty of Medicine, Zagazig University (IRB number 9355). The study was done according to The Code of Ethics of the

World Medical Association (Declaration of Helsinki) for studies involving humans.

Cases with immunocompromised patients, patients administrating anticoagulants, ovariectomy and previous laparotomy or laparoscopy were excluded from the study.

All studied cases were subjected to complete history taking with special emphasis on any complaint, menstrual history including age of menarche, regularity, frequency, presence of dysmenorrhea, duration, date of last menstrual period, past medical and past surgical history and family history. Complain and clinical presentation were variable either 1. Abdominal pain (dull aching pain, acute abdominal pain) either suprapubic, right or left iliac fossa, 2.Pain during or shortly after menstruation, 3. Pelvic or abdominal pressure symptoms as bloating in the abdomen, dyspnea and increase frequency of urination and 4. Menstrual irregularities (abnormal uterine bleeding, spotting). Also patients were subjected to complete general and abdominal examination including vital signs (blood pressure, pulse, temperature), abdominal palpation for detection of mass or tenderness, supraclavicular lymph nodes and lower limb edema or varicose vein.

### Ultrasound examination:

A Mindray ultrasound system with a 2–5 MHz convex transducer was utilized for the sonographic assessment of the pelvic organs. Every girl had her bladder full when she was scanned. A low-frequency convex probe was used. The machine's parameters were adjusted to maximize image quality for the scan. The patient's right side or head was the target of the probe indicator when it was pointed cephalad. A particular scanning method was applied.

### US was used for detection of:

#### 1. Type and nature of cyst:

According to the definition, a simple cyst had no solid component or septation, anechoic fluid, a smooth, thin wall, and posterior acoustic enhancement. A complicated ovarian cyst was defined as one that has a solid component, septation, internal echoes, and/or an echogenic wall.

#### 2. The size of an ovarian cyst:

The greatest measurement in any dimension was used to characterize the size of an ovarian cyst, which was then divided into three groups: <3 cm, 3-7 cm, and >7 cm.

**3. Associated abnormality in U/S like intraperitoneal fluid:**

If an ultrasound scan identifies a complex cyst the case referred to oncology outpatient clinic in our department for further investigation and management.

The primary outcomes measures were detection of ovarian cyst in adolescent girls and ultrasound criteria of cyst including (size, shape, content, presence of septation).

Secondary outcomes measures were need for conservative management, need for immediate admission in case of presence of complication (torsion, rupture) and cases require referral to oncological outpatient clinics.

**Ethical considerations:**

The study was approved by the Ethics Committee of Faculty of Medicine, Internal Medicine department Zagazig University Hospital. An informed written consent was obtained from the patients.

**STATISTICAL ANALYSIS**

IBM Inc., Armonk, NY, USA used SPSS v28 for statistical analysis. Using the unpaired Student's t-test, quantitative variables were compared between the two groups and provided as mean and standard deviation (SD). The frequency and percentage(%) of the qualitative variables were reported, and when applicable, the Fisher's exact test or the Chi-

square test were used for analysis. A statistically significant result was defined as a two-tailed P value less than 0.05.

**RESULTS**

The baseline characteristics of the studied patients were presented in table 1. Lower abdominal pain was presented in 60.7% of cases and associated symptoms of the studied patients were fever in 4.4%, Iry Amenorrhea (imperforate hymen) in 1.1% and vaginal discharge and itching in 23.08%. Spasmodic dysmenorrhea commonly occurred than congestive type among studied group. Among the studied patients, ovarian cyst was detected in only 25 (16.67%) patients (Table 2).

Using ultrasound, the most commonly detected cyst was simple, unilocular, unilateral and less than 7 cm in size (Table 3, figure 1,2). There were statistically significant differences between patients with ovarian cysts compared to other group regarding BMI and family history (Table 4).

There were no statistically significant differences regarding age of menarche and age distribution of menarche between patients with and without ovarian cysts. There were statistically significant differences between patient with ovarian cysts and other group regarding menstrual disturbance and lower abdominal pain (Table 5).

**Table 1: Baseline characteristics of the studied patients**

		Total (n=150)
Age (years)	<b>Mean± SD</b>	16.5 ± 2.1
	<b>Range</b>	10 - 19
BMI (Kg/m <sup>2</sup> )	<b>Mean± SD</b>	24.2 ± 3.82
	<b>Range</b>	16.4 - 33.9
Residence	<b>Urban</b>	126 (84%)
	<b>Rural</b>	24 (16%)
Education	<b>Yes</b>	127 (84.67%)
	<b>No</b>	23 (15.33%)
Family history	<b>Yes</b>	37 (24.67%)
	<b>No</b>	113 (75.33%)
Age of menarche (years)	<b>Mean± SD</b>	12.2 ± 1.28
	<b>Range</b>	10 - 16
Age distribution of menarche	<b>10 years</b>	9 (6%)
	<b>11 years</b>	25 (16.67%)
	<b>12 years</b>	71 (47.33%)
	<b>13 years</b>	13 (8.67%)
	<b>14 years</b>	11 (7.33%)
	<b>15 years</b>	3 (2%)

		<b>Total (n=150)</b>
	<b>16 years</b>	5 (3.33%)
	<b>No mensteruation yet</b>	13 (8.67%)

BMI: body mass index.

**Table 2: Clinical presentation of the studied patients**

		<b>Total (n=150)</b>
Menstrual disturbance	<b>Yes</b>	87 (58%)
	<b>No</b>	63 (42%)
Type of menstrual disturbance (87cases)	<b>Heavy menstrual bleeding</b>	42 (48.3%)
	<b>Hypomenorhea /oligomenorrhea</b>	22 (25.3%)
	<b>amenorrhea</b>	23 (26.4%)
Lower abdominal pain	<b>Yes</b>	91 (60.7%)
	<b>No</b>	59 (39.3%)
Associated symptoms with lower abdominal pain	<b>Fever</b>	4 (4.4%)
	<b>Iry Amenorrhea (imperforate hymen)</b>	1 (1.1%)
	<b>Vaginal discharge , Itching</b>	21 (23.08%)
Site of abdominal pain	<b>Suprapubic</b>	66 (72.5%)
	<b>Right iliac</b>	16 (7.5%)
	<b>Left iliac</b>	9 (9.9%)
Dysmenorrhea	<b>Yes</b>	105(70%)
	<b>No</b>	45(30%)
Type of dysmenorrhea	<b>Spasmodic</b>	70 (66.66%)
	<b>Congestive</b>	35 (33.33%)
Ovarian Cyst	<b>Yes</b>	25 (16.67%)
	<b>No</b>	125 (83.33%)

**Table 3: Ultrasound Criteria of ovarian cyst among the studied patients**

		<b>Total (n=25)</b>
Type of cyst	<b>Simple</b>	14 (56%)
	<b>Complex</b>	11 (44%)
Size of cyst	<b>&lt;3 cm</b>	11 (44%)
	<b>3-7 cm</b>	13 (52%)
	<b>&gt;7 cm</b>	1 (4%)
Number of locules	<b>Unilocular</b>	18 (72%)
	<b>Multilocular</b>	7 (28%)
Unilateral/ bilateral	<b>Unilateral</b>	19 (76%)
	<b>Bilateral</b>	6 (24%)
Pelvic fluid	<b>Yes</b>	16 (64%)
	<b>No</b>	9 (36%)

**Table 4: Relation between ovarian cyst findings and baseline characteristics**

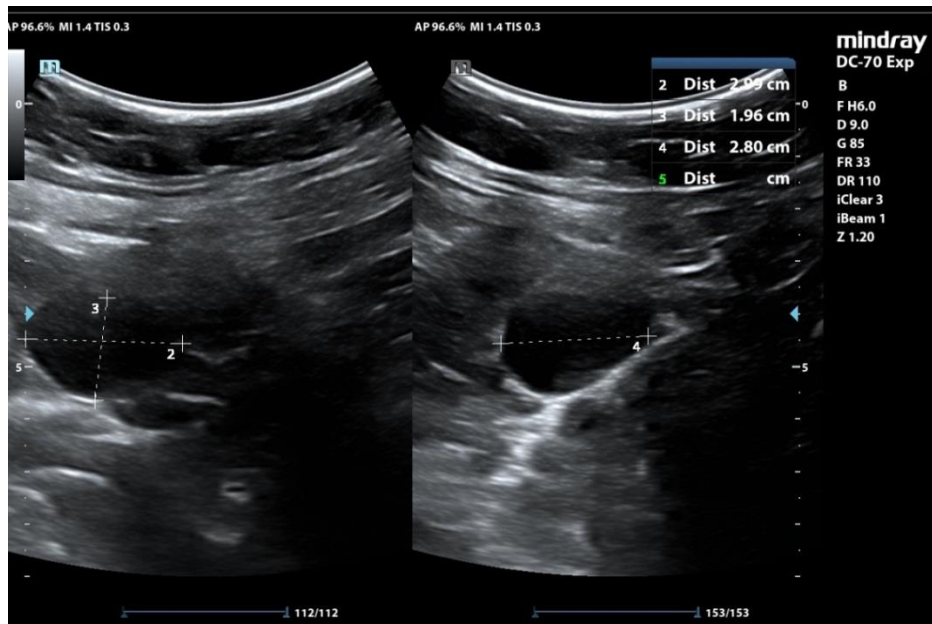
		With ovarian cyst (n=25)	Without ovarian cyst (n=125)	Test of sig.	P value
Age (years)	Mean ±SD	16.96 ± 1.54	16.14 ± 2.05	t=1.907	0.058
	Range	14 - 19	10 - 19		
BMI (Kg/m <sup>2</sup> )	Mean± SD	25.7 ± 5.02	23.9 ± 3.47	t= 2.180	<b>0.031*</b>
	Range	18.7 - 33.8	16.4 - 33.9		
Residence	Rural	20 (80%)	106 (84.8%)	X <sup>2</sup> =0.089	0.765
	Urban	5 (20%)	19 (15.2%)		
Family history	No	14 (56%)	99 (79.2%)	X <sup>2</sup> =4.851	<b>0.027*</b>
	Yes	11 (44%)	26 (20.8%)		

BMI: body mass index, \*: statistically significant as P value <0.05.

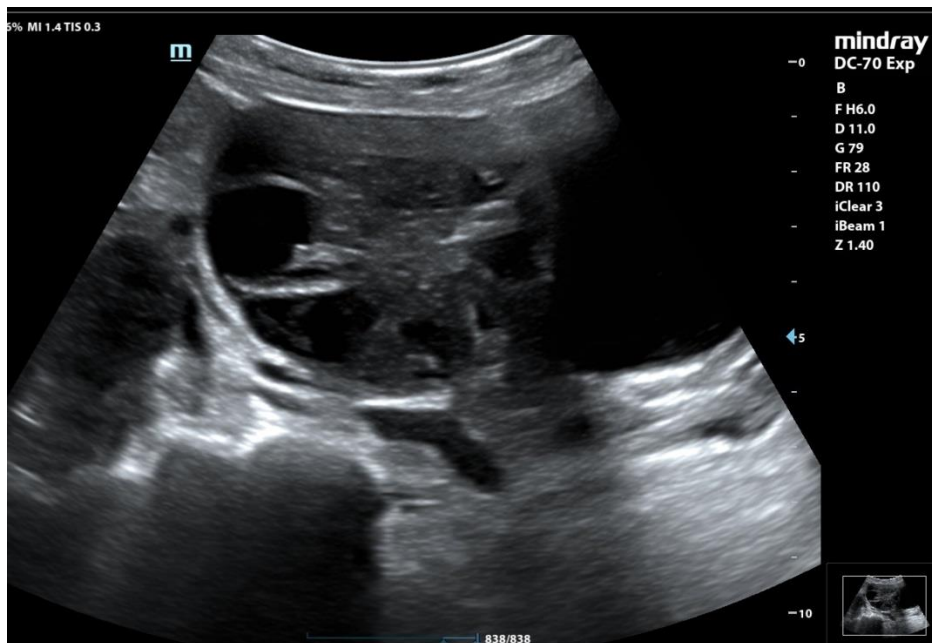
**Table 5: Relation between ovarian cyst findings and age of menarche and clinical data.**

		With ovarian cyst (n=25)	Without ovarian cyst (n=125)	Test of sig.	P value
Age of menarche (years)	Mean± SD	11.7 ± 1.03	12.3 ± 1.31	t= 1.802	0.074
	Range	10 - 15	10 - 16		
Age distribution of menarche	10 years	1 (4%)	8 (6.4%)	X <sup>2</sup> = 11.62	0.114
	11 years	9 (36%)	16 (12.8%)		
	12 years	9 (36%)	62(49.6%)		
	13 years	2 (8%)	11(8.8%)		
	14 years	0 (0%)	11 (8.8%)		
	15 years	1 (4%)	2 (1.6%)		
	16 years	0 (0%)	5 (4%)		
	No menstruation yet	3 (12%)	10 (8%)		
Menstrual disturbance	Yes	19 (76%)	68 (54.4%)	X <sup>2</sup> =3.153	<b>0.049*</b>
	No	6 (24%)	57 (45.6%)		
Lower abdominal pain	Yes	23 (92%)	68 (54.4%)	---	<b>&lt;0.001*</b>
	No	2 (8%)	57 (45.6%)		

\*: statistically significant as P value <0.05.



**Figure 1:** Simple ovarian cyst in female aged 12 years presented by lower abdominal pain.



**Figure 2:** Complex ovarian cyst in female aged 15 years presented by lower abdominal pain and menstrual irregularity.

### DISCUSSION

Ovarian cysts are simple or complicated formations filled with fluid. These are typical discoveries that are typically made by accident during a medical examination or imaging. Gynecological emergencies, such as rupture, bleeding, and torsion, can result from complications caused by ovarian cysts [7].

Most ovarian cysts are asymptomatic functional (physiologic) cysts that have a straightforward look and a small size (1-3 cm). Occasionally, they can grow to higher sizes (>5 cm), but they hardly ever

cause ovarian torsion or rupture, which would make them clinically noticeable. Despite the fact that teenagers are known to have larger and more frequent ovarian cysts due to the ovaries' increased gonadotropin stimulation during puberty. Few research have been conducted on the prevalence and ultrasonography results of ovarian cysts in teenagers [8].

The primary objective of this study was to assess the incidence of ovarian cysts in adolescent girls presenting with lower abdominal pain and/or menstrual disturbances at gynecology outpatient clinic Zagazig University. This involved a detailed

analysis of the incidence and characteristics of ovarian cysts.

This cross-sectional prospective study was conducted on 150 adolescent girls collected from Ultrasound and Fetal Medicine Unit part of Obstetrics and Gynecology Department, Zagazig University Hospital referred from either Outpatient Clinic or Emergency Unit.

In our study, the age of menarche was ranged from 10 – 16 years with a mean of  $12.2 \pm 1.28$  years. Different result reported by [9] who study the relationship between Body Mass Index and Menstrual Irregularities among 253 adolescent girls, aged 12-18 years, they found that the mean age of menarche is  $13.14 \pm 1.173$  SD. This difference may be due to different sample size and study design.

Ovarian cysts in adolescents mainly presented with irregular vaginal bleeding. In our study, among 150 adolescents' girls attended to Gynecology outpatient clinics at time of the study, there were 87 (58%) patients presented by menstrual disturbance, only 42 (48.3%) patients had heavy menstrual bleeding, 22 (25.3%) patients had oligomenorrhea and 23 (26.4%) patients had amenorrhea. In agreement with results reported by **Kanizsai et al. [10]** whereby they investigated the features of ovarian cysts in 119 girls who were having ultrasounds because they had been experiencing abnormal bleeding that number of girls scanned because of irregular bleeding was (80cases), dysfunctional uterine bleeding (DUB) reported of the individuals with menstrual abnormalities, half (41 cases) reported having either secondary amenorrhea or oligomenorrhea. (39 cases).

In this study, regarding clinical presentation among our cases only 91 (60.7%) patients had lower abdominal pain that was associated with fever in 4 (4.4%), Iry amenorrhea in 1 (1.1%), itching and vaginal discharge in 21 (23.08%). Regarding the site of abdominal pain, 66 cases (72.5%) had suprapubic pain, 16 cases (7.5%) had right iliac pain, 9 cases (9.9%) had left iliac pain. In agreement with our study, [11] study retrospectively youngsters and teenagers arriving to a children's hospital with ovarian cysts in 155 girl aged less than 18 years and found that the most common presenting complaint was acute abdominal pain in 54 girls (44%). Adolescents may have symptoms such as lower abdominal pressure or pain that is unilateral. Sharp or dull pain can be either persistent or sporadic. If an ovarian cyst bursts or an ovarian torsion occurs, the patient can

feel immediate, intense pain that could be accompanied by nausea and vomiting [12].

In our study, among the studied cases, ovarian cyst was detected only in 25 cases (16.67%). Regarding the type of cyst on U/S examination, 14 (56%) patients had simple cyst, 11 (44%) patients had complex cyst. The size of the cyst was  $<3$  cm in 11 (44%) patients, 3-7 cm in 13 (52%) patients and  $>7$  cm in 1 (4%) patient. Among the studied patients who had cyst on U/S examination, 18 (72%) patients had unilocular cyst and 7 (28%) patients had multilocular cyst. On U/S examination, was unilateral in 19 (76%) patients and bilateral in 6 (24%) patients. Additionally, 16 (64%) patients had pelvic fluid on U/S examination. Different result found by, **Porcu et al. [13]** who performed pelvi-abdominal Ultrasound of the ovaries in the follicular phase of 139 girls aged 10-19 years for one years. According to their findings, 17.2% of the teenagers studied had an ovarian cyst during the study period. In their series, the prevalence of ovarian cysts larger than 3 cm was 12%. It was thought that most of these cysts were functioning cysts. The design, sample size, and ethnicity differences between our study and this study could be the cause of the differences in frequencies. Furthermore, **Kanizsai et al. [10]** examined the features of ovarian cysts in 119 girls who had ultrasound examinations because most of them had irregular bleeding. They found that most of the cysts they found in their obstetrics and gynecology clinic were simple and unilateral, which is consistent with our findings. They further divided the cysts into three sizes based on their diameter: 63% of the cysts had a diameter of 3-5 cm, 28% had a diameter of  $>5$  cm, and 9% had a diameter of 1-3 cm. Given that most ovarian cysts found are functional cysts (follicular or corpus luteum), which are normally not greater than 3 cm in diameter, the frequency of ovarian cysts measured between 3-5 cm appears to be higher than usual in the **Kanizsai et al. [10]** series. Moreover, girls in the **Kanizsai et al. [10]** study were assessed for more common complaints linked to ovarian problems and in a more competent division; as a result, the frequency of ovarian cysts larger than 3 cm in these girls may have been overestimated. Also, in agreement with our study results, **Kulathevanayagam et al. [14]** study presentation and diagnosis of 112 ovarian cysts and masses in childhood and adolescences and reported that simple cyst was present in 65% of cases, and complex cysts in 32%.

In the current study, there were significant relations between ovarian cyst findings and BMI. As BMI

was significantly higher in patients with ovarian cyst compared to patients without ovarian cyst ( $P=0.031$ ). In agreement with our study, **Khaskheli et al. [15]**, study Menstrual irregularities, hormonal imbalance and obesity in 83 adolescent girls in Hyderabad aged 12-19 years, and they found that girls with ovarian cysts were obese; however, obesity was not statistically significantly associated with ovarian cyst and any of the hormones studied.

In our study, there were insignificant relations between ovarian cyst findings and age, as age was insignificantly different between patients with and without ovarian cysts. In agreement with our study **Emeksiz et al. [16]** reported that, in their study of 1009 girls aged 5-18, 13.1% (132 girls) were found to have ovarian cysts  $\geq 1$  cm, with a higher incidence (8.2%) of cysts  $>3$  cm among adolescents. These larger cysts often had complex appearances and were associated with significant pathologies like ovarian torsion or neoplasms. The onset of cyst formation was observed to increase around the age of 11, approximately 1.7 years before the average age of menarche in Turkish girls, peaking at age 15 (31.3%). The frequency of cysts remained high through middle adolescence across all cyst size categories but showed a decline in late adolescence, presumably because of ovarian maturation being completed. Two mucinous and one serous form of unilateral cystadenomas were discovered in three girls whose cyst sizes were greater than five centimeters. According to **Emeksiz et al. [16]**, ovarian cyst age-specific frequencies were modest and essentially stable during childhood. The incidence of ovarian cyst development increased with the onset of early adolescence, peaked at age 15, and continued to be roughly raised for all cyst size categories into middle adolescence. This discrepancy in the results could be attributed to the short sample size—many instances are needed to identify every cyst size.

In our study, there were significant relations between ovarian cyst findings and clinical data. As menstrual disturbance and lower abdominal pain were significantly higher in patients with ovarian cyst compared to patients without ovarian cyst ( $P=0.049$ ,  $<0.001$  respectively). Also, **Venturoli et al. [17]** found that nearly 35% of adolescents with irregular menstrual cycles had abnormal levels of sex hormones. Additionally, a high percentage (57.9%) had multicystic ovaries on ultrasound examination. These findings suggest that hormonal imbalances and structural changes in the ovaries may contribute to irregular periods in adolescents with ovarian cysts. **Emeksiz et al. [16]** reported

severe lower abdomen pain and a cyst diameter greater than 5 cm were present in teenage girls in their series who were diagnosed with ovarian torsion. Girls with an ovarian cyst larger than five centimeters had a torsion rate of 10.5% (2/19).

Ovarian cysts can also cause irregular or heavy menstrual cycles, as well as spotting, or abnormal vaginal bleeding between periods. These issues arise when the cyst secretes sex hormones that cause the lining of the womb to grow more, which can lead to irregular menstrual cycles and abnormal vaginal bleeding. These studies highlight the complex relationship between ovarian cysts and menstrual disturbances. While the specific nature of this relationship depends on the type and characteristics of the cyst, the evidence generally suggests that cysts can contribute to menstrual irregularities in various ways [18, 19].

## CONCLUSION

This study found that the incidence of ovarian cysts in adolescent girls presenting with lower abdominal pain and/or menstrual disturbances was 16.67%. These cysts were associated with various symptoms, including dysmenorrhea, lower abdominal pain and menstrual irregularity. The most common type of cyst observed was a simple cyst. Fortunately, most patients experienced resolution of their symptoms, indicating a favorable outcome. Early detection and appropriate management of ovarian cysts in adolescent girls are crucial for achieving positive outcomes. The study also highlighted significant associations between ovarian cyst findings and BMI, as well as clinical data such as menstrual disturbance and lower abdominal pain.

## CONFLICTS OF INTEREST

The authors report no conflicts of interest. The authors along are responsible for the content and writing of the paper.

## FUNDING

None declared

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