

Ovarian Cyst Types in Female of Reproductive Age Visiting Secondary and Primary Hospitals in Ogoni Ethnic Groups and Port Harcourt City Centers

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DOI: <https://doi.org/10.36348/sjnhc.2026.v09i03.002>

| Received: 30.01.2026 | Accepted: 23.03.2026 | Published: 26.03.2026

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Abstract

Ovarian cysts are common gynecological conditions that affect women of reproductive age and vary widely in types, and associated demographic factors. This study investigated the distribution types, hormonal profile, and histological patterns of ovarian cysts among 414 female patients in a tertiary hospital, as well as their association with age and ethnicity. Data were obtained through ultrasonographic and hormonal analyses, including serum levels of FSH, LH, estradiol, progesterone, and prolactin, and analyzed using ANOVA and Chi-square tests. The majority of participants were aged 27–36 years, with cysts occurring more frequently in the right ovary (46.1%) than the left (35.7%), while 18.1% were bilateral. Dermoid cysts were the most prevalent (22.5%), followed by endometriomas (19.8%), cystadenomas (19.1%), and polycystic ovarian cysts (15.7%), whereas malignant cysts accounted for 9.4% of cases. Ethnic group was significantly associated with cyst type ($p < 0.001$) but not with cyst location, and age group also showed a significant association with cyst type ($p = 0.008$). No significant variations were found in hormonal levels across cyst types or ethnic groups ($p > 0.05$). These findings indicate that dermoid cysts remain the most common benign ovarian cysts, predominantly affecting women in their reproductive years, with a right-sided predominance. Although hormonal profiles showed no statistical variation, the relationship between age, ethnicity, and cyst type suggests possible genetic and environmental influences. The relatively higher incidence of malignant cysts observed underscores the need for early detection, regular screening, and timely intervention to prevent complications and improve reproductive health outcomes.

Keywords: Ovarian cysts, female patients, cyst type, Dermoid cyst, hormonal profiles, statistical variation.

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INTRODUCTION

Infertility is involuntary childlessness and is either primary if conception has never been achieved or secondary if conception has been experienced before. The causes of infertility are many and varied. For example, 5% of infertility can be attributed to genetic conditions, anatomical defects, and endocrinological or immunological dysfunction (Baylis, 2012). An ovarian cyst is a sac filled with liquid or semiliquid material that arises in an ovary (Templeman, *et al.*, 2000). The number of diagnoses of ovarian cysts has increased with the widespread implementation of regular physical examinations and ultrasonographic technology (senaldi, *et al.*, 2015). The discovery of an ovarian cyst causes considerable anxiety in women owing to fears of malignancy, but the vast majority of ovarian cysts are benign (Tanos, *et al.*, 1995). These cysts can develop in females at any stage of life, from the neonatal period to

post menopause (kanizsai, *et al.*, 2019). Most ovarian cysts, however, occur during infancy and adolescence, which are hormonally active periods of development (fallat, *et al.*, 2002). Most are functional in nature and resolve without treatment (Hertweck, *et al.*, 2001). Ovarian cysts are a common gynecological condition that can affect women of reproductive age, including young adults. While many ovarian cysts are benign and asymptomatic, some can cause significant morbidity and impact fertility.

Studies have shown that ovarian cysts can affect fertility in several ways: Hormonal imbalance: Ovarian cysts can disrupt hormonal balance, leading to ovulation disorders and infertility (Rossi *et al.*, 2018), Ovarian cysts can cause tubal damage, leading to infertility and increased risk of ectopic pregnancy (Kim *et al.*, 2019). In women of reproductive age, most ovarian cysts are

Citation: Woroma Ibiwari Benwoke & Elvis Tams Godam (2026). Ovarian Cyst Types in Female of Reproductive Age Visiting Secondary and Primary Hospitals in Ogoni Ethnic Groups and Port Harcourt City Centers. *Saudi J Nurs Health Care*, 9(3): 53-59.

functional and benign and do not require surgical intervention (Bottomley and Bourne, 2019). However, ovarian cysts can lead to complications such as pelvic pain, cyst rupture, blood loss, and ovarian torsion that require prompt management (Hasiakos *et al.*, 2018).

Functional cysts, including follicular and corpus luteum cysts, are the most prevalent types, arising due to normal ovulatory function (Agarwal *et al.*, 2021). On the other hand, pathological cysts, such as dermoid cysts, endometriomas, and cystadenomas, may require surgical intervention depending on their size, appearance, and associated symptoms (Smith & Jones, 2022).

Functional cysts are the most common type of ovarian cyst and aren't disease-related (Bottomley and Bourne, 2019). They occur as a result of ovulation and can be a sign that the ovaries are functioning normally (Johnson and Everitt, 2018). Functional cysts generally shrink over time, usually within 60 days, without treatment (Grimes and Jones, 2017). These cysts include:

- I. Follicular cysts: A follicular cyst forms when the follicle doesn't release an egg, instead filling with fluid and forming a cyst (Moore *et al.*, 2018).
- II. Corpus luteum cysts: A corpus luteum cyst forms when the corpus luteum fills with fluid instead of breaking down after ovulation (Guyton and Hall, 2016).

Not all ovarian cysts form in response to the menstrual cycle (Hasiakos *et al.*, 2018). Other types of ovarian cysts include:

- i. Cystadenomas: These cysts form on the surface of the ovary and can be filled with fluid (Netter, 2019).
- ii. Dermoid cysts (teratomas): Dermoid cysts contain cells similar to the tissue in hair, teeth, or skin and are typically noncancerous (American Cancer Society, 2020).
- iii. Endometriomas: These cysts are filled with menstrual blood and are typically a sign of endometriosis (Giudice and Kao, 2004).
- iv. Ovarian cancer cysts: Ovarian cancer cysts are solid masses of cancer cells, which can occur at any age but are more common after menopause (National Cancer Institute, 2020).

Most ovarian cysts are harmless, and they often eventually go away on their own (Bottomley and Bourne, 2019).

MATERIALS AND METHODS

This is a retrospective study; the case files of female patients aged 18 - 45 years who have ovarian cyst, and referred for pelvic ultrasound examination in the primary and secondary health centers in Ogoni (Gokana, and khana) ethnic groups and port Harcourt city were retrieved for the study.

The files were assessed based on pelvic ultrasound examination findings, age and hormonal assays were obtained. The population of the study includes ultrasound images and records of females of reproductive age from 2020 to 2024.

Inclusion criteria

Females of reproductive age from 18 to 45 years. participants with a confirmed diagnosis of ovarian cyst via ultrasound.

Exclusion criteria

Individuals below 18 years of age. females who were not diagnosed with ovarian cyst.

The sample size for this study was 413 ultrasound records which was obtained from few medical centers in Ogoni and some hospitals in port Harcourt city. Using Yamane, (1967) formula:

$$n = N / (1 + N(e^2))$$

$$\text{Total population (N)} = 4,632,000$$

computed sample size was approximated the achieved 413 participants. Thus, solving for e (margin of error) when n = 413 gives:

$$413 = 4,632,000 / (1 + 4,632,000(e^2))$$

$$\rightarrow 1 + 4,632,000(e^2) = 4,632,000 / 413$$

$$\rightarrow 4,632,000(e^2) = (4,632,000 / 413) - 1$$

$$\rightarrow e^2 = [(4,632,000 / 413) - 1] / 4,632,000$$

$$\rightarrow e^2 = (11212.84 - 1) / 4,632,000 = 0.00242$$

$$\rightarrow e = \sqrt{0.00242} = 0.049.$$

Substituting e = 0.049 back into the formula:

$$n = 4,632,000 / (1 + 4,632,000(0.049^2))$$

$$= 4,632,000 / (1 + 4,632,000(0.00240))$$

$$= 4,632,000 / (1 + 11116.8)$$

$$= 4,632,000 / 11117.8 \approx 416.$$

Hence, the estimated sample size \approx 413–416, which corresponds exactly to the achieved 413 participants. Final Sample Size (n) = 413.

The data needed includes:

- ✓ Hormonal assay of the patient
- ✓ Age of the patient
- ✓ Size, volume, location, shape and type of cyst.

Ethical Considerations

The study was approved by institutional ethical committee of Basic Medical Sciences Department of Human Anatomy

Data Analysis

The data were analyzed using descriptive statistics, Chi-square tests, independent sample t-tests, Pearson's correlation, and one-way ANOVA, as appropriate.

RESULTS

Presentation of the results of the study on ovarian cyst patterns and associated hormonal va

Table 1: Age Distribution of Cases

Age Group	Frequency (%)
18–26	118(28.5%)
27–36	176(42.5%)
37–45	120(29%)
Total	414(100%)

Table 2: Ethnic Group Distribution of Cases

Ethnic Group	Frequency
Ogoni	276(66.7%)
Port Harcourt	138(33.3%)
Total	414(100%)

Table 3: Distribution of Cyst Types

Cyst Type	Frequency (%)
Dermoid Cyst	93(22.5%)
Cystadenoma	79(19.1%)
Endometrioma	82(19.8%)
Hemorrhagic Cyst	22(5.3%)
Follicular Cyst	24(5.8%)
Polycystic Ovarian Cyst	65(15.7%)
Malignant Cyst	39(9.4%)
Corpus Luteum Cyst	10(2.4%)
Total	414(100%)

Table 4: Mean and Standard Deviation of Measured Variables

Variable	N	Mean ± SEM
Cyst Size (cm)	414	38.73 ± 0.79
Cyst Volume (cm ³)	414	38.08 ± 0.76
FSH (mU/mL)	414	5.34 ± 0.12
Estradiol (E ₂) (pg/mL)	414	178.12 ± 5.01
LH (mU/mL)	414	8.49 ± 0.19
Progesterone (ng/mL)	414	13.46 ± 0.34
Prolactin (ng/mL)	414	10.55 ± 0.26

Note: N= number, cm= centimeter, N= number of cases, SEM= standard error of mean, FSH (mU/mL) = Follicle Stimulating Hormone (milli-international units per milliliter), E₂ (pg/mL) = Estradiol (picograms per milliliter), LH (mU/mL) = Luteinizing Hormone (milli-international units per milliliter), Progesterone (ng/mL) = Progesterone (nanograms per milliliter), Prolactin (ng/mL) = Prolactin (nanograms per milliliter).

Table 5: Cross-tabulation of Ethnic Group and Cyst Type

Ethnic Group	Dermoid	Cystad.	Endom.	Hemorr.	Follic.	PCOS	Malig.	CL	Total
Ogoni	63	52	62	0	13	55	31	0	276
Port Harcourt	30	27	20	22	11	10	8	10	138
Total	93	79	82	22	24	65	39	10	414

Note: Dermoid = Dermoid Cysts; Cystad. = Cystadenoma; Endom. = Endometrioma; Hemorr. = Hemorrhagic Cysts; Follic. = Follicular Cysts; PCOS = Polycystic Ovarian Cysts; Malig. = Malignant Cysts; CL = Corpus Luteum Cysts.

Table 6: Comparison of Mean Cyst Size and Volume by Ethnicity

Variable	Group	Mean ± SEM	t	df	p-value
Cyst Size (cm)	Ogoni	39.16 ± 0.79	0.78	412	0.436
	Port Harcourt	37.86 ± 0.79			
Cyst Volume (cm ³)	Ogoni	38.77 ± 0.76	1.29	412	0.197
	Port Harcourt	36.70 ± 0.73			

Note: t= t-value, df= degree of freedom, p-value= probability value, SEM= standard error of mean.

Table 7: Independent Samples t-Test for Hormonal Levels by Ethnic Group

Variable	Mean (Ogoni)	Mean (Port Harcourt)	t	df	p-value
FSH (mU/mL)	5.28	5.47	-0.76	412	0.446
Estradiol (pg/mL)	179.72	174.93	0.45	412	0.653
LH (mU/mL)	8.32	8.81	-1.22	412	0.224
Progesterone (ng/mL)	13.46	13.47	-0.02	412	0.983
Prolactin (ng/mL)	10.43	10.79	-0.63	412	0.528

Note: t= t-value, df= degree of freedom, p-value= probability value, FSH (mU/mL) = Follicle Stimulating Hormone (milli-international units per milliliter), E₂ (pg/mL)= Estradiol (picograms per milliliter), LH (mU/mL)= Luteinizing Hormone (milli-international units per milliliter), Progesterone (ng/mL) = Progesterone (nanograms per milliliter), Prolactin (ng/mL) = Prolactin (nanograms per milliliter)

Table 8: Comparison of Hormone Levels Across Cyst Types (ANOVA)

Variable	F	p-value	Interpretation
FSH	0.75	0.629	NS
Estradiol	1.34	0.230	NS
LH	0.67	0.694	NS
Progesterone	1.13	0.340	NS
Prolactin	1.16	0.323	NS

Note: NS= Not Significant, F= f-statistic, p-value= probability value, NS= not significant, FSH= follicle stimulating hormone, LH= luteinizing hormone.

Table 9: Association Between Age Group and Cyst Type

Total	Dermoid Cyst	Cystadenoma	Endometrioma	Hemorrhagic Cyst	Follicular Cyst	Polycystic Ovarian Cyst	Malignant Cyst	Corpus Luteum Cyst	Age Group
118 (100%)	30 (25.4%)	19 (16.1%)	31 (26.3%)	1 (0.8%)	1 (0.8%)	25 (21.2%)	11 (9.3%)	0 (0.0%)	18–26 years
176 (100%)	38 (21.6%)	34 (19.3%)	34 (19.3%)	10 (5.7%)	14 (8.0%)	25 (14.2%)	14 (8.0%)	7 (4.0%)	27–36 years
120 (100%)	25 (20.8%)	26 (21.7%)	17 (14.2%)	11 (9.2%)	9 (7.5%)	15 (12.5%)	14 (11.7%)	3 (2.5%)	37–45 years
414 (100%)	93 (22.5%)	79 (19.1%)	82 (19.8%)	22 (5.3%)	24 (5.8%)	65 (15.7%)	39 (9.4%)	10 (2.4%)	Total

Table 10: Chi-square Test of Association Between Age Group and Cyst Type

Test	Value	df	Asymptotic Sig. (2-tailed)
Pearson Chi-Square	29.87	14	0.008
Likelihood Ratio	36.71	14	0.001
Linear-by-Linear Association	0.56	1	0.453
N of Valid Cases	414		

Note: df= degree of freedom, sig= significance. The Chi-square test result ($\chi^2 = 29.87$, df = 14, p = 0.008) indicates a statistically significant association between age group and cyst type (p < 0.05).

ANALYSIS

Table 1: Most of the participants (42.5%) were aged between 27 and 36 years, followed by 29.0% aged 37–45 years, while the least proportion (28.5%) were within 18–26 years. This suggests that the majority of cases of ovarian cysts occurred among women of reproductive age.

Table 2: The Ogoni ethnic group constituted the majority (66.7%) of the cases, while cases from Port Harcourt accounted for 33.3%.

Table 3: Dermoid cysts were the most prevalent type (22.5%), followed closely by endometriomas (19.8%) and cystadenomas (19.1%). Malignant cysts constituted 9.4% of the total, indicating a lower but clinically relevant occurrence.

Table 4: The mean cyst size was 38.73 cm with a standard deviation of 16.03. The mean estradiol level

was 178.12 pg/mL, and mean LH level was 8.49 mU/mL. Progesterone and prolactin levels were also within normal hormonal ranges for women of reproductive age.

Table 5: A statistically significant relationship (p < 0.001) was found between ethnic group and cyst type. This suggests that the prevalence of certain cyst types varied significantly across the Ogoni and Port Harcourt groups, with dermoid and endometrioma types being more frequent among the Ogoni group

Table 6: No significant difference was found in mean cyst size (p = 0.436) or volume (p = 0.197) between the two ethnic groups, implying that cyst dimensions were comparable across groups.

Table 7: The t-test results showed no significant difference (p > 0.05) in mean hormone levels between the Ogoni and Port Harcourt groups, suggesting hormonal patterns were similar across both ethnicities

Table 8: There were no statistically significant differences in hormone levels across the various cyst types ($p > 0.05$). This indicates that cyst type did not appear to influence the hormonal profile among participants

Table 9 and 10: Note: df = degree of freedom, sig = significance. The Chi-square test result ($\chi^2 = 29.87$, $df = 14$, $p = 0.008$) indicates a statistically significant association between age group and cyst type ($p < 0.05$).

This means the distribution of cyst types varies significantly across different age groups.

- Among younger women (18–26 years), endometriomas (26.3%) and dermoid cysts (25.4%) were the most common types.
- In the 27–36 age group, the distribution was more evenly spread, with dermoid cysts, cystadenomas, and endometriomas being most frequent.
- Among older women (37–45 years), dermoid and cystadenoma types remained common, but hemorrhagic and malignant cysts appeared slightly more frequently compared to younger groups.

This suggests that age may influence the pattern of cyst development, possibly due to hormonal fluctuations and reproductive factors associated with different life stages.

DISCUSSION

The present study examined the patterns of ovarian cysts and associated hormonal variations among women of Ogoni and Port Harcourt ethnic groups in Rivers State, Nigeria. The findings reveal that the majority of participants (42.5%) were within the reproductive age range of 27–36 years. This aligns with previous Nigerian studies which have shown that ovarian cysts are more prevalent among women in their reproductive years due to the influence of cyclical hormonal changes and active ovulation (Oluwole *et al.*, 2020; Eze *et al.*, 2018). Similarly, Ibekwe *et al.*, (2019) in Enugu reported that most ovarian cyst cases occurred among women aged 25–40 years, supporting the pattern observed in this study. Dermoid cysts were the most common type (22.5%), followed by endometriomas (19.8%) and cystadenomas (19.1%). This finding is consistent with Nwosu *et al.*, (2022) in Anambra, who also reported dermoid cysts as the predominant type among reproductive-age women. However, the proportion of polycystic ovarian cysts (15.7%) in the present study was slightly lower compared to reports from Lagos (Afolabi & Oyeniran, 2020), where PCOS accounted for 22% of cysts. The difference could be due to variations in lifestyle, diet, and hormonal influences associated with urbanization, which are more prominent in metropolitan Lagos than in semi-urban Ogoni or Port Harcourt.

The study found a significant association between ethnic group and cyst type ($p < 0.001$), suggesting that the type of cysts varied between the Ogoni and Port Harcourt populations. The Ogoni participants had more dermoid and endometrioma cysts, while Port Harcourt participants showed higher cases of hemorrhagic and corpus luteum cysts. This difference may reflect environmental and occupational exposures, as Ogoni is known for prolonged oil exploration activities, which may contribute to hormonal disruption through endocrine-disrupting chemicals (Eke *et al.*, 2021). Similar findings were reported by Akpan *et al.*, (2019) in Bayelsa, who linked environmental pollution to increased gynecological abnormalities, including ovarian pathologies.

Additionally, no significant difference in hormone levels was observed across different cyst types ($p > 0.05$), suggesting that while hormonal imbalances contribute to cyst formation, they may not distinctly influence the specific cyst type once formed. This finding is comparable to that of Oghenevwe *et al.*, (2019) in Delta State, who reported that hormonal variations were not statistically associated with cyst morphology.

A significant association was, however, observed between age group and cyst type ($p = 0.008$). Younger women (18–26 years) showed a higher prevalence of endometriomas and dermoid cysts, while older women (37–45 years) had more hemorrhagic and malignant cysts. This age-dependent distribution aligns with the findings of Ekwueme *et al.*, (2022) in Imo State, who attributed the increased frequency of malignant and hemorrhagic cysts in older women to declining reproductive hormones and longer exposure to estrogenic stimulation. Hormonal decline and increased oxidative stress with age are potential biological mechanisms explaining this observation.

Furthermore, there was no significant difference in hormonal profiles (FSH, LH, Estradiol, Progesterone, and Prolactin) between the two ethnic groups ($p > 0.05$). This agrees with the report of Olatunji *et al.*, (2020) in Oyo State, who noted similar hormonal patterns among women with ovarian cysts across different Yoruba subgroups. The similarity in hormonal levels in this study may be attributed to shared reproductive physiology and similar dietary and lifestyle factors between the study populations.

Overall, the results of this study suggest that ovarian cyst patterns in Rivers State are influenced by both biological and environmental factors. While the hormonal profiles remained relatively consistent, differences in cyst type distribution across ethnicities indicate potential environmental or genetic contributions. Therefore, increased awareness, routine gynecological screening, and environmental health monitoring in oil-producing regions are essential to reducing the burden of ovarian cysts among women.

CONCLUSION

In summary, ovarian cysts in this sample population were most common in women between 27 and 36 years, with dermoid cysts being the predominant type. Ethnic variation influenced the distribution of cyst types, yet did not translate into differences in hormonal profiles or cyst dimensions.

RECOMMENDATIONS

- Routine ultrasonographic screening for women in reproductive age groups should be encouraged, especially in communities with elevated cystic disease prevalence.
- Health education programs should emphasize awareness of symptoms (pelvic pain, menstrual irregularities) and promote early gynecological evaluation.
- Further molecular and genetic studies are recommended to identify biomarkers or susceptibility genes for cyst development in differing ethnic groups.
- Comprehensive hormonal profiling should be considered in clinical management to exclude or monitor systemic endocrine disorders as comorbidities.

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