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Original Research Article

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

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Abstract: Ovarian cysts are common gynecological conditions that affect women of reproductive age and vary widely in types, laterality, hormonal profile, and associated demographic factors. This study investigated the distribution(location), hormonal profile, and histological patterns of ovarian cysts among 414 female patients of reproductive age visiting secondary and primary hospitals in Ogoni ethnic groups and Port Harcourt city, as well as their association with age and ethnicity. Data were obtained through ultrasonographic and hormonal analyses, including serum levels of Follicle stimulating hormones (FSH), Luteinizing hormone (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. 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 ($p > 0.05$). 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 cyst, female patient, cyst location, Port Harcourt, Ogoni, ultrasonographic and hormonal analyses.

INTRODUCTION

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.,*2000). Most are functional in nature and resolve without treatment (Hertweck, *et al.,*2001). Ovarian cysts can develop from a variety of physiological and pathological processes. The most common types are functional cysts, which include follicular cysts and corpus luteum cysts, both related to the normal menstrual cycle. Follicular cysts form when a follicle fails to rupture and release an egg during ovulation, while corpus luteum cysts develop when the follicle sac closes after releasing the egg and then fills with fluid (Berek and Novak, 2019).

Beyond functional causes, hormonal imbalances, particularly those involving elevated levels of luteinizing hormone or polycystic ovary syndrome (PCOS), can contribute to the formation of multiple cysts (Kavitha and Shetty, 2020). Additionally, endometriosis can lead to the development of endometriomas cysts formed when endometrial tissue attaches to the ovary and bleeds (Agarwal *et al.,* 2021).

Other causes include pregnancy, where a corpus luteum cyst may develop in early stages, and pelvic infections, which can spread to the ovaries and cause

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abscess-like cysts. In some cases, cysts such as dermoid cysts (mature cystic teratomas) or cystadenomas arise from abnormal cell growth and are considered non-functional, though typically benign (Smith and Jones, 2022).

The diagnosis of ovarian cysts typically begins with a clinical assessment, including a pelvic examination to detect any abnormalities in the size, shape, or consistency of the ovaries. However, many cysts are asymptomatic and discovered incidentally during imaging for unrelated conditions (Berek and Novak, 2019).

Ultrasound, particularly transvaginal sonography, is the primary imaging modality used for evaluating ovarian cysts. It helps determine the cyst's size, location, composition (solid, fluid-filled, or mixed), and vascularity, all of which are critical in distinguishing between benign and potentially malignant masses (Timmerman *et al.,* 2016).

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. It was calculated using Yamane 1967 formula:

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

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 ≈ 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 variations among women in the study population organized in tables and interpreted accordingly.

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 Location

Cyst Location	Frequency
Bilateral	75(18.1%)
Left	148(35.7%)
Right	191(46.1%)
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), **E_2 (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 Location

Ethnic Group	Bilateral	Left	Right	Total
Ogoni	46 (16.7%)	99 (35.9%)	131 (47.5%)	276 (100%)
Port Harcourt	29 (21.0%)	49 (35.5%)	60 (43.5%)	138 (100%)
Total	75 (18.1%)	148 (35.7%)	191 (46.1%)	414 (100%)
Test Statistic	Value	df	p-value	Interpretation
Chi-square (χ^2)	1.28	2	0.527	Not significant ($p > 0.05$)

Chi-square = 1.28, df = 2, p = 0.527. Note: df= degree of freedom, p-value= probability value.

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

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			

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), **E_2 (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).

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%.

Table3: Cysts were more commonly located on the right ovary (46.1%), followed by the left ovary (35.7%), while bilateral cysts were least frequent (18.1%).

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: There was no statistically significant association between ethnic group and cyst location ($p > 0.05$), indicating that the occurrence of cysts in either ovary was not influenced by ethnicity

Table 6: No significant difference 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

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 research.

The finding that right-sided ovarian cysts (46.1%) were more frequent than left-sided ones (35.7%) correspond with observations from a similar study in Ibadan by Ayinde and Omigbodun (2019), who suggested that increased venous flow on the right side of the pelvis and anatomical variations could predispose the right ovary to more cystic changes. In contrast, a study in Maiduguri by Mohammed *et al.,* (2021) found a nearly equal distribution between right and left cysts, which they attributed to sample variation and possible diagnostic differences. The variation between these studies may result from differences in population size, diagnostic tools (such as ultrasonography sensitivity), and environmental exposures.

The absence of a significant association between ethnicity and cyst location ($p = 0.527$) indicates that both populations are equally likely to develop cysts in either ovary. This is in line with the report of Adebayo and Sanni (2018) in Kwara State, who found no laterality preference in cyst occurrence among Nigerian women.

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. The hormonal profiles remained relatively consistent. 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. Ethnic variation influenced the distribution of cyst types, yet did not translate into differences in hormonal profiles or cyst dimensions. These findings imply that the pathophysiology of many ovarian cysts may revolve around localized ovarian processes rather than broad endocrine imbalance.

RECOMMENDATIONS

- Conduct larger multicenter studies including rural and urban populations to enhance generalizability.
- Investigate environmental and occupational exposures (such as oil pollution, chemicals, and lifestyle factors) that may explain differences in cyst distribution between Ogoni and Port Harcourt.
- Explore genetic factors that may predispose women to particular cyst types in this region.
- Longitudinal studies should examine hormonal changes over time in women with ovarian cysts, particularly focusing on LH abnormalities.
- Future research should evaluate the clinical outcomes of different cyst types (e.g., recurrence, complications, fertility implications).

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