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# Correlation Between Number of Hysterosalpingography Abnormalities and Age among Women with Infertility in a Tertiary Hospital in Port Harcourt

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***Authors' contributions***

*This work was carried out in collaboration among all authors. Author VNA did the conceptualization, data collection, results interpretation, reviewing and editing of the manuscript. Author EIN-E did the conceptualization, reviewing and editing of the manuscript. Author GJA did the reviewing and editing of the study. All authors read and approved the final manuscript.*

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## ABSTRACT

**Background:** The number of abnormalities detected on Hysterosalpingography (HSG) varies with age and the type of infertility. The more the numbers of abnormalities, the slimmer the chance of conception naturally and fecundity decreases with increasing age. HSG is still useful in evaluating the reproductive systems in developing countries.
**Aim:** The aim of this study is to determine the number of hysterosalpingography abnormalities and to determine if there is any relationship with age and type of infertility among women who had HSG in a tertiary hospital in Port Harcourt.
**Methods:** A retrospective study involving a total of 226 patient`s data, carried out in a tertiary hospital in Port Harcourt. A *P*-value below 0.05 was considered statistically significant.

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**Results:** Two-hundred and twenty-six women were studied. The mean age of the study population was 35.07±5.45years and ranges from 22-48years. Most women were 30-39 years and have the highest number of abnormalities. Normal HSG findings were seen in 64, 28.3% and abnormal HSG (162, 71.7%). There was significant association with age and number of abnormalities on HSG, with *P*-value of 0.037(scatter plot). Significant association was also seen between number of HSG abnormalities and type of infertility with a *P*-value of 0.028 (multiple linear regression).
**Conclusion:** Hysterosalpingography (HSG) is a valuable tool in investigating women with infertility and most frequently encountered type in this study was secondary infertility. More than 71% of women had abnormal HSG. There was significant association between number of abnormalities in HSG with age and type of infertility.

*Keywords: Correlation; infertility; age; women; hysterosalpingography; abnormalities.*

## 1. INTRODUCTION

Infertility definition varies considerably. Often referred to as the inability of a couple to achieve gestation/conception within a time not less than a year of adequate/ enough unprotected sexual contact or coitus.[1] Basically two types of infertility have been identified; primary if the woman has never achieved pregnancy over a period of one year and not using birth control. Secondary infertility occurs when the woman has been able to achieve at least one prior pregnancy. In sub-Saharan Africa and in other parts of the world infertility is a foremost clinico-social concern [2,3]. Past records had shown that about 10-20% of females within the reproductive age bracket in sub-Saharan Africa has infertility predicament [4]. Female infertility is considered as a misfortune and is often the grounds for separation and divorce or polygamy as well as denial of rights in family functions in Nigeria [5]. Recently, in Nigeria fertility rate is just about 5.25 children per woman in year 2020 [6].

HSG is widely used to study the gross anatomy of the uterine cavity and establish the patency of fallopian tubes. The number of abnormalities detected in Hysterosalpingography (HSG) varies with age and the type of infertility. The more the numbers of abnormalities the slimmer the chance of conception naturally. As fecundity decreases with increasing age.

The aim of this study is to determine the number of hysterosalpingography abnormalities and to determine if there is any relationship with age and type of infertility among women who had HSG in a tertiary hospital in Port Harcourt. In this environment, there is a paucity of information on this hence the need for this present study and also to have a working document for the hospital.

## 2. MATERIALS AND METHODS

The study was conducted at the Radiology and the Obstetrics and Gynaecology Departments of RSUTH, South-South Nigeria. Patients who presented for hysterosalpingography for infertility between 1st of January, 2020 to 1st of January 2022 were included in the study. Those with incomplete request forms were excluded from the study. The Biodata, indicated type of infertility under evaluation and the HSG findings were obtained and documented.

Ethical approval is not required in this kind of study.

**Sample size calculation:** A sample size of 226 was used for this study while employing the formula for cross-sectional design [7]. Eduwem et al [8] recorded a prevalence rate of HSG abnormality as 85.8%. The sample size was gotten using desired precision of 0.05.

**Data analysis:** Data obtained from the study proforma was entered into Microsoft Excel, and then exported to IBM Statistical Package for Social Sciences (SPSS) version 21 for statistical analysis. Tables and charts were used to display data as appropriate. Descriptive statistics employed means, standard deviation, median and ranges for numerical data, and absolute frequencies and percentages for categorical data. Comparisons of number of abnormalities by infertility were performed using independent t-test to determine significant differences. A multiple linear regression analysis of age, infertility, and number of abnormalities in the study was also done. Statistical significance when *P*-value is less than 0.05.

## 3. RESULTS

Mean age of study population ± S.D = 35.07 ±5.45 years, median age = 35.00 years. The range is 22-48years.

Table 1 is showing the age category. Age 30-39 has the highest frequency/percentage (130, 57.5%), followed by 40-49 years and 20-29 years been the least.

Table 2 revealed that the occurrence of at least one abnormality is seen more in 30-39 years category (n=62 or 47.7%) followed by 40-49years category and the 20-29years category. Similar pattern of occurrence is also seen with minimum of two abnormalities. However greater than two abnormalities is more common in 40-49 years category (n=2 or 3.6%) while 20-29 and 30-39 had equal numbers. This showed that the number of abnormalities increases with increasing age.

Table 3 revealed that secondary infertility was more common than primary infertility at all age category and it is not statistically significant with *p*-value=0.908. Age 30-39 years had the highest occurrence rate for both primary (6, 4.6%) and secondary infertility (124, 95.4%) respectively.

Fig. 1 showed that the relationship between age (years) and number of abnormalities are significant with *p*-value =0.037. This further showed that number of HSG abnormalities have a strong association with age.

**Table 1. Age distribution of women in the study**

| Variable | Frequency | Percentage |
|---|---|---|
| **Age category** | | |
| 20 – 29 years | 40 | 17.7 |
| 30 – 39 years | 130 | 57.5 |
| 40 – 49 years | 56 | 24.8 |

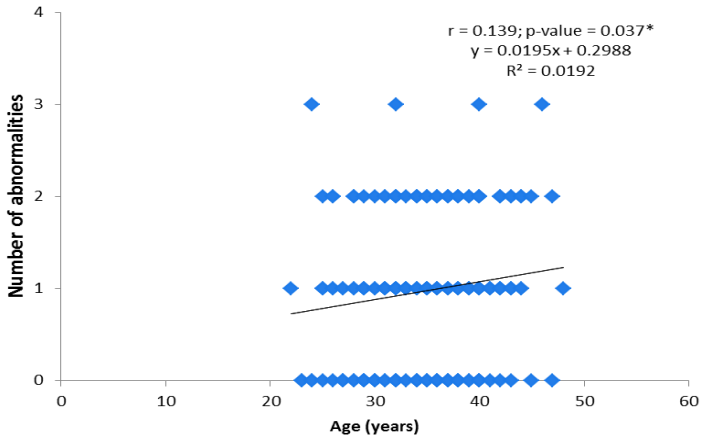


**Fig. 1. Scatter plot showing relationship between age (years) and number of abnormalities in the study**

**Table 2. Comparison of age category against number of abnormalities on HSG among the study population**

| | Number of abnormalities | | | | |
|---|---|---|---|---|---|
| **Age category** | **Normal** | **One** | **Two** | **Greater than two** | **Total** |
| 20 – 29 years | 17 (42.5) | 15 (37.5) | 7 (17.5) | 1 (2.5) | 40 (100.0) |
| 30 – 39 years | 36 (27.7) | 62 (47.7) | 31 (23.8) | 1 (0.8) | 130 (100.0) |
| 40 – 49 years | 11 (19.6) | 29 (51.8) | 14 (25.0) | 2 (3.6) | 56 (100.0) |
| **Total** | **64 (28.3)** | **106 (46.9)** | **52 (23.0)** | **4 (1.8)** | **226 (100.0)** |

*Fisher's Exact = 8.199; p-value = 0.188*

**Table 3. Comparison of age category against type of infertility among the study population**

| Age category | Primary infertility n (%) | Secondary infertility n (%) | Total n (%) |
|---|---|---|---|
| 20 – 29 years | 1 (2.5) | 39 (97.5) | 40 (100.0) |
| 30 – 39 years | 6 (4.6) | 124 (95.4) | 130 (100.0) |
| 40 – 49 years | 3 (5.4) | 53 (94.6) | 56 (100.0) |
| **Total** | **10 (4.4)** | **216 (95.6)** | **226 (100.0)** |

*Fisher's Exact= 0.432; p-value = 0.908*

**Table 4. Classification of HSG among the study population**

| HSG Classification | Frequency | Percentage |
|---|---|---|
| Normal HSG | 64 | 28.3 |
| Abnormal HSG | 162 | 71.7 |
| **Total** | **226** | **100.0** |

**Table 5. Number of abnormalities among those with abnormal HSG in the study population**

| Number of abnormality | Frequency | Percentage |
|---|---|---|
| None | 64 | 28.3 |
| One abnormality | 106 | 46.9 |
| Two abnormalities | 52 | 23.0 |
| Three abnormalities | 4 | 1.8 |
| **Total** | **226** | **100.0** |

Table 4 is simply showing the numbers of normal HSG findings and abnormal HSG findings in the study population.

Table 5 is showing the number of abnormalities among the abnormal HSG findings. One abnormality is more prevalent than two or three abnormalities. The above table also relates the fact that more than one abnormality can be observed in a single study, and consequently lead to more difficulty encountered by the patient in achieving conception.

Table 6 is showing the comparison of number of abnormalities and age by type of infertility, which showed that there is an association between number of abnormalities and infertility type (*P*-value= 0.028). Furthermore the occurrence of the number of abnormalities is more in secondary infertility. There is no significant association between age and type of infertility.

Table 7 is displaying a multiple linear regression analysis of age, number of abnormalities and infertility in the study. Number of abnormalities and type of infertility showed significant association with *P*-value of 0.026 and age with type of infertility was not significant (*p*-value=0.638).

**Table 6. Comparison of number of abnormalities and age by type of infertility**

| | Primary Mean ± SD | Secondary Mean ± SD | T | p-value |
|---|---|---|---|---|
| Number of abnormalities | 1.50 ± 0.71 | 0.96 ± 0.76 | 2.206 | 0.028* |
| Age | 34.80 ± 4.47 | 35.08 ± 5.50 | -0.160 | 0.873 |

***Statistically significant*

**Table 7. Multiple linear regression analysis of age, number of abnormalities and infertilityin the study**

| | | *Type of infertility* | | |
|---|---|---|---|---|
| | ***B*** | ***95% Confidence Interval for β*** | | ***p-value*** |
| **Variables** | | ***Lower limit*** | ***Upper limit*** | |
| Age in years | 0.001 | -0.004 | 0.006 | 0.638 |
| Number of abnormalities | -0.040 | -0.076 | -0.005 | 0.026* |

**Statistical significance p<0.05*

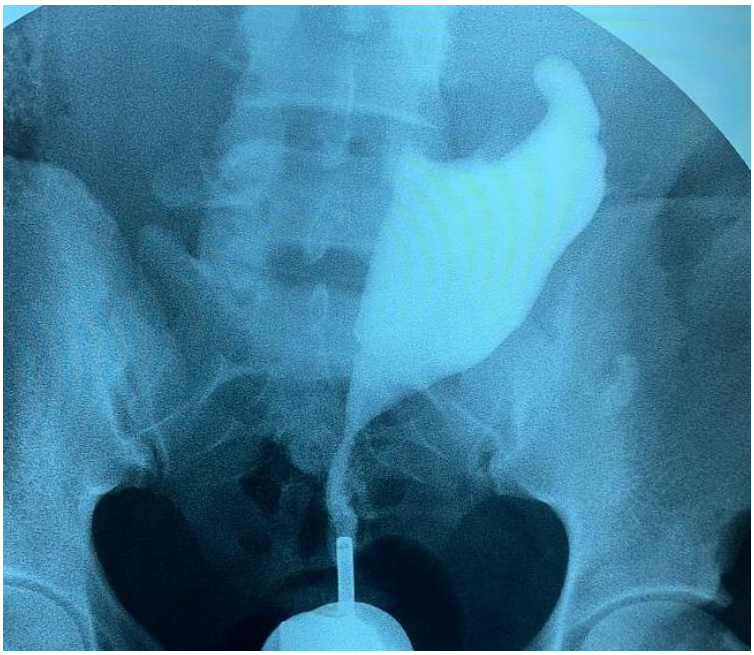

**Fig. 2. A spot film showing a capacious contrast opacified uterine cavity with irregular outline and depression at the fundal region. The fallopian tubes are not demonstrated. Features are in keeping with uterine myoma with bilateral tubal occlusion**

**Fig. 3. Showed an elongated stretched contrast opacified uterine cavity angulated at the fundus and a well defined roundish calcified myoma on its right side. Both fallopian tubes are visualized and ends abruptly at the cornua**

**Fig. 4. Showed a contrast opacified uterine cavity with irregular outline, both fallopian tubes were not demonstrated. Intravasation was noted**

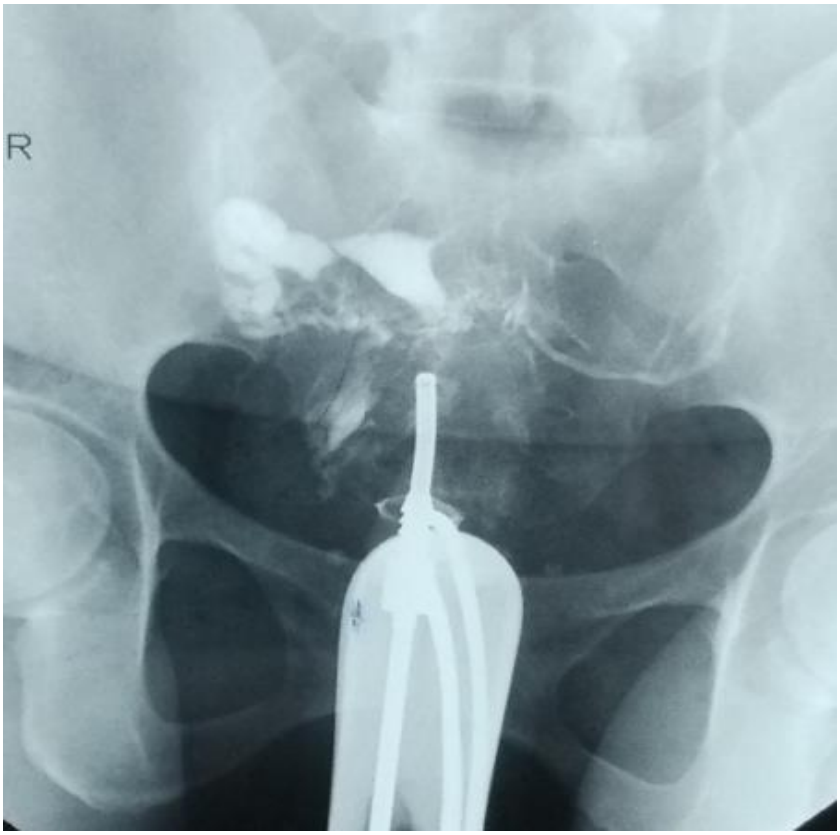


**Fig. 5a**

**Fig. 5b delayed image**

**Fig. 5. Showed contrast opacified uterine cavity with dilated and tortuous right fallopian tube, which is persistent in the delay image film**

## 4. DISCUSSION

Infertility is a big deal in Nigeria, female infertility is considered as a disaster and is often the rationale for separation and divorce or polygamy as well as denial of rights in family functions [5].

In our study the mean age was 35.07±5.45years and the age range was 22-48 years. Age 30-39 years had the highest frequency of people presenting for HSG due to infertility. This is probably due to an increase in girl child education and more women in career pursuit [9]. This supports previous studies done [10-15]. The minimum age in our study was 22 years compared to studies done in Northern Nigeria with a minimum of 17 years. This could be linked to socio-cultural background in the North where early marriage is encouraged and common [11,16].

In this study, secondary infertility (n=216, 95.6%) is commoner than primary infertility (n=10, 4.4%). Similar findings were made by other investigators [2,10,13,16-23]. The possible explanation for this may be as a result of pelvic inflammatory disease, sepsis, sexually transmitted diseases and unsafe abortion alongside post surgical procedures conducted in septic environs [18,24]. In contrast to our findings, others found out that primary infertility is a more frequent indication for HSG than secondary infertility [12,25,26]. This disparity in findings could be due to geographical location and methodology.

In this current study, 28.3% of the women had normal HSG findings. This observations corroborates with other studies [10,12-13,16,21,26] but disagrees with an earlier study done in Port Harcourt (44.2%) by Nwankwo et al [27] and in Northern Nigeria studies by Saidu et al-59% and Lawan et al-55% respectively [19,28]. A possible reason for this is early marriage, religious beliefs and/or premarital sex.

Of the two-hundred and twenty-six patients, 162 (71.7%) had abnormal HSG findings. This is similar to 73.1% and 75.2% reported by Udobi et al and Eze CU et al respectively [21,26]. Other studies [8,29,30] done within Nigeria also reported high percentage of abnormalities in infertility work up. More often infertility cases are linked with problems resulting in incomplete or complete distortion of the uterine cavity and the occlusion of the fallopian tubes. HSG does clearly outline this reproductive pathway and thus an important tool in evaluation of infertility [8]. From this current study that an individual can have just one or more than one pathology is in tandem with earlier studies [16-17,31-33].

Bello et al [17] also documented that pathology is associated with type of infertility and it is statistically significant with *P*-value<0.05 Similarly, Itanyi et al [31] reported that an association exist between abnormalities and type of infertility (*P*-value=<0.0001. Lash et al [34], established an association between secondary infertility and abnormality seen on HSG. These

reports agree with the findings of this study using either multiple linear regression analysis (*P*-value=0.026) or two by two table *P*-value=0.028). Conversely, Aduayi et al [14] and Udobi et al [26] documented that there was no association between abnormalities and type of infertility.

With regards to age in this index study there is an association between abnormalities and age using scatter plot with *P*-value of 0.037. This corroborates with Aduayi et al [14] (*P*-value=0.002) and Akagbue et al [35,36] (*P*-value=0.007). On the other hand, some studies [26,31] disagree with this submission. Interestingly in our study there is no correlation between age and type of infertility and this agrees with Aduayi et al and Udobi et al respectively [14,26].

## 5. CONCLUSION

Hysterosalpingography (HSG) is a valuable tool in investigating women with infertility and most frequently encountered type in this study was secondary infertility and the commonest age category with abnormalities is 30-39 years. Abnormal HSG accounted for 71.7%. There was significant association with age, type of infertility and number of abnormalities on HSG therefore women are encouraged to marry early once they reach adulthood.

## 6. LIMITATION OF THE STUDY

This is a retrospective study and the sample size is not representing the total population. Some patients still patronizes unorthodox practitioners.

## CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

## ETHICAL APPROVAL

It is not applicable.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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