



**HYSTEROSALPHINGOGRAPHIC FINDINGS IN INFERTILE WOMEN: A SYSTEMATIC REVIEW**

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ABSTRACT

**Keywords:**

Hysterosalpingography, Infertility, Women.

**Background:** Hysterosalpingography (HSG) is a valuable radiological procedure for imaging the female reproductive tract. Structural abnormalities on hysterosalpingography (HSG) are among the important factors in the evaluation of female infertility.

**Objectives:** The study was aimed at reviewing the available literatures on hysterosalpingography findings in infertile women, identifying the missing gap in the subject area, coming up with which area of further that will further enhance the role of HSG in the diagnosis of infertility.

**Methods:** The study was a systemic review that focused on literature on the topic and key words of research. The references were obtained using a database; IEEE Xplore, EBSCO, Cochrane and MEDLINE. The search terms used were; hysterosalpingography findings, HSG, detection of infertility, fluoroscopic examinations. The inclusion criteria are articles published in English language, non-duplicated and those that full text are available online.

**Result:** Eleven articles were considered for the review. Four of the articles were prospective, whereas the other seven were retrospective studies. Ten of the reviewed articles are from Africa and only one is from Asia. The most frequent finding in the reviewed articles on the two continents was bilateral tubal blockage whereas the least frequent finding is associated with the cervix. The majority of the reviewed articles used short study duration, retrospective, or small sample size. None of the reviewed articles established a relationship between the HSG findings with demographic information or clinical history of the selected subjects.

**Conclusion:** The findings of the published articles have proven the potentiality of HSG in detecting uterine abnormalities related to infertility. None of the reviewed articles established a relationship between relationship between the HSG findings with demographic information or clinical history of the selected subjects.

## INTRODUCTION

Hysterosalpingography is a fluoroscopic guided contrast examination of the female genital tract using about 10 to 20mls of contrast media. [1] The female reproductive tract comprises of the vaginal canal, uterine cavity, and Fallopian tubes, but the main focus of HSG is the uterine cavity and Fallopian tubes. [2] HSG is an important diagnostic component of the basic infertility evaluation because a major cause of infertility is blocked Fallopian tubes. Other Indications for HSG may include infertility, recurrent miscarriages (which may be due to polyps, submucosal leiomyomas), following tubal surgery, assessment of the integrity of a Caesarean uterine scar, synechiae, Mullerian anomalies, hydrosalpinges, salpingitis isthmica nodosa (SIN), and peritubal or peritoneal adhesions [3]. HSG is safe, relatively inexpensive, simple and rapid diagnostic test [4]. Some authorities' believed that laparoscopy and hysteroscopy can really replace HSG [5]. However, the superiority of HSG in detecting uterine and intraluminal tubal pathology Mgbo, [6] its ready availability and cost effectiveness still makes it the standard procedure for evaluating female infertility in most developing countries. Although HSG is associated with some disadvantages which include patient discomfort, radiation exposure to patient and personnel, higher cost than ultrasound, and sometimes scarcity of resources, it is the gold standard for diagnosing infertility [7].

Despite advancements in gynecological imaging in the western world, the readily availability and cost effectiveness of HSG still makes it a first line investigation in evaluation of the female genital tract, particularly in the initial diagnostic workup of female infertility in most developing countries like Nigeria [8]. It also has a sensitivity of 44.4% for uterine pathology and 75% for the detection of intrauterine adhesion. In addition, this procedure was shown to have therapeutic value of the flushing effect [9]. Hysterosalpingography is complicated by more or less pronounced abdominal symptoms, in the form of pain and tenderness in the iliac fossae and in the hypogastric region, sometimes defensive rigidity, now and then accompanied by nausea and vomiting, and often by raise in temperature.

Infertility is the inability of a couple to establish a pregnancy within a certain period (one year) of unprotected coital exposure. Infertility could be primary or secondary. Female infertility can be of primary or secondary cause and can be due to structural or functional abnormalities. Primary

infertility is the condition of those who have never conceived in their life time. Whereas secondary infertility which is the most common; is applied to those who have conceived at some time in the past. Infertility remains a major challenge globally and despite the technological advancement in medical imaging, HSG remains the gold standard the evaluation female reproductive tract which its abnormality is the major cause of infertility. The review will identify the missing gaps in the published original research articles in the subject area and come up with an area of further studies that will further enhance the role of HSG in the evaluation of female genital tract. This study is aimed at reviewing published original research articles on HSG findings in infertile women, identifying a missing gap and coming up with an area of further studies.

## METHODOLOGY

The study was a systemic review that focused on literature on the topic and key wards of research. The references were obtained using a database; IEEE Xplore, EBSCO, Cochrane and MEDLINE. The search terms used were; hysterosalpingography findings, HSG, detection of infertility, fluoroscopic examinations. The inclusion criteria were; articles published in English language, non-duplicated and those that full text where available online. The exclusion criteria were; articles not written in English language, not relevant title, or articles that the full text was not online. The continents where the studies were conducted, year of publication, study design, sample size, normal and abnormal findings were extracted from the reviewed articles.

## RESULTS

With the exception of the study conducted by Al-jaroudi *et al.* [14] that was conducted in Asia, all the other studies were conducted in Africa. The study duration of the reviewed articles ranged from 1 year to 6 years. A study conducted by Bukar *et al.* [12] had a study duration of six years, which was the longest study duration among all the reviewed articles, followed by Udobi & Aronu. [13] that had 4 years study duration and then Dambatta *et al.* [2] and Malwadda & Byanyima [11] that each had 3 years study duration. Furthermore, studies conducted by Dambatta *et al.* [2], Oguntoyinbo & Aboyeji. [7], Lawan *et al.* [9] and Aduayi *et al.* [15] each had a study duration of one year, which was the shortest study duration among the reviewed articles. Four out of the eleven reviewed articles

were prospective while the other seven were retrospective studies. Studies conducted by Dambatta *et al.* [2]; Oguntoyinbo & Aboyeji. [7], Lawan *et al.*[9] and Aduayi *et al.* [15] used a prospective study, whereas those conducted by Mathew *et al.* [1], Danfulani *et al.*[10], Malwadde & Byanyima [11], Bukar *et al.* [12], Udobi & Aronu [13], Al-jaroudi *et al.* [14] and Moi *et al.* [16] employed retrospective study design.

A study conducted by Udobi & Aronu [13] used a sample size of 446 participants, which was the largest sample size among the reviewed articles, followed by Danfulani *et al.*[10] and then Mathew *et al.* [1] that used a sample size of 317 and 290 participants respectively. Studies conducted by Malwadde & Byanyima [11], Bukar *et al.* [12], Moi *et al.* [16] and Lawan *et al.* [9] used a sample size of 289, 272, 245 and 220 participants. Furthermore, a study conducted by Oguntoyinbo & Aboyeji. [7] used a sample size of 100 participants, which was the smallest sample size among the reviewed articles, followed by Aduayi *et al.* [15] and then Dambatta *et al.* [2] that used sample size of 134 and 212 participants respectively.

Mathew *et al.* [1] and Dambatta *et al.* [2], each reported 62.4% normal findings among the participants, which was the highest percentage reported among the reviewed articles, followed by Lawan *et al.* [9] and then Al-jaroudi *et al.* [14] that reported 55% and 53.8% respectively as normal findings among the participants of their studies. Studies conducted by Moi *et al.* [16], Danfulani *et*

*al.* [10], Bukar *et al.* [12] and Udobi & Aronu. [13] reported 44%, 41.7%, 29.4% and 26.9% as percentages of normal findings among the participants of their studies. Furthermore, a study conducted by Oguntoyinbo & Aboyeji. [7] reported 7% normal findings among the participants, which was the lowest percentage of normal findings reported among the reviewed articles, followed by Malwadde & Byanyima [11] and then Aduayi *et al.* [15] that reported 16.6% and 25.4 % respectively as percentages of normal findings among the participants of their studies.

A study conducted by Oguntoyinbo & Aboyeji. [7] reported 93% abnormal findings among the participants in their study, which was the highest percentage of abnormal findings that was reported among the reviewed articles. This is followed Malwadde & Byanyima [11] and then Aduayi *et al.* [15] that reported 83.4% and 74.6% respectively as percentages of abnormal findings in their studies. Udobi & Aronu [13], Bukar *et al.* [12], Danfulani *et al.*[10] and Moi *et al.* [16] reported 73.1%, 70.6%, 58.3% and 56% as percentages of abnormal findings in their studies. Furthermore, Mathew *et al.* [1] and Dambatta *et al.* [2], reported 37.6% each as abnormal findings among the participants, which was the lowest percentage of normal findings reported among the reviewed articles, followed by Lawan *et al.* [9] and then Al-jaroudi *et al.* [14] that reported 45% and 46.2% respectively as percentages of normal findings among the participants of their studies.

**Table 1 : Summary of the results from published works**

Author(s) & year of publication	Continent	Study duration	Study design	Sample size	Normal findings (%)	Abnormal finding (%)
Dambatta <i>et al.</i> 2019	Africa	2018-2019	Prospective	212	62.4	37.6
Udobi&Aronu. 2017	Africa	2013-2017	Retrospective	446	26.9	73.1
Mathew <i>et al.</i> 2016	Africa	2013-2014	Retrospective	290	62.4	37.6
Al-jaroudi <i>et al.</i> 2016	Asia	2015-2016	Retrospective	200	53.8	46.2
Aduayi <i>et al.</i> 2015	Africa	2014-2015	Prospective	134	25.4	74.6
Moi <i>et al.</i> 2014	Africa	2012-2014	Retrospective	245	44	56
Lawan <i>et al.</i> 2013	Africa	2011-2013	Prospective	220	55	45

Author(s) & year of publication	Continent	Study duration	Study design	Sample size	Normal findings (%)	Abnormal finding (%)
Danfulani <i>et al.</i> 2012	Africa	2009-2012	Retrospective	317	41.7	58.3
Oguntoyinbo & Aboyeji. 2011	Africa	2009-2011	Prospective	100	7	93
Bukar <i>et al.</i> 2006	Africa	2000-2006	Retrospective	272	29.4	70.6
Malwadde & Byanyima. 2000	Africa	1997-2000	Retrospective	289	16.6	83.4

## DISCUSSION

Despite advancement in imaging technology, hysterosalpingography remains a goal standard imaging tool in evaluation of the uterus and Fallopian tubes in particular with a sensitivity of 44.4% for uterine pathology and 75% for the detection of intrauterine adhesion. [9] The findings from the review shows that ten out of the eleven reviewed articles were conducted in Africa, the eleventh study was conducted in Asia as shown in the table of summary. The possible reason might be because HSG remains the investigation of choice in the developing countries. The study conducted by Bukar *et al.* [12] had the longest study duration as shown in the table of summary which served as a strength over the studies conducted by Dambatta *et al.* [2], Udobi & Aronu. [13], Mathew *et al.* [1], Al-Jaroudiet *al.* [14] and Aduayiet *al.* [15] that all had one year as their study duration. The longer the study period the more cases were included in the study. Prospective study has a strength over retrospective study because all the necessary information could be obtained and recorded better in prospective when compared to a retrospective study. Therefore, the studies conducted by Dambatta *et al.* [2], Aduayiet *al.* [15], Lawanet *al.* [9] and Oguntoyinbo & Aboyeji. [7] as shown in the table of summary had a strength over the other reviewed articles in terms of study design.

Furthermore, the studies conducted Udobi & Aronu. [13] and Danfulani *et al.* [10] used a larger sample size than the other reviewed article as shown in the table of summary, therefore, the two studies had strength other reviewed articles in terms of sample size. The larger the sample size, the more the accuracy and reliability of the findings. The studies conducted by Oguntoyinbo & Aboyeji. [7], Malwadde & Byanyima. [11] and Aduayiet *al.* [15] reported a higher percentage of abnormal

findings than the other studies as shown in the table of summary which served as a strength of the studies. Although, the differences were not linked to the study design, duration of the study or sample size. The majority of the reviewed articles used short study duration, retrospective, or small sample size. None of the reviewed articles established relationship between the HSG findings with demographic information or clinical history of the selected subjects.

## CONCLUSION

The findings, reported by published articles had proven the potentiality of hysterosalpingography to diagnose and sometimes treat infertility in infertile women. Tubal blockage was the most common and predominant abnormal imaging finding on HSG. Further studies should consider using a prospective study design, longer study duration, larger sample size and correlate the HSG findings with demographic information and clinical history.

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