



Comparison of Hysterosalpingography and Avicenna's Method for Evaluation of Tubal Patency

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Abstract

This study was designed to compare the findings of hysterosalpingography and "garlic test" to assess the fallopian tubes and uterus for diagnosis of obstruction in internal female genital tract. This survey was done using the database from 50 infertile women assessed for infertility both via hysterosalpingography and garlic test. The concordance between the two tests was evaluated using overall agreement percent and kappa coefficient. The sensitivity and specificity for garlic test were 56% and 75%, respectively, with 60% positive and 72% negative predictive values. The concordance between the two assays was 67.5% with a corresponding coefficient of 31%. Thus, it seems that garlic test is an easy, noninvasive and safe method. Specificity and negative predictive value of garlic test is relatively suitable but its diagnostic sensitivity and positive predictive value is not high. It can be repeated during infertility treatment for several times and seems to have favorable compliance by the patient compared to hysterosalpingography.

Keywords: Garlic test; Hysterosalpingography; Avicenna; Iranian traditional medicine; Female infertility

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1. INTRODUCTION

Uterus and fallopian tube disorders, pelvic adhesions and uterine abnormalities can cause infertility via interfering with normal transport of the oocyte and sperm through the fallopian tubes and normal implantation. Abnormal findings in uterus and tubes are common causes (~30-50%) of infertility [1], [2]. Various diagnostic techniques have been developed to determine the location of obstruction or other disorders for planning treatment [3], [4].

The diagnostic techniques include laparoscopy, transvaginal ultrasonography, hysterosalpingography (HSG), hysteroscopy and sonohysterography [4], [5], [6]. Despite their advantages, each one of these techniques has limitations and some of them can cause complications such as uterine perforation, infection, allergic reaction, syncope, etc. [7], [8]. HSG is the classic method to survey and evaluate disorders of the uterus and fallopian tubes. It is the first and only radiologic examination method of uterus and the fallopian tubes since its introduction in 1910 [8]. Despite the widespread use of HSG as a standard method and its acceptability among experts to assess infertility [9], besides being costly it can have side effects such as uterine pain and discomfort due to injection of contrast material, increased risk of infection and inflammation, likelihood of allergy to contrast material and uterine rupture. In addition, ovarian exposure to radiation limits the repeated use of this diagnostic tool [8], [10].

Today, the world is moving towards integrating complementary and traditional medicine with the modern medicine to increase efficacy and decrease side effects and costs [11].

"Ibn Sina" or "Avicenna" as known in the West (980-1037) was a foremost Iranian physician [12]. His masterpiece the "Al-Qanun fi al-Tibb" or "Canon of Medicine" is the most famous medical textbook. In this book, Avicenna discusses human body and its disorders based on practical experience and

experimental methods. In the third book of Canon, in a chapter on women's disease which was dedicated to "diagnosis and treatment of infertility in women" he has suggested a simple and practical method, called "garlic test".

This method is applied after taking the patient's medical history and careful examination of both male and female [13]. Avicenna and other Iranian traditional medicine followers believe that garlic test can prove if there is any obstruction (structural and functional) in the internal female reproductive system [14], [15], [16], [17].

This study was done to investigate the validity and accuracy of garlic test in comparison to HSG to diagnose uterine and fallopian tube disorders.

2. METHODS

In this cross-sectional study, 50 women aged 20 to 45 years old with primary or secondary infertility who referred to the Iranian traditional medicine clinic of Imam Khomeini Hospital from April till September 2011 were evaluated using garlic test to rule out internal female reproductive system obstructions. All the patients had been previously evaluated for different causes of infertility and some of them had HSG done for them to rule out tubal/uterine factors. Exclusion criteria were the absence of HSG. A total of 40 out of 50 patients who had the results of both the HSG and garlic test were selected. In this clinic, garlic test is routinely performed for the assessment of female infertility as follows: the patient inserts a peeled garlic clove twisted inside a piece of sterile gauze, tied with a string in the vagina. The test should be performed after the last day of the patient's menstruation on an empty stomach (2 to 3 hours after a meal) with the garlic left inside the vagina overnight.

The patient is asked to report if she feels the smell or taste of garlic in her nose or mouth any time after putting the garlic in her vagina. If so, the test is normal and the patient has no uterine or tubal obstruction. If the

Table 1. Comparing the data obtained from garlic test and hysterosalpingography

Garlic test	(HSG) HSGNo occlusion	One-sided occlusion	Two-sided occlusion	Hydrosalpinx	Tubal-ovarian adhesion	Dilated cervix
Normal	15	7	0	0	2	1
Abnormal	6	4	3	2	0	0

patient does not feel the smell or taste of garlic until the next day, the test is abnormal and shows that some kind of obstruction exists [13].

All the subjects provided written informed consent. The time interval from the vaginal insertion of the garlic till the patient feels its smell or taste affects the interpretation of test results. However, the effect has not been considered in this study due to the lack of information.

The findings from HSG were used as the standard reference for evaluating sensitivity, specificity, false positivity, false negativity, and positive and negative predictive values of the garlic test. The concordance between the two tests was evaluated using overall agreement percent and kappa coefficient. SPSS₁₇ software (SPSS Inc., Chicago, Il) was used for statistical analysis.

3. RESULTS

Overall, 40 patients were evaluated with a mean age of 31.4 ± 4.9 years (range 22-41). Duration of infertility was between 1 to 22 years with a mean of 5.7 ± 4.6 years. Thirty three (82.5%) patients had primary and 7 (17.5%) had secondary infertility. Of all patients, 24 (60%) had normal HSG which indicated that fallopian tubes were open. There was at least one disorder (obstruction in one or two fallopian tubes, tubal-ovarian adhesion, or dilated cervix) in HSG in the other 16 patients (40%). It should be mentioned that all the patients with abnormal

findings on HSG such as an obstruction in one fallopian tube, two fallopian tubes or hydrosalpinges were categorized as having HSG disorder. In addition, in one case the cervix was reported to be dilated in HSG and there was a report of fallopian tube adhesion to the ovary in two cases. Due to the absence of tubal obstruction in these patients, they were categorized in the normal HSG group.

Garlic test was normal in 25 (62.5%) and abnormal in 15 (37.5 %) patients and was a probable sign of tubal occlusion. Information obtained via the garlic test and HSG are reported in table 1. These data were compared using the Kappa test and the results are shown in table 2.

The concordance between the two assays was 67.5% with a kappa coefficient of 31% (95%CI = 0.01-0.61). Sensitivity and specificity of garlic test were 56% and 75%, respectively, with 60% positive and 72% negative predictive value.

None of the patients reported side effects such as tingling, itching, discomfort in the pelvis and vagina, spotting or infections during the test.

4. DISCUSSION

One of the main and common stages of evaluating infertile women is the anatomical survey of the uterus and fallopian tubes. Since tubal factor is a common problem in infertile women, diagnosis of tubal disorders has special importance in choosing the appropriate treatment modality.

Table 2. Evaluation of concordance between hysterosalpingography (HSG) and garlic test

Uterine-tubal evaluation method		HSG [n(%)]		All [n (%)]
		Abnormal	Normal	
Garlic test	Abnormal	9(56)	6(25)	15(37.5)
	Normal	7(44)	18(75)	25(62.5)
All		16(100)	24(100)	40(100)

In this regard, it seems necessary to consider the use of a simple, easy, safe, precise and cost-effective method at the first step to get information about tubal patency.

Different diagnostic methods for assessing the causes of internal female genital tract obstruction have been suggested in Iranian traditional medicine. One of these simple methods is the garlic test [17].

To our knowledge up to now, the sensitivity and specificity of this test has not been compared with common methods in modern medicine and this study is the first work done in this field.

The sensitivity and specificity of garlic test compared to HSG in diagnosing tubal obstruction were 56% and 75%, respectively. Its positive predictive value was 60% and negative predictive value 72%.

In a previous study, the sensitivity and specificity of HSG were 53% and 87% for any tubal pathology and 46% and 95% for bilateral tubal pathology [18]. Another study, comparing HSG and hysteroscopy laparoscopy (HLC), reported the sensitivity and specificity of HSG as 72-85 and 68-89 percent, respectively [19]. In Bacevac and Ganovic study on 140 patients, the agreement of HSG and laparoscopy has been indicated was 22.9% in normal tubal findings and 25% in tubal occlusion diagnosis. The best sensitivity rate of HSG was 78% in revealing proximal tubal occlusion and the best specificity of HSG was reported as 96% for combined occlusion [20].

Streda et al. showed that HSG had high specificity to diagnose obstructions in the initial sector and hydrosalpinges and low sensitivity in detecting obstructions in peritoneum [21].

HSG is able to detect intrauterine abnormalities (except endometrial hyperplasia) in 50 to 80 percent of the cases [22]. It is a technique depending on both the patient and physician. It requires the necessary skills of the person performing it and cooperation of the patient. In many cases, during HSG a spasm of initial tubal section

can occur leading to a false report of tubal obstruction [23].

The garlic test is an innovative method used for diagnosing obstruction or "Soddeh" in internal female genital tract which was presented by practitioners of Iranian traditional medicine known as "Hakims" long times ago. Garlic test is an easy and noninvasive method without any serious side effect, with almost no costs for the patient and can be repeated several times during infertility treatment. It does not need any special skill or instrument and can be easily performed by the patient, with better acceptance by the patient compared to HSG.

According to our results, it seems that garlic test has low sensitivity so it cannot be a good test for screening. But, specificity and negative predictive value of this test is acceptable. It can be used as the first step in evaluating the internal female genital tract in women willing to postpone their motherhood or those trying to get pregnant. Besides, it can be used as the initial infertility assessment process in deciding for some treatment options especially in patients with contraindications to HSG and those who are not willing to undergo HSG or other diagnostic tests or procedures.

Besides informing about tubal patency, garlic test can give us indirect information about the uterine cavity. Thus, in patients with normal garlic test, we can postpone HSG, whereas patients with abnormal garlic test should be considered for quick assessment.

This study is a preliminary investigation of the results of garlic test. Obviously, a judgment on the absolute sensitivity and specificity of this test based on our findings is not possible due to the low number of samples and additional studies with more sample size are necessary. To compare the results of garlic test and HSG more precisely, it is necessary to match the timing of both methods in regard to the menstrual cycle more accurately and to reduce the time interval

between two methods. It is also supposed that the time between putting garlic in the vagina and feeling its smell can be useful in showing the severity of obstruction that should be considered in subsequent studies.

It also seems necessary to compare garlic test with the gold standard methods of evaluating the uterus and fallopian tubes i.e. hysteroscopy and laparoscopy to determine its practical performance in providing useful information about the internal female genital tract.

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5. CONFLICT OF INTERESTS

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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