

ASSOCIATION BETWEEN OBESITY AND TUBAL OCCLUSION USING HYSTEROSALPINGOGRAPHY AMONG WOMEN WITH SECONDARY INFERTILITY AT REHMAN MEDICAL INSTITUTE PESHAWAR

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Abstract

Objective: To determine association between obesity and tubal occlusion using HSG among secondary infertile women at Rehman Medical Institute Peshawar.

Methodology: A descriptive cross-sectional study conducted in the department of Radiology at Rehman Medical Institute, Peshawar. A total of 165 secondary infertile women were included after fulfillment inclusion and exclusion criteria. Patients related demographic and clinical information were collected on pre designed performa. Body mass index was determined by measuring weight and height of the patient. Tubal occlusion assessment was done through HSG. All the data were analyzed through SPSS version 25.

Results: A total 165 patients were assessed for tubal occlusion. Majority of the patients (65.4%) belongs to age group 18-30 years. The incidence of tubal occlusion was higher in obese women than normal. High frequency of tubal occlusion was seen among the couples having >10 years' duration of infertility. Bilateral fallopian tube blockage was the most common 34(58%) occlusion seen in the studied population. A significant association (p<0.000) has been observed between obesity and fallopian tube occlusion.

Conclusion: The incidence of tubal occlusion was higher in obese women than normal. High frequency of tubal occlusion was seen among the secondary infertile couples having >10 years' duration of infertility. Bilateral occlusion was the most common blockage seen in the studied population.

INTRODUCTION

Infertility is clinically described as the failure to conceive after 12 months of unprotected coitus¹. Most common causes of female infertility are fallopian tube obstruction, while endocrine diseases, delayed childbearing and ovulatory disorders associated with reduced ovarian reserve are additional causes. Additionally, 5-10% of afflicted women have chromosomal abnormalities, gene mutations, or polymorphisms². One of the most significant issues is infertility, which might vary based on socioeconomic level and geographic region. The first stages in maintaining the impact of pregnancy on lifestyle modification are knowledge and comprehension of infertility³. In Pakistan, sub-fertile women faced societal separation, in-law entrapment, external shame, and even divorce. Subfertility is a major, multifaceted global problem that is increasing in both high- and low-income countries. Pakistan has a higher subfertility rate (21.9%), comprising 18.4% secondary and 3.5% primary, despite being one of the world's most densely populated regions at the moment with a resident growth rate of roughly 2%. This suggests that this problem is predominantly associated with one in five married couples in the country⁴. Primary infertility was more common among infertile couples in Pakistan. Gynecological difficulties, irregular menstruation, hormonal abnormalities, polycystic ovarian syndrome, living status, weight gain history, family history of infertility and malnutrition were the main risk factors for female infertility, furthermore, caesarean sections, obesity, overweight, and age (>30 years) were more frequently linked to female infertility⁵. Secondary infertility is defined as the inability of couples to achieve pregnancy after 12 months of intercourse, following at least one previous pregnancy in their reproductive years. Among infertility cases, secondary infertility is more common than primary infertility⁶. Causes of secondary infertility are different depend upon on the life style and geographical variation among the population of the world. Probability of the

ovulatory failure or disorder is the most common reason followed by Poly cystic ovarian syndrome, age of the couple marriage, tubular blockage and infections of the reproductive are also major factors associated with secondary infertility in women⁷. Several studies highlighted risk factors of secondary infertility, of these, older age >35 years of marriage couple, obesity and poly cystic ovarian syndrome were crucial determinants of secondary infertility, furthermore endometriosis, fallopian occlusion, uterine fibroids and abortion related complications also increased the risk of secondary infertility⁸. Obesity is one of the modifiable risk factors associated with infertility among women of this region. The study highlight obesity is one of the patient life related factor contributing infertility and large number of female (54.7%) presented with obesity having infertility⁹. Tubal pathology contributes to as much as 35% cases of infertility. Among which 10-25% of the occlusion is observed in the proximal part of the tube in women suffering from infertility¹⁰. Various reports indicate that proximal blockage happen to occur more frequently than distal ones¹¹. In term of obesity is associated with infertility is define as the inability of a couple to conceive after a year of healthy sexual intercourse particularly in women aged <35 years. Different studies sign towards a higher prevalence of infertility in overweight women¹². In obese women instead of normal menstrual cycles having low pregnancy rates were observed¹³. The risk of infertility is understood to be three times higher in obese women as compared to normally weighted women and affecting the conception cycles both naturally and assisted¹⁴. Globally obesity rates between women of child bearing age are increasing¹⁵. Different studies sign towards a higher prevalence of infertility in overweight women, and also indicating a longer time to attain pregnancy and low pregnancy rates despite having normal menstrual cycles¹⁶. In Pakistan and particular in this region very sparse epidemiological and prevalence data available in term of obesity and its significant association with tubular

abnormalities. Some research highlights clinical significance of obesity and considered a determinant risk factor for female infertility, but no such specific data focused on fallopian tube occlusion and obesity. Therefore, the current study is designed with the aim to determine association between obesity and fallopian tubal occlusion among secondary infertile women of this region. These findings may help identify at risk women earlier and guide ways to improve their fertility. The significance of this study is to improve the lifestyle of women before pregnancy and adopt a healthy lifestyle, as it can improve their fertility health.

Material And Methods

Descriptive cross sectional study carried out in the department of Radiology at Rehman Medical Institute Peshawar. After obtaining ethical approval from Research ethical committee of Rehman Medical Institute, all the patients were selected after fulfilling inclusion and exclusion criteria. Females presented with secondary infertility referred to Radiology department for hysterosalpingography with age limit 18 to 50 years were included. Women with previous pelvic surgery, bleeding disorder and other pelvic inflammatory diseases were excluded. The sample size was calculated through open EPI calculator using prevalence (14.5%) of secondary infertility¹⁷. Demographic data of the patients and clinical history was collected on pre-designed data collection performa. Obesity of the patient was calculated using body mass index, a formula of weight in kilograms by dividing height in meters (kg/m^2). Hysterosalpingography (HSG) was performed by Radiology Technologist. During the procedure patient lie in supine position on the fluoroscopy machine couch and pre-medicated with IV pain killer. To see the cervical OS, the Cusco's speculum was introduced into vagina and advanced the foley catheter into the cervical canal. Urografin (20ml) was injected into the cavity of uterus and fallopian tubes. Anteroposterior and oblique images were taken after contrast injected,

visualizing spillage to check the patency of tubes. For the assessment, images were stored and the result interpretation was done by the consultant Radiologist. Statistical analysis of data was carried out using Statistical Package for Social Sciences (SPSS version.25). Chi-square test was carried out used to determine association between obesity and tubal occlusion using HSG among secondary infertile women and p-value <0.05 was considered significant.

Results

Demographic details and clinical data of the patients was shown in table 1. In the current study total 165 patients participated. Majority (65.4%) of the patients belongs to age group 18-30 years followed by 33.3% in age group 31-40 years and small number (10.3%) as seen in age group 41-50 years. Frequency of bearing one child was higher 114(69.1%) than couples having more than one (>1) child. Out of 165 secondary infertile women, the number of house wife as higher 132(80%) than worker women 33(20%). Only 59(36%) females have miscarriage history, while rest of the females 106(64%) having no miscarriage findings. Regular menstrual cycle was observed in 118(71.5%) and 47(28.5%) patient presented with irregular menstrual cycles. Out of 165 women, 108(65.5%) were obese (BMI, 25-29.9) and 57(34.5%) having normal BMI (18.5-22.9). Majority of the women 101(61.2%) having 05years duration of secondary infertility and >10 years duration of secondary infertility was seen in 14(8.5%) females. Of the 165 patients, 20 (12%) used oral contraceptives pills, while 145 (88%) did not. Fallopian tube occlusion was seen in 59(36%) patients and most of the patients 106(64%) were diagnosed with patent tubes finding (Figure 1). Out of total 59 patients, bilateral blockage was more common 34(58%) followed by Left (unilateral) blockage 19(32%) and Right (unilateral) blockage 6(10%). Table 3 shows the association between body mass index (BMI), menstrual cycle, contraceptive pill use, miscarriage history, occupation, and tubal occlusion among 165 infertile women. A

significant association was observed between high BMI and tubal occlusion ($p < 0.001$). Tubal occlusion was present in 55 of 108 obese women (51%) compared with only 4 of 57 women with normal BMI (7.0%), indicating that obesity was strongly associated with an increased prevalence of tubal occlusion. No significant association was found between menstrual cycle pattern and tubal occlusion ($p = 0.42$). Tubal occlusion was identified in 40 of 118 women (33.9%) with regular menstrual cycles and in 19 of 47 women (40.4%) with irregular cycles. Similarly, the use of contraceptive pills was not significantly associated with tubal occlusion ($p = 0.62$). Tubal occlusion was observed in 6 of 20 women (30.0%) who had used contraceptive pills compared with 53 of 145 women (36.6%) who had never used them. A statistically significant association was found between miscarriage history and tubal occlusion ($p = 0.018$). Tubal occlusion was detected in 14 of 59 women (24%) with a history of miscarriage and in 45 of 106 women (42.5%) without a history of miscarriage. Occupation was not significantly associated with tubal occlusion ($p = 0.935$). The prevalence of tubal occlusion was comparable between housewives (35.6%) and employed women (36.4%).

Discussion

Infertility remains a major public health concern worldwide, affecting millions of couples and necessitating accurate diagnostic approaches to identify its underlying causes and guide appropriate management. The present cross-sectional study investigated the prevalence of tubal occlusion and its associated risk factors among 165 women with secondary infertility. Unlike a previous retrospective study conducted in southern Pakistan¹⁸, which evaluated tubal occlusion among women undergoing infertility treatment irrespective of infertility type, the present study specifically focused on women with secondary infertility, thereby providing more targeted evidence regarding tubal pathology in this population. The majority of participants (65.4%) were aged 18–30 years, whereas only

10% were older than 40 years. This age distribution is consistent with previous reports demonstrating that most infertile women belong to the reproductive age group of 21–30 years¹⁹. However, our findings differ from those reported by another study in which the mean age was 33.98 ± 3.85 years (range, 24–40 years)¹. These differences may reflect variations in demographic characteristics, reproductive behavior, cultural practices, healthcare-seeking patterns, and geographical settings. Furthermore, the previous study included both primary and secondary infertility, whereas our study was restricted to women with secondary infertility. Secondary infertility is frequently associated with complications of previous pregnancies. Obstetric events such as unsafe abortions, postpartum infections, retained products of conception, manual removal of the placenta, and ruptured ectopic pregnancies may compromise fallopian tube integrity and subsequent fertility²⁰. In the present study, 59 women reported a previous miscarriage, and miscarriage history showed a significant association with tubal occlusion ($p = 0.018$). This finding is partially consistent with previous research reporting that 17.7% of infertile women had experienced a first-trimester miscarriage²¹. Pregnancy loss may predispose women to pelvic inflammatory changes or intrauterine infections that adversely affect tubal patency and increase the likelihood of secondary infertility. Tubal factor infertility remains one of the leading causes of female infertility worldwide. In the present study, obesity demonstrated a strong association with tubal occlusion ($p < 0.001$), with obese women exhibiting a substantially higher prevalence of tubal blockage than women with normal body mass index. Similar findings have been reported previously¹⁷, where abnormal tubal pathology was significantly associated with elevated BMI ($p = 0.035$). Obesity is recognized as an important modifiable risk factor that adversely affects female reproductive function through hormonal imbalance, chronic inflammation, oxidative stress, and impaired reproductive physiology. These mechanisms may

contribute directly or indirectly to tubal pathology and infertility. Duration of infertility was also associated with the likelihood of tubal occlusion. Women with infertility lasting more than 10 years showed the highest proportion of tubal occlusion, with 11 of 14 women (78.6%) demonstrating blocked fallopian tubes. These findings support previous studies reporting that prolonged infertility is associated with an increased prevalence of abnormal hysterosalpingography findings¹. Delayed clinical evaluation may therefore reduce the likelihood of successful fertility management. Hysterosalpingography (HSG) remains one of the most widely used first-line investigations for assessing tubal patency because of its relatively high diagnostic accuracy, reported sensitivity of approximately 80% and specificity of 76%²². Using HSG, the present study demonstrated that bilateral tubal occlusion was more common than unilateral occlusion, consistent with previous findings in which bilateral tubal blockage was also reported more frequently than unilateral disease¹. These findings further support the clinical utility of HSG in the evaluation of women presenting with secondary infertility. Obesity has been consistently associated with adverse reproductive outcomes, including infertility, ovulatory dysfunction, menstrual irregularities, poor pregnancy outcomes, and an increased risk of miscarriage²³. Previous studies have shown that obesity increases oxidative stress and impairs fertility even in women without anovulation²⁴. In the present study, obese women constituted the majority of participants and had a significantly higher prevalence of tubal occlusion than women with normal BMI. Similar observations have been reported previously, where overweight and obesity were identified as the most prevalent risk factors among women with secondary infertility. These findings reinforce the hypothesis that obesity contributes substantially to secondary infertility and may exacerbate tubal pathology through multiple biological mechanisms. The relationship between obesity and menstrual dysfunction has also been well established. Excess

adiposity may disrupt the hypothalamic-pituitary-ovarian axis, leading to hormonal imbalance, oligo-ovulation, anovulation, and menstrual irregularities²⁵. In the present study, 47 women reported irregular menstrual cycles. Although menstrual irregularity was not significantly associated with tubal occlusion, its relatively high frequency supports previous evidence suggesting that obesity-related endocrine disturbances adversely affect female reproductive health²⁶. Despite these important findings, several additional factors may contribute to secondary infertility but were not evaluated in the present study. These include socioeconomic status, pelvic inflammatory disease, sexually transmitted infections, uterine abnormalities, endometriosis, male-factor infertility, educational level, and increasing maternal age. Future multicenter prospective studies incorporating these variables are warranted to better understand the multifactorial nature of secondary infertility. Overall, the present study highlights obesity and previous miscarriage as significant factors associated with tubal occlusion among women with secondary infertility. These findings underscore the importance of early reproductive assessment, lifestyle modification, weight management, and timely investigation of women with previous adverse pregnancy outcomes. Public health interventions aimed at promoting healthy lifestyles, increasing awareness of reproductive health, and facilitating early infertility evaluation may help reduce the burden of secondary infertility, particularly in resource-limited settings such as Pakistan.

Conclusion

The incidence of tubal occlusion was higher in obese women than normal. A significant association ($p < 0.001$) has been observed between obesity and fallopian tube occlusion. High frequency of tubal occlusion was seen among the secondary infertile couples having >10 years' duration of infertility. Bilateral occlusion was the most common blockage seen in the studied population.

Conflict of Interest

All the authors declared no conflict of interest

Authors Contribution

OI contributed to the conception, design, acquisition, analysis and interpretation of results.

MH contributed to data collection, analysis of results and manuscript writing. MN contributed

in data collection and study designing. ZA contributed to data analysis and results interpretation. SR helped in manuscript writing, study design and data analysis. MI draft the manuscript, critical review and statistical analysis.

Table 1. Demographic and Clinical data of the Patients

DEMOGRAPHIC DATA	
Age Limits (Years)	Number (%)
18 - 30	93(65.4)
31 - 40	55(33.4)
41 - 50	17(10)
Number of Children of Patients	
1	114(69.1)
>1	51(30.9)
Occupational status of the patients	
House wife	132(80)
Worker	33(20)
CLINICAL DATA	
Miscarriage History	
YES	59(36)
NO	106(64)
History Menstrual Cycle	
Regular cycles	118(71.5)
Irregular cycles	47(28.5)
Obesity	
Normal [*]	57(34.5)
Obese ^{**}	108(65.5)
Duration of Secondary Infertility	
5 years	101(61.2)
10 years	50(30.3)
>10 years	14(8.5)
Use of Contraceptive Pills	
YES	20(12)
NO	145(88)

Normal^{*} (BMI): 18.5-22.9, Obese^{**} (BMI): 25-29.9

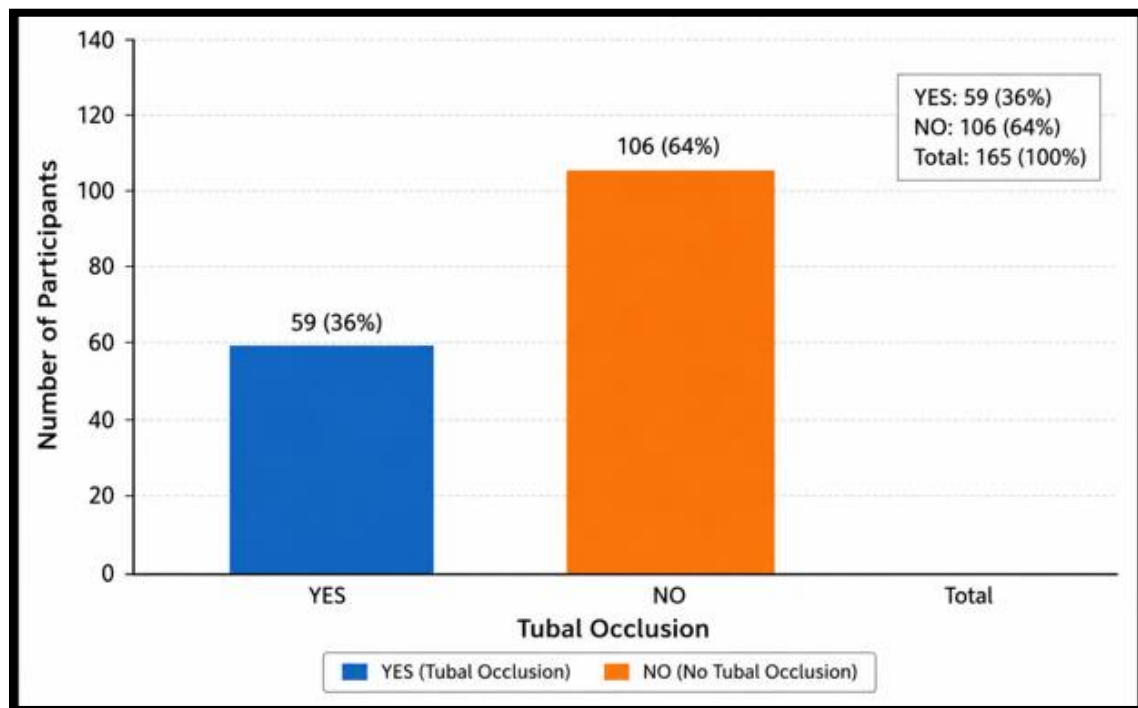


Figure 1. Overall Tubal occlusion status of the patients

Table 2. Types of Tubal Blockage

Types of Tubes Blockage	Number of Patients	Percentage
Right(unilateral) blockage	6	10
Left(unilateral) blockage	19	32
Bilateral blockage	34	58
Total	59	100

Table 3. Association of Body mass index, Menstrual cycle, Use of contraceptive pills and Miscarriage history with tubal occlusion

Parameters	Number of Patients	Tubal Occlusion		Tubal Occlusion		P-value
		YES		NO		
Body Mass Index (BMI)		N	%	N	%	
Normal	57	4	7	53	93	
Obese	108	55	51	53	49	0.000*
Menstrual Cycle						
Regular cycles	118	40	34	78	66	0.42

Irregular cycles	47	19	40.4	28	59.6	
Use of Contraceptive Pills						
YES	20	6	30	14	70	
NO	145	53	36.6	92	63.4	0.62
Miscarriage History						
YES	59	14	24	45	76	
NO	106	45	42.5	61	57.5	0.018*
Occupation of Patients						
House wife	132	47	35.6	85	64.4	0.935
Worker	33	12	36.4	21	63.6	

P-value <0.05 is considered statistically

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