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Pulmonary Tuberculosis and Type-II Diabetes as Risk Factors for Infertility: A Cross Sectional Study among Reproductive Age Women Attending in a Tertiary Care Hospital in Bangladesh

Research Article

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Introduction

Infertility is a burning issue in reproductive health. Scenario has changed since last couple of years among the Bangladeshi population. It is well recognized that the concept of family planning and its implementation is a successful project by the government of Bangladesh. In recent years we are observing the increases trends of the prevalence of infertility in our daily practice. Infertility is defined as the inability of a couple to achieve of pregnancy after 12 months of regular, unprotected intercourse. The infertility treatment imposes a substantial financial burden for the family and as well as for the society.

The current fertility rate for World in 2022 is 2.428 births per woman, a 0.41% decline from 2021. The World data for fertility rate in 2021 was 2.438 births per woman a 0.41% decline from 2020. Over the last 50 years the global fertility rate has halved. There are no reliable estimates for global prevalence of infertility till now. An estimated 15% of couples will have trouble in conceiving. (UCLA Health, 2020) Globally, 48.5 million couples experience infertility. (Reproductive Biological Endocrinology, 2015) About 9% of men and 10% of women aged 15 to 44 reported infertility problems in the United States. (CDC, 2013 and Office on Women's Health, 2019) [1].

The incidence of female infertility is rising, either primary or secondary infertility. Female infertility occurs in about 37% of all infertile couples. The rate has reported to be ranged from 0.6% to 3.4% for the primary infertility and 8.7% to 32.6% for the secondary infertility. The etiology of infertility is an important criterion for recognition and characterization of infertile women. The association between medical conditions like diabetes and female infertility has already been reported. Despite the type of treatment, diabetic women are at increased risk of infertility, delayed puberty and menarche, menstrual irregularities and possibly earlier menopause [2]. A Chinese study on 1895 women in reproductive age found that the occurrence of infertility was correlated with body mass index and some concurrent diseases [3-12].

Globally, Tuberculosis (TB) is among the top five killers of women aged 20-59 years [13]. Tuberculosis is a worldwide disease. The greater prevalence of the disease where the population is concentrated in areas, especially with poor sanitation and unfavorable social and economic conditions. Genital tuberculosis has also been suggested as one of the infertility causes [3]. One hundred fifty women with infertility and forty five women with general gynaecological problems were compared. Genital tuberculosis was diagnosed in 7.2% of infertilities women and 2.8% of general gynecological problems women [14]. Genital TB occurs mostly secondary to pulmonary tuberculosis commonly by the haematogenous route in a manner similar to spread to other extra pulmonary sites like urinary tract, bones and joints etc., [15]. The fallopian tubes are affected in almost 100% of cases followed by the endometrium in 50%, ovaries in 20%, cervix in 5% and vulva and vagina in 1% cases. There is still no massive scientific study on type-II DM and tuberculosis as the risk factors for infertility in Bangladesh or the South Asian Regions. Our aim is to find out the association of type-II diabetes and tuberculosis with infertility.

Research has revealed that around the world women who are childless suffers from an array of social, economic and emotional difficulties. The causes of this suffering are primarily related to their gender position in the society and their gender identity. The causes of infertility may different from person to person, sometimes it may vary because of ethnic, geographical, physical, and socioeconomic parameters.

BIRDEM hospital is the world's largest hospital in treating diabetes. It has been designated as a WHO Collaborating Centre on Diabetes, Endocrine and Metabolic Disorders as the only one of its kind in Asia. BIRDEM-2 hospital is dedicated for children and women health. Since it's inception, this hospital is providing treatment and care for infertile couple with reputation. The aim of this study is to find out the prevalence of type-II diabetes and tuberculosis as contributing factors for infertility in reproductive age group of women attending BIRDEM-2 hospital for treatment.

Methodology

A case control study were carried out to see clinical risk factor for infertility. The data has been collected from the infertile couple attending the outpatient department of the division of Reproductive Medicine & Infertility, department of OBGYN, BIRDEM General Hospital during January 2014 to January 2020 with a structured questionnaire. After enrollment, exclusion of patients were done if they are already diagnosed as type-II DM and or tuberculosis. Moderate to severe semen abnormalities and other male factor causes has been excluded from the study too. A total 981 women were enrolled for the study. Informed consent were taken. A set of questions were asked according to the questioner. All female patients were advised to take 75 gm of oral Glucose liquid solution after 8 to 14 hrs of overnight fasting. Two samples of blood were taken two hours apart for blood glucose monitoring. If the fasting level is more than 6 mmol/L and two hours after glucose intake is more than 7.8 mmol/L, patients were considered as diabetic. A plane X-ray chest P/A view show any signs of patchy opacity, ipsilateral hilar and medistinal lymphadenopathy and / or positive. Tuberculin test was done by injecting purified protein derivative fluid into the skin of lower part of arm. The induration was measured 48-72 hrs after the injection if the indurated area is 15 mm or more it was taken as positive.

Physical examination along with relevant investigations for routine infertility work up were also done during the analysis. The data screening, entry and analysis were be done by Statistical Package for the Social Sciences (SPSS) updated version. This analysis was compare different variables responsible for primary and secondary subfertility and also observe that is there any significant relationships between diabetes and tuberculosis with infertility. A chy square test was done and if the p value is < 0.05, considered as significant.

Results

A total of 1936 patients were enrolled during this period of time of the study initially. Around 957 patients excluded from the study. Among them 244 did not show up with blood lab workup reports due to either non-cooperation from husband or financial constraints (Table 1 & 2). Two hundreds and ten patients did not give consent for the study. Two hundred and one patients with some form of male factor infertility 212 already diagnosed as Diabetes and 90 patients already treated for tuberculosis were excluded from the study. Finally 981 enrolled for the study (Figure 1).

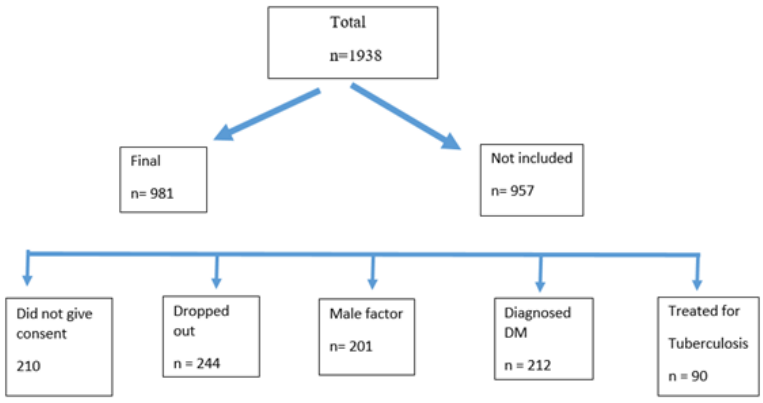

Figure 1: Enrolled for the study.

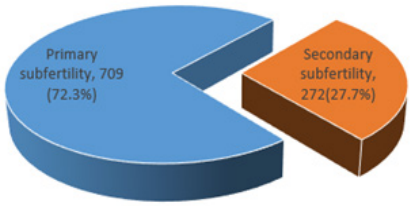

Figure 2: Among 981 patients 72.3% female were suffering from Primary subfertility and 27.7% with secondary subfertility.

Table 1: Showed negative correlation of fertility and diabetes. (p value < 0.05 was considered significant).

Variable	Category	Subfertility	Chi Square	P value
Diabetes	Yes	82 (8.4)		
	No	899 (91.6)	1.207	0.272

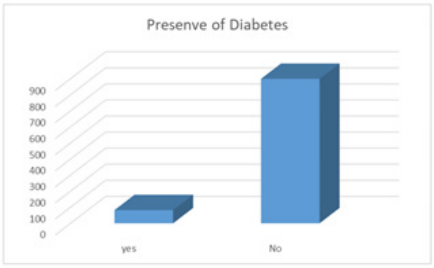

Figure 3: Showed first time diagnosed as diabetic while attending our center for in Infertility workup.

Table 2: Negative correlation of infertility and tuberculosis.

Variable	Category	Subfertility	Chi Square	P value
Tuberculosis	Yes	18 (1.8)		
	No	963 (98.2)	0.288	0.592

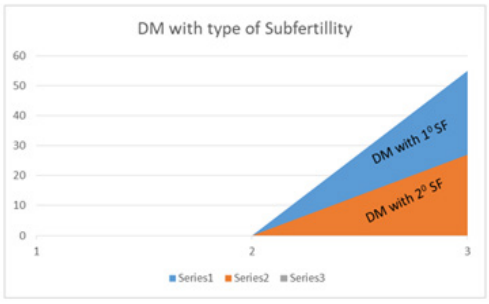

Figure 4: showed the correlation of type of subfertility and diabetes. It has been seen that 7.8% patient with primary subfertility has diagnosed as Diabetic while 9.9% with secondary subfertility has diabetic.

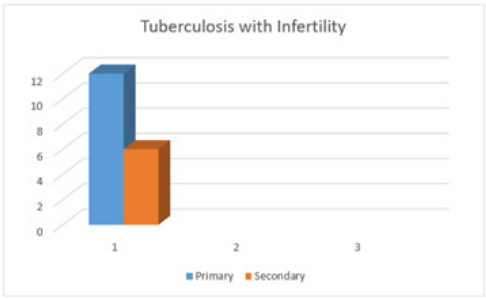

Figure 5: Tuberculosis with type of subfertility.

Age of the female partners were between 18-42 years amung them 637 (64.9%) has regular menstruation and 344 (35.1%) has some irregularaties in menstruatal cycle. While asking question if they have experienced pain during their mentrsual period 301 (30.7%) has dysmenorrhoea, 649 (66.2%) does not complain regarding pain during their menstruation and 31 (3.3%) answered they have experienced dysmenorrohoea sometimes not in every menstyrual cycle. Among 981 patients 72.3% female were suffering from Primary subfertility and 27.7% with secondary subfertility (Figure 2-5).

Discussion

Infertility is a multi-dimensional health issue. Tubal factor due to infection STD or tuberculosis, ovulatory defect due to hormonal imbalance and other medical condition like DM, poor ovarian reserve due to age related issue contributed to female infertility. Diabetes is a chronic disease and effect million people. The WHO estimate more than 180 Million people suffers from Diabetes around the world. This number is likely more than double by the end of 2030.

There is an association of the type-II diabetes and fertility. It causes changes in the length of menstrual cycle. Type-II diabetic patient may develop PCOS and that may lead to infertility [2]. Hyperinsulenaemia results from insulin resistance that may lead to alteration in the level of IGFBP, IGF1 and SHBG stimulates to increased androgen secretion at the adrenal gland of the ovary and then causes anovulation [4,7]. PCOS women are at higher risk of development Impaired glucose tolerance and Type-II D and insulin resistance. The presence of microvascular or cardiovascular complications also common among the diabetic population with low fertility [11]. Few studies have so far been conducted to see the association of Diabetes and fertility status [12]. Till now, no study has been done among Bangladeshi population to see the association of Diabetes and Infertility. The decrease standard fertility ratio was found in patient those who has uncontrolled DM. Strict control of DM and changes of life style may cause changes in pattern of standard fertility ratio [9]. We found type-II Diabetes did not show increase risk for Subfertility and that matched with the findings of Swedish group. There has been a potential relationship of type-I DM and female fertility status. Most of the DM patient developed hypothyroidism that attributes negative impact in fertility status [8].

However due to Diabetes there could be sexual dysfunction due to impaired sexual arousal and inadequate lubrication, that could be reason for subfertility for this group of patients [4,5,10]. Extra Pulmonary TB among female populations may contribute to development of major factor for infertility cases due to tubal involvement of pelvic tuberculosis. Early diagnosis and recent modalities of treatment of pulmonary tuberculosis can reduce the risk of development of extra pulmonary TB and hence the fertility outcomes. Infertile women suffers from anxiety, depression and sexual dysfunction. Many of the risk factor for infertility like diabetes can be preventable. Life style modification, changes in dietary habits can be helpful in some extend to prevent developing chronic diseases like type-II DM. Women with family history of diabetes has an extra risk for developing type-II DM and premature ovarian insufficiency leading to infertility. More research should be done to correlate the type -I diabetes and fertility status.

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