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Orignal Article

Incidence of Infertility in Females and Evaluation of its Causes Using Ultrasonography

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ABSTRACT

Infertility is a condition in which a woman is not able to conceive following 12 months of regular and unprotected intercourse. It is a major health issue that affects 186 million people worldwide. **Objective:** To determine the incidence and causes of infertility in females using ultrasound. **Methods**: It is a cross-sectional study conducted in a private diagnostic Centre in Gujrat, Pakistan, over a period of 4 months. A sample size of 75 was calculated using a convenient approach after informed consent. Patients subjected to ultrasonography were married, diagnosed infertile women between 20-45 years. Patients with hysterectomy or congenital ovarian abnormalities were excluded. Collected data was analyzed using SPSS version 20. **Results:** The study showed that the incidence of infertility is higher in 20-25 age group and least in 41-45 age group. The majority of females 51(68%) had primary infertility while 24(32%) had secondary infertility. The majority of infertile women were from a moderate socioeconomic background. The common cause of infertility was due to submucosal fibroid 25(33.3%), hormonal imbalance in 16(21.3%) and PCOS in 14(18.17%). **Conclusions:** The study concluded that the incidence of infertility is highest in 20-25 age groups. Submucosal fibroid, hormonal imbalance, and PCOS are the most common causes of infertility in females.

INTRODUCTION

Infertility is a condition in which a woman is unable to conceive following 12 months of regular and unprotected intercourse [1-3]. There are two types of infertility, primary and secondary [4]. Primary infertility is the failure to conceive within two years of unprotected intercourse, whereas Secondary infertility is referred as the inability to conceive after a prior pregnancy [5]. Secondary infertility is associated with reproductive tract infections [3]. The causes of female infertility are difficult to diagnose sometimes [6]. Infertility is a major health issue that affects people all around the world [7]. Worldwide 186 million people suffer from infertility [3,8-10]. Infertility is a medical condition that can affect a patient's emotional, physical, mental, spiritual, and medical well-being [11]. Infertility affects around one-third of women. The risk of infertility increases with age. It affects an estimated of 8 to 12 percent of couples worldwide [12]. However, males contribute to 20-30% of infertility cases[13]. The incidence of infertility in Pakistan is 22%, with primary infertility accounting for 18% and secondary infertility accounting for 4% [14]. Studies have found that the death risk in infertile women has increased to 10% [15]. Female infertility is difficult to diagnose sometimes and radiographic imaging plays an important role in assessing infertility [16,17]. Modalities such as hysterosalpingography, hysterographic, pelvic ultrasonography (US), and magnetic resonance imaging (MRI) are widely used [18]. However, ultrasound is the gold standard modality for assessing anatomical abnormalities as well as possible causes of female infertility because of its real-time efficiency and low cost

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[6,19]. The common causes of the Infertility in women are as follows:

Fallopian Tubes Abnormalities: Female infertility is most commonly caused by fallopian tube abnormalities [20], which contribute to 30–40% of cases. Blocked and damaged fallopian tubes commonly cause infertility [21]. Other abnormalities include hydrosalpynix, PID (pelvic inflammatory disease), tubal torsion, para-tubal cyst, etc.

Ovarian disorder: Ovarian abnormalities include polycystic ovaries (PCOS), androgenic disorder, premature ovarian failure, poor egg quality, hyperprolactinemia and thyroid disorder, etc. The hormonal imbalance is the leading cause of infertility. Changes in hormone levels make conception and pregnancy more challenging [22].

Uterine abnormalities: Uterine abnormalities include submucosal fibroids (accounting for 30 to 40 %) of women. They are benign and non-cancerous tumors of the muscular wall of the uterus. Endometriosis, endometrial polyps, adenomyosis, intrauterine adhesions, and Mullerian duct anomalies also constitute uterine abnormalities. Cervical factors include cervical stenosis and cervicitis [23,24]. The other conditions causing infertility can be some surgical conditions which can lead to scarring or damage to the fallopian tubes and cervix. Chronic conditions such as AIDS and cancer can also affect fertility. Age-related infertility can affect many women over the age of 35 as their ovarian reserve decreases. The study highlighted the significance of ultrasonography in diagnosing causes of female infertility (including cervix, ovary, fallopian tube, and uterine abnormalities). Ultrasound is the most preferable modality as it is non-invasive, highly sensitive, and cheap. Moreover, this study was conducted to determine the incidence and causes of infertility in females using ultrasound.

METHODS

It is a cross-sectional study conducted in a private diagnostic Centre in Gujrat, Pakistan, over a period of 4 months. A sample size of 75 was calculated using a convenient sampling approach by using the mean from previous related studies [6,25,26]. All the patients were recruited for this study after signing the informed consent form. Patients were subjected to ultrasonography using Toshiba and GE healthcare machines with a 2-5MHz convex transducer. A supine position was adopted for the scan and gel was applied to the area of interest. All the married infertile women aged 20–45 years who were diagnosed with primary and secondary infertility were included. Patients with hysterectomy or congenital ovarian abnormalities were excluded. Collected data was analyzed through SPSS version 20.

RESULTS

The study highlighted the significance of ultrasonography in diagnosing causes of female infertility (including cervical, ovarian, fallopian tube, and uterine abnormalities). In the current study, 75 infertile females were studied. Table 1 shows the age distribution among infertile females. The patients were divided into five age groups. The incidence of infertility is higher in the 20–25 years age group and least in the 41–45 years age group.

Age (years)		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20-25	21	28.0	28.0	28.0
	26-30	19	25.3	25.3	53.3
	31-35	20	26.7	26.7	80.0
	36-40	12	16.0	16.0	96.0
	41-45	3	4.0	4.0	100.0
	Total	75	100.0	100.0	

Table 1: Age Distribution of Infertile Females

Table 2 shows that the incidence of primary infertility is higher than secondary. Out of 75 patients, 51 (68%) had primary infertility, whereas 24 (32%) had secondary infertility. In table 3, the socioeconomic status is categorized as high, middle, and low. According to this study, the majority of infertile women aged 40 (53.33%) have a moderate socioeconomic background. Table 4 shows the causes of infertility. There were 25 (33.3%) females with submucosal fibroid, 16 (21.3%) with hormonal imbalance, and 14 (18.17%) with PCOS.

Classification of infertility		Frequency	Percent	Valid percent	Cumulative Percent
Valid	Primary	51	68.0	68.0	68.0
	Secondary	24	32.0	32.0	100.0
	Total	75	100.0	100.0	

Table 2: Types of Infertility

Socioeconomic status		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High	27	36.0	36.0	36.0
	Middle	40	53.3	53.3	89.3
	Low	8	10.7	10.7	100.0
	Total	75	100.0	100.0	

Table 3: Distribution of Socioeconomic Status among Infertile Females

Ultrasound Findings		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Sub mucosal Fibroid	25	33.3	33.3	33.3
	Hormonal Imbalance	16	21.3	21.3	54.7
	Polycystic Ovaries (PCOS)	14	18.7	18.7	73.3
	Pelvic Inflammatory Diseases (PID)	10	13.3	13.3	86.7
	Adenomyosis	3	4.0	4.0	90.7
	Endometriosis	1	1.3	1.3	92.0
	Uterine hypoplasia (Congenital)	4	5.3	5.3	97.3
	Endometrial Polyp	2	2.7	2.7	100.0
	Total	75	100.0	100.0	

Table 4: Ultrasound Findings of Infertility in Women

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DISCUSSION

Infertility is a serious health issue that affects millions of individuals. Ultrasound is the most preferable modality as it is minimally invasive, highly sensitive, and cheap. The purpose of the current study was to discuss the incidence of infertility in females and to evaluate its common findings on ultrasonography. A total of 75 patients were enrolled in the current study. Regarding age, 28% were 20–25 years old, 25.3% were 26–30 years old, 26.7% were 31–35 years old, 16.0% were 36–40 years old, and 4% were 41–45 years old. Regarding socioeconomic status, 36% were high, 53.33% were moderate, and 10.67% were low. The occurrence of primary infertility is higher in the 20–25 years age group, whereas the incidence of secondary infertility is higher in the 36–40 years age group. Infertility in females is commonly caused by sub-mucosal fibroid (PCOS, hormonal imbalance, and submucosal fibroid). The current study showed that according to socioeconomic status, 36% were high, 53.33% were moderate, and 10.67% were low while similar studies findings were found in another study that reported socioeconomic status as 39.2% in high, 50.4% in moderate and 10.4% as low socioeconomic status [27]. This study showed that the occurrence of primary infertility is greater than secondary. The prevalence of primary infertility in women accounted for 51 (68%), whereas secondary infertility accounted for 24 (32%). These observations are also supported by a study who stated that 69% of respondents reported primary infertility, while 31% had secondary infertility [27]. The incidence correlated the incidence of female infertility with age and risk factors. He found that the prevalence of infertility is higher in the age group of 15-20. He also concluded that PCOS (76%), menstrual disorders (51.2%), and fundal fibroids (16.8%) are the common causes of infertility in females which have similar outcomes as in the current situation. This study concluded that according to the causes of infertility, 33.3% were caused by sub-mucosal fibroid, 21.3% by hormonal imbalance, 18.17% by PCOS, 13.3% by PID, 4% by adenomyosis, 1.3% by endometriosis, 5.3% by uterine hypoplasia, and 2.7% by endometrial polyps. The causes were easily diagnosed by ultrasound. A similar study was conducted by Maysa S. Elkerdawy in 2020, who discussed the role of ultrasound in the evaluation of causes of infertility in females [6]. It was concluded that uterine abnormalities constitute about 60% of ovarian abnormalities (23.3%), and cervical abnormalities (3.3%), while tubal abnormalities constitute 13.3% of infertility in females and constitute the same findings and literature.

CONCLUSIONS

The study concluded that ultrasound is a reliable diagnostic technique for diagnosing abnormalities in females associated with infertility. The incidence of primary infertility is higher than that of secondary infertility. The problems in the uterus, ovaries and fallopian tubes are responsible for infertility in females. However, infertility was commonly caused by submucosal fibroids, hormonal imbalance, and PCOS.

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