



**ASSESSMENT OF PREVALENCE AND RISK FACTORS OF INFERTILITY
AMONG SAUDI WOMEN: A CROSS SECTIONAL STUDY**

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ABSTRACT

Infertility is a global problem affecting women worldwide. Identifying factors influencing female infertility can help women get successful pregnancies and prevent secondary infertility. The aim of the current study to identify types and assess risk factors of infertility among Saudi women in Riyadh city. A descriptive cross sectional correlational study design was utilized. The researcher developed a questionnaire that comprised of four parts: demographic data, obstetric and gynecological history, medical history, and family history. The data was collected from the patient's medical records using the hospital's BEST care system. The mean age of women was 34.03± 1.37 years old and half of them 50.4% had a BMI was classified as overweight. Two-third of the women 67.0% had secondary infertility, while one-third 33.0% had primary infertility. Implicated causes among subjects include defect in ovulation was 28.9%, tubal adhesion or obstruction was 7.4%, and male factors was 12.6%. There was a statistically significant relationship between types of infertility with age and marital duration, contraceptive methods, duration of contraception used, causes of infertility and types of drugs for induction of ovulation. Maternal factors as defects in ovulation, tubal adhesion or obstruction, uterine fibroid, pelvic inflammation disease, endometriosis and urinary tract infection and male factors were expressed to be causing infertility. There were risk factors associated with infertility, such as mother age, medical problems, and the types of drugs used to induce ovulation.

Keywords: infertility; risk factors; saudi women

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INTRODUCTION

Infertility is "A reproductive system disease defined by the failure to achieve clinical pregnancy after 12 months or more of regular unprotected sexual intercourse, but advanced maternal age 35 years old or more 6 months unprotected sexual intercourse with unsuccessful effort consider as infertile women" (WHO, 2020). The primary infertility is defined as there is no history of pregnancy, while secondary infertility is the failure to conceive with a history of pregnancy within one year, with either unclear, or a mixture of male and female causes. At the same time, the inability to bear offspring without any medication during normal marital life after 12 months of unprotected intercourse is very common among women over 35 years of age. (American College of Obstetricians and Gynecologists, 2017).

Alamri et al, (2019) reported that the main cause of infertility in Northern Saudi Arabia was defect in ovulation in 24.6%, followed by a polycystic ovary in 21.8%, tubal adhesions or obstruction in 6.7%, endometriosis in 3.2% , and uterine fibroid in 3.0%. There are multiple

causes, such as endometriosis, fibroid, polycystic ovary syndrome, and reproductive tract infection, leading to infertility. Furthermore, Causes of infertility can involve either or both spouses, or no reason can be identified. At the same time, the causes of female infertility include: ovulation disorders involving the release of ovarian eggs. That include Hormone abnormalities such as the disease of polycystic ovaries. Hyperprolactinemia, can affect ovulation. The menstrual cycle may be impaired or infertility can be triggered either by hyper or hypothyroidism effect, such root factors may include tumors. Uterine or vaginal anomalies, uterine polyps. Noncancerous benign tumors in the uterine wall uterine fibroids can cause infertility by blocking the fallopian tubes or by preventing the implantation of a fertilized egg into the uterus, (American College of Obstetricians & Gynecologists, 2017).

The main risk factors for both male and female infertility include: Age. Women's fertility declines steadily with age, Infertility is possibly due to the smaller number and quantity of eggs in older women, and may also be due to health issues impacting fertility. Men over the age of 40 are less fertile than younger men (Sparks, 2019) Usage of nicotine, cigarettes or marijuana, reducing the rate of pregnancy. Smoking also lowers the future success of fertility medication, miscarriages are more frequent (Moridi,et al,2019). Jaroudi et al, (2019) reported that the most common causes of male and female infertility in North America were varicocele 49.4% and ovulation disorders 57.5% respectively. The risk of erectile dysfunction and a low sperm count in men can be increased by smoking. The Use of Alcohol may lead to infertility. Heavy alcohol consumption can limit sperm count and motility for males, Inactive Lifestyle and Overweight increase infertility rate.

METHOD

This study was conducted using a descriptive cross sectional correlational study design which utilized to conduct through medical records of the patient and best care. A 270 infertile women's who were attended the GYN 101 clinic and IVF clinic at King Abdul-Aziz Medical City was the target sample of the study based on the Inclusion and Exclusion Criteria. The inclusion criteria: all infertile woman were included, Primary and secondary infertility, Reproductive age (18-45) year old. Data collection tools was developed after an extensive review of literature, using variety of tools as questionnaire. The designed questionnaire comprised of four parts: First part included Demographic data such as age, marital duration, education, Occupation type, infertility type ,smoking, BMI etc. The second part consisted of medical history such as: medical diseases, autoimmune disease, hematological disorder, genetic causes, chromosomal disorder, endocrine disorder, thyroid gland disorder, mental disorder, cancer, structural anomalies any chemotherapy or x-ray exposure, etc. Third part consisted of family history of hereditary medical diseases, genetic disorder, difficulty to get pregnant, PCOs, fibroid, early menopause, and chronic diseases. Forth part included Obstetric and gynecological history such as menarche and the frequency and duration of the menstrual cycle, menstrual regularity, fertility causes ,present of previous abortions with gestational age of last abortion , number of living children if term or preterm, postpartum complication, ectopic pregnancy with any complications, hormonal essay , contraceptive methods types and duration, types of diagnostic procedures done, etc. Types of management provided . The Content validity of the questionnaire were assessed by 3 PhD faculty members who are expert in the field of maternity nursing, they reviewed the tool, and the modifications were carried out according to their feedback. The questionnaire applied on 20 women as a pilot study to check validity, clarity, feasibility and applicability of the questionnaire, those subjects were excluding from the study. The result from the pilot study was used to rephrase the questionnaire form.

Data were collected over a two-month period, beginning in June 2021 and ending in July 2021. The researcher contacted nursing and medical managers at King Fahad Hospital's GYN 101 clinic and IVF clinic. The study's goal and advantages were discussed to the GYN word and clinic manager. Data were acquired from medical record files using the hospital's BEST care system for each participant who matched the inclusion criteria and filled out the questionnaire completely. Data were coded for entry and analysis using SPSS statistical software package version 22. Data was presented using descriptive statistics in the form of frequencies and percentages. Interval and ratio variables were presented in the form of means and standard deviations. Association between the variables, relevant statistical tests was used according to the types of the variables. P-value less than 0.05 were considered statistically. Final Ethical Approval of the Institutional Review Board Committee (IRB) at King Abdullah International Medical Research Centre (KAIMRC) was obtained. The hospital protocol and research ethics followed strictly by researcher while conducting the study, all data taken from the patients' medical records considered highly confidential and no part of the study will be showing the identity of patients or their families. Data was entered in secured computer with strong password and research team only have access to this information.

RESULTS

Table 1.
Frequency distribution of Socio-demographic Data of sample (n=270)

Variable & choices	f	%
Age		
From 18 to 25 Years	17	6.3
From 26 to 35 Years	142	52.6
From 36 to 45 Years	111	41.1
Mean $\pm$ SD 34.03 $\pm$ 1.37		
Marital Duration		
From 1 to 5 years	81	30.0
From 6 to 10 years	83	30.7
From 11 to 15 years	55	20.4
Above 16 years	51	18.9
BMI		
Underweight	7	2.6
Normal	118	43.7
Overweight	136	50.4
Obese	9	3.3
Mean $\pm$ SD 28.649 $\pm$ 6.570		
Educational level		
Primary	5	1.9
Secondary	71	26.3
University	194	71.9
Residency		
Urban	233	86.3
Rural	37	13.7
Occupation		
Government employee	92	34.1
Private employee	37	13.7
Non-working	141	52.2
Smoking		
Yes	9	3.3
No	261	96.7

Table 1 showed the distribution of socio-demographic characteristics of participants Fifty - two percent of the sample their age range was 26 - 35 Years, while only 6.3% their age range was 18- 25 Years, with a mean age of 34.03 $\pm$ 1.37 years old. Moreover ,30.7 % of the

sample Marital Duration range was from 6 -10 years. While, 18.9% were above 16 years, also, 43.7% of the sample their BMI was normal, while only 2.6% were underweight, with a mean BMI of 28.6. However 71.9% of the sample received a university education, while only 1.9% received primary education. In addition, 86.3% of the sample resides in urban areas. Moreover, 52.2% of the sample were not working, while 13.7% were working in Private sectors. Moreover 3.3% of the sample were smoking.

Table 2.
Frequency distribution of Previous Medical History (n=270)

Variable & choices	f	%
Medical problems		
Yes	63	23.3
No	207	76.7
Types of medical problems: n= 63		
Autoimmune disease (rheumatoid arthritis, sick cell anemia)	12	19.05
Hematological disorder (HTN, preeclampsia)	4	6.35
Chromosomal disorder	1	1.59
Endocrine disorder (diabetes, adrenal)	18	28.57
Hypothyroidism	44	69.9
Hyperthyroidism	7	11.11
Cancer	5	7.94
Structural anomalies	2	3.17
Hyperprolactinemia	7	11.11
Ulcerative colitis	3	4.76
other (depression)	11	17.46
Expose to Xray or chemotherapy		
Yes	11	4.1
Rh incompatibility		
Yes	36	13.3
Previous Family History		
Hereditary medical disease	46	17.0
Genetic disorder	10	3.7
Difficulty in getting pregnant	66	24.4
PCOS & fibroid	45	16.7
Early menopause	22	8.1
Chronic diseases	176	65.2

Table 2 showed the distribution of medical history among the Sample. Noted 23.3% of the sample complained of medical problems, (28.57%) from them suffered from Endocrine disorder (diabetes, adrenal), while 19.05% from them are suffered from autoimmune disease. While 17.46% from them suffered from depression. In addition, (4.1%) of the sample Exposed to X-ray or chemotherapy. Finally (13.3%) of the sample have RH incompatibility. In the other part of the table showed the frequency distribution of the family history of the Sample. Noted (17.0%) of the sample suffered from Hereditary medical disease. While 3.7% of the sample suffered from Genetic disorders. Moreover, (24.4%) of the sample their family suffered from Difficulty getting pregnant. While (16.7%) of the sample their family suffer from PCOS & fibroid. In addition, (8.1%) suffered from early menopause. Finally, (65.2%) of the sample suffered from Chronic diseases. The figure II showed 67.0% of the sample suffered from secondary Infertility, while only 33.0% were primary infertility.

Figure I: Distribution of infertility types according to the sample

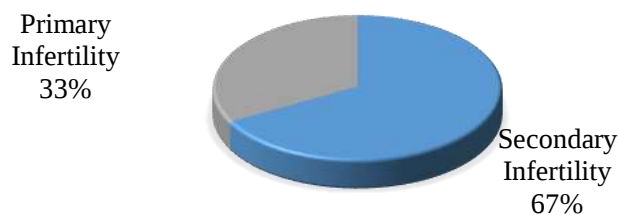


Table 3.

The relationship between types of infertility among Saudi women and sociodemographic

Demographic characteristics		Infertility Types				Test	P Value
		Primary (89)		Secondary (181)			
		f	%	f	%		
Maternal age	From 18 to 25 Years	14	15.7	3	1.7	23.491	0.000
	From 26 to 35 Years	49	55.1	93	51.4		
	From 36 to 45 Years	26	29.2	85	47.0		
	Mean ± SD 34.03 ± 1.37						
Marital Duration	From 1 to 5 years	38	42.7	43	23.8	28.434	0.000
	From 6 to 10 years	36	40.4	47	26.0		
	From 11 to 15 years	9	10.1	46	25.4		
	Above 16 years	6	6.7	45	24.9		
BMI	Underweight	4	4.5	3	1.7	4.433	0.218
	Normal	42	47.2	76	42.0		
	Overweight	42	47.2	94	51.9		
	Obese	1	1.1	8	4.4		
Mean ± SD 28.649 ± 6.570							
Educational level	Primary	1	1.1%	4	2.2%	0.403	0.818
	Secondary	24	27.0%	47	26.0%		
	University	64	71.9%	130	71.8%		
Residency	Urban	78	87.6%	155	85.6%	0.203	0.652
	Rural	11	12.4%	26	14.4%		
Occupation	Government employee	25	28.1%	67	37.0%	2.191	0.334
	Private employee	14	15.7%	23	12.7%		
	Non-working	50	56.2%	91	50.3%		
Smoking	Yes	5	5.6%	4	2.2%	2.151	0.143
	No	84	94.4%	177	97.8%		

Table 3 showed the relationship between types of infertility among Saudi women and socio-demographic characteristics. There was a statistically significant difference between types of infertility categories and only 2 items of demographic characteristics: Maternal age ($p=0.00$), Marital Duration ($p=0.00$). However, there was no statistically significant between types of

infertility among Saudi women and other socio-demographic.

Table 4.

The relationship between types of infertility among Saudi women and Medical History

Medical History			Infertility Type				Test	Pvalue
			Primary (89)		Secondary (181)			
			f	%	f	%		
Medical problems (n=63)	Autoimmune disease (rheumatoid arthritis, sick cell anemia)	9	10.1	3	1.7	28.691	0.001	
	Hematological disorder (HTN, preeclampsia)	0	0.0	4	2.2			
	Chromosomal disorder	0	0.0	1	0.6			
	Diabetes mellitus	2	2.2	16	8.8			
	Hypothyroidism	12	13.5	32	17.7			
	Hyperthyroidism	1	1.1	6	3.3			
	Cancer	2	2.2	3	1.7			
	Structural anomalies	0	0.0	2	1.1			
	Hyperprolactinemia	5	5.6	2	1.1			
	Ulcerative colitis	2	2.2	1	0.6			
	other (depression)	0	0.0	11	6.1			
Expose to Xray chemotherapy	Yes	4	4.5	7	3.9	0.060	0.806	
	No	85	95.5	174	96.1			
Rh incompatibility	Yes	10	11.2	26	14.4	0.505	0.477	
	No	79	88.8	155	85.6			

Table 4 showed the relationship between types of infertility among Saudi women and Medical History. There was a statistically significant difference between types of infertility and medical history: medical problems (p=0.001). However, there was no statistically significant relationship between types of infertility among Saudi women and Rh incompatibility.

Table 5.

The relationship between types of infertility among Saudi women and Family History

Family History (n=270)			Infertility Type				Test	Pvalue
			Primary (89)		Secondary (181)			
			f	%	f	%		
Hereditary disease	medical	Yes	16	18.0	30	16.6	0.083	0.773
		No	73	82.0	151	83.4		
Genetic disorder		Yes	2	2.2	8	4.4	0.790	0.374
		No	87	97.8	173	95.6		
Difficuly in getting pregnant		Yes	22	24.7	44	24.3	0.005	0.941
		No	67	75.3	137	75.7		
PCOS & fibroid		Yes	15	16.9	30	16.6	0.003	0.954
		No	74	83.1	151	83.4		
Early menopause		Yes	4	4.5	18	9.9	2.368	0.124
		No	85	95.5	163	90.1		
Chronic diseases		Yes	60	67.4	116	64.1	0.291	0.590
		No	29	32.6	65	35.9		

Table 5 showed the relationship between types of infertility among Saudi women and family history. There was no statistically significant relationship between types of infertility among Saudi women and all family history.

Table 8.

The relationship between types of infertility among Saudi women and obstetrical variables

gynecological variables			Infertility Type				Test	P value
			Primary (89)		Secondary (181)			
			f	%	f	%		
Age of menarche	13 and less	68	76.4	127	70.2%	1.158	0.282	
	14 and above	21	23.6	54	29.8%			
	Mean ± SD	12.65 ± 1.46						
Menstrual cycle regularity	Regular	80	58.4	166	66.3%	1.600	0.449	
	Irregular	9	10.1	15	8.3%			
Types of contraceptive	Hormonal	11	12.4	79	43.6%	45.180	0.000	
	Non-hormonal	3	3.4	15	8.3%			
Duration of contraception used (n=127)	Local	2	2.2	17	9.4%	45.016	0.000	
	Less than 3 years	7	7.9	51	28.2			
	more than 3 years	9	10.1	60	33.1			
Causes of infertility	Defect in ovulation (PCO)	32	36.0	46	25.4	16.022	0.025	
	Tubal adhesions or obstruction	7	7.9	13	7.2			
	Endometriosis	0	0.0	4	2.2			
	Uterine fibroid	4	4.5	9	5.0			
	Pelvic inflammatory diseases(PID)	1	1.1	4	2.2			
	Urinary tract infection (UTI)	0	0.0	1	0.6			
	Male factor	18	20.2	16	8.8			
	Unexplained	27	30.3	88	48.6			
Type of diagnostic procedure	all diagnostic procedure	47	52.8	61	33.7	11.229	0.082	
	Laparoscopy	0	0.0	3	1.7			
	Cervical smear	5	5.6	10	5.5			
	Hysterosalpingography	2	2.2	5	2.8			
	Hysteroscopy	3	3.4	9	5.0			
	Hormonal assay	24	27.0	61	33.7			
Type of hormonal Essay	Follicle Stimulating Hormone (FSH) & Luteinizing Hormone (LH)	5	5.6	21	11.6	13.217	0.021	
	Estradiol hormone (E2)	2	2.2	6	3.3			
	Anti-Molecular Hormone (AMH)	0	0.0	3	1.7			
	Prolactin hormone	3	3.4	20	11.0			
	All hormonal essay types	68	76.4	100	55.2			

Table 5 showed the relationship between types of infertility among Saudi women and obstetrical variables. There was statistically significant relationship between types of infertility categories and Contraceptive methods ($p=0.00$), Duration of contraception used ($p=0.00$) and causes of infertility ($p=0.025$). However, there was no statistically significant relationship between types of infertility among Saudi women and other obstetrical variables.

Table 6.
The relationship between types of infertility among Saudi women and Types of management provided

Types of management provided		Infertility Type				Test	Pvalue
		Primary (89)		Secondary (181)			
		f	%	f	%		
Drugs for induction of ovulation							
Types of induction drugs (n=140)	Clomid	25	28.1	31	17.1	16.004	0.025
	Ovulation stimulation inj	11	12.4	11	6.1		
	Cabergoline	1	1.1	1	0.6		
	Cetrotide	9	10.1	11	6.1		
	Estradiol	1	1.1	10	5.5		
	Gonal	10	11.2	16	8.8		
	Merional	1	1.1	2	1.1		
Duration	less than 6 months	33	37.1	47	26.0	9.433	0.009
	More than 6 months	25	28.1	35	19.3		
Induction of ovulation Complications	No complications	48	53.9	73	40.3	11.198	0.011
	Ovulation disorder	6	6.7	4	2.2		
	Increase in weight	4	4.5	5	2.8		
Herbal remedies							
Types of herbal remedies (n=37)	marjoram	7	7.9	9	5.0	4.109	0.534
	Honey	4	4.5	4	2.2		
	sagebrush	1	1.1	3	1.7		
	Saussurea costus	0	0.0	2	1.1		
	other herbs	1	1.1	6	3.3		
Duration	less than 6 months	11	12.4	17	9.4	0.989	0.610
	More than 6 months	2	2.2	7	3.9		
IVF in vitro fertilization							
Number of IVF times (n=93)	1-3	29	32.6	47	26.0	1.311	0.519
	4-7	5	5.6	12	6.6		
Pregnancy test (HCG) positive	Yes	5	5.6	18	9.9	3.867	0.145
	No	29	32.6	41	22.7		
IUI intrauterine insemination							
Number IUI of times (n=34)	1-3	14	15.7	18	9.9	2.224	0.329
	4-7	1	1.1	1	0.6		
Pregnancy test (HCG) positive	Yes	2	2.2	1	0.6	2.947	0.229
	No	13	14.6	18	9.9		
Treatment for Husband							
Types of huspand treatment (n=24)	Clomid	1	1.1	1	0.6	5.377	0.068
	vitamins &	12	13.5	10	5.5		
	Steroids						
Duration	less than 6 months	6	6.7	4	2.2	5.623	0.060
	More than 6 months	7	7.9	7	3.9		

Table 6 showed the relationship between types of infertility among Saudi women and the measures of management. There was a statistically significant relationship between types of infertility categories and only 10 items of management were provided: drugs for induction of ovulation (p=0.025), Duration of Drugs for induction of ovulation (p=0.009), complication of drugs for induction of ovulation (0.011). However, there was no statistically significant

relationship between types of infertility among Saudi women and other management provided.

DISCUSSION

A woman's fertility plays a significant role on her psychological feeling of completeness, (Thable et al., 2020). Female infertility is caused by multiple factors such as ovulation disorders, polycystic ovary syndrome, dysfunctional pituitary gland, fallopian tube blockage, uterine abnormalities, and other unknown factors, which tend to confer a substantial psychological burden leading to several adverse outcomes such as depression, stress, tension and even death on patients (Egbe et al., 2020).

The current study was consistent with a similar study conducted in Congo by Jean-didier et al. (2019), which revealed a mean age of 34 in their study. On the same line Alamri et al. (2020), reported that about half of their study subjects were within the age range of 30 to 40 years. However, a Cameroonian study by Egbe et al. (2020) found a mean age of 30 years in their study. Differences in mean age may be related to cultural differences and educational exposure. Also, Egbe (2020), who worked on a study in Africa, found that poor education was prevalent among women of marriageable age. The role of education in delayed age among women of reproductive age was further explained by Moridi et al. (2019), Almusa et al. (2019) their revealed that many educated women delay their childbearing until they finish schooling. Therefore, higher age is expected in women of reproductive age that are educated than women that are not educated. However, Bakhtiyar et al. (2019) reported a high illiteracy rate among half of their study subjects, which contradicts the current study. Furthermore, just like the current study, Alamri et al. (2020) revealed smoking habits in a few study subjects. Similar results were also reported by Musa and Osman (2020). This might indicate that smoking is direct cause of infertility due to the role of tobacco. On the other hand, the BMI results obtained by Alamri, et al. (2020), Khadawardi (2020), contradicted those obtained in this current study, the authors recorded that one-third of their study subjects were overweight.

This part includes a discussion of the sample's medical histories results such as medical problems, exposure to X-ray or chemotherapy, Rh incompatibility According to the current study, nearly one-quarter of the participants had a history of medical problems that could be direct causes or factors associated with infertility. About one-fifth of the study subjects had thyroid disorders, less than one-third had endocrine disorders, one-fifth had autoimmune disease and depression, one-fifth had hematological disorder, hyperprolactinemia in about one-tenth, and chromosomal disorder, and few had other cancer, structural anomalies, ulcerative colitis, and chromosomal disorder, and about one-tenth had Rhesus incompatibility. These were consistent with the findings of another research (Dawood and Salem, 2018; Mahey et al., 2018; Khraif et al., 2019). Two-thirds of participants complained of chronic diseases, less than one third had difficulty getting pregnant, less than one fifth had PCOS and fibroid, and less than one-tenth had genetic disorders and early menopause. These have been proven by several studies (Dawood and Salem, 2018; Mahey et al., 2018; Khraif et al., 2019; Khizroeva et al., 2019; Moridi et al., 2019; Khadawardi, 2020; Musa and Osman, 2020).

The findings indicated a mean age at menarche was 12.65 ± 1.464 years, with about three-quarters of the research samples experiencing menarche at the age of 13 or younger. The majority of women had regular menstrual flow. Nearly two-thirds had previously been pregnant one to three times, a little less than half had a previous gestational age of 37 to 40 weeks, and nearly half of their previous pregnancies terminated in abortion, with the majority having one to three previous abortions. This study's mean menarche age is consistent with that

of Egbe et al. (2020), who also found a 13-year mean menarche age. The majority of research participants had normal menstrual flow, according to the authors. However, the present research's menstrual flow findings contradict those of Khadawardi (2020), who reported that just one-third of his study subjects had normal menstrual flow. Jean-didier et al. (2019) challenged the gravidity findings by demonstrating that just a few of the research participants had had one previous pregnancy. However, Alamri et al. (2020), Jean-didier and colleagues found previous abortions in most of their research participants, revealing similar results to their current study. In contrast to these findings, Khadawardi (2020), reported a history of abortion in one-third of their research subjects.

Furthermore, the present study's findings revealed that less than one-tenth had previously suffered problematic ectopic pregnancies, whereas almost one-fifth had postpartum issues, with nearly three quarters experiencing heavy bleeding. Approximately two-thirds of the research individuals had undergone a caesarean section as their previous mode of delivery, used contraceptives, the majority of which were hormonal contraceptives, and used them for more than three years. These findings are consistent with the findings of Musa and Osman (2020), who recorded complications such as excessive bleeding and ectopic pregnancy among their study subjects; and revealed that approximately half of their study subjects had caesarean sections as their previous mode of delivery in the same line as Khraif et al. (2019), who highlighted the use of contraceptive methods among their research subjects.

According to the findings, two-thirds of the research participants had secondary infertility, while one-third had primary infertility. These findings matched those of comparable research done by Jean-didier et al. (2019), Alamri et al. (2020), who found that two-thirds of their study participants had secondary infertility and one-third had primary infertility. Bakhtiyar (2019), on the other hand, discovered that the majority of their research samples had primary infertility, with less than one-tenth diagnosed with the secondary type. Furthermore, less than half of the research subjects had an unexplained cause of infertility, according to the findings. PCO, malefactors, tubal adhesion or blockage, uterine fibroid, pelvic inflammatory illness, endometriosis, and urinary tract infection have all been possible causes. Several investigations (Mahey et al., 2018; Bakhtiyar, 2019; Jean-didier et al., 2019; Khraif et al., 2019; Khizroeva et al., 2019; Moridi et al., 2019; Alamri et al., 2020; Egbe et al., 2020; Khadawardi, 2020; Musa and Osman, 2020.) found similar results.

For the method of infertility diagnosis among study subjects, findings revealed that two-fifths of the sample employed all types of diagnostic procedures, one third did hormonal assay while a few did cervical smear, hysteroscopy, hysterosalpingography, and laparoscopy. Providing backing for the diagnostic method used in this study, Wasilewski et al. (2020) stated that understanding the biochemistry of infertility is a potent tool in the proper diagnosis of the disease; therefore, hormonal assays should be conducted to detect significant fertility based biochemical parameters that would help diagnose infertility in women. Similarly, the cervical smear test, also called the Pap smear test, has been a potent tool in diagnosing infertility. The test is non-invasive and easy to perform and helps detect precancerous lesions, infections and cancers that could lead to infertility (Sachan et al., 2018; Carson and Kallen, 2021). Other studies have shown that imaging techniques such as hysteroscopy, hysterosalpingography, and laparoscopy are potent diagnostic tools for female infertility (Jean-didier et al., 2019; Carson and Kallen, 2021). The results of the study participants' infertility management revealed that half of the sample used Clomid, ovulation stimulation injection, Cetrotide, Gonal, Estradiol, Cabergoline, and Merional to assist induce ovulation. Approximately half of the sample has been on these medicines for less than six months, with

slightly more than one-tenth suffering complications such as ovulation dysfunction and weight gain. In addition, slightly more than one-tenth used herbal remedies such as Marjoram honey, sagebrush, *Saussure costus*, and other herbs. Three-quarters of respondents who used herbal remedies had just been on medication for six months. Ovulation induction is a method of infertility treatment that promotes dominant follicle production through a variety of techniques. It has long been used to treat infertility in reproductive endocrinology (Lindheim et al., 2018; Aladin et al., 2020). Herbal remedies have also been reported in several studies to promote ovulation and treat female infertility (Alarbash, 2019; Jaradat and Zaid, 2019). Similarly, one-third of the sample employed in vitro fertilization, one-fifth of whom became pregnant. About one-tenth also used intrauterine insemination majority very few of whom became pregnant. Finally, less than one-tenth of the women in the sample gave their husbands vitamins, steroids, or Clomid, with more than half of the men receiving these treatments for more than six months. Several studies have described the potency of in vitro fertilization as reported by Aladin et al., (2020), as well as intrauterine insemination documented by Almaslami and Aljunid, (2020), and the treatment of partners as reported by Alamri et al., (2020) in the management of secondary infertility in women.

The findings demonstrated a statistically significant association between infertility types and age and marriage duration. This finding was consistent with the findings of Abdelkader et al. (2014), who discovered a significant relationship between a woman's age and her fertility, gravidity, and parity. Age is a significant factor in infertility; according to Aketayeva et al. (2018), female pregnancy chances decline to about 5% at the age of 40. Similarly, Barbieri (2019) revealed that the 2 million oocytes and follicles in the ovaries at birth drop to a few thousand as one gets older. This quick reduction contributes to decreased fertility and subsequent infertility. As a result, the longer a woman delays to be married, the older she grows and the more likely she may become infertile. Furthermore, this current study recorded a statistically significant relationship between types of infertility with medical problems, showing that the more the occurrence of medical issues in a woman's life, the more likely the participants may become infertile. Several studies have shown that medical problems like those recorded in this study, such as endocrine disorder, autoimmune disease and depression, hematological disorder, cancer, hyperprolactinemia, chromosomal disorder, structural anomalies, and ulcerative colitis, could lead to infertility (Dawood and Salem, 2018; Mahey et al., 2018; Khraif et al., 2019; Khizroeva et al., 2019; Moridi et al., 2019; Khadawardi, 2020; Musa and Osman, 2020).

In addition, the current results recorded that a statistically significant relationship between types of infertility and contraceptive methods, duration of contraception used and causes of infertility, showing that the use of contraceptives could lead to infertility. On the same line Sedlander et al. (2018) and Girum and Wasie (2018) stated that contraceptives could lead to several unwanted adverse outcomes such as cancer and decreased libido, which could play a significant role in infertility. Similarly, there were also a statistically significant relationship between types of infertility and Types of drugs for induction of ovulation, Duration of Drugs for induction of ovulation, Complications of drugs for induction of ovulation, showing ironically that the use of ovulation induction drugs could lead to infertility. According to Sousa et al. (2015) and Sun et al. (2021), the use of ovulation induction drugs can lead to diseases such as ovarian hyper stimulation syndrome and other severe health complications, which could play a significant role in infertility.

CONCLUSION

Based on the findings of the study it is concluded that secondary infertility was common type among the Saudi participants. Defects in ovulation (PCO), malefactors, tubal adhesion or obstruction, uterine fibroid, pelvic inflammation disease, endometriosis and urinary tract infection were the main cause of infertility. Types of infertility, age and marital duration, medical problems, contraceptive methods, duration of contraception used, causes of infertility, types of drugs for induction of ovulation, duration of such drugs were risk factors for infertility.

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