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Distribution of the causes of infertility in men referred to the Besat infertility clinic in Sanandaj City, Iran

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Original Article

Abstract

BACKGROUND: Infertility, defined as the couple not being able to have children after one year of regular intercourse without any protection, is one of the most critical healthcare issues encountered in all human societies. The mean prevalence of infertility in different communities could range from 8% to 12%. The current study aimed to investigate the frequency distribution of causes of infertility in men referred to the infertility treatment center of Besat Hospital in Sanandaj City, Iran.

METHODS: In this cross-sectional study, a sample of 320 men with infertility from all the infertile men admitted to the infertility clinic of Besat Hospital in 2019 was selected. Using medical records and complementary interviews, the data were documented by completing a pre-designed checklist. The checklist checked for demographic information and background medical, surgical, and habitual history of the patients. The data were then analyzed using SPSS software.

RESULTS: Among 320 subjects, the mean age was 35.7 years (21-58 years). The mean duration of infertility was 5.4 years (1 to 28 years). Among all patients, 38.44% had no university education, 39.69% were self-employed, 77.12% had primary infertility, and 22.88% had secondary infertility. 69.4% of the patients were smokers, of whom 60% had a history of surgery, most of which was related to varicocele. 68.8% of the patients had a history of impaired sperm morphology.

CONCLUSION: Infertility is associated with lifestyle factors, such as sedentary lifestyle, obesity, smoking, unhealthy environmental exposures, stress, poor nutrition, and harmful environmental toxins, which can negatively affect sperm parameters. Therefore, raising awareness about these harmful components can lead to a reduction in exposure to these factors.

KEYWORDS: Male Infertility; Risk Factors; Life Style; Iran

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Introduction

Infertility is the inability of a couple to have children who have had regular unprotected intercourse for at least one year.[1] Infertility can lead to severe psychological stress in one or both couples. The infertile partner may lose self-confidence and feel inadequate for the other partner, leading to depression and irreversible outcomes. Moreover, the

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psychological issue itself can also be the cause of infertility.[2] Infertility is one of the significant health problems worldwide. The mean prevalence of infertility in developed countries can range from 3.5% to 16.7%, and in developing countries from 6.9% to 9.3%.[3] The prevalence of infertility varies from country to country and between different country regions. As the studies have suggested, the prevalence of infertility in the United Kingdom (UK) and the United States (US) is 6% and 10%, respectively. In some African countries, such as Nigeria, Sudan, and Cameroon, the prevalence of infertility has reached almost 30%.[4] The overall prevalence of infertility in Iran is reported to be 13.2%.[5] It is estimated that about 7% of all men suffer from infertility disorders.[6] For a long time, infertile men have been denied, and women were considered the main culprits.[7] Studies from the last 20 years have shown that 30% to 50% of infertility in couples was associated with infertility in men, and 50% to 70% were related to women. In 20% of the cases, infertility was associated with both men and women although in some cases, no risk factor was associated with any of the partners.[8]

Infertility can be either primary or secondary. The primary is more common in men. In the primary type, no previous attempts in the couple have led to a successful pregnancy, but infertility usually occurs after one or more successful pregnancies in the secondary type.[9] Infertility can have several causes, including anatomical, physiological, and genetic factors. In general, causes of infertility in men can be classified into three categories: infertility in pre-testicular, post-testicular, and testicular levels. Genetic factors can play a crucial role in all of these categories. Moreover, many environmental and acquired factors are associated with infertility and can lead to infertility. The factors and their prevalence distribution can be different in various regions. For the most part, these differences are due to various environmental factors affecting reproductive behaviors, such as the age of marriage, multiple sexual partners, environmental pollution, smoking and alcohol abuse, lifestyle changes, and nutrition.[6,10]

Reproduction in men is also strongly influenced by environmental factors in their work and living places.[11] Cooper et al. have pointed out that developments in countries have been associated with deteriorating environmental conditions and, consequently, reduced reproductive capacity in men. Risk factors such as high ambient temperature, industrial noise pollution, radiation exposure, electromagnetic waves, driving time during the day, air pollution, living place pollution, stress, alcoholism, varicocele, genital infection, sexual dysfunction, testicular torsion, anti-sperm antibodies, and a range of chemicals have all been associated with male infertility. In regions such as Africa, where infertility is highly prevalent, the leading cause is genital tract infections, which are associated with abnormal semen parameters and low sperm count.[12]

Since the most important and logical approach to infertility is to reduce the incidence and promote reproductive health, identifying the frequency of the risk factors associated with infertility in each region is of great public health importance. The pattern and prevalence of infertility is a suitable index for recognizing the health status of the families in the community and guiding us through designing improvement plans. One critical issue is that data related to reproductive health and its demographic and social aspects are not adequately available. Without careful regional studies, diagnosis and treatment of infertility in men will not be possible. Although global estimations are available on the prevalence and causes of infertility, this information is generally a rough estimate and a combined average of various parts of the world. It does

not reflect the prevalence in a particular country or region, and the gap is even more pronounced in developing countries. Detailed regional studies can provide the health care system with information beneficial for preventing and managing impotency and infertility disorders associated with men in Kurdistan. Consequently, this study aims to investigate the frequency of causes of infertility in men referred to the infertility treatment center of Besat Hospital in Sanandaj City, Iran.

Methods

This descriptive cross-sectional study was conducted at Kurdistan University of Medical Sciences in Sanandaj City in 2019. A list of all the infertile men admitted to the infertility clinic of Besat Hospital in Sanandaj City was obtained. Female and non-infertile individuals were excluded from the study. Based on the Sohrabwand study, for sample size, 320 people were randomly chosen from all target patients' lists with a simple random sampling method.[13] Considering a 95% confidence level and 5% relative error, the sample size was calculated using the following equation:

$$n = \frac{Z^2_{1-\frac{\alpha}{2}} P(1-P)}{d^2}$$

The data were obtained through the medical records of the patients. In case of any incompleteness, data were obtained through telephone contact with patients and were documented in pre-designed forms. The data collection tool in this study consisted of a checklist that contained samples' demographic information, including age, occupation, and place of residence, which was recorded through reviewing health records and telephone calls to individuals. The checklist also contained the variables of the study, including the level of education, duration of infertility, type of infertility (primary or secondary), smoking, genitourinary surgery including varicocele surgery, hernia, and orchiopexy, history of undescended testicles in childhood, drug addiction, alcohol consumption, use of fertility drugs, exposure to lead, history of testicular trauma, history of testicular torsion and spermogram abnormalities including azoospermia, oligospermia, abnormal sperm morphology, sperm motility disorders, idiopathic causes, hypogonadism, and other causes of endocrine diseases and varicocele which were collected through telephone calls and medical records. The data were then analyzed through SPSS software (version 21, IBM Corporation, Armonk, NY, USA) (Ethics code: IR.MUK.REC.1398.034).

Results

The average age of the subjects was 35.7 years ranging from 21 to 58 years, and the average duration of infertility was 5.4 years, ranging from 1 to 28 years.

Table 1 shows the frequency distribution of the level of education, job, and individual habits of the subjects. About 123 (38.44%) subjects had a diploma, and only one (0.31%) had a doctorate. Most subjects, i.e., 127 (39.69%), were self-employed, and only 2 (0.63%) were unemployed. Frequency distribution of individuals' habits shows that most of them, i.e., 222 (69.4%), had smoked, and only one (0.31%) had used drugs.

Table 2 shows the frequency distribution of the history of fertility drugs, lead exposure, testicular trauma, endocrine diseases, hypogonadism, and surgical procedures in the study population. Most of the study population, i.e., 312 (97.5%), had no history of fertility drug use, and 8 (2.5%) had a history of fertility drug use. Most of the subjects, i.e., 310 (97.5%), had no history of lead exposure, and 8 (2.5%) had a history of exposure. 318 subjects (99.4%) had no history of testicular trauma, and 2 (0.6%) had a history of testicular trauma. Most subjects, i.e., 305 (95.3%), had no history of endocrine diseases

and hypogonadism, and 15 (4.7%) had a history of endocrine diseases and hypogonadism. 192 (60%) had a history of surgery, which most of the surgeries were related to varicocele and only one of them (0.31%) had orchiopexy surgery, and 128 of them (40%) had no prior history of surgery.

Table 1. Frequency distribution of the level of education, job, and individuals' habits

Variable	Subvariable	n (%)
Education	No education	7 (2.19)
	Primary school	47 (14.69)
	Middle school	57 (17.81)
	Diploma	123 (38.44)
	Associate degree	22 (6.88)
	Bachelor's degree	57 (17.81)
	Master's degree	6 (1.88)
	Doctorate degree	1 (0.31)
Job	Unemployed	2 (0.63)
	Clerk	46 (14.38)
	Self-employed	127 (39.69)
	Military personnel	14 (4.38)
	Teacher	9 (2.81)
	Manual worker	49 (15.31)
	Driving jobs	30 (9.38)
	Miscellaneous	43 (3.44)
Social habits	Cigarette	222 (69.40)
	Alcohol	8 (2.50)
	Drugs	1 (0.31)
	No habits	89 (27.80)

Table 3 shows the frequency distribution of infertility type and spermogram abnormalities in the subjects. Most of the subjects, i.e., 246 (77.12%), had primary infertility and 73 (22.88%) had secondary infertility. On the other hand, 220 (68.8%) had a history of abnormal sperm morphology, and the least frequent abnormality was azoospermia, which was found in 81 (25.3%) subjects.

Discussion

This study aimed at identifying and investigating the different causes of infertility in Sanandaj City. Due to various environmental conditions associated with reproductive behaviors such as the age of marriage, multiple sex partners, environmental pollution, alcohol and smoking, the prevalence of infectious diseases in different communities, the etiology of infertility, and the frequency distribution of different causes of infertility vary among different regions. This difference is especially evident between developed and developing countries. Since the most important and logical approach to the problem of infertility is to try to reduce the incidence and promote reproductive health, identifying the frequency of the risk factors associated with infertility in each region is of great public health importance and could be beneficial to the health care management decision-making process.[4]

Table 2. Frequency distribution of the level of education, job, and individuals' habits

History		n (%)	Type	n (%)
Fertility drug use	No	312 (97.50)	-	-
	Yes	8 (2.50)	-	-
Exposure to lead	No	310 (96.90)	-	-
	Yes	10 (3.10)	-	-
Testicular trauma	No	318 (99.40)	-	-
	Yes	2 (0.60)	-	-
Endocrine diseases and hypogonadism	No	305 (95.30)	-	-
	Yes	15 (4.70)	Diabetes	8 (2.50)
			Hypothyroidism	4 (1.25)
			Other	3 (0.93)
Surgery	No	128 (40.00)	-	-
	Yes	192 (60.00)	Varicocele	111 (34.70)
			Inguinal hernia	14 (4.40)
			Orchiopexy	1 (0.31)
			Other	66 (20.62)

Table 3. Infertility and abnormalities

Infertility and abnormalities		n (%)
Type of infertility	Primary	246 (76.80)
	Secondary	73 (22.90)
	Idiopathic	1 (0.31)
Spermogram abnormalities	Azoospermia	81 (25.30)
	Oligospermia	120 (37.50)
	Sperm morphology disorders	220 (68.80)
	Sperm motility disorders	204 (63.80)

The mean age of the subjects in our study was 35.7 (from 21 to 58 years), close to the mean age of subjects in previous studies, including the study of Moronkeji et al.[9] and Ohaneje et al.[14] which is entirely coherent considering the mean age of fertility and mean age when couples attempt to have a child and fertility disorders, if any, can occur at this age and people naturally refer to infertility treatment centers seeking for medical attention.

The highest percentage of infertility in couples in the study of Pino et al. was among the age group of 25-29 years. Findings indicate that about one-third of couples who do not get pregnant by 30 will suffer from infertility disorders. According to available records, 1 in 7 couples aged 30-34 suffers from infertility.[15] Studies have supported the association between aging and decreased sperm parameters.[16,17] Although Pino et al. reported a negative correlation between age and sperm count, they did not find any significant changes in fertility with aging.[15] The results indicated that aging in men was not correlated with sperm morphology, but sperm concentration decreased significantly with age. In addition, the process of sperm movement and progressive motility was reduced but not very significantly. These results are consistent with previous reports suggesting that aging is associated with decreased semen quality and sperm parameters (e.g., concentration and motility).[16,17] This phenomenon may be due to hormonal changes, including a decrease in testosterone secretion.[18] On the other hand, it is possible that the use of some drugs due to diseases associated with aging could potentially impair the hormonal and, consequently, the reproductive system.[19] In addition, the significant relationship between age and a decrease in sperm count and sperm motility parameters could indicate that aging can affect the quality of sperm parameters, as some previous studies have supported this hypothesis.[20-22] Another important factor predicting the likelihood of pregnancy is the duration of infertility. Our study's average duration of infertility was 5.4 (1-28) years, similar to previous studies, including Shafabakhsh et al.'s study which showed the relationship between conception and the duration of infertility with semen abnormalities.[22] "Spontaneous" pregnancies were reported significantly more frequently for men with an infertility duration of fewer than two years than men with more than two years.[23] Couples with a history of infertility less than three years are more likely to get pregnant. Additionally, the study showed that the mean age of couples in primary infertility was lower than in secondary infertility, while the duration of infertility in the primary type was longer. These findings are consistent with several studies. One hundred twenty-three patients (38.44%) had a diploma degree, and only one (0.31%) had a doctoral degree. The effect of the level of understanding and literacy of the person on accepting infertility disorder and its associated outcomes and the extent to which the person is willing to follow the treatments, maintain the marriage, deal with meddling, and prevent the psychological outcomes of infertility has been thoroughly discussed.[24]

Most of our subjects, i.e., 127 (39.69%), were self-employed, 49 (15.31%) were construction workers, and only 2 of them (0.63%) were unemployed. Most subjects, i.e., 246 (77.12%), had primary infertility, while 73 (22.88%) had secondary infertility. The incidence of primary infertility in this study was much higher than in other studies. The cause of infertility in developed countries has shifted towards primary infertility due to problems associated with the aging process, while secondary infertility is increasing in developing countries.[11,12] It should be noted that puerperal infections are still a significant health problem in these countries. The high prevalence of primary infertility in this study might be due to the low age of marriage in the population and specifically the study population. In turn, the prevalence of ovarian disorders and pelvic infections should increase, just as the subsequent results of this study also confirmed. Most of the subjects, i.e., 222 (69.4%), smoked, and only one of them (0.31%) had used drugs. In a review study by Harlev et al., it was stated that men who smoked were more likely to be infertile than non-smokers, and smoking decreased sperm. Smokers have significantly lower sperm concentration, motility, quality, and quantity and also less naturally-shaped sperms than non-smokers. Harmful substances in cigarette smoke affect the hypothalamic sex hormone production cycle and prevent adequate sperm count and sperm quality production.[15] Shafabakhsh et al. believed that smoking harmed progressive sperm motility. They believed the effect of smoking on male infertility remained inconclusive.[4] The majority of the subjects, i.e., 310 (97.5%), had no history of medical drug treatment, and 8 (2.5%) had a drug treatment history. Spermatogenesis is a complex process that takes about 70 days in humans. Various hormones, antihormones, or psychotropic drugs can interfere with the underlying endocrine control mechanisms. Cytotoxic agents or industrial chemicals such as dibromochloropropane (DBCP) directly affect the germinal epithelium. Sperm maturation may become impaired by α-hydrochloride, antiandrogens, or sulfasalazine, and sperm motility in the female reproductive system can be inhibited by vaginal spermicides such as nonoxynol-9 and propranolol. Side effects of other drugs in reducing fertility have been shown in various studies.[11-13,22]

Most of the patients, i.e., 318 (99.4%), did not have any history of testicular trauma, and 2 (0.6%) had a history of testicular trauma. Unilateral trauma to the testis after puberty can lead to changes in semen parameters, but its effect on fertility depending on the extent of the injury, pathology, and unilateral involvement is not apparent. 305 subjects (95.3%) did not have any history of endocrine diseases and hypogonadism, while 15 (4.7%) had a history of hypogonadism. Some of the subjects, i.e., 220 (68.8%), had a history of abnormal sperm morphology, and the least frequent abnormality was azoospermia, seen in 81 of them (25.3%). Regarding the cause of infertility in men, semen analysis showed that the most common pathospermia were motility disorder and sperm count. The most common cause excluding idiopathic causes was primary gonadal insufficiency and varicocele. Most of the subjects, i.e., 192 (60%), had a history of surgery, of which most of the surgeries were related to varicocele, and only one of them (0.31%) had orchiopexy surgery, and 128 (40%) had no history of surgery. As mentioned in previous sections, most patients with endocrine disorders refer to endocrinologists, follow their treatment, and refer to infertility treatment centers less often, unless for interventional treatments. In our study, due to limited budget and time, a larger community was not surveyed. It is suggested that the causes of male infertility be investigated in different regions and communities and finally a meta-analytical study be developed for the subject.

Conclusion

The current study showed that infertility was associated with lifestyle factors. Therefore, raising awareness about the harmful components of lifestyle can reduce exposure to these factors. In addition, by recognizing these factors, physicians can adopt appropriate therapeutic approaches for these patients, ultimately leading to increased fertility success.

Conflict of Interests

Authors have no conflict of interests.

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