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Demographic and Social Traits of Infertile Men Visiting the Urology Clinic in South of Iran

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ABSTRACT

Infertile couples are those who have not managed to conceive after a year of regular and unprotected intercourse. 25-50% of the infertility cases are due to the male factor. Since a number of individual traits are correctible, raising awareness of those traits can cut down on the rate of infertility. Therefore, the present research aims to investigate the correlation of some individual traits and the parameters related to male infertility. The target population of the present analytic, cross-sectional research was all men visiting the Urology clinic of Hormozgan University of Medical Sciences between January-July 2017. From among 127 visitors of the clinic, 101 entered the study. Once their infertility was established, their demographic information was filled in a checklist of personal information as well as the seminal fluid test results. The data entered SPSS ver. 16.0 and were analyzed using the Chi-squared test, Mann-Whitney U test and Spearman correlation coefficient. P value was set at below 0.05 for the significance of the data. The mean age of the subjects was 29.63±6.28 years. The mean BMI was 25.06±3.54 of the subjects (53.5%) were smokers. 15 of them (14.9%) were diabetic. Most of the infertility problem was due to the lack of sperm motility. 82 subjects (81.2%) had sperm motility below 60% and had fewer than 20 million sperms per milliliter of semen. 3 of them (2.97%) had no sperm at all. In terms of sperm count, the subjects were divided in two groups which were significantly divergent in terms of the state of their diabetes. Diabetes seems to be a risk factor of low sperm count (P=0.042, OR=3.1, CI95%=1.007-9.591). The subjects' infertility was mostly due to low sperm motility. However, how this parameter was related to the demographic traits was not straightforward. The significant correlation between diabetes and sperm count is a key side effect of diabetes.

Key words: Male, Infertility, Semen Analysis, Sperm Parameters, Demographic

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INTRODUCTION

As the fifth disabling factor in the world, infertility has turned into a global crisis today [1]. Infertility is a disease afflicting the reproduction system as couples do not manage to conceive after twelve months of regular unprotected intercourse [2, 3]. According to a report by WHO (World Health Organization), the ratio of infertility in developing countries is 1 to 4 [4]. Regardless of ethnicity and race, 13-20% of couples are infertile worldwide, and in 25-50% of cases, male infertility is the cause [5]. The cause of infertility due to the male factor in the Middle East is 40% [5, 6]. Male infertility can be due to different factors such as genetic mutations, chromosome abnormalities, infectious diseases, tract obstruction, varicocele, radiation, chemotherapy, etc. and about 50% of male infertility is considered idiopathic [7]. Infertility is divided into two groups: primary (no prior experience of pregnancy) and secondary (experience of prior pregnancy regardless of the result) [8].

Infertility can be accompanied by socioeconomic, psychological and physical problems [9], and can be treated through surgical, medical, assisted and secondary interventions [10]. The majority of these methods are costly and it is not easy to access them [11]. A body of research revealed that lower social level was significantly correlated with couple's less conflict in solving this problem [12]. However, in low social levels, the percentage of dealing with this problem is very low and usually leads to such undesirable results as divorce [9]. In many communities, infertility is accompanied by certain inappropriate reactions including depression [12]. Dramatic mental disasters follow which can even lead to divorce, low self-confidence and aloofness [6].

The main cause of male infertility is defect in the properties of seminal fluid (morphology, sperm count and motility) [13]. These properties are a function of social and demographic traits including sexually transmitted infection, sexual Partner count, high BMI, diabetes, smoking and alcohol [14]. Varicocele also plays a role in infertility. However, its role in infertility is yet unknown [15].

Due to the fact, that some demographic traits are correctible especially through raising awareness of the effect of those traits on reducing infertility. Therefore, the present research aims to investigate the parameters related to male infertility.

MATERIALS AND METHODS

Patient subjects

The present analytic, cross-sectional research aimed to investigate some of demographic or social traits associated with male infertility. The target population is all men visiting the urology clinic of Hormozgan University of Medical Sciences between January-July 2017. The inclusion criteria were: couple's inability to conceive after at least one year of regular and unprotected intercourse and the age range of 18-50 years. The exclusion criteria were infection in the reproduction system as diagnosed by an urologist, varicocele, cryptorchidism, renal or urinary infection, trauma, chemotherapy, inflammatory prostate, inflammatory epididymic tracts, orchidism, mumps, testicular trauma, hyperthyroidism, hypothyroidism, major thalassemia, genetic diseases involved in infertility (Klinefelter, XX male, Noonan syndrome). Those who were unwilling to participate were excluded. Among the 127 subjects visiting the clinic, 101 who met the inclusion criteria entered the study with a written consent.

Research protocol

The present research protocol was approved by the Committee of Ethics at Hormozgan University of Medical Sciences. Once the subjects were examined by an urologist and their infertility was confirmed, they entered the study according to the inclusion and exclusion criteria. Their demographic information was filled in a checklist of demographic information (age, height, weight, BMI, age of marriage, diabetes, smoking background, spouse's fertility background, prior surgery e.g. hernia, prostate, varicocele and seminal test results). This information was acquired face to face and was recorded for all patients. All patients were interviewed by the same researcher and their information was recorded. The semen analysis was done once manually for all the subjects and was done in a single lab. Subjects were weighed with a digital scale and their height was measured up with a standardized meter.

Statistical Procedures

The data entered SPSS ver16.0 and were reported as mean, standard deviation and percentage. They were analyzed through Chi-squared test, Mann-Whitney U test and Spearman correlation coefficient. P value was set at below .05 for the significance of the data.

RESULTS

The mean age of the subjects was 29.63±6.28 years. The mean length of marriage was 3.93±2.52 years. The mean BMI was 25.06±3 kg/m^2. Patients' demographic information was recorded in table 1. Fifty four of the subjects (53.5%) smoked cigarettes. 15 subjects (14.9%) were afflicted with diabetes. According to the semen analysis test, the foremost male infertility had to do with sperm motility. 82 subjects (81.2%) had a sperm motility below 60%. In terms of sperm count, 37 subjects (36.6%) had fewer than 20 million sperms per milliliter of seminal fluid. from among them, 3 subjects (2.97%) had no sperm (azoospermic). Table 2 indicates the state of fertility parameters.

Table 1: Demographic traits and seminal fluid parameters

Parameter	Median	Mean ± SD	Min	Max	CI95%
Age (yrs.)	28	29.68 ± 6.28	19	47	28.44-30.92
Age of marriage (yrs.)	3	3.93 ± 2.52	1	12	3.43-4.42
Weight (kg.)	79	77.84 ± 11.18	57	102	75.63-80.04
Height (m)	1.79	1.76 ± 0.06	1.59	1.90	1.74-1.77
BMI (kg/m2)	25	25.06 ± 3	19.11	33.46	24.46-25.65
Sperm count (million per ml)	33.5	35.28 ± 24.73	0	94.55	30.40-40.17
Seminal fluid volume (ml)	3.3	4.46 ± 2.41	2	9.1	3.98-4.93
% of motile sperm	37.93	36.91 ± 21.72	0	81.09	32.62-41.20
% of progressive sperm	31.06	32.31 ± 20.51	0	80.55	28.26-36.36
% of normal morphology	23	24.93± 16.11	0	70	21.75-28.11

The subjects were divided in two groups based on sperm count per milliliter of seminal fluid: ≥20 millions and <20 million. There was no statistically significant difference between the two groups in terms of age, age of marriage, weight, height and BMI (p>.05). However, a significant divergence was observed between the groups in terms of the volume of seminal fluid, percentage of motile sperm, progressive sperm and normal morphology (p<.05) (table 3). In terms of diabetes, the two groups showed to be significantly different and it seems that diabetes is a risk factor for reducing sperm count (table 4) (p=0.042,OR=3.1,CI95%=1.007-9.591). Fertility parameters were compared between the patients in terms of smoking and showed to statistically significant divergence (P>0.05) (table 5). Similarly, fertility parameters were compared in terms of affliction with diabetes and showed no statistically significant difference (P>0.05). In terms of sperm count, the difference between the groups was closer to the significance level (P=0.097) (table 6). The correlation coefficient of the quantitative variables was assessed too. A direct weak correlation was observed between sperm count and the volume of seminal fluid which was close to the significance level (P=0.92). A direct moderate correlation was found between sperm count and percentage of progressive sperm which was statistically significant (P=0.037, P=0.026). A strong correlation was observed between sperm count and percentage of normal morphology (0.000). Other weak, moderate or strong correlations were also found between the fertility parameters which were statistically significant (P<0.05) (table 7).

Table 2: Seminal fluid parameters

Seminal fluid parameters	Sub-groups	F (%)
Seminal fluid volume (ml)	>2	87(86.1%)
	≤2	14(13.9%)
	Total	101(100%)
Sperm count per ml of seminal fluid (millions)	≥20	64(63.4%)
	<20	37(36.6%)
	Total	101(100%)
% of motile sperm	>60	19(18.8%)
	≤60	82(81.2%)
	Total	101(100%)
% of progressive sperm	≥50	22(21.8%)
	25-49	45(44.6%)
	<25	34(33.7%)
	Total	101(100%)
% of normal morphology	>40	30(29.7%)
	≤40	71(70.3%)
	Total	101(100%)

Table 3: Comparison of subjects' demographic traits between groups in terms of sperm count

Demographic trait	Sperm count≥20 m/ml	Sperm count <20 m/ml	Mann-Whitney U test	p-value
Age (yrs.)	29.35 ± 5.69	30.24 ± 7.23	1168.00	0.910
Age of marriage (yrs.)	3.71 ± 2.09	4.29 ± 3.12	1160.00	0.863
Weight (kg.)	77.73 ± 10.96	78.02 ± 11.68	1120.00	0.651
Height (m)	1.76 ± 0.06	1.75 ± 0.06	1148.00	0.801
BMI (kg/m2)	25.04 ± 3.12	25.09 ± 2.82	1133.00	0.722
Seminal fluid volume (ml)	4.66 ± 2	4.1 ± 2.98	743.00	0.002
% of motile sperm	42.06 ± 23.35	28 ± 15.08	679.00	0.000
% of progressive sperm	37.28 ± 22.66	23.73 ± 12.27	689.00	0.000
% of normal morphology	33.48 ± 13.47	10.13 ± 6.96	169.00	0.000

Table 4: Comparison of subjects' demographic traits between groups in terms of sperm count

Demographic trait	Sub-group	Sperm count ≥20 million/ml	Sperm count <20 million/ml	Total no.	K2	P-value	OR	CI 95%
Diabetes	No	58(67.4%)	28(32.6%)	86(100%)	4.143	0.042	3.107	1.007-9.591
	Yes	6(40%)	9(60%)	15(100%)				
	Total	64(63.4%)	37(36.6%)	101(100%)				
Smoking	No	33(70.2%)	14(29.8%)	47(100%)	1.775	0.183	1.749	0.766-3.993
	Yes	31(57.4%)	23(42.6%)	54(100%)				
	Total	64(63.4%)	37(36.6%)	101(100%)				
BMI (kg/m2)	<25	34(69.4%)	15(30.6%)	49(100%)	1.487	0.223	1.660	0.732-3.77
	≥25	30(57.7%)	22(42.3%)	52(100%)				
	Total	64(63.4%)	37(36.6%)	101(100%)				
Prior surgery	No	12(54.5%)	10(45.5%)	22(100%)	0.943	0.332	0.623	0.239-1.626
	Yes	52(65.8%)	27(34.2%)	79(100%)				
	Total	64(63.4%)	37(36.6%)	101(100%)				
Spouse's fertility	Fertile	49(64.5%)	27(35.5%)	76(100%)	0.162	0.687	1.21	0.478-3.060
	Infertile	15(60%)	10(40%)	25(100%)				
	Total	64(63.4%)	37(36.6%)	101(100%)				

Table 5: Comparison of subjects' parameters in terms of smoking

Variable	No smoking	Smoking	Mann-Whitney U test	p-value
Sperm count (m/ml)	38.53±23.99	32.46±25.24	1062.00	0.159
Volume of seminal fluid (ml)	4.5±2.43	4.46±2.41	1220.00	0.738
% of motile sperm	36.88±21.36	36.94±22.22	1260.00	0.954
% of progressive sperm	32.34±20.29	32.29±20.51	1261.00	0.957
% of normal morphology	27.89±16.56	22.35±15.39	1046.00	0.128

Table 6: Comparison of subjects' parameters in terms of diabetes

Variable	No diabetes	Diabetes	Mann-Whitney U test	p-value
Sperm count (m/ml)	37.00±24.59	25.43±24.01	471.00	0.097
Volume of seminal fluid (ml)	4.27±2.27	5.54±2.97	511.50	0.200
% of motile sperm	21.27±36.88	21.27±37.09	636.00	0.932
% of progressive sperm	20.17±32.45	23.11±31.52	596.50	0.643
% of normal morphology	16.08±25.84	15.78±19.66	505.50	0.182

Table 7: Correlation of quantitative parameters

Variable	Sperm count	Sperm count (m/ml)	Semen volume	% of motile sperm	Progressive sperm	% of normal morphology
Age	Spearman	-0.065	0.184	0.071	0.105	0.047
	p-value	0.515	0.066	0.480	0.297	0.642
Age of marriage	Spearman	0.033	-0.010	-0.030	0.009	0.067
	p-value	0.741	0.921	0.767	0.927	0.506
BMI	Spearman	-0.015	0.142	-0.029	0.010	-0.053
	p-value	0.881	0.155	0.773	0.924	0.596
Sperm count	Spearman	----	0.169	0.221	0.208	0.650
	p-value	----	0.092	0.026	0.037	0.000
Semen volume	Spearman	---	---	0.455	0.426	0.421
	p-value	---	---	0.000	0.000	0.000
% of motile sperm	Spearman	---	---	---	0.902	0.619
	p-value	---	---	---	0.000	0.000
% of progressive sperm	Spearman	---	---	---	---	0.647
	p-value	---	---	---	---	0.000

DISCUSSION

Factors involved in infertility vary across different geographical, racial, medical and cultural contexts worldwide. Determining these factors in different countries in terms of geographical contexts is of a great significance. The present research looks into demographic traits and how they correlate with male infertility. No statistically significant correlation was found between such factors as obesity, smoking and sperm qualities. However, a statistically significant correlation was observed between diabetes and sperm count.

In the present research, no significant correlation was found between smoking and sperm count per milliliter of seminal fluid. Similarly, no statistically significant correlation was observed between seminal fluid parameters and smoking. In Relwani *et al.*'s study as well as Jong De *et al.*'s, no significant correlation was found between smoking and infertility [16, 17]. The findings reported by Wegner et al., Yang *et al*., Hull *et al*., and Hassan *et al*., were not consistent with the findings of the present research. They had observed significant correlations between smoking, years of smoking and the number of cigarettes smoked a day and infertility problems [18-21]. In fact, the deleterious content of smoke affects the hypothalamic cycle of producing sex hormones and prevents an adequate production of quality sperm [16]. One limitation in the present study as well as the body of related research has been the low number of smokers.

No statistically significant correlation was found between BMI and sperm count per milliliter of seminal fluid. Findings reported by Relwani et al. and Pauli et al. confirmed the correlation between BMI and sperm count [16, 22]. The correlation of BMI and sperm count was reported as weak by Aggerholm *et al*., [23]. No such significant correlation was found between these two by Wegner *et al*., and Paasch *et al.,* similar to the present investigation [18, 24]. In their research, Du Plessis SS *et al*., (2010) showed that weight loss had no effect on improved sperm quality [25]. In two cohort studies conducted in the U.S. and Norway, The effect of BMI was explored independently from smoking and sex on sperm count. Despite the fact that increased BMI showed to have lengthened infertility but had no effect on sperm count [26, 27]. In the present research, the effect of BMI was explored on sperm count although the effect of BMI on infertility can be due to the effect of obesity on sex hormones or biological aspects. Moreover, the duration of obesity and high BMI can lead to divergent results too.

In the present research, a significant correlation was found between affliction with diabetes and sperm count per milliliter of seminal fluid. The risk of fewer than 20 millions of sperm per milliliter of seminal fluid in diabetic infertile men is three times as high as non-diabetic infertile men. In La Vignera *el al.,* study, a higher percentage of diabetic patients got infertile and a significant correlation showed up between infertility and diabetes [28]. Similarly, in Delfino et al. and Dinulovic *et al.,* investigations, diabetes showed to negatively affect the sperm quality and showed to be correlated with infertility. According to research findings, diabetes has a negative effect on secondary sex hormones (testosterone level) and the spermatogenesis process (negative effects on epididymis cells). Therefore, it can lead to infertility and disruption in seminal fluid parameters. Moreover, the percentage of sperm with fragmented DNA was higher in diabetic infertile men than other infertile counterparts [29, 30].

In their research, Bener *et al*., (2009) aimed to investigate the role of diabetes in infertile men, and found a significant correlation between diabetes and infertility [31]. Due to the significant role smoking plays in a body of research, it is suggested that the effect of diabetes be investigated separately from smoking.

Arjmand *et al*., (2015) conducted a study which explored the correlation of type II diabetes and female infertility. Contrary to what the researchers anticipated, diabetes had a protective role towards infertility and helped to reduce it. This divergence can be due to the differing research populations (inclusion of female subjects) [32].

The present research showed no significant correlation between experience of prior surgery and sperm count per milliliter of seminal fluid. Although varicocele was known as the key cause of male infertility, no significant correlation was found between surgical treatment, varicocele and infertility [15].

In a body of research with proper sample sizes, high BMI and smoking were considered as the two key factors of infertility [18]. Due to its probable injuries, diabetes and its negative impact already confirmed in similar research can be considered as a risk factor [28]. This has been approved in the present research.

Environmental and social factors vary across different geographical areas. Therefore, there is a need for further research in different geographical areas due to the effect of geography on infertility. One limitation of this research was lack of access to sufficient and ideal patient subjects. Therefore, we suggest that more research be conducted with a larger sample size. We also suggest that controlled blood pressure and sperm variation modifications be investigated in diabetic infertile men.

CONCLUSION

The foremost infertility problem was concerned with sperm motility the correlation of which with demographic parameters remained uncertain. A statistically significant correlation between diabetes and sperm count is a key side effect of diabetes and shows the significance of controlling blood glucose in diabetic infertile men.

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Ethical issues

During the whole procedures, patient subjects participated with full consent and were ensured of the confidentiality of the information they provided.

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