Original Article

Facts of life and global issues affecting semen parameters causing male infertility in and around our institute – A prospective study

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Abstract

Context: Nowadays, the inability to conceive is a common problem. Reason can be either from female or male side. Male lifestyle factors such as alcohol consumption, tobacco smoking and chewing are some of the most common causes of male infertility.

Aims: The aim was to describe the semen quality (sperm count and motility) of those consuming alcohol and smoking and chewing tobacco.

Settings and Design: This prospective study was conducted in and around of our institute, during the period of July 2017 to June 2018.

Materials and Methods: A total of 203 cases, aged 18 to 50 years, were included for semen analysis by using manual method according to World Health Organization 2010 criteria and also asked to answer a validated questionnaire about life habits and health status. Data analysis was performed by Statistical Package for the Social Sciences version 19.

Results: Of 203 samples, 125 (61.58%) cases were between the ages of 18 and 30 years. Percentage of normozoospermia, oligozoospermia and azoospermia were 73.40%, 23.15% and 03.44%, respectively. Out of 47 (23.15%) sample of oligozoospermia, 38 (80.86%) were alcoholic, 32 (68.09%) men tobacco smokers and 12 (25.54%) men tobacco chewers. A total of 72 (35.47%) out of 203 samples showed reduced sperm motility, of which 50 (69.44%) patients were addicted to alcohol consumption.

Conclusion: This study indicates that male fertility is damaged by negative influences of lifestyle factors. Therefore, before the attempt to conceive, it is advisable to modifying lifestyle factors discussed in the present study that helps controlling their own fertility potential.

Keywords: Infertility, lifestyle factors, sperm count, sperm motility

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INTRODUCTION

In up to 40% of infertile couples, male plays a key role for difficulty in conception. Infertility means failure to conceive pregnancy after regular unprotected intercourse for 1 year that efforts emotionally stressful and physically taxing in most couples.[1,2] There are many factors affecting reproductive system, and some might be beyond patient's control, such as medical issues, nutrition, weight, exercise, psychological stress. Negative effects of lifestyle factors also have been documented.[3] Along with liver, respiratory and cardiovascular system, alcohol and tobacco are closely known hazardous factors for reproduction causing low sperm count, sperm motility and sperm fertilizing capacity by increased seminal oxidative stress and DNA damage.[4,5] Tobacco contains some deadly toxic carcinogens: nicotine, carbon monoxide, nitrogen oxide and cadmium, which directly affect male and female gametes and embryos. Semen analysis is the non-invasive and cornerstone method for directly evaluating, to get information regarding functional status of seminiferous tubules, epididymis and accessory sex glands and the relationship between exposure to environmental agents and fertility to be investigated.[1,6] Men can have children with low sperm count and those count are normal can be infertile.[7] In this study, we evaluated the potential risk and complications of alcohol and tobacco smoking or chewing on semen and the need for early attention to avoidable or remediable causes.

MATERIALS AND METHODS

This prospective study took place in L.L.R.M. Medical College between July 2017 and June 2018 comprised 203 consecutively recruited male partners referred for semen analysis in Department of Pathology. Clinically infertile men with a history of infertility persisting longer than 1 year and Lifestyle factors that affect assisted reproduction were enrolled in the present study. The patients who were detected with a history of systemic disease, drug use, inguinal or testicular surgery, varicocele, undescended testis and hypoplasic testis at physical examination were excluded from this study. The study protocol was approved by the Institutional Ethical Committee. Participants were questioned regarding their alcohol consumption, smoking habits and tobacco chewing. Informed written consent was obtained from each patient. After 3 days of sexual abstinence, semen samples were obtained by masturbation in a sterile and wide mouthed container. Samples were kept at normal room temperature and processed immediately after complete liquefaction, and routine semen analysis was carried out according to the World Health Organization (WHO) guidelines. The results were categorized on the basis of sperm count and motility: normozoospermia, oligozoospermia, azoospermia and asthenozoospermia. Data were analysed using the Statistical Program for Social Science software 19.

RESULTS

Total 203 cases of clinically diagnosed male infertility were included in this study. The ranges of age group were 18 to 50 years. Most of the patients were between the ages of 18 and 30 years ($N = 125$; 61.58%) followed by 31 to 40 ($N = 49$; 24.13%) and 41 to 50 years ($N = 29$; 14.29%) [Table 1].

Majority of cases were of normozoospermia ($N = 149$; 73.40%). A total of 54 patients showed low sperm count, out of which 47 (23.15%) were of oligozoospermia and seven (03.44%) were of azoospermia [Table 2]. Out of 47 cases of oligozoospermia, 80.86% patients were alcoholic, 68.09% were tobacco smokers and 25.54% were tobacco chewers. Out of seven patients of azoospermia, 85.72% were alcoholic and smokers per each [Table 3]. Out of 72 cases of asthenozoospermia, 69.44% cases were alcoholics, 63.88% were tobacco smokers and 25% were tobacco chewers [Table 4].

DISCUSSION

In the present days, awareness to infertility is the main focus, because of lots of male partners were consulted for semen analysis for infertility. This allowed us to investigate the association between high prevalent risk factors and the outcomes related to infertility. Male plays a major role in infertility almost in half of the infertile couples due to highly sensitivity to the various factors. The reasons may be either from genetic, lifestyle and environment factors

Table 1: Distribution of cases ($N = 203$) according to the age

Age	Number of cases	Percentage (%)
18–30	125	**61.58**
31–40	49	24.13
41–50	29	14.29
Total	**203**	**100**

Table 2: Various semen variables and distribution of cases ($N = 203$)

Semen variable	Number	Percentage (%)
Normospermia	149	73.40
Oligospermia	47	23.15
Azoospermia	07	03.44
Asthenospermia	72	35.47

Table 3: Association of lifestyle factors with various semen variables

No. of cases	Types	Alcohol		Tobacco smoking		Tobacco chewing	
		Present	Absent	Present	Absent	Present	Absent
Sperm count	Normozoospermia (N = 149)	26 (17.45%)	123 (82.55%)	28 (18.79%)	121 (81.21%)	06 (04.03%)	143 (95.97%)
	Oligozoospermia (N = 47)	38 (80.86%)	09 (19.14%)	32 (68.09%)	15 (31.91%)	12 (25.54%)	35 (74.46%)
	Azoospermia (N = 07)	06 (85.72%)	01 (14.28%)	06 (85.72%)	01 (14.28%)	03 (42.867%)	04 (57.14%)
Total	**203**	**70 (34.48%)**	**133 (65.52%)**	**66 (32.51%)**	**137 (67.49%)**	**21 (10.34%)**	**182 (89.66%)**

Table 4: Association of lifestyle factors with sperm motility

Motility	No. of cases	Alcohol		Tobacco smoking		Tobacco chewing	
		Present	Absent	Present	Absent	Present	Absent
Asthenospermia	72 (35.47%)	50 (69.44%)	22 (30.55%)	46 (63.88%)	26 (36.11%)	18 (25.00%)	54 (75.00%)

may be chemicals and physical generated by industrial or agricultural activities. Some studies have proven that no medical or surgical factors are implicated, and the aetiology remains unclear Some ordinarily skirmished drugs and medications may be resulted in prejudicial to semen parameters and male sexual execution due to exert of gonadotoxic effect on the testicles, alter the hypothalamic–pituitary–gonadal axis, impair ejaculation, erectile function and libido.[3,8,9]

Although there are several lifestyle factors that contribute to male infertility, in this study we focused on impact of certain lifestyle factors such as alcohol consumption, smoking and tobacco chewing, and these are responsible for decline in male reproductive health. In the present study, the total sperm count and normal motility were significantly lowered among the lifestyle-exposed patients. In a recent study, most of the cases were of the age group of 18 to 30 years, which means this is the common age of infertility presentation. Among the study patients, seven (03.44%) were azoospermia, 47 (23.15%) oligozoospermia and remaining 149 (73.40%) had normal sperm count. A total of 72 (35.47%) patients had asthenozoospermia. Almost similar findings were observed in study of Sunil *et al.*[10] which showed 7.9% were azoospermic, 26.3% oligozoospermic, 65.8% normozoospermia and 36.7% patients were asthenozoospermic.

Alcohol consumption is the most common in India. Some studies showed that high-level alcohol has damaging effect on the body including reproductive system. Alcohol gradually decreases the spermatogenesis, interferes with the production of GnRH, FSH, LH and testosterone as well as impairs the functions of Leydig and Sertoli cells.[11,12] Data from some studies also showed that the dose of alcohol has a key role on semen parameters. Those men who consume alcohol in large amount per day or in a week found have more effect on sperm count and motility. One study suggests that heavy chronic alcohol intoxication produces azoospermia ultimately which diagnosed initially as teratospermia and oligoasthenoteratospermia. Jensen *et al.* reported that moderate alcohol consumption does not impair semen parameters.[13-16]

In the present study, alcohol consumption had more impact on both sperm count and motility. A total of 80.86% of the patients of alcohol habits had oligozoospermia and 69.44% had asthenozoospermia. This study was similar to the study of Abhinav and Sunil *et al.* which showed that oligozoospermia was much higher among alcoholics, which indicate the significant relationship between alcohol consumption and infertility. Overall 17.45% of the alcoholics showed normozoospermia followed by oligozoospermia, azoospermia (85.72%) and asthenozoospermia (69.44%)-dominated alcoholics [Tables 3 and 4]. Similar findings were observed by Gaur and Abhinav *et al.*[6,10,17]

According to the WHO (2002), approximately one-third of the world's male adult population (above 15 years of age) smoke. Reports have shown lots of hazardous chemicals substances are present in tobacco smoke such as reactive oxygen species that submerge the endogenous antioxidant defences, expose the spermatozoa to oxidative stress and can end up in the seminal plasma *via* various modes of diffusion and active transport. Consequently, it impairs sperm parameters and ultimately compromises male fertility.[11,18] In the present study, the total sperm count and normal motility were significantly lowered among the tobacco-smoke-exposed patients, which showed 68.09% oligozoospermia and 63.88% asthenozoospermia. Some scientific studies have suggested that smoking reduces sperm production, sperm motility, sperm normal forms and sperm fertilising capacity through increased seminal oxidative stress and DNA damage. Few papers reported non-significant differences in semen parameters between smokers and non-smokers.[5,19] One study suggests that

mild smoking does not express any effect on sperm motility, whereas the moderate and heavy smokers had significant low motility. But no significant differences in sperm count were noted between the smokers and non-smokers. Further, it was suggested that the relationship between smoking and sperm motility was dose-dependent.[4,20,21]A total of 30 mutagenic agents are present in tobacco. Out of them, nicotine is most hazardous which gets absorbed through skin, mucous membrane and respiratory tract and finally metabolized through liver and degraded its products in serum, urine, saliva, milk and seminal plasma. Nicotine affects the sperm plasma membrane and genetic integrity by its powerful oxidizing actions. The present study showed mild association of tobacco chewing with 25.54% oligozoospermia and 25% asthenozoospermia. Priyadarsini *et al.*[22] in their study found oligo (66%) and asthenozoospermia (85%) were significantly high among the chewers as compared to non-chewer. According to the above, tobacco chewing may also affect male infertility, but to which level? That is not clear. No more data were found regarding that.

CONCLUSION

A variety of risk factors had influence on sperm quality. Overall this study suggests that alcohol consumption, smoking and tobacco chewing may impact fertility. As far as lifestyle factors are concerned, more abnormalities are frequently reported due to alcohol consumption and smoking. Interestingly, tobacco chewing has been associated with a low impact on reproductive system. It seems advisable to encourage the male to change lifestyle factors before attempting to conceive, which will provide better chances for natural conception.

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Conflicts of interest
There are no conflicts of interest.

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