

Research Article

The Effect of Recreational Drugs on Seminal Parameters in Males of Pashtoon Tribe of Khyber Pakhtunkhwa, Pakistan

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Keywords

- Recreational drugs (Naswar, marijuana, & cigarette) seminal parameters; Pashtoon tribes

Abstract

Objective: The present study aimed to determine the effects of the different recreational drugs (cigarette, dipping tobacco and marijuana) on the semen parameters of infertile males.

Study Design: Case Control study: 1.1.2. Study Population: The study population consisted of 160 apparently healthy infertile adult males of Pashtoon ancestry which were divided in to four groups, consisting of (n = 40) subjects each.

Study Settings: The study was conducted in Institute of Basic Medical Science, Khyber medical university (IBMS-KMU), Peshawar, Bannu Medical College (BMC), Samad Clinical laboratories and Shah Noor Medical laboratories Bannu.

Methodology: The semen samples were obtained through masturbation and were analyzed by conventional method as described by WHO.

Results: The results showed no significant changes in the baseline characteristics (Age, BMI, Blood pressure) of the study populations when compared with control group. The semen parameters showed that active motile sperms were $50.18 \pm 19.8\%$, $45.83 \pm 20.4\%$, $43.78 \pm 21\%$ and $42.28 \pm 16.8\%$ in control, smokers, dippers and marijuana users respectively. The viscosity of the semen was 1.43 for control, 1.16 for smokers, 1.45 for dippers and 1.38 for marijuana users. The mean seminal volume was 2.0 ml, 2.0 ml, 2.0 ml and 2.18 ml respectively in controls, smokers, dipping tobacco users and marijuana users. The sperm count was 74.73, 73.43, 68.00 and 66.18 million/ml in controls, smokers, dipping tobacco users and marijuana users respectively.

Conclusion: Our study showed that the users of recreational drugs affect the semen parameters by decreasing sperm count, and actively motility.

INTRODUCTION

The population of the world has exceeded more than 6 billion peaks in the previous millennium. Thus the population explosion has many deleterious effects; one of them is the masking effect on infertility prevalence. It has been estimated that about more than one third of all men in the world smoke tobacco in some form and 21.6% of men in America smoke cigarettes [1]. There is strong linkage between smoking and a myriad of adverse health outcomes, which included respiratory diseases, cardiovascular diseases, cancer of various body organs like lungs, esophagus, stomach, bladder, etc [2].

Use of recreational drugs like Cigarette, Dipping tobacco and marijuana is related to social factors especially the influence of parents and peers. Taste and smell also increases the inclination towards smoking. As cigarette smoking is suggested to be mood stabilizer, this may reinforce and maintain daily use among the young people [3]. Decrease in male fertility is not conclusively demonstrated by available data, however its impact on various semen parameters, it is regarded as a risk factor for infertility [4].

Dipping tobacco (Naswar) is a one of the type of smokeless tobacco (*Nicotiana tabacum*) which is typically produced and used in South East and Central Asia and, particularly in Pakistan. Serum nicotine and Cotinine levels were found increased in rats when they were exposed to smoking. Both these adversely affected sperm fertilizing potential and spermatogenesis [5]. The marijuana is used for thousands of years for medicinal and recreational purposes [6]. Marijuana derived from female cannabis sativum plant, about 400 compounds in marijuana is derived, in which Delta-9-Tetrahydrocannabinol is the major psychoactive compound [7]. The effects of marijuana in the human have been observed in relation to production and morphology of sperms. Oligospermia has been observed which is dosing related [8].

Various detrimental effects have been shown on various semen analysis parameters and forward progression rates. Ramlau-Hansen et al., found that those who smoke cigarettes had lower volume of semen, lower sperm count and lower percentage of motile sperm compared to those who were not smoking. It was further suggested that the relationship between sperm

concentration and cigarette smoking was dependent on the dose of smoking. Those who smoke more than 20 cigarettes per day had a 19% reduced sperm concentration as compared with non-smokers. Thus it was concluded that smoking in adults impaired the semen quality moderately [9]. Kunzle et al., demonstrated that cigarette smoking decreases total sperm count (17.5%), sperm density (15.3%) and total motile sperm (16.6%). Furthermore ejaculate volume and morphology is decreased but not significantly [10].

Saaramen et al., noted that volume of semen per ejaculate was lower in smokers as compared With non-smokers. He also noted that the inhibition occur specifically in those who smoke more than 16 cigarettes per day [11]. In another study by Zhang et al., it was found that decreased semen volume and sperm concentration occurred in smokers as compared to nonsmokers [12]. Keeping these in mind, the present study was designed to see the effect of recreational drugs on seminal parameters in males of Pashtoon tribe of Khyber Pakhtunkhwa

MATERIALS AND METHODS

Study Design

Case Control study

Study Population

The study population consisted of 160 apparently healthy infertile adult males. The study subjects were mostly of Pashtoon ancestry. The participants were divided in to four groups: cigarettes smokers (n = 40), dipping tobacco users (n =40), marijuana users (n = 40) and 40 young healthy infertile controls. The following inclusion & exclusion were adopted.

Inclusion & Exclusion criteria

All the subjects who were infertile and using recreational drugs (Naswar, Cigarettes and Marijuana) for a minimum five years' time were included. While, infertile males who were using multi drugs, chronic diseases such as diabetes, hypertension, nephrotic syndrome or arterial fibrillation, and non-willing persons were excluded from the study.

Study Settings

The study was conducted in Institute of Basic Medical Science, Khyber medical university (IBMS-KMU) Peshawar, Bannu Medical College (BMC) Bannu, Samad Clinical laboratories and Shah Noor Medical laboratories Bannu.

Semen Sample Collection

The semen samples were obtained through masturbation using standardized technique and were analyzed by conventional method as described by WHO.

Statistical analysis Statistical Analyses

Statistical analyses were carried out using SPSS 19. The normality of the data was tested using Kolmogorov-Smirnov and Shapiro-Wilk tests and histograms. Abnormalities in sperms variables were not normally distributed and were log transformed for analysis. Summary statistics were calculated and data were expressed as means \pm standard deviation. Age,

height, weight, BMI, SBP, DBP, and semen analysis parameters were compared between groups by ANOVA. p- Value less than 0.05 was accepted as significant.

RESULTS

In this study 160 infertile healthy subjects were recruited. The study participants were mostly of Pashtoon ancestry. The infertile subjects were further divided in to four groups. Among them 40 were cigarette smokers, 40 were marijuana users, 40 were using dipping tobacco (naswar) and 40 were infertile males who were not using any recreational drugs (control). All the participants of the study had used these drugs for more than five years and they were still using the same drugs.

Table 1 shows the baseline characteristics of the study participants i.e. control group, smokers, dippers and marijuana users. There was no difference in the mean age of participants among the different groups. The heights and weight were the same in all the study groups. BMI was calculated from height in meters² divided by weight in Kg of the participants. BMI was same in all groups. Blood pressure was measured to check any adverse effects of recreational drugs used. A variable trend in both systolic and diastolic blood pressures was observed in all the four groups as shown in the Table 1.

The mean systolic blood pressure of the control was not much different from those of dippers. While, the systolic blood pressure was increased in smokers (118.75 \pm 9.04) and decreased in marijuana users (111.575 \pm 19.74), however the difference was statistically non-significant.

Table 2 shows the comparison of semen parameters among the smokers, dippers and marijuana users of the study with that of control group. It is clear from this table that the active motile sperm percentage in various groups was 50.18 \pm 19.8%, 45.83 \pm 20.4%, 43.78 \pm 21% and 42.28 \pm 16.8% of control, smokers, dippers and marijuana users respectively, showing low motility in smokers, dipping tobacco users and marijuana users as compared to controls. The decrease was, however, more pronounced in marijuana users followed by dipping tobacco and smokers as compared to the controls (Table 2). The increase in viscosity was more in smokers (1.16) followed by dipping tobacco (1.45) users.

The mean seminal volume in controls, smokers, dipping tobacco users and marijuana users was 2.0 ml, 2.0 ml, 2.0 ml and 2.18 ml respectively, showing no significant affected, however, the result of our study showed that the sperms count was decreased in recreational drugs users as compared to controls. The sperm count was 74.73, 73.43, 68.00 and 66.18 million/ml in controls, smokers, dipping tobacco users and marijuana users respectively Table 2, showing that the sperm count was more affected by marijuana users followed by dipping tobacco and smoking but the decrease was not significant. On the other hand the abnormal sperm percentage in the semen of controls, smokers, dipping tobacco users and marijuana users were 7.14 %, 5.73%, 5.93% and 6.24% respectively showing reduced percentage of abnormal sperms in recreational drugs users as compared to controls.

DISCUSSION

Infertility is defined as the inability to get pregnancy within

Table 1: Baseline characteristics of the study participants, control group, smokers, dippers and Marijuana users.

Parameters	Study Groups			
	Control n = 40	Smoking n = 40	Dippers n = 40	Marijuana n = 40
Age (year)	28.5 ± 6.21	29.57 ± 6.43	30.1 ± 6.73	30.17 ± 6.61
Height (meter)	1.718 ± 0.07	1.70 ± 0.58	1.70 ± 0.07	1.70 ± 0.05
Weight (Kg)	68.57 ± 6.10	68.875 ± 7.35	68.525 ± 6.21	68.55 ± 7.66
BMI (Kg/m ²)	23.29 ± 2.3	23.80 ± 2.03	23.63 ± 2.93	23.77 ± 2.60
Systolic blood pressure (mmHg)	116 ± 8.71	118.75 ± 9.04	117.25 ± 10.25	111.57 ± 19.74
Diastolic Blood Pressure (mmHg)	75.87 ± 5.98	78.62 ± 7.60	75.32 ± 13.76	75.62 ± 7.17

Abbreviation: BMI, Body Mass Index (Kg/m²)

Table 2: Semen parameters of the participants. Group-wise comparison of study population.

Parameter	Study Groups			
	Control n = 40	smoking n = 40	Naswar n = 40	Marijuana n = 40
Active (%)	50.18 ± 19.81	45.83 ± 20.43	43.78 ± 21.38	42.28 ± 16.88
Viscosity	1.43 ± 0.50	1.60 ± 0.50	1.45 ± 0.50	1.38 ± 0.49
Semen volume (ml)	2.00 ± 0.49	2.00 ± 0.57	2.00 ± 0.60	2.18 ± 0.48
Sperm count (Million/ml)	74.73 ± 28.23	73.43 ± 26.86	68.00 ± 27.38	66.18 ± 25.63
Log abnormal	7.14(5.43-9.40)	5.73(4.38-7.49)	5.93(4.26-8.25)	6.24(4.04-9.65)

12 months through regular unprotected sexual relations with the same opposite partner [13]. Male fertility potentials are of great interest for various academicians & researchers. The male infertility is a clinical syndrome which is a collection of different conditions and exhibits a verity of etiologies and has varying prognosis [14]. It is unreasonable that one should consider that tests will tell us about the fertility of a man.

The willingness and availability of men to undergo the evaluation is the major hurdle to respond the infertility because the inability of a man to impregnate a woman is thought to be due to diminished masculinity and virility. Infertility evaluation of male dominated society like Pakistan is not a simple task, as the husbands never push themselves for evaluation rather they push their wives for evaluation. They think that by simply performing coitus has proven their fertility but when their views were found normal then they agree for evaluation in the form of semen analysis. Decline change has been noted in such type of attitude, as most of the clinicians require the assessment of both male and female partners simultaneously. Thus report of semen analysis is made mandatory by majority of clinicians and gynecologists before the evaluation of female partner.

The main causative factors which are responsible for male infertility are testicular tissue absence, such as anorchism, bilateral castration, and Klinefelter's syndrome in which production and function of sperm is impaired. Similarly, AZF gene deletion (Genetic risk of azoospermia factor) (y deletion), cryptorchidism, cancer of the testis, impaired transport of sperms, blockage of epididymus, failure of ejaculation, vasectomy, impotence and varicocele are also responsible for male infertility. Besides this, age above 55 years, environmental agent like extremes of temperature, genitourinary infections, radiations,

occupational hazards, nutritional deficiencies of trace elements mainly zinc, selenium, vitamins, various recreational drugs like alcohol, tobacco abuse, and marijuana are reported to cause male infertility [15].

It is quite refutable that the cigarette smoking has detrimental effects on male reproduction, performance and specifically on parameters of semen [13]. There is a great and recent desire to better understand and treat male infertility so it has become very important to reach the possible adverse effects of cigarette smoking on reproduction in males [14]. Mutagen which are chemical agents, effects reproduction in male by effecting directly on the testis and their ability of sperm production [16,17]. The mechanism involved in these processes may be due to the hormonal control of sperm generation or they may directly affect sertolli and germ cells within the seminiferous tubules [18,19]. A number of studies have reported higher incidence of abnormal sperm cells, along with decreased motility and sperm count in male smokers [20].

In the present study we investigated the effects of cigarette smoking on the semen quality of the infertile men who smoked for a long time. The results showed that the smokers have decreased sperm count with an average 73.43 million/ml, less active motile sperm 45.83% (Table 2).

The cigarette smoke contains more than 4000 substances which are harmful. There has long been concern that smoking could have bad effects on male reproduction. First and foremost cigarette smoking has adverse effects on semen quality including sperm count, semen volume, and motility of sperms along with morphology. Furthermore disorders of reproductive hormones system defects in spermatogenesis, process of sperm maturation or defective spermatozoa function has been observed in smokers.

Despite of the detrimental effects of smoking on male fertility, many of the smokers are fertile but they have a high risk of sub fertility or infertility [21].

In our study the results showed that there was no difference in semen volume of smokers and nonsmokers (2.00 ml for each group), but the active motile sperms were less in smokers than nonsmokers, 45.83% and 50.18% respectively (Table 2). Sperm count was less in smokers than nonsmokers, 73.43 million/ ml and 74.73 million/ ml (Table 2). Other studies showed that the volume of semen was less in smokers [22]. Our study also showed that volume of semen increases when the dose of smoking was increased or the number of sticks smoked per day was increased. This could be due to the nicotine present in cigarettes which stimulate the accessory sex glands which are prostate gland, seminal vesicle and urethral glands etc. which increases the seminal volume through their secretions [23].

Active motile sperms in our study were decreased 47.87% as compared to controls 50.18% (Table 2). The probable explanation of this could may be due to mutagenic effects of aromatic hydrocarbons and the toxic effects of nicotine [24], which can reduce the testicular microcirculation due to which less RBCs reach the cells in the testes to supply oxygen for respiration. The cigarette smoke contains carbon mono oxide which also reduces the oxygenated hemoglobin availability which led to reduced supply of oxygen to sperm cells [25]. Reduced supply of oxygen to sperm cells reduces the utilization of oxygen by the mitochondria of sperm cells [26] which reduces motility of sperms. In our study the sperm count was less in smokers than in control and the effect was dose dependent. This finding is corroborated with another prior study [27]. It is explained that Nicotine present in cigarette impairs spermatogenesis which leads to reduced total sperm count in smokers as compared with nonsmokers also confirmed by Trummer et al., [28].

CONCLUSION

In the present study we investigated the effects of 3 recreational drugs like cigarette smoking, naswar and marijuana on the semen quality of infertile men who using these drugs for long time. The findings of our study showed that the users of these recreational drugs affect the semen parameters by decreasing sperm count, and active motility.

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