

Effect of Smoking on Quality of Semen Profiles among Primary Infertility Couple in Bangladesh

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Abstract

Background: Smoking has different bad effects in the human body. **Objective:** The purpose of the present study was to effect of smoking on quality of semen profiles among primary infertility couple. **Methodology:** This case-control study was carried from June 2010 to December 2010 for a period of six months. This study was conducted in the Infertility Centre at Shaheed Suhrawardy Hospital, Dhaka, Bangladesh and also in a selected private clinics of Dhaka City. The male smokers with the age group of more than or equal to 18 years who attended in the outpatient department of Infertility Clinic were selected as case group and nonsmoker male were selected as control group. The semen samples were analyzed in infertility laboratory of Shaheed Suhrawardy Medical College Hospital, Dhaka, Bangladesh. **Result:** A total number of 200 male were recruited for this study of which 100 cases were in the case group and the rest of 200 cases were in control group. Most of the study population was in the age group of 36 to 40 years which was 44(44.0%) cases and 40(40.0%) cases in case and control groups respectively ($p=0.414$). The mean with SD of volume of semen was in fewer amounts in case group than control group which was 2.2 ± 0.7 mL and 2.7 ± 0.6 mL respectively ($p=0.002$). The mean with SD of sperm count of semen was less in case group than control group which was 51.4 ± 20.8 /mL and 57.6 ± 17.1 /mL respectively ($p=0.028$). However, the mean with SD of motility of sperm in semen was less in case group than control which was 34.1 ± 10.3 and 62.0 ± 16.7 respectively ($p=0.001$). **Conclusion:** In conclusion the volume of semen, sperm count and motility of sperm are significantly associated with the smoking. [Journal of National Institute of Neurosciences Bangladesh, January 2022;8(1): 65-68]

Keywords: Effect; smoking; quality; semen profiles; primary infertility couple

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Introduction

Infertility is defined as inability of a couple to achieve conception after one year of unprotected coitus¹. This condition may be further classified as primary infertility, in which no previous pregnancy has occurred, and secondary infertility, in which a prior pregnancy, although not necessarily a live birth, has occurred². The primary infertility is found to be more frequently due to

male involvement and secondary infertility due to female involvement³.

The incidence of male infertility is also influenced by environment, occupation, socioeconomic condition, stress, sexual behavior, smoking and drinking habit as well as consumption of illicit drugs⁴. According to a study, smoking, density of sperm and the viability of sperm were found to be significant predictors for

infertility among men⁵. The duration of infertility also provides one of the most significant prognostic indicators of male infertility⁶.

In a meta-analysis⁷, including 27 studies on the association between cigarette smoking and semen quality a mean reduction in sperm concentration of 13.0% a mean reduction of sperm motility of 10% and a mean reduction of morphologically normal sperm of 3.0% was reported in smokers. Most of the studies, however, which reported a significant difference in semen quality, were performed in normal, non-infertility clinic men. Unfortunately, in 25 out of 27 studies in this meta-analysis, the number of smokers was less than 200 men⁷. Another major shortcoming is the lack of accurate smoking dose information. The purpose of the present study was to effect of smoking on quality of semen profiles among primary infertility couple.

Methodology

This was a case-control study. This study was carried from June 2010 to December 2010 for a period of six months which was conducted in the Infertility Centre at Shaheed Suhrawardy College Hospital, Dhaka, Bangladesh and in selected private clinics of Dhaka City. Consecutive male smokers who attended the outpatient department of Infertility Clinic of Shaheed Suhrawardy Medical College Hospital, Dhaka, Bangladesh and in selected private clinics were included in this study. Male infertile couple with age of 25 to 40 years with a history of primary sub fertility who were able to provide an ejaculate, the subject who had never had urogenital or serious systemic diseases, married at least for one year or none of them ever used any contraceptive measure for the past one year or longer were included in this study. Patients with the history of tobacco or betel nut chewing, bidi smoking, patients with occupational exposures to chemical or excessive heat like cases working at petrol pumps, chemical factories and bakeries, patients with history of injury to the testes, varicocele, hydrocoele, undescended testis or its corrective surgery and vasectomy reversal surgery, patients with history of any chronic illness such as tuberculosis, diabetes mellitus, hypertension, thyroid diseases, mumps or any ailment with long term under medication or azoospermics patient or above 45 years of age to avoid effects of ageing on sperm variables were excluded from this study. The semen samples were analyzed in the infertility laboratory of Shaheed Suhrawardy Medical College Hospital, Dhaka, Bangladesh. Semen samples were collected by masturbation in a clean specimen

container after a sexual abstinence for 3 to 6 days which was allowed to liquefy and were evaluated immediately thereafter. The result of semen analysis was classified according to the nomenclature of semen variables. Data was collected from the male partner and recorded on a pre-designed data collection sheet from each patient by face to face interview and from semen analysis report. Data was processed and statistical analysis was performed by Statistical Package Social Science (SPSS Version 20.0) software packet. P value less than 0.05 was considered significant and was measured by unpaired Student 't' test and 'x²' test.

Results

A total number of 200 male were recruited for this study of which 100 cases were in the case group and the rest of 200 cases were in control group. Most of the study population was in the age group of 36 to 40 years which was 44(44.0%) cases and 40(40.0%) cases in case and control groups respectively. However, next highest number of study population was 36(36.0%) respondents and 32(32.0%) respondents in the age group of 31 to 35 years in case and control groups respectively. The difference of age group in case and control groups were not statistically significant ($p=0.414$) (Table 1).

Table 1: Age Distribution of Study Population (n=200)

Age Group	Group		P value
	Case	Control	
26 to 30 Years	20(20.0%)	28(28.0%)	0.414
31 to 35 Years	36(36.0%)	32(32.0%)	
36 to 40 Years	44(44.0%)	40(40.0%)	
Total	100(100.0%)	100(100.0%)	

The mean with SD of volume of semen was in fewer amounts in case group than control group which was 2.2 ± 0.7 mL and 2.7 ± 0.6 mL respectively. The difference of volume of semen between the case and control groups was statistically significant ($p=0.002$). However, the mean with SD of pH of semen was 7.3 ± 0.1 and 7.7 ± 0.1 in case and control groups respectively. The difference of pH of semen between the case and control groups was statistically significant ($p=0.024$) (Table 2).

The mean with SD of sperm count of semen was less in case group than control group which was 51.4 ± 20.8 /mL and 57.6 ± 17.1 /mL respectively. The difference of sperm count of semen between the case and control groups was statistically significant

($p=0.028$). However, the mean with SD of motility of sperm in semen was less in case group than control which was 34.1 ± 10.3 and 62.0 ± 16.7 respectively. The difference of motility of sperm in semen between the case and control groups was statistically significant ($p=0.001$). Furthermore, the mean with SD of morphology of sperm in semen was less in case group than control which was 48.6 ± 10.2 and 54.8 ± 10 respectively. The difference of morphology of sperm in semen between the case and control groups was statistically significant ($p=0.003$) (Table 3).

Table 2: Semen Parameter in Case and Control Groups (Mean \pm SD)

Variables	Group		P value
	Case	Control	
Volume (ml)	2.2 \pm 0.7	2.7 \pm 0.6	0.002
Range (min-max)	(1 - 4)	(2 - 4)	
pH	7.3 \pm 0.1	13.7 \pm 19.7	0.024
Range (min-max)	(7.2 - 7.6)	(7.2 - 7.2)	

Student t test was performed to see the level of significance

Table 3: Microscopic Findings of Semen of Study Population (Mean \pm SD)

Variables	Group		P value
	Case	Control	
Sperm count/(ml)	51.4 \pm 20.8	57.6 \pm 17.1	0.028
Range (min-max)	(15 - 90)	(40 - 100)	
Motility (%)	34.1 \pm 10.3	62.0 \pm 16.7	0.001
Range (min-max)	(8 - 45)	(40 - 130)	
Morphology (%)	48.6 \pm 10.2	54.8 \pm 10	0.003
Range (min-max)	(30 - 68)	(30 - 70)	

Student t test was performed to see the level of significance

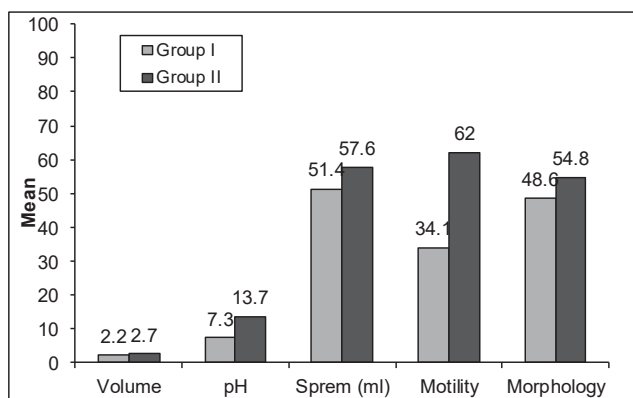


Figure I: Bar diagram showing the Semen parameter among smoker and non-smoker

Discussion

Infertility is a common problem affecting one in six couples' inability of a couple to achieve conception

after one year of unprotected coitus⁸. In 30.0% of infertile couples, the male factor, in the form of defective sperm quality, is a major cause and as a large number of men smoke worldwide and the fact that cigarette smoke contains known mutagens and carcinogens, there has been much concern that smoking may have unfavorable effects on male reproduction⁹. Several studies from different parts of the world have observed that cigarette smoking has an effect on the semen quality especially in those who are heavy smokers or who have been smoking for many years.

The results of semen analysis are classified according to the nomenclature of semen variables. Normozoospermia is diagnosed when sperm concentration, motility and morphology were within the reference values. The reference value for sperm concentration was taken as outlined in WHO guideline for sperm concentration ($>20 \times 10^6$ sperm/mL, motility ($\geq 50.0\%$) sperm with forward progression [categories 'a' and 'b'] or $\geq 25\%$ sperm with category 'a' movement; and for 'morphology; $\geq 30\%$ sperm with normal morphology respectively. Oligozoospermia is determined when sperm concentration was less than reference value. Likewise, asthenozoospermia was diagnosed when motility, and teratozoospermia when morphology, was below the reference values. An oligoasthenoteratozoospermia is diagnosed when all three variables like concentration, motility, morphology are disturbed. Combinations like oligoasthenozoospermia, oligoteratozoospermia, asthenoteratozoospermia are also used when two variables are found together.

In a study¹⁰, the quality of semen obtained from smokers were much lower than non-smokers ($p < 0.01$). The sperm concentration, viability and forward progression were negatively correlated with cigarette smoking ($p = 0.01$). No significant differences were noted in the quality of spermatozoa obtained from mild, moderate and short term smokers and non-smokers. Most semen parameters in the heavy and long term smokers are significantly lower than their corresponding values in the non-smokers ($p = 0.01$). In another study¹¹ the semen volume and activity and the sperm density, viability and forward progression, were much lower in the medium, heavy and long-term smokers than in the non-smokers ($p = 0.01$). The sperm density, viability and forward progression were negatively correlated with the amount and duration of cigarette smoking ($p = 0.01$). Several studies have mentioned these types of results. In this context a study¹² has been performed and is found that an inverse

dose-response relation between smoking and semen volume, total sperm count and percentage motile sperm. Heavy smokers had 19.0% lower sperm concentration than non-smokers. In a meta-analysis¹⁴ it has been mentioned that smoker's sperm concentration on average is 13.0% lower than that of non-smokers. Among normal healthy men like excluding infertility clinic patients, smokers had 24.0% lower sperm concentration.

Different studies have been performed in healthy men and 12 studies were conducted in infertility clinic patients and they all have suggested a decline in semen volume, sperm concentration, motility or morphology with an increase in the number of cigarettes smoked per day¹⁵. In this present study the semen volume and acidity and density morphology and forward progression are much lower in the smokers than in the non-smokers ($p < 0.05$). No significant difference in the results of semen quality were seen between mild medium and short term smokers. Most semen parameters in the heavy and long term smokers are significantly lower ($p < 0.05$).

Conclusion

In conclusion the volume of semen, sperm count and motility of sperm are significantly associated with the smoking. The sperm count of semen is found significantly less in case group than control group. The motility of sperm in semen is significantly less in case group than control. The morphology of sperm in semen is significantly less in case group than control. Further large scale study should be conducted in multi-center basis.

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