

A Prospective Study on Effect of Cigarette Smoking on Male Fertility in a Tertiary Care Hospital

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ABSTRACT

Introduction: Infertility poses severe ramifications at the cultural, social and emotional levels. It directly affects the lives of married couples resulting in distress, anxiety, blame and marital and sexual problems. Smoking is supposed to be one of the causes of Male infertility. Tobacco contains many compounds which are proven carcinogens have a harmful effect on testicular function which may affect male fertility directly.

Aim: This prospective study was carried out to establish the relationship between cigarette smoking and male infertility.

Materials and Methods: A total of 145 male patients were selected on the basis of inclusion and exclusion criteria. Out of 145 patients, n=117 were smokers and n=28 were non- smokers.

Results: Overall percentage of low sperm motility was more in cigarette smokers' n=78 (66.6%) group than in non-smokers n=28. Among 117 cigarette smokers, 33.3% had normal motility. In n= 117 cigarette smokers group, 34 subjects (29%) also showed low sperm counts.

Conclusion: This study throws light on the detrimental effect of cigarette smoking on male fertility as reflected by decreased vital parameters of semen like sperm motility and sperm count. Therefore awareness programmes should be carried out to show the detrimental effect of smoking on infertility.

KEYWORDS: Male infertility, Smoking, Sexual problems.

INTRODUCTION

Semen quality is believed to be informative about male fertility, which is defined as men's biologic capacity for reproduction irrespective of pregnancy intentions¹. Semen analysis remains the clinical standard for assessing male fecundity and related impairments including hormone production², and key components such as sperm concentration, motility and morphology are reported to be capable of classifying men by fertility potential³. Infertility is the inability to conceive after twelve months of regular sexual relation without the use of contraception or, carry to a live birth, a pregnancy⁴. Infertility poses severe ramifications at the cultural, social and emotional levels. It directly affects the lives of married couples resulting in distress, anxiety, blame and marital and sexual problems.⁵

Earlier studies have showed that both acute and chronic alcohol use can lead to impotence in men. Increased blood alcohol concentrations lead to decreased sexual arousal, increased ejaculatory latency, and decreased

orgasmic pleasure. The incidence of impotence may be as high as 50% in patients with chronic alcoholism. The commonest sexual dysfunctions in the male are erectile dysfunction, premature ejaculation, retarded or inhibited ejaculation.

Tobacco has numerous carcinogens and mutagens which have deleterious effects on human beings. Effect of carcinogens has been observed to be more on rapidly dividing cells which include germ cells. The maximum prevalence of smoking is observed in young adult males in the reproductive period⁶. Despite this, the undesirable effects of smoking on male reproductive health are less recognized and the impact of cigarette smoking on male fertility and sperm characteristics still remains controversial. Hence, this prospective study is undertaken to observe the effects of smoking on a few selected seminal fluid parameters like sperm count and motility and to compare the results with other similar studies.

MATERIALS AND METHODS

This was an observational and prospective study done on male patients presented with complaints of infertility in outpatient department of Medicine and Psychiatry, Rajshree Medical Research Institute, Bareilly in collaboration with the Department of Medicine in Rohilkhand Medical College, Bareilly. The study was approved by the ethics committee of the hospital and informed consent was obtained from all the subjects. The study was conducted on 25 to 40 age group patients over a period of 6 months and patients were enrolled on

the basis of inclusion and exclusion criteria. Selected patients were disseminated on the basis of Smoking history and were divided into n=28 Non-Smoker and n=117 smokers group. Only those patients were recruited in Smoker group who smoked a minimum of 10 cigarettes per day. They were categorized on the basis of duration of smoking as those smoking cigarettes for less than 5 years or for more than 5 years [Table-1]. Subjects with chronic illnesses like diabetes mellitus, hypertension and tuberculosis were excluded from this study.

[Table-1]: Depicts entire study group

Smoking history	Numbers	Percent
Non smokers	28	16.3
Smoking history less than 5 years	52	34.1
Smoking history more than 5 years	65	44.8
Total	145	100.0

[Table-2]: Comparative analysis of Sperm motility in Non-smokers and Smokers group.

Groups	Normal motility (greater than 32%) N=59	Low motility (less than 32%) N=86	Total N=145
Smokers			
< 5 years	24	20	44
> 5 years	15	58	73
Non-Smokers	20	8	28

[Table-3]: Comparative analysis of sperm count in non-smokers and smokers

Groups	Normal count N=108	Low count N=37	Total N=145
Smokers			
< 5 years	62	10	72
> 5 years	21	24	45
Non-Smokers	25	3	28

A detailed history including the duration and number of cigarettes smoked per day was elicited from the subjects. The subjects were instructed to observe three days of sexual abstinence since a longer period of abstinence reduces the sperm motility and a shorter period reduces the sperm count. The subjects were instructed to obtain the sample by masturbation making sure to include the first portion of the ejaculate since it is the most concentrated and contains the highest number of sperms. Condom collection was not entertained as it contains spermicidal agents.

The entire ejaculate was collected in a clean, dry, sterile and leak-proof wide-mouthed plastic container in a collection room attached to the laboratory. Routine semen analysis was carried out under light microscopy according to the 5th edition of WHO laboratory manual for the examination and processing of human semen.

Following liquefaction of semen, the wet sample was first assessed by placing 10µl of semen onto a glass slide

and covered with a coverslip. Approximately 200 spermatozoa in 5 fields at 200x magnification were counted for calculating the percentage of motility under three categories as progressive motility, non-progressive motility and immotility⁷. Sperm counting was then done by using modified Neubauer counting chamber. The total number of sperms was calculated by using the formula⁷, Total Sperm Count = Number of sperms counted x 50,000/ml Semen samples from 20 non-smokers were also collected in a similar fashion for comparison.

RESULTS

A total of 145 male patients aged 25 to 40 years were enrolled, attending the medicine department from Feb 2014 to Jan 2015 with the problems of Infertility. Enrolled patients were disseminated in two groups on the basis of history of smoking. Out of 145 patients selected, n=28 belongs to Non-smoker group and n=117

were smokers [Table-1]. Further smoker group was spliced into patients having Smoking history less than 5 years and patients having a smoking history more than 5 years. As depicted in [Table-2], Overall percentage of low sperm motility was more in cigarette smokers' n=78 (66.6%) group than in non-smokers n=28. Also, majority of the patients in Smoker group, were found in patients having smoking history of more than 5 years n= 58 than in patients smoked for less than 5 years n=20. Whereas only eight non-smokers showed sperm motility of less than 32%, the cause for which was not established. Obviously, the reduced sperm motility in this group was definitely not due to cigarette smoking since they were non-smokers. Among 117 cigarette smokers, 33.3% had normal motility. In our study of 117 cigarette smokers, 34 subjects (29%) also showed low sperm counts [Table-3]. Majority of low sperm count was found in patients having smoking history of more than 5 years n=24 than n=10 in patients smoked for less than 5 years. In non-smoker group n=3 patients were found to have low sperm count. That may be because of some other reason but not because of smoking. Therefore, our study showed that Cigarette smoking have a detrimental effect on both the sperm motility and the sperm count, but the effect on sperm motility was greater than that of sperm count.

DISCUSSION

This prospective study was undertaken to ascertain the link of Smoking habits to male infertility. All the previous studies have showed the detrimental effects of cigarette smoking on all the seminal parameters, therefore this study was done to relate the effect of the individual parameters on Infertility. Smoking causes increase in the concentrations of reactive oxygen species, cadmium and lead which affect sperm quality⁸. But in cases of a good primary testicular function it may mask or compensate the free radical injuries. The effectiveness of spermatogenesis is measured by sperm count. But sperm motility indicates epididymal maturation and sperm functional capability⁹. Sperm motility is attributed to its tail which is composed of flagella. The energy required for the movement is provided by the mid piece which is rich in mitochondria¹⁰. Motility is vital in normal functioning of sperm, as it not only helps in transportation but also helps in penetrating the outer layers of ovum for fertilization¹¹. Hence, the sperm motility can be considered as the most important factor influencing fertility.

According to previous research, it has been demonstrated that, mammalian sperm must remain motile in the female genital tract and free energy released from the hydrolysis of ATP is required for this movement¹². Zavos et al., have reported reductions in sperm motility associated with abnormalities in the

ultrastructure of the flagellum and the axonemal structures of the sperm tail¹³.

The present study showed decreased sperm motility and sperm count in cigarette smokers which was more evident in those with a smoking history of more than 5 years. Out of the 117 subjects, 39 had low sperm count whereas 78 had low sperm motility [Table-2, 3]. On comparing these two parameters, it was observed that the sperm count was less affected than the sperm motility. Zakarya Bani Meri et al., showed that there was a significant decrease in sperm concentration among heavy smokers as compared to the light smokers. They concluded that, cigarette smoking has a deleterious effect on some of the seminal fluid parameters like motility, morphology and leukocyte count which may in turn result in male subfertility¹⁴. Farkhunda Nadeem et al., identified the potential hazardous chemicals present in cigarette smoke which may cause sperm abnormality by affecting the chromosomes. They opined that, smoking can decrease male fertility by decreasing the sperm motility and percentage of normal sperm cells, and that a decrease in the percentage of motility of sperm cells and normal morphology is correlated with the number of cigarettes smoked per day¹⁵. This is in concurrence with our study as well as the studies by Shaaraway M et al., Kaulikauskas V et al., Vogt et al., Lingappa HA et al.¹⁶⁻¹⁹. In striking contrast to our observations and all the other studies, the study by Azar Aghamohammadi et al., opined that cigarette smoking does not appear to adversely affect sperm parameters since there was no significant difference in sperm quality in smokers except for semen volume and total sperm count. However, they concluded quitting smoking is clearly beneficial in terms of enhancing general health and more research is necessary to evaluate its role in male fertility²⁰.

CONCLUSION

Many of the male patients suffering from infertility not proven by other cause are found to be smokers. Therefore smoking has a definite relationship with male infertility. The vital seminal parameters which play a major role in male fertility like sperm motility and sperm count are decreased due to smoking and show a further decline with continuation of smoking for more than five years. Therefore awareness programmes should be carried out to show the detrimental effect of smoking on infertility.

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