

TO STUDY THE EFFECT OF HABITUATED TOBACCO CHEWING ON SEMEN QUALITY IN BIHAR

Sagar Dulal Sinha¹, Neelu Prasad², Rita Chakor³, Hira Lal Mahto⁴

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Corresponding Author:

Dr. Sagar Dulal Sinha,

Email: sagardulalsinha@gmail.com

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Abstract

Background: Male infertility has a significant contribution in cases of infertility. Different habits among males i.e. smoking, tobacco chewing and alcohol intake have found adverse influence on sperm count and sperm motility. The mechanisms according to which tobacco affects spermatozoa are poorly understood. The objective is to identify the role of smoking and tobacco chewing in decreasing sperm count and motility. **Materials and Methods:** It was a retrospective study done in Department of pathology-Central pathology laboratory from January 2021 to December 2021 in a tertiary care hospital in Bihar. A total of 150 samples were recorded during the study period. After 2 to 7 days of abstinence, semen samples were obtained by masturbating in a sterile container or using a semen collection condom. After liquefaction, the samples were promptly examined, principally for sperm count and motility. WHO criteria was used for comparing the reference values. SPSS was used for analysis. **Result:** Out of 150 samples studied 89 showed low sperm count, of which 71 were addicted to either smoking or tobacco, 26 were chronic smokers, 36 chronic tobacco chewers, of them 9 smoked and chewed both, and 18 men were free of addiction and this was statistically significant ($p < 0.05$) which indicates that tobacco in any form decreases sperm count. 57% (79) had low sperm motility in which 61 samples belonged to chronic addiction of tobacco and 14 individuals are chronically addicted but had normal sperm motility and this was significant ($p < 0.05$). **Conclusion:** Smoking or chewing tobacco both contribute to the decline in sperm quality and, consequently, the infertility of male partners.

INTRODUCTION

Infertility, in the words of the World Health Organization, is "a disorder of the reproductive system defined by the failure to obtain a clinical pregnancy after 12 months or more of regular sexual activity that is not protected. An important factor in cases of infertility is male infertility. Routine semen examination continues to be the key indicator of male fertility evaluation, surpassing overall physical condition, genetics, hormones, and concomitant disorders. Male infertility has been attributed to contemporary living styles and urbanization. Nicotine is a component of tobacco. It's well known that nicotine and the metabolite it produces, cotinine, can impair semen function and result in infertility.^[1]

Research has looked into how smoking or chewing tobacco affects the quality of human seminal tissue.

It is smoking most likely has a negative impact on male reproductive health.^[2] Semen analysis, while being a fairly basic and straightforward test, continues to be the principal inquiry to explore their influence in cases of male infertility.^[3] Studying the causes of infertility and taking action to reduce it are necessary because the number of instances is rising. So, the purpose of this study is to determine how tobacco use, one of the contributing factors to male infertility, affects the quality of the semen using seminal analysis as support.

MATERIALS AND METHODS

It was a retrospective study done in Department of pathology- Central pathology laboratory from January 2021 to December 2021 in a tertiary care hospital in Bihar.

After 2 to 7 days of abstinence, semen samples were obtained by masturbating in a sterile container or using a semen collection condom. After liquefaction, the samples were promptly examined, principally for sperm count and motility.

Methodology

After 2 to 7 days of abstinence, semen samples were obtained by masturbating in a sterile container. Semen normally appears as a semisolid coagulated mass right away after ejaculation into the collection receptacle. The semen typically starts to liquefy (thin out) within a few minutes at ambient temperature, at which point a heterogeneous. The fluid will have a variety of lumps. The semen becomes more uniform and watery as liquefaction progresses, and in the last stages, just a few small patches of coagulation are left. The entire sample typically liquefies in 15 minutes or less at room temperature, though on rare occasions it could take up to 60 minutes or longer. The sample is then quickly tested, largely for sperm count and motility.^[3] When the semen sample had been properly liquefied, the wet preparation was examined using light microscopy, and the results were compared to WHO criteria.^[4]

Inclusion Criteria

This study covered a total of 150 cases of clinically confirmed infertility that were reported at the Hospital in Bihar in 2021. The cases ranged in age from 22 to 45. Participants' occupations, smoking and chewing habits, medical histories, and family histories were all probed study were compared for

two traits: one is for progressive motility; the other is for quantity of sperm count. People were classified as chronic smokers or tobacco chewers, or chronically addicted, if they had smoked or chewed tobacco for longer than 12 months.

Varicocele, cryptorchidism, epididymitis, mumps, azoospermia, and other conditions that have previously affected reproductive function; vasectomy and vasectomy reversal were excluded from the study. The study was approved by Institutional Ethics Committee.

Statistical Analysis

The statistical analysis was performed using SPSS for windows version 22.0 software (Mac, and Linux). The findings were present in number and percentage analyzed by frequency, percent, and Chi-squared test. Chi-squared test was used to find the association among variables. The critical value of P indicating the probability of significant difference was taken as <0.05 for comparison.

RESULTS

As per [Table 2] that out of 150 samples studied 89 showed low sperm count, of which 71 were addicted to either smoking or tobacco, 26 were chronic smokers, 36 chronic tobacco chewers, of them 9 smoked and chewed both, and 18 men were free of addiction and this was statistically significant ($p < 0.05$) which indicates that tobacco in any form decreases sperm count.

Table 1: WHO criteria and Normal Reference value for Semen.^[4]

| Liquefaction time | Complete in 60min |
|----------------------|---------------------------------|
| Volume | 1.5ml |
| Color | Opalescent white |
| pH | >7.1 |
| Concentration (ml) | 15 million |
| Progressive motility | 32% |
| Vitality | 58% |
| Morphology | 4% |
| Leukocytes (ml) | < 1 million |
| Mar test | <50% sperm with bound particles |

Table 2: Distribution according to Sperm Count.

| Relation of sperm count and tobacco addiction | Low sperm count | Normal sperm count | Total | p-value |
|---|-----------------|--------------------|-------|---------|
| Chronically Addicted | 71 | 14 | 85 | 0.01* |
| Free of Addiction | 18 | 47 | 65 | |
| Total | 89 | 61 | 150 | |

Table 3: Distribution according to Morphology

| Relation of sperm motility and tobacco addiction | Low sperm motility | Normal sperm motility | Total | p-value |
|--|--------------------|-----------------------|-------|---------|
| Chronically Addicted | 61 | 14 | 75 | 0.01* |
| Free of Addiction | 18 | 57 | 75 | |
| Total | 79 | 71 | 150 | |

As per [Table 3] association between sperm motility with tobacco addiction was seen out of 150 samples 57% (79) had low sperm motility in which 61 samples belonged to chronic addiction of tobacco and 14 individuals are chronically addicted but had normal sperm motility and this was significant ($p < 0.05$). This concludes that tobacco

addiction deteriorates semen quality by decreasing sperm quality and motility.

DISCUSSION

Male fertility patterns differ significantly between and even within regions. A confluence of social

behaviors, such as smoking cigarettes, environmental factors, and this variance may be influenced by genetics.^[5] The World Health Organization (2022) estimates that roughly one-third of male adults (over 15 years of age) worldwide smoke. Around 4000 chemical compounds, some of which are highly poisonous, are produced when tobacco is burned. As a result of the presence of more than 30 known mutagens or carcinogens in cigarette smoke, such as radioactive polonium, benzo(a) pyrene, dimethylbenz(a)anthracene, dimethylnitrosamine, naphthalene, and methylnaphthalene, which have a direct detrimental effect on human embryos and female and male germ cells, are likely.^[6]

Cigarettes contain a variety of harmful ingredients. One of them is cadmium, which has been shown through experimentation to impair spermatogenesis and reduce sperm production smokers' concentration.^[7] Moreover, zinc, which is considered to be one of the key elements affecting sperm motility, was shown to be considerably lower in seminal plasma in smokers.^[8]

It has been demonstrated that nicotine raises the level of free radicals in sperm. At the same time, it makes the sperm more vulnerable to free radicals. There have underlined that because of the abundance of polyunsaturated fatty acids in their plasma membranes, human spermatozoa are particularly vulnerable to oxidative stress-induced damage by reactive oxygen species (ROS).^[9] The sperm damage that results in reduced sperm viability, sperm concentration, sperm motility, and increased morphological defects is thought to be mostly caused by the ROS in tobacco smoking, which cause lipid peroxidation of the sperm plasma membrane.^[10,11]

In one study, all patients' semen parameters—such as density, total sperm counts, motility, viability, and normal morphology—were significantly worse than those of the controls.^[12] A study that measured the amounts of cotinine in the blood and seminal plasma of fertile and subfertile males assessed the effects of smoking on male factor subfertility as well as the semen parameters of sperm count, motility, and morphology.^[13]

In a prospective research, infertile males who smoked had significantly fewer spermatozoa with motility grade B (9.37% against 11.9%, P0.05) than nonsmokers.^[14] According to a study, chewing tobacco negatively affects sperm quality and, to a lesser extent, oligospermia, nozoospermia, and azoospermia.^[15]

A study examined the effects of cigarette use on the semen characteristics of 327 men in Portugal in retrospective comparative research. First, the semen parameters of smokers and nonsmokers were compared, and then an examination of heavy smokers and light smokers was conducted. 55 (40.7%) of the total 135 smokers were heavy smokers across groups, the demographic traits were

comparable. In contrast to the other semen characteristics, smoking was linked to a higher incidence of oligo/azoospermia. Moreover, a link between excessive smoking and anomalies in semen volume was found.^[16]

Centers for Disease Control and Prevention (2019) found that the fertility of sperm from chronic smokers was 75% lower than that of sperm from nonsmokers.^[17]

CONCLUSION

Our study revealed that smoking has a substantial impact on the quality of semen, and we can raise awareness about quitting smoking to enhance semen quality and lower the rate of male infertility, hence reducing the overall number of infertility cases, which is on the rise in the modern world.

REFERENCES

1. Arabi M, Shareghi B. Anti-fertility effect of nicotine. *Zhonghua Nan KeXue* 2015;11(5): 323-330
2. Li Y, Lin H, Li Y, Cao J. Association between sociopsychobehavioral factors and male semen quality systematic review and meta-analyses. *FertilSteril.* 2014 Jan;95(1):116-23.
3. WHO laboratory manual for the Examination and processing of human semen. 5th edition. Switzerland: WHO press; 2016.
4. WHO Laboratory manual for the examination of Human semen and Sperm-Cervical mucus interaction. 5th edition. Melbourne: Cambridge University Press; 2019.
5. Kidd SA, Eskenazi B, Wyrobek AJ. Effects of male age on semen quality and fertility: a review of the literature. *FertilSteril.* 2011 Feb;75(2):237-48.
6. Zenzes MT. Smoking and reproduction: gene damage to human gametes and embryos. *Hum Reprod Update.* 2009 Mar-Apr;6(2):122-31.
7. Martelli A, Rousselet E, Dycke C. Cadmium toxicity in animal cells by interference with essential metals. *Biochimie.* 2016 Nov;88(11):1807-14.
8. Chia SE, Ong CN, Chua LH. Comparison of zinc concentrations in blood and seminal plasma and the various sperm parameters between fertile and infertile men. *J Androl.* 2009 Jan-Feb;21(1):53-7.
9. Gulaya NM, Margitich VM, Govseva NM. Phospholipid composition of human sperm and seminal plasma in relation to sperm fertility. *Arch Androl.* 2011 May-Jun;46(3):169-75.
10. Arabi M, Moshtaghi H. Influence of cigarette smoking on spermatozoa via seminal plasma. *Andrologia.* 2015 Aug;37(4):119-24.
11. Kao SH, Chao HT, Chen HW, et al. Increase of oxidative stress in human sperm with lower motility. *FertilSteril.* 2018 May;89(5):
12. Chia SE, Lim ST, Tay SK. Factors associated with male infertility: a case-control study of 218 infertile and 240 fertile men. *BJOG.* 2009 Jan;107(1): 55-61.
13. Wong WY, Thomas CM, Merkus HM. Cigarette smoking and the risk of male factor subfertility: minor association between cotinine in seminal plasma and semen morphology. *FertilSteril.* 2015 Nov;74(5):930-5.
14. Taszarek-H G, Depa-Martynów M, Derwich K. The influence of cigarette smoking on sperm quality of male smokers and nonsmokers in infertile couples. *Przegl Lek.* 2015;62(10):978-81.
15. Said TM, Ranga G, Agarwal A. Relationship between semen quality and tobacco chewing in men undergoing infertility evaluation. *FertilSteril.* 2015 Sep; 84(3): 649-53.
16. Coelho C, Júlio C, Silva G. Tobacco and male infertility: a retrospective study in infertile couples. *Acta Med Port.* 2019 Nov-Dec;22(6):753-8.
17. Centers for Disease control and Prevention 2019. Office on Smoking and Health, National Center for Chronic Disease Prevention and Health Promotion.