Research Article

Effect of tobacco chewing on semen parameters

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Abstract

Background: Tobacco is a plant with green foliage and tubular flowers. Biologically titled as *Nicotiana tabacum*. Tobacco is evil for human health. It has been noted that 35% of death worldwide happen due to the tobacco intake only. Individual with no education is 2.69 times more likely to smoke and chew tobacco than those with a postgraduate education. Tobacco causes reduction in sperm count, motility, and concentration.

Objective: To affirm the deleterious effects of tobacco abuse on various semen parameters.

Materials and Methods: This cross-sectional descriptive study was conducted on 100 healthy adults in GGH Hospital, Jamnagar, Gujarat, India. Out of which, 50 were tobacco chewers and 50 were nontobacco chewers. Semen was collected in the vicinity of laboratory bathroom and immediately handover to laboratory technician for evaluation of various parameters.

Result: Result shows that there is a significant decrease in semen volume, sperm concentration, motility, and viability in tobacco chewers than control group. There was progressive decrease in sperm count and liquefaction time as the duration of tobacco chewing is increase.

Conclusion: There is an adverse effect on all the seminal parameters who practicing of tobacco chewing as compared to non-chewers mainly sperm concentration, total sperm count, motility, and viability of sperm are also decreases in tobacco chewer than the control group. As the frequency of tobacco chewing is increasing, it is associated with more adverse effects on semen volume, count, concentration, motility, and viability of sperm.

KEY WORDS: Semen, tobacco chewers, parameter, sperm

Introduction

Tobacco is a plant with green foliage and tubular flowers. Biologically titled as *Nicotiana tabacum*.[1] Tobacco is evil for human health. It has been noted that 35% of death worldwide happen due to the tobacco intake only. However, tobacco consumption in different forms is a common addiction in the socioeconomically handicapped population in many developing countries, where large populations also suffer from under nutrition with invariably low intake of dietary proteins. Tobacco chewing is broadly recognized as a health hazard and a major cause of mortality, but still people continue to use it on a regular basis.[2]. The World Health Organization has reported that approximately one-third of the world's population older than 15 years is using tobacco by one or other means.[3] Along with smoking, chewing the tobacco constitutes one of the forms of smokeless tobacco consumption. Once considered a harmless pleasure, smokeless tobacco came to the forefront of health news at the turn of the millennium because of increasing evidence that it is just as dangerous as cigarette smoking. In fact, most medical professionals now agree that smokeless tobacco—also known as "chaw" or "chew"—is equally addictive and carcinogenic, and have come to consider the substance

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as contributing to the US tobacco epidemic. The highest prevalence of smoking is observed in young adult boys during their reproductive period between 20 and 39 years.[4] In India, chewing tobacco is systematically associated with socioeconomic markers at the individual and household level. Individual with no education are 2.69 times more likely to smoke and chew tobacco than those with a postgraduate education.[5] Tobacco causes reduction in sperm count, motility, and concentration. It causes defects in head-piece spermatozoa with cytoplasmic droplets.[6] In this study, attempt has been made to affirm the deleterious effects of tobacco abuse on various semen parameters. Since tobacco chewing is more prevalent than smoking in Saurashtra region, Gujarat, India, tobacco chewers were included in study group.

Materials and Methods

The study was conducted on 100 cases after obtaining permission from Institutional Ethics Committee.

This was a hospital-based, cross-sectional descriptive study conducted in GGH Hospital, Jamnagar, Gujarat, India, between May 2012 and May 2015. The subjects enrolled for the study were informed about the study and procedural details and an informed consent was obtained. The recruitment of subject was conducted on the basis of following criteria.

Inclusion criteria: Subject having age between 20 and 40 years, not using any type of other addiction like alcohol or not taking any kind of medication. No history of urogenital disease, developmental anomalies, occupational exposure to toxic chemicals or higher temperature. No history of surgery of urogenital disease/any endocrine disorders, major medical illness such as tuberculosis, hypertension, diabetes, and so on. No history of mumps, orchitis, or any other disease that affects functions of testis

Exclusion criteria: Subject having age more than 40 years, using alcohol or any kind of medication._Subject having any kind of conditions mentioned in inclusion criteria.

Subjects were explained the purpose and protocol of the study. After obtaining informed consent, semen sample was collected to measure following parameters: semen volume, liquefaction time, count, motility, and viability of sperm.

Semen was collected by subjects themselves in the vicinity of pathology laboratory bathroom after showing some of magazines. Semen was immediately handover to technician for evaluation of various parameters. Sperm count was done by improved neubauer chamber, viability and motility were done by microscopy, and liquefaction test was done by incubation in incubator.

Statistical Analysis

Mean and standard deviation (SD) were calculated. Unpaired Student's *t*-test was applied to test difference between means. Comparison of more than two groups is done by one-way ANOVA test in different subgroups of tobacco chewers.

Result

A total of 100 normal asymptomatic healthy men (50 control, 50 tobacco chewers) aged between 20 and 40 years were classified as follows:

- Group I: mild (<3 times a day);
- Group II: moderate (3–6 times a day); and
- Group III: severe(>6 times a day) chewers.

Duration of consumption is measured in short-term (1–5 years) and long-term (6–10 years) chewers.

Table 1 shows that there is a significant decrease in semen volume, sperm concentration, motility, and viability in tobacco chewers than in control group.

Table 2 shows progressive decrease in sperm count and liquefaction time from Group I to Group III.

Table 3 shows progressive decrease in sperm motility and viability from Group I to Group III.

Table 4 shows a linear decrease in semen volume and sperm count as the duration of tobacco chewing increases.

Table 5 shows a linear decrease in sperm motility and sperm viability as the duration of tobacco chewing increases.

Discussion

In this study, semen volume in mild, moderate, and severe tobacco chewers was 1.71 ± 0.62, 1.80 ± 0.58, and 1.42 ± 0.44 mL, respectively. Our study demonstrates that semen volume decrease with the increase in severity of tobacco chewing.

These observations are consistent with the findings of Dikshit et al.[7] It was revealed by Dikshit et al. that values of semen volume decrease in tobacco chewers compared to control group.

Our study demonstrates that tobacco chewing does not significantly affect the seminal pH and liquefaction time.

Our study clearly demonstrates that tobacco chewing causes statistically significant decrease in sperm concentration. These observations are in tune with findings of others like Said et al.[8] and Banerjee et al.[9]

Study conducted by Said et al.[8] reported that sperm concentration in mild, moderate, and severe tobacco chewers was 77.95 ± 49.36, 47.59 ± 27.39, and 27.25 ± 29.49 millions/mL, respectively, and according to Dikshit et al.[7]) and Banerjee et al.[9] sperm concentration was significantly ($p < 0.05$) decrease in tobacco chewers compared to the control group.

Our study clearly demonstrates that tobacco chewing causes statistically significant decrease in total sperm count ($p < 0.05$).

These observations are in tune with findings of others studies such as Dikshit et al.[7] and Banerjee et al.[9] It was revealed by Dikshit et al.[7] and Banrjee et al.[9] that total sperm count was significantly low ($p < 0.05$) in tobacco chewers compared to the control group.

Table 1: Semen parameters of control group and chewers

Parameters	Control group		Chewers	
	Mean	± SD	Mean	± SD
Semen volume (mL)	2.43	0.44	1.69	0.59*
Seminal pH	7.40	0.03	7.37	0.03
Liquefaction time (min)	41.94	3.99	41.34	4.00
Sperm concentration (millions/mL)	68.48	9.07	45	7.03*
Total sperm count (millions)	162.42	16.16	74.82	21.52*
Sperm motility (%)	68.62	9.94	46.86	10.69*
Sperm viability (%)	72.98	5.26	52.64	7.85*

*$P < 0.001$ significant.

Table 2: Semen parameters of different subgroups of chewers

Parameters	Chewers ($N = 50$)		
	Mild ($n = 7$)	Moderate ($n = 10$)	Severe ($n = 33$)
Semen volume (mL)	1.42 ± 0.44	1.8 ± 0.58	1.71 ± 0.62
Seminal pH	7.37 ± 0.29	7.36 ± 0.54	7.36 ± 0.80
Liquefaction time (min)	41.66 ± 6.80	41.16 ± 8.00	39.05 ± 7.60
Sperm concentration (millions/mL)	56.57 ± 5.91*	46.33 ± 5.03*	42.03 ± 4.62*
Total sperm count (millions)	121.94 ± 31.39*	88.77 ± 5.80*	63.08 ± 10.45*

*$P < 0.001$ significant.

Table 3: Semen parameters of different subgroups of chewers

Parameters	Chewers ($N = 50$)		
	Mild ($n = 7$)	Moderate ($n = 10$)	Severe ($n = 33$)
Sperm motility (%)	59.57 ± 5.06*	56.2 ± 6.94*	41.33 ± 7.90*
Sperm viability (%)	65.14 ± 5.46*	55.8 ± 6.54*	49.03 ± 5.11*

*$P < 0.001$ significant.

Table 4: Semen parameters of control group, short-term, and long-term tobacco chewers

Parameters	Control ($N = 50$)	Duration of tobacco chewing	
		Short term (1–5 years) ($N = 19$)	Long term (6–10 years) ($N = 31$)
Semen volume (mL)	2.43 ± 0.44	1.69 ± 0.59*	1.42 ± 0.44*
Seminal pH	7.40 ± 0.03	7.38 ± 0.30	7.37 ± 0.03
Liquefaction time (min)	41.94 ± 4.00	41.10 ± 4.16	40.30 ± 4.78
Sperm concentration (millions/mL)	68.48 ± 9.07	48 ± 7.97*	43.16 ± 5.77*
Total sperm count (millions)	162.42 ± 16.16	87.85 ± 23.61*	66.13 ± 14.92*

*$P < 0.001$ significant.

Table 5: Semen parameters of control group, short-term, and long-term tobacco chewers

Parameters	Control ($N = 50$)	Duration of tobacco chewing	
		Short term (1–5 years) ($N = 19$)	Long term (6–10 years) ($N = 31$)
Sperm motility (%)	68.62 ± 9.94	50 ± 12.74*	44.93 ± 8.89*
Sperm viability (%)	72.98 ± 5.26	54.73 ± 8.08*	51.35 ± 7.55*

*$P < 0.001$ significant.

Our study demonstrates that tobacco chewing significantly reduce percentage of sperm motility.

These observations are in tune with findings of Said et al.[8] and Banerjee et al.[9]. It was revealed by Said et al.[8] that sperm motility in mild tobacco chewers was 60.87 ± 8.74%, in moderate tobacco chewers 56.69 ± 10.4%, and in severe tobacco chewers 49.29 ± 16.88%. According to Banerjee et al.[9] study, sperm motility in tobacco chewers was found significantly ($p < 0.05$) lower compared to control group.

The study conducted by Dikshit et al.[7] was in complete contrast with our study, it shows that percentage of sperm motility in tobacco chewers was not much different from that of control group.

Our study demonstrates significant decrease in sperm viability with increase in severity of tobacco chewing.

These observations are in tune with findings of Dikshit et al.,[7] Said et al.,[8] and Banerjee et al.[9]. It was revealed by Said et al. that sperm viability in mild tobacco chewers was 64.1 ± 8.98%, in moderate tobacco chewers 59.38 ± 10.39%, and in severe tobacco chewers 52.55 ± 15.51%.

Our study demonstrates that as the duration of tobacco chewing increased, it was associated with reduction in various semen parameters such as semen volume, sperm concentration, total sperm count, sperm motility, and sperm viability.

Limitations

Our study included 50 tobacco chewers and 50 non-chewers. If the sample size were larger that will be more conclusive as compared to study conducted by us.

Conclusion

Semen volume decreases in tobacco chewer than in control group. Seminal pH and liquefaction time are not significantly affected by tobacco chewing. Sperm concentration and total sperm count decreases in tobacco chewer than in control group. Motility and viability of sperm are also decreases in tobacco chewer than in control group. As the frequency of tobacco chewing is increasing, it is associated with more deleterious effects on semen volume, sperm count and concentration, and sperm motility and viability.

All seminal parameters are altered more in long-term practicing of tobacco chewing as compared to short-term.

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