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ORIGINAL ARTICLE

Effects of Ghutka on Semen Analysis: Observe the Effects of Ghutka on Semen Analysis in Male Patients Presenting with Infertility

KAWEETA KUMARI[1], NAND LAL DHOMEJA[2], MOMY GUL[3], NAZIA HASHIM[4], SYEDA ZAIN[5], FAIZ BAKHTAWAR[6], SHAHEEN ZAFAR[7]
[1]Professor & Head of Department, Department of Obstetrics & Gynecology, United Medical and Dental college, Karachi, Pakistan.
[2]Jinnah Sindh Medical University
[3]Assistant Professor, Gynecology Unit 2, Bolan Medical College Quetta
[4]Associate Professor, Obstetrics and Gynecology, Department of Sir Syed College of Medical sciences for girls (SSCMS)
[5]MBBS, M phil, Pharmacology, Associate professor UMDC
[6]United Medical and Dental College, Karachi, Pakistan.
[7]MBBS, FRCOG, Medical director SIRM
Corresponding author: Kaweeta Kumari, Email: kaweetadhomeja@ymail.com

ABSTRACT

Background: To observe the effects of ghutka on semen analysis in male patients presenting with infertility.

Methods: It was a descriptive observational study conducted at SIRM (Sindh institute of reproductive medicine) from April 2021 till july 2021. All males with history of primary or secondary infertility who presented at SIRM opd and who were habitual ghutka (all types) and niswar eaters were included in the study. All males with history of primary or secondary infertility taking recreational drugs other than ghutka were excluded. A total of 52 male patients with history of eating ghutka were analyzed for male infertility at Sindh Institute of Reproductive Medicines, at Karachi Pakistan. Data was collected on a formatted questionnaire after informed consent. The study was approved by Ethical review board. Statistical analysis was done using SPSS version 22.

Results: As the results were evaluated, primary infertility with ghutka eating was 11 % while secondary infertility was found in 89%. Out of the total,23% patients were eating dry ghutka while 77% patients were wet ghutka eaters. Low Bmi was seen in 7%. Patients, high BMI in 25% males while in 60%, BMl was normal. Primary infertility was seen in 17% males who were wet ghutka eaters while it was found in 72% with dry ghutka. Only 11% males who were eating dry ghutka presented with secondary infertility. Sperm motility was low in 15% while it was normal in 85% males. Normal sperm morphology was seen in 39% while 61%. Had a normal morphology. Azoospermia was seen in 1% while teratozoospermia was seen in 33%. Asthenoteratozoospermia in 6%. While Normozoospemia in 25% was seen

Conclusion: Ghutka. Addiction is a menace in our Society and its use on the rise. Many males and even females in Pakistan especially at Karachi are addicted to it. One of the greatest known hazards is Oral cancer and many are the sufferers. It has systemic effects and in males is responsible for infertility especially who are taking it for a long time.

Keywords: infertility, ghutka, smokeless tobacco, males, habitual

INTRODUCTION

Smokeless tobacco use is prevalent worldwide, and it leads to the development of oral submucous fibrosis (OSMF), a serious and long-lasting condition of the oral cavity that has the potential to cause malignancy. When using smokeless tobacco, unburned tobacco is consumed through chewing, spitting, dipping, or snuffing. The user chews the tobacco in their mouth and spits out excess juice. This process causes nicotine and other compounds to be absorbed into the lining of the oral cavity. Many regions around the world, including India, Pakistan, other Asian countries, and North America have a lengthy history of smokeless tobacco use. Smokeless tobacco consists of about 28 chemical constituents that are known carcinogens; nitrosamine is particularly prominent among them. Sweet tasting gutkha is commonly consumed as a candy by children. In South Asian countries especially, paan in its smokeless form along with areca nut consumption rates remain high despite health concerns associated with their use. [1]

Several forms of smokeless tobacco (ST) have geographical affiliations with various countries across the globe. Historically, in the United States, tobacco was predominantly utilized by placing leaves between the gums and cheek or through chewing.[1] Cigarettes are currently the most widespread form of tobacco product. However, in recent decades there has been a surge in the usage of moist snuff. In the year 2009, smokeless tobacco was used by an estimated 3.5% of adults in the United States, and more than three-quarters of this market consisted of moist snuff. This type of smokeless tobacco comprises cured tobacco that is finely ground into particles, which can be placed between the cheek and gum by way of a pinch or "dip." Unlike traditional chewing tobacco that requires users to spit frequently, moist snuff can be enjoyed without expectoration. Chewing tobacco has historically been associated with outdoor male activities. [2]

The substance commonly known as gutkha, which is a form of pan masala that contains tobacco, is predominantly utilized in the Indian subcontinent and various regions within South Asia [3.] Apart from tobacco, gutkha is a substance that comprises of areca nut (the seed of areca palm), slaked lime (a paste of calcium hydroxide), catechu (an extract obtained from the wood of the acacia plant), and a variety of spices. Its mode of consumption involves placing it between the gum and cheek and either chewing or sucking on it. While areca nut is acknowledged as a human carcinogen, information regarding the toxicological effects of slaked lime or catechu remains limited. [4] In addition to tobacco, there is a substance known as gutkha that is placed within the oral cavity and either sucked or chewed. [4] Its composition comprises a fusion of areca nut, which is the seed of the areca palm, slaked lime that adheres to calcium hydroxide glue, catechu derived from the acacia plant's wood extract, and assorted spices.[5.] The areca nut has been identified as a carcinogen for humans[6], whereas there is limited knowledge about the potential toxicity of slaked lime or catechu. The usage of smokeless tobacco products is increasingly prevalent among young individuals in various regions of South Asia.[7] According to national surveys such as the National Survey on Drug Use and Health and the National Health Interview Survey, it has been determined that tobacco use among South Asians residing in the United States ranges from 7.0% to 12.4%[8]. Smokeless tobacco products such as paan (either homemade or manufactured as paan masala or gutkha) are predominantly used. Findings based on animal models have indicated that prolonged use of gutkha can result in reproductive toxicity, including decreased spermatid/sperm count and production in male mice. However, research on this topic remains limited. [9] Prolonged exposure of rodents to gutkha has been observed to lead to a reduction in cellular reinforcement resistance, ultimately resulting in persistent sensitivity in the liver and lung. The gradual decline in the antioxidant defense mechanism and prolonged inflammation triggered by smokeless tobacco are potential contributing factors to the pathogenesis instigated by gutkha consumption. [10] Research on the effects of short-term exposure to different ST products on

animal models, particularly those containing gutkha, is significantly lacking. Considering the increasing prevalence and global consumption of culturally-specific tobacco items, including gutkha, a study was conducted on mice to determine the toxicological implications of gutkha through an exposure route relevant to human experience.

Approximately 15-20% of couples attempting to achieve conception are unable to do so, according to evaluations. In over half of these cases, a male factor is the predominant contributing factor.[11] The gradual decline in the production of sperm in men has become a growing concern and a topic of widespread debate in recent years. The impact of the environment on public health, particularly on reproductive ability, is causing increasing concern. Certain studies have claimed that the quality of human semen has decreased, leading to controversy. However, these warnings have received limited attention possibly due to their reliance on data from specific groups of men recruited from infertility clinics. [12] Several factors have been attributed as potential causes for the decline in male reproductive capabilities, including modifications in lifestyle and heat exposure. It is noteworthy that testicular function is contingent on temperature and necessitates a temperature range of 2-4°C below normal body temperature. Increased testicular temperature has been validated as a contributing factor towards aberrant spermatogenesis; this has been observed in common ailments associated with male infertility such as varicocele and undescended testicles. [13]

There exist diverse methods of tobacco consumption on a global scale, with tobacco use broadly categorized into two groups: Smoking and Smokeless. Smokeless tobacco denotes the utilization of tobacco in several ways where the products derived from tobacco are utilized through means other than smoking. They can be ingested orally or nasally. Oral smokeless tobacco commodities are employed by placing them in the mouth, cheek, or lip and sucked (dipped) or chewed. In some cases, tobacco pastes or powders are used in a similar manner and applied to the gums or teeth. Additionally, other methods involve inhaling fine mixtures of tobacco that get absorbed in the nostrils. Table-1 highlights various kinds of smokeless tobacco (SLT) products as well as their method of use[14]

As per the World Health Organization, approximately a third of individuals worldwide who are over the age of 15 indulge in smoking. There is limited understanding regarding how tobacco smoke impacts spermatozoa. However, nearly two decades ago, it was established that cigarette smoke has an effect on sperm function. [15]

Smoking by fathers has been linked to a notable rise in the proportion of sperm cells exhibiting DNA harm. Tobacco combustion results in the production of roughly 4,000 chemical substances. Gaseous compounds include carbon monoxide, nitrogen oxide, ammonia, and hydrocarbons, while nicotine aggregates constitute the primary component of the particulate matter. In mice, polycyclic aromatic hydrocarbons activate a proapoptotic protein that adversely affects oocytes and lowers fertility.[16]

The impact of aging on male fertility is not yet fully understood. While fertilization rates for men under the age of 39 are generally above 60%, those over this age experience a decline to approximately half. The link between tobacco use and male infertility remains uncertain. Several studies have demonstrated that smoking adversely affects sperm concentration, motility, morphology, and damages DNA. There is increasing evidence to suggest that chemical and physical agents in the environment may also affect male fertility in humans. Both scientific and public concerns exist regarding the potential reproductive health effects of tobacco consumption. However, little is known about the impact of tobacco chewing on male reproduction. Thus, our research aims to evaluate the correlation between tobacco chewing and sperm quality in male partners of infertile couples undergoing infertility evaluation.

METHODOLOGY

The Sindh Institute of Reproductive Medicine conducted a descriptive observational study from April to July 2021. Non-randomized sampling was utilized to recruit participants, and approval for the study was obtained from the institutional review board of AEIRC Advanced Educational Institute and Research Center affiliated with SIRM. Written consent was secured from all participants prior to their inclusion in the study.

In the Infertility OPD at SIRM, the couple was interviewed and investigated on the basis of infertility guidelines of the institution . All males with history of primary or secondary infertility who presented at Sirm opd and who were habitual ghutka (all types) and niswar eaters were included in the study. All males with history of primary or secondary infertility taking recreational drugs other than ghutka were excluded. A total of 52 male patients with history of eating ghutka were analyzed for male infertility at Sindh Institute of Reproductive Medicines, at Karachi Pakistan. Data was collected on a planned formatted questionnaire after informed consent. The highlights of the questionarre were age and the total duration of ghutka . It also focused on the reasons and dose of ghutka. Also related history of any childhood diseases like mumps, surgical interventions and other comorbities were excluded.

Semen sample was obtained after counselling the male partner for abstinence for 2-3 days and collected at SIRM . The sample was then subjected to chemical and microscopic analysis under the microscope. Detailed semen analysis which included consistency, total sperm count, PH and morphology based on Krukenberg criteria was done.

The process of analyzing statistics for this particular study was conducted by utilizing the renowned statistical software, SPSS version 22.

RESULTS:

As the results were evaluated, primary infertility with ghutka eating was 11 % while secondary infertility was found in 89%. Out of the total,23% patients were eating dry ghutka while 77% patients were wet ghutka eaters. Low BMI was seen in 7%. , high BMI in 25% males while in 60%, BMI was normal. Primary infertility was seen in 17% males who were wet ghutka eaters while it was found in 72% with dry ghutka. Only 11% males who were eating dry ghutka presented with secondary infertility.

Sperm motility was low in 15% while it was normal in 85% males. Normal sperm morphology was seen in 39% while it was abnormal in 61%. Azoospermia was seen in 1% while teratozoospermia was seen in 33%. Asthenoteratozoospermia in 6%. While Normozoospemia in 25% was seen.

From the above result, 23% subjects were eating dry ghutka while 77% eating wet ghutka. Out of the total patients, 25% were overweight and 7% underweight. We found the following changes in semen of males who were eating ghutka. The changes in morphology were 33% Teratozoospermia, 25% Normozoospermia, 7% Teratozoopermia.hyperspermia, 6%Astheno teratozoospermia & Normozoospermia. Hypospermia, 5% Teratozoospermia hypospermia & severe oligo astheno teratozoospermia, 4% Normozoospermia. Hyperspermia & Severe oligo astheno teratozoospermia.hypospermia, 2% Severe oligo astheno teratozoospermia.hypospermia and at last 1% Asthenozoospermia & Azoospermia. In which 89% primary infertility (17% eat wet gutka while 72 eat dry gutka) and 11% secondary infertility occurs, they all eat dry gutka and low motility find up to 15% with 48% grade 2 and 50% grade 3 semen motility. Primary infertility exist in majority whose duration of eating gutka was >5years. Head abnormalities seen like small head 34% and 54% tapered head and slightly pyriform, pin or round head sperm observe. Furthermore 60% Moderate and 20% severe neck piece defects and also observe 31% coiled and 69% bent tail defects.

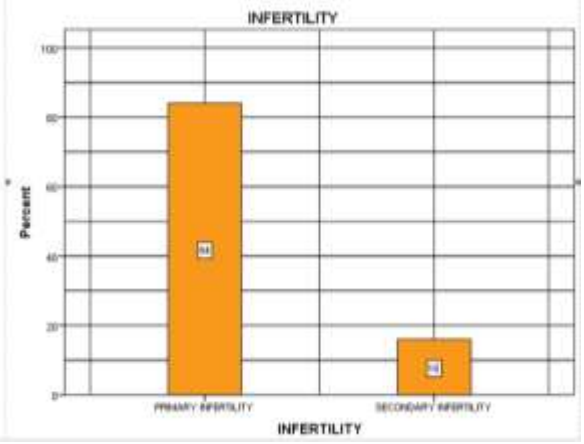

Figure 1: Infertility incidence in our study population

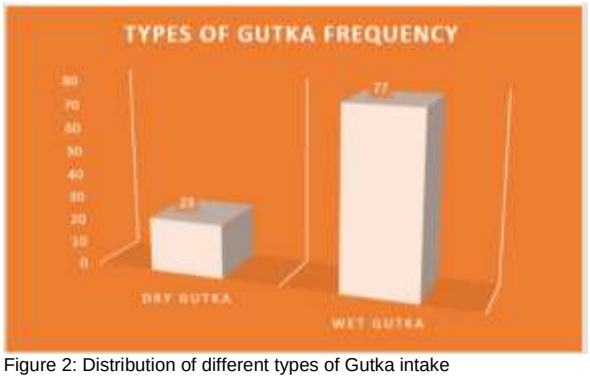

Figure 2: Distribution of different types of Gutka intake

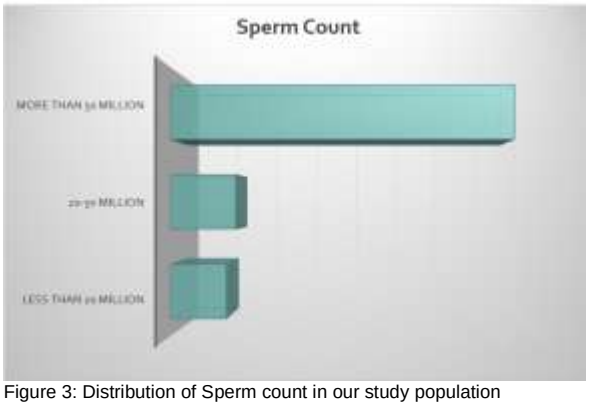

Figure 3: Distribution of Sperm count in our study population

Figure 4: Percentage of Sperm Motility

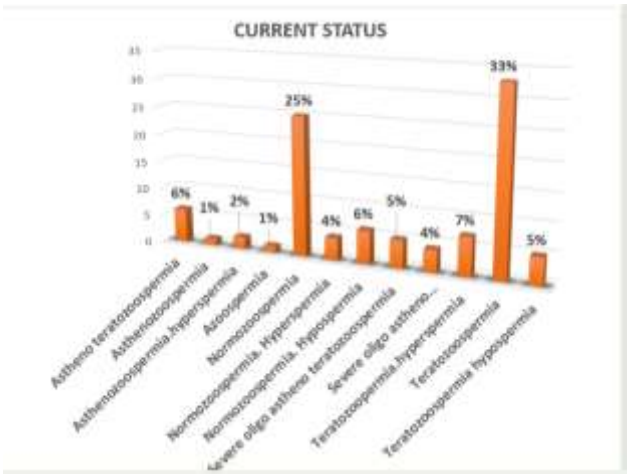

Figure 5: Effect of Gutka on Sperm

Figure 6: Distribution of Sperm Morphology

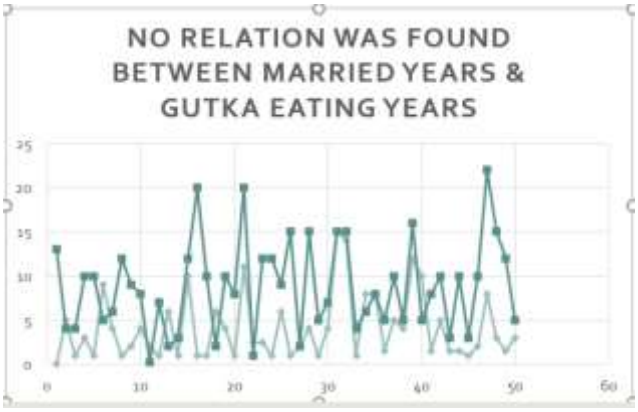

Figure 2: Relationship between duration of marriage and consumption of Gutka.

DISCUSSION

The examination revealed that smoking had an evident influence on both the volume and quality of sperm in the male subjects who were infertile, which was not surprising. The use of tobacco correlated with a decrease in sperm count and an increase in morphological abnormalities such as flaws in the head, neck, and tail of the sperm cells. However, there were no adverse effects on the pH or motility of the sperm cells, nor any interference with reproductive hormones among this group of infertile men. A recent meta-analysis examined human semen and found that tobacco smoking had a harmful impact on semen parameters such as

reduced sperm count and impaired motility in samples from 5865 young men who were either fertile or infertile.[14]

According to the research conducted by Tamer et al., there exists a noteworthy reduction in semen quality such as sperm count, motility, morphology and viability among men undergoing fertility evaluation due to their use of chewing tobacco. This decrease is observed for the first time in this study. However, no considerable alterations in sperm parameters were detected in individuals with a mild habit compared to the standard values recommended by WHO. These findings are consistent with our own research results. [17]

The ratification of the WHO Framework Convention on Tobacco Control (WHO FCTC) in 2005 has resulted in a significant public health discourse in Pakistan regarding the battle against tobacco use, specifically cigarette smoking. [18]

CONCLUSION

It has been observed that smokeless tobacco products have a high consumption rate in Pakistan, making it the second most prominent country for their usage. The prevalence of these products among men and women in Pakistan is 21.3% and 19.3% respectively. Research shows that tobacco products are strongly correlated with oral cancer cases, as over 90% of reported cases are linked to their use. Furthermore, a study revealed that women who chewed tobacco more than ten times a day were at an increased risk of oral cancer compared to non-tobacco chewers.

Ghutka Addiction is a menace in our society and is on the rise. Many males and even females in Pakistan especially at Karachi are addicted to it. One. Of the greatest known hazards is Oral cancer and many are the sufferers. It has systemic effects and in males is responsible for infertility especially who are taking it for a long time.

It is imperative that immediate and rigorous actions be implemented to eradicate the consumption of Ghutka in our neighborhoods, in order to avert the accompanying health risks.

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