

Effect of Cigarette Smoking on Male Fertility : A Prospective Hospital Based Study

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ABSTRACT

Background: World Health Organization (WHO) has reported that smoking is very much prevalent among 30% of all 15 years and older men. Approximately 46% of smokers (men) belong to reproductive age (20~39 years of age). A survey from 187 countries reported that the prevalence of smoking in male smokers was decreased from 41.2% in 1980 to 31.1% in 2012. Though, the number of everyday smokers increased from 721 million in 1980 to 967 million in 2012.

Methods: Eighty male cases were included in this study. Out of eighty male cases 51 had low sperm count & 29 cases were normal. The study was conducted in Department of General Medicine, Kanachur Institute of Medical Sciences, Natekal

Results: In the present study, low sperm count was occurred in 36.3% and normal sperm count was occurred in 63.7% cases.

Conclusion: The results of the present study showed that smoking has severe effects on male fertility. It decreased the sperm motility and sperm count and causes a further decline with continuation of smoking for more than five years.

Keywords: Sperm motility, Smokers, Non-smokers, Fertility

DOI:10.21276/iabcr.2018.4.4.21

Received: 28.05.18

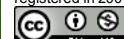
Accepted: 21.06.18

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INTRODUCTION


It is a well-known fact that smoking has a harmful effect on health in general and on male reproductive system in particular. Despite that it remains a worldwide phenomenon.^[1] World Health Organization (WHO) has reported that smoking is very much prevalent among 30% of all 15 years and older men.^[2] Approximately 46% of smokers (men) belong to reproductive age (20~39 years of age).^[3] A survey from 187 countries reported that the prevalence of smoking in male smokers was decreased from 41.2% in 1980 to 31.1% in 2012. Though, the number of everyday smokers increased from 721 million in 1980 to 967 million in 2012.^[4]

Semen quality is supposed to be informative about male fertility, that is defined biologic capacity of males for

reproduction.^[5] Semen analysis is the clinical standard for assessing male fecundity.^[6] Apart from this, sperm concentration, motility and morphology are reported to be the key components of classifying men by fertility potential.^[7] Infertility is defined as the inability to conceive after twelve months of regular sexual relation without the use of contraception.^[8] It poses severe consequences at the cultural, social and emotional levels. It leads to distress, anxiety, blame and sexual problems in married couples' lives.^[9]

Tobacco has numerous carcinogens and mutagens which have deadly effects on human beings. One of the most harmful effects of carcinogens has been observed to be more on rapidly dividing cells that include germ cells. It has been

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| DOI: 10.21276/iabcr.2018.4.4.21 | |

How to cite this article: Reddy KS. Mohan Effect of Cigarette Smoking on Male Fertility : A Prospective Hospital Based Study. Int Arch BioMed Clin Res. 2018;4(4):74-76.

Source of Support: Nil, **Conflict of Interest:** None

already reported that the prevalence of smoking is very much high in young adult males in the reproductive period. Despite this, the undesirable effects of smoking are not well recognized and its impact on male fertility and sperm characteristics still remains debatable.

METHODS

Study Population: - Eighty male cases were included in this study. Out of eighty male cases 51 had low sperm count & 29 cases were normal.

Study Area: -The study was conducted in the Department of General Medicine, Kanachur Institute of Medical Sciences, Natekal

Sample Collection: - In this study 13 non-smokers and 67 smokers in the age group between 25 to 40 years attending the primary infertility clinic 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

Data analysis:-Data were analyzed by using of Microsoft Excel.

RESULTS

In our study, 80 total numbers of cases were included in this study. Among the 80 cases 13 belongs to non-smoking and 67 were belongs to smoking history. In the present study, low sperm count was occurred in 36.3% and normal sperm count was occurred in 63.7% cases. On the basis of above result the present 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.

Table 1:- Smoking & non-smoking history in all cases

| Smoking history | No. of cases | Percentage |
|-------------------|--------------|------------|
| Non-smokers | 13 | 16.3% |
| Less than 5 years | 27 | 33.7% |
| More than 5 years | 40 | 50% |
| Total | 80 | 100% |

Table 2:- Distribution of cases according to sperm count

| Motility | Frequency | Percentage |
|---------------------------|-----------|------------|
| Normal (greater than 32%) | 29 | 36.3% |
| Low(Less than 32%) | 51 | 63.7% |
| Total | 80 | 100% |

Table 3:- Comparative study between non-smoker & smoker and sperm motility

| Smoking history | Sperm motility greater than 32% | | Sperm motility less than 32% | | Total |
|------------------------------|---------------------------------|------------|------------------------------|------------|-------|
| | No. of cases | Percentage | No. of cases | Percentage | |
| Non-smokers | 10 | 76.9% | 3 | 23.1% | 13 |
| Smokers(less than 5 year) | 12 | 44.5% | 15 | 55.6% | 27 |
| Smokers(greater than 5 year) | 7 | 17.5% | 33 | 82.5% | 40 |

DISCUSSION

It has been observed in many studies that the effects of cigarette smoking on all the seminal parameters are detrimental. Though, its effect on the individual parameters is yet to be established. Due to smoking, there is an increase in the concentrations of reactive oxygen species and cadmium which affect sperm quality.^[10] A good primary testicular function may compensate the free radical injuries. As, this is known that sperm count is used to measure the effectiveness of spermatogenesis. Epididymal maturation and sperm functional capability are indicated by sperm motility.^[11] Sperm motility is attributed to its tail which is composed of flagella. The mid piece provides the required energy for the movement which is rich in mitochondria.^[12] Motility is important for the normal functioning of sperm, as it is not only helpful in transportation but also in penetrating the outer layers of ovum for fertilization.^[13] Hence, the sperm motility can be considered as the most important factor that influences fertility.

It has been revealed in the previous researches that mammalian sperm remain motile in the female genital tract and free energy released from the hydrolysis of ATP that is required for this movement.^[14] Zavos et al., have reported that abnormalities in the ultrastructure of the flagellum and the axonemal structures of the sperm tail are related with reductions in sperm motility.^[15] Garrett et al., have observed in their study that superior sperm morphology and motility increased the pregnancy rates.^[16]

The present study results found decreased sperm motility and sperm count in cigarette smokers with a smoking history of more than 5 years. Out of the 80 subjects, 51 subjects had low sperm count. It showed that the sperm count was less affected than the sperm motility. Zakarya Bani Meri et al., revealed in one of their study that sperm concentration was less among heavy smokers as compared to the light smokers. They concluded that, cigarette smoking has a harmful effect on some of the seminal fluid parameters like motility, morphology and leukocyte count that result in male subfertility.^[17] Farkhunda Nadeem et al., found the potential dangerous chemicals present in cigarette smoke which may affect chromosomes and lead to sperm abnormality. They also reported that smoking can decrease the sperm motility and percentage of normal sperm cells that results male infertility. It is also correlated with the number of cigarettes smoked per day.^[18] These results supports our study and many other studies also (Shaaraway M et al., Vytas Kaulikauskas et al., Vogt et al., Hughes ED et al, Vine MF et al., Alexander E et al., Al Bader A et al., S. Sinclair, Arabi M and Somwanshi et al.).^[19-28] Azar Aghamohammadi et al. revealed some contradictory results to our study that there was no significant difference in sperm quality in smokers except for semen volume and total sperm count. Though, they also concluded that quitting smoking is beneficial for enhancing general health. So, more research is necessary to evaluate its role in male fertility.^[29]

CONCLUSION

The results of the present study showed that smoking has severe effects on male fertility. It decreased the sperm motility and sperm count and causes a further decline with continuation of smoking for more than five years.

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