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A Study on Prevalence of Abnormal Seminogram and Its Association with Alcohol Consumption

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Abstract
Infertility is a disease of male or female reproductive system defined by the failure to achieve a pregnancy after 12 months of unprotected sexual intercourse. Globally, around 15% of couplein reproductive are affected by infertility.Semenanalysis is a gold standard technique in identifying the male factor. Men should accept their responsibility and move forward for infertility testing. Amidst social, physical and economical set back infertility causes psychological distress among couple.Environmental and lifestyle factors such as smoking, excessive alcohol intake, obesity and exposure to environmental pollutants have been associated with lower fertility rates. This study evaluates the prevalence of abnormal semen parameters (33.5%) and impact of alcohol on malefertility (1.8 times greater risk).Significant association($x^2 = 6.51$, $p = 0.010$) was found between alcohol consumption and decline in the semen qualityand male reproductive potential. Lifestyle modifications, particularly cessation of alcohol, premarital counselling and pre-conception counselling enhances the reproductive potential.Thus the current study adds more evidence to the existing literature.

Key Words
Male Infertility, Alcohol intake, Semen parameters, Reproductive potential, Lifestyle Modifications.

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I. Introduction

World Health Organisation (WHO) states, "Infertility as a disease of male or female reproductive system defined by the failure to achieve a pregnancy after 12 months of unprotected sexual intercourse[1]. Infertility affects 3.9 % to 16.8 % of couple in India. Analysis of sperm sample is an essential investigating tool in evaluation of male infertility. Several worldwide research suggests decline in quality of semen among men in recent years[2]. The etiological factors of infertility changes with lifestyle and geographical variations.Lifestyle factors namely obesity, smoking, alcoholism play a vital role inhealth. Among these factors alcohol consumption causes deleterious effects on Hypothalamic Pitutary Gonadal (HPG) axis leading tohypotestosteronemia, reduced leutinizing, follicle stimulating hormones and primary testiculopathy (at testicular levels).In India, the prevalence rate of alcohol consumption by male both in rural and in urban areas vary between 23 % to 74 %. A high prevalence of alcohol intake coupled with apparent raise in infertility necessitates to explore the association between alcohol intake and male infertility. Thecurrent study is aimed at evaluating the prevalence of sperm abnormalities among men. Considering above issues one of the main objective of the study is to assess the impact of alcohol on male reproductive health.

AIM

To evaluate the prevalence of abnormal seminal pattern and assess the impact of alcohol intake on male infertility thereby execute the findings to improvise the infertility management.

OBJECTIVES

- Toevaluate the semen parameters ofmen attending Reproductive Medicine Department at tertiary care centre.
- To assess the association between alcohol consumption and abnormal semen parameters.

II. Methodology

The present study is a cross sectional study conducted among male partners of women with infertility,attending the Department of Reproductive Medicine,Chettinad Hospital and Research Institute, Chennai from September 2016 to June 2017 over a period of 10 months.

Inclusion criteria

Men in age group 25 – 40 years of age with history of infertility more than 12 months of intercourse. Only men withvoluntary participation and consentwere included in the study.

Exclusion criteria

Men with the following conditions;
Previous history of surgery associated with reproductive function
Vasectomy or revival vasectomy
Previous history diseases likecryptorchidism, epididymitis, varicocele, cryptorchidism
Chemical or occupational exposure
Genetic defects
Chronic debilitating diseases (Diabetes, hypertension thyroid disorders) were excluded.
On treatment for infertility

Sample size

According to previously available literature[3], related to prevalence of male infertility based on seminal analysis was 56.5%, considering it as 'p' with limit of accuracy as 10% the sample size is calculated as,

$\mathbf{N= Z_{(1-a/2)\ 2} x\ P\ x\ Q\ /\ L^2}$

N: Required sample size
Z(1-a/2): Reliability coefficient at the level = 1.96
Significance level (alpha): 100- Confidence level is 100-95 =5%
P = Anticipated Population Prevalence from previous literature = 56.5%
Q= 100 – P = 43.5%
Absolute precision desired (as L% of P that is 10 % of P) = 56x10 /100 =5.6
N=1.96 × 1.96 ×56.5×43.5/ 5.65×5.65 = 3.84 x 2457.75 / 31.92 = 295.6 rounded to 295.
N = 295
Therefore, among men attending the reproductive medicine department, 295 men satisfying the inclusion and exclusion criteria were selected by simple random sampling technique for the study.

All the participants were provided with structured questionnaire for eliciting their information on socio demographic characteristics (age, education, occupation,duration of infertility, past medical and surgical history and personal habits (alcohol consumption status), their identity were masked and confidentiality maintained. After required exclusions participant eligible for the study were requested to provide their semen sample after 3 days to 5 days ofabstinence. The supporting and nursing staffs were trained prior to counsel the male partners of the infertile couple. The participants were instructed to wash their hands properly before semen collection. The semen samples were collected in designated room in the department under sterile conditions. The semen samples were shifted to the laboratory within 15 minutes. Analysis was performed according to WHO guidelines of semen analysis[4]. The report results were disclosed and discussed to the couple in person by the doctor.

III. Materials

The materials used for the study were:

- sterile semen collection container
- sterile pastuer pipette
- cryocell counting chamber
- glass slide
- cover slip
- pH paper
- microscope

- Both macroscopic and microscopic analysis was done.
- In macroscopic analysis, semen volume, Ph, viscosity, liquefaction time was observed.

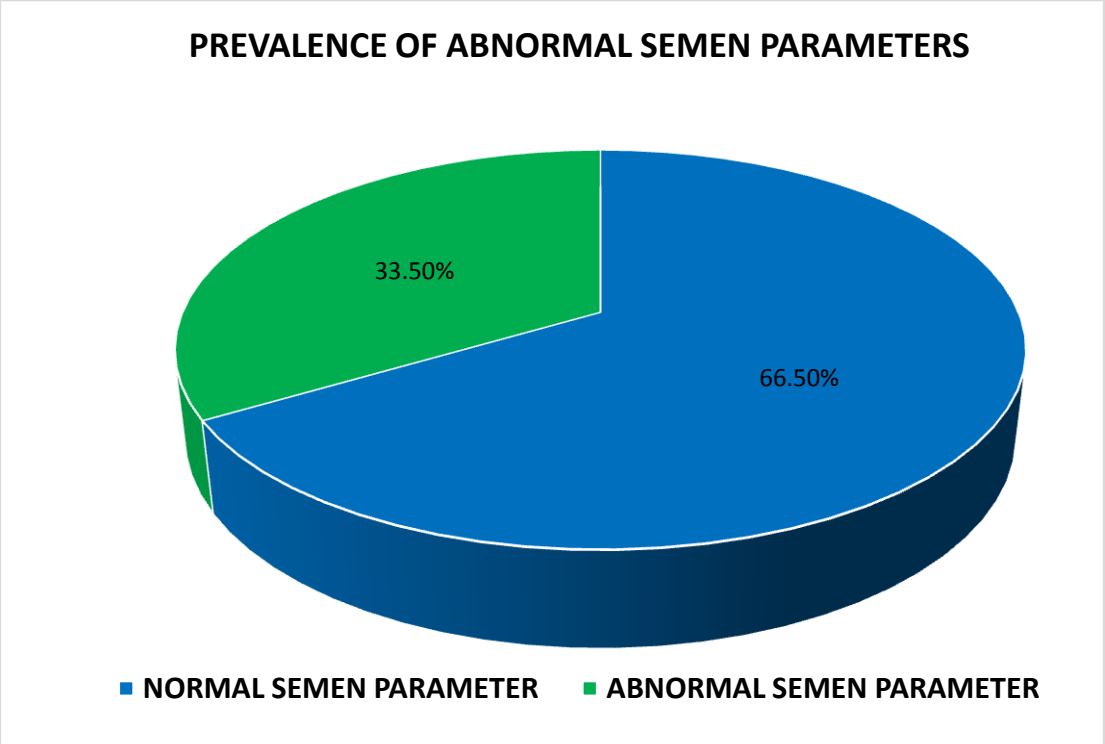
- With sterile pastuer pipette viscosity and volume of liquefied semen sample was noted.
- pH was measured according to the colour change in the ph paper.
- In microscopic analysis,sperm concentration,motility,morphology, aggregation were assessed.
- Sperm concentration and motility were analysed with the help of cryocell counting chamber.
- Sperm aggregation observed in wet slide with cover slip.
- Sperm morphology was examined with staining method.

Statistical analysis

The data was entered and analysed using SPSS version 20. Descriptive statistical analysis done by calculating percentages, chi-square test and odds ratio for association of risk factor and 95% CI were computed and prevalence was obtained. Among the factors evaluated, association between alcohol and infertility is discussed in this research article.

IV. Results

CHART 1



It is observed from **Chart 1** that, a total of 295 men participated in the study. The semen analysis revealed that 196 (66.5%) had normal and 99 (33.5%) had abnormal semen parameters. The age of participants were in a range between 25-40 years and the mean age was found to be 32.4 years.

TABLE –A: Distribution of Abnormal semen parameters based on Alcohol consumption

FACTOR	ABNORMAL SEMINOGRAM	NORMAL SEMINOGRAM	TOTAL
ALCOHOL-CONSUMERS Observed (O) Expected (E) Chi-SquareContribution **$(O-E)^2/E$**	 58(a) 47.65 2.25	 84(b) 94.35 1.13	142
NON-ALCOHOLICS Observed (O) Expected (E) Chi Square Contribution **$(O-E)^2/E$**	 41 (c) 51.35 2.08	 112 (d) 101.65 1.05	153
TOTAL	99	196	295

X^2test static= 2.25 + 1.13+ 2.08 + 1.05 = 6.51

Alternate method to calculate $x^2 = n \times (ad-bc)^2 / (a+c)(b+d)(c+d)(a+b)$

$X^2 = 295 \times (6496- 3444)^2 / 99 \times 196 \times 153 \times 142$

X^2= 295 x 3052 x3052 / 421571304 = 6.518

Table Areveals the Observed, Expected frequencies and Chi-square contribution of each cell.The entire distribution of Abnormal semen parameters based on Alcohol consumption is portrayed in Table A**.**

TABLE B : Association between Alcohol consumption and Abnormal semen parameters

The Chi-square statistic x^2 is 6.51. The p-value is 0. 0106. Significant at p < 0.05

FACTOR	SEMEN-ANAYSIS PARAMETERS		TOTAL	ODDS RATIO	95% CI	CHI-SQUARE x^2	p value
	ABNORMAL	NORMAL		1.88	1.16 –to-3.08	6.51	0.010
ALCOHOL-CONSUMERS	58 a	84 b	142				
NON-ALCOHOLICS	41 c	112 d	153				
TOTAL	99	196	295				

The Chi-square statistic with Yates correction is 5.903.The p-value is 0.0151. Significant at p < 0.05 (Yates correction prevents over- estimation of statistical significance)

Table B depicts that among 295 participants, total 99 (33.5%) men had abnormal semen parameters. Nearly half of the study subjects (ie) 142 (48%) among 295 subjects were found to be alcohol consumers.Among 99 male with abnormal semen parameters, 58 (59%) men who had abnormal semen parameters were alcohol consumers.

ODDS RATIO = Odds of exposure among diseased a/c = ad/ bc = 58 x 112 / 41x 84 = 1.88
Odds of exposure among non-diseased b/d

It conveys that alcohol consumers are 1.8 times at a greater risk of developing abnormal semen parameters than never users of alcohol.To know, whether this result has occurred by chance / sampling error or not, we calculated 95% confidence interval which is 1.16 – 3.08, as it does not contain 1(one), it can be concluded that there are higher odds of developing abnormal semen among alcoholics as compared to non-alcoholics and is statistically significant.

The chi square table value at one degree of freedom at 0.05 level of significance is 3.84. The calculated chi square value is 6.51 is greater than the table value. Hence the positive association between the alcohol consumption and abnormal semen parameters is statistically significant at p = 0.0106 (p=0.05) has not occurred by chance or sampling error.

V. Discussion

This study was performed to evaluate the sperm parameters of male partners of women attending infertility clinic and observe the prevalence of abnormal sperm parameters and assess whether alcohol consumption is associated with abnormal seminogram.

We have considered 295 male satisfying our inclusion and exclusion criteria for this study and the prevalence of male infertility based on abnormal semen parameters was found to be 33.5%. This result were compared to Neena V et al [3]andBhaduri N et al [5]studies shows, 56.5% and 56% respectively. Around 33.5% abnormal semen parameters in men in present study was similar to Jyoti Garg et al [6] study results, 30.5 % semen abnormality among men.

The prevalencein this study is high when compared to prevalence rate of male infertility in India (23%), global rates of male infertility by metanalysis systemic review done by Ashok Agarwal et al [7]reveals(2.5 – 12%).Based on WHO reports, the prevalence of infertility in general population is 15- 20% and male infertility factor holds responsible 20-40 % to this.The difference in prevalence rates may be due to geographical, lifestyle and cultural variations.

Garg J et al[6]andSamal S et al[8](p value <0.01) observations were similar to the current study (p=0.010), where alcohol addiction had statistically significant association with abnormal semen parameters.Jajoo SKalyani K R etal [9]study reveals 29.7% men who had semen abnormality were addicted to alcohol which was less compared to present study with 58.5% men with semen abnormalities were alcohol consumers. The above observation was found to be statistically significant with p value = 0.0106 (p<0.05). The odds ratio is 1.88,which denotes alcohol consumers had 1.88 greater risk of developing semen abnormalities as compared to non-consumers of alcohol.The present study illustrates that, alcohol intake and decreased semen quality may be attributed to a direct adverse effect of alcohol on spermatogenesis. Men should be aware that habitual alcohol intake may affect not only their general but also their reproductive potential.

Several epidemiological and clinical studies[10,11] demonstrated thatalcohol consumption is associated with raise in beta- endorphin levels leading to spermatozoal chromatin disorder and testicular damage by sperm apoptosis.Inhibition of beta hydroxysteroid dehydrogenase, 17- Ketosteroid reductase, decrease in the mitochondrial membrane potential along with ROS generation and depletion of glutathione pool in the testicular tissue induces spermatogenesis disorder. Habitual alcohol abuse may damage the Leydig cells or impair the Hypothalamic–Pituitary–Gonadal axis and decrease testosterone levels.

VI. Conclusion

In conclusion, it is essential also to recognize the male factor contributing for infertility than burdening female. Men should accept their responsibility on infertility as it is a couple -oriented problem and reduce the societal sigma over women. Semen analysis is a gold standard technique in identifying the male factor. Semen analysis along with complete clinical evaluation of the couple produces a better outcome in infertility management. Men should be encouraged to move forward for infertility testing. Women has a right to health and right to live with dignity, therefore men should protect her from social discrimination, by providing mutual respect. Awareness on reproductive health has a opportunity to bring social change and better attitude among families and communities.Integration of infertility management and prevention along with basic health care services is a best recommendation to theHealth and Family WelfareDepartment. Infertility being considered as public health issue, role of primary care physicians / general practitioners is inevitable, to ensure early diagnosis, appropriate management and onward referral to fertility specialist for timely intervention.As the current study indicates a strong association between alcohol intake and decreased semen quality.The study highlights that alcohol use is a potential risk for developing male infertility.It is a red alert to the couple, regarding undesirable lifestyle factors.Lifestyle modifications[12], particularly cessation of alcohol, premarital counselling and pre-conception counselling are suitable intervention strategiesfor prevention of infertility.Thus, the current study adds more evidence to the existing literature.

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