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# Pattern of seminal fluid abnormalities in male partner of infertile couple: A single center study in eastern India

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**Abstract**
**Introduction:** Male factor accounts for 30% of cause of infertility, while combined male and female factor comprise an additional 20%.Current reference range for semen parameter have been taken from WHO manual published in 2010. We are heavily dependent on western literature and research for scientific data related to the disease. The purpose of this research was to integrate the understanding of epidemiology and infertility in our geographical region.
**Methods:** This was a cross sectional study conducted among male partners of infertile couple aged more than 21 years of age who visited the OPD of the Department of Urology and Reproductive Biology of IGIMS, Patna, during the period from January 2016 to November 2017. Patients with age < 21 years, or having history of recent febrile illness or on drugs which might influence seminal parameters were excluded from the study.
**Results:** In our study male factor abnormality was present in 38.5%. Most common age group with abnormal seminal parameters was 31 – 40 year. Azoospermia was present in 7%.Most common single factor abnormality was oligospermia 31%.Oligoasthenoteratozoospermia was present in 5.4% cases.
**Conclusion:** A high percentage of semen fluid and sperm morphology abnormalities were found in males of infertile couples. Further studies are needed to address possible etiologies and treatment of oligospermia in our region to improve fertility rates.

**Keywords:** Male factor, Oligozoospermia, Azoospermia, Infertility

## Introduction

Infertility is defined as a failure to conceive within one or more years of regular unprotected coitus. Primary infertility denotes those patients who have never conceived. Secondary infertility indicates previous pregnancy but failure to conceive subsequently.

Male factor accounts for 30% of infertility cause, while combined male and female factor comprise an additional 20% [1]. Men from infertile couple do not seek complete evaluation. Such couples are directly offered IVF or other forms of ART. Although the final outcome is satisfying for the couple but it has its own drawback [2, 3]. Various studies have linked male infertility with overall health especially cardiovascular fitness and development of cancer [3]. Complete evaluation is must as many factors of male infertility are treatable.

Semen analysis shows both intra individual and inter individual variation.Current reference range for semen parameter have been taken from WHO manual published in 2010.These data were obtained from fertile men from 8 countries whose partner got pregnant within 12 months [3].

Meta-analysis, systematic reviews and other individual studies have shown stark difference in sperm counts varying between countries [4, 5]. It is influenced by a multitude of influencing factors, which need further study to better characterize them [5, 6].

Unfortunately we are heavily dependent on western literature and research for scientific data related to the disease. The purpose of this research is to integrate the understanding of epidemiology and infertility in our geographical region [7, 8].

### Aim of the Study

- To analyze the pattern of seminal fluid abnormalities in male partner of infertile couple.
- To generate knowledge/data that can be used to understand, prevent and/or treat male infertility.

## Methods

This was a cross sectional study, conducted among male partners of infertile couple, who visited the OPD of the Department of Urology and Reproductive Biology of IGIMS Patna, during the period from January 2016 to November 2017

### Inclusion criteria

1).Adult (>21 years age) 2). Married with complain of infertility

### Exclusion criteria

1) Recent viral/febrile illness (<3 months), 2) Patients on drugs which might influence seminal parameters

### Study Methodology

After approval for the study from institutional ethical committee, patients who met the inclusion criteria were enrolled and informed consent was taken. Patients were evaluated by history, clinical examination and semen analysis. Semen analysis was done after an abstinence of 3 to 5 days. The technician was blinded for the study. Analyses was using reference values from -WHO criteria 2010, 5th Edition: semen volume: ≥1.5 ml, total sperm number: 39 million spermatozoa per ejaculate or more, total motility:≥ 40% motile or ≥32% with progressive motility, sperm morphology (normal forms): ≥4%. [9].

**Table 1:** Age wise distribution of patients showing semen volume, abnormal sperm count, motility and morphology variation

| Age Group (years) | Semen volume (ml) | | Abnormal sperm Count | | Sperm Motility (%) | | Sperm morphology | |
|---|---|---|---|---|---|---|---|---|
| | >=1.5 | <1.5 | Oligospermia | Azoospermia | Normal | Abnormal | Normal | Abnormal |
| 21-25 | 41 | 5 | 5 | 1 | 38 | 8 | 39 | 7 |
| 26-30 | 83 | 16 | 31 | 8 | 80 | 19 | 85 | 14 |
| 31-40 | 135 | 24 | 60 | 11 | 128 | 31 | 132 | 27 |
| >40 | 10 | 0 | 2 | 1 | 9 | 1 | 9 | 1 |

## Results

Of the total 100 infertile couples attending the infertility clinic the male factor was responsible in 43% cases as a cause of infertility and 57% males were normospermic.

314 infertile couple visited our OPD between Jan 2016 and Nov 2017. Semen analysis was normal in 195 male partners. Abnormal semen analysis pattern was present in 119 cases (38%). 21 males (7%) were azoospermic while 98 males (31%) had other factor semen abnormality. Most common age group of males visiting the OPD belonged to 31 – 40 years. 50.6% of the males belonged to this group. 28% of them had normal seminogram while 20.6% had abnormal seminogram. 46.1% males belonged to 21 – 30 years while only 3.2% were more than 40 years.

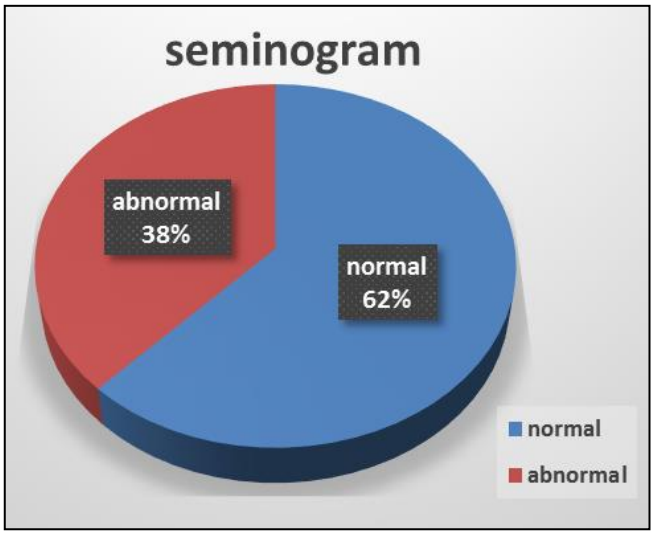



**Table 2**

| Age Group (years) | Seminogram | | Total |
|---|---|---|---|
| | Normal | Abnormal | |
| 21-25 | 40 | 6 | 46 |
| % | 12.7% | 1.9% | 14.6% |
| 26-30 | 60 | 39 | 99 |
| % | 19.1% | 12.4% | 31.5% |
| 31-40 | 88 | 71 | 159 |
| % | 28.0% | 22.6% | 50.6% |
| >40 | 7 | 3 | 10 |
| % | 2.2% | 1.0% | 3.2% |
| Total | 195 | 119 | 314 |
| % | 62.1% | 37.9% | 100.0% |

## Semen volume

In our study normal semen volume was defined as between 1.5ml – 6ml. 269 males (86%) had normal semen volume. 45 males (14%) had low semen volume. 41 males with low semen volume also had abnormal seminogram. Other seminal parameters were normal for the rest 4 males despite having low semen volume. Most common age group with low semen volume was 31 -40 years. 24 of 45 males (53%) belonged to this group. Of the 21 males with azoospermia 11 male

**Table 3:** S (50%) had low semen volume.

| Semen volume | Frequency | Percent |
|---|---|---|
| >=1.5 ml | 269 | 85.7 |
| <1.5 ml | 45 | 14.3 |
| Total | 314 | 100.0 |

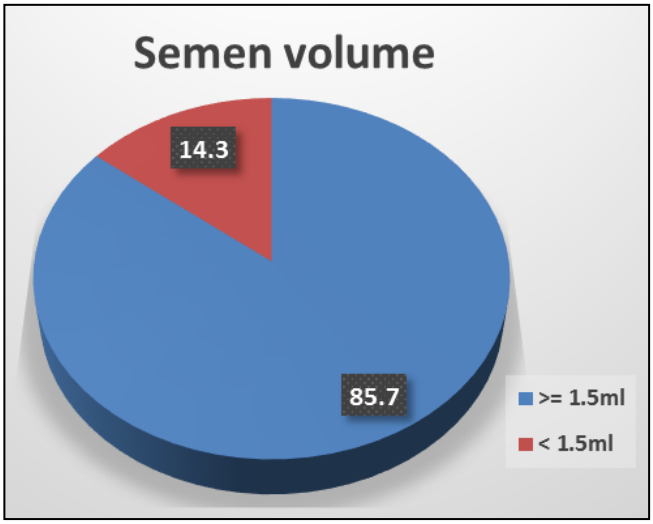



**Table 4**

| | Semen volume | | Total |
|---|---|---|---|
| Age Group (years) | >=1.5 ml | <1.5 ml | |
| 21-25 | 41 | 5 | 46 |
| % | 13.1% | 1.6% | 14.6% |
| 26-30 | 83 | 16 | 99 |
| % | 26.4% | 5.1% | 31.5% |
| 31-40 | 135 | 24 | 159 |
| % | 43.0% | 7.6% | 50.6% |
| >40 | 10 | 0 | 10 |
| % | 3.2% | .0% | 3.2% |
| Total | 269 | 45 | 314 |
| % | 85.7% | 14.3% | 100.0% |

**Table 5**

| | Semenogram | | Total |
|---|---|---|---|
| | Normal | Abnormal | |
| Volume >=1.5 ml | 191 | 78 | 269 |
| % | 60.8% | 24.8% | 85.7% |
| <1.5 ml | 4 | 41 | 45 |
| % | 1.3% | 13.1% | 14.3% |
| Total | 195 | 119 | 314 |
| % | 62.1% | 37.9% | 100.0% |

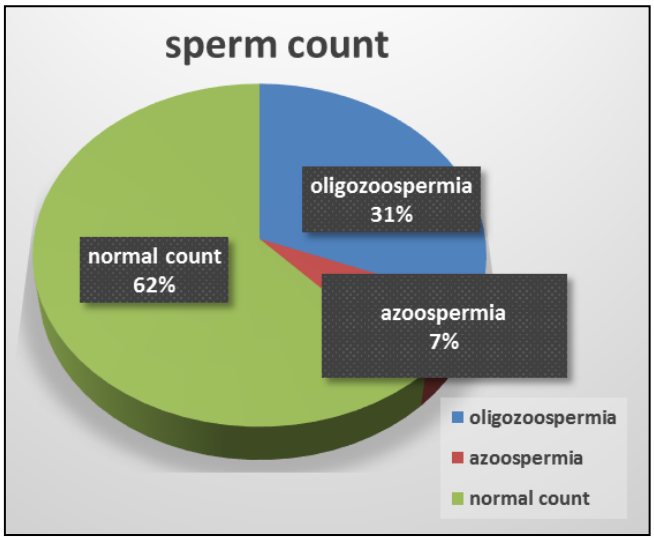



**Table 7**

| | Number of males | Percent |
|---|---|---|
| Oligozoospermia | 98 | 31% |
| Azoospermia | 21 | 7% |
| Normal count | 195 | 62% |

**Table 8**

| | Count | | |
|---|---|---|---|
| Age Group (years) | Oligo | Azoo | Total |
| 21-25 | 5 | 1 | 6 |
| % | 4.2% | 0.8% | 5.0% |
| 26-30 | 31 | 8 | 39 |
| % | 26.1% | 6.7% | 32.8% |
| 31-40 | 60 | 11 | 71 |
| % | 50.4% | 9.2% | 59.7% |
| >40 | 2 | 1 | 3 |
| % | 1.7% | 0.8% | 2.5% |
| Total | 98 | 21 | 119 |
| % | 82.4% | 17.6% | 100.0% |

Normal sperm count was present in 191 (62%) males. 98 males (31%) were oligospermic. 21 males(7%) were azoospermic. Most common age group with oligospermia was 31 -40 years.71 of 119 males (59.7%) belonged to this group. 50.4% males of this age group were oligospermic while 9.2% were azoospermic.

**Sperm motility**

**Table 9**

| | Number of males | Percent |
|---|---|---|
| Normal | 255 | 81.2 |
| Abnormal | 59 | 18.8 |
| Total | 314 | 100.0 |

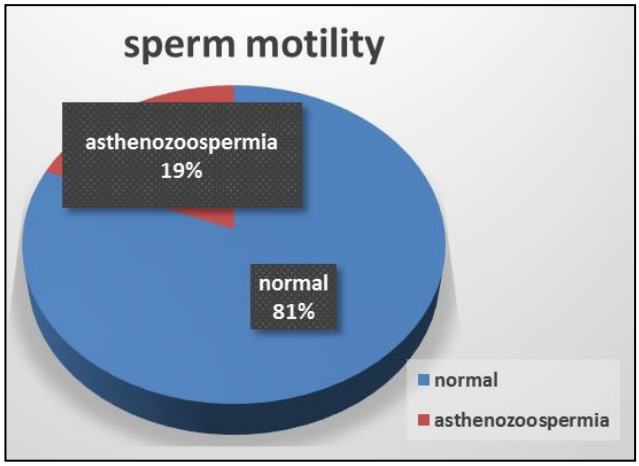



**Table 10**

| | motility | | Total |
|---|---|---|---|
| Age Group (years) | Normal | Abnormal | |
| 21-25 | 38 | 8 | 46 |
| % | 12.1% | 2.5% | 14.6% |
| 26-30 | 80 | 19 | 99 |
| % | 25.5% | 6.1% | 31.5% |
| 31-40 | 128 | 31 | 159 |
| % | 40.8% | 9.9% | 50.6% |
| >40 | 9 | 1 | 10 |
| % | 2.9% | .3% | 3.2% |
| Total | 255 | 59 | 314 |
| % | 81.2% | 18.8% | 100.0% |

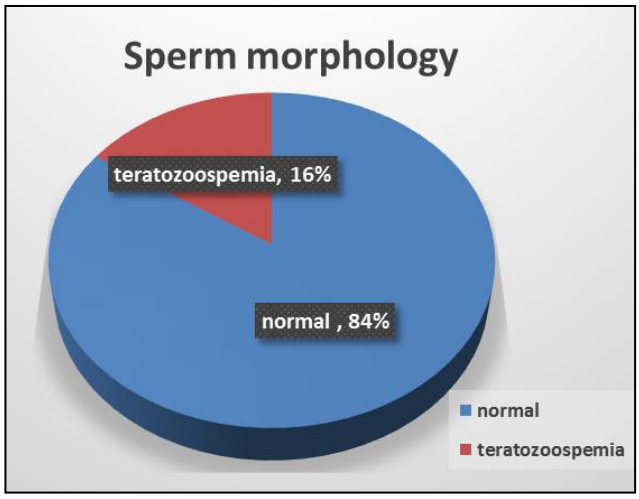



**Table 12**

| | morphology | | Total |
|---|---|---|---|
| Age Group (years) | Normal | Abnormal | |
| 21-25 | 39 | 7 | 46 |
| % | 12.4% | 2.2% | 14.6% |
| 26-30 | 85 | 14 | 99 |
| % | 27.1% | 4.5% | 31.5% |
| 31-40 | 132 | 27 | 159 |
| % | 42.0% | 8.6% | 50.6% |
| >40 | 9 | 1 | 10 |
| % | 2.9% | .3% | 3.2% |
| Total | 265 | 49 | 314 |
| % | 84.4% | 15.6% | 100.0% |

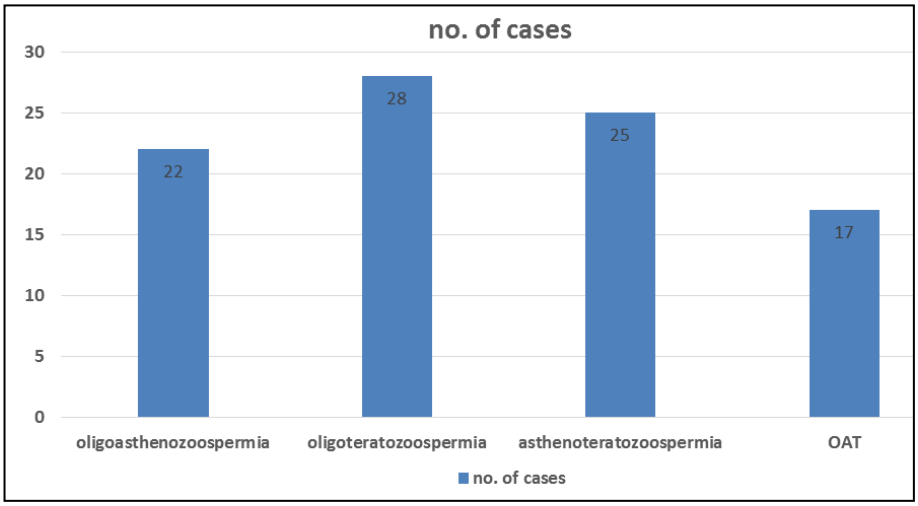
265 males (85%) had normal sperm morphology. Teratozoospermia was present in 49 males (15%). Most common age group was 31 – 40 years. 27 of 49 males (54%)

belonged to this age group.

**Multi factor abnormality**

| | oligozoospermia | asthenozoospermia | teratozoospermia | Oligo + astheno | Oligo + terato | Astheno + terato | Oligo+astheno+terato |
|---|---|---|---|---|---|---|---|
| frequency | 98 | 59 | 49 | 22 | 28 | 25 | 17 |

17 males had 3 factor abnormality, ie asthenoteratozoospermia. 28 males were oligoasthenoteratozoospermia. 24 males were oligoteratozoospermic and 22 were oligoasthenozoospermic.




## Association of infertility with addiction

**Table 13**

| seminogram | normal | oligospermic | azoospermic | Total |
|---|---|---|---|---|
| alcoholic | 24 | 21 | 7 | 52 |
| smoker | 37 | 25 | 1 | 63 |

**Table 14**

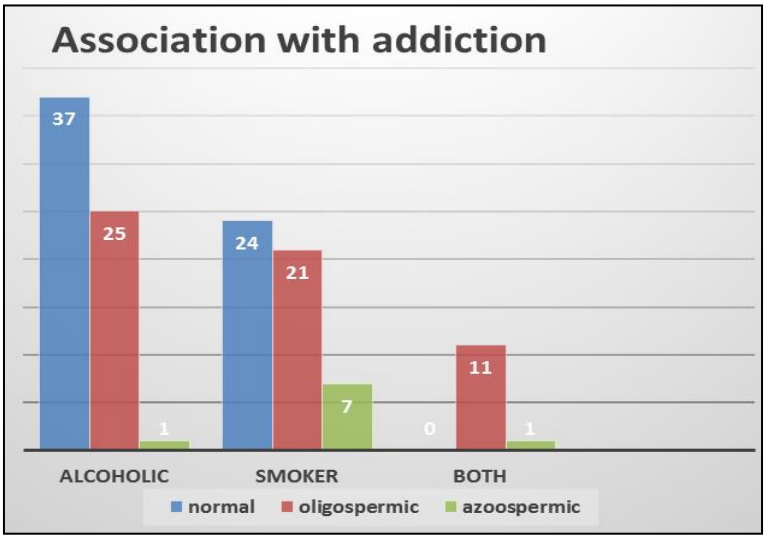
| | alcoholic | |
|---|---|---|
| Age Group (years) | No | Yes |
| 21-25 | 42 | 4 |
| % | 13.4% | 1.3% |
| 26-30 | 82 | 17 |
| % | 26.1% | 5.4% |
| 31-40 | 129 | 30 |
| % | 41.1% | 9.6% |
| >40 | 9 | 1 |
| % | 2.9% | .3% |
| Total | 262 | 52 |
| % | 83.4% | 16.6% |

**Table 15**

| Smoker | Number of Males | Percent |
|---|---|---|
| No | 251 | 79.9 |
| Yes | 63 | 20.1 |
| Total | 314 | 100.0 |

**Table 16**

| | smoker | |
|---|---|---|
| Age Group (years) | No | Yes |
| 21-25 | 41 | 5 |
| % | 13.1% | 1.6% |
| 26-30 | 77 | 22 |
| % | 24.5% | 7.0% |
| 31-40 | 124 | 35 |
| % | 39.5% | 11.1% |
| >40 | 9 | 1 |
| % | 2.9% | 0.3% |
| Total | 251 | 63 |
| % | 79.9% | 20.1% |




52 males (16%) in the study group were alcoholic. 24 males (7.5%) had normal seminogram. 21 males (8.5%) were oligospermic and 7 were azoospermic. 63 males (20%) were smoker. 37 males (12%) had normal seminogram. 25 males (8%) were oligospermic and 1 was azoospermic.12 males were both smoker and alcoholic. 11 males were oligospermic and 1 was azoospermic.

**Discussion**

Male infertility can be due to a variety of conditions. Some of these conditions are identifiable and reversible, such as ductal obstruction and hypogonadotropic hypogonadism. Other conditions are identifiable but not reversible, like bilateral testicular atrophy secondary to viral orchitis. When identification of the etiology of an abnormal semen analysis is not possible, the condition is termed idiopathic. When the reason for infertility is not clear, with a normal semen analysis and partner evaluation, the infertility is termed unexplained. Rarely patients with normal semen analyses have sperm that do not function in a manner necessary for fertility [10, 4].

The purpose of the male evaluation is identification and treatment of reversible conditions which may improve the male's fertility and allow for conception through intercourse. Detection of conditions for which there is no treatment will spare couple induced with treatments the distress of attempting ineffective therapies [11]. If specific corrective treatment is not available, it still may be possible to employ assisted reproductive techniques such as testicular or epididymal sperm retrieval with intracytoplasmic sperm injection [12]. Alternatively, such couples may consider therapeutic donor insemination or adoption. Finally, male infertility may occasionally be the presenting manifestation of an underlying life-threatening condition [13].

In the present study it was found that the male factor was responsible in 38% cases as a cause of infertility (Table 1). By Raymont *et al* (1970) study male factor was responsible in 31.5% cases [13]. In Dor *et al* (1977) study it was 28% [14]. Also in Marshall (1978) study male was responsible in 30% cases as a cause of infertility and 30% had combined factor both male and female factor [15]. Dawn (1980) conducted study and found that the Male factor was responsible in 25% cases and 20% cases have combined male and female factors [16]. Andrews *et al* (1986) analyzed national survey of family growth in USA and found that male factor in infertility accounted for approximately 40% of the cases [17]. The results of male factor as a cause of infertility in the present study was similar to studies done by Roland (1968), Behrman *et al* (1975), Andrews *et al* (1986), Kulkarni *et al* [18], and Bodal *et al* [2]. However, contribution of male factor as a cause of infertility varies in studies done by Raymont *et al* (1970), Dor *et al* (1977), Marshall (1978) and Dawn (1999) from the present study. The possible reason for this discrepancy might be because of variation in geographical factors and sample size.

In our study low semen volume was present in 14% males. This was similar to the study conducted by Diallo (11.2%), Kulkarni (13.6%) [19, 18]. Two studies from India by Joshi and Bhadauri reported low semen volume in 6% and 7.45% cases respectively [20, 21]. The findings of the study show low ejaculate volume both in azoospermic and olizoospermic males when compared with normozoosporic men. This low volume can reflect abnormalities in accessory sex glands fluid synthesis or secretion. It can -also be indicative of a physical obstruction somewhere in the reproductive tract or may occur in the cases of incomplete retrograde ejaculation. Semen volume and total sperm counts were found to be significantly correlated with increase in sexual abstinence from 2-7 days. This is supported partly by other studies [22, 23] for positive correlation of volume, sperm concentration and total count with abstinence.

In our study asthenozoospermia was present in 19 % of male partners of infertile couples [Table 1]. In a study from university college hospital Ibadan done by Adenijiv *et al* (2003) asthenozoospermia was the most common abnormal factor in seminogram [23]. It was present in 27.8% cases. Ugboaja *et al* (2010) studied the pattern of seminal fluid abnormalities in male partners of infertile couples in southeastern Nigeria over a period of 12 months and it was found that out of the 348 semen sample reports evaluated 237 had semen fluid abnormalities. Asthenozoospermia (16.7%) was the single main abnormality followed by oligoasthenozoospermia (14.7%) [24]. Percentage of asthenozoospermia cases as a cause of infertility in present study is comparable with the study conducted by Ugboajo *et al* (16.75%), Muhammad *et al* (21.4%), Kulkarni *et al* (19.9%). However, the percentage of asthenozoospermia was higher from the study conducted by Aulia *et al* (5.9%) and Diallo *et al* (10%). Variations in environmental factors, industrial pollution and/or lifestyle could explain these discrepancies.

In present study majority of male partners of infertile couples with semen defect was of age group 31 – 40 years which was similar to result of studies by Warner (1963) [25], Cates *et al* (1985) [26] and Marimuthu *et al* (2003) [27]. This could be due to the fact that physiological alteration of seminal parameters is a common finding in ageing males.

Oligozoospermia was present in 31% of males in our study. This was the most common abnormal seminal parameter in the study. This was similar to the studies by Chukwunyere *et al* (28%) Joshi *et al* (36%) and [20, 28]. Some other studies by Kulkarni *et al* (18.6%) and Bhaduri *et al* (20%) have reported a comparatively lower rate of oligozoospermia [18, 21].

Teratozoospermia, oligozoospermia, and their combined presence amongst alcoholics were double or more than that found in controls [29]. Asthenozoospermia (sperm motility defects) is a very subtle, "early indicator" of reduction in the semen quality, which may get overlooked, and hence demands further exploration. Amount of alcohol intake per day positively correlates with all the three variables, asthenozoospermia, teratozoospermia, and oligozoospermia [30]. Fifty four percent of males addicted to alcohol were infertile and 41% males addicted to smoking were infertile. The association of alcohol and smoking was significant in our study. The authors found that smokers had lower seminal zinc levels than nonsmokers, with associated decreases in sperm concentration, motility, and morphology [31]. There is also evidence to suggest that the adverse effects of smoking may not be due exclusively to the toxins found in cigarette smoke. Nicotine may also play an important role in the adverse effects of smoking on fertility, independent of the toxins found in the smoke. Interestingly, parameters affected by oral nicotine were improved following 30 days of cessation, suggesting a component of reversibility to these effects.

## Conclusion

- In our study male factor abnormality was present in 38.5%.
- Most common age group with abnormal seminal parameters was 31 – 40 year.
- Azoospermia was present in 7%.
- Most common single factor abnormality was oligospermia. It was present in 31%.
- Most common two factor abnormality was oligoteratozoospermia. It was present in 9% cases.
- Oligoasthenoteratozoospermia was present in 5.4% cases.
- There was significant association of infertility with smoking and alcoholism.

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