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HIGH PREVALENCE OF SEMEN ABNORMALITIES IN AN INDUSTRIAL AREA IN HYDERABAD

Pathology

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ABSTRACT

Semen analysis is the preliminary investigation for evaluation of male infertility. Spontaneous pregnancy is difficult in couples when male partner has abnormal semen parameters. A lot of physical and environmental factors influence semen quality. Early identification and addressing of these issues can help resolve the burden of infertility cases. In our study we want to highlight the prevalence of male infertility and their associated etiological factors in an industrial area in Hyderabad. Over 80% of our patients showed abnormal semen analysis results. Asthenozoospermia was the most common abnormality. The recent trends show that 'Male factor infertility' is on rise and it should be treated as a global problem. Increased prevalence of oligozoospermia and asthenozoospermia are contributing towards abnormal semen quality. There are many related factors like cigarette smoking, alcohol consumption, varicocele, and industrial toxin exposure. Prompt diagnosis, proper counselling and removal of these etiological agents will result in improvement of male fertility.

KEYWORDS

Asthenozoospermia, Infertility, Oligozoospermia, Varicocele.

INTRODUCTION

- WHO defines infertility as failure to achieve clinical pregnancy after 12 months or more of regular unprotected sexual intercourse.[1]
- Infertility affects the individual in more ways than highlighted. It causes personal suffering, social stigmatization, and emotional differences between the couples. Anxiety to conceive may also lead to sexual dysfunction.
- Male infertility is responsible for 20–30% of infertility cases, while 20–35% is due to female infertility, and 25–40% is due to combined problems in both partners. [2][3]
- "Male factor" infertility is described as an alteration in sperm concentration and/or motility and/or morphology in at least one sample of two sperm analyzes, collected 1 and 4 weeks apart.[4]
- As high as 90% of male infertility problems are related to count and there is a positive association between the abnormal semen parameters and sperm count.[5]
- Numerous factors alter semen quality. A complete history (intake of drugs, steroids, urinary tract infection, previous genital tract surgery, any exposure to chemicals/radiation, working conditions) physical and urological assessment of each individual is mandatory in establishing the cause of infertility. Apart from lifestyle factors, environment, and nutrition too play an important role in sexual health. Jobs that require working in hot environments or subjected to mechanical trauma and physical load on the pelvic contents can reduce semen quality.[6]
- Anatomical factors include varicoceles, ductal obstructions, or ejaculatory disorders. Varicoceles have been correlated to lower testosterone levels, testicular inflammation and oligo-asthenozoospermia.[7]
- Our study intends to highlight the prevalence of semen abnormalities in an industrial area and how these associated factors influence the results.

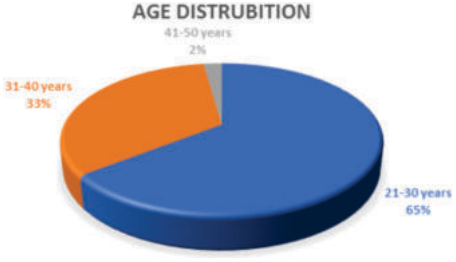
MATERIALS AND METHODS

- A Cross-sectional study was done on 135 males who presented to outpatient department of General Surgery and Gynecology at Mamata Academy of Medical Sciences, Bachupally for a duration of one year i.e., from August 2020 to July 2021 for infertility were evaluated by Semen Analysis at the department of Pathology.
- After appropriate consent, a questionnaire was given to all the participants which included age, occupation, and history of present illness, past history, family history, duration of married life & duration of infertility. Personal history was also noted such as smoking and alcohol intake, presence of obesity and stress.
- Physical examination was done and weight, height, BMI were recorded.
- Sample was collected in a wide mouth, sterile plastic container by masturbation after 3 days of abstinence.
- Semen sample was assessed after liquefaction and physical characteristics were noted under following parameters- quantity, color, appearance, and time for liquefaction.
- Microscopic examination was done using improved Neubauer chamber and reported according to 2010 WHO guidelines.
- On microscopy, total sperm count, viability, motility, and morphology were noted along with presence/absence of pus cells, epithelial cells, and RBCs.

RESULTS

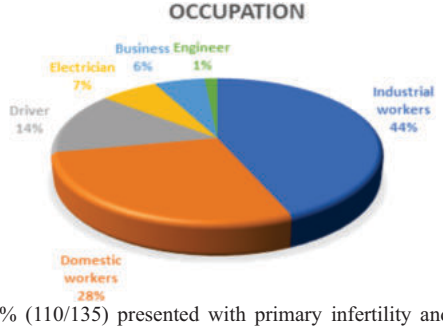
Age distribution ranged from 21-50 years. Majority of patients belonged to age group 21-30yrs (64.4%).

Table 1: Age Distribution



43.7% of patients were industrial workers indicating exposure to toxic chemicals.

Table 2: Occupation



- 81.4% (110/135) presented with primary infertility and 18.5% (25/135) with secondary infertility.
- In our study, 30% patients gave history of both smoking and alcohol intake.

Table 3: Personal History

Personal History	No. of cases	Frequency
No history	24	17.7
Only Smoking	25	18.5
Only Alcohol intake	15	11.1
Tobacco chewing	20	14.8
Smoking + alcohol	41	30.3
Smoking + tobacco	10	7.4
TOTAL	135	99.8

Clinical examination revealed Varicoccele of varying grade in 26.6% as most common abnormality.

Table 4: Clinical Diagnosis

Clinical diagnosis	No. of cases	Frequency
Varicocele • Grade I • Grade II • Grade III	Total 36 06 22 08	26.7%
Epididymal cyst	04	2.9%
Spermatocele	02	1.4%
Undescended testes	01	0.7%
Erectile dysfunction	01	0.7%
No abnormality	91	67.4%
Total	135	99.8%

On microscopy, Asthenozoospermia was seen in 26.6% of participants followed by oligoasthenozoospermia in 16.2%.

Table 5: Semen Analysis -microscopic Diagnosis

Diagnosis	No. of cases	Frequency
Asthenozoospermia	36	26.6%
Oligozoospermia	12	8.8%
Oligoasthenozoospermia	22	16.2%
Pyospermia	30	22.2%
Azoospermia	08	5.9%
Normal study	27	20%
Total	135	99.9%

DISCUSSION

- Semen analysis remains the most useful and fundamental investigation that it is able to detect 9 out of 10 men with a genuine problem of male infertility.[8]
- The two major quantifiable attributes of semen i.e., total number of spermatozoa and total fluid volume contributed by accessory glands, along with nature of the spermatozoa (vitality, motility, and morphology) and composition of seminal fluid are important for sperm function.[9]
- We are following WHO 2010 guidelines for semen reporting.[10]
- Patients whose sperm parameters fall below the given WHO values are considered to have male factor infertility. The most significant are low sperm concentration (oligospermia) and poor sperm motility (asthenospermia).[11]
- There is multifactorial etiology behind decline in semen quality. Lifestyle factors like smoking, tobacco intake, nutritional deficiencies and stress result in decreased libido, low semen quality and change in sperm morphology.[12] Alcohol intake causes decrease in testosterone levels and decrease in sperm production. Stress itself can affect sperm parameters and reduces sperm morphology.[13]
- Semen parameters can change after exposure to heavy metals such as lead, mercury, and pesticides. [14] Men living in rural and industrial areas are more exposed to these chemical and physical agents and hence more prone to infertility. Extended exposure to pesticides, organic solvents, benzenes, toluene, xylene, herbicides, painting materials and lead contribute to low sperm counts.[7].
- Exposure to industrial chemicals is not only responsible for male infertility but also can result in DNA fragmentation.[14]
- Farmers exposed to organophosphorous chemicals have altered sperm parameters and reduced serum FSH, LH and testosterone levels, which decrease fertility.[15,16]
- Other factors include testicular heat stress, intense cycling, lack of sleep, and exposure to radiation from mobile phones.[17]
- The association between varicocele and improvement of semen quality after its repair is frequently reported. [18,19] This is in accordance with the results of our study.
- Proposed mechanisms of semen abnormalities include hypoxia and stasis, testicular venous hypertension, autoimmunity, elevated testicular temperature, reflux of adrenal catecholamine, and increased oxidative stress.[20]
- Varicocele leads to increase the temperature of testes and cause reflux of toxic metabolites of adrenal vein to the left kidney. Increased concentration of regressed toxic metabolites in the testes (e.g. catecholamines from the adrenal glands) can cause chronic vasoconstriction and subsequent dysfunction of the spermatic epithelium.[21]
- Varicocelectomy is believed to improve one or more semen parameters in 65% of those men who are treated. [22]. Recent evidence shows varicocelectomy prior to IVF improved live birth rates when oligozoospermia is present in men with varicoceles.[23]
- We must also keep in mind that fertility may not always improve after surgical repair of varicocele. A multifactorial approach is necessary while dealing with such cases. In our study, out of 26.6% cases that showed varicocele, 21% had improved sperm counts and motility after treatment.
- Presence of leukocytes in semen indicate ongoing damage to sperms due to an infection or an inflammatory process as they are the main source of reactive oxygen species leading to increased sperm DNA damage.[24]

Comparative Studies Related To Infertility

In the present study 81.4 % (110/135) presented with primary infertility and 18.5 % (25/135) presented with secondary infertility. Similar findings were observed in other studies such as in Parija Juneja et al study [25] where 80 participants (84.1%) presented with primary infertility while 14 (14.9%) as secondary infertility and in S N Aulia et al study [28] where 88.7% men had primary infertility and 11.3% had secondary infertility.

Comparative Studies Related To Physical Examination

In our study, on clinical examination varicocele constituted 26.6%, followed by Epididymal cyst 2.9 %. In Parija Juneja et al study, [25] varicocele was seen in 6.38% and hydrocele in 8.51%. In Milardi et al study [27] varicocele was present in 25% of patients.

Table 6: Comparative Studies Related To Microscopic Semen Analysis

Diagnosis	Parija Juneja et al study	Ugwuja E I et al study	Milardi et al study	S N Aulia et al study	Present study
Asthenozoospermia	35.11%	Most common abnormality	27%	5.9%	26.6%
Oligozoospermia	25.53%		26%	39.7%	8.8%.
Oligoasthenozoospermia				17.8%	16.2%
Pyospermia					22.2%
Azoospermia	4.26%			24.4%	5.9%

In our study, 80% participants had abnormal semen parameters, most common being asthenozoospermia (26.6%) which was in accordance with Parija Juneja et al study [38], Ugwuja et al study [26] and D. Milardi et al study [27]

Oligozoospermia was most common abnormality detected in in S N Aulia et al study [28] (39.7%)

CONCLUSION:

Male infertility is quite common and an escalating health issue. Because of rise in environmental pollution in a developing country like India, there is a significant increase in infertility disorders and decline in sexual health.

The significant causes of male factor infertility in our study were asthenozoospermia, oligozoospermia, varicocele, and leukocytospermia.

Modifications in lifestyle such as weight loss, cessation of smoking, alcohol intake and tobacco consumption, improved nutrition play an important role in shaping the sexual health of an individual. Decreasing the environmental and occupational hazards would go a long way in improving the semen quality in infertile males. Patients should be educated and offered better treatment for conditions like varicocele.

In cases where semen parameters are far from improving, assisted reproductive techniques can be offered to the couple.

Further research is required to ascertain the true magnitude of underlying etiology.

REFERENCES:

1. Zegers-Hochschild F, Adamson GD, de Mouzon J, Ishihara O, Mansour R, Nygren K, et al. International Committee for Monitoring Assisted Reproductive Technology (ICMART) and the World Health Organization (WHO) revised glossary of ART terminology, 2009. Fertil Steril. 2009; 92:1520–4
2. Chowdhury SH, Cozma AI, Chowdhury JH. Infertility. Essentials for the Canadian Medical Licensing Exam: Review and Prep for MCCQE Part I. 2nd edition. Wolters Kluwer. Hong Kong. 2017.
3. ART fact sheet (July 2014). European Society of Human Reproduction and Embryology. Archived from the original on 4 March 2016
4. 4th ed. Cambridge: Cambridge University Press; 1999. World Health Organization. WHO Laboratory Manual for the Examination of Human Semen and Semen-Cervical Mucus Interaction; pp. 1–86
5. Sabra SM, Al-Harbi MS. An influential relationship of seminal fluid microbial infections and infertility, Taif Region, KSA. World J Med Sci. 2014; 10:32–7.
6. S Lin, SA Hwang, EG Marshall, R Stone, J Chen. Fertility rates among lead workers and professional bus drivers: a comparative study. Ann Epidemiol. . 1996; 6(3):201–08.
7. Tronchon V, Vialard F, Sirkasi M, Dechaud H, Rollet J, Albert M et al. Tumor necrosis factor-alpha− 308 polymorphism in infertile men with altered sperm production or motility. Human Reproduction. 2008; 23(12):2858-2866
8. Butt F, Akram N. Semen analysis parameters: Experiences and insight into male infertility at a tertiary care hospital in Punjab. J Pak Med Assoc. 2013; 63:558–62.
9. Semen manual: WHO laboratory manual for the examination and processing of human semen; 5th edition, 2010
10. Cooper TG, Noonan E, von Eckardstein S, Auger J, Baker HW, Behre HM, et al. World Health Organization reference values for human semen characteristics. Hum Reprod Update. 2010;16:231–45
11. Harris ID, Fronczak C, Roth L, Meacham RB. Fertility and the aging male. Rev Urol. 2011; 13:e184–90.
12. N Sofikitis, I Miyagawa, D Dimitriadis, P Zavos, S Sikka, W Hellstrom. Effects of smoking on testicular function, semen quality and sperm fertilizing capacity. J Urol. 1995;154(3):1030–34
13. EK Sheiner, E Sheiner, RD Hammel, G Potashnik, R Carel. Effect of occupational exposures on male fertility: literature review. . Ind Health. 2003; 41(2):55–62.
14. Sumner, RN, Tomlinson, M, Craigon, J, England, GCW, Lea, RG. Independent and combined effects of diethylhexyl phthalate and polychlorinated biphenyl 153 on sperm quality in the human and dog. Sci Rep. 2019; 9(1):3409.
15. Dhanushka, MAT, Peiris, LDC. Cytotoxic and genotoxic effects of acephate on human sperm. J Toxicol. 2017; 2017:1–6. doi:10.1155/2017/3874817.
16. Kudavidanage, EP, Peiris, DC. Exposure of Judo 40 alters DNA integrity and sperm function of rat multidisciplinary. EPRA Intern Onal J Multidiscip Res. 2016; 9(2):1119. https://www.academia.edu/29299680/EPRA_International_Journal_of. Accessed 14 March, 2019
17. Durairajanayagam, D. Lifestyle causes of male infertility. Arab J Urol. 2018; 16(1):10–20. doi:10.1016/j.aju.2017.12.004
18. JP Jarow. Effects of varicocele on male fertility. Hum Reprod Update. . 2001; 7(1):59–64.
19. L Lund, SB Larsen. A follow-up study of semen quality and fertility in men with varicocele testis and in control subject. Br J Urol.1998;82(5);682-86.
20. M. Nistal, R. Gonzalez-Peramato, A. Serrano, and J. Pegadera, ´ "Physiopathology of the infertile testicle. Etiopathogenesis of varicocel," Archivos Espanoles de Urologia, vol. 57, no. 9, pp. 883–904, 2004
21. Naugton DK, Nangia AK, Agarwal A. Varicocele and male infertility: Part II. Pathophysiology of varicoceles in male infertility. Hum Reprod Update 2001; 7: 473-481
22. M. H. Schlesinger, I. F. Wilets, and H. M. Nagler, "Treatment outcome after varicocelectomy: a critical analysis," Urologic Clinics of North America, vol. 21, no. 3, pp. 517–529, 1994
23. Kirby EW, Wiener LE, Rajanahally S, et al. Undergoing varicocele repair before assisted reproduction improves pregnancy rate and live birth rate in azoospermic and oligospemric men with a varicocele: a systematic review and meta-analysis. Fertil Steril 2016; 106:1338-43. 10.1016/j.fertnstert.2016.07.1093
24. Menkveld R. Leukocytospermia. In: Daya S, Harrison RF, Kempers RD, editors. Advances in Fertility and Reproductive Medicine. International Congress Series 1266. Amsterdam: Elsevier B.V; 2004, p218–24
25. Juneja P et al. Int J Reprod Contracept Obstet Gynecol. 2019 Mar;8(3):997-1000
26. Ugwuja E I, Ugwu N C and Ejikeme B N. Prevalence of Low Sperm Count and Abnormal Semen Parameters in Male Partners of Women Consulting at Infertility Clinic in Abakaliki, Nigeria. African Journal of Reproductive Health. Vol. 12 No.1 April, 2008: 67-73
27. D. Milardi et al. Male Fertility and Reduction in Semen Parameters: A Single Tertiary-Care Center Experience. International Journal of Endocrinology Volume 2012, Article ID 649149.
28. S N Aulia et al 2017 J. Phys.: Conf. Ser. 884 012138