ORIGINAL ARTICLE

Correlation between Occupation and Sperm Morphology along with Sperm Count in Industrial Workers in District Faisalabad, Pakistan

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ABSTRACT

Aim: To determine whether there is a relation between abnormal semen parameters and occupational exposure to excess heat, chemical solvents and pesticides.

Study design: Cross sectional study.

Place and duration of study: Life Medicare and Areeba Clinic of Fertility Centres, District Faisalabad, Punjab from 1st January 2019 to 30th June 2019.

Methodology: Three hundred and sixty semen samples were collected from married men between 25 to 55 years of age, with different occupations. Semen analysis was done using computer assisted semen analysis (CASA) technique.

Results: There was a strong association between industrial hazards and their effects on male reproductive health. Exposure to high heat in bakers and oven workers (Tandoor) showed remarkable decrease in sperm count, motility and morphology. Workers who were exposed to textile chemicals had disturbed sperm morphology and moderately decreased sperm count along with motility.

Conclusions: High heat has strong association with spermatogenesis and influences normal sperm motility. Working environment for bakers and oven workers (Tandoor) seems to be very hostile for their reproductive health, while textile chemical industry worker had better working environment and their results were slightly better than oven workers. Farmers and gardeners seem to be on safer side due to their working environment in open fields and garden. Their sperm count, motility and morphology were much better than other two groups.

Keywords: Computer assisted semen analysis, Male infertility, Occupational hazards, Sperm count,

INTRODUCTION

Semen is an ejaculate of male reproductive system. It is also known as “seminal fluid”. In normal semen sperms are floating with its supporting organic fluid. This organic fluid is responsible for normal physiology of sperms.[1] There are some other biological and environmental factors which also help in maturity and nourishment, such as lifestyle, food, endocrine function and normal health.[2,3] These factors not only effect the sperm production but also persuade the changes of composed semen.[4,5] To analyze the normal male fertility, semen analysis is always a key test to perform in daily practice. After the abstinence period of 3 to 5 days (time period from last ejaculate) semen is collected by masturbation and analyzed in laboratory[6,7].

Normal reproductive age of male usually starts at puberty from 12 years till death. The hormones and sperm count decreases with advancing age. The best age of male reproductive system lies between 18 to 40 years. As age progresses, changes are seen in sperm production, either by hormonal changes or by DNA damage.[8] Along with age progression, few diseases also play a vital role in affecting reproductive system, for example Diabetes Mellitus known to cause micro and macro vascular changes. These changes cause decrease in sperm production, loss of libido and erectile dysfunction[9].

It is thought that certain medications which cause erectile dysfunction, loss of libido, changes in hormone levels, gynecomastia also interfere with semen cells production, for example anti hypertensive drugs, diuretics, nicotine, alcohol and analgesics[10-12].

WHO reported in 1992, made criteria to describe normal semen, which should be 2-4 ml or greater in volume, with pH ranges from 7.2 to 8, sperm concentration equal or greater than 20×10^6 spermatozoa/ml, sperm count higher than 40×10^6 spermatozoa in each ejaculate with motility higher than 50% with forward progressive movements in between 40-60 minutes after ejaculation.[13]

The total sperm count and quality of semen determines the ability of a male to accomplish fertilization. Any defect in sperms and supporting component of semen causes male infertility[14].

These defects may be histological or physiological, both influences the reproductive health of human. Due to impaired anatomical structure of testis, undescended testis, blockage of any part of ejaculatory ducts, chronic inflammatory diseases of testis such as orchitis and other sexual transmitted diseases also cause Azoospermia, morphological defects or poor quality of semen.

Due to increasing number of fertility problems in Pakistan[15], a study was required to check the effects of hazardous job related known risk-factors on sperm count and its morphology. A study was performed on semen analysis of married men related with different occupations who visited two fertility clinics in Faisalabad district. As Faisalabad is the 3rd largest and one of the most heavily populated city of Pakistan, most of its residents has occupation related to high risk factors such as excess heat, chemicals and pesticides.

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This study has documented the sperm parameters of Pakistani married men related to different occupations and their effects on sperm count as well as its morphology. It also helped in routine clinical practice for physicians to determine the relationship between occupational risk factors and patient's poor semen parameters. It generates understanding among employee to implement anticipatory measures during harmful tasks.

MATERIALS AND METHODS

This cross-sectional study was conducted at Fertility Clinics, Areeba clinic and Life Medicare in District Faisalabad, Punjab from January to June 2019. Three hundred and sixty semen samples were collected from married men between 25 to 55 years of age, with different occupations and 3-5 days of abstinence were included. Patients diagnosed with chronic diseases previously and any sexual or physical deformities were excluded. All these semen samples were taken from male partners of couples. These samples were collected by laboratory technicians. Both were well trained and experienced. A Standardized laboratory facility was available on these setups. Computer Assisted Semen Analysis (CASA) technique has been used. A questionnaire was prepared to take brief history and grouped these samples according to their occupation and possible risk factors. All semen samples were characterized according to questionnaire which consisted of name and age, life-style, marital status with years of marriage, previous medical history if any and job information, which was: job title, duty hours and Job duration with monthly gross salary. This information was used for allocating the subjects according to their job titles and possible risk factors**.** All these workers who participated in study claimed that their job, environment and life style had not been changed for past 6 months before semen sampling. The semen analysis has been evaluated according to WHO criteria. The data was entered and analyzed through SPSS-20.

RESULTS

Out of 300 samples, 45.3% were from age 36-40 years old, 21.7% were 41 plus, 18.3% were 31-35 years old and 14.7% were below 30 years (Fig. 1). Percentage of active sperm was highest among farmers followed by industry workers and bakers group. Sluggish and dead sperm percent was highest in bakers followed by industry worker and farmers (Fig. 2). Head defect percent was highest among bakers followed by industry workers and farmers. Mid piece, tail and tapering defect percent was highest among Industry workers followed by bakers and farmers (Fig. 3).

Fig. 1: Age distribution of respondents

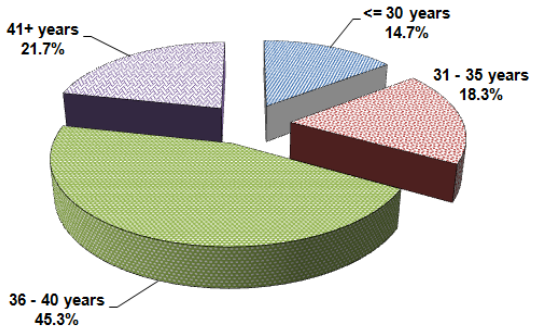


Fig. 2: Summary of microscopic examination of sperm motility %

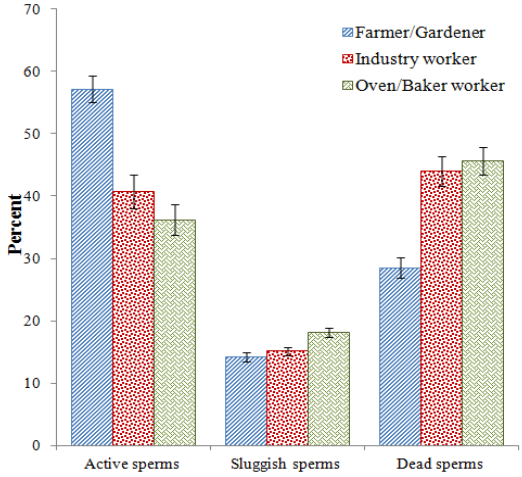
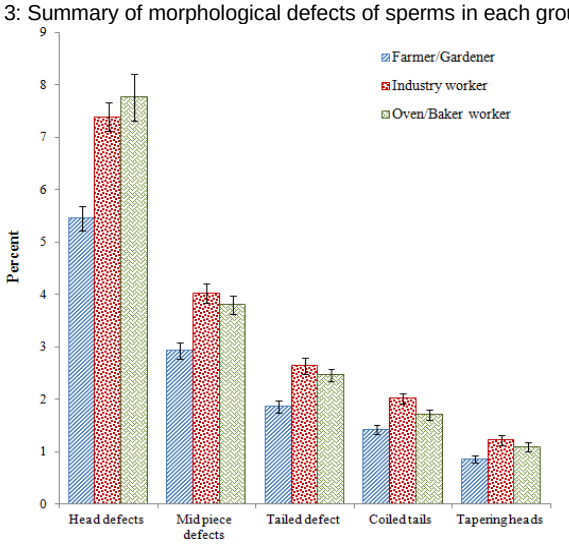


Fig. 3: Summary of morphological defects of sperms in each group



DISCUSSION

Faisalabad lies in the middle of Punjab province, Pakistan.[16] According to the area it is third largest and heavily populated city of Pakistan. The territory lies outside the rain zone and climate is hot and humid for about 9 months.[17] A wide majority of its population have their job in industries, such as textile industry, farming, cooking baking and construction.[18,19] Currently as the part of China Pakistan Economic Corridor (CPEC) project, textile industry is booming along with construction and restaurant business which increased demand of workers.[20-22] Traditionally small restaurants, BBQ shops, Naan centre (Ovens for baking traditional bread in South Asia) and tea stalls have been opened near these factories or construction sites. Most of male population has been related to such shops, bakers and Tandoor (oven) either they owned it or were hired. Along with these laborious jobs another huge number of male population is related to agriculture land farming industry.[23] People usually hire workers for pesticide sprays, fertilizers and plantations. While performing duties these industrial population have to face severe weather conditions throughout the year, which leads to affect their general health.[24-27]

In this study I have noticed that along with harsh weather these workers were also exposed to number of other stressful conditions in their work field such as financial, psychological, chemical and physical stimuli.[28]

During this study on semen analysis of 360 men, it was noticed that strong association was found for those who were related to high heat jobs such as oven workers (Tandoor) which led to increase in their scrotal temperatures thus interfering in sperm production and decrease in sperm motility[29].·These results are in correlation with the study conducted in 2018.[30]

Out of 120 samples 21 were Azoospermia (no sperm). Statistical analysis shows that oven workers had least amount of sperm count as compared to other two groups. Motility percent shows that they had more sluggish and dead sperms as compared to active ones.[31,32] Morphological defects were also seen. These finding correlated with studies done internationally.[33-35]

The textile industry workers showed slightly similar results to oven workers, who were exposed to chemicals, had increased frequency of abnormal sperm morphology predominantly coiled tail, midpiece and tapering head defects, decreased total count and motility. Out of 120 samples 19 were (Azoospermia). On statistical analysis, motility percent shows slightly better results than oven workers, but increased sluggish and dead sperms as compared to active sperms. These findings from textile chemical industry workers were almost similar to study published in 2016 by Meeker et al[36], Lea et al[37], in 2018 by Rehman et al[38], Smarr et al[39] and Inos et al[40].

Although there are few limitations in my study which comprises of use of tobacco, alcohol, unknown herbal or homeopathic medications, levels of depression and anxiety, family crises, financial issues and poor hygienic living conditions.

CONCLUSION

Male industrial workers of Faisalabad i.e. farmers, oven and textile factory workers were in correlation with studies done in past from different countries having different race, life styles, traditions, quality of food and environmental settings.

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