Occupational Distribution of Patients Presenting With Male Factor Subfertility

AUB Pethiyagoda[*], K Pethiyagoda[**]

[*]Department of Surgery, Faculty of Medicine, University of Peradeniya, Sri Lanka
[**]Department of Community Medicine, Faculty of Medicine, University of Peradeniya, Sri Lanka

Abstract- Male subfertility is a major problem that is encounted in today's urological practice. Occupation plays an important role among the factors contributing to male subfertility. The present study evaluates the pattern of occupational distribution in a subfertile population attending to urology and andrologyclinics. The current study included 120 male patients with a history of subfertility. According to the results, the highest percentage of study subjects were from armed forces (16.7%) followed by skilled agricultural, forestry and fishery workers (15%) and craft and related trade workers (15%). According to current study there is an association between occupation and subfertility**.**

Index Terms- Male,Subfertility, Occupation, Urology,Andrology

I. INTRODUCTION

Subfertility is a failure to conceive after one year of unprotected regular sexual intercourse. Subfertility can be primary or secondary.Primary subfertility isa delay for a couple to conceive who have had no previous pregnancies. Secondary subfertility is a delay for a couple to conceive who have conceived previously, although the pregnancy may not have been successful [1]

Male factor subfertility is a condition frequently encountered by the genito-urinary surgeons thatassociate with a substantial social, cultural and medical challenge in the management. The fertility plays an important role on individual basis up to national level as it is a major determinant factor of growth of population. Therefore the clinical management of subfertility should involve careful patient evaluation, timely investigations and well planned interventions.

Male factor subfertility has gradually increased in its prevalence over time.This can be due to changing lifestyles and increasing environmental exposure to endocrine disrupters. These factors areresponsible for the occurrence of male reproductive health problems, including testicular cancer, undescended testis and poor semen quality,which may also contribute to the low fertility rates. [2]

There is evidence to say that obesity and sedentary occupation play a role in male subfertility. [2]The main occupational agents and factors known to adversely affect male fertility include heavy metals, solvents, pesticides and other agricultural materials, radiation and heat. [3]

Since the testicular function is temperature dependent, normal testicular function requires a temperature 2–4°C below body temperature. Therefore there is a temperature difference between the body core and the testicles.[5]

External factors such as posture, clothing, lifestyle and seasonscan affect the temperature difference between the body core and the scrotum. Previous studies in animals and humans have demonstrated the role of exogenous heat exposure in male subfertility. Alsonumerous epidemiological studies have indicated the possible effects of various types of occupational exposure on male fertility. [5]

In a study done by Sas and Szllosiusing 2984 patients, they found out that the incidence of seminal fluid abnormalities was significantly increased among occupational drivers compared to other professionals. The ratio of severe sperm abnormalities was increased in proportion to the number of years of driving. [6]

Lead is considered as one of the material that is detrimental to fertility. In a case-control study from Finlandit has shown that an increase in the level of lead in blood in men was associated with an increased risk of miscarriage. Analysis of sperm counts in lead workers showed a decrease in sperm count, decreased motility and lifespan of sperm, in direct relation to the level of lead in the blood. [3]

In 1977, a group of men working in a pesticide plant in California had experienced a decreased birth rate.At that timethe plant was producing agricultural pesticide called Dibromochloropropane (DBCP). A similar report was published a year later in Israel by Potashniket al.about workers in a pesticide plant who came in contact with the same material. This report demonstrated the suppressive effect of DBCP on human spermatogenesis in a followup of the workers exposed to this material; it became clear that the agent could cause permanent azoospermia. [3]

Occupational exposures have a negative impact on the male reproductive system, but sometimes it is difficult to isolate a single insult.There is a proven insult to spermatogenesis among professional drivers who are exposed to the products of fuel consumption, noise, vibration, emotional stress, physical load on the pelvic organs and increased temperature in the pelvis because of prolonged sitting. Also in welders, who are exposed to heat, solvents, heavy metals and noise there is a proven insult to spermatogenesis. [3]

Some of the organic solvents found in paints dyes and thinners, such as 2-methoxyethanol (2-ME) and 2-ethoxyethanol (2-EE)are found to cause detrimental effects on male fertility. [3] When considering most of the published data regarding occupation and subfertility, there is a clear association between occupation and male subfertility. Thus evaluation of occupational pattern of patients present with subfertility is important.

The objective of this study was to evaluate the relationship between occupation and subfertility in a group ofsubfertile men

present to urology and andrology clinics, Teaching hospital Peradeniya, Sri Lanka.

II. PATIENTS AND METHOD

The study was conducted as a descriptive observational study by the Department of Surgery, Faculty of Medicine, University of Peradeniya, Sri Lanka.Male patients who presented to urology and andrology clinics,Teaching Hospital Peradeniyafrom January 2005 to December 2011 with a history of subfertility fortwo or more than two years were included in the study. For all the patients seminal fluid analyses were performed. The epidemiological data including occupation and relevant factor in the history were recorded. The patients who have done same occupations for more than two years were enrolled in study. The occupation of each individual was categorized according to standard international classification of occupations. Percentages of patients with subfertility doing each occupation were calculated. The occupational distribution of subfertilepatients was compared with the occupational distribution of general Sri Lankan population. Analysis was carried out using 20.0 version of the statistical package for the social sciences (SPSS).

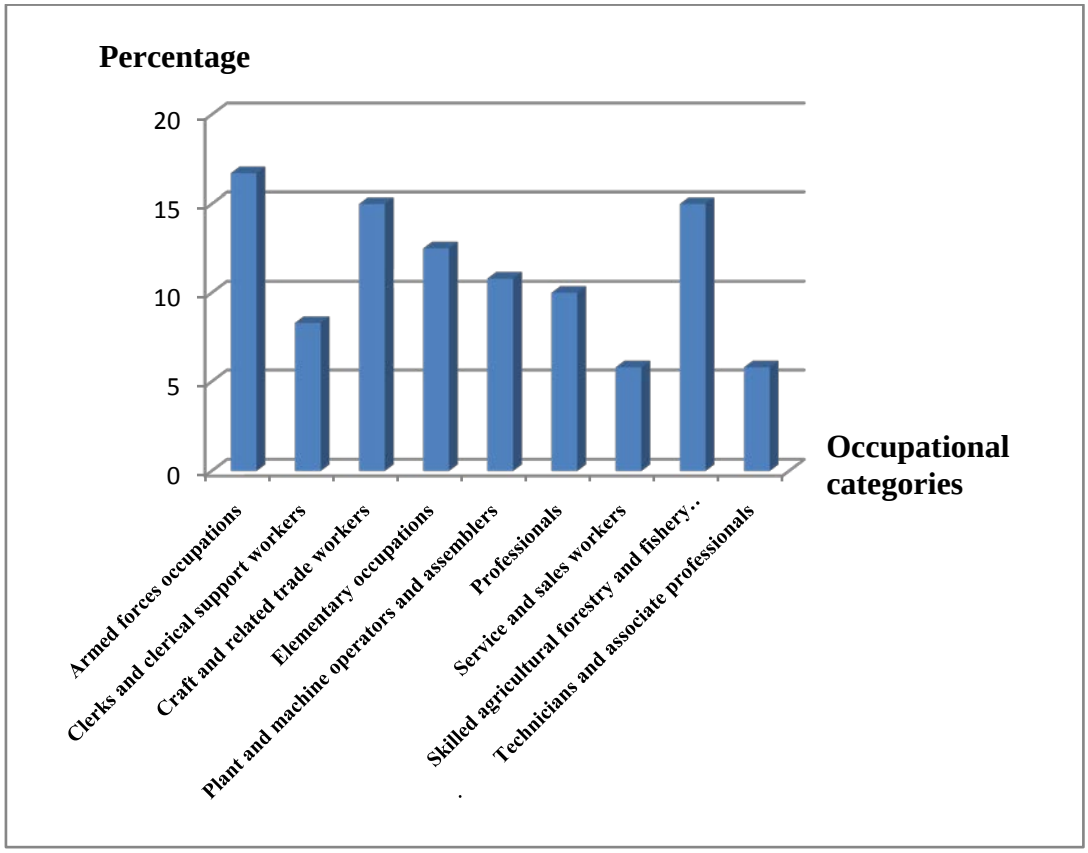
III. RESULTS

There were 120 male patients between ages 24-48 years with a mean age of 34.26years (SD 5.14). Of the study population 92.5% had primary subfertility and 8% had secondary subfertility

Among the study subjects highest percentage of subjects were from the occupational category armed forces occupations which accounted for 16.7%of the study population, and there were no subjects from the occupational category of managers, senior officials and legislators. There were 10.0% professionals, 5.8% technicians and associate professionals, 8.3% clerks and clerical support workers, 5.8% service and sales workers, 15.0% skilled agricultural forestry and fishery workers, 15.0% craft related trade workers, 10.8% plant and machine operators and assemblers and 12.5% elementary occupations(Table2)(Graph1)

Table2. Percentage of each occupational categories presenting with subfertility

	Frequency (n)	Percentage %
• Armed forces occupations	20	16.7
• Clerks and clerical support workers	10	8.3
• Craft and related trade workers	18	15.0
• Elementary occupations	15	12.5
• Plant and machine operators and assemblers	13	10.8
• Professionals	12	10.0
• Service and sales workers	7	5.8
• Skilled agricultural forestry and fishery workers	18	15.0
• Technicians and associate professionals	7	5.8
Total	120	100.0



Graph1.Percentage of subfertile males in each occupational category

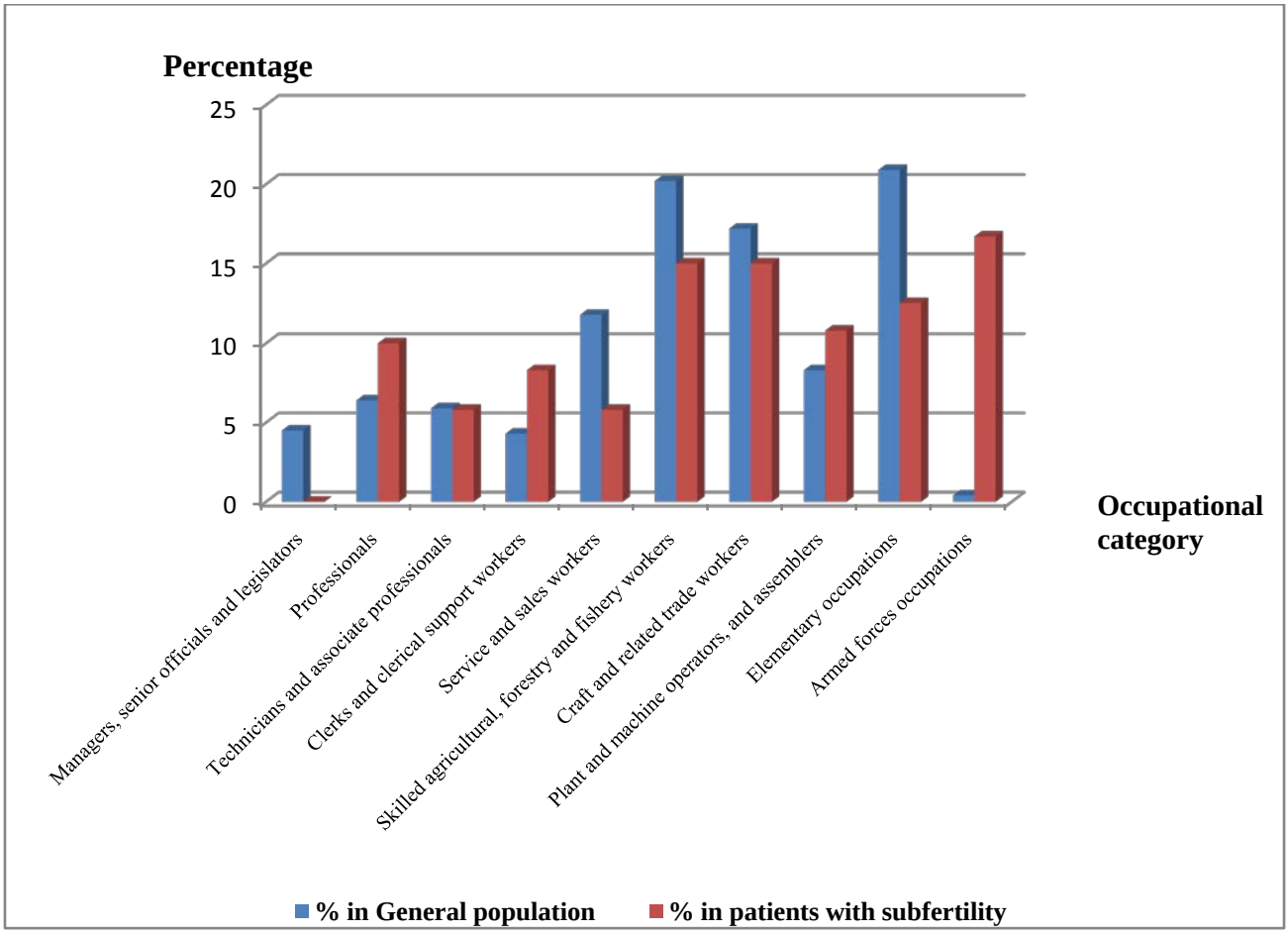
The following table shows the occupational categories according to Sri Lankanstandard classification of occupations in 2011[12]. The employed population by occupation category in general Sri Lankan population was obtained by annual publication of Sri Lankanlabourforce survey annual report in 2014 by census and statistics department of Sri Lanka. [13] In the same time it presents the percentage population that occupy each occupational category in general Sri Lankan population and study population of patients presented with subfertility (Table3).(Graph2)

Table3. The percentage population of each occupational category in general Sri Lankan population and study population of patients presented with subfertility.

Occupational category	% in General population	% in patients with subfertility
Managers, senior officials and legislators	4.5	0
Professionals	6.4	10
Technicians and associate professionals	5.9	5.8
Clerks and clerical support workers	4.3	8.3
Service and sales workers	11.8	5.8
Skilled agricultural, forestry and fishery workers	20.2	15
Craft and related trade workers	17.2	15
Plant and machine operators, and assemblers	8.3	10.8
Elementary occupations	20.9	12.5
Armed forces occupations	0.4	16.7
Total	**100**	**100**

In general population highest percentage of people were engaged in occupational category of elementary occupations. In our study 12.5% of study subjects were from that occupation

category. Highest percentage of study subjects were from armed forces occupations which include 16.7% of subjects, in general population only 0.4% of people were engaged in armed forces. There were no study subjects from the category managers, senior officials and legislators whereas in general population that category consists of 4.5% of population.



Graph2.The percentage population of each occupational category in general Sri Lankan population and study population of patients presented with subfertility

IV. DISCUSSION

Workers are exposed to a number of harmful physical, chemical and psychological factors in their working environment.[7] During recent years the effect of these factors on fertility have drawn the attention of a number of researchers throughout the world. A number of reports concerning this have been published. However, InSri Lanka a limited number of studies have been conducted on the problem of infertility. This study was undertaken with the goal of gaining an understanding of the patternof occupation and subfertility inmale patients presented to urology and andrology clinics, Teaching Hospital Peradeniya over 6years period.

Inthe current study majority of subfertile males were from the occupational category armed forces, even though the lowest percentage of general population was engaged in this occupational category. This can be due to various risk factors including physical separation and exposure to heat (traveling in armoredvehicles, wearing the tight uniforms)

Similarly in a study done by Qudsia Nawaz et al. using 232 couples,theyconcluded that incidence of subfertility in military couples is high and it can be attributed to military deployments and lifestyle. [9] Also in a study conducted by Velez de la Calle et al. to investigate subfertility risk factors in a French military population, they found that heat exposure is an independent risk factor for male infertility. [8]

Impaired fertility among agricultural workers has been shown in numerous studies in the pastand it is associated with exposure to pesticides.[3] In contrast in a study done by Thonneau et al., in 1999 using 362 French rural workers, 449 Danish farmers and 121 Danish greenhouse workers exposed to pesticides, they concluded thatthere is no relation between fertility and male exposure to pesticides. In current study skilled agricultural, forestry and fishery workers accounted for 15% of study subjects. [10]

Numerous studies have been shown reduced fertility among drivers. Sas and Szollosi (1979) found that 291 (9.4%) of the 2984 patients consulting for infertility in Hungary were professional drivers, whereas this occupation accounted for only

3.8% of the general population in the same catchment area. [6] Impairment of spermatogenesis has been found in a high prevalence among professional drivers.[3]Similarly in current study10.8% of study subjects were from the occupational category which includes drivers whereas it accounted for 8.3% of general population.

According to the literature occupationswhich involve frequent contacts with heavy metals, pesticides, solvents and other substances which have estrogenic effect, can contribute to the decrease in malefertility. These agents may reduce sperm production,increase the number of defective spermatozoa and decreaseandrogen production. Exposure to ionizing radiation or hightemperature has similar effects. Normal spermatogenesisoccurs at a temperature which is 3-4°C lower than the bodytemperature, and a rise of 1°C in temperature reduces thenumber of spermatozoa by approximately 14%. Such risks arefaced by men working in conditions of elevated temperature,e.g. bakers, welders, metallurgists, cooks, workers in theceramic industry [11]

However there is a controversy on the relationship between the occupation and subfertility. Mohammad HosseinVaziri et al. conducted cross-sectional study using 1164 males who were referred to the Infertility Research Center in Tehran. According to their results there were no statistically significant differences in the mean sperm count or sperm morphology between occupational categories. But there was an association between occupation and sperm motility. [7]

Another study carried out by Clarisa R. Gracia et al. using650 infertile cases and 698 fertile controls.They found out that there is no significant association between fertility status and exposure to shift work, metal fumes, electromagnetic fields, solvents, lead, paint, pesticides, work-related stress or vibration. [4]

V. CONCLUSION

According to current study armed forces, skilled agricultural forestry and fishery workers and craft and related trade workers are having the highest frequencies of male subfertility respectively.When considering both literature and current studythere is an association between occupation and subfertility.

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AUTHORS

First Author – AUB Pethiyagoda, Consultant genito-urinary surgeon/ Senior lecturer, Department of Surgery, Faculty of Medicine, University of Peradeniya, Sri Lanka. Email: pethiya@yahoo.com. Telephone: 0094773079078

Second Author – K Pethiyagoda, MSc in community medicine & PhD in occupational health, Senior lecturer in community medicine, Department of Community Medicine, Faculty of medicine, University of Peradeniya, Sri Lanka. Email: Kalyaniq33@gmail.com

Correspondence Author - AUB Pethiyagoda. Email: pethiya@yahoo.com, Alternate Email: aubp@pdn.ac.lk, Contact number: 0094773079078