

## Epidemiology of Infertility in Gezira Region, Central of Sudan

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**Abstract:** This study aimed at identifying the etiology of infertility among Sudanese couples. This study was a cohort study and it was held in Wad medani city, Gezira state (central of Sudan), the study group was composed of 200 infertile couples presented with infertility to the primary health care units. Demographic and epidemiological data were collected in special questionnaire. Medical history and examination was performed by the health centre doctor, midwife, nurse. Variable investigations were done including; blood, urine, hormonal assay, seminal analysis, histosalpingiography and ultra sounds. Outcome results were 79.5% were suffered from primary infertility and 20.5% had secondary infertility. Infertility due to husbands only was 20% that due to wives alone was 37.5% and infertility due to both couple was 31% while those with unknown aetiology was 11%. Sexual Transmitted Diseases (STDs) were not incriminated as an infertility etiological factor.

**Key words:** Epidemiology, infertility, couple, STDs, hormonal, Sudan

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### INTRODUCTION

Reproductive health usually includes four elements; fertility regulation, safe pregnancy and childbirth, infant and child health and safe sex. One of the indicator of lacking reproductive health is infertility. In general reproductive health is influenced by religion and region (Berek, 1997). Around 60-80 million cases all over the world suffer from infertility (Cates *et al.*, 1984). Infertility is a threat to humans continued survival on earth (Chamberlain, 2000). A vast proportion of the world's population has no access to medical treatment for infertility and even in developed and emerging economies there are great inequalities in access to proper diagnosis and treatment.

Infertility is defined as inability to conceive after 1 year of unprotected adequately time intercourse (Gorkemli *et al.*, 2006). This definition is arbitrary and other definitions extend the trying time to 24 months or shorten it to 6 months, depending on the age group and population under study. Related terms used by clinicians, epidemiologists and demographers are infecundity which is a synonym for infertility; sterility is the complete absence of reproductive capability, fertility is the demonstrated capacity to conceive; fecundity is the physiological ability to reproduce, whether or not it has been demonstrated and fecundability is the monthly probability of conception. Normal fecundability in a healthy young couple is approximately 0.25 that is a 25% probability of conception per month (Cundiff *et al.*, 1995). It classifies as primary infertility which is the term used for

a couple who have never achieved a pregnancy and secondary infertility, refer to a couple who have previously succeeded in achieving at least one pregnancy even if this ended in abortion (Helmerhorst *et al.*, 1995). The prevalence and aetiology of infertility vary from place to others all over the universe, for example in USA one couple from 7 couples has infertility while in Africa the main cause of infertility is tubal problem while in Western world ovulation disorder and male factors are common (Ilesanmi, 1995).

The main causes of infertility include pelvic infections including STDs (Sexual Transmitted Diseases), abnormalities in the semen, ovulation disorders, tubal occlusion, peritoneal factors uterine factors and abnormality in cervical mucus-sperm interaction (Zegers *et al.*, 2008). Investigations and treatment of infertility are always time consuming, expensive and in developing countries raise moral problem to the males side, they usually escape from the clinician after they know the fact that they are the cause of the problem. Although, there were no previous study has provided national estimates of the prevalence of primary and secondary infertility in sizeable areas of sub-Saharan Africa, infertility is not merely an individual concern, it is a public health problem.

Sudan is the vast country in Africa most of its population live in rural areas. The county facing manifold problems including low socioeconomic status, transportation, education and health problems. One of these health problem is infertility. In literature, it is generally believed that the prevalence of infertility in sub share areas is 10% of all unions. This figure seems to have

built momentum as it is repeated frequently without very much documentation concerning its validity. This also applied to Sudan where there is no actual study done recently to assess the magnitude of infertility. There are many perspectives for the impact of infertility. These include psychological (Jejeebhoy and Sathar, 2001), economical and socio-cultural factors which affect the infertile couple and the whole community. In Sudan the traditional emphasis of a women's role is defined in terms of her fertility her whole social personal security may depend on it. Therefore doctors should emphasize simple investigation which will bring out most of treatable cause of infertility and hence to avoid expensive, time consuming and usually inconclusive procedures to make live easy for all infertility couples in Sudan. This study aimed to identify the epidemiology of infertility in Gezira area, central of Sudan.

### **MATERIALS AND METHODS**

This study was performed in Gezira state (Wad Medani city) central Sudan. To have a representative sample, out of 17 primary health centers four health care centers were chosen randomly, they were Police, Banat, Eldibagha, Gezira health centers. According to frequent figure of prevalence of infertility in sub Saharan area which is 10%, sample size was calculated as 10% from the total number of married females patients coming to the health center for any complain during 1 month. The final total number was 200 infertile couple. Before starting interviewing the couples a consent was secured after clear explanation of this study to the couples. A questionnaire was performed to include: full history of both wife and husband, present complain, past complain, surgical history, family history of chronic diseases and infertility, history of sexual intercourse (the frequency and timing), physical examination and investigations. There were two type of investigations, First group done within the laboratories of the health centers, those includes hemoglobin %, Total White Blood Count (TWBC), ESR, urine analysis and seminal analysis. By doing seminal analysis in health centers laboratory which is nearby houses of the male patient we had solve the problem of male rejection to that test.

Male usually refuse to do seminal analysis due to the complicated procedure of the test when they do it in any privat laboratory but by doing the test near their home they did not need to do it at the laboratory by they can did it at home and bring it to the health center laboratory. The second type of tests were performed in Gezira University Medical Laboratory for microbiology to do high vaginal swab for culture and sensitivity for wives. Institute of Nuclear Medicine and Molecular Biology

(INMMB) in Gezira University for reproductive hormonal immune assay for all wives and Ultra Sound (U/S) to those who need this investigation. X-ray department of Wad Medani Teaching hospital to do hysterosalpingography. Surgical department in Wad Medani Teaching Hospital for testicular biopsy. Obstetric department in Wad Medani Teaching hospital. WHO classification was followed for results of seminal analysis which is the volume will be  $>2$  mL.

The sperm count is as following normal sperm count  $>20$  million per H.P.F, Moderately oligospermia  $>5$  million but  $<20$  million. Sever oligospermia  $<5$  million, Azoospermia is no spermatozoa seen. The sperm motility,  $>60\%$  of the sperms will be actively motile after production (within half an hour). The shape  $>60\%$  of spermatozoa should be normal in shape. Any husband with a sperm count  $<20$  million asked to repeat the test after 2-3 weeks with avoidance of intercourse for 3-7 days prior to the test.

**Hysterosalpingography (HSG):** In this test Urographin used as radio-opaque contrast medium. This procedure done from 6-9 day from the first day of the cycle.

**Hormonal assay:** In this study four reproductive hormones were estimated, Luteinizing Hormone (LH), Follicular Stimulating Hormone (FSH) and progesterone, they were done in day 21 from the first day of the cycle. A blood level of progesterone  $>20$  nmol L<sup>-1</sup> indicate ovulation. Prolactin hormone level done in day 3-5 from first day of the cycle, a blood level  $>500$  nmol L<sup>-1</sup> consider high level. Hormonal analysis performed in the institute of nuclear medicine and molecular biology, it was done by the method of ImmunoRadiometric Assay (IRMA).

### **RESULTS AND DISCUSSION**

**The age of the couple:** The female age range from 18-49 years, 62.5% (125 females) their age between 30-39 year. For male, their age range between 23-70 year. About 40% their age between 40-49 year. Level of education of both couples range from illiteracy to higher education. The majority of both couple have secondary level of education (99 female, 88 males) (Table 1). About house hold occupation, 82% (164 men) work in three types of work, employee, workers and businessman, respectively (Table 2). The study group were from  $>7$  different tribes from different parts of Sudan, 50% of the couple were from three tribes Jaaline, Shaygea and Danagla, those three tribes belong to the north of Sudan but this is not indicate that there is high rate of infertility among these tribes. About marital status 77.5% of the partners are in monogamous unions, the rest are polygamous. While 57.5% of the couples were non

Table 1: Demographic data of female and male with different characteristics

| Variables/characteristics           | Frequency | Percentage |
|-------------------------------------|-----------|------------|
| <b>Female age in years)</b>         |           |            |
| <20                                 | 1         | 0.5        |
| 20-29                               | 62        | 31.0       |
| 30-39                               | 125       | 62.5       |
| >/= 40                              | 12        | 6.0        |
| <b>Educational level for female</b> |           |            |
| Illiterate                          | 23        | 11.5       |
| Khalowa                             | 1         | 0.5        |
| Primary school                      | 69        | 34.5       |
| Secondary school                    | 99        | 49.5       |
| University and higher education     | 8         | 4.0        |
| <b>Male age in year</b>             |           |            |
| 20-29                               | 8         | 4.0        |
| 30-39                               | 77        | 38.5       |
| 40-49                               | 80        | 40.0       |
| 50-59                               | 26        | 13.0       |
| 60 and above                        | 9         | 4.5        |
| <b>Educational level for male</b>   |           |            |
| Illiterate                          | 18        | 9.0        |
| Khalowa                             | 11        | 5.5        |
| Primary school                      | 64        | 32.0       |
| Secondary school                    | 88        | 44.0       |
| University and higher education     | 19        | 9.5        |

Table 2: Male occupation

| Occupation   | Frequency | Percentage |
|--------------|-----------|------------|
| No job       | 2         | 1.0        |
| Employee     | 62        | 31.0       |
| Worker       | 50        | 25.0       |
| Driver       | 14        | 7.0        |
| Technician   | 1         | 0.5        |
| Builder      | 2         | 1.0        |
| Farmer       | 2         | 1.0        |
| Practitioner | 5         | 2.5        |
| Businessman  | 49        | 24.5       |
| Abroad       | 9         | 4.5        |
| Other        | 1         | 0.5        |

Table 3: Duration of infertility among all couples

| Duration of complain in years | Frequency | Percentage |
|-------------------------------|-----------|------------|
| 1                             | 24        | 12.0       |
| 2                             | 24        | 12.0       |
| 3-8                           | 97        | 48.5       |
| 9-14                          | 41        | 20.5       |
| 15-28                         | 14        | 7.0        |

relatives and no family relationship between the wife and her husband, the rest (42.5%) are found to be first or second kin's. The economic status of the infertile couples, the mean monthly income is 405.90 Sudanese pounds (around 200\$) that mean the majority of them lie in the moderate socioeconomic class (Sudanese census 93). The duration of infertility range from 1-28 year, 60% of the infertile couple their problem extend from 2-8 years. This is usual habit of Sudanese women, they began to seek medical advice after the end of the first year of marriage as shown in Table 3.

The main complain of 63% of the infertile wives was inability to conceive other common complain were irregular menstrual cycle, vaginal discharge and abdominal pain. Around 75% of infertile women had

Table 4: Psychological pressure upon wives

| The source of pressure | Frequency | Percentage |
|------------------------|-----------|------------|
| From the husband       | 70        | 35.0       |
| From husband's family  | 45        | 22.5       |
| From wife's family     | 6         | 3.0        |
| From the community     | 79        | 39.5       |

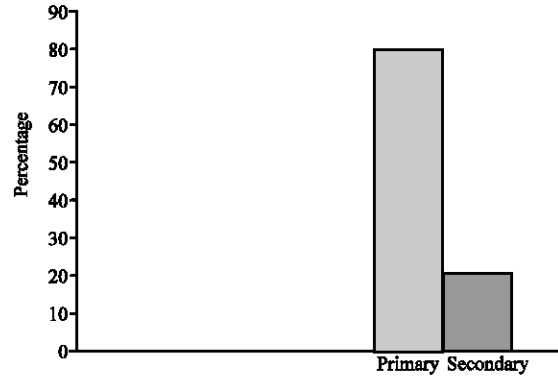


Fig. 1: Type of infertility

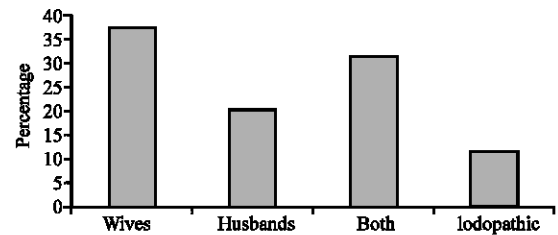


Fig. 2: Classification of causations of infertility among couples

family history of hypertension and diabetes and those with the same problem of infertility within their families were 45%. Concerning the male side only 16% admitted that they had some complains of sexual disturbances in form of impotence.

About 86% of husbands their past medical history was free from chronic illness or STDs. The 88% of the husbands have family history of diabetes and hypertension. Infertility has psychological reflect upon the wife first and the husband and the families of both couple, psychological pressure upon wives was shown in Table 4. Outcome results were 79.5% suffered from primary infertility and 20.5% had secondary infertility (Fig. 1).

Infertility due to husbands only was 20% that due to wives alone was 37.5% and infertility due to both couple was 31% while those with unknown aetiology was 11% (Fig. 2). Worldwide the over incidence of infertility related to both male and female factors continue to rise despite many advance in reproductive technology (Wilkins *et al.*,

2010). Obviously infertility is a medicosocial problem in some countries it account for 40% outpatient gynaecological consultations (Almroth *et al.*, 2005). In the study Female infertility factors showed that the age distribution of the study population which was based on the international scale, 77 female (38.5%) their age group is 35-39 years old.

From this age group there were 9 women presented with secondary infertility while the rest 68 female have primary infertility. Hence the age played a significant role in female aetiology of infertility and average years in which the infertile woman consult a doctor was 2-4 years after marriage but this age group 35-39 years old indicates delayed age of marriage might explained the etiology of their infertility also in Sudan there is genital mutation in childhood in the form of female genital mutation FGM (also called fornic circumcision) may contribute in aetiology of primary infertility. A study of 99 infertile women examined, 48 had adnexal pathology indicative of previous inflammation. After controlling for covariates, these women had a significantly higher risk than controls of having undergone the most extensive form of FGM, involving the labia majora (odds ratio 4.69, 95% CI 1.49-19.7). Among women with primary infertility, both those with tubal pathology and those with normal laparoscopy findings were at a higher risk than controls of extensive FGM, both with borderline significance ( $p = 0.054$  and  $p = 0.055$ , respectively). The anatomical extent of FGM, rather than whether or not the vulva had been sutured or closed was associated with primary infertility (Sakar *et al.*, 2008). The 90% of the women had different educational level so they can explain their problem clearly and follow the instruction of management (treatment and health education).

Among the study group 42.5% were found to be first or second kin's. Sudanese people used to have consanguine marriage but it seems this habit began to decrease because more than half of couples under study were not. The economic status of the infertile couples can affect their continuation in seeking management for their problem. Around two third of study group their problem extend from 2-8 years. This is usual habit of Sudanese women, they began to seek medical advice after the end of the first year of marriage. Only 5% of the males received previous management for infertility while around 90% of the female received treatment for their problem. This usually happen were both invasive and non invasive investigations were applied more frequent to the female partner than male partner (Prasad and Dunbar, 2000). The outcome results depend on the results of all investigations done, simple investigation, seminal analysis, hormonal analysis and hysterosalpingogram which is a more economical and elementary method suitable for evaluation of endometrial and tubal

pathologies (Stanley *et al.*, 1985. Trantham, 1996). The final results showed that around 80% of the investigated infertile couples suffered from primary infertility and 20% had secondary infertility.

After full examination and investigation of 200 infertile couples the responsibility of infertility due to wives was only present in 37.5% and that due to husbands was found in 20.5% that due to both partners was 31% and those of unknown etiology were 11%. This result seems to be similar to other studies (Jejeebhoy and Sathar, 2001). If we compare this result to the study done by The WHO in 33 infertile clinics in 25 developed and developing countries showed that infertility in both partners was found in 1/3 African couples and infertility due to females only 30-40% and those of unknown etiology was 5%. The two studies outcomes are almost similar.

## CONCLUSION

From this study we concluded that infertility is a public health problem in Sudan and the main infertility pattern is a primary rather than secondary infertility. Elder marital age and high costly infertility investigations play a major role in the epidemiology of this problem. STDs is not the main causative factor as have been postulated by The WHO (Infertility in Sub-Saharan countries).

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## REFERENCES

- Almroth, L., S. Elmusharaf, N. El-Hadi, A. Obeid, M.A.A. El-Sheikh, S.M. Elfadil and S. Bergstrom, 2005. Primary infertility after genital mutilation in girlhood in Sudan: A case control study. *Lancet*, 366: 385-391.
- Berek, J.S., 1997. *Novak's Gynecology*. 12th Edn., Lippincott Williams and Wilkins, Baltimore.
- Cates, W., T.M. Farley and P.J. Rowe, 1984. Patterns of infertility in the developing world. WHO Special Programmed of Research Development and Research Training in Human Reproduction.
- Chamberlain, G., 2000. *Gynaecology by Ten Teachers*. 17th Edn., Arnolds, London.

- Cundiff, G., B.R. Carr and P.B. Marshburn, 1995. Infertile couples with a normal hysterosalpingogram. Reproductive outcome and its relationship to clinical and laparoscopic findings. *J. Reprod. Med.*, 40: 19-24.
- Gorkemli, H., M.N. Cicek, C. Akyurek and C. Celik, 2006. Approach to Infertile Patient. In: *Gynecology and Obstetrics*, Gorkemli, H, M.N. Cicek, C. Akyurek and C. Celik (Eds.). Gunes Kitabevi ve Kirt. Tic. Ltd., Ankara, Turkey.
- Helmerhorst, F.M., N.L. Schork, S.G. Oei, K.W.M. Bloemenkamp and M.J.N.C. Keirse, 1995. Cancer and male infertility Consistency and variation in fertility investigations in Europe. *Hum. Reprod.*, 10: 2027-2030.
- Ilesanmi, A.O., 1995. Endometrial dating correlated with multiple luteal progesterone levels in confirming ovulation and luteal function in infertile Nigerian women. *West Afr. J. Med.*, 14: 152-156.
- Jejeebhoy, S.J. and Z.A. Sathar, 2001. Womens autonomy in India and Pakistan: The influence of religion and region. *Popul. Dev. Rev.*, 27: 687-712.
- Prasad, S.V. and B.S. Dunbar, 2000. Human sperm-oocyte recognition and infertility. *Seminars Reproductive Med.*, 18: 141-149.
- Sakar, M.N., T. Gul, A.E. Atay and Y. Celik, 2008. Comparison of hysterosalpingography and laparoscopy in the evaluation of infertile women. *Saudi Med. J.*, 29: 1315-1318.
- Stanley, G., T. Clayton, L.T. Lewis and G. Pinker, 1985. *Gynecology by Ten Teachers*. 14th Edn., Oxford University Press, USA.
- Trantham, P., 1996. The infertile couple. *Am. Family Phys.*, 54: 1001-1010.
- Wilkins, K.M., J.K. Warnock and E. Serrano, 2010. Depressive symptoms related to infertility and infertility treatments. *Psychiatric Clin. North Am.*, 33: 309-321.
- Zegers, F., J.E. Hochschild, V. Schwarze and F. Alam, 2008. *Infertility International Encyclopedia of Public Health*. Academic Press, USA.