Determinants of Primary Infertility among Women of Reproductive Age Group in a Tertiary Care Hospital in Hyderabad, Andhra Pradesh, India

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ABSTRACT

Background: Infertility is an emerging public health issue. However there are sparse data on the prevalence of primary infertility in India, especially from Southern parts of India. Hence a sincere attempt has been made to describe the prevalence of primary infertility and associated socio-demographic factors among women of reproductive age group in a tertiary care hospital in Hyderabad, Andhra Pradesh.

Material and Methods: Cross sectional study in a tertiary Care Maternity Hospital, Hyderabad

Results: Prevalence of Primary Infertility was 132 (10.71%) and was significantly more in the Upper middle class (43.18%) (Chi square 22.82 p value 0.0001) and among Hindus (52.3%). Mean age at menarche (14.11 yrs), Mean age at first sexual activity (19.32) and mean number of unprotected sexual acts in the previous three months (36.69) was significantly higher in women with primary infertility while mean years of marriage (8.31) significantly higher in fertile women. Women with abnormal vaginal discharge were at decreased odds of infertility, where as women with genital ulcer, HSV 2 antibodies and syphilis were at increased odds of infertility compared to others.

Conclusions: Primary infertility is increasing and is emerging as a new public health problem which needs immediate attention before it goes out of hand.

Key Words: Primary infertility, Women, Reproductive age group

INTRODUCTION

Parenthood is one of the universally desired instincts in life and motherhood is a blessing. However, not all couples are blessed with parenthood and most of the women need medical help. Infertility has been recognized as a public health issue worldwide by the World Health Organization (WHO). The World Health Organization (WHO) estimates that 60 to 80 million couples worldwide currently suffer from infertility.[1] Infertility varies across regions of the world and is estimated to affect 8 to 12 per cent of couples worldwide.[2,3] One estimate of overall primary and secondary infertility in South Asia, on the basis of women at the end of their reproductive lives in the age group 45-49 years, suggests an infertility rate of approximately 10%: 8% in India, 10% in Pakistan, 11% in Sri Lanka, 12% in Nepal and 15% in Bangladesh.[4] Underlying these numbers exists a core group of couples, estimated to be 3 to 5 per cent, who are infertile due to unknown or unpreventable conditions. A prevalence of infertility above this level suggests preventable or treatable causes.[5] Infertility tends to be highest in countries with high fertility rates, an occurrence termed "barrenness amid plenty". [6] To-

tal infertility is divided into primary and secondary infertility. Definitions of primary infertility vary between studies, but the operational definition, put forth by the WHO, defines primary infertility as the "Inability to conceive within two years of exposure to pregnancy (*i.e.* - sexually active, non-contracepting, and non-lactating) among women 15 to 49 yr old". [7] Secondary infertility refers to the inability to conceive following a previous pregnancy. Globally, most infertile couples suffer from primary infertility.[8]

The WHO estimates the overall prevalence of primary infertility in India to be between 3.9 and 16.8 per cent.[1] Estimates of infertility vary widely among Indian states from 3.7 per cent in Uttar Pradesh, Himachal Pradesh and Maharashtra, [9] to 5 per cent in Andhra Pradesh, [10] and 15 per cent in Kashmir. [11] Moreover, the prevalence of primary infertility has also been shown to vary across tribes and castes within the same region in India. [9,12] However, it should be noted that many of these estimates use different definitions of infertility and consider different time periods, which makes direct comparisons difficult between any studies.

As per DLHS-3, in the state of Andhra Pradesh, Women who had primary and secondary infertility constitute 8.2 and 2.7 percent respectively of ever married women between 15-49 years.[13] Except for the six districts in Andhra Pradesh, namely Hyderabad, Khammam, Krishna, Srikakulam, Anantapur, Mahbubnagar and Guntur where the infertility problem among ever married women is less than 10 percent, the remaining districts have infertility problem including primary and secondary infertility among ever married women ranging from 10-16 percent. [13]

There are sparse data on the prevalence of primary infertility in India and almost none from southern India including Andhra Pradesh. Hence an attempt is made to estimate the prevalence of primary infertility and determine the factors associated with it among women of reproductive-age group in a tertiary care hospital in Hyderabad, India.

MATERIAL AND METHODS

A Cross sectional study was conducted in a Tertiary Care Maternity Hospital, Hyderabad. It is a tertiary care hospital with a bed strength of 250 catering to Maternal and Child Care Services. Average Out-patients per day is about 342 and average In-patients per day is 78. **Study was conducted for 6 months (Nov 2015 to April 2016).** As per the WHO definition, women were defined as having primary infertility if they were married (or with their main partner) for longer than two years, sexually active, not using modern contraception, and

without children.[6] Infertility clinic is held on two days in a week, Tuesdays and Fridays. Randomly 30 married women in reproductive age group were selected per day and data was collected using a predesigned and pretested questionnaire on the two days every week for six months. A total of 1232 women could be interviewed. All the participants were informed about the purpose of the study and consent was taken with their voluntary will to participate. Also they could withdraw from the study anytime they wished. Demographic variables including age in years and education, occupation, socio-economic status, religion and consanguinity were evaluated as categorical variables. Reproductive health variables including years sexually active, age at sexual debut, and number of unprotected sex acts in the prior three months were examined as continuous variables. Specimens were collected and examined for sexually transmitted diseases (STDs). Data was analyzed using Microsoft excel 2007 and Epi info 3.5.3. Chi-square test for categorical variables and t test or Z test for continuous variables were used to analyze the relationship between the variables.

Lab diagnosis: A type-specific ELISA test was used to detect HSV-2 IgG antibodies. Manufacturer's instructions were followed using an index value of >1.1 as positive HSV-2 specimen. Vaginal swabs were also cultured, using organism specific kits, for *Trichomonas vaginalis, Candida* species, and *Neisseria gonorrhoeae*, according to manufacturer's instructions. All diagnostic tests were carried out in the microbiology laboratories of Osmania General Hospital, Hyderabad.

Ethical clearance was obtained from the ethical committee of Osmania Medical College, Hyderabad.

RESULTS

Of the 1232 women interviewed, 1124 (91.23%) completed all baseline procedures; 108 participants were excluded as they failed to consent or to give the necessary information. Socio – demographic details of the study subjects have been detailed in **table 1.**

Prevalence of primary infertility in our study was 132 (10.71%) and prevalence was significantly more in the Upper middle class (43.18%) and among Hindus (52.3%) **(Table 1)**

Mean age at menarche (14.11 yrs), Mean age at first sexual activity (19.32) and mean number of unprotected sexual acts in previous three months (36.69) was significantly higher in women with primary infertility while mean years of marriage (8.31) significantly higher in fertile women **(Table 2).**

Table 1: Socio – demographic profile of the study population (N=1124)

Characteristic	Primary infertility (n=132) (%)	Fertile (n=992)(%)	P value
Age (years)			
15-20	13 (9.85)	49 (4.94)	0.037
21-25	27 (20.45)	249 (25.1)	
26-30	53 (40.15)	467 (47.08)	
31-35	19 (14.39)	81 (8.17)	
36-40	10 (7.57)	63 (6.35)	
41-45	7 (5.31)	47 (4.74)	
>46	3 (2.28)	36 (3.6)	
Literacy status			
Illiterate	13 (9.85)	87 (8.77)	0.761
Primary	9 (6.82)	82 (8.27)	
Middle	21 (15.91)	171 (17.24)	
High school	63 (47.73)	423 (42.64)	
Above high school	26 (19.69)	229 (23.08)	
Occupation			
Housewife	89 (67.43)	637 (64.21)	0.336
Unskilled	31 (23.48)	219 (22.08)	
Skilled	12 (9.09)	136 (13.71)	
Socio-economic status			
Lower	17 (12.88)	171 (17.24)	<0.001
Upper lower	19 (14.39)	259 (26.11)	
Lower middle	39 (29.55)	317 (31.95)	
Upper middle	57 (43.18)	245 (24.7)	
Religion			
Hindus	69 (52.3)	433 (43.65)	0.183
Muslims	31 (23.48)	319 (32.16)	
Christians	22 (16.67)	171 (17.24)	
Others	10 (7.6)	69 (6.95)	
Consanguinity			
Present	76 (57.57)	327 (32.96)	<0.001
Absent	56 (42.43)	665 (67.04)	

Overall, lower number of infertile women reported to have abnormal vaginal discharge, burning urination and vaginal itching. The prevalence of genital ulcer was significantly more in infertile group (p 0.0001). Women with genital ulcer were at increased odds of infertility (OR: 2.44; 95% CI: 1.56 – 3.81) compared to women without genital ulcer. Abnormal vaginal discharge was significantly more in women in the fertile group (p 0.0001). Women with abnormal vaginal discharge were at decreased odds of infertility (OR: 0.38; 95% CI: 0.25 – 0.59) compared to women without abnormal discharge. Women who were positive for HSV-2 antibodies were at increased odds of infertility (OR: 2.98; 95% CI: 1.93 – 4.58) compared to women who were seronegative and women who were positive for syphilis antibodies were also at increased odds of infertility (OR: 8.23; 95% CI: 3.73 – 18.16) compared to women who were seronegative. **(Table 3)**

The overall prevalence of HSV-2 within this group was 13.08 percent (147/1124). The prevalence of HSV-2 seropositivity among women with primary infertility was 27.27 percent (36/132), compared to 11.2 percent (111/992) among the fertile women showing significant association between HSV-2 infection and primary infertility (*P* 0.0001). The overall prevalence of Syphilis was 13.08 percent (26/1124). The prevalence was significantly high (*P* 0.0001) among women with primary infertility 9.84% (13/132), compared to 1.31 percent (13/992) among the fertile women.

The prevalence of BV was 25.80 per cent (290/1124) among the women, but did not differ between the two groups. Similarly, the prevalence of *T. vaginalis* did not differ between the two groups and the overall prevalence was 7.12 per cent (80/1124). The prevalence of *Candidiasis* was 21.71 per cent (244/1124), and was not significantly different between the two groups **(Table 3).** No cases of *N. gonorrhoeae* infection were identified.

Table 2: Reproductive characteristics of the study population

Characteristic	Primary infertility (n=132)	Fertile (n=992)	P value
Mean age at menarche (yrs)	14.11	13.37	<0.0001
Mean age at first sexual activity (yrs)	19.32	17.14	<0.0001
Mean years of marriage	5.72	8.31	<0.0001
Mean no. of unprotected sexual acts in last 3 months	36.69	23.14	<0.0001

Table 3: Clinical and laboratory characteristics of the study population (N=1124)

Characteristic	Primary infertility (n=132) (%)	Fertile (n=992) (%)	Odd's ratio	95% CI	Z Value	P value
Abnormal vaginal discharge	27 (20.45)	397 (40.02)	0.3854	0.2478 – 0.5994	4.232	< 0.0001
Vaginal itching	23 (17.42)	213 (21.47)	0.7717	0.4801 – 1.2404	1.070	0.2845
Burning micturition	17 (12.88)	167 (16.83)	0.7303	0.4274 – 1.2479	1.150	0.2502
Genital ulcer	31 (23.48)	111 (11.2)	2.4361	1.5560 – 3.8139	3.893	0.0001
Bacterial vaginosis	31 (23.48)	259 (26.12)	0.8686	0.5670 – 1.3309	0.647	0.5177
Vaginal Candidiasis	33 (25.0)	211 (21.3)	1.2338	0.8088 – 1.8821	0.975	0.3295
Trichomoniasis	07 (05.3)	73 (07.36)	0.7050	0.3175 – 1.5654	0.859	0.3904
HSV 2 seropositivity	36 (27.27)	111 (11.2)	2.9764	1.9344 – 4.5797	4.961	< 0.0001
Syphilis	13 (09.84)	13 (01.31)	8.2269	3.7264 – 18.1629	5.215	< 0.0001

DISCUSSION

The WHO estimates of primary infertility in India are 3.9 per cent (age-standardized to 25-49 yr) and 16.8 per cent (age-standardized to 15-49 yr), using the "age but no birth" definition.[1] Prevalence of primary infertility in the present study was 132 (10.71%) which is within the range reported by the WHO, [1] Adamson et. al [14] and similar to estimates from the Kashmir region.[11] Prevalence was significantly more in the Upper middle class (43.18%) (Chi square 22.82 p value 0.0001) consistent with previous findings in India.[9] Primary infertility was more in women with higher levels of education which may indicate a delay in marriage and higher age at first sex . These findings are similar to those of Talwar PP.[9] Consanguinity was more commonly found in infertile women, 57.5 %, and was found significantly associated as also revealed by Shireen J. Jejeebhoy.[15] In our study, mean number of unprotected sex acts were significantly associated with primary infertility, possibly because the couples with infertility made active and repeated attempts to conceive, by increasing the number of unprotected sexual acts. This is consistent with the findings of Adamson et. al. [14] As found in our study, previous studies have shown the association of STDs with primary infertility. In particular, previous history of STDs is associated with such conditions as tubal factors in the female partner (in particular tubal occlusion or pelvic adhesions) and obstruction or gland infection in the male partner; the major STDs being gonorrhoea and chlamydial.[4] Our study also revealed significant association of chlamydial infection (syphilis) with primary infertility. As it is shown by studies, upto two-thirds of infertile women who have never been pregnant are reportedly infertile because of previous pelvic infection, mostly sexually transmitted infections in Africa and other countries with high risk factors.[16] Our study revealed that HSV-2 seropositivity was significantly associated with primary infertility. Cherpes et al. [17] have also demonstrated an association between HSV-2 infection and Primary infertility. Two mechanisms were suggested for infertility caused by HSV-2 infection: lower-genital tract ulcerations caused by HSV-2 infection increase the spread of lower genital tract pathogens to the upper genital tract, thereby facilitating PID or HSV-2 infections may increase host inflammatory responses in the upper genital tract, leading to tubal damage.[17] Other studies have found HSV-2 DNA associated with low sperm counts and decreased sperm motility in men attending infertility clinics.[18-20]

Limitations: Since the study was conducted in a hospital our results may not be generalizable to the population. Despite these limitations, our study also has several strengths including a large sample size and accuracy of diagnosis of primary infertility and associated STIs.

CONCLUSION

The prevalence of primary infertility among women of reproductive-age group is high and with the changes in lifestyle it is expected to increase further as more women are heading towards higher levels of education which may lead to delay in marriage and higher age at first sex, increased stress at work place and other consequences leading to infertility. Hence it is required to create awareness about this before the situation goes out of hand. Further study is needed in the community, to determine other causes of primary infertility.

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