PREVALENCE AND RISK FACTORS INFLUENCING PRIMARY INFERTILITYChethana R¹, Shilpa²**HOW TO CITE THIS ARTICLE:**

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ABSTRACT: OBJECTIVE: a) To describe the socio- demographic characteristics of couples with primary infertility. b) To estimate the prevalence of primary infertility in study population. c) To find out the probable causes of primary infertility. **DESIGN:** Cross- sectional descriptive study. **SETTING:** Rural field practice area of tertiary hospital, Bangalore. **SAMPLE:** Complete enumeration of entire Kumbalgodu Primary Health center area covering 26, 190 populations. **METHODS:** In depth interview using a pretested pre-structured questionnaire along with the help of key informants - ASHA (Accredited Social Health Activist) workers was conducted for a period of 18 months (January 2012 to June 2013) to enumerate all couples with primary infertility in the entire Kumbalgodu Primary Health Centre area. Review of investigation reports available with couples at the time of study. **MAIN OUTCOME MEASURES:** Timely awareness and health education amongst the rural population about the prevailing causes of primary infertility are needed and facilities should be made available at the periphery for early diagnosis and treatment of the same. **RESULTS:** In the present study area, prevalence of primary infertility was 4.5%. The most common cause of primary infertility among females was pelvic inflammatory disease followed by polycystic ovarian disease and among males it was oligospermia. **CONCLUSION:** This study has yielded important information regarding the prevalence and risk factors influencing primary infertility. Efforts to raise awareness in the population about the causes of primary infertility are needed and facilities should be made available for early diagnosis and treatment.

KEYWORDS: Primary infertility, prevalence, rural, Polycystic ovarian disease, menstrual irregularities, Body Mass Index.

INTRODUCTION: Infertility is a global health issue, affecting approximately 8-10% couples worldwide.¹ The world health organization estimates that 60 to 80 million couples worldwide currently suffer from infertility.² The 1981 census of India estimated infertility to be in the range of 4-6%.¹ WHO estimates the prevalence of primary infertility in India to be between 3.9 to 16.8%.¹

Infertility is not merely a health problem it is also a matter of social injustice and inequality.¹ Infertility is a life crisis with invisible losses, and its consequences are manifold. Childless women experience stigma and isolation. Infertility can threaten a woman's identity, status and economic security and consequently, be a major source of anxiety leading to lowered self-esteem and a sense of powerlessness.¹

The biological and social factors including stress due to economic status, religious attitudes, age at marriage, urbanization leading to modernization, higher literacy, contraceptive usage and nuclear families play a significant role in lowering fertility.³ Sexually transmitted infections(STIs) are generally considered the leading preventable cause of infertility worldwide, especially in developing countries.²

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The World Health Organization (WHO), using a two year reference period, defines primary infertility as the lack of conception despite cohabitation and exposure to risk of pregnancy (in the absence of contraception) for a period of two years or more.¹

There was no public health program that focused on infertility in the Indian context, though the International Conference on Population and Development (ICPD) program of action stated that reproductive health services should include prevention and appropriate treatment of infertility.

The Ninth Five-Year Plan (1997–2002) document of Government of India included infertility in the comprehensive reproductive and child health package.³

Services for infertility and RTI are available only at district and sub district hospitals and some community health centers. The social factors that may cause infertility such as poor health care, nutritional status, contraceptive methods or environmental factors were not considered important earlier.³

More recent studies have also identified allopathy as one of the more popular treatments that are sought besides traditional treatments. Although infertility treatment is available in government hospitals, there is often poor coordination between Gynecologists, infertility specialists, surgeons and laboratory technicians.³

In this background present study will be undertaken to estimate the prevalence and also to describe the factors affecting primary infertility in rural practice area of Kempegowda Institute of Medical Sciences, Bangalore.

METHODS: Preliminary discussions were held with medical officer, health worker male and female, ASHA (Accredited Social Health Activist) workers of Kumbalgodu PHC. Medico social workers of medical college (Kempegowda Institute of Medical Sciences), members of stree shakti sangha, gram panchayat and village sabha members were also involved.

Information of the previous year's population and eligible couples of the Kumbalgodu PHC were procured referring the registers maintained at PHC. Area map of PHC with details of two sub centers (Kumbalgodu and H Gollahally) and 16 villages was obtained.

From the pilot survey conducted in November 2011 in Myelesandra village, prevalence of primary infertility was found to be 5%. Prestructured pretested Case record form was designed and translated to local language kannada with the consultation of department of kannada (VV Puram College of Arts and Commerce) and back translation was done from Kannada to English with consultation of department of English (VV Puram College of Arts and Commerce).

The study protocol was reviewed and approved by the ethics committee of the teaching Institute and written consent was obtained from study individuals. In case of illiterates consent was obtained in the form of thumbing. The contents were explained to them in the presence of witness.

The study was carried out in Kumbalgodu PHC area of Rural field practice area of a tertiary hospital, Bangalore from January 2012 to June 2013. A total of 26, 190 people were accessed from 6335 households. The sampling unit was a household with a sampling frame of 6335 households. Kumbalgodu sub centre was covered first and then H gollahally sub centre was completed.

House to house survey was done covering all the villages coming under these sub centers so as to completely enumerate the eligible couples. Among these eligible couples those who are exposed to the risk of pregnancy were considered and couples with inability to conceive

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despite cohabitation and exposure to the risk of pregnancy (in the absence of contraception, breastfeeding, post-partum amenorrhea) for two years or more (As per WHO Epidemiological definition) were included. These couples should have been the residents of the locality (minimum duration of 6 months). We excluded those not willing to participate and co-operate in the study.

The data from couples with primary infertility was collected using case record forms. Data regarding socio-demographic and probable causes for primary infertility were collected based on the investigation reports that were available with the couples with primary infertility at the time of survey.

All the households of study area were accessed by house to house survey and information about age, sex, religion (religious practices which would compel them to live separately despite staying under the same roof), education, occupation, duration of married life, age at menarche, menstrual history, contraception (Type, duration, complications), medical illnesses, pelvic inflammatory disease, surgical history, alcohol, smoking and other forms of tobacco consumption, drug abuse history, exposure to toxins or heat at work place, medication history, frequency of intercourse, history of difficulty in intercourse, treatment seeking pattern (Allopathy, homeopathy, ayurveda, traditional practitioners) and switch from one system to another system and reason for the same, were collected through a structured interview schedule.

Locked houses were given minimum of three visits so as to ensure that they are not excluded from the study. Care taken to reduce the bias during the collection and entry of the data to SPSS 16 and rechecking of all the case record forms for completeness by the trained investigators and their team. The collected data was analyzed by descriptive and inferential analysis. Frequency and percentages were used to describe the demographic characters and also to determine the probable causes of infertility.

RESULTS:

Prevalence of primary infertility in the study area was 4.5%: Primary infertility among males was found to be highest -21(33.9%) in the age group of 25-29 years and in females to be 26(41.9%) in the age group of 20-24 years which highlights the fact that there was early manifestation of primary infertility in females as compared to males. Couples educated up to high school had highest (25.8% in males and 29.0% in females) problem of primary infertility. Manual laborer suffered highest this problem and female homemakers had this problem .11(32.35%) of males suffered from sperm abnormalities.

Those who had sperm parameters abnormality were exposed to excess of heat in their workplace and they were asked to change their occupation as it is one of the important contributory factors to infertility. There were two men with primary infertility engaged in painting. Only one of them had got investigations and he had normal sperm count. (Table 1)

Out of 3237 Hindu couples 47(1.45%) had primary infertility, out of 662 Muslim couples 14(2.11) had primary infertility and out of 221 Christian couples only 1(0.45%) couple had primary infertility. Out of 2568 eligible couples belonging to nuclear family 41(1.60%) had primary infertility, out of 890 eligible couples belonging to joint family 17(1.91%) had primary infertility and out of 662 couples belonging to three generation family 4(0.60%) had primary infertility (Table 2).

Among couples with primary infertility highest were in 35(56.6%) medium socioeconomic status, 17(27.4%) were in high socio-economic status, 07(11.3%) belonged to low socioeconomic

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status and 3(4.8%) belonged to very high socioeconomic status. Among the couples with secondary infertility 19(38.8%) belonged to medium socioeconomic status and high socioeconomic status, 9(18.4%) belonged to low socioeconomic status and 02(4.1%) belonged to very high socioeconomic status. (Table 3)

Duration of infertility was less than 5 years in 61.29% of Primary infertility couples as till this duration they were waiting for spontaneous conception. Higher the duration of infertility lesser number was found they would approach the health care facility for treatment seeking. Mean duration of married life is 7.8yrs. (Table 4)

52.94% of men with primary infertility were both smokers and consumed alcohol. Smoking and alcohol being the important contributory factors to infertility. 35.29% of men with primary infertility consumed only alcohol, 11.76% of men were smokers only. In our study we also found out that none of the men had habit of snuffing tobacco and none of females with primary infertility had habit of alcohol consumption or tobacco usage in the form of smoking or snuffing. But 4(100%; n=4) of them had habit of chewing tobacco. We also did not find the use of illicit drugs or smoking marijuana, heroin etc. among our study subjects. (Table 4)

Among 34(54.84%) of males who had undergone investigations 6(17.65%) diabetes, 5(14.71%) had hypertension, 2(5.88%) had hypothyroidism, 1(2.94%) had tuberculosis and others include 1 (2.94%) of fatty liver. Out of 34(54.84%) who had undergone investigations 11(32.35%) found to have abnormality in seminal parameters. (Figure 1)

Among females couples with primary infertility co morbid conditions includes pelvic inflammatory disease 18(42.9%), polycystic ovarian disease 13(31.0 %%), Hypothyroidism 04(9.5%), hypertension 3(7.1%), diabetes 2(4.8%), endometritis 2(4.8), fibroid 2(4.8), tuberculosis 2(4.8), PID and PCOD 2(4.8) and 4(9.5% of other diseases includes cervical polyp, hemorrhagic cyst, sub mucosal fibroid and herpes genitalis. (Figure 2)

17(27.42) of females with primary infertility had menstrual cycle irregularities. Among the menstrual cycle irregularities most common was oligomenorrhoea 14(82.35%) followed by hypomenorrhoea 1(5.88%), polymenorrhoea 1(5.88%) and amenorrhoea 1(5.88%). (Table 6)

Among couples with primary infertility majority of them 27(43.54%) of them had frequency of intercourse thrice a week, 18(29.03%) of couples with primary infertility had frequency of intercourse daily, 10(16.12%) of them had intercourse twice a week and 7(11.29%) of them had frequency of intercourse occasionally. Ovulation period is crucial period and couples should be given health education about the increased probability of conception during this fertile period. Inadequate coital exposure of less than thrice a week or occasionally reflects the need for health education. (Table 7)

BMI classification proposed by the WHO Western Pacific Regional Office in collaboration with IOTF (International Obesity Task Force) steering committee (2000) for Asian People is used as reference. It is classified as BMI <18.5 (Underweight), 18.5-22.9(Normal), 23.0-24.9(At risk obesity), 25.0-29.9(Obese I) and ≥ 30 (Obese II). Problem of obesity among males with primary infertility was found to be quite significant.

Among males with primary infertility majority 31(50.00%) were obese I, 18(29.03%) were at risk of obesity, 10(16.13%) were in normal range and 3(4.84%) were obese II. In females with primary infertility 23(37.10%) were obese I, 16(25.81%) were in normal range, 12(19.35%) were at risk of obesity, 9(14.25%) were obese II and 2(3.23%) were underweight. Obesity and low

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body weight can impact on reproductive function by causing hormone imbalances and ovulatory dysfunction. (Table 8)

DISCUSSION:

Main Findings: The prevalence of primary infertility in the present study area was 4.5%. Most of the females with primary infertility were in age group of 20-24 years and most males were in age group of 25-29 years. Among the primary infertility couples most of them had education up to high school. Most of males among primary infertility couples were laborers while in females among primary infertility couples most of them were housewives.

Primary infertility couples were highest among Muslims and those who belonged to nuclear family. Most of primary infertility couples belonged to medium socio economic status. Majority of primary infertility couples had duration of infertility less than 5 years. Most of males among primary infertility couples had habit of both consumption of alcohol as well tobacco. Most common menstrual irregularity was oligomenorrhoea. The most common cause of primary infertility among females was Pelvic Inflammatory Disease followed by Polycystic Ovarian Disease and among males it was oligospermia.

Most of couples had frequency of intercourse thrice a week but many of couples had frequency of intercourse occasionally which further decreases their chances of conception if not timed during the period of ovulation. Most of males and females among the primary infertility couples were in Obese I category.

Strengths:

- The main strength of our study is we have used the operational definition of primary infertility given by WHO scientific group on epidemiology. Age range in our study is also 15-49 years same age range is being used by WHO.
- This study has yielded important information regarding the risk factors of primary infertility in rural context

Limitations: Medical conditions mentioned in this study are based on the investigations available with the couples at the time of survey.

Interpretation: The prevalence of primary infertility in the present study area was 4.5% which is within the limits of WHO prevalence of primary infertility 3.9%-16.8%.² Study conducted by Aflatoonian A et al showed prevalence of primary infertility to be 3.9% and study conducted by Paul CA et al on in Mysore, India showed prevalence of primary infertility to be 12.2%.^{4,2} Females with primary infertility were common in 20-24 years age group which is similar to study conducted by Paul CA et al.² Couples educated up to secondary school had highest prevalence of primary infertility which is similar to study conducted by Paul CA et al.²

Studies have shown that those exposed to toxins at workplace like pesticides, herbicides, petrochemicals and heat, like those working in industries, taxi drivers, welders are at increased risk of infertility. Thus highest prevalence of sperm abnormalities was among those exposed to heat and chemicals at their workplace.⁵

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Most of primary infertility were Muslims as deduced from present study. There were no specific cultural or social practices in this community contributing to infertility like, separation of the couples following marriage for a certain period of time or any other practices which would hinder consummation.²

In present study most of primary infertility couples were from medium socioeconomic status which is similar to study conducted by Aflatoonian A et al. Present study did not prove the fact that infertility is commonly found in lower socioeconomic status which could be because of the fact that standard of living index was taken into consideration which considers mainly the material things rather than monthly income.⁴

Age at marriage has been recognized by the policy makers as contributory to fertility. Postponement of marriage results in reduction of the period of fertility significantly, there by shortening the total reproductive span.

Most of couples with primary infertility had duration of infertility less than 5 years which is similar to study conducted by Hasssan KS.⁶ Infertile couples faced this problem of conception during the first 5 years of married life.⁷ With regard to the influence of unhealthy lifestyles and practices, problem of infertility was more among the couples who consumed tobacco. As observed by Mohamed AMH, negative lifestyle is associated with significant reduction in fecundity. Those who used to smoke cigarettes had a statistically significant reduction in fecundity.⁸ Cigarette smoking interferes with folliculogenesis (nicotine and other harmful chemicals in cigarettes interfere with estrogen synthesis), embryo transport, endometrial receptivity, endometrial angiogenesis, uterine blood flow and the uterine myometrium.⁹ In present study none of the females were smokers but they were passive smokers as their spouses smoked.

Obesity among women results in menstrual irregularities like oligomenorrhoea and anovulation contributing to infertility. Study conducted by Shamila S et al on risk factors affecting female infertility in South Indian districts of Tamil Nadu and Kerala opine that there was a positive correlation between infertility and menstrual irregularity.¹⁰ In the present study most common menstrual irregularity was oligomenorrhoea which is similar to study conducted by Dhont N et al.¹¹

Conditions associated with female primary infertility most common was Pelvic Inflammatory Disease followed by Polycystic Ovarian Disease. Study conducted by Dhont N et al on also showed that pelvic inflammatory disease was the most common cause of infertility followed by fibroid, PCOD, ovarian cyst and congenital uterine abnormalities.¹¹ Population study of causes, treatment, and outcome of infertility by Hull MG et al revealed failure of ovulation was most common followed by endometritis, coital failure, tubal damage and abnormalities of sperm.¹² Study conducted by Samiha M et al showed most common cause of primary infertility as PCOD followed by genital infection, endometriosis and fibroid. Other conditions present were diabetes, hypertension and thyroid problems.¹³ Agarwal AK et al observed reproductive tract infection among women can result in decreased fertility.¹⁴ If the frequency of intercourse is less and not timed with the fertile period then the chances of conception drastically reduces.¹⁵

In a study by Harumi from Japan pointed out that infertility risk is 2.7-fold higher in obese women (body mass index [BMI]>30).¹⁶ Male obesity is associated with increased incidence of low sperm concentration and low progressively motile sperm count.¹⁷

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CONCLUSION: Focus should be on early diagnosis and treatment of reproductive tract infections as it is one of the preventable causes of infertility. Facilities should also be made available for same and also for treatment of infertility free of cost or at an affordable cost. Reduction in body weight and change in life style should also be stressed upon as polycystic ovarian disease is the second most common cause of infertility. Efforts should also be made to raise awareness among the population about these preventable attributes for primary infertility through health education so that preventive actions can be taken before the onset of the same.

Rigorous social science research in the field of infertility in rural context would be an important first step in highlighting the extent of the problem, its causes and its consequences for wellbeing, especially that of women, as well as for program needs.

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RESULTS:

Age	Males (%)	Females (%)
15-19	-	04(6.5)
20-24	04(06.5)	26(41.9)
25-29	21(33.9)	12(19.4)
30-34	14(22.6)	08(12.9)
35-39	10(16.1)	09(14.5)
40-44	11(17.7)	03(04.8)
45-49	02(03.2)	-
Level of education	Males (%)	Females (%)
Graduate	08(12.9)	02(3.2)
Intermediate	05(08.1)	04 (6.5)
High school	16(25.8)	18(29.0)
Middle school	13(21.0)	12(19.4)
Primary school	09(14.5)	11(17.7)
Illiterate	11(17.7)	15(24.2)
Occupation	Males (%)	Females (%)
Unemployed	03(04.84)	44(70.96)
Labourer	27(43.55)	08(12.90)
Business	13(20.97)	04(06.45)
Farmer	10(16.13)	04(06.45)
Government Service	05(08.06)	01(01.61)
Professional	04(06.45)	01(01.61)
Total	62(100.00)	62(100.00)

Table 1: Distribution of infertile couples according to age, level of education and occupation

Note: Figures in parenthesis indicates percentage.

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Religion	Total eligible couples (n=4120)	Couples with Primary infertility (%) (n=62)
Hindu	3237	47(01.45)
Muslim	0662	14(02.11)
Christian	0221	01(0.45)
Nuclear family	Total eligible couples (n=4120)	Couples with Primary infertility (%) (n=62)
Nuclear family	2568	41(01.60)
Joint family	0890	17(01.91)
Three generation family	0662	04(0.60)
Table 2: Distribution of study subjects according to religion and type of family		

Note: Figures in parenthesis indicates percentages.

Socioeconomic Status*	Couples with Primary infertility	Couples with Secondary infertility
Low	07(11.3)	09(18.4)
Medium	35(56.5)	19(38.8)
High	17(27.4)	19(38.8)
Very high	03(04.8)	02(04.1)
Total	62(100.00)	49(100.00)
Table 3: Distribution of infertile couples according to socioeconomic status		

*Socioeconomic status measured by standard of living index

Note: Figures in parenthesis indicates percentages.

Duration of Infertility (years)	Primary infertility
<5	38(61.29)
5-9	11(17.74)
10-20	12(19.35)
>20	01(01.61)
Total	62(100.00)
Table 4: Distribution of infertile couples according to period of infertility after marriage	

Note: Figures in parenthesis indicates percentages.

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Habits	Primary Infertility (n=62)
Alcohol and tobacco smoking	18(52.94)

Table 5: Distribution of study subject males according to history of personal habits (n= 41) (*Multiple response)

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