Lifestyle factors associated with infertility in a rural area: A cross-sectional study

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ABSTRACT

Background: Lifestyle factors are the modifiable habits and ways of life that can greatly influence overall health and well-being, including fertility. **Objectives:** (1) To describe the sociodemographic characteristics prevailing among infertile subjects of the study population, (2) to identify lifestyle factors associated with infertility. **Materials and Methods:** A cross-sectional descriptive study was conducted at rural field practice area of Tertiary Hospital, Bengaluru. Complete enumeration of entire primary health center (PHC) area covering 26,190 population. In-depth interview using a pre-tested pre-structured questionnaire was conducted enumerating all couples with infertility in the entire PHC area and their lifestyle factors. **Results:** The significant lifestyle factors include frequency of intercourse, body mass index, alcohol, and tobacco consumption. **Conclusion:** Thus, lifestyle factors play a role in determining reproductive status and have a significant impact on fertility.

KEY WORDS: Primary Infertility; Secondary Infertility; Prevalence; Rural; Lifestyle Factors; Body Mass Index

INTRODUCTION

Lifestyle factors are the modifiable habits and ways of life that can greatly influence overall health and well-being, including fertility. Many lifestyle factors such as the age at which to start a family, nutrition, weight, exercise, psychological stress, environmental and occupational exposures, and others can have substantial effects on fertility.[1] Lifestyle factors such as cigarette smoking, illicit drug use, alcohol, and caffeine consumption can negatively influence fertility while others such as preventative care may be beneficial.[2]

Infertility is divided into primary and secondary infertility. The operational definition, put forth by the World Health Organization (WHO), using a 2 years reference period, defines primary infertility as the lack of conception despite cohabitation and exposure to the risk of pregnancy (in the absence of contraception) for 2 years or more. Secondary infertility is defined as the failure to conceive following a previous pregnancy despite cohabitation and exposure to the risk of pregnancy (in the absence of contraception, breastfeeding, or postpartum amenorrhea) for 2 or more years.[3]

The 1981 census of India estimated infertility to be in the range of 4-6%.[4] According to the District Level Household and Facility Survey (DLHS), Karnataka, women who had primary and secondary infertility constitute 5.9 and 1.7%, respectively, of ever married women between 15 and 49 years.[5]

Lifestyle is sometimes held to be related to infertility-smoking, alcohol consumption, drug use, and even over exercise.[6]

The researchers, dieticians, and clinicians worldwide adopted body mass index (BMI) and waist circumference based on the WHO classification for the assessment of obesity. The

WHO classification for BMI is not suitable for assessment of obesity among Indians and Asians because it has been found that for a given BMI Indians have more body fat compare to other ethnic groups both within and outside Asia.[7]

The relative increase in adiposity in Indians has led to the suggestion that the BMI should be reduced for Indians and Asians. Hence, the BMI (proposed WHO Asia-pacific classification) is an appropriate measure for Asians for the assessment of obesity.[8]

Male obesity is associated with increased incidence of low sperm concentration and low progressively motile sperm count.[9] Increased BMI may be associated with low testosterone and sex hormone binding globulin or alterations in luteinizing hormone.[10]

In this background, the present study will be undertaken to find out the lifestyle factors associated with infertility in rural practice area of Kempegowda Institute of Medical Sciences, Bengaluru.

Objectives

1. To describe the sociodemographic characteristics prevailing among infertile subjects of the study population.
2. To identify lifestyle factors associated with infertility.

MATERIALS AND METHODS

A cross-sectional study was conducted using a pre-designed, pre-tested, structured pro forma. Area map of Primary health center (PHC) with details of two subcenter (Kumbalgodu and H. Gollahalli) was obtained from the medical officer of Kumbalgodu PHC, health worker male and female, Accredited Social Health Activist, and Anganwadi worker. Discussions were held explaining them the objective of the study and assuring them that the identity of the couples will be kept confidential.

The study protocol was reviewed and approved by the Ethics Committee of the Teaching Institute and informed consent was obtained from study subjects ensuring them that all the information will be kept strictly confidential and will be used only for research purposes.

A total of 26,190 people were accessed from 6,335 households. House to house survey was done covering all the villages coming under these subcenters so as to completely enumerate the eligible couples. Among these eligible couples, couples with primary and secondary infertility were enumerated. These couples were included in the study after they fulfilled inclusion criteria.

Data regarding sociodemographic variables and lifestyle factors associated with infertility were collected by face-to-face interviews using pre-designed, pre-tested, structured pro forma.

For the measurement of height, study subjects were made to remove the footwear and stand with heels together and toes apart and head positioned so that the line of vision was perpendicular to the body (Frankfurt line) against the wall. The arms were hung freely by the sides, the head, back, buttock, and heels in contact with the wall. A wooden scale was brought down to the topmost point on the head and marking was made on the wall. Measurement was taken using measuring tape in centimeters. Height was recorded to nearest 0.5 cm.

The weight was measured in kilograms using standardized bathroom weighing machine with the study subject standing erect on center of platform, with the body weight evenly distributed between both the feet together and toes apart without footwear with accepted clothing and looking straight ahead. The weight was recorded to nearest 0.5 kg.

BMI

In this study, BMI classification proposed by the WHO Western Pacific Regional Office in collaboration with the International Obesity Task Force Steering Committee (2000) for Asian people was used. It is also called as Quetelet index and was used to assess obesity and is computed by:

$$BMI = Weight~(in~kg)/height~(in~m^2)$$

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 $\geq$30 (Obese II).

RESULTS

Total population covered under the study is 26,190. Among them, number of couples was 5210. Among 5210 couples, total number of eligible couples was 4120. Among the eligible couples, only 1379 were exposed the risk of pregnancy. The prevalence of primary infertility is 4.5%. the prevalence of secondary infertility is 3.6%. Hence, the prevalence of infertility is 8.1%.

The analysis showed that majority of males with primary infertility were in age group of 25-29 years (21 [33.9%]), had educational qualification up to high school (16 [25.8%]), and were laborers. Majority of females with primary infertility were in age group of 20-24 years (26 [41.9%]), had educational qualification up to high school (18 [29.0%]), and were homemakers.

Males among couples with secondary infertility were highest 13 (26.5%) in 30-34 years and females were highest 17 (34.7%) in the age group of 25-29 years. Majority of males 19 (38.78%) with secondary infertility had education

up to high school and 14 (28.57%) females had education till middle school. Among the couples with secondary infertility, majority of males among were laborers and females were homemakers.

Majority of primary infertile couples 47 (1.45%) belong to Hindu religion, whereas 14 (2.11%) of couples belong to Muslim religion and very few 1 (0.45%) of couples belongs to Christian religion. 33 (1.02%) of Hindu couples, 11 (1.66%) of Muslim couples, and 5 (2.26%) of Christian couples had secondary infertility.

Majority 41 (1.60%) of couples with primary infertility and 33 (1.29%) of couples with secondary infertility belonged to nuclear family.

Among couples with infertility, majority of them (29.0% primary and 20.4% secondary) had frequency of intercourse thrice a week. Among the menstrual cycle irregularities, most common was oligomenorrhea, 14 (82.35%) in females with primary infertility and 13 (72.22%) in females with secondary infertility.

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 (Table 1).

Among males with secondary infertility, 17 (34.69%) each were Obese I and normal range, 11 (22.45%) were at risk of obesity, 3 (6.12%) were Obese II, and 1 (2.04%) was underweight. Among females with primary infertility, 17 (34.69%) were in normal range, 14 (28.57%) were at risk of obesity, 10 (20.41%) were Obese I, and 8 (16.33%) were underweight (Table 1).

18 (29.0%) of males among couples with primary infertility had habit of both alcohol and tobacco consumption as compared to 114 (9.0%) of males who were not having infertility and the difference was found to be statistically highly significant ($P < 0.01$). The odds of having both alcohol and tobacco consumption were 4.141 times higher among those with primary infertility as compared to those who were not having infertility (Table 2).

30 (48.4%) of males among couples with primary infertility had habit of alcohol consumption as compared to 219 (17.3%) of males who were not having infertility and the difference was found to be statistically highly significant ($P < 0.01$). The odds of having alcohol consumption were 4.191 times higher among those with primary infertility as compared to those who were not having infertility (Table 2).

22 (35.5%) of males among couples with primary infertility had habit of tobacco consumption as compared to 131 (10.3%) of males who were not having infertility, and the difference was found to be statistically highly significant ($P < 0.01$). The odds of having alcohol consumption were 4.774 times higher among those with primary infertility as compared to those who were not having infertility (Table 2).

21 (42.9%) of males with secondary infertility had alcohol consumption as compared to 219 (17.3%) who did not have infertility and the difference between them was found to be statistically significant ($P < 0.01$). The odds of alcohol consumption were 3.592 times higher among those who had infertility as compared to those who were not having infertility (Table 3).

16 (32.7%) of females with secondary infertility had alcohol and tobacco consumption as compared to 114 (9.0%) who did not have infertility and the difference between them was not found to be statistically significant ($P < 0.01$). The odds of both alcohol and tobacco consumption were 4.908 times higher among those who had infertility as compared to those who were not having infertility (Table 3).

19 (38.8%) of males with secondary infertility had tobacco consumption as compared to 131 (10.3%) who did not have infertility and the difference between them was found to be statistically significant ($P < 0.01$). The odds of tobacco consumption were 5.497 times higher among those who had infertility as compared to those who were not having infertility (Table 3).

Table 1: Distribution of subjects with primary infertility according to BMI

BMI	Range (in kg/m²) <18.5	Primary infertility		Secondary infertility	
		Males	**Females**	**Males**	**Females**
Underweight	<18.5	-	02 (03.23)	01 (02.04)	08 (16.33)
Normal range	18.5-22.9	10 (16.13)	16 (25.81)	17 (34.69)	17 (34.69)
At risk of obesity	23-24.9	18 (29.03)	12 (19.35)	11 (22.45)	14 (28.57)
Obese I	25-29.9	31 (50.00)	23 (37.10)	17 (34.69)	10 (20.41)
Obese II	≥30	03 (4.84)	09 (14.25)	03 (06.12)	-
Total	-	62 (100.00)	62 (100.00)	49 (100.00)	49 (100.00)

Figures in parenthesis indicate percentages. BMI: Body mass index

Table 2: Association between habits among males with primary infertility and primary infertility

Habits	Men among couples with infertility (*n*=62)	Men among couples without infertility (*n*=1268)	Odds ratio	95% CI		Chi-square value	*P* value
				Lower	Upper		
Alcohol and tobacco consumption							
Present	18 (29.0)	114 (9.0)	4.141	2.316	7.405	26.558	0.0000002
Absent	44 (71.0)	1154 (91.0)					
Alcohol consumption							
Present	30 (48.4)	219 (17.3)	4.491	2.673	7.545	37.610	<0.0000001
Absent	32 (51.6)	1049 (82.7)					
Tobacco usage							
Present	22 (35.5)	131 (10.3)	4.774	2.752	7.545	36.759	<0.0000001
Absent	40 (64.5)	1137 (89.7)					

Figures in parenthesis indicate percentages. CI: Confidence interval

Table 3: Association between habits among males with secondary infertility and secondary infertility

Habits	Men among couples with Secondary infertility (*n*=62)	Men among couples without infertility (*n*=1268)	Odds ratio	95% CI		Chi-square value	*P* value
				Lower	Upper		
Alcohol and tobacco consumption							
Present	16 (32.7)	114 (9.0)	4.908	2.621	9.191	29.691	<0.0000001
Absent	33 (67.3)	1154 (91.0)					
Alcohol consumption							
Present	21 (42.9)	219 (17.3)	3.592	2.003	6.443	20.724	0.000005
Absent	28 (57.1)	1049 (82.7)					
Tobacco use							
Present	19 (38.8)	131 (10.3)	3.009	10.041	37.821	<0.0000001	3.009
Absent	30 (61.2)	1137 (89.7)					

Figures in parenthesis indicate percentages. CI: Confidence interval

DISCUSSION

In the present study, the overall prevalence of infertility was 8.1%. The prevalence of primary infertility was 4.5% and secondary infertility was 3.6%. According to DLHS, Karnataka, women who had primary and secondary infertility constitute 5.9 and 1.7%, respectively, of ever married women between 15 and 49 years.[11] A study conducted by Zargar et al. to assess the magnitude of primary infertility and to study its etiologic aspects in Kashmir, India, showed the magnitude of primary infertility to be 4.66%.[12] In the present study, the highest prevalence of the infertility was among the highly reproductive age group.

In the present study, menstrual irregularity was present in 27.4% of females with primary infertility and 36.7% of females with secondary infertility while in a study conducted by Samiha et al., menstrual cycle irregularity was reported among 27.3% of females with primary infertility and 37.2% of females with secondary infertility. Females with menstrual irregularity had a significantly higher risk of

infertility relative to females with regular cycles.[13] In the present study, it was observed that most common menstrual irregularity was oligomenorrhea. In women, early-onset obesity favors the development of menses irregularities, chronic oligo-anovulation, and infertility in the adult age. A study conducted by Shamila and Sasikala 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.[14]

In the present study, majority of males and females with primary infertility were Obese I. Infertility was significantly related to men's BMI. Overweight men had an adjusted odds ratio for infertility of 1.19 (95% confidence interval [CI] = 1.03–1.37] relative to men with low normal BMI. For obese men, the adjusted odds ratio was 1.36 (95% CI = 1.12–1.62).[15] Studies have shown that male obesity is associated with increased incidence of low sperm concentration and low progressively motile sperm count. Thus, BMI is an important contributory factor to male infertility.[9] Multivariate relative risks for infertility among females were 1.3 for BMI 24-25.9,

1.7 for BMI 26 to 27.9,2.4 for BMI 28 to 29.9, 2.7 for BMI 30 to 31.9, and 2.7 for BMI ≤32.[16]

A study conducted by Hassan and Killick showed that negative lifestyle is associated with a significant reduction in fecundity. A statistically significant reduction in fecundity occurred with smoking.[17] The study conducted by Mohammad and Fariba revealed that the possibility of infertility in men smokers was 1.5 times as much as nonsmokers (odds ratio = 1.5). Smoking is a dangerous habit which can effect sperm quality and quantity and result in male infertility.[18] Tobacco smoking significantly increased the risk of secondary infertility, the adjusted relative risk being 3.0 (1.3-6.8). Cigarette smoking is associated with reduced semen quality in terms of sperm density, total sperm count, total number of motile sperm, and citrate concentration.[19]

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. Cigarette smoke and its constituents as well as nicotine appear to have adverse effects on many biological mechanisms required for successful reproduction in humans.[19]

A study conducted by Close et al. showed the relationship of current use of cigarettes and alcohol to the parameters of seminal fluid analysis, sperm penetration assay, and sperm autoimmunity. Current cigarette smokers and heavy alcohol users showed greater numbers of leukocytes in the seminal fluid than did nonusers ($P < 0.02$ and < 0.01, respectively). In addition, cigarette smokers had lower sperm penetration assay scores than nonsmokers. Cigarette smoking continued to show a significant decrease in sperm penetration assay score ($P = 0.03$).[20]

CONCLUSION

The present study encompasses multiple lifestyle factors and places infertility in context for the couple by focusing on both males and females. The significant lifestyle factors include frequency of intercourse, BMI, alcohol, and tobacco consumption. Thus, lifestyle factors play a role in determining reproductive status and have a significant impact on fertility.

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