

Prevalence of subfertility and associated factors in Jaffna District, Sri Lanka: A cross sectional study

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Abstract

Subfertility is an emerging health problem in Sri Lanka, associated with many factors. Most subfertility issues can be dealt with excellent efficacy of early detection and management. The unavailability of the prevalence and associated subfertility factors in the Jaffna district paved the way for conducting a community-based cross-sectional descriptive study among women aged 18 to 49 years, Tamil speaking, and residents in the same household for at least six months. A multi-stage cluster sampling approach was used through the medical officer of health, followed by the public health midwife area. Twenty households were selected in each cluster to collect data on socio-demographic characteristics, selected disease conditions, information related to subfertility, including the risk of male and female factors, and psychological well-being status. Statistical analysis was carried out using SPSS (V25) software. Prevalence and associated risk factors were calculated. The response rate was 85.8%. Prevalence of subfertility was 23.1%. Primary and secondary subfertility were observed in 18.8% and 4.4%, respectively. In total, males have a slightly higher mean age than females, 40.8(4.2). Most were Sri Lankan Tamil, and Hindus of both sexes. Diabetic mellitus and thyroid gland diseases in women are statistically associated with subfertility ($p < 0.05$). This study showed an increased subfertility prevalence in the Jaffna district, Sri Lanka. In this context, the increasing prevalence of subfertility is an eye-opener to the healthcare system and policy-makers to concentrate on subfertility care in Sri Lanka.

Introduction

The World Health Organization defined subfertility as a disease of the male or female reproductive system which fails to achieve a pregnancy after 12 months or

more of regular unprotected sexual intercourse. Further, it was reported that one in six couples experience subfertility globally throughout their lifetime [1]. It can be classified as primary and secondary subfertility. Primary subfertility is a delay for a couple who have had no previous pregnancies, and secondary subfertility is a delay for a couple who have conceived previously. However, the pregnancy may not have been successful (for example, miscarriage and ectopic pregnancy) [2].

The major causes of subfertility can be grouped into female factors, male factors, both, and unexplained subfertility. The prevalence of subfertility varies with associated aetiological factors [3]. A study revealed global patterns and trends in subfertility and an increased trend of prevalence reported in Sub-Saharan Africa and South Asia since 1990 [4]. According to the previous study in India revealed that, 7% of women were childless in India in 2015-2016, which increased to 12% during 2019-2021. Childlessness was positively associated with level of education, age at marriage, body mass index (BMI) level, and presence of thyroid. Urban women were more prone to experience childlessness [1].

In Sri Lanka, evidence shows that the prevalence of primary subfertility in the Colombo district is 40.5 per 1000 married women in the reproductive age group [5]. The lack of evidence in the Northern Province, including the Jaffna district, paved the way for a prevalence study that could describe the associated factors. Further, this study is a roadmap for the screening, treatment, and planning of fertility care model strategies for subfertile couples. Thus, it aims to estimate subfertility prevalence and describe the factors associated with subfertility in Jaffna District, Sri Lanka.

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Methodology

A descriptive cross-sectional study was carried out among women aged 18-49 years, registered in the Public Health Midwife eligible couple registry, and living in Jaffna District, Northern Province, during 2022-2023. Tamil speaking women were taken into consideration because the percentage of others is negligible in the Northern Province. All women with contraindications for pregnancy, such as WHO class 3 and 4 heart disease, a severe autoimmune disease with renal impairment, CKD more than stage 3, thrombophilia's diseases with active thrombosis and acute medical conditions leading to immediate medical treatment, were excluded from this study [6].

The subfertility prevalence among women aged 25 to 44 is reported to be between 3.5 to 16.7% in developed countries and 6.9% to 9.3% in developing countries [7]. Based on the best guess method, it was observed to be 10% in the Northern Province of Sri Lanka. We considered cluster effect 2 and non-responsive percentage (15%) at 95% Confidence limits (C.L.) and $\pm 0.5\%$ -the margin of error, leading to a minimum sample size of 320. Multi-stage cluster sampling was used at MOH and PHM levels to collect 320 participant's data. Twenty participants were selected randomly for each cluster.

The interviewer administrative questionnaire was used through Kobo Collect application form, an electronic data-capturing system. The socio-demographic characteristics and questions about selected disease conditions relevant to subfertility, including risk of male and female factors, fertility related issues, administered treatments, reason for delayed pregnancy, social support and psychological well-being status were compromised by using Depression anxiety stress scale- Item 21-(DASS 21).

Statistical analysis was carried out using SPSS (V25) software. Prevalence and associated risk factors were calculated, and logistic regression was done to calculate the adjusted odd ratios of all the known associate factors.

Results

320 participants consented to the study, with a response rate of 85.8%. The subfertility was identified among 74 (23.1%). Primary and secondary subfertility were observed in 60 (18.8%) and 14 (4.4%) respectively. Table 1 shows the socio-demographic characteristics of the study participants. In total, males have slightly higher mean age than females, 40.8 (4.2). Most of them were Sri Lankan Tamil, and Hindus of both sexes.

Table 1. Socio-demographic characteristics of study participants

Socio-demographic, economic characteristics	Female (n=320)					Male (n=320)
	Total	Total Sf (n=74)	Primary Sf (n=60)	Secondary Sf (n=14)	Not subfertility (n=246)	
Age mean (S.D.)	37.1 (7.9)	38.4 (6.9)	38.2 (7.1)	38.8 (6.1)	36.7 (8.2)	40.8 (4.2)
Ethnicity						
Sri Lankan Tamil	319 (99.7)	74 (100.0)	60 (100.0)	14 (100.0)	245 (99.6)	320 (100.0)
Sinhala	01 (0.3)	0	0	0	01 (0.4)	0
Religion						
Hindu	281 (87.8)	68 (91.9)	55 (91.7)	13 (92.9)	213 (86.6)	277 (86.6)
Christian	38 (11.9)	06 (8.1)	05 (8.3)	01 (7.1)	32 (13.0)	42 (13.1)
Buddhism	01 (0.3)	0	0	0	01 (0.4)	01 (0.3)
Occupation status						
Unemployed	0	0	0	0	0	02 (0.6)
Employed - Full time	75 (23.4)	11 (14.9)	09 (15.0)	02 (14.3)	64 (26.0)	303 (94.7)
Employed - Part-time	07 (2.2)	1 (1.4)	01 (1.7)	0	06 (2.4)	14 (4.4)
Retired	0	0	0	0	0	01 (0.3)
Homemaker	238 (74.4)	62 (83.8)	50 (83.3)	12 (85.7)	176 (71.5)	02(0.6)
Educational status						
No formal schooling	0	0	0	0	0	0
Grade 1-5	08 (2.5)	02 (2.7)	01 (1.7)	01 (7.1)	06 (2.4)	12 (3.8)
Grade 6-10	36 (11.3)	08 (10.8)	07 (11.7)	01 (7.1)	28 (11.4)	58 (18.1)
GCE O/L	144 (45.0)	40 (54.1)	32 (53.3)	08 (57.1)	104 (42.3)	138 (43.1)
GCE A/L	82 (25.6)	16 (21.6)	14 (23.3)	02 (14.3)	66 (26.8)	73 (22.8)
Diploma	12 (3.8)	01 (1.4)	01 (1.7)	0	11 (4.5)	03 (0.9)
Degree or postgraduate	38 (11.9)	07 (9.5)	05 (8.3)	02 (14.3)	31 (12.6)	36 (11.3)

In all, nearly one-fifth (16.6%) of subfertility women reported having problems with infertility; when asked who the subfertility issues affected, 18.8% said husbands, 62.5% said wives, and 18.8% said both spouses. Thyroid-related disorders caused irregular periods in 14 (18.9%) of the subfertility women. The median (IQR) number of sexual encounters each week was 2 (2).

Table 2 shows the factors, which are associated with

subfertility. In all subfertility women, nearly one-fifth that is 16 women (21.6%) reported having problems related to subfertility; when asked who the subfertility problems affected, 18.8% stated husbands, 62.5% stated wives, and 18.8% mentioned both spouses. Of those subfertility women, 14 women (18.9%) reported to have irregular periods and thyroid-related problems identified in 13 women (17.6%). The median (IQR) days of sexual intercourse per week was 2 (2).

Table 2. Factors associated with subfertility

<i>Variable</i>	<i>Total (n=320)</i>	<i>Total subfertile women (n=74)</i>	<i>Primary subfertility (n=60)</i>	<i>Secondary subfertility (n=14)</i>	<i>Not sub fertility (n=246)</i>
Factors related to delayed fertility in women					
Irregular periods	43 (13.4)	14 (18.9)	12 (20.0)	02 (14.3)	29 (11.8)
Chemotherapy and radiation	0	0	0	0	0
Head injury or surgery	1 (0.3)	0	0	0	1 (0.4)
Surgery in hip	07 (2.2)	3 (4.1)	03 (5.0)	0	4 (1.6)
Factors related to delay in having a child in men					
High exposure to heat in the working environment	62 (19.4)	17 (23.0)	12 (20.0)	05 (35.7)	45 (18.3)
Usage of motor vehicles	131 (40.9)	29 (39.2)	23 (38.3)	08 (42.9)	102 (41.5)
Long distance drivers	31 (9.7)	04 (5.4)	01 (1.7)	03 (21.4)	27 (11.0)
Head injury or surgery	05 (1.6)	02 (2.7)	01 (1.7)	01 (7.1)	03 (1.2)
Chemical pesticide usage	28 (8.8)	05 (6.8)	04 (6.7)	01 (7.1)	23 (9.3)
Testicular infection	03 (0.9)	03 (4.1)	02 (3.3)	01 (7.1)	0
Erection dysfunction	04 (1.3)	04 (5.4)	02 (3.3)	02 (14.3)	0
Surgery in testis	02 (0.6)	02 (2.7)	01 (1.7)	01 (1.7)	0
Undescended testis / inguinal hernia	01 (0.3)	01 (1.4)	01 (1.7)	01 (7.1)	0
Number of days having intercourse in a week median (IQR)	02 (2)	02 (2)	02 (2)	02 (2)	01 (2)
Comorbid conditions – Women					
Thyroid gland diseases	24 (7.5)	13 (17.6)	09 (15.0)	04 (28.6)	11 (4.5)
Diabetes Mellitus	21 (6.6)	10 (13.5)	07 (11.7)	03 (21.4)	11 (4.5)
Hypertension	17 (5.3)	04 (5.4)	02 (3.3)	02 (14.3)	13 (5.3)
Comorbid conditions – Men					
Diabetes	22 (6.9)	06 (8.1)	06 (10.0)	0	16 (6.5)

(Continued)

Variable	Total (n=320)	Total subfertile women (n=74)	Primary subfertility (n=60)	Secondary subfertility (n=14)	Not sub fertility (n=246)
Depression					
Normal	317 (99.1)	73 (98.6)	59 (98.3)	14 (100.0)	244 (99.2)
Mild	01 (0.3)	0	0	0	01 (0.4)
Moderate	02 (0.6)	01 (1.4)	01 (1.7)	0	01 (0.4)
Severe	0	0	0	0	0
Extremely severe	0	0	0	0	0
Anxiety					
Normal	308 (96.3)	70 (94.6)	57 (95.0)	13 (92.9)	238 (96.7)
Mild	05 (1.6)	02 (2.7)	01 (1.7)	01 (7.1)	03 (1.2)
Moderate	06 (1.9)	01 (1.4)	01 (1.7)	0	05 (2.0)
Severe	01 (0.3)	01 (1.4)	01 (1.7)	0	0
Extremely severe	0	0	0	0	0
Stress					
Normal	319 (99.7)	74 (100.0)	60 (100.0)	14 (100.0)	245 (99.6)
Mild	0	0	0	0	0
Moderate	01 (0.3)	0	0	0	01 (0.4)
Severe	0	0	0	0	0
Extremely severe	0	0	0	0	0

Figure 1 shows the treatment status of subfertility, and Table 3 describes its risk factors. Among those subfertility women, less than two-thirds that is 48 women

(64.9%) are not undergoing any treatment related to subfertility. Diabetic mellitus, thyroid gland diseases in women are statistically associated with subfertility.

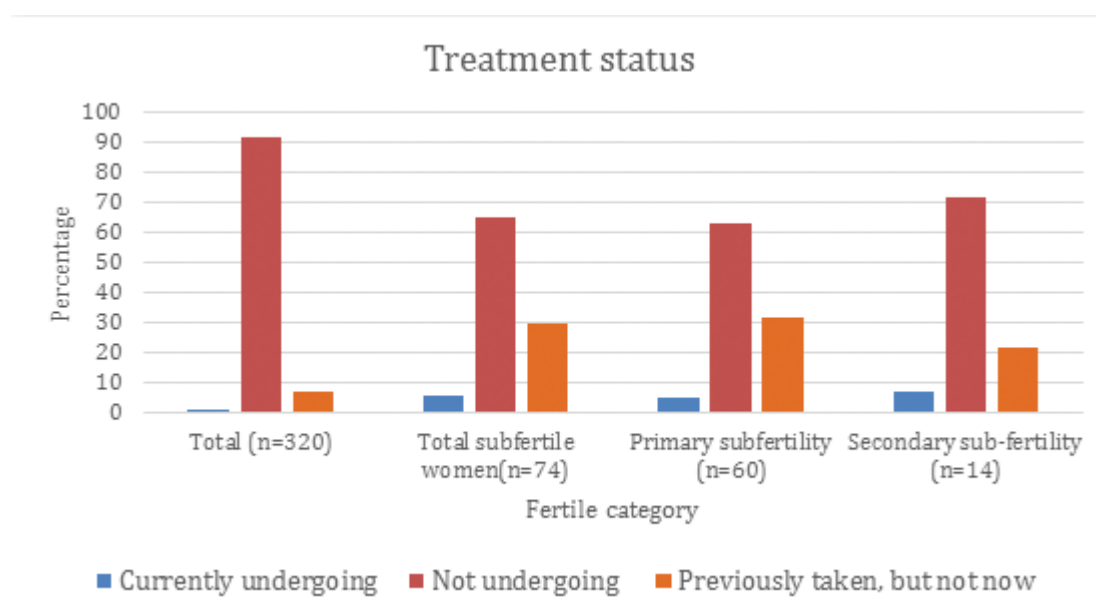


Figure 1. Treatment status of subfertility.

Table 3. Risk factors of subfertility

Variables	COR	95% CI		P value
		Lower	Upper	
Diabetes mellitus	3.33	1.35	8.20	0.006
Thyroid diseases	4.55	1.94	10.66	<0.001
Irregular periods	0.57	0.28	1.15	0.118

Discussion

The prevalence of subfertility in Sri Lanka is reported as 15%. Primary and secondary subfertility in the Colombo district are 5.52% and 10.07%, respectively. In our study, the subfertility prevalence is (23.1%). Number of women with primary and secondary subfertility were observed to be 60 (18.8%) and 14 (4.4%) respectively. The prevalence of subfertility is high in comparison to the previous literature. The causes of this high prevalence have not been analysed previously. Northern Province has a population of almost an ethnical minority – Sri Lankan Tamils. This region had been through thirty years of civil war and is currently facing severe economic crisis. This study tries to better understand the associated risk factors in the Northern Province population.

The mean age of the study population is 37.1, and sub-fertile women's age is slightly high (mean 38.4). The mean age of the reproductive age women is higher than in the previous studies [8]. Females in Sri Lanka marry at a mean age of 23.4 years. The average age at marriage for Tamils is higher than that of other ethnicities [9]. However, it does not show a significant difference between fertile and sub-fertile couples in our study. A systematic review published in 2022 also showed no association between age and subfertility [10]. Mean age of the male partner is higher than the female partner, and this age difference is usual in the Sri Lankan community.

The employment status of women influences fertility in many ways. Their career goals conflict with planning the child and reduce their time availability. Mostly, more educated, and least educated women got work easily. More educated people can get professional jobs easily, and less educated people can get agricultural or manual labour jobs easily. Women in professional jobs have an income and delay marriage. Occupational exposure to different norms and cultures can influence lifestyle and marriage age [11,12]. It shows a clear negative correlation in high-income countries, and in lower-middle-income countries, effects vary according to occupation. Usually, the agricultural jobs do not have much correlation [13]. In our study, most of the women are homemakers, and this percentage increases slightly among the sub-fertile population, and it does not have a significant correlation with subfertility.

Female partner in our study shows more identified risk factors within the sub-fertile couples. Subfertility is caused by male and female factors equally. However, in our cultural context, mostly women are blamed for subfertility issues [14].

Irregular periods are higher among the subfertile women than the common population. Oligomenorrhea is one of the features of Polycystic ovary syndrome (PCOS), which is high in the South Asian population and leading to subfertility [15].

Diabetes, hypertension, and thyroid diseases are more common among the subfertile compared to the mean of those general participants. Diabetes and thyroid diseases show a significant difference within the subfertile group. Diabetes leads to oligomenorrhoea or amenorrhoea in women [16]. In men, it reduces the testosterone level and influences sperm production and function [17] and erection [18]. Thyroid dysfunction can lead to menstrual irregularities and anovulatory cycles, resulting in subfertility [19].

Exposure to heat, testicular infection, erectile dysfunction, surgery in the testis, undescended testis / inguinal hernia and surgery in the head are slightly higher among subfertile men [20]. Testicular ambient temperature increases and reduces spermatogenesis and quality [21]. Undescended testis also exposes the body to excessive body temperatures. Infections of the testis and epididymis influence sperm production and quality [22].

The frequency of intercourse is reported as twice a week in primary and secondary subfertile couples and once a week in fertile couples. The frequency in subfertile couples is consistent with previous studies [23,24]. The frequency of sexual intercourse is high, indicating that subfertile couples are willing to conceive.

Society has high expectations for children, which leads to increased depression among the subfertile couples, and particularly women. Depression and anxiety are high among the subfertile couples in other studies [25,26]. In our study, only one woman showed a moderate level of depression. This may be due to the undesirability of the patient to reveal the depression to the researcher. Anxiety levels were also reported very poorly in our study.

Almost Two-thirds of the subfertile couples are not undergoing any treatment, and one in five of the population previously got the treatment and is currently not following it. Cultural and religious beliefs delay people from seeking treatment. Even after getting treatment, they quickly default from the treatment and go for other non-clinical remedies [27]. Treatment-seeking behaviour is also high in both females and males; on the other hand, treatment avoidance is high [28].

Conclusion

Subfertility is one of the reproductive problems increasing globally and impacts not only the physical but also psycho-social aspects of couples. Reforming the existing subfertility care system is one of the key elements to overcome this challenge, and measuring the burden of subfertility is an initial step forward. This study showed increased subfertility prevalence in the Jaffna district, Sri Lanka. In this context, the increasing prevalence of subfertility is an eye-opener to the healthcare system and policymakers to concentrate on subfertility care in Sri Lanka.

Declaration

Ethical approval and consent for participation

Ethical approval was obtained from the Ethical Review Committee of the Faculty of Medicine, University of Jaffna (J/ERC/22/134/NDR/0274). The study was conducted in accordance with the ethical standards of the relevant institutional ethics committee. All study participants have granted their consent as per the institutional review protocol.

Consent for publication

The manuscript does not contain data from any person.

All authors have granted consent for publication of the final paper.

Availability of data and materials

The datasets generated and/or analyzed during the current study are not publicly available due to the information being private and confidential. However, they are available from the corresponding author upon reasonable request.

Competing interests

The authors declare that there is no conflict of interest regarding the publication of this article.

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Authors contributions

The conception and framework of this study and drafting of the article were done by Dr. S. Raguraman, the protocol for this study and the questionnaire, were suggested by Dr. B. Balagobi, Dr. S. Kumarn, Dr. G. Rajeev, Miss. Y. Shanmuganathan, Mrs. T. Kiruththiga and data collectors training and data analysis was done by U. Powsiga and S. Kanesamoorthy. Final approval of the version to be published was done by all authors.

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