Study on probable aetiological factors of subfertility in a tertiary care hospital

Lamsal M,[1] Tamrakar SR[2]

[1]Manoj Lamsal, Lecturer, Department of Obstetrics and Gynaecology, Universal College of Medical Sciences, Siddharthanagar, Rupandehi, Nepal; [2]Suman Raj Tamrakar, Professor, Department of Obstetrics and Gynaecology, Dhulikhel Hospital, Dhulikhel, Kavrepalanchok, Nepal.

Abstract

Background: Subfertility refers to describe women or couple who are not sterile but exhibit decreased reproductive efficiency even after 12 months of regular unprotected intercourse.

Objectives: To find probable aetiological factors in subfertile couples attending Dhulikhel Hospital.

Methods: This descriptive cross-sectional study was conducted among 140 subfertile couples in Dhulikhel Hospital from March 2016 to December 2017 after ethical clearance. The participants were recruited by convenience sampling, data were entered in Microsoft Excel Sheet and analysed using SPSS v.23. Descriptive statistics like frequency, percent, mean, and standard deviation have been presented.

Results: Among 140 subfertile couples, mean duration of subfertility was 5.55 ± 3.96 years. About two-thirds (95, 67.9%) of them were of primary subfertility. Most subfertile clients (both) were of 26-30 years age group and about three-fifths (83, 59.3%) were of Janajati caste. The most common cause of subfertility was female factor (72, 51.4%) only. Ovulatory dysfunction (49, 35%) followed by tubal abnormalities (24, 17.1%) were major female contributory factors. Thyroid disorder was noted in 19 (13.6%) clients and hyperprolactinaemia was observed in 14 (10%) subfertile female clients. Two (1.4%) female clients had diabetes mellitus and 24 (17.1%) had evidence of different forms of genital infection. Only male factor contributed was seen in 16 (11.4%) clients and asthenozoopermia was the commonest abnormal semen parameters. Six (4.3%) males with abnormal semen parameter were working abroad.

Conclusion: Ovulatory causes was found to be the commonest cause of subfertility in Dhulikhel Hospital. Asthenooospermia was the most common male factor.

Key words: Asthenozoospermia; Hysterosalpingography; Ovulatory dysfunction; Subfertility.

INTRODUCTION

Subfertility is described as a condition where women or couple who are not sterile but exhibit decreased reproductive efficiency within specified time.[1] It is categorised as primary or secondary on the basis of whether or not the clients have conceived yet or had previous pregnancy but failed to conceive subsequently.[2] One estimate of overall primary and secondary subfertility in South Asia is approximately 10%: 8% in India, 10% in Pakistan, 11% in Sri Lanka, 12% in Nepal, and 15% in Bangladesh. Because of the huge impact of subfertility on human reproductive health, risk factors have attracted much concern. However, comprehensive epidemiological studies on the risk factors for subfertility are not well documented.[3]

There are limited articles related to aetiological factors of infertility published from Nepal and Dhulikhel Hospital (DH).[4-12] As there are adequate numbers of infertility cases being managed in DH, this descriptive cross-sectional

study aimed to find the probable etiological factors in subfertile couple attending DH.

METHODOLOGY

This was a descriptive cross-sectional study of aetiological factors of subfertility conducted in 140 subfertile couples seeking treatment in the Department of Obstetrics and Gynecology of DH from March 2016 to December 2017. Ethical clearance was taken from the institutional review committee of KUSMS (Ref. 16/16, dated 10th January, 2016). Along with socio-demographic information namely age, ethnicity, address, occupation, and probable causes were explored in the subfertile couple.

Infertility is defined as a couple's inability to conceive after a period of 12months of regular unprotected intercourse. Alike some experts, the authors of this study also preferred the term subfertility to refer to this problem as this is correctable in most occasion. Subfertile couples with more than one year of infertility and willing to participate in the study were included in the study by convenience sampling. While the couples denied participating and undergoing necessary investigations were excluded from the study. Sample size was calculated by using standard formula: $n = Z_{1-a/2}{}^2 \times P (1-P)/e^2$. Here, $Z_{1-a/2}{}^2$ = standard normal variate [at 5% type 1 error (p <0.05) it is 1.96]; P = 0.1, prevalence of 10% was taken in this study, as global prevalence of infertility is 10-15%.[1] The e = 0.05, margin of error 5% was taken. Thus n = 138.29 ≈ 140. Hence, sample size generated was 140. After informed consent these couples were evaluated by taking history, clinical examination, and necessary investigations and treated as per need.

Ultrasound of pelvis, thyroid function test, serum prolactin, and random blood sugar were done for female client in same visit. Tubal factor was assessed via hysterosalpingography (HSG) on day seven to ten of normal menstrual cycle or withdrawal bleeding. And laparoscopy with or without chromotubation was carried out in premenstrual period. Semen analysis was done after two to three days of sexual abstinence. Results were analysed manually as according to WHO 2010 guidelines.

Data were analysed through IBM SPSS Statistics for Windows, version 23 (IBM Corp., Armonk, N.Y., USA) applying appropriate statistical tools. Categorical variables have beendescribed as frequency (percent), mean ± standard deviation have been used for continuous parameters.

RESULTS

Of 140 subfertile couple evaluated, mean age is 27.07 ± 4.95 years for female and 30.34 ± 5.18 years for male. The age ranged from 18-42 years for male clients and 19-48 years for female clients. About two-thirds (95, 67.9%) of couples seeking treatment were of primary subfertility and rest were of secondary subfertility (45, 32.1%). In primary subfertility group, most of the male clients were of 26-30 years age (48, 34.3%) and female clients were of 21-25 years (36, 25.7%). And in secondary subfertility group, most of male clients were of age group 31-35 years (17, 12.1%) and female clients were of age group 26-30 years (20, 14.3%) (Table 1).

In this study, mean duration of marriage seeking for subfertility treatment was 5.55 ± 3.96 years that ranged from one year to 20 years. Mean duration of subfertility in primary subfertility group was 4.23 ± 2.97 years and that in secondary subfertility group was 4.53±2.94 years. The mean number ± standard deviation (SD) of previous conception was 1.50±0.7 in the couples of secondary subfertility (with range one to three).In this study, the most common cause of subfertility in both types was female factor and significant numbers of mixed subfertility were of primary type (Table 2).

Of the subfertile couples, about three-fifths(83,59.3%) were of Janajati followed by Brahmin/Chhetri (46, 32.9%), and rest were Dalit, Madhesi, and Muslims (11, 7.9%). Two-thirds (54, 65.1%) of Janajati were of Newar caste.

In total 140 cases, 72 (51.4%) cases had only female factor subfertility. Of the female contributory factors, one-third (49, 35%) of them were ovulatory dysfunction (Table 3). Ovulatory dysfunction was measured in terms of menstrual irregularity. And 41 (29.3%) female clients had abnormal ultrasound findings, of which 17 (12.1%) had polycystic ovaries (PCO), and 10 (7.1%) had adnexal pathology in the form of unilateral/bilateral complex cyst, dermoid cyst and endometriotic cyst.

Hysterosalpingography and diagnostic laparoscopy detected tubal abnormalities in 24 (17.1%) clients. Of them, most common problem was left tubal block, followed by right tube and bilateral block. Ultrasound, diagnostic hysteroscopy and laparoscopy revealed 18 (12.9%) uterine abnormalities. Of them, eight (5.7%) cases were with fibroid uterus, five (3.6%) cases with endometrial polyp, two (1.4%) cases with bicornuate uterus, and one (0.7%) case each with adenomyosis, small uterus and cervical stenosis

Hypothyroidism was noted in 18 (11.4%) clients while hyperthyroidism in one (0.7%) client. Likewise, hyperprolactinaemia was observed in 14 (10%) subfertile clients. Two female (1.4%) clients had diabetes mellitus. Besides, three (2.1%) clients had features of chronic pelvic inflammatory disease (laparoscopy finding) and one (0.7%) case had uterine synechiae (hysteroscopy finding).

Only male factor contributed in approximately 16 (11.4%) clients. Thirty-six (25.7%) cases were detected with abnormality in semen analysis (Table 4) while two clients (1.4%) had premature ejaculation problem. The varieties of semen analysis abnormalities are shown (Table 5).

About one-fourth (38, 27.1%) of male clients were doing self-business, rest were service holders (28, 20%), foreign employees (20, 14.3%), daily wagers (19, 13.6%), farmers (14, 10%), teachers and drivers (8, 5.7% each), and others

(5, 3.6%) (Table 6). Of the female clients, 119 (85%) were house wives, and rest were teachers (6, 4.3%), self-business doers (5, 3.6%), service holders, and foreign employees (3, 2.1% each), and others (4, 2.9%).

Seven (5%) male clients with abnormal semen parameter were alcoholics and three (2.1%) male clients with abnormal semen parameter had smoking habit. None of the male client with abnormal semen parameter had history of pelvic surgery, consuming any drugs, epididymo-orchitis and mumps in the past.

Twenty-two (15.7%) couples had mixed type of subfertility. Of them, almost fourth-fifth (17, 77.3%) clients were of primary subfertility (Table 2). In 30 (21.4%) couples no obvious causes have been identified. More than one causes were noted in certain subfertile female clients.

Table 1: Age distribution of subfertile clients

Age profile (in years)	Male client, n (%)			Female client, n (%)		
	Primary	**Secondary**	**Total**	**Primary**	**Secondary**	**Total**
≤20	1 (0.7)	-	1 (0.7)	13 (9.3)	1 (0.7)	14 (10)
21-25	18 (12.9)	2 (1.4)	20 (14.3)	36 (25.7)	7 (5)	43 (30.7)
26-30	48 (34.3)	16 (11.4)	64 (45.7)	31 (22.1)	20 (14.3)	51 (36.4)
31-35	23 (16.4)	17 (12.1)	40 (28.6)	11 (7.9)	12 (8.6)	23 (16.5)
>35	5 (3.6)	10 (7)	15 (10.7)	4 (2.9)	5 (3.6)	9 (6.4)
Total	**95 (67.9)**	**45 (32.1)**	**140 (100)**	**95 (67.9)**	**45 (32.1)**	**140 (100)**

Table 2: Subfertility type versus causal factor, n (%)

Type	Factor				Total
	Female	**Male**	**Mixed**	**Unexplained**	
Primary	47 (33.6)	14 (10)	17 (12.1)	17 (12.1)	95 (67.9)
Secondary	25 (17.9)	2 (1.4)	5 (3.6)	13 (9.3)	45 (32.1)
Total	**72(51.4)**	**16 (11.4)**	**22 (15.7)**	**30 (21.4)**	**140 (100)**

Table 3: Female factors, n (%)

Causes	Frequency	Remarks
Ovulatory dysfunction	49 (35)	
Tubal abnormality	24 (12.1)	
Thyroid disorder	19 (13.6)	Hypothyroidism 18 (12.9) Hyperthyroidism 1 (0.7)
Uterine abnormalities	18 (12.9)	
Polycystic ovaries	17 (12.1)	
Hyperprolactinaemia	14 (10)	
Adnexal pathology	10 (7.1)	
Endometriosis	7 (5)	

Table 4: Semen analysis result, n (%)

	Frequency (%)
Normal	104 (74.3)
Abnormal	36 (25.7)

Table 5: Varieties of semen analysis abnormalities, n (%)

Abnoramalities (N = 36)	Frequency
Asthenozoospermia	10 (27.8)
Azoospermia	7 (19.4)
Oligoasthenozoospermia	5 (13.9)
Oligoasthenoteratozoospermia	4 (11.1)
Oligozoospermia	4 (11.1)
Teratozoospermia	3 (8.3)
Oligoteratozoospermia	3 (8.3)

Table 6: Comparison between occupation of male clients and semen analysis report, n (%)

Occupation of male partner	Semen analysis		Total
	Normal	Abnormal	
Business	29 (20.7)	9 (6.4)	38 (27.1)
Service holder	22 (15.7)	6 (4.3)	28 (20)
Foreign employee	14 (10)	6 (4.3)	20 (14.3)
Worker	15 (10.7)	4 (2.9)	19 (13.6)
Farmer	10 (7.1)	4 (2.9)	14 (10)
Teacher	6 (4.3)	2 (1.4)	8 (5.7)
Driver	7 (5)	1 (0.7)	8 (5.7)
Others	1 (0.7)	4 (2.9)	5 (3.6)
Total	**104 (74.3)**	**36 (25.7)**	**140 (100)**

DISCUSSION

Conventionally, parameters such as age, smoking and drinking habits, menstruation, body mass index (BMI), lifestyle and environmental factors were considered to be the major risk factors leading to subfertility. Cultural and socio-economic factors, health care practices and policies, and environmental factors play a major role in the prevalence and aetiology of subfertility. Factors from either or both clients may contribute to difficulties in conceiving; therefore, it is important to consider all possible diagnoses.

In this study, the probable etiological factors in subfertile couple attending DH were explored. In this study, primary subfertility was in 95 (67.9%) and secondary subfertility was in 45 (32.1%). This result was similar to findings of other studies.[10,12-15] Most of subfertile clients (both) were of 26-30 age groups (Table 1). This was similar to other study findings.[8] Mean age of female clients seeking for subfertility services was 27.07 ± 4.95 years which was comparable to other study findings.[6,14-16] Of the subfertile couples, caste distribution was similar to that of longitudinal study conducted in same hospital.[6]

In this study, female factor was the commonest factor for subfertility in 72 (51.4%) clients (Table 2). This finding was similar to the results of studies done in other institutes.[13,14,17] However this study result did not match with study findings of Subedi et al.[7] with male factor of 37.39%, of Rahim et al.[18] with male factor of 45.13%, and of Kamali et al.[19] with male factor of 50.5%. The levels and patterns of subfertility apparently vary widely and also are different in various region of the world.

Multiple aetiological factors have been identified in female client in this study (Table 3). Some of the individual had ovarian, tubal, uterine and adnexal pathology either in single or in combination as seen in other studies as well.[6,13] Ovulatory dysfunction as commonest contributory female factor was seen in the various studies where ovulatory cause contributed 35%, 33.63%, 50.07%, and 69.50% respectively.[6,14,17,20]

Tubal cause was the second most finding in this study (24, 17.1%). However, it was main cause for subfertility in the study done in Pakistan (51.53%) and in Bangladesh (33%) may be due to high prevalence of genital infection and tuberculosis.[18,15] Studies by Tamrakar et al. and Karki et al. from same hospital found abnormal tubal findings in 15.5% and 40% of subfertile female clients respectively.[6,16] And this problem was seen in 19% to 60%.[8,9,15,18,21]

Uterine causes were responsible for 18 (12.9%) cases of female factor. Of which, fibroid was the commonest one (8, 5.1%). Uterine abnormalities were seen in other studies ranging from 8.8 to 45%.[8,9,16,21] Heertum et al. stated that uterine myomas clearly have a detrimental effect on fertility outcomes. Evidence show that submucous myomas are more associated with infertility.[22] Ozkanet al. observed endometriosis as a leading cause of infertility with a prevalence of 0.5-5% in fertile and 25-40% in subfertile female client.[23] Endometriosis was seen in seven (5%) female clients in this study which was similar to study from same hospital.[9] But such pathology was seen in 50% of cases in different forms.[24]

Arojoki et al. observed that the prevalence of abnormal thyroid stimulating hormone (TSH) among the subfertile couples was highest in the ovulatory dysfunction (6.3%) and unexplained subfertility (4.8%) groups and lowest in

the tubal subfertility (2.6%) and male subfertility (1.5%) groups.[25] Thyroid abnormality was seen in 19 (13.6%) and hyperprolactinaemia in 14 (10%) of subfertile female clients in this study. Such thyroid abnormalities were seen 7.7%, 8.69%, 11.8%, and 50% in studies by Manadhar et al., Subedi et al., Rijal et al., and Banu respectively.[10,7,4,11] And hyperprolactinaemia was found in 2.6%, 16%, and 57% of clients in studies by Subedi et al., Sultana et al., and Banu respectively.[7,14,11]

Only male factor contributed in approximately 16 (11.4%) cases of this study. In 36 (25.7%) cases, abnormality in semen analysis was detected (Table 4) while premature ejaculation was noted in two (1.4%) cases. Overall, abnormal semen parameter was the main cause of male subfertility in the study from South India.[26] Commonest semen abnormality was asthenozoospermia followed by azoospermia, oligoasthenozoospermia etc. which was similar to study findings from same hospital.[6] But the result was little different from other study findings.[5,7,11,27]

Six (4.3%) male clients with abnormal semen parameter were working in abroad while another four clients were farmer and one was driver. Subedi et al. found the most of the male clients with abnormal semen parameter were working in abroad in Arabian countries.[7]

A meta-analysis on effects of tobacco smoking and alcohol consumption found that smoking is likely toreduce the sperm concentration and cause impairment of sperm motility.[28] Few male clients with abnormal semen parameter were alcoholics and smoker. Smoking and alcohol consumption were the common risk factors amongst male clients.[5] Among male client with azoospermia three had hydrocoele, one had undergone right orchidectomy and one had history of trauma to the testis. In asthenospermia cases, two were chronic alcoholic and two had history of repair of hernia.[7]

Shrivastav et al. also found cigarette smoking (35.1%), tobacco chewing (20.1%), alcohol consumption habit (18.1%), history of mumps orchitis (11.6%), and scroto-perineal surgery (3.9%) etc. as risk factors of male subfertility.[12] In this study, none of the male client with abnormal semen parameter had history of pelvic surgery, consuming any drugs, epididymo-orchitis and mumps in the past.

Of 30 (21.4%) cases with unexplained infertility, nine (6.4%) couples had irregular coitus (less than one coitus per month) and one (0.7%) couple had infrequent coitus. In a study done in Srilanka, it was found to have abnormality in sexual function in 10% cases and the most common causes were irregular and infrequent coitus.[17]

Complete records of certain aetiological factors like hormonal reports, socio-economic status could not be retrieved and analysed. Other limitations of this study are inadequate sample size, non-compliance with certain investigations.

CONCLUSION

In most of the subfertile clients, causes were identified in DH. Major cause of subfertility in female was of ovulatory dysfunction and asthenozoospermia was the commonest type of male factor subfertility. Further study should be done with greater sample size to validate these findings so that the study findings can be used for clinical benefits.

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