SUMMARY

The present study entitled “Risk factors for female infertility in a rural population in Central India: a hospital based case - control study.” was carried out according to the guidelines of reporting observational studies; “The strengthening the reporting of observational studies in Epidemiology (STROBE) statement”. Department of Obstetrics and Gynaecology, Acharya Vinoba Bhave Rural Hospital, Jawaharlal Medical College, Sawangi(Meghe), Wardha, in order to study the association between demographic, menstrual, sonographic and hormonal factors and the risk of infertility.

A total of 200 (100 cases and 100 control) women fulfilling inclusion criteria were enrolled. The main findings of the study are as follows.

Almost all women enrolled in our study were aged less than 35 years, median age being 25 years. A total of 102 study participants (60 cases and 42 controls) were aged less than 25 years. Eleven women were aged more than 33 years. Age >=30 years was statistically significant risk factor for infertility when compared to age less than 25 years (p=0.01). This suggest advancing age is associated with prolongation in average time for achieving conception.

Most women enrolled in our study came from neighbouring villages and a small city. **Residence** was not associated with infertility (p=0.88) our results may not be applied to women with different ethnic group and urban setting. These results may not be generalizable to more affluent settings in India in which psychological stress, alcohol related problems, long duration marriages might be key factors for infertility. No women in our study were found with history of smoking or taking alcohol.
Socioeconomic status (p=0.86), Education (p=0.83) or occupation either housemaker or working (p=0.50) were not predictors of infertility.

Infertile women tended to be more sexually active (frequency =4.45) compared to fertile ones (frequency =3.35, p=0.001). The increased coital frequency did not result in conception, as infertile women might not have had sexual intercourse during fertile window or there may be presence of any other risk factor.

Neither age at Menarche (p=0.77) nor Dysmenorrhoea (0.88) were associated with primary infertility. However irregularity of menses was just significant (0.05). In women with irregular menses, cases were (n=24) having longer menstrual period (> 4 days) compared to control (n=13).

Pelvic inflammatory disease was not found to be significant risk factor for primary infertility in our study (p=0.08). PID in women is more likely to be caused by interventions such as insertion of IUCD, or termination of pregnancy and therefore is more likely to be associated with secondary and not primary infertility.

Tuberculosis was evident in 8 women (4%), seven of them were infertile. Amongst seven infertile women one had received treatment of tuberculosis in childhood, laparoscopy in her revealed dense adhesion and blocked tubes.

In clinical examination Hirsutism was significant risk factor for infertility (p=0.03). Galactorrhea was found in both cases patients as well as control group.

In Anthropometric measurements mean height of cases (154.54cms) did not differ from those of controls (154.54) (p=0.68). Cases weighed almost similar to controls (51.53 kg vs. 52.34kg, p=0.50). The body mass index did not differ from that of controls (21.57 vs. 21.83, p=0.58). Control group had broader waist and larger hip circumference than cases. As such waist, hip ratio was more in control group(0.76 vs.
0.78). The women in control group (1-1.5 years PNC) might not have lost their weight gain during pregnancy also attributed to intake of fat and carbohydrate rich diet after delivery. But when bivariate analysis of thirty women found to have PCOS in our study was done women with PCOS tended to have higher body mass index (23.46 vs. 21.39 kg m$^2$) compared to those without (p=0.001) Also they tended to have larger waists (74.2 vs. 72.2; p=0.01) and broader hips (96.8 vs. 93.3cms; p=0.01)

In pelvic examination one patient had narrow vagina preventing coitus (coital factor or vaginal factor 1%). Cervical erosion was found in 31 patients (12 cases 11 controls ) which is statistically insignificant (p=0.82) Vaginal discharge was present in 10 cases and 4 participants of control. Uterine mobility was restricted in 7 patients and 3 controls though statistically not significant (p=0.19). Bulky uterus was found more in participants of control group.

**Ultrasonographically** uterine dimensions did not differ in both groups. A total of 15 women (11 control and 4 cases) had a mass in uterus. Twelve cases had adnexal mass as compared to 5 controls. Sonohysterosalpingography was performed during ultrasonography showed tubal block in nine cases. On imaging ovaries, ovarian width and ovarian volume was significantly higher in infertility cases as compared to controls (p=0.001). Cases tended to have higher antral follicle count (15.4) compared to that of controls (9.2) p=0.001.

In **hormonal assay**, elevated LH was observed more in cases (n=26) as compared to control (n=10) p=0.03. Rest of hormonal analysis i.e. Testosterone, Insulin, FSH, Prolactin did not show significance on univariate analysis. In comparison of cases with PCO and without PCO group values of serum, testosterone, serum LH and serum insulin showed significance p=0.001.
Cases tended to have higher TSH (n=20) as compared to controls (n-13).

Laparoscopy was performed in 28 patients on basis of clinical and ultrasonographic examination. Six patient had normal findings. One patient had uterine myoma which was removed. Two patients had bicornuate uterus; one patient of tuberculosis had very small uterus. Adhesions were found in four patients. Endometriosis was evident in three patients. Of the 22 patients with ovarian pathology 19 had polycystic ovaries in whom drilling was performed. One had endometrioma and two had cysts which were removed. Eleven patients of ovarian pathology in whom drilling was performed and one patient of endometriosis in whom fulguration was performed conceived during study period.

In sperm measurements partners of one case had azospermia.

In partners of cases all parameters of sperm measurements like concentration, motility, morphology were significantly on lower side as compared to that of control. By applying bivariate analysis sperm concentration (2.21[1.37-4.02]) and sperm motility (1.89[1.02-6.67]) was significantly on lower side in partners of cases.

Final model from multivariate logistic regression analysis showed the risk factors for primary infertility with odds ratio as - frequency of sexual intercourse (1.53[1.18-1.97]) p=0.001. tuberculosis (11.86[1.17-148.02]) p=0.05. hirsutism (12.30[1.18-128.12]) p=0.03, antral follicular count (1.22[1.04-1.20]) p=0.001, PCOS (4.19[2.25-6.68]) p=0.001. sperm concentration (2.25[1.37-4.02]) p=0.04, sperm motility (1.89[1.02-6.67]) p=0.02.

Frequency of etiological factors responsible for primary infertility is found as- ovarian factor -39, male factor -15, unexplained- 31, hyperprolactinemia -11, tubal
factor -9, tuberculosis-7, uterine factor -5, endometriosis-3, vaginal factor -1, more than one factor was responsible in eleven patients.

Our results suggest that polycystic disease, (adnexal mass, antral follicle count; hirsutism) tuberculosis, tubal occlusion, lower and higher lower sperm concentration and motility, frequency of sexual intercourse, vaginal factor, uterine factor are important risk factors for infertility in rural Indians.

Infertility, however, continues to be a countrywide problem, affecting an estimated 10–12 million women and men countrywide, a vast majority of who pay out-of-pockets and are too poor to afford the costs of infertility evaluation and management. Resources needs to be directed depending upon the presence of risk factor in the region for example early detection and management may be in adolescent age of PCOD, prevention and early detection and management of tuberculosis etc.