EUROPEAN JOURNAL OF BIOMEDICAL AND PHARMACEUTICAL SCIENCES
http://www.ejbps.com

ISSN 2349-8870
Volume: 3
Issue: 4
334-341
Year: 2016

A COMPARATIVE CLINICAL RETROSPECTIVE STUDY FOR EVALUATING THE ETIOLOGICAL FACTOR CAUSING INFERTILITY IN INDIAN FEMININE POPULATION

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Article Received on 31/01/2016 **Article Revised on 21/02/2016** **Article Accepted on 13/03/2016**

ABSTRACT

Background: In literature numerous etiological factors causing infertility are depicted. There are evidences of similar factors present in fertile feminine population, thus the study aimed to validate etiological factors causing infertility by comparing in both fertile and infertile feminine populations. **Methods:** Etiological factors which cause infertility in feminine population were reviewed in literature and considered as important evaluation parameters for the study. These parameters were evaluated in both populations based on their medical history and current investigational records. **Results:** In the present study, literature review which claimed etiological factors for female infertility were evaluated in the study population; theses comparison of etiological factors between the infertile and fertile feminine population aided us to validate etiological factors and resolve the myth or misconceptions which were written in literature. **Conclusions:** The clinical retrospective study validated actual etiological factors causing infertility by either interfering with ovulation cycles, hormonal alterations or damage structures of reproductive system like fallopian tubes, endometrium, uterus, ovaries.

KEYWORDS: Infertility, Case Record Form and PCOS (Polycystic Ovaries Syndrome).

INTRODUCTION

Infertility is the inability of a couple to achieve pregnancy over an average period of one year (in a woman under 35 years of age) or 6 months (in a woman above 35 years of age) despite adequate, regular (3-4 times per week), unprotected sexual intercourse.[1] Infertility is clinical presentation and not a disease, it is estimated that female etiological factors and unexplained infertility accounts for 50-80% while the male etiological factor accounts for 20-50% of the cause of infertility.[2]

Currently in India it is estimated, probably 15-20 million couples suffer from infertility every year (25% of the global populations). The behavior of Indian society towards infertile females have been disappointing, gradually with time the improvement have been seen but the impact on psychology is the same.[3]

Through literature review the etiological factors causing infertility in feminine population include hormonal imbalance (increased level of testosterone, estrogen), Anatomical disorders (tubal abnormalities), vaginal infection (STD, TORCH infection) and hereditary factors (PCOS). Additional preventable etiological factors included are lifestyle factors, marital age, diet, body weight, depression, coitus history, contraception method history and socio-economic status.[3,4]

The present retrospective study aimed to evaluate and claim the actual etiological factors which are responsible for infertility in infertile feminine population by comparing it with fertile feminine population. The etiological factors reviewed in literature were considered as important evaluation parameters for the study.

MATERIAL AND METHOD

The clinical retrospective study was carried out in the Bharatiya Sanskriti Darshan Trust's Ayurved Hospital and Research Center, Wagholi, Pune, after receiving Ethics Committee approval letter. The study was carried

out in n= 100 feminine population, two groups were selected Group A (50 infertile females) and Group B (50 fertile females). A written informed consent was obtained from each eligible subject before enrolment in the study. Subject history was thoroughly reviewed. The Case Record Form was designed which contains all the important details for the study, clinical assessments were done.

Subject Inclusion criteria

Group A

Females between age group 20- 40 years who failed to achieve conception after one year of unprotected intercourse and possessed primary as well as secondary infertility.

Group B

Females between age group 20-40 years having at least two children without any treatment for infertility and 1st child delivered within two years of marriage with last child having age less than 5 yrs.

Subject Exclusion criteria

Female other than group 20-40 years. Females with infertile male partners.

Study Evaluation Etiological factors

The following factors were evaluated during the study:

1. Type of Infertility.
2. Age: Age group distribution and marital age.
3. Life style Factors: Food intake, sleeping patterns, nicotine dependence, profession and personality traits.
4. Menstrual Cycle.
5. Coitus pattern.
6. Conceiving history.
7. Contraception history.
8. Disease history.
9. Diagnostic factors.

Statistical Analysis of the study etiological factors

The Chi-square method was used for statistical evaluation of etiological factors and the statistical significance P value was used.

RESULTS

OF 100 subjects, 50 were assigned to Infertile Group A and 50 to Fertile group B; all the subjects willingly participated in the study. The results obtained in the study aid us to correlate the actual factors which cause infertility and to resolve the misconceptions and myth regarding the infertility.

Type of Infertility

The type of infertility is one of the major parameter for evaluation. In primary infertility, the couples have never been able to conceive; while in secondary infertility there is difficulty in conceiving after having conceived (either carried the pregnancy to term or had a miscarriage).[1] The (Table-1) depicts that in group A population, 64% subjects possessed primary type of infertility whereas 36% of subjects possessed secondary type of infertility.

Table 1: Type of Infertility.

Type of Infertility	Percentage of Patients in Group A
Primary	64
Secondary	36

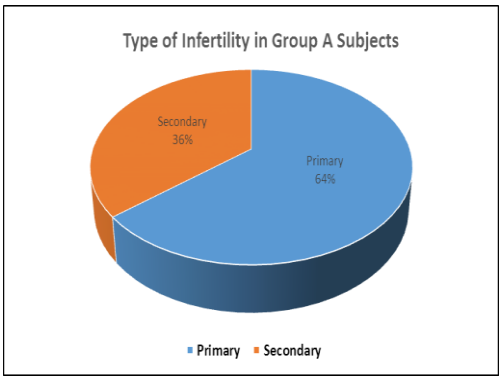

Figure 1: Type of Infertility.

Age wise distribution

Age of patient

In the present study, the subjects between 20 to 40 years age group were enrolled. In (Table -2.1) it was observed that subjects of age group between 26 to 30 years (best time for fertile window) were enrolled in group A maximum (50%) and group B (48%) which aid in achieving the objective of the study.

Table 2.1: Age wise distribution of patient.

Age (Years)	% of Group A	% of Group B
21-25	32	4
26-30	50	48
31-35	16	32
36-40	2	16

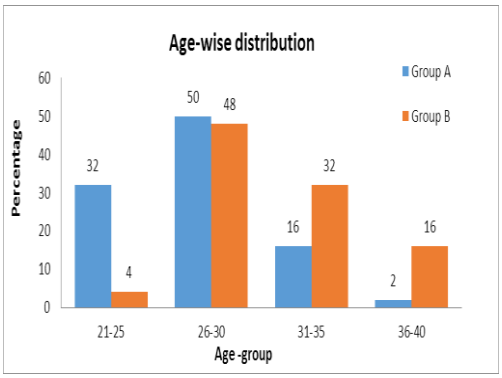

Figure 2.1: Age wise distribution of patient.

Marital age

In (Table -2.2), maximum subjects enrolled in both the groups possessed marital age between 23-26 years, followed by the age group of 19-22 yrs. The marital age 15-18 years were observed in both groups i.e. 8% in

group A and 12% in group B, which reveals the orthodox culture of India.

Table 2.2: Martial Age of Patients.

Martial Age	% of Group A	% of Group B
15-18	8	12
19-22	34	38
23-26	52	50
27-30	6	0

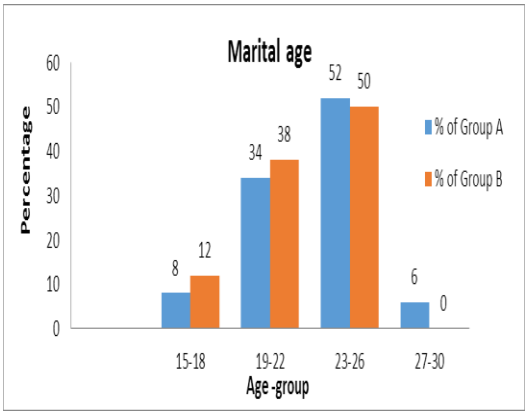

Figure 2.2: Martial Age of Patients.

Life style

The study focuses on the impact of several lifestyle factors which include: food intake, nicotine dependence, sleeping pattern dependence, profession and personality traits. The impact of these factors on reproductive performance may vary depending on individual etiology and circumstances.

Impact of food intake, nicotine dependence and sleeping pattern

The life style of female population is much affected by the components of daily food intake habit; we observed in (Table-3.1) that percentage of vegan population was (44%) in Group A and (12%) in Group B, whereas, highest percentage i.e. (56%) in Group A and (88%) in Group B of non- vegan population was observed. Nicotine dependence (Tobacco intake) was evaluated in the study population, Group A population contains highest 14% of population having nicotine dependency as compared to Group B i.e. 2% population. Sleep is one of the important parameter of healthy life style, adequate sleep is observed in maximum Group B female population as compared to Group B.

Table 3.1: Impact of food intake, nicotine dependence and sleeping pattern.

Life style factor	% of Group A	% of Group B
Vegan	44	12
Non vegan	56	88
Nicotine dependence	14	2
Adequate sleep	42	82
Inadequate sleep	58	18

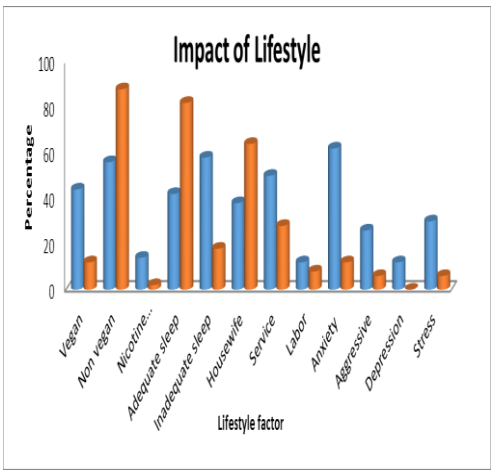

Figure 3: Impact of Life style Factor.

Impact of profession and personality traits

The (Table 3.2) shows that maximum feminine population group A possessed working profession followed by house wife population. Working women had

fast and stressful lifestyle when compared with housewives. The profession affects all aspects of individual personality, it was observed that female Group A population possessed maximum personality traits (Quality) which includes anxiety, aggressive, depression and stress in comparison with Group B population.

Table no 3.2: Impact of profession and personality trait.

Life style factors	% of group A	% of group B
Profession		
Housewife	38	64
Service	50	28
Labor	12	8
Personality Traits		
Anxiety	62	12
Aggressive	26	6
Depression	12	0
Stress	30	6

Menstrual cycle details

Irregular or abnormal ovulation accounts for 30% to 40% of all cases of infertility. Having irregular periods, no periods or abnormal bleeding often indicates that female isn't ovulating, a condition known clinically as anovulation.[5] In the present study the important parameters which provide us the insight details of

ovulation included were menstrual cycle: regularity, duration time and interval in days, menstrual bleeding quantity, severity of discomfort (pain) and age of menarche.

Evaluation of menstrual cycle regularity, duration time and interval in days

In the study population (Table-4.1) shows that; Group A (50%) subjects were having regular cycles while (48%) subjects were having irregular cycles and (2%) subjects doesn't have menstruation history clearly depicts that the subject can't ovulate. In Group B (100%) subjects were having regular menstrual cycle. The menstrual bleeding occurs for 3-5 days both group i.e. (42%) in Group A and (76%) in Group B. In majority of subjects i.e. (48%) of Group A and (46%) of Group B the interval between two cycles was 26-30 days.

Table 4.1: Evaluation of menstrual cycle regularity, duration time and interval in day.

Menstrual cycle parameters	% of group A	% of group B
Regularity of menstrual cycle		
Regular menses	50	100
No menses	2	0
Menstrual bleeding duration		
3 to 5 days	42	76
Days interval between two cycles		
26-30 days	48	46

Evaluation of menstrual bleeding quantity, severity of discomfort (pain) and age of menarche

In the study population (Table-4.2) shows that; (48%) subjects of group A and (98%) subjects of group B were having moderate quantity of menstrual bleeding. The severity of pain observed in the study ranged from severe to painless. In Group A, (46%) subjects suffered moderate pain during menses, (34%) subjects were having painless menses only (18%) subjects suffered severe pain. In Group B, (48%) subjects suffered moderate pain during menses, (40%) subjects were having painless menses only (12%) subjects suffered severe pain. Menarche is the first menstrual cycle or first menstrual bleeding, in female humans. In the study the age of menarche of (58%) subjects from Group A was 14 to 16 years while (40%) subjects had menarche at the age of 11 to 13 years and In Group B (60%) subjects had given history of menarche at the age of 11-13 years; (40%) subjects were having menarche at 14-16 years.

Table 4.2: Evaluation of menstrual bleeding quantity, severity of discomfort (pain) and age of menarche.

Menstrual cycle parameters	% of group A	% of group B
Menstrual Bleeding		
Moderate bleeding	48	98
Severity of pain		
Moderate pain	46	48
Severe pain	34	40
No pain	18	12
Age of Menarche		
11-13 years	58	60
14-16 years	40	40
Not applicable	2	0

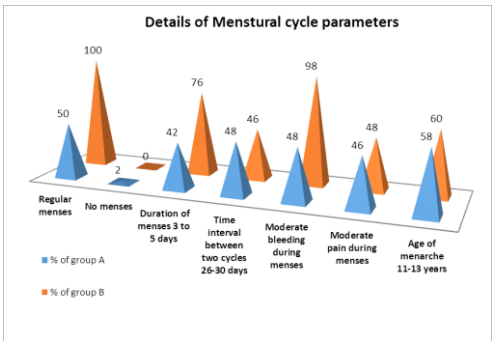

Figure 4: Details of Menstrual cycle parameters.

Coitus History

Coitus is the most important factor for fertility; coitus has to take place every 48 hours during the fertile window period to offer the optimum chance of conception. Too frequent coitus rarely, if ever accounts for infertility. Infrequency of coitus and attempts to limit it to the day of ovulation are much more important causes for failure to conceive. In the study, parameters included were coitus frequency, position and satisfaction. The details of results are mentioned in (Table-5).

Coitus Frequency

In group A (68%) of subjects were having frequency of coitus 3-4 times per week, only (6%) subjects reported to have infrequent coitus. While in group B, (92%) subjects were having 3-4 times per week frequency of coitus and remaining (8%) had 5-6 times coital frequency per week.

Coitus position and satisfaction

The coitus position and satisfaction are important parameters for conception. In the study, 90% subjects had given the history of correct scientific position during the coitus, (10%) subjects had given history of incorrect position of coitus in Group A while in group B all the (100%) subjects had given history of correct scientific position during the coitus. In group A (82%) of subject had given history of satisfactory coitus and (18%) subjects were unsatisfied while in group B (100%) subjects were satisfied.

Table 5: Coitus History.

Coitus History	% of group A	% of group B
Coitus Frequency		
3-4	68	92
Infrequent	6	0
Coitus Position		
Correct position	90	100
Incorrect position	10	0
Satisfaction		
Satisfactory	82	100
Unsatisfactory	18	0

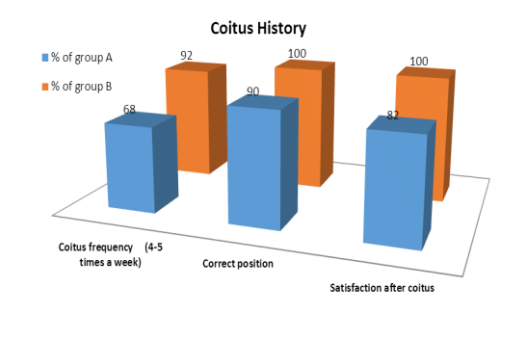

Figure 5: Coitus History.

Conception History

Conceiving is the ability of a woman to get pregnant. In the study, through the history of conception we observed in (Table-6) that in group A (64%) of subjects never conceived, (28%) population with history of Abortions and (8%) were patients possessing secondary infertility. In group B (100%) subjects were fertile.

Table no 6: Conception History.

Conception History	% of group A	% of group B
Never conceived	64	0
Multigravida	0	100
Abortion	28	0
Infertility after one child	8	0

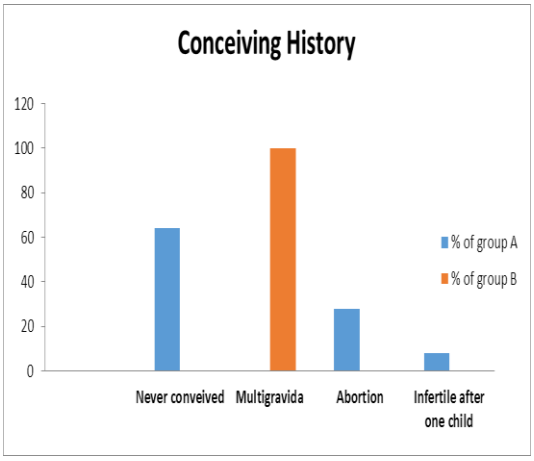

Figure 6: Conceiving History.

Contraception History

Currently, contraception method are preferred to eliminate the risk of pregnancy, the use of non-surgical methods i.e. oral contraceptives and copper T (Intrauterine Devise) is found maximum in female populations. Tubectomy (Tubal ligation) is the best and safe method for contraception. From (Table-7) it was observed that in Group A i.e. (78%) subjects had never used any contraception methods while (20%) subjects used oral contraceptive pills and 2% had done Tube Ligation. In group B, (50%) subjects had done Tube Ligation, (4%) subjects had given history of using Cu-T and (46%) gave history of not using any contraception methods.

Table 7: Contraception History.

Contraception Method	% of group A	% of group B
Oral Contraceptive	20	0
Tube Ligation	2	50
Intrauterine device	0	4
Never used any method	78	46

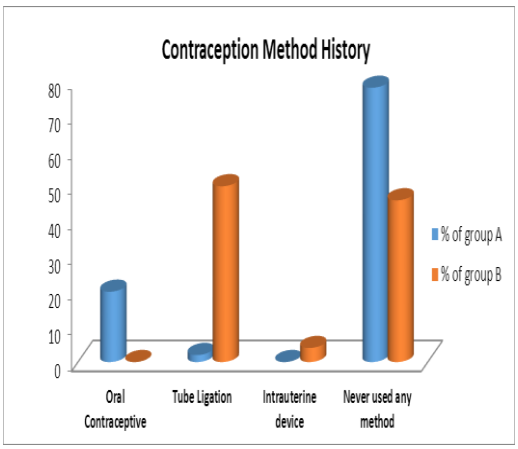

Figure 7: Contraception History.

Disease history

The detail patient disease history in (Table-8) reveals that in Group A (4%) patients were having history of Tuberculosis which lead to tubal blockage, (34%)

subjects were obese while (22%) patient were under weight. In group B none of the subjects had disease history.

Table 8: Disease history of patients.

Disease	% of group A	% of group B
Tuberculosis	4	0
Obesity	34	0
Underweight	22	0
None	40	100

Figure 8: Disease history of patient.

Diagnostic factors

There are various factors which lead to infertility in females, as per literature review the important factors listed in (Table-9) were diagnosed in both the population. In group A, (32%) patients were diagnosed with polycystic ovarian syndrome, (18%) patients anovulatory cycles, (14%) patients were suffering from hyperacidity, (12%) patients had hypothyroidism, (8%) patients were with anaemia and remaining (12%) patients were with torch infection, Leucorrhea, vaginitis and cervical erosion while (10%) patients were having tubal blockage. In Group B (10%) patients had Hyperacidity, 6% were anemic while remaining (86%) patients had none of them.

Table 9: Important diagnostic factor.

Important diagnostic Factors	% of group A	% of group B
Hyperacidity	14	10
PCOS	32	0
Anovulatory cycle	18	0
Hypothyroidism	12	0
Anaemia	8	6
Torch infection	4	0
Leucorrhea	2	0
Vaginitis	4	0
Cervical erosion	2	0
Arcuate uterus	2	0
Medicines	8	0
None	26	86

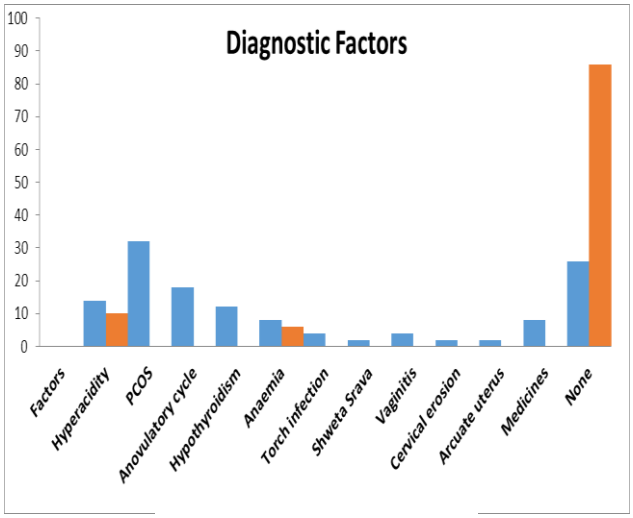

Figure 9: Diagnostic factors.

Statistical analysis

The Chi-square test was used to test the statistically significant difference of etiological factors between the two groups, the P value was found to be significant in maximum number of factor in (Table-10).

Table no 10: Statistical Analysis of data.

Evaluation Parameters	Chi-square value	P value	Statistical difference between the two groups
Profession	6.816	0.03	Significant
Dietary habits	12.69	0.0003	Highly significant
Anxiety	26.812	0	Significant
Aggressive	5.512	0.04	Significant
Stress	6.25	0.01	Significant
Regularity of menstrual cycle	19.4	0.00001	Very highly significant
Menstrual bleeding duration	11.97	0.002	Highly significant
Days interval between two cycles	17.88	0.001	Very highly significant
Menstrual Bleeding	16.17	0.001	Highly significant
Severity of pain	1.26	0.5	Non-significant
Coitus frequency	12.91	0.0048	Significant
Coitus position	6.263	0.021	Significant
Coitus satisfaction	1.32	0.24	Non-significant
Contraception method	12.66	0.05	Significant

DISCUSSION

In the present study, literature review which claimed the etiological factors for female infertility were evaluated in the study population; the comparison between the infertile patients and fertile healthy females aided us to validate etiological factors and resolve the myth or misconceptions which were written in literature.

The age group between 26-30 years is considered as the best period for pregnancy; (Figure 2.1) depict maximum participation of infertile patients which is very unfortunate. The marital age of female in India as per law is 18 year, in (Figure 2.2) it was observed that marital age of female was between 15 -18 years participated in the study, which reflects the orthodox culture of India. In (Figure 1) it was observed in Group A maximum subjects possessed primary type of infertility.

The literature sage, lifestyle (Figure 3) is one of the most important etiological factor to cause infertility. Subjects with non-vegan (mixed) dietary habits were considerably more in number in fertile group than in infertile group. While those who had vegetarian diet were more in infertile group than in fertile group. It shows protein rich and balanced diet has a role in conception. A study in the US indicated that approximately 20% of infertile women had a past or current eating disorder, which is five times higher than the general lifetime prevalence rate.[6]

In feminine population tobacco causes change in the cervical mucus, which affects passage of sperm to reach the ovum due to which fertilization process doesn't occur; this would be a correlated reason for infertility in infertile patients.[7] In feminine population the sleeping pattern is directly proportional to the levels of progesterone, progesterone mechanism of action is similar to sedative; which aids in ovulation process, thus infertile female possessed inadequate sleep in comparison with fertile healthy female group.[8] The personality traits of infertile patients i.e. aggression and anxiety were found correlating with their work profession. Maximum subjects in Group A were working women compared to Group B. Occupation plays major role in etiology of infertility as working females have to face fast and stressful life at both fronts i.e. at home and work. In infertile group many of the subjects were not able to follow proper daily routine, didn't get sufficient sleep.

The menstrual cycle and ovulation period are interconnected, important parameters for infertility which were studied are irregular menses, age of menarche, scanty bleeding, time interval between two cycles and pain during menses (symptom endometrioses). In the infertile population majority females possessed irregular menses which affects the ovulation cycle also one infertile patient possessed clinical indication of uterine hypoplasia due to which the patient doesn't had history of menstrual cycle. The finding by Komura. H reported that female with age of menarche more than 15years are more risky to develop infertility than those with less than 15 year, in (Figure 4) it was observed the age of menarche in maximum fertile population was between 11 to 13 years which contradict these findings. Scanty bleeding, pain during menses and interval between two cycles which are symptoms of endometrioses were observed in infertile population.

Coitus (Sexual intercourse) is one of the prime factor for conception. It's the frequency, position, satisfaction and coitus during ovulation period is important for conception. The conceiving history in (Figure 5) depicts that maximum infertile population never conceived. Abortion cases and infertility after first child were patient with secondary infertility.

In (Figure 6) the use of contraceptive method in both the groups observed was tubal ligation (safest method), apart from this other methods possessed side effects like the use of oral contraceptive causes persisting anovulation or delay the normal pattern of ovulation process while IUD

can cause salpingitis and tubal damage (Jeffcoates) in the infertile groups.

In (Figure 7) body weight parameter was found to be maximum in Group A subjects. Estrogen (sex hormone) is produced by body fat cell and sexual organs; increased estrogen levels are observed in the body of overweight females which interprets as birth control, limiting the chances of getting pregnancy, whereas insufficient estrogen production in underweight females causes menstrual irregularities with anovulatory cycle.[3]

The diagnostic factor were selected on the basis of life style, anatomical disorders, hormonal changes and vaginal infection.

It was observed in (Figure 8) that cases of hyperacidity and anemia were due to improper nutrition, this factor can be resolved by following a balanced healthy nutritive diet. In hypothyroid patients increased levels of both thyroid stimulating hormone (TSH) and prolactin (hyperprolactinemia) is observed, hyperprolactinemia causes ovulatory dysfunction.[2]

The PCOS (Polycystic Ovaries Syndrome) is usually a hereditary problem and accounts for up to 90% cases of anovulation. In PCOS the ovaries produce high amounts of androgen, particularly testosterone, thus amenorrhea is observed in patients. The increased level of androgen causes high levels of luteinizing hormone (LH) and low levels of Follicle-stimulating hormone which prevents follicle from producing a mature egg. PCOS women also possess a high risk for insulin resistance, which is associated with type 2 diabetes. In the present study (32%) of infertile patients possessed this syndrome were young females.[9] Anovulatory cycle, vaginal erosion and leucorrhea are inter correlated with hormonal dysfunction and life style. Vaginitis and torch infection are infections which are caused due to STD or any bacterial infection.

CONCLUSION

The case study validated the actual etiological factor causing infertility by either interfering with ovulation cycles, hormonal alterations or damage structures of reproductive system like fallopian tubes, endometrium, uterus, ovaries. We recommend, etiological factors like marital age, lifestyle, obesity, depression should be identified and treated, by which positive conception can result in the patients.

ACKNOWLEDGMENT

We would like to sincerely thank the Management, Director and Principal of Bharatiya Sanskruti Darshan Trust's College and Hospital Pharmacy for providing us the facilities to carry out the clinical study.

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