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*RESEARCH ARTICLE*

# EFFICACY OF INTRAUTERINE INSEMINATION IN THE MANAGEMENT OF INFERTILITY

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## *Abstract*

**Introduction:** Intrauterine insemination (IUI) aims to enhance the likelihood of conception by directly depositing sperm into the uterine cavity. This abstract assesses the effectiveness of IUI in addressing infertility.

**Objectives:** To illustrate the efficacy of IUI in addressing infertility. To compare the results of couples who opt for timed intercourse under an identical stimulation protocol with those of couples who select intrauterine insemination (IUI).

**Materials And Methods:** A descriptive, observational study was conducted in the Department of Gynaecology at VarunArjun Medical College and Rohilkhand Hospital in Shahjahanpur, Uttar Pradesh, India, over duration of 20 months. The research was performed on 50 patients.

**Results:** In the current study, the majority of individuals, 48%, achieved pregnancy following the IUI cycle.

**Conclusion:**In light of the scarcity of prospective, controlled studies, managed ovarian hyperstimulation and IUI seem to be at least as cost-effective asIVF when considering the very small direct and indirect costs.



## Introduction:-

Infertility is defined as the inability to conceive after 1 year of regular, unprotected sexual intercourse. The infertile group comprises subfertile couples (78%) and couples with male (50%) or female infecundity (50%). Azoospermia or aspermia can induce male and female sterility, while female sterility may arise from bilateral tubal obstruction or ovarian insufficiency (1). Despite a reduced monthly conception rate in subfertile couples, unplanned conception remains a possibility (2, 3). An estimate indicates that 60 to 80 million couples globally are infertile. There are several discrepancies in the reported prevalence of sterility (having experienced altered sexual function in one's reproductive life), which is attributed in part to differing definitions and evaluations of infertility.

The prevalence in wealthy countries ranges from 10% to 33% (5, 6, and 7). In developed countries, three to seven percent of women beyond reproductive age are childless due to infertility. Disruption in either the female partner alone (50%), the male partner alone (50%), or both partners together (100%) might result in infertility. 10-15% of couples experiencing infertility exhibit no discernible etiology (9, 12). The primary reasons for infertility include

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decreased ovarian reserves due to decreasedavailability of primordial cells, Tuberculosis, ovulation disorders (20-32%), tubal abnormalities (14-26%), and endometriosis (4-6%). In 26–30% of couples, no female factor contributes to infertility, while 24–42% of male partners exhibit suboptimal semen quality. More than half of infertile women seeking solutions for their infertility (about 50%) ultimately achieve pregnancy, either through their treatment or as a consequence of it (14). Determining the most suitable infertility treatment for a couple may prove to be difficult. GnRH antagonist protocol is better than GnRH agonist protocol.

To minimize the overall costs of infertility treatment and mitigate any health risks associated with ovarian stimulation, it is essential to prevent overtreatment and unnecessary operations. An efficacious therapeutic approach for anovulatory disorders, including hypogonadotrophichypogonadism and normogonadotrophic anovulation, involves ovulation induction using gonadotrophins, clomiphene citrate (CC), or pulsatile gonadotrophin-releasing hormone (GnRH). The rates of cumulative conception and live births can be normal if anovulation is addressed with an appropriate ovulation induction protocol. The disadvantages of ovulation induction therapy encompass rigorous monitoring, the substantial cost associated with GnRH and gonadotropin utilisation, and the potential for multiple pregnancies.

Notwithstanding the limited and variable nature of the signs in relation to outcomes, particularly in comparison to anovulatory infertility (17, 18, 19), ovulation stimulation protocols have been employed as a standard treatment for unexplained infertility. The volume of surgical interventions necessary for infertility treatment has diminished, with assisted reproductive technology (ART) predominantly assuming its role. Endometriosis, ovarian neoplasms, adhesions, subserosal and submucosal fibroids, and intrauterine abnormalities are presently addressed with conservative laparoscopic surgery and operational hysteroscopy.

## Aim and Objectives:-

The purpose of the current study is to assess the efficacy of intrauterine insemination in treating infertility and to compare the outcomes of couples opting for timed intercourse under the same stimulation protocol with those of couples selecting IUI.

## Materials and Methods:-

The descriptive and observational study was conducted in the Department of Gynaecology, VarunArjun Medical College and Rohilkhand Hospital, Shahjahanpur, Uttar Pradesh, India, over a duration from March 2022 to December 2023. The research was performed on 50 patients. All patients meeting both inclusion and exclusion criteria were informed about the disease process, various treatment modalities, therapeutic outcomes, known side effects, complications, and the potential for replication in both procedure and informed written consent was obtained prior to the commencement of the study. They have been adequately informed of their right to withdraw from the study at any given moment.

**Data collection:**

All patients had an exhaustive clinical assessment, encompassing a meticulous medical history and an extensive physical examination. Participants who satisfied the inclusion criteria were enrolled in the study, and a case report form (CRF) was created for each individual to record essential information including age, height, weight, BMI, prior deliveries and surgeries, medical and surgical history, menstrual history, characteristics and severity of vaginal bleeding, and symptoms indicative of significant pathology. The clinical assessment comprised a comprehensive physical examination, examinations of the abdomen and pelvis, and the reporting of pelvic ultrasound results. The collected data included the commencement, progression, length, criteria, and pattern of bleeding, any history of bleeding predispositions or general aetiologies of bleeding, recent utilisation of hormonal contraceptives or drugs, prior surgeries or blood transfusions, and familial history of analogous diseases. The general examination included weight, height, BMI, vital signs, pallor, and anaemia indicators, whereas the local examination concentrated on the external genitalia. A bimanual examination evaluated uterine dimensions, mobility, orientation, tenderness, and adnexal masses. Furthermore, pelvic ultrasound findings and semen analysis results, encompassing sperm concentration, motility, morphology, and seminal plasma properties, were thoroughly recorded, guaranteeing a comprehensive dataset for the investigation.

**Sperm Collection:**
The sperm sample was obtained from the patient's spouse and liquifaction of around 20 to 30 minutes should be done and underwent capacitation before being inseminated into the uterine cavity. The material was subjected to centrifugation and washing, and subsequently incubated to ready it for the process. Sperm separation and isolation were conducted utilising the swim-up technique and two-layer discontinuous density gradient centrifugation, guaranteeing a high-quality sample for effective insemination.

**Two-layer discontinuous density gradient centrifugation:**
In this technique, 1 ml of liquefied semen was meticulously placed atop a 40% density gradient and subjected to centrifugation at 3000 rpm for 15 minutes. To maximise sperm recovery, the volume at each interface was maintained below 1 ml, facilitating the migration of motile sperm down the gradient layers. The centrifugation parameters, encompassing force and duration, were modified according to the sample's quality, with extended extraction times for more viscous specimens.

Following centrifugation, the supernatant was meticulously discarded, and the pellet was transferred to a new, sterile tube. The pellet was resuspended in 5 ml of medium to remove the gradient media, followed by an additional centrifugation at 2000 rpm for 10 minutes. The supernatant was thereafter discarded, and 5 ml of fresh medium was introduced. A concluding centrifugation was conducted, and the resultant pellet was resuspended in sterile medium, priming it for artificial insemination (AI). This approach guaranteed the extraction of highly motile and viable sperm for application in the process.

USG has to be done for endometrial thickness, which should be a minimum of 7mm. Progesterone support to the female partners micronized progesterone (Oral or Vaginal), (Vaginal is better than Oral). Injectible progesterone can also be given upto 12 weeks.

**Insemination:**
Patients received fertility drugs, including HCG, to induce ovulation during the insemination procedure. Routine blood tests and ultrasound assessments were performed to meticulously track ovulation. Patients were directed to attend the study site upon confirmation of ovulation. A speculum was employed to view the cervix, and a specialised tiny tube for intrauterine insemination (IUI) was utilised to introduce the prepared semen sample into the uterus.

The operation was expeditious, generally devoid of pain, and permitted patients to return to their routine activities, including sexual intercourse, shortly thereafter. Certain women encountered moderate discomfort during the session or suffered spotting for one to two days following the operation. Patients were instructed to conduct a urine pregnancy test (UPT) two weeks post-insemination to verify pregnancy results.

**Statistical examination:**
The gathered data was entered into Microsoft Excel Worksheet 2010 and subsequently analysed using IBM SPSS Statistics for Windows, version 24 (IBM Corp., Armonk, N.Y., USA) to compute frequency, percentage, mean, standard deviation, and probability value.

## Results and Discussion:-
This descriptive, observational study was undertaken in the Department of Obstetrics and Gynaecology at VarunArjun Medical College and Rohilkhand Hospital, Shahjahanpur, Uttar Pradesh, India, involving 50 patients with infertility. The subsequent outcomes of the study were as follows:

**Table1:-** Subjectdistributionaccordingtotheirage.

| Age group (years) | Number of subjects (N) | Percentage (%) |
|---|---|---|
| **21-25** | 8 | 16 |
| **26-30** | 12 | 24 |
| **31-35** | 26 | 52 |
| | | |

| | | |
|---|---|---|
| **36-40** | 4 | 8 |
| **Total** | 50 | 100 |
| **Mean age** | | 33.45 ±8.74 |

The subjects in this study were divided into four age groups, each with a 5-year interval. The table above presents data on the distribution of study subjects according to their age.

The predominant age group was 31-35 years, including 26 participants (52%); this was followed by 12 subjects (24%) in the 26-30 years age group, 8 subjects (16%) in the 21-25 years age group, and 4 subjects (8%) in the 36-40 years age group.

**Table2:-** Meanbiometricparametersofstudysubjects.

| **Biometricparameters** | **Mean±Sd** |
|---|---|
| **Weigh(kg)** | 62.27±6.42 |
| **Height(cm)** | 167.39±12.71 |
| **BodymassIndex(kg/m$^2$)** | 24.07±2.19 |

The above table gives data on mean anthropometric parameters of study subjects. The mean weight of study subjects was found to be 62.27± 6.42 kg. The mean height of patients was seen to be 167.39± 12.71 cm and mean BMI of study subjects was found to be 24.07±2.19 kg/m2.

**Table3:-** Subjectdistributionaccordtotheirfamilyhistoryofinfecundity, Gravidawiseand previous obstetric outcome wise distributionofstudypopulation. Consanguinitywise, periodofinfecundity and subject distributionofstudypopulation.

| **Familyhistoryofinfecundity** | **Numberofpatients(N)** | **Percentage (%)** |
|---|---|---|
| **Present** | 23 | 46 |
| **Absent** | 27 | 54 |
| **Total** | 50 | 100 |
| | | **Gravidawisedistributionofstudypopulation** |
| **Gravida** | Totalsubjects(N) | Totalsubjects(N) |
| **Primi** | 32 | 32 |
| **Multi** | 18 | 18 |
| **Total** | 50 | 50 |
| **Previousobstetricoutcomewisedistributionofstudypopulation** | | |
| **Previousobstetricoutcome** | Numberofsubjects(N) | Numberofsubjects(N) |
| **Normal** | 8 | 8 |
| **Poorobstetricoutcome** | 42 | 42 |
| **Total** | 50 | 50 |
| **Consanguinity** | Number of subjects (N) | Percentage (%) |
| **NCM** | 41 | 82 |
| **II CM** | 8 | 16 |
| **III CM** | 1 | 2 |
| **Total** | 50 | 100 |
| **Subjectdistributionaccordingtothetypeofinfecundity** | | |
| **Typeofinfecundity** | subjects(N) | contingency(%) |
| **Primary** | 32 | 4 |
| **Secondary** | 18 | 36 |
| **Sum** | 50 | 100 |
| | | **Subjectdistributionaccordingtoperiodofinfecundity** |
| **periodofinfecundity(years)** | subjects(N) | Percentage (%) |
| **1-2** | 17 | 34 |

| | | |
|---|---|---|
| **2-5** | 21 | 42 |
| **>5** | 12 | 24 |

The above table gives data on distribution of patients based on their history of family at infecundity.Maximum patients did not have family history of infertility, i.e., 27 subjects (54 %) and 23 subjects (46 %) subjects had a family history of infertility.

The overhead table provides data on distribution of patients rely on gravida.Maximum patients were in the primi, i.e., 32 patients (64 %), then eighteen subjects (36 %) in multiparity.The overhead table provides data on distribution of study patients based on the previous obstetric outcome.Maximum patients had poor obstetric outcome, i.e., 42 patients (84 %), then 8 subjects (16 %) comes under normal obstetric outcome.

The overhead table provides data on study patients rely on consanguinity.Maximum patients had non consanguinity marriage, i.e., 41 patients (82 %), then 8 patients (16 %) with first degree consanguinity marriage and finally 1 subject (2 %) with second degree consanguinity marriage.

The up head table provides data of study patients rely on type of infecundity.Maximum patients had primary infecundity, i.e., 32 patients (64 %), then 18 subjects (36 %) with secondary infertility.

The up head table provides data on patients rely on period of infecundity. Maximum patients had infertility for duration of 2-5 years, i.e., 21 patients (42 %), then 17 patients (34 %) for duration of 1-2 years and finally 12 subjects (24 %) for a duration of > 5 years.

**Table 4:-** Subjectdistributionaccordingtotheirhistoryofinfertilitytreatments and nutritional deficiency, bloodtestreports and ultrasound reports.

| **Historyofinfertilitytreatments** | **subjects(N)** | **Contingency (%)** |
|---|---|---|
| **By allmeans** | 38 | 76 |
| **Notatall** | 12 | 24 |
| **Sum** | 50 | 100 |
| **Subjectdistributionaccordingtotheirhistoryofnutritionaldeficiency** | | |
| **Historyofnutritionaldeficiency** | subjects(N) | Contingency (%) |
| **Yes** | 6 | 12 |
| **No** | 44 | 88 |
| **Sum** | 50 | 100 |
| **Blood test reports** | Number of subjects (N) | Percentage (%) |
| **Normal** | 45 | 90 |
| **Abnormal** | 5 | 10 |
| **Total** | 50 | 100 |
| **Subjectdistributionaccordingtotheultrasoundreports** | | |
| **Ultrasoundreports** | Numberofsubjects(N) | Percentage (%) |
| **Normal** | 12 | 24 |
| **Abnormal** | 38 | 76 |
| **Total** | 50 | 100 |

The up head table provides data on patients rely on their historical of infertility treatments.

Maximum patients underwent infertility treatments previously, i.e., 38 patients (76 %), then12 patients (24 %) of no historical infertility treatments.

The up head table provides data on patents rely on their historical deficiencies in nutrition

Maximum patients did not have nutritional deficiency, i.e., 44 patients (88 %), then 6 patients (12 %) nutritional deficiency.

The uphead table provides data on patients rely on blood test reports. Maximum patients had normal blood test reports, i.e., 45 patients (90 %), then 5 patients (10 %) have abnormal blood test reports.

The uphead table provides data on patients rely on ultrasound reports. Maximum patients had abnormal ultrasound reports, i.e., 38 patients (76 %), then 12 patients (24 %) have normal ultrasound reports.

**Table5:-** Outlines the distribution of subjects based on IUI cycles, pregnancy outcomes, delivery modes, ovulation induction methods, and the severity of male infertility. It reveals that 48% of subjects achieved pregnancy following IUI, with a significant number (68%) undergoing caesarean delivery. Clomiphene citrate (62%) was the most commonly used method for ovulation induction, and mild oligospermia was the most prevalent male infertility severity (46%).

| **Parameter** | **Category** | **Number of Subjects (N)** | **Percentage (%)** |
|---|---|---|---|
| **Cycles of IUI** | Single | 39 | 78 |
| | Multiple | 11 | 22 |
| | **Total** | 50 | **100** |
| **Pregnancy Outcome Following IUI** | Pregnant | 24 | **48** |
| | Not Pregnant | 26 | 52 |
| | **Total** | 50 | **100** |
| **Mode of Delivery** | Normal Vaginal Delivery | 16 | 32 |
| | Caesarean Sections | 34 | 68 |
| | **Total** | 50 | **100** |
| **Method of Ovulation Induction** | Letrozole | 19 | 38 |
| | Clomiphene Citrate | 31 | 62 |
| | **Total** | 50 | **100** |
| **Severity of Male Infertility** | Mild Oligospermia | 23 | 46 |
| | Moderate Oligospermia | 19 | 38 |
| | Severe Oligospermia | 8 | 16 |
| | **Total** | 50 | **100** |

The above table gives data on distribution of study subjects based on number of cycles of IUI.
Maximum patients had single IUI cycle, i.e., 39 patients (78 %), then 11 patients (22 %) with multiple IUI cycles.

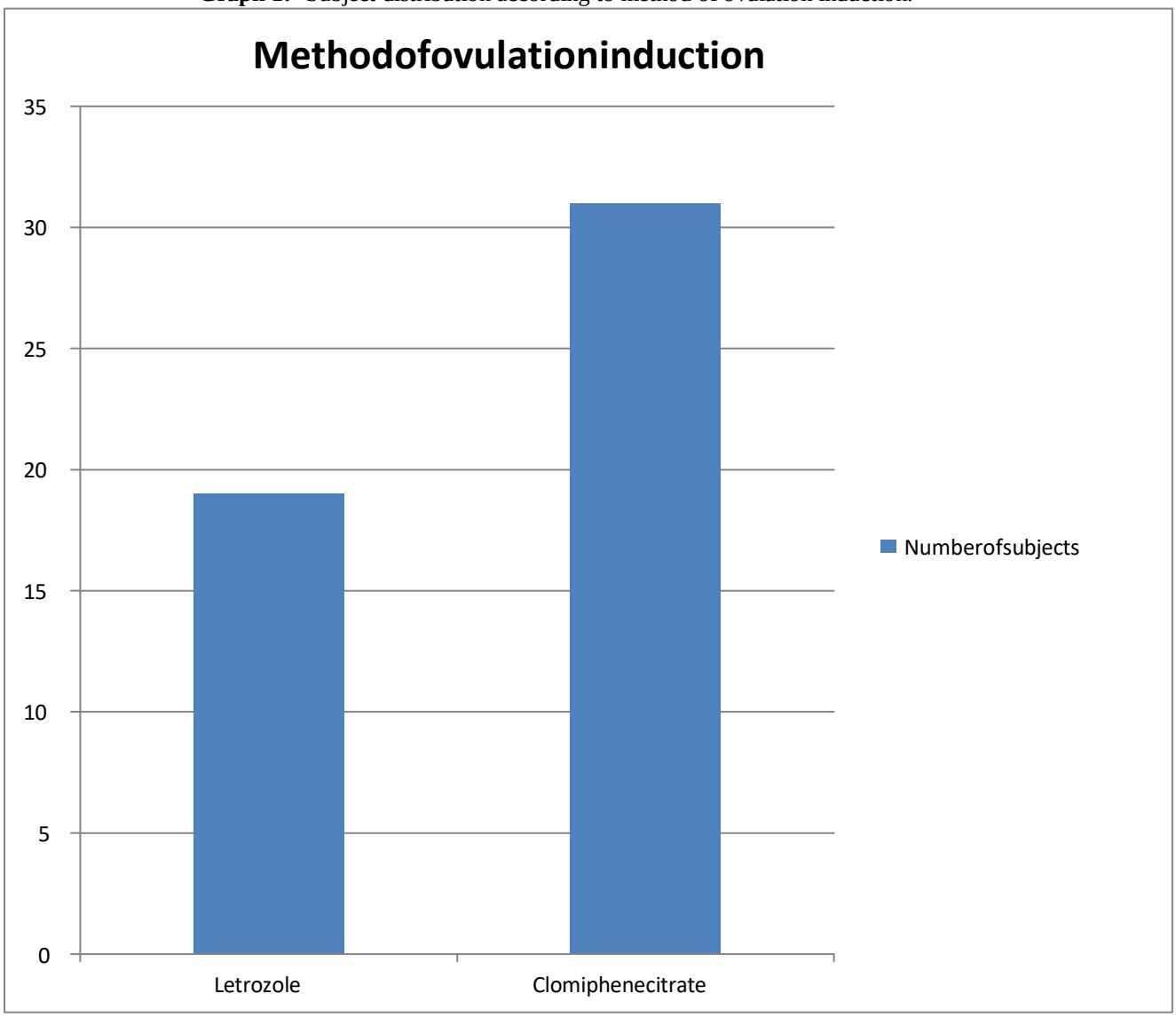
The up head table provides data patients rely on pregnancy outcome. Maximum patients were pregnant following IUI cycle, i.e., 24 patients (48 %), and then26 patients (52 %) not get pregnant.

The up head table provides data on patients rely on mode of delivery.

Maximum patients had caesarean sections, i.e., 34 patients (68 %), 16 patients (32 %) with normal vaginal delivery.

The up head table provides data on patients rely on method of ovulation induction.Maximum patients had letrozole based induction, i.e., 31 patients (62 %), then 19 patients (38 %) with clomiphene citrate based induction.

**Graph 1:-** Subject distribution according to method of ovulation induction.

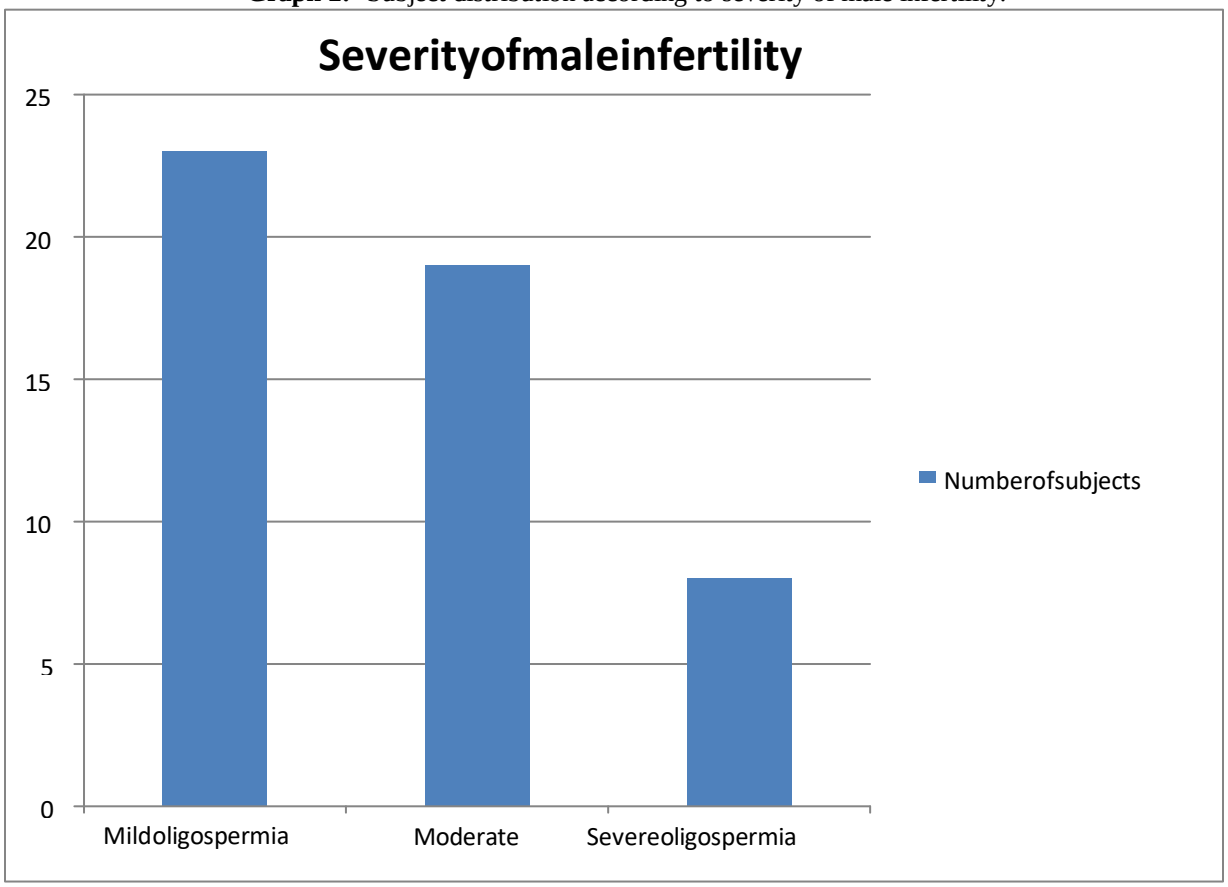



The up head table provides data on patients rely on severity of male infertility.Maximum patients had mild oligospermia, i.e., 23 subjects (46 %), followed by 19 subjects (38 %) with moderate oligospermia and finally 8 subjects (16 %) with severe oligospermia.

## Conclusion:-

This study sheds light on the multifaceted challenges of infertility, revealing its complex interplay of factors affecting both men and women. It emphasizes the need for personalized care, as many participants had poor obstetric outcomes and prolonged struggles with conception. Male infertility, particularly mild oligospermia, emerged as a significant factor, underscoring the importance of including male evaluations in infertility management. While many individuals had undergone prior treatments, successful outcomes highlight the necessity of precise diagnostic tools like ultrasound and blood tests. Overall, the findings stress the importance of a comprehensive and individualized approach, integrating medical expertise and multidisciplinary care, to address the diverse needs of couples facing infertility.

**Graph 2:-** Subject distribution according to severity of male infertility.




**Conflict of Interest:**
The authors declare no conflicts of interest.

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**Consent:**
Written consent from participants has been obtained and preserved.

**Ethical Approval:**
Ethical approval was obtained and documented as per institutional guidelines.

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