

## A Detail Study on Contraceptives and Its Status in India

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### Abstract

Prevention of pregnancy remains a significant act of practice in medicine. Contraception is the use of various methods or techniques to prevent pregnancy, which is an outcome of sexual intercourse. Contraception helps individuals to decide whether to postpone or avoid having kids according to their convenience. Contraceptives help in slow population growth. This is significant because over population puts pressure on the environment, the economy, and other services like education and health. Summarizing the previous article, it accounts to the fact that contraceptive usage is gender-biased and often females are forced to rush to bear a child and once the desire is fulfilled the terminal methods are approached.

This article gives an outline of accessible methods for prevention of pregnancy, its related information on usage, side effects, advantages, and status of contraception methods followed in India. This article focuses on additional and advanced methods of contraception and illuminates the current state of the use of contraceptives.

### Method

This article is a review based on the work of Ms Rakhi Jain and Ms Sumathi Muralidhar on Contraceptive methods: Needs, Options and Utilization which was published in Journal of Obstetrics and Gynaecology of India.

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Date of Submission: 17-08-2020

Date of Acceptance: 03-09-2020

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### I. Introduction

Contraception prevents pregnancy by interfering with the regular process of ovulation and fertilization. Intimacy and increased communication are positively connected with contraceptive use. Unintended and unplanned pregnancy is associated with unsafe abortions or poor development, education, and economic outcomes. Contraceptive use helps individuals to full fill sexual desire with no dread. Different birth control methods act in a different way on different processes such as hormonal methods, non-hormonal methods, barrier, non-barrier methods, and sterilization, which is most commonly performed.

“India was the first country in the world to adopt an official population policy and launch official family planning program way back in 1952 which remains the mainstay of family planning efforts. During its early years, the program focused on the health rationale of family planning”.

### BACKGROUND

According to WHO contraception is defined as the intentional prevention of conception through the use of various devices, sexual practice, chemicals, drugs and surgical procedures. Thus, any device that serves the purpose of contraception is considered as contraceptive.

### NEED FOR CONTRACEPTION

To begin with unwanted pregnancies and spread of sexually transmitted disease, the need of contraception in our day to day life is increased. The rate of men and women now choose to regulate their fertility and limit their family with the use of contraception. Also, contraception is used to exclude the process of abortion as it might be painful and risky to one's life. In India a survey suggests that abortion is responsible for 10 – 20 % of all maternal deaths. Men are more effective transmitters of STI than women thus to avoid the risk of infection condoms are popularly used in a lot of countries. Usually teenagers and younger married woman are less likely to use birth control in many countries as they are unaware about the knowledge of contraception. there is a need for the awareness regarding the concept and its correct use to prevent the pregnancy, STD's and female vulnerability.

**ABBREVIATIONS**

LNG- Levonorgestrel  
 STI- Sexually Transmitted Infection  
 STD- Sexually Transmitted Disease  
 HIV- Human Immunodeficiency Virus  
 AIDS- Acquired Immuno Deficiency Syndrome  
 LARC- Long Acting Reversible Contraceptive  
 IUD- Intra Uterine Device  
 IUS- Intra Uterine System  
 LH- Luteinizing Hormone  
 FSH- Follicle Stimulating Hormone  
 PCOS- Poly Cystic Ovary Syndrome  
 BMI- Body Mass Index  
 OC- Oral contraceptive  
 GIT- Gastro Intestinal Tract  
 BBT- Basal Body Temperature

**KEYWORDS**

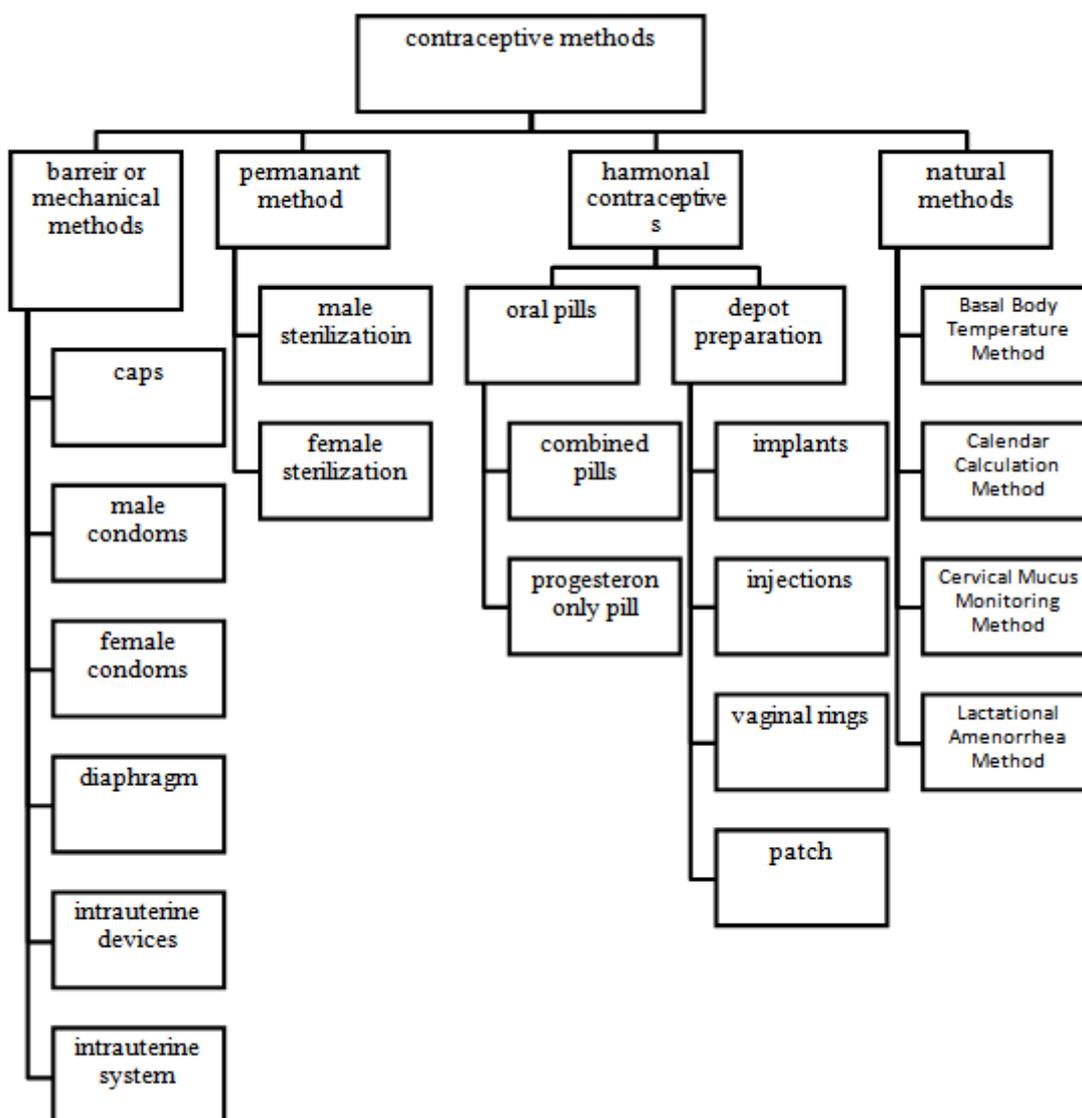
Contraception, Methods, STD's, Sterilization, Devices, Hormones

**HISTORY OF CONTRACEPTIVES**

Before we study about the methods of contraception let us brush up our history on the various birth control methods used till date. The practice of effective birth control has been used for many centuries. these methods have been in use for much longer time but not regularly. A concern to avoid unwanted pregnancies have been in history for various reasons such as extra marital relations, prostitution, birth control and to preserve feminine health.

PLACE	YEAR	TYPE OR METHOD OF BIRTH CONTROL
<b>ANCIENT WORLD</b> ANCIENT EGYPT & MESOPOTOMIA	1850 BC	A mixture of honey, acacia and lint was used to make cervical caps
GREECE & ROME	FIRST CENTURY AD	<ul style="list-style-type: none"> <li>• Silphium plant</li> <li>• Asafoetida</li> <li>• Dacus carota</li> <li>• Willow date</li> <li>• Pomegranate</li> <li>• Penny royal</li> <li>• Cedar oil</li> </ul>
<b>SEVENTH CENTURY BC</b> CHINA	7 <sup>th</sup> century BC	<ul style="list-style-type: none"> <li>• Coitus reservatus</li> <li>• Coitus obstructus</li> <li>• A mixture of oil and quick silver</li> </ul>
INDIA	7 <sup>th</sup> century BC	Coitus obstructus
<b>MEDIEVAL &amp; EARLY MODEREN PERIOD</b> PERSIA	LATE 9 <sup>th</sup> AND EARLY 10 <sup>th</sup> CENTURY	<ul style="list-style-type: none"> <li>• Coitus interruptus</li> <li>• Cabbage</li> <li>• Pessaries of rock salt</li> </ul>
SOUTH ASIA	10 <sup>th</sup> CENTURY	<ul style="list-style-type: none"> <li>• Potion of palm leaf and red chalk</li> <li>• Pessaries of honey, ghee, rock salt and seeds of palasa tree</li> </ul>
EUROPE	18 <sup>th</sup> CENTURY	<ul style="list-style-type: none"> <li>• Pessaries of lily root and rue caps</li> </ul>
<b>MODERN BIRTH CONTROL MOVEMENT</b> BRITAIN	19 <sup>th</sup> CENTURY	Abortion and contraception
BRITAIN	1877	Family planning
BRITAIN	1870-1900	Diaphragms made of vulcanized rubber
BRITAIN	1921	Establishment of 1 <sup>st</sup> birth control clinic

BRITAIN	LATE 1930'S	Formation of national birth control council
LATE 20 <sup>th</sup> CENTURY	1950-1960	Introduction of birth control pills
	1970	Medical abortion
	1972	Right to possess and use contraceptives to unmarried couples
	1980	Availability of mifepristone



❖ **BARRIER METHODS**

## 1. CERVICAL CAPS

<b>Definition</b>	<p>The cervical cap comes under the barrier method of contraception. A cervical cap is made of rubber that fits tightly over the opening to the uterus (the cervix). A spermicide is applied before it is used. A cap can be inserted in advance or just before sex.</p> <p>The cervical cap is an archaic method of contraception rejuvenated during the 1970s by feminist health care practitioners. It acts as a contraceptive both mechanically and chemically.</p> <p>Using a cervical cap needs a prescription from the doctor. To learn the way of using the cap may require 2 visits to the doctor. One for fitting the cap and another visit is done while still, the cap inserted this is done to check the position of the cap.</p>
<b>Method of using a cervical cap</b>	<ul style="list-style-type: none"> <li>• <b>Check your cervix position before the cervical cap is inserted:</b> Insert your finger deep into your vagina, to find your cervix. The cervix feels like a nose tip. Its position will vary depending on the time of the month and position of your body.</li> <li>• <b>Application of spermicide:</b> Fill the bowl of the cervical cap with about 1/4 teaspoon of spermicide (1.25 milliliters). Spread a thin spermicidal layer on the cervical cap. In the groove between the rim and the cervical cap dome, place 1/2 teaspoon (2.5 milliliters) of spermicide. If the user has sex for the second time with the cap still in, some experts suggest using an additional dose of spermicide.</li> <li>• <b>Insertion of the cap into the cervix:</b> Before sexual arousal, insert the cervical cap into your vagina to ensure proper positioning. Find a comfortable position for example squatting. Separate your labia by one hand. Hold the cervical cap with the bowl facing upwards, while squeezing the rim of the cervical cap between your thumb and index finger.</li> <li>• <b>Removal of the cap:</b> The cap should not be removed until 6 hours after sex, but removed before 48 hours. For removing the cap Squat, bear down and rotate the cap. Relax the muscles and push the cervical cap dome up to break the seal. Grasp the strap for removal and pull gently. Be wary of scratching your vagina. Wash the cervical cap with mild soap and warm water after removal and let air-dry it. Store the cervical cap in the container provided for it. Only if they are reusable caps they can be sanitized and used again</li> </ul>
<b>Risk</b>	<ul style="list-style-type: none"> <li>• The cervical cap does not protect against sexually transmitted infections.</li> <li>• Approximately 16 out of 100 women who have never been pregnant or given birth vaginally within the first year of the normal use of the cervical cap will become pregnant. Approximately 32 out of 100 women who have given birth vaginally within the first year of normal use would become pregnant.</li> <li>• The disparity is because by giving birth vaginally the vagina and the cervix are extended, which means the cervical cap does not fit as well.</li> <li>• Inconsistent or misuse of the cervical cap raises the pregnancy risk.</li> <li>• The cervical cap is removed within six hours of intercourse if not removed spermicide applied to the cervical cap may cause damage to vaginal lining cells, causing:             <ul style="list-style-type: none"> <li>• Increased risk for STI contracts</li> <li>• Vaginal or urinary tract infection</li> <li>• Irritation in the vagina</li> </ul> </li> </ul>
<b>Advantages</b>	<ul style="list-style-type: none"> <li>• Future fertility does not affect either the woman or the man.</li> <li>• Only used when sexual intercourse occurs.</li> <li>• Use whilst breastfeeding is safe.</li> <li>• It is cheaper than hormonal birth control methods.</li> </ul>
<b>Disadvantages</b>	<ul style="list-style-type: none"> <li>• A woman who has ever had toxic shock syndrome should not use the cervical cap.</li> <li>• During menstrual period, the cervical cap is never used.</li> <li>• Some women experience odor problems if they leave the cervical cap in place for longer than 24 hours.</li> <li>• The cervical cap can be hard to properly place or remove.</li> <li>• The cervical cap can be irritating to the cervix...</li> <li>• The cervical cap is less effective at preventing pregnancy after vaginal delivery by a woman.</li> <li>• Some people find it embarrassing to use this method or feel that the method may interrupt foreplay or intercourse.</li> <li>• A couple should be comfortable using the cap and ready to use it whenever they have sex.</li> <li>• Check the cap for any cracks, holes, or other damage that would reduce its efficacy. Avoid using any vaginal creams, oils, or ointments made from petroleum. These can cause rubber damage. However, water-based personal lubricants are safe to use, such as Astroglide and K-Y Jelly.</li> </ul>

## II. Male And Female Condoms

Condoms have been used for at least 400 years. Since the 19th century, they have been one of the most popular methods of contraception in the world. While widely accepted in modern times(3).Decreased use of condoms in India is due to people's priority of birth control pills, as a safer method of birth control. In India, condoms distribution by the government is reduced by 38%. It is reported that 21 of India's 28 states, including the capital city of New Delhi and the northern states of Haryana and Uttar Pradesh, have registered a decline in the use of a condom. Investments in media campaigns to use condoms were very high in 2006-07 because they were linked to the fight against HIV-AIDs.

A condom is a thin tube that man inserts into the penis during sex or women into the vagina. Condoms prevent pregnancy and STD. They create a barrier to keep semen and other body fluids out of the vagina, rectum, or mouth and it is called the barrier method. Do not use male and female condoms at the same time. One can stick to the other and pull it out of place or tear it.

• **TYPES:**

- a) Synthetic – AT-10 resin and polyisoprene.
- b) Natural Latex –They can be stretched more than 800% before it is broken.
- c) Spermicidal –Manufactured by lubricating condoms with small amount of nonoxynol -9(spermicidal chemical)
- d) Lambskin –Produce more warmth and tactile sensation than any other

	Male condoms	Female condoms
<b>Definition</b>	Male condoms are made of very thin latex (rubber), polyisoprene or polyurethane and are constructed to avoid a man's semen from coming into contact with his sexual partner.	A female condom is a long plastic tube usually made of polyurethane, often from nitrile rubber, which goes inside the body during intercourse. Flexible rings keep it in place at both ends. Condoms form the walls of the vagina and collect semen and other fluids.
<b>Mechanism of action</b>	Condoms are a barrier form of contraception. These prevent abortion by preventing sperm from entering eggs. These are often used during vaginal and oral intercourse To protect against STI. When the condom is not correctly used, it may spill out of the penis and penetrate the vagina leading to emergency contraception.	Female condoms are a barrier method of contraception worn inside the vagina. These prevent conception by preventing an egg from communicating with sperm. Female condoms are inserted in the vagina before intercourse, but make sure that the penis is not exposed to the vagina until the condom is put in. Semen may also come out of the penis even before man had an orgasm (full ejaculation). When used properly condoms are the only form of contraception that protects against pregnancy and STI.
<b>Efficacy</b>	Male condoms are 98% effective. Ineffective in the event of a condom breaking and usage of oil-based lubricants in case of latex condoms.	Female condoms are 95% effective. Ineffective in case of penis touches the area around the vagina before a female condom is put in.
<b>Side effects</b>	There are no many side effects except in case of latex allergy. Spermicides may cause itching and burning.	Spermicides could trigger yeast infection in the female.
<b>Risk</b>	Improper use of condoms increases risk. Oral sex may be less risky but infections can be transmitted without a latex condom or dental dam –a thin square piece of rubber made with latex	Inconsistent use of condoms increases risk.
<b>Contraindication</b>	Condoms have no contradictions except in persons with preexisting allergies to latex rubber or lubricant	Female Condoms have no contradictions as these are made from a soft plastic material called nitrile.
<b>Advantages</b>	a) They help to protect from STI including HIV and gonorrhea. b) They are inexpensive. With proper use—and use at every act of intercourse-women whose partners use male condoms experience a 2% per-year pregnancy rate.	a) They help to protect from STI including HIV and gonorrhea. b) Female condoms are completely hypoallergenic and will not irritate sensitive genital skin as these are made from a soft plastic material called nitrile.
<b>Disadvantages</b>	a) Oil-based lubricants can damage the condom. b) Breakage can decrease effectiveness. c) Some people show allergy to latex	a) Less than one percent of women use this barrier method because it is complicated to use. b) It is expensive compared to male condoms. It is of low demand

e)

**DIAPHRAGM**

Contraceptive Diaphragms	
<b>Definition</b>	<p>A diaphragm is a barrier type of contraceptive method. It is usually Dome-shaped and has a soft thin Silicone or Latex material and should be fitted or trained by a professional doctor or nurse. They come in different sizes and types there are commonly four types:</p> <ul style="list-style-type: none"> <li>• Arching spring tie from: should be used by women with a weak vaginal muscle tone, has a firm rim, and is very easy for insertion.</li> <li>• Coil spring diagram: suitable for women with average vaginal muscle tone. It has a soft rim and is very flexible.</li> <li>• The flat spring diaphragm: it is suitable for women with very strong vaginal muscle tone. It is similar to coil spring diaphragm but has a thin rim.</li> <li>• The wide seal rim: women who are sensitive and have allergies to latex can opt for silicone one.</li> </ul>
<b>Mechanism of action</b>	<p>It is inserted into the vagina to block the entry of sperms. It is usually used along with spermicides. Spermicides are usually foam or jelly which contains chemicals that kill the sperms. The diaphragm should remain inside the vagina for 6-8 hours after intercourse and should be removed after 24 hours. It is necessary to replace the diaphragm in one to two years (if re-usable)</p>
<b>Side effects</b>	<ul style="list-style-type: none"> <li>• Irritation of the skin of the vagina.</li> <li>• Allergic reactions due to the material of the diaphragm.</li> <li>• May cause urinary tract infections.</li> <li>• May cause allergies to the male partner as well.</li> </ul>
<b>Advantages</b>	<ul style="list-style-type: none"> <li>• Diaphragms are easily available and they can be used up to 2 years.</li> <li>• It has to be used only before sexual intercourse instead of having it in the body for years.</li> <li>• So far no serious health risks have been reported</li> </ul>
<b>Disadvantages</b>	<ul style="list-style-type: none"> <li>• It is not as effective as other contraceptives.</li> <li>• The user must learn how to use it.</li> <li>• It does not provide a guarantee against sexually transmitted diseases.</li> <li>• It can lead to cystitis in some women.</li> <li>• Some people are allergic to latex and spermicides.</li> </ul>
<b>Some facts about diaphragms</b>	<ul style="list-style-type: none"> <li>• It is less common and effective than a male condom.</li> <li>• In a study in 2012, Tubal ligation, followed by injections and implants were perceived to be the most effective methods with 68%, 40%, and 36% of women of Bihar and Jharkhand.</li> <li>• They were least certain about diaphragms, spermicides, the ring, and the patch. (4)</li> <li>• Less than one-third of the women interviewed mentioned male and female sterilization, and diaphragm in Ghana's Demographic and Health Surveys (2008, 2014) which report universal contraceptive knowledge among all women. (5)</li> </ul>

**INTRAUTERINE DEVICES AND INTRAUTERINE SYSTEM**

	Intrauterine devices	Intrauterine system
<b>Definition</b>	<p>The IUD also referred to as 'the coil' and tends to be the more popular out of the two devices. It is a long-acting reversible contraceptive (LARC) that is inserted into the vagina where it stays until it needs to be replaced.</p> <ul style="list-style-type: none"> <li>• Some IUDs contain copper while others are made from plastic.</li> <li>• It is a T-shaped device.</li> <li>• It lasts for 5-10 years but can be taken out sooner.</li> <li>• It works immediately and can be inserted at any point in the month.</li> <li>• No protection against sexually transmitted infections (STIs).</li> </ul>	<p>The IUS is occasionally referred to as 'the coil'. It is a long-acting reversible contraceptive (LARC) that is inserted into the vagina where it stays until it needs to be replaced.</p> <ul style="list-style-type: none"> <li>• IUS is a T-shaped device.</li> <li>• It is made from plastic and releases progesterone.</li> <li>• It lasts for 3-5 years.</li> <li>• Can be inserted at any point in the month.</li> <li>• No protection against sexually transmitted infections (STIs).</li> </ul>
<b>Mechanism of action</b>	<p>The IUD acts by releasing copper ions into the uterine endometrium, which reduces its hostility to sperms, causing fragmentation and obstructing their passage into the fallopian tubes to achieve fertilization. It also stimulates an inflammatory endometrial response, which can destroy the embryo even if fertilization does occur.</p>	<p>The IUS acts by releasing progesterone into the uterine cavity, which has the following actions:</p> <ol style="list-style-type: none"> <li>Primary endometrial action - thinning and secretory atrophy of the uterine lining, making it unfavorable to an implant of the embryo even if fertilization occurs</li> <li>Changing the characteristics of the cervical mucus so that it becomes thick, hostile to sperm</li> </ol>

		penetration. c) Inhibition of ovulation occurs in some women, by the suppression of the natural gonadotropin-releasing hormone secretion, which is responsible for the increase in LH and FSH gonadotropins, which trigger follicular development and ovulation.
<b>Menstrual abnormalities</b>	Irregular intermenstrual bleeding, especially within the first few weeks.	Irregular menstruation, which may be light or heavy. This type of bleeding occurs in the first few months.
<b>Side effects</b>	No hormonal symptom and metabolic effects but may have iron deficiency anemia	Headaches, acne flares, breast tenderness, weight gain, fluid retention, ovarian follicular cysts
<b>Risk</b>	Pelvic infections, ectopic pregnancy, damage to the womb	Pelvic infections, ectopic pregnancy, damage to the womb
<b>Contraindications</b>	Pregnant women, untreated STI or pelvic infection, unexplained bleeding between periods or after sex	Breast cancer in the past 5 years, cervical cancer or womb (uterus) cancer, liver disease, unexplained bleeding between periods or after sex, arterial disease or a history of serious heart disease or stroke, an untreated sexually transmitted infection (STI) or pelvic infection, problems with womb or cervix
<b>Advantages</b>	<ul style="list-style-type: none"> <li>It prevents pregnancy for 5 or 10 years.</li> <li>The majority of women can use it.</li> <li>No hormonal side effects, such as acne, headaches, or breast tenderness.</li> <li>It does not interrupt sex.</li> <li>Safe to use an IUD when breast-feeding.</li> <li>Pregnancy may occur as soon as the IUD is removed.</li> <li>It is not affected by other medicines</li> </ul>	<ul style="list-style-type: none"> <li>It prevents pregnancy for 5 or 10 years.</li> <li>It doesn't interrupt sex</li> <li>Safe to use an IUD when breast-feeding.</li> <li>It is not affected by other medicines</li> </ul>
<b>Disadvantages</b>	<ul style="list-style-type: none"> <li>The periods may be heavier, longer, or more painful, but after a few months, this resolves.</li> <li>No protection against STI's</li> <li>While side effects are uncommon, most women avoid IUD due to vaginal bleeding and pain. (6)</li> <li>Infection while IUD fitting can lead to pelvic infection.</li> </ul>	<ul style="list-style-type: none"> <li>Some women experience headaches, acne, breast tenderness, and changes in mood and libido after IUS has been fitted.</li> <li>An unusual side effect of the IUS is that some women can develop small, fluid-filled cysts on the ovaries, which normally disappear without treatment</li> <li>While side effects are uncommon, most women avoid IUD due to vaginal bleeding and pain</li> <li>No protection against STI's</li> </ul>

❖ **PERMANENT METHOD  
MALE AND FEMALE STERILIZATION**

	FEMALE STERILIZATION	MALE STERILIZATION
<b>Definition</b>	Female sterilization is a technique for permanently avoiding conception by blocking the fallopian tubes, which prevents the sperm from reaching the egg. If women chose not to have children, it is a positive choice. It is safe for nearly all women and has an extremely low failure rate.	Vasectomy also is known as male sterilization is permanent contraception. The male vasa deferentia is cut and tied or sealed during the procedure to prevent sperm from entering the urethra and thus prevent female fertilization through sexual intercourse.
<b>Procedure</b>	Female sterilization can be done by both surgical and non-surgical procedures. The surgical procedure is performed using laparoscopy to do tubal ligation. In this procedure anesthesia is given then abdomen is inflated with gas and a small incision is made to access reproductive organs with the laparoscope. Then fallopian tubes are sealed by cutting and folding the tubes or removing sections of the tubes or blocking the tubes with bands /clips. Whereas in non-surgical procedures there is no incision. There is a device name Essure, which contains two metal coils, which are inserted into each fallopian tube through the vagina and cervix. Scar formation takes place around the metal coils, which blocks the fallopian tubes. This process is called as	Male sterilization can be done by two methods i.e. conventional vasectomy and no-scalpel vasectomy. In a conventional vasectomy, cuts are made to reach two tubes called vas deferens present one for each testicle. Now a small piece of each tube is removed and a short gap is left between two ends of each vas deferens. The open ends are tied each one off with the stitch. Cuts that are made on the scrotum are stitched. Whereas in no-scalpel vasectomy, the doctor feels for each vas deferens under the scrotum and a clamp is used to hold them in place. A tiny hole is made in the scrotum, stretch it open and both vas deferens are lifted out. Then cut is made on vas deferens and seal it with searing, stitches, or both. There is no need for stitches in the scrotum like that of conventional vasectomy.

	fallopian tube occlusion.	
<b>Side effects</b>	Bleeding and infection are common side effects of tubal ligation.	Swelling, bruising, inflammation, pain, and infection are seen after the procedures that are not serious.
<b>Risk</b>	Ectopic pregnancy	Prostate cancer
<b>Effectiveness, Recovery and cost</b>	Tubal ligation is immediately effective while tubal occlusion can take more than three months. Compared with male sterilization the cost of female sterilization is greater.	Male sterilization is 100 % effective but 10-20 ejaculation is required to clear sperm from the semen completely. Recovery can be seen within one day but it is best to take a week's rest. The male sterilization is cost-effective and safer than female sterilization.
<b>Advantages</b>	<p>a) Pregnancy is effectively stopped.</p> <p>b) No need to think about the pregnancy leading to sexual gratification.</p> <p>c) There is no influence of sterilization on hormones, menstruation, or sexual desire. This may also lower the risk of ovarian cancer.</p> <p>d) It is healthy for virtually all women and has an exceptionally low rate of failure.</p>	<p>a) It will not affect testosterone level, erections, climaxes, sex drive, or any other aspect of sex life.</p> <p>b) Simple method.</p> <p>c) Compared with tubal ligation it is cost-effective.</p>
<b>Disadvantages</b>	<p>a) For women who want to get pregnant in the future, female sterilization is not a viable choice, because it is a permanent method reversal is not possible.</p> <p>b) Minor surgery is required by a specially trained physician.</p> <p>c) Superficial bleeding can be seen.</p>	<p>a) It is not easy to reverse male sterilization and sometimes it probably will not work.</p> <p>b) Condoms should be used to avoid STIs.</p> <p>c) Contraceptives should be used for 2-3 months before the semen is sperm-free.</p>

❖ **HORMONAL CONTRACEPTIVES**

**1. COMBINED PILLS**

<b>Definition</b>	<p>Combined pills for contraception are oral contraceptives that contain a combination of estrogen and progesterone. They come under hormonal contraceptives. They are also known as a combination of birth control pills. There are different types of birth control pills depending upon the dose of estrogen and progesterone. There are 2 types of combined oral contraceptives</p> <p>a) Monophasic pills: this is the most common type of combined birth control pill. They contain the same amount of estrogen and progesterone throughout the cycle.</p> <p>b) Phasic pills: they contain different amounts of estrogen and progesterone at different levels of cycle.</p>
<b>Mechanism of action</b>	<p>These pills act mainly by inhibiting ovulation. This occurs primarily by inhibiting the gonadotropin secretion hormone from both the pituitary and hypothalamus (7). The follicle-stimulating hormone, luteinizing hormone, mid-cycle LH surge is also inhibited. Both progesterone and estrogen work synergistically. The estrogen suppresses the follicle-stimulating hormone and inhibits the folliculogenesis. Progesterone prevents the sperms from reaching the uterine cavity by making the cervical mucus thick and impermeable. It also reduces the tubal mobility restricting the movement of sperm and oocytes through the fallopian tube. In a normally menstruating woman, progesterone is present in an appreciable amount in the luteal phase of the menstrual cycle. Administration of combination oral contraceptive pill, the progesterone affects antecedents the estrogen effects. The outcome of this is thin, decidualised endometrium with atrophied glands that is not suitable for embryo implantation. While progestin alone is an effective contraceptive, there are advantages when combining estrogen and progesterone in a combined OCP. By directly inhibiting FSH, by limiting follicular production, estrogen contributes to the combined oral contraceptive efficacy. Stimulation of estrogen in the endometrium offers control and can reduce abnormal bleeding seen with progestin-only contraceptives(7).</p>
<b>Contraindications</b>	<ul style="list-style-type: none"> <li>• Body mass index more than 35</li> <li>• Lactating females</li> <li>• Smoking for more than 35 years of age</li> <li>• Blood pressure</li> <li>• History of venous thromboembolism, or family history</li> <li>• Prolonged surgical immobility or disability</li> <li>• Diabetes mellitus with complications like retinopathy</li> <li>• A history of Aura migraines</li> <li>• Primary liver tumors or breast cancer</li> </ul>
<b>Advantages</b>	<ul style="list-style-type: none"> <li>• Non-intrusive</li> </ul>

	<ul style="list-style-type: none"> <li>• if taken correctly it is more effective than other barrier methods</li> <li>• The use of contraceptives does not disturb sex</li> <li>• Menses tend to become normal, lighter, and less painful, enabling control of menses timing.</li> <li>• Reduced risk of ovarian, uterine and colon cancers</li> <li>• Decreased chance of operative ovarian cysts</li> <li>• Normal fertility returns immediately after the stoppage of use.</li> </ul>
<b>Disadvantages</b>	<ul style="list-style-type: none"> <li>• It is user-dependent</li> <li>• Some females may experience temporary adverse effects such as headaches, breast tenderness, and mood changes</li> <li>• Blood pressure could rise</li> <li>• Women may experience the first few months of bleeding and spotting</li> <li>• Greater risk of venous thrombo embolization</li> <li>• Small risk increase for myocardial infarctions and strokes</li> <li>• Small increase breast and cervical risk • Dependent User</li> <li>• Some females may experience temporary adverse effects such as headaches, breast tenderness, and mood changes</li> <li>• Blood pressure could rise</li> <li>• Women may experience the first few months of bleeding and spotting</li> <li>• Greater risk of venous thromboembolisation</li> <li>• Small risk increase for myocardial infarctions and strokes</li> <li>• A small increase in breast and cervical risk.</li> </ul>

## 2. PROGESTERONE ONLY PILL

Progesterone only pills are a suitable alternative to the combination pills or in whom estrogen is contraindicated. These drugs not only prevent pregnancy but also help in regulating the menstrual cycle and treating PCOS. Besides, it is also used to treat dysfunctional uterine bleeding and endometriosis.

<b>Definition</b>	It is an oral dosage form, which consists of only 1 hormone.
<b>Mechanism of action</b>	Increases insulin levels and decreases sodium reabsorption Secretion of LH prevents ovulation it also makes cervical mucus less suitable for the passage of sperm
<b>Fact</b>	It has to be taken daily.
<b>Side effects</b>	<ul style="list-style-type: none"> <li>• Breast engorgement</li> <li>• Irregular menstrual cycle</li> <li>• Decreased libid</li> <li>• Anxiety</li> <li>• Depression</li> <li>• Headache</li> <li>• Nausea</li> <li>• Weight gain</li> <li>• Breakthrough bleeding</li> </ul>
<b>Contraindications</b>	<ul style="list-style-type: none"> <li>• Pregnancy</li> <li>• Thromboembolic disease</li> <li>• Cardiovascular disorder</li> <li>• Migraine</li> <li>• Active hepatobiliary disease</li> <li>• Unexpected abnormal bleeding</li> </ul>
<b>Advantages</b>	<ul style="list-style-type: none"> <li>• Can be used while breastfeeding</li> <li>• Safe for patients with hypertension</li> <li>• Can be used by the patients who are sensitive to estrogen.</li> </ul>
<b>Disadvantages</b>	<ul style="list-style-type: none"> <li>• May cause irregular periods and spotting</li> <li>• No protection against STD'S</li> <li>• Must be taken at the same time daily.</li> </ul>

### 3. IMPLANTS

<b>Definition</b>	Implants are contraceptives, which are implanted by surgery under the skin of the upper arm. Implants are mainly of two types: Levonorgestrel implants and Etonogestrel implants. These are effective reversible contraceptive methods whose effects last for about 5 years and fertility is restored almost immediately after its removal. (8)
<b>Mechanism of action</b>	Implants release a steady dose of the hormone progestin and prevent pregnancy in three different ways: <ul style="list-style-type: none"> <li>• Suppressing ovulation by inhibition of gonadotropin surge</li> <li>• Preventing the sperm from entering the cervix by thickening the cervical mucus thus preventing fertilization</li> <li>• By suppressing the growth of the endometrium, resulting in the thin lining that does not support implantation.</li> </ul>
<b>Adverse drug reaction</b>	The major adverse effect known with implant use is menstrual abnormalities particularly within the first 6-12 months of use and is the primary cause for discontinuation. The other less serious, common adverse effects noticed are headache, skin reactions, weight gain, and dizziness. Serious health issues such as ectopic pregnancy, hypertension, stroke, gall bladder disease are much less frequently reported with implant use. (7-10)
<b>Contraindication</b>	<ul style="list-style-type: none"> <li>• Women with hepatic diseases or infections</li> <li>• History of or suspected malignancy of breast, uterus, cervix or ovaries</li> <li>• Undiagnosed vaginal bleeding</li> <li>• Pregnant women (9)</li> </ul>
<b>Pharmacokinetics</b>	Within a few hours of etonogestrel implant insertion, serum concentrations reach sufficient levels to inhibit ovulation. The time required for achieving the maximum concentration is 4 days. The rate of absorption of etonogestrel declined by 50% after 2 years of implant insertion. The pharmacokinetics of levonorgestrel is identical to that of etonogestrel. (10,11)
<b>Advantages</b>	<ul style="list-style-type: none"> <li>• Its effects last for up to 5 years</li> <li>• Does not cause interruptions in sexual activity (12)</li> <li>• Implants are equally effective irrespective of BMI (13)</li> <li>• Continuation and acceptability rate is higher than other reversible contraceptive methods (14)</li> </ul>

### 4. INJECTIONS

Injectable contraceptives, given intramuscularly, are a highly effective method of contraception and are administered once every 1-3 months depending on the type of injectable used. They act by

- Inhibiting ovulation
- Thickening for the cervical mucus to prevent penetration of sperm
- Inducing endometrial atrophy

These are of two types

- Progestogen-only injectable contraceptives
- Combined injectable contraceptives

	<b>Progestogen-only injectable contraceptives</b>	<b>Combined injectable contraceptives</b>
<b>Definition</b>	Progestogen-only injectable include <ul style="list-style-type: none"> <li>• Depot medroxyprogesterone acetate (DMPA): 150mg injected every 3 months</li> <li>• Norethisterone enanthate (NET-EN): 200mg injected every 2 months</li> </ul> For immediate contraception <ul style="list-style-type: none"> <li>• Start within 3 weeks postpartum (if not breastfeeding)</li> <li>• Start within 6 weeks postpartum (if breastfeeding)</li> <li>• Immediately after abortion or miscarriage</li> <li>• Start within the first 5-7 days of the menstrual cycle</li> </ul>	The combined injectable contraceptives contain two hormones, a progestogen, and an estrogen. These are highly effective and cause minor menstrual abnormalities when compared to progestogen-only injections.
<b>Adverse drug reactions</b>	The major side effect associated with the use of progestogen-only injectable is menstrual abnormalities with amenorrhea being the most common. Other side effects include headache, weight gain, dizziness, and hypertension. Menstrual abnormalities are also the main cause of discontinuation.	The primary side effect is menstrual abnormalities. Other minor side effects include headache, dizziness, breast tenderness, migraine.
<b>Contraindication</b>	<ul style="list-style-type: none"> <li>• Pregnant women</li> </ul>	

	<ul style="list-style-type: none"> <li>• Women with liver or disorders</li> <li>• Those with thromboembolism (15–18)</li> </ul>	
<b>Advantages</b>	<ul style="list-style-type: none"> <li>• Highly effective and easy delivery</li> <li>• Ideal for women who are unable to take estrogen-containing contraceptives because of health conditions such as the elevated risk of thromboembolism, liver, or cardiac disorders.</li> <li>• Safe to use in lactating women</li> <li>• Non-contraceptive advantages such as treatment of dysmenorrhea and menorrhagia (when associated with tumors), prevention of pelvic inflammatory disease, endometrial cancer, iron deficiency anemia.</li> <li>• Does not interrupt sexual activity</li> </ul>	<ul style="list-style-type: none"> <li>• Less menstrual abnormalities</li> <li>• More rapid restoration of fertility within 6 months to 1 year after stopping the injections</li> <li>• Immediate contraception and highly effective</li> </ul>
<b>Disadvantages</b>	<ul style="list-style-type: none"> <li>• Menstrual abnormalities are common</li> <li>• It may take up to 9-10 months for period regularity and fertility restoration after stopping the injections</li> <li>• There may be reversible loss of bone mineral density (BMD)</li> <li>• There is no protection against sexually transmitted infections (STIs)</li> </ul>	<ul style="list-style-type: none"> <li>• More frequent injections</li> <li>• Not recommended for lactating women</li> <li>• Cannot be used by women with estrogen contraindications (19,20)</li> </ul>

c)

### 5. VAGINAL RING (21)

<b>Definition</b>	A vaginal ring is a small plastic ring designed for the release of drug intravaginally.
<b>Mechanism</b>	<ul style="list-style-type: none"> <li>• The release of progesterone and estrogen into the bloodstream prevents the release of the egg each month.</li> <li>• It thickens the cervical mucus, which affects the motion of sperm through the cervix.</li> </ul>
<b>Fact</b>	<ul style="list-style-type: none"> <li>• Once inserted is left inside for 21 days</li> <li>• When removed a 7-day break is given every month.</li> </ul>
<b>Risk</b>	<ul style="list-style-type: none"> <li>• Blood clots</li> <li>• Stroke</li> <li>• Pulmonary embolism</li> <li>• Heart attack</li> </ul>
<b>Side Effects</b>	<ul style="list-style-type: none"> <li>• Increased vaginal discharge</li> <li>• Headache</li> <li>• Mood swings</li> <li>• Vaginal infection</li> <li>• Nausea</li> <li>• Breast tenderness</li> </ul>
<b>Contraindications</b>	<ul style="list-style-type: none"> <li>• Hypertension</li> <li>• Smokers</li> <li>• &gt; 35 years of age</li> <li>• Sensitive to hormones</li> <li>• Breast cancer</li> </ul>
<b>Advantages</b>	<ul style="list-style-type: none"> <li>• It is 99% effective</li> <li>• It is easy to use</li> <li>• It shows lesser side effects than oral contraceptives.</li> </ul>
<b>Disadvantages</b>	<ul style="list-style-type: none"> <li>• Does not protect against STD'S</li> <li>• May cause vaginal infection or irritation or both</li> </ul>

6. PATCH

<b>Definition</b>	Transdermal contraception usually uses a sticky patch that is placed on different parts of your body, which releases hormones that are highly effective at preventing pregnancy. It is a very convenient hormonal contraceptive method.
<b>Mechanism of action</b>	“The transdermal patch contains a total of 6.0 mg of norelgestromin and 0.75 mg of Ethinyl estradiol. Norelgestromin, also known as 17-deacetylnorgestimate, is the active metabolite of norgestimate, which is the progestin contained in certain oral contraceptives. Ethinyl estradiol is the estrogen component of most oral contraceptives. The transdermal contraceptive patch is designed to deliver 150 µg of norelgestromin and 20 µg of Ethinyl estradiol daily for 7 days.” (22) These hormones are absorbed into the skin from the patch and they prevent the process of ovulation and thus prevent the release of eggs. Due to this, the sperm will have no egg to fertilize, and apart from this, the patch thickens the mucus lining of the cervix, which makes it difficult for the sperm swim. The hormones also thin the lining of the uterus to avoid implantation.
<b>Method of using</b>	The patch can be worn on different parts of the body like buttocks, back, lower abdomen, and upper arms avoiding breasts. It should not be used if the skin has bruises or if the skin is irritated. It should be worn for 3 weeks straight by replacing the patch with a new one every 7 days. After 3rd week skip it for 4th week, which means you will get your periods this week. (3 patches per month). “Serum concentrations of norelgestromin and Ethinylestradiol from the contraceptive patch remain within the reference ranges throughout the 7 days wear period, regardless of the site of application.” (23)
	<ul style="list-style-type: none"> <li>• The patch falls off? : Usually, the patch has a strong adhesive property but if it still falls off, try applying a new one as soon as possible. Besides, if it is past 24 hours use another contraceptive method like condoms for additional safety as it loses its efficacy after 24 hours.</li> <li>• I forget to wear a new patch after a week? : Change it as soon as possible but if its more than 48 hours, use an additional contraceptive or talk to your doctor.</li> <li>• I forget to remove it after 3 weeks? : Take it off as soon as possible and start the next cycle as usual.</li> <li>• Do I have to wear the patch at the same place every time? : The patch must be placed on different locations every time to improve its efficacy.</li> </ul>
<b>Contraindication</b>	The contraindications are similar to those for other methods containing both estrogen and progestin such as combined oral contraceptives and the vaginal ring. These include, but are not limited to, prior or increased risk for thromboembolism, uncontrolled hypertension or diabetes, vascular disease or prior stroke, ischemic heart disease, liver disease, and tumors, which are estrogen-dependent. Besides, use in postpartum women should be delayed until 21–42 days after delivery, depending on the presence or absence of risk factors, owing to an increased risk of venous thromboembolism. <sup>12</sup> Besides, women with sensitive skin or dermatologic disorders may not be suitable candidates for this method. “The body habitus may affect metabolism sufficiently to compromise contraceptive effectiveness.” (24) Apart from this, the following should avoid using patches : <ul style="list-style-type: none"> <li>• Pregnancy</li> <li>• Breastfeeding women</li> <li>• Women who have been smoking lately.</li> <li>• Age about 35 years.</li> <li>• Overweight.</li> <li>• Women who are on medications such as : <ul style="list-style-type: none"> <li>✓ Antibiotics like rifampicin</li> <li>✓ Griseofulvin</li> <li>✓ HIV medications</li> <li>✓ Anti-seizures</li> <li>✓ St. John warts</li> </ul> </li> </ul>
<b>Risk</b>	“As is true of all estrogen-containing contraceptive methods, venous thromboembolism is the commonest serious side-effect associated with patch use, although less commonly users with risk factors can also experience a stroke and myocardial infarction.”(22)
<b>Advantages</b>	<ul style="list-style-type: none"> <li>• Does not interrupt intercourse and easy to use.</li> <li>• Unlike the oral contraceptive, you do not have to consider it every day and can be used only once a week.</li> <li>• The stomach does not absorb the hormones, so can be used even when you have GIT problems.</li> <li>• Aids in premenstrual syndrome.</li> <li>• It has better compliance</li> <li>• “The numerically lower overall failure rate for the contraceptive patch may be due to the better compliance shown with this once-weekly dosing regimen vs. the daily dosing for the OC.” (25)</li> </ul>
<b>Disadvantages</b>	<ul style="list-style-type: none"> <li>• It is visible and can cause skin irritation, itching.</li> <li>• No guarantee against STD, so you may have to use condoms as well.</li> </ul>

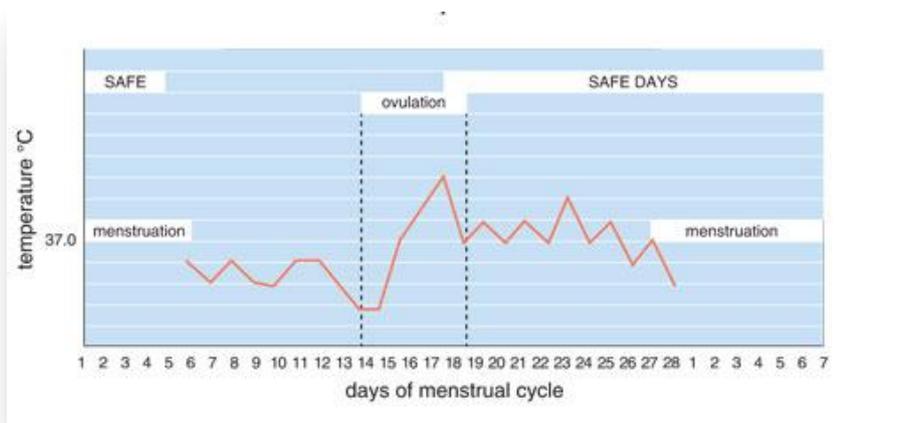
	<ul style="list-style-type: none"> <li>• Rarely, women get mild side effects in initial days of usage.</li> <li>• Breakthrough bleeding sometimes.</li> </ul>
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❖ **NATURAL FAMILY PLANNING (26)**

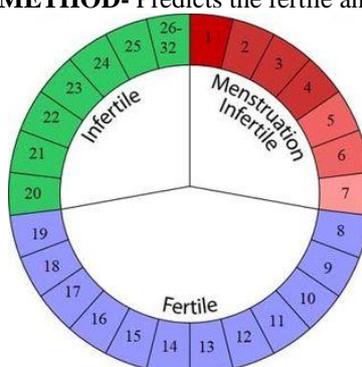
Natural family planning is nothing but a form of fertility awareness where a woman monitors various fertility signals during the menstrual cycle.

<b>Definition</b>	A birth control method does not involve any use of drugs or devices.
<b>Fact</b>	*This method is used as a means of both to prevent pregnancy and to conceive
<b>Types</b>	<ul style="list-style-type: none"> <li>• Basal Body Temperature Method</li> <li>• Calendar Calculation Method</li> <li>• Cervical Mucus Monitoring Method</li> <li>• Lactational Amenorrhea Method</li> </ul>
<b>Advantages</b>	<ul style="list-style-type: none"> <li>• When the method is followed properly it can be 99% effective</li> <li>• It is a long term reversible way of contraception</li> <li>• There are no health risk or side effects of this method</li> <li>• It is a highly economical method</li> <li>• Helps in being aware of when the body is fertile or infertile</li> </ul>
<b>Disadvantages</b>	<ul style="list-style-type: none"> <li>• Needs consistent and accurate record-keeping</li> <li>• It is more challenging for the woman with an irregular cycle.</li> </ul>

- **BASAL BODY TEMPERATURE METHOD** – This method helps to identify the fertile and infertile period of a woman’s cycle by daily taking and recording the rise in body temperature during and after ovulation. Before ovulation, a woman’s BBT falls about 0.5 F at the time of ovulation.



- **CALENDER CALCULATION METHOD**- Predicts the fertile and infertile period by menstrual dating



- **CERVICAL MUCUS MONITORING METHOD** – This method helps in the identification of the fertile and infertile period with the help of cervical secretions.  
**Dry Phase (nonfertile) DAY 1-3 after periods** – The mucus is dry or has a hint of moisture

**Sticky Phase (non-fertile) Day 4-6** – The mucus is white or cloudy in color and forms small sticky globs

**Creamy Phase (semi fertile) DAY 7-9** – The mucus is creamy or cloudy in color and is thick in consistency

**Clear Phase (fertile) DAY 10-14**- the mucus appears like raw egg white and is stretchy and slippery in nature.



- **Lactation Amenorrhea Method** – Lactational amenorrhea is the phase where the woman is breastfeeding in the absence of a menstrual cycle. There is increase suppression of ovulation during breastfeeding although the effectiveness is limited up to six months.

#### STATUS OF CONTRACEPTION IN INDIA

“Youth (15-34 yr.) account for 34.8 percent of the total Indian population, of which an enormous number still do not have access to contraceptives”(27)

“In India, efforts have been made over the years by the government to create a favorable policy environment for family planning, in the form of several important policy and programmatic decisions. At the London Summit on Family Planning held in 2012, the Government of India made a global commitment to provide family planning services to an additional 48 million new users by 2020”(27)

The family planning in India is dominated by the use of sterilization. One woman out of ten has an unmet family planning need. Approximately 45000 Indian women die per year for pregnancy and related complications less than half of India's married women use a modern form of contraception. The efficacy of pregnancy per 100 women who use female condom reliably and correctly is 5%. The efficacy of births per 100 women as common usage of male condoms is 13% and female condoms is 21%. Condoms were the most used mode of contraception in India between April and June 2020, with 4.14 million users, apart from other prominent forms of family planning.

“A considerable number of 25–28-year-old married women opting for female sterilization and the unique preference for female sterilization when the family size is complete show the predominant reliance of young women on female sterilization.”(28)

The barrier method remains the most used contraceptive among Indians where male condoms are preferred most. Unlike male condoms, diaphragms are known and used by a little percentage of the population. Although being introduced in the 1950s they were never really promoted, and women would not prefer using it as they found it messy. According to a study in Tami Nadu, low income settled women when given diaphragms to use with training they found it acceptable and were motivated to use it. According to some gynecologists, Indian women liked using diaphragm when it was explained and made available to them. So diaphragm awareness is necessary for the Indian context.

“Approximately 48.2% of couples of 15 to 49 years of age practice family planning methods in India. Female sterilization accounts for 34.2%, with male sterilization declining from 3×4% in 1992–93 to 1.9% in 1998–99. Use of the condom increased to 3.1% from 2.4%.”(29)

“The current usage of any methods of contraception in Jharkhand is only 35.7% out of which terminal methods especially female sterilization accounts to 23.4% and male sterilization being only 0.4%. A similar picture is also reflected in the conventional methods such as; IUCD-0.6percentage, oral pill -3.8%, and condom-2.7percentage. The implant contraceptives also provide up to 99% of protection. Continuation rate of implants ranged between 78%-96% at one year and 56%-86% at three years as reported by multi-country clinical trials and observational studies.”(30)

The safety and efficacy of available oral contraceptives were evaluated. An indigenously developed oral contraceptive ‘Centchorman’, which is a nonsteroidal, weakly estrogenic but potently antiestrogenic, was found to be safe and effective and is now being marketed in India since 1991 as a ‘once a week’ pill.(29)

In the year 1960 it was first introduced in India and was marketed in 1991.25% of women of age 15-44 use progesterone only pills as their first choice. These pills are 99% effective when taken on time. although 7/10 women get pregnant every year even after the use of pill.

“IUD continuation rate at 1 year was 62.8%. Most removals within 1 year were due to associated side effects. Almost half of the women discontinuing IUD did not switch to an alternative modern contraceptive method.”(6)

The implant contraceptives are highly effective and have a failure rate of less than 1%. “Continuation rate of implants ranged between 78%-96% at one year and 56%-86% at three years as reported by multi country clinical trials and observational studies”.(30)

Injectable contraceptives DMPA and NET-EN are approved for retail sale in India, with the use of DMPA being more widespread. They have been proved to be 97-99% effective in preventing pregnancies. It has also been found through studies that there is a demand for injectable contraceptives among women as well as healthcare workers. While this procedure is highly effective, due to side effects such as menstrual irregularities, vaginal discharge and weight fluctuations, a significant percentage of women chose to discontinue its usage. Other factors for discontinuation include preference for a particular method, inconvenience and difficulties of regular visits to clinics for subsequent doses. There is a room for improvement in the counseling aspect of injectable as it is reported that women opting for this method are not being offered complete counseling.

The idea of contraception in India started in 1952. Due to religious issues, it remains a taboo in some parts of India. Mostly contraception depends on the economic factors, status, and the level of education the person has. A study has shown that Muslim women use the least contraception whereas Hindus were found to be highest. Hormonal patches are not very common to people of India and it remains one of the barely used methods in India.

Vaginal ring was introduced in 2009 in India. 94.2% women [195/207] were satisfied by using the ring. 76.2% women reported regular menstrual bleeding. Women > 18 years of age seek this method of contraception as it has less contraindications than other methods”.(31) “Although there was a discontinuation of LNG-releasing vaginal ring as they caused irregularity in periods in 36% women and vaginal irritation in 6% women”.(29)

“In 1951, India became the first country in the developing world to introduce the natural family planning programme 48.2 % of couple both married and non-married practice this method in India. According to the study conducted in 2011 there is a high use of these methods i.e. 18% in West Bengal and 17% I Assam .by the end of 2012 almost 13 million couples were using the method of natural family planning”.(29)

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