CONTRACEPTIVE METHODS: A REVIEW ARTICLE

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Abstract

Contraception is the intentional prevention of conception through the use of various devices, sexual practices, chemicals, drugs or surgical procedures. An effective contraception allows a physical relationship without fear of an unwanted pregnancy and ensures freedom to have children when desired. The aim is to achieve contraception in maximum comfort and privacy, with minimum cost and side effects. Some methods, like male and female condoms, also provide twin advantage of protection from sexually transmitted diseases. The burden of unsafe abortion lies primarily in developing countries. Here, contraceptive prevalence is measured among currently married women of reproductive age, and levels have not yet reached those that exist in developed countries.

Key words: *Contraception, Temporary, Permanent, Condom, Intrauterine contraceptive devices*

Introduction:

Contraception means preventing the union of the sperm and ovum; suppressing ovulation, or interfering with the implantation of fertilized ovum in the uterus.The term contraception includes all measures temporary or permanent, designed to prevent pregnancy due to the coital act. Ideal contraceptive should fulfil the following criteria:

- Widely acceptable
- Inexpensive
- Simple to use
- Safe
- Highly effective

Requiring minimal motivation, maintenance &supervision.The last few years have witnessed a contraceptive revolution; i.e. man is trying to interfere with the ovulation cycle.

Definition:

It defined as use of artificial methods or techniques to prevent pregnancy by interfering with normal process of ovulation, fertilization

Methods of contraception:

Temporary methods of contraception

Temporary methods of contraception are commonly used to postpone or to space births. However, these are also used frequently by couples, who desire to have no more children.

Barrier methods:

Barrier methods prevent sperm deposition in the vagina or sperm penetration through cervical canal. The objective is achieved by mechanical devices or by chemical means, which produce sperm immobilization or by combined means. The following are included:

Mechanical:

Male condom

Condoms are made of polyurethane or latex. Polyurethane condoms are thinner and suit- able to those who are sensitive to latex rubber. It is the most widely practiced method used by the male. A widely marketed brand in India is 'Nirodh. The efficacy of condoms can be augmented by adding spermicidal agents during its use. Protection against sexually transmitted disease is an additional ad- vantage. The method is suitable for couples. Who want to space their pregnancies and 1- who have contraindications for the use of oral contraceptive or IUCD. These are also suitable to those who have infrequent sexual intercourse. **Instructions for use** The condom is unrolled over the erect penis before any genital contact. The rim of the condom should be held against the base of the penis during withdrawal making sure the condom does not become dislodged from the penis. The condoms are tested for holes electronically by the manufacturer and need not be tested before use. The condom should be grasped at its open end and held in place during withdrawal of penis. However, after use it should be checked for tears before throwing it away. If it is found torn, a spermicidal jelly should be put into the vagina immediately. The condom should be thrown away after single use. **Use of condom** are As an elective contraceptive method, As an interim form of contraception during pill use, following vasectomy operation and if an IUCD is thought lost, until a new IUCD can be fitted, During the course of treatment of the wife for Trichomonasvaginalis. advantages: Easily available and inexpensive, No contraindications or side effects, Easy to carry, simple to use and disposable, Protection against sexually transmitted diseases like chlamydia, gonorrhea and human immunodeficiency virus (HIV), Protection against pelvic inflammatory diseases, Suitable for use during lactation, for teenagers and in cases where pills and IUCDs are contraindicated, Useful where sexual intercourse is infrequent and irregular. Disadvantages: It reduces sexual pleasure to a small ex- tent due to reduced sensitivity for the male and interruption of sexual act, May accidentally break or slip off during coitus.

Female condom (femshield)

Female condom is a pouch made of polyurethane, which lines the vagina and external genitalia. It is about 15 cm in length with one flexible polyurethane ring at each end. The condom is inserted into the vagina in such a manner that the closed inner end is anchored in place by the polyurethane ring, while the open outer edge lies flat against the vulva. The inner ring at the closed end is smaller compared to the outer ring. It gives protection against sexually transmitted disease and pelvic inflammatory disease. Female condoms were not accepted well though they were not expensive or required no prescription from physician (Ford and Mathie, 1993).

Diaphragm:

Diaphragm is an intravaginal device made of rubber with flexible metal or spring ring at the margin. Its diameter varies from 5 to 10 cm. It is not a popular method. It requires a medical person to measure the size required. instructions for use: The diaphragm of the right size is selected that is of the same length as the distance between the top of the posterior fornix and the under surface of the symphysis pubis. It is inserted dome pointing down with some spermicidal

jelly within the cup and along the rim. The diaphragm is pinched between the thumb and index finger and released only after insertion into the vagina. The device should be introduced up to 3 hours before intercourse and kept for at least 6 hours after the last coital act. Ill-fitting and accidental displacement during intercourse increases the failure rate.

Advantages: Inexpensive, Can be used repeatedly for long time, Highly effective if used properly, No interruption in love making as with condom. Disadvantages: Requires help of a physician to measure the size required, Risk of vaginal irritation and urinary tract infection, More difficult to use than condom and requires high degree of motivation for the user.

Vaginal contraceptives: vaginal contraceptive sponge

The sponge is made of polyurethane impregnated with a spermicide-nonoxynol-9, which acts as a surfactant. It is to be worn by the woman in the vagina during coitus. It is shaped like a mushroom cap, the con- cave surface facing the cervix. The sponge is moistened with water, squeezed gently to remove excess water and inserted high in the vagina

manually or with an applicator. It is not removed for at least 6-8 hours after coitus. The sponge absorbs semen as it is de- posited in the vagina, prevents its entry into the cervix and releases nonoxynol-9 during coital thrust, which inactivates sperm. The sponge measures about 2 cm in diameter and is made for single use. It does not require fit- ting by physician. It is less effective and more expensive. Allergic reactions and soreness are common.

Chemical (vaginal contraceptives): Creams: Delfen, velpar, Foam tablet: Durofoan tablet, Aerosol foam: Nonoxynol-9, Contraceptive sponge: Today sponge.

Combination: Combined use of mechanical and chemical methods.

Natural contraception:

Rhythm method: The rhythm method is the only birth control method (besides total abstinence), which is officially approved by the Roman Catholic Church. It is also referred to as 'safe period' or 'temporary abstinence. Advantages are No cost, No side effects. Disadvantages are Difficult to calculate the safe period, Compulsory abstinence from sexual act during certain periods, Not applicable during lactational amenorrhea or when periods are irregular, Higher rate of ectopic or congenital ab- normality of the fetus because of chances of the union of aging sperm and ovum.

Coitus interruptus: Coitus is the oldest and probably the most widely accepted contraceptive method used by man. It necessitates withdrawal of penis shortly before ejaculation. It requires sufficient self-control by the man, so that with drawal of penis precedes ejaculation. Disadvantages are Requires sufficient self-control by the men, The woman may suffer anxiety, vaginismus or pelvic congestion, Chance of pregnancy is more: Precoital secretion may contain sperm, Accidental chance of sperm deposition in the vagina.

Breastfeeding:

Prolonged and sustained breastfeeding offers a natural protection of pregnancy. This is more effective in women, who are amenorrheic than those who are menstruating. The risk of pregnancy to a woman who is fully breastfeeding and amenorrheic is less than 2% in the first 6 months.

Intrauterine contraceptive devices

Intrauterine devices (IUD), often referred to as IUCDs, are small plastic or metal forms to which a 'tail' of nylon threads is usually attached. These are worn by women in their uterine cavity. During the last couple of decades, there has been a significant improvement in its design and content. Types of iud- There are two basic types of IUD, non-medicated and medicated. Both are usually made of polyethylene or other polymers; in addition, the medicated or bioactive IUD, release either metal ions (copper) or hormones (progestogens). The non-medicated IUDs are often referred to as first generation IUDs. The copper IUDs comprise the second and the hormone- releasing IUDs-the third generation IUDs. The medicated IUDs were developed to reduce the incidence of side effects and to in- crease the contraceptive effectiveness. First generation iuds- Include Lippes loop, Margulies spiral, Saf-T-coil and Dana super (Figs 24.3A to D). Of these, the Lippes loop was widely used in India since 1965, when it was introduced in the national family planning program. Second generation iuds- Were introduced in the 1970s. It was found that metallic copper had a strong antifertility effect (Zipper, 1969). The addition of copper has made it possible to develop smaller devices, which are easier to fit; even in nulliparous women.A number of copper bearing devices are now available. **Earlier devices:** Copper-7, Copper T-200. **Newer devices:** Variants of the T device- Copper T-220C (Cu T-220C), Cu T-380A or Ag, Nova T, Multiload devices, Multiload copper-250 (ML Cu- 250), ML Cu-375.

Advantages of copper devices are Lower expulsion rate, Lower incidence of side effects, e.g. pain and bleeding, easier to fit even in nulliparous women, better tolerated by nullipara, increased contraceptive effectiveness. Third generation IUDs these are based on still another principle, i.e. release of a hormone. The most widely used hormonal device is Progestasert. It has a direct local effect on the uterine lining, on the cervical mucus and possibly on the sperms. Because the hormone supply is gradually depleted, regular replacement of the device is necessary. Another hormonal device that has been tested is a T-shaped IUD, the levonorgestrel intrauterine system (LNG-IUS) releasing 20 µg of the potent synthetic steroid Long-term clinical experience with levonorgestrel-releasing IUD has shown to be associated with lower menstrual blood loss and fewer days of bleeding than the copper devices. Time of insertion is During menstruation or within 10 days of the beginning of a menstrual period (Gray, 1980). During this period, insertion is technically easy because the diameter of the cervical canal is greater at this time than during the secretary phase. The uterus is relaxed and myometrial contractions, which might tend to cause expulsion, are at a minimum (Hawkins, 1979). In addition, the risk that a woman is pregnant is remote at this time. Postpartum insertion is done 6-8 weeks

after delivery. Post puerperal insertion has several advantages. It can be combined with the follow-up examination of the woman and her child. Post abortion insertion can be taken up immediately after a legally induced first trimester abortion. Immediate postpartum insertion of JUD can also be done during the 1st week after delivery before the woman leaves the hospital. Special care is required with insertions during the 1st week after de livery because of the greater risk of perforation during this time. Furthermore, immediate insertion is associated with a high expulsion rate. Indications for removal of IUD

The indications for removal are: Persistent excessive regular or irregular bleeding and/or severe cramp-like pain in the lower abdomen, Flaring up of salpingitis, Perforation of the uterus with the device in the peritoneal cavity, Downward displacement of the device into the cervical canal or partly protruding outside into the vagina, Patient desirous of a baby, Missing thread

Steroidal/hormonal contraceptives

Hormonal contraceptives when properly used are the most effective spacing methods of contraception. Oral contraceptives of the combined type are almost 100% effective in preventing pregnancy. More than 65 million people in the world are estimated to be taking the 'pill' of which about 10 million are estimated to be in India. Classification of hormonal contraceptives Hormonal contraceptives currently in use and/or under study are classified as follows: oral pills- Combined pill, Progestogen-only pill (POP)-minipill, postcoital pill, Once a month (long acting) pill. Depot (slow-releasing) formulations- Injectables, Sub dermal implants, Vaginal rings. Combined pill: The combination pill is one of the major spacing methods of contraception. Most formulations of the combined pill of the present time contain 30-35 µg of synthetic estrogen and 0.5-1.0 mg of progestogen. The pill is given orally for 21 consecutive days beginning on the 5th day of the menstrual cycle, followed by a break of 7 days of no hormonal intake (7 pills contain no hormones and are inert) during which menstruation occurs. When bleeding occurs, this is considered the 1st day of the next cycle. The bleeding is not like normal menstruation, but is an episode of uterine bleeding from an incompletely formed endometrium caused by the withdrawal of exogenous hormones. Therefore, it is called 'withdrawal bleeding' rather than menstruation. The loss of blood, which occurs, is about half that occurring in a woman having ovulatory cycle. If bleeding does not occur, the woman is instructed to start the second cycle 1 week after the pre- ceding one. Ordinarily, the woman menstruates after the second course of pill intake. Types of pills: The department of family welfare, in the Ministry of Health and Family Welfare, Government of India has made available two types of low dose oral pills under the brand names of Mala N and Mala D: 1. Mala N: Norgestrel 0.3 mg and ethinylestradiol 0.03 mg. 2. Mala D: Norgestrel 0.3 mg and ethinylestradiol 0.03 mg. Mala D is available in a package of 28 pills (21 of oral contraceptive pills and 7 brown, ferrous fumarate coated tablets at a price of 2/packet). Mala N is supplied free of coast through all Primary Health Centers and Ur- ban Family Welfare Centers. **Progesterone-only pill:** Progestogen-only pill is commonly referred to as the minipill or micro pill. It contains only progestogen, which is given in small doses throughout the cycle. The commonly used progestogens are norethisterone (350 µg) and levonorgestrel (30 µg).**postcoital pill**: Postcoital (or 'morning after') contraception is recommended within 48 hours of unprotected intercourse. Two methods are available: IUD, especially a copper device, Hormonal: More often, a hormonal method may be preferable. **Once a month (long acting) pill** Experiments with once a month pill in which quinestrol, a long-acting estrogen is given in combination with a short-acting progestrogen, have been disappointing. The pregnancy rate was too high to be acceptable. **Depot (slow-releasing) formulations** the need for depot formulations, which arehighly effective, reversible, long acting and estrogen free for spacing pregnancies in which a single administration suffices for several months or years led to the development of injectable contraceptives and sub-dermal implants. **Injectable contraceptives** There are two types of injectable contraceptives: Depot medroxyprogesterone acetate (DMPA) or Depo-Provera, Norethisteroneenanthate (NET-EN).Both are administered intramuscularly. DMPA is given in a dose of 150 mg every 3 months or 300 mg every 6 months. NET-EN is given in a dose of 200 mg at 2-monthly intervals. **Subdermal implants** The population council, New York has developed a subdermal implant known as Norplant for long-term contraception. It consists of six silastic (silicone rubber) capsules containing 35 mg (each) of levonorgestrel. More recent devices comprise fabrication of levonorgestrel into two small rods, Norplant (R)-2, which are comparatively easier to insert and remove. It initially releases 80 µg and later on reduced to 30 µg levonorgestrel per day over 5 years. Norplant capsules measure 34 mm x 24 mm and provide effective contraception for 5 years. **Implanon** Single implant rod of 4 cm long, containing 60 mg of ketodesogestrel is used. It releases the hormone about 60 µg per day over 3 years. Use of single rod makes Implanon easier for insertion and removal. Efficacy and side effects are the same as that of Norplant. **Vaginal ring (nova ring)** A ring-shaped device that contains the hormone estradiol and etonogestrel (a progestin) can be placed in the vagina. It remains in place for 3 weeks continuously and releases low levels of hormone into the bloodstream. Then it is removed for a week to allow for menstrual period.

Permanent methods (sterilization)

Voluntary sterilization is a well-established contraceptive procedure for couples desiring no more children. Currently female sterilizations account for 85% and male sterilizations for 10%-15% of all sterilizations in India (Government of India Yearbook, 1983-1984). Voluntary sterilization is a surgical method whereby the reproductive function of an individual male or female is destroyed purpose- fully and permanently. The operation done on male is vasectomy and that on female is tubal ligation or tubal occlusion. Sterilization offers many advantages over other contraceptive methods: It is a one-time method, It does not require sustained motivation of the user for its effectiveness, It provides the most effective protection against pregnancy, . The risk of complications is small if the procedure is performed according to accepted medical standards, It is most cost-effective.

Guidelines for sterilization

Sterilization services are provided free of charge in government institutions. Guide- lines issued by the Government of India covers various aspects of sterilization. These are:

- The age of husband should not ordinarily be less than 25 years or more than 45 years.
- The age of wife should not be less than 20 years or more than 45 years.
- The motivated couple must have two living children at the time of operation.
- If the couple has three or more living children, the lower limit of age of the husband or wife may be relaxed at the discretion of the operating surgeon.
- The couple knows that for all practical purposes, the operation is reversible.

Vasectomy or male sterilization

Vasectomy is a permanent sterilization operation done in the male, where a segment of vas deferens of both the sides is resected (1 cm) and the cut ends are ligated. The ligated ends are then folded back on them and sutured into position, so that the cut ends face away from each other. This will reduce the risk of recanalization later. Advantages are The vasectomy operation is simple and can be performed as an outpatient or outdoor procedure, Complications-immediate or late, are few, Failure rate is about 0.15% and there is a fair chance of success of reversal anastomosis (recanalization) operation (50%), The overall expenditure is minimal in terms of the equipment, hospital stay and doctor's training. Cost wise the ratio is about five vasectomies to one tub- al ligation. **No-scalpel vasectomy** No-scalpel vasectomy is a new technique, i.e. safe, convenient and acceptable to males. This new method is now being canvassed for men as a special project, on a voluntary basis un- der the family welfare program. This method, which is popular in China, is performed under local anaesthetic. Stretched skin over the vas is punctured with one blade of sharp-pointed dissecting scissors, instead of using a scalpel. Then the hole is increased and the vas is dissected out by using the tip of the scissors. The testicular end is dropped back into the scrotum and the upper end is cauterized. The procedure is repeated for the second vas through the same incision. The rest of the steps are same as for the regular vasectomy procedure. **Open-ended vasectomy** The abdominal end of the resected vas is coagulated. The testicular end is left open. This will prevent congestive epididymitis.

Female sterilization

Occlusion of the fallopian tubes in some form is the underlying principle to achieve female sterilization. It is the most popular method of terminal contraception, specially adopted in the developing countries, where high parity births prevail in a comparatively younger age group. It is also widely accepted in the affluent countries. Female sterilization also known as tubal ligation or tubectomy is a surgical procedure in which the fallopian tubes are severed and sealed or 'pinched shut' in order to prevent fertilization. It is a highly effective, safe and simple procedure that involves cutting, tying or removing a part of the fallopian tubes. Consequently the passage of eggs from the ovaries to the uterus is blocked and sperm will not be able to reach the eggs. The eggs released from the ovaries after tubal ligation break and get absorbed harmlessly by the body. Tubal ligation is performed in a hospital as inpatient or outpatient procedure under general or regional anesthesia, using various techniques.

METHODS OF TUBAL LIGATION

Occlusion method:

It is for tubal ligation are typically carried out on the isthmic position of the fallopian tube that is the thin portion of the tube closest to the uterus: **partial salpingectomy:** The Pomeroy technique is widely used for achieving partial salpingectomy. This method involves tying a small loop of the tube by suture and cutting off the top segment of the loop. This can be done via laparoscopy or laparotomy. **clips:** It clamps the tube and inhibit blood flow to that portion causing a small amount of scarring or fibro- sis, in turn preventing fertilization. The most commonly used clips are Filshie clip made of titanium and the Hulka clip or Wolf clip made of stain- less steel and spring loaded. Clips are simple to insert, but require a special instrument to put it in place. The clip is introduced into the abdominal cavity via laparoscopic clip applicator. It is placed across the fallopian tube and when closed, a small spring holds it firmly. The Hulka clip has the advantage of damaging only a very small portion of the fallopian tube-approximately 7 mm. The squeezed portion is deprived of its blood supply and eventually under- goes a vascular necrosis. **Falope rings:** Tubal rings are similar to clips and they are used to block the tube mechanically. When placed, it encircles a small loop of the fallopian tube, blocking the blood supply to that small loop, resulting in scar- ring that blocks passage of sperm or egg. A commonly used type of ring is the Yoon ring made of silicone. The procedure is performed by inserting a laparoscope just under the umbilicus. After identifying the fallopian tube, the device with the ring is slidover 2-3 cm 'knuckle' of tube that is kinked off by the ring. This is done once for each side **electrocoagulation or cauterization:** Electric current is used to coagulate or burn a small portion of each fallopian tube. It mostly uses bipolar coagulation, where electric current enters and leaves through two ends of a forceps applied to the tubes. The procedure is usually done via laparoscopy.

Method of tubal ligation by entry sites or routes:

Laparotomy method: Pomeroy method: An occlusion type procedure in which a part of the fallopian tube on each side is elevated to create a loop or knuckle. An absorbable suture is tied around the base of the elevated segment and the segment is severed In modified Pomeroy method, a silk stitch is applied medial to the tubal stump after the conventional steps. Pomeroy method is usually performed after delivery by cesarean section. Irving tubal ligation: In this procedure two ligatures are placed around the tube in its proximal tomidsegment and a tubal segment between the two ligatures is re- moved. The tied end of the tube attached to the uterus is then sutured into the back side of uterus and the other end is buried in the connective tissue underlying the fallopian tube. This method keeps the two cut ends of the tubes healthy, should reversal micro- surgery become a need. Uchida method: The fallopian tube is dissected at the midpoint and the proximal end is ligated and allowed to drop back into a sac that has been created in the serosa. The distal end is tied and left to project into the abdominal cavity. This method has been abandoned, as it was associated with higher failure rates. Earlier techniques that used fimbriectomy were also abandoned. **Laparoscopic tubal ligation:** The procedure is done under general or regional anesthesia. The surgeon makes an incision of about 1/2 inches just in- side the naval. The laparoscope (a fine tube that conducts light connected to a telescope) is inserted through the opening. The instrument for blocking the tube is then introduced throughanother opening on the side. Application of clips, rings or cauterization is then performed. **Minilaparotomy:** This procedure is done under general anesthesia and involves making a small incision just above the pubic hairline. The surgeon lifts the fallopian tubes through the incision and blocks them using electrocoagulation, clips or rings. This method differs from laparoscopy that no visualizing instrument is inserted. This method is recommended for women for whom laparoscopy is contraindicated, such as those who had previous abdominal surgery for other reasons, recent or chronic tubal infections, or serious heart or respiratory illness. **Vaginal tubal ligation (colpotomy):** This procedure is done for women, who cannot have a laparoscopy or laparotomy. This involved making a small incision in the vaginal wall through which the surgeon can draw the tubes and ligate them using suture material. The procedure can be performed under local anesthesia and there will be no visible scar. However, the woman is more susceptible to infection because of high bacterial count in vagina. Some women find sexual intercourse painful for several months after surgery Advantages of female sterilization are Very effective as a method of contraception, Gives permanent or lifelong protection, Nothing to remember, no supplies needed and no repeated clinic visits required, No interference with sex, No known long-term side effects or health risks.

Conclusion:

Recent advances in the development of highly effective reversible methods of contraception have focused mainly on improving the ease of device insertion and removal, making these methods more acceptable to young and nulliparous women. There is a compelling rationale for immediate postpartum and post-abortion access to IUCs and implants and policy progress towards

Improving access in the US would require only regulatory changes at the state health services level. With regard to developments in emergency contraception, ulipristal acetate has been found to be more effective than levonorgestrel in delaying imminent ovulation, but copper IUCs are the most effective option for women who are willing to use them.

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