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Review Article

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An Overview on Family Planning, Methods and Latest Updates: Review Article

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ABSTRACT

Family planning is one important consulting encountered daily in the medical profession. Choosing the contraception method among others should be based on both patients' and physician's choices. Multiple options of contraception now are available in the markets, each one has its unique pros and cons. So, profound knowledge about each type is mandatory to help the patients in that regard. We aimed to review the literature reviewing contraception methods, their mechanism of action, side effects, efficacy, and contraindications. PubMed database was used for article selection, gathered papers had undergone a thorough review. Against the common belief that there is a perfect contraceptive method, each patient has their perfect match instead. Taking into consideration efficacy, reversibility, side effects, accessibility, and usage complexity would, certainly, contribute to the determination of the method of choice. Compliance is a key factor that must be addressed and shed light on with patients during a consultation session where proper education showed better outcomes in compliance.

Key words: *Contraception, Contraceptive counseling, Condoms, IUD, COC, POP*

INTRODUCTION

Pregnancies are a miraculous event, only, when it is intended [1-4]. Consequently, the contraception concept and industry gain huge attention in the past century. Family planning consulting falls under the responsibility of both family physician and gynecologist. Therefore, proper education and further details to be discussed with the patient of concern. Contraception method is very versatile and they have a lot of forms that can be classified according to different items, such as their application, accessibility, efficacy, effectiveness, and duration of effect. Pregnancy and family planning is a major concern in the public health of every country, especially in those that lack resources and encompassing a large number of citizens. China, for example, had adopted an extreme intervention of the one-child policy in the period between 1979-2015 preceded and proceeded by periods of the two-child policy.

Those measures had been taking to ensure public safety and manage the human overpopulation, as the fertility rate has dropped from an estimated 5.9 births per woman in 1970 to 1.5-1.7 in the 1990s [5, 6]. Moreover, contraception accessibility would reduce the number of unwanted pregnancies, thence induced abortions. A Finnish study found an overall reduction of abortion rates after introducing a free-of-charge long-acting reversible contraception program; the results noticeably noted in the teenage group with a drop of 36% [7]. In this paper, we will review the available contraception options, including, hormonal, non-hormonal, and surgical with a review of the hormonal cycle and the process of decision making.

MATERIALS AND METHODS

PubMed database was used for the selection process of relevant articles, and the following keys used in the mesh ((“Contraception" AND (“Efficacy"[Mesh] OR "Mechanism of action"[Mesh] OR "Side effects"[Mesh] OR "Contraindications"[Mesh])). For the inclusion criteria, the articles were selected based on including one of the following: contraception, mechanism of action, side effects, efficacy, and contraindications. Exclusion criteria were all other articles that did not meet the criteria by not having any of the inclusion criteria results’ in their topic.

Review

With the variety of options and forms that contraception can take the shape of. Assessment of the efficacy of each product shall be made, Pearl Index provides an estimate of failure rate (unintended pregnancies) per 100 women. **Table 1** shows Pearl Indices for common contraception methods [8]. The classification that would be made in this paper is based on whether it is a hormonal or non-hormonal method. The main focus will be poured upon the most common options used in practice. Hormonal options include but are not limited to: hormonal intrauterine device (IUD), combined oral contraception, progestogen (or progesterone) only pills, injectables, and patches. While non-hormonal includes the following: barriers (e.g. female and male condoms), gels, copper IUD, and sterilization surgeries among others.

Menstrual cycle

The menstrual cycle is the key component of ovulation, and consequently pregnancy. Hormonal contraception works on disturbing the natural harmony and balance of this cycle. The starting point of the cycle is the hypothalamus, it secretes gonadotropin-releasing hormone (GnRH) which stimulates the anterior pituitary to secrete both follicle-stimulating hormone (FSH) and luteinizing hormone (LH) in a pulsatile fashion. The levels and timing of secretion of each one of them are dependent on GnRH, feedback from sex hormones. The gonadotropins rule is to stimulate the ovary to produce the sex hormones, estrogen and progesterone from theca cells and luteum respectively. With the maturation of the follicle and ovulation, the steroidal sex hormones in their turn also play a role in stimulating endometrial proliferation and. While estrogen and progesterone have little feedback effect at the level of the hypothalamus, the significant feedback occurs at the anterior pituitary [9]. **Figure 1** shows the levels of gonadotropin hormones in parallel to sex steroidal hormones.

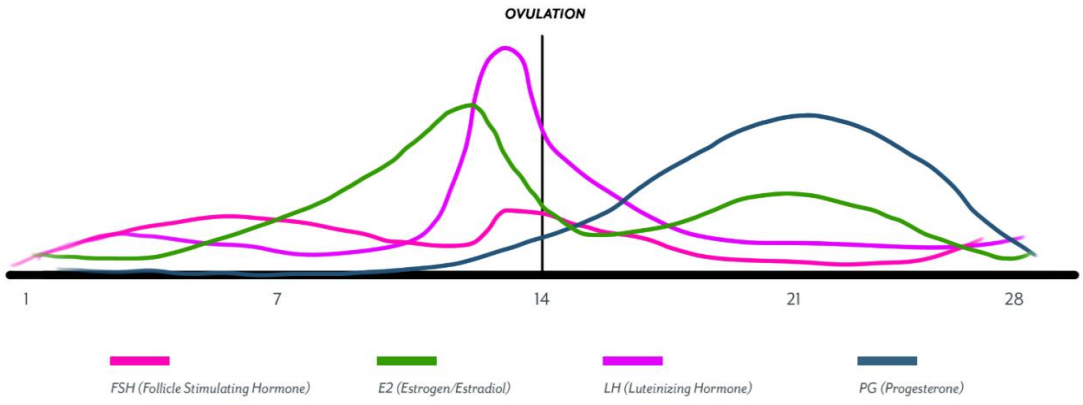

Figure 1. Gonadotropin hormones and sex hormones change and relations throughout the normal menstrual cycle.

Table 1. Pearl Indices for common contraceptive methods in use

Method	Pearl Index in typical use (per 100)
Combined oral contraception	0-2.18
Progestogen only pills	0.41
Hormonal patches	0.71–1.24
Hormonal implants	0–0.3
Hormonal injectables	0
Copper IUD	0.16–1.26
Hormonal IUD	0.09–0.11
Male condoms	2.5–5.9
Natural methods	3.8–20.4

Hormonal

Combined oral contraception (COC)

As its name indicates, combined oral contraception (COC) has both estrogen and progestogen (progesterone) as active ingredients. The continuous administration of COC disturbs the usual traffic of the hypothalamic-pituitary-gonadal axis; progestogen suppresses the secretion of luteinizing hormone and estrogen affects a follicle-stimulating hormone to prevent ovulation. Progestogen also works by causing endometrial atrophy, decreased tubal motility, and cervical mucus thickening. Despite progestogens being the dominant component that provides contraceptive benefit, estrogen significantly stabilizes the endometrium to reduce breakthrough bleeding and augment the effect of progestogens, permitting lower doses of the drug to be equally effective [10].

COC regimen consists of on and off periods, 21 days of hormonal consumption followed by hormonal-free pills (placebo) allows withdrawal and bleeding to mimic natural physiological cycles. Another suggested regimen includes a shorter period of free-hormonal pills as short as 4 days per cycle. Eliminating the free period is the latest proposed option; continuous regimen shows a similar effect as the previous two with more menstrual-related complaints and disorders control. COC provides other non-contraceptive favorable effects, such as reductions in lifetime risk for ovarian, endometrial, and colorectal cancer. The downside of COC is the unpleasant side effects, some of them are headaches, nausea, dizziness, and breast tenderness. Usually, those symptoms manifest in the free-hormonal period and subside after the first few months of usage, furthermore continuous regimen can overcome these problems. Weight gain, irregular cycles, and breakthrough bleeding also can be experienced by some of the users [10]. Evident contraindications of COC are hypertension, smoking, complicated diabetes, coronary artery disease, history of venous thromboembolism, breast cancer, or migraine headaches with aura [11].

Progestogen-only pill (POP)

A progestogen (or progesterone) -only pills are mainly meant for women whom breastfeeding, smoking, having venous thromboembolic or arterial specific risk factors. POP lacks the estrogen component in COC as well as it has a lower dose of progestin, which led to the common name of "minipills". The progestogen effects as aforementioned include inhibition of ovulation, change of the cervical mucus, endometrial changes, and finally, changes in tubal mobility. Unlike the cyclic regimen in COCs, the POP regimen consist of a single pill-taking daily at the same time [12, 13].

The most recurrent side effects reported by the users which are related to progestogens are acne, hirsutism, depression, and weight gain. Moreover, the most experienced side effect of continuous use of POP is irregular bleeding. The contraindications list of POP is relatively few. However, it includes breast cancer, liver disease, and benign or malignant liver tumors [12].

Hormonal injectable and implants

Three progestin-only injectables are widely available. Some examples include; depot medroxyprogesterone acetate (DMPA) (via intramuscular route), (Depo-Provera®); depo-subQ Provera 104™ (via subcutaneous route), and norethisterone enanthate (via intramuscular route). These three injectable options share the same mechanism of action with all other progestogen agents, by preventing pregnancy through ovulation suppression, with other possible secondary mechanisms discussed earlier. Combined injectable contraceptives, containing estrogen and progestin, are rarely used in family planning programs [14].

Hormonal implants come in the form of one or two small, thin, flexible, and non-biodegradable rods. Three implants are accessible in markets. Examples include; Implanon®, a one-rod implant that contains etonogestrel as it is an active agent (sub-dermal), Jadelle®, and Sino-implant (II)®, Both two-rod methods that contain levonorgestrel (sub-dermal). Implants continuously release low doses of progestin, hence inhibits ovulation and thickens cervical mucus. Progestin-only methods induce higher menstrual irregularity than combined methods, and it is to be expected especially in the first year of its usage [14].

Hormonal IUD

There are two types of levonorgestrel-containing intrauterine systems; the difference is based on the amount of total levonorgestrel they contain and the rate of delivery. Levonorgestrel-releasing intra-uterine device IUD (LNG 20) has a total of 52 mg of levonorgestrel. Initially, releases 20 mcg of levonorgestrel daily, decreasing to 10–14 mcg per day after the first 5 years. As a result, the LNG 20 IUD should be replaced after 5 years. Levonorgestrel-releasing IUD (LNG 14) has a total of 13.5 mg levonorgestrel, initially releases 14 mcg daily, declining to 5 mcg per day after 3 years; warranting replacement after the 3rd year. Both of those IUDs options act by making local changes of thickening the cervical mucus, causing endometrial decidualization, glandular atrophy, which inhibits the passage and binding of sperms. Up to 20% of the users will experience anovulation as well [12, 15].

Contraindications for using this method include severe deformity of the uterine cavity; whether congenital anomalies or acquired, sexually transmitted infections, unexplained vaginal bleeding, breast cancer, and/or pregnancy. The major encountered side effect is irregular bleeding, which is very common during the first 3-6 months and shared with another progestogen-only contraception. Other rarely experienced side effects include breast tenderness, mood changes, and acne. Non-contraceptive benefits of LNG IUD are; reducing the menstrual bleeding, decreasing the pain experienced during menstruation, protecting the endometrium from cancer on those who take hormonal replacement therapy, protecting against pelvic inflammatory disease by preventing ascension of infection as the cervical mucus thicken, and treating endometrial hyperplasia in selected patients who would rather preserve fertility in the time being [12, 15].

Non-hormonal

Barriers, male and female condoms

The male condom is a thin rubber or latex sheath that is applied to the erect penis before intercourse. It prevents semen and other fluids from entering the woman's vaginal cavity, hence, preventing fertilization. The male condom is 95% effective, according to the pearl index, if used properly. It is readily accessible for all age groups, easy to install, and warrant no prescriptions. It is designed to be used once and applied correctly to achieve optimum protection. The extra perk condoms provide is sexually transmitted infection (STI) protection, review **Table 2** for details of protective efficacy against STIs. The prominent side effect of condoms is reduced sensation and pleasure and latex allergy. Allergy manifests as either immediate or a delayed reaction, where the first is a type I reaction and the latter is a delayed hypersensitivity reaction (type IV reaction). The symptoms range from simple urticaria, skin rash/hives, or itching, and severe ones such as cough, chest tightness, shortness of breath, wheezing, confusion, and low blood pressure [16-18].

The female condom is a vaginal pouch made of latex, with two rings, one at each end. The closed ring is to be installed inside the vagina and works as a stabilizer. The outer ring is opened and protects the external genitalia. Its major drawbacks to female contraception, despite providing acceptable protection against both pregnancy and STIs, are the cost and the uncomfortable sensation caused by the inner ring [17].

Table 2. Male condoms protective efficacy against STIs

Pathogen	Estimated protection efficacy %
Human immune deficiency virus (HIV)	>90
Hepatitis B virus	>90
Human papilloma virus (HPV)	Not significant
Herpes simplex virus type 2	10-50
Cytomegalovirus	50-90
Chlamydia trachomatis	50-90
Neisseria gonorrhea	>90
Trichomonas vaginalis	>90

Treponema pallidum (syphilis)	50-90
Hemophilus ducreyi	10-50
Pthirus pubis	Not significant

Copper IUD

The copper intrauterine device (IUD), the primary mechanism of action is the prevention of fertilization through a cytotoxic inflammatory reaction that is fatal to sperms. The copper concentration in cervical mucus is high enough to restrict sperms' motility. Copper also affects the endometrium, causing changes to prevent sperm migration and implantation. The serious side effect that can result from copper IUD insertion is perforation of the uterus, and it occurs at a rate of 1-2 per 1,000 insertions. Expulsion of the device may occur in the first year after insertion of IUD, it tends to happen at the time of menstruation and can be suspected if the patient presented with symptoms of cramping, vaginal discharge, and bleeding. Another side effect that should be monitored in the few days after insertion is upper genital tract infection and the possibility of developing the pelvic inflammatory disease. For the contraindication of using copper IUD, infection, pregnancy, uterine anomalies, gynecologic cancer, and adverse reactions to copper should always be considered and assessed before choosing this method [15, 19].

Surgical sterilization

Female sterilization, known as tubectomy or tubal ligation is a permanent surgical contraceptive method in which the fallopian tubes are cut and ends closed, closed by a band, or sealed with cautery to prevent the sperms from meeting the ovum in their distend place. It is a one-day surgery method with very reliable outcomes. For the side effect, few women tend to have heavier periods than usual after the procedure. Moreover, in some rare incidences, tubes are rejoined and pregnancy may occur. Despite being a permanent option, reversion of the surgery is possible with a possibility of failure [17, 20].

Male Sterilization, known as a vasectomy is a permanent surgical method concerning men in which the vas deferens, that carry the sperms from the testes to the penis, are blocked. Consequently, the sperms are blocked from releasing into the semen in ejaculation. The procedure itself reliable method and not requiring hospitalization [17, 20].

Family planning consultation and decision making

In a family clinic setting, counseling the patients about contraception is a duty that lies within the items that must be checked by every general practitioner. Consultation about contraception must be thorough and detailed, this would fulfill the patients' needs and fill their knowledge gaps. Taking into consideration the patient's wishes, current medical status, parity, and future pregnancy desire, a decision about the suitable method of contraception can be made. Including the patients in decision-making results in better compliance, a study conducted in Egypt found that receiving client-centered counseling, as opposed to physician-centered, was associated with better compliance and continuation of the chosen method [21]. For reaching effective communication during the consultation, two pillars should be present properly: relational communication and task-oriented communication [22, 23].

Relational communication component concern with building a relationship characterized by trust due to the nature of the sensitive topic. It also covers the part of making a decision, best strategy in making a decision is "shared decision" where it falls between informed decision, solely by the patient, and directive decision, by the physician. The other pillar, task-oriented communication tackles the technical and professional part of the consultation. Exploring the possible side effects, their duration, and how to overcome them is crucial and would exempt the patient from unnecessary worrying and visits. Asking about the patients desired outcomes, while keeping the medical history and current comorbidities in mind, would narrow the window of options, for example, a patient in fear of catching STIs from the partner would use male or female contraception with or without other contraception, patients who want to delay pregnancy for upcoming five years would be a good candidate for hormonal IUD, while the patients who do not want to get pregnant at all, the best option would be surgical ligation. **Table 3** summarizes the side effects and contraindications of common contraception methods. After choosing the optimum method, a follow up must be scheduled to gather as much information as possible about the chosen option and how the patient is keeping up with it. For example, after a condom prescription, exploring the intimacy between the couple and whether it is affected would provide the patient with other possibilities or better application. Irregularity in a cycle with progestogen-only methods tends to affect the compliance as well,

explaining that the symptoms would fade away after a certain time might provide relief to the patient and enhance the compliance [22, 23].

Table 3. Summary of side effects and contraindications of common contraception method

Method	Side effects	Contraindications
Combined oral contraception (COC)	Headaches, nausea, dizziness, and breast tenderness, weight gain, irregular cycles, and breakthrough bleeding	hypertension, smoking, complicated diabetes, coronary artery disease, history of venous thromboembolism, breast cancer, or migraine headaches with aura
Progestogen-only pill (POP)	acne, hirsutism, depression, weight gain, and irregular bleeding	breast cancer, liver disease, and benign or malignant liver tumors
Hormonal injectable and implants	Menstrual irregularity	Similar to POP
Hormonal IUD	irregular bleeding breast tenderness, mood changes, and acne	severe deformity of the uterine cavity, sexually transmitted infections, unexplained vaginal bleeding, breast cancer, or pregnancy
Male/ female condom	Reduced sensation, and latex allergy	NA
Copper IUD	perforation Expulsion is upper genital tract infection	infection, pregnancy, uterine anomalies, gynecologic cancer, and adverse reactions to copper

CONCLUSION

Contraception is a thorny issue that general practitioner, family physicians, and gynecologist need to deal with it quite often. There is no “one for all” option that suits all patients, thus, a tailored decision should be made according to one’s specific conditions and desires. Discussing the currently available options with the patients and providing them with comprehensive details regarding efficacy, usage, and side effects would result in better overall outcomes and compliance. Patient education, respecting their autonomy by providing the professional trying to reach a shared decision is an optimum conclusion that can be obtained out of any consultation regarding this topic. Breakthroughs in this field are still heavily studied and a change in the common preferable options of contraception may happen in the upcoming years.

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