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AN UPDATED PERSPECTIVE REVIEW ON BIRTH CONTROL PILL AND ITS IMPACT ON FEMALE HEALTH

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ABSTRACT
Birth control pills (BCPs), often known as oral contraceptive pills or OCPs, are becoming more and more popular across the world. Over 20% of people in 27 countries who are capable of becoming pregnant and are of reproductive age report using one of the 151 million OCP users that have been identified since 1994.OCPs can be prescribed for a number of conditions, such as menstruation problems, endometriosis, and polycystic ovarian syndrome, and they are often used to prevent unwanted pregnancies. Additionally, OCPs have been linked to a decreased risk of endometrial and ovarian cancer. However, the choice to take OCPs is unique and has to be carefully thought out, especially in light of evidence that some OCP user groups have increased rates of hypertension, cancer, cardiovascular disease (CVD), and venous thromboembolism (VTE). The modest amount of blood pressure (BP) elevation that can occur with OCP usage is unlikely to be clinically relevant, given the minimal absolute risk of CVD in otherwise healthy, reproductive-aged self-identifying women. However, OCP usage may raise a woman's risk to an intolerable degree if she has numerous significant risk factors.

KEYWORDS: Contraceptive, Pregnancy, Polycystic ovary syndrome, Endometrial cancer, Cardiovascular disease.

INTRODUCTION

Controlling pregnancy is the practice of using contraception. This might be an apparatus, a drug, a process, or a way of acting. With the help of contraception, a woman may take charge of her reproductive wellness and actively participate in family planning. The goal of contraceptive technologies is to overcome biology through technical advancements. The largest developments in female reproductive health, including more accessible medical treatments, equipment, and alternatives, have occurred in the 20th century. Counseling should take availability, acceptability, safety, and effectiveness of contraceptive options into consideration. A key tenet is that the selection of contraceptive techniques should be voluntary. Associative contraceptive counseling also significantly increases the likelihood that contraceptive methods will be successfully used. The purpose of birth control

methods is to stop conception, halt or reverse implantation, and stop growth. Less effectively, abstention during fertile times or withdrawal measures can prevent conception. Other procedures involve physically restricting the route (barrier methods or sterilization), hormonally altering the menstrual cycle (oral contraceptive (OC) tablets), or both. The application of a foreign object (intrauterine device, or IUD) or surgical removal might compromise implantation.[1]

An oral contraceptive, commonly known as a birth control pill, is a medication taken by mouth to avoid pregnancy. Birth control tablets function by thickening the cervical mucus, which prevents sperm from fertilizing the egg, and by preventing the ovaries from producing eggs.[2] There are two types of birth control pills: the "mini-pills" only contain progestin, while combination pills include both progestin and estrogen. Combination birth control tablets often have a somewhat higher effectiveness rate than progestin-only birth control tablets. There are two different sizes of combination pills: 21-day packs that contain 21 active tablets and 28-day packs that contain 21 active tablets and 7 inactive tablets. Seasonique and other extended-cycle medications comprise 84 active and 7 inactive tablets. The purpose of the inactive pills is to aid the lady in remembering when to begin taking a fresh pack of tablets. During the duration of taking the inactive tablets, the menstrual cycle takes place. There is no possibility that missing the inactive tablets may result in pregnancy. But it's crucial to take the active tablets and new pack on the appropriate day.[3]

ADVANTAGES TO THE BIRTH CONTROL PILL[4]

The contraceptive pill has a high degree of efficacy and may be reasonably convenient if used as directed. But for many women, there are additional benefits to taking the pill, such as.

1. Lighter, less frequent or no periods may be possible depending upon the type of pill taken and dosing schedule. The birth control pill can lessen heavy bleeding, pain and severity of endometriosis and fibroid tumors.
2. Reduce pain and cramping during menstruation.
3. Acne or premenstrual dysphoric disorder (PMDD) may improve with some birth control pills.
4. Prevent ovulation and pregnancy in women with primary ovarian insufficiency (POI).
5. The use of the birth control pill can lower the risk of pelvic inflammatory disease, uterine cancer and ovarian cancer.
6. The progestin-only forms may be used by women who are breast-feeding or cannot use estrogen for medical reasons.
7. Reduce the symptoms of endometriosis, polycystic ovary syndrome (PCOS), premenstrual syndrome or premenstrual dysphoric disorder (PMDD).

CLASSIFICATION OF BIRTH CONTROL PILL

1. On the basis of Dose[5]

A) Low- dose pill

This tablet is commonly referred to as "low dose" since it contains 35 µg of estrogen or less. For the majority of women, they are secure and efficient. Low dosage medications include, for instance.

a. Drospirenone and Ethinylestradiol (Yasmin)
b. Levonorgestrel and Ethinylestradiol (levora)
c. Norgestrel and Ethinylestradiol(lo/ovral-28),
d. Norgestimate and Ethinylestradiol (ortho – tricyclenlo).
e. Norethindrone and Ethinylestradiol (estrostep or ortho-novum).

B) Ultra-low dose pill choice

The 20µg of estrogen or less found in the tablet include
a. Norethindrone and ethinylestradiol (Loestrin Fe).
b. Levonorgestrel and Ethinylestradiol (Alesse).
c. Drospirenone and Ethinylestradiol and Ethinylestradiol (mircette) Drospirenone and Ethintlestradiol (Yaz).

2. On the basis of gender[6]

The various kinds of oral contraceptive drugs are

A) Female contraceptive pill: - There are 2 types of female oral contraceptive drug available.

- First one is combined oral contraceptive pill contains progesterone and estrogen and is taken once a day.
- The other kind of pill which is the progestin-only pill contains only progesterone and it is taken once a day.

B) Male contraceptive pill: - The male contraceptive pills are no longer marketed, it is chemically known as11-beta-methyl-19- norestoeteronedodecylcarbonate (11-betaMNTDC), it is a drug which shows the combined action of androgen and progesterone.

3. On the basis of combination

A) Progestin-only contraceptive pills[7]

This progestogen-only tablet contains ethynodiol, levonorgestrel, and norethisterone as active ingredients. Comparatively speaking, they are 96–97% less effective than combination oral contraceptives. The medication is taken continuously every day. The main mechanism of action is to make the cervical mucus uninhabitable for sperm. It is also likely that the progestogen prevents implantation. Another method of achieving effective contraception is to inject 150 mg of depot medroxyprogesterone acetate every three months. This is not the ideal preparation for ladies who intend to become pregnant shortly after ending their therapy. This is due to the fact that ovulation suppression may linger for up to 18 months following the last injection. The disadvantages include headaches, migraines, breast soreness, and irregular, sometimes heavy, menstrual flow. For some women (e.g., venous thrombosis, smoking, old age, and unacceptable increase in blood pressure) in whom estrogen is contraindicated, progestogen-only

contraceptives provide an appropriate alternative to the combination pill. Some brands of progestin-only birth control tablets are Errin, Camila, Heather, Jolivette, Nora-BE, and others. The following are more advantages of progestogen-only tablets:

- *Lactation:*Progestogen-only contraception does not reduce a lactating woman's milk supply or provide any harm to the unborn child. Menstrual symptoms: Due to their antimitotic and transformational actions on endometrial cells, contraceptive progestogens may lessen the frequency and intensity of uterine bleeding. Progestogens that limit ovulation and are contraceptive can lessen dysmenorrhea. Additionally, prostaglandin synthesis in the endometrium is inhibited or reduced by progestogens, increasing endometrial width.
- *Menstrual migraine*: Long-term use of a progestogen reduces the intensity of menstrual migraine.
- *Progestogens:* can reduce the endometrium's proliferative activity in endometriosis.

B) Combined oral contraceptives pill[8]

Estrogen and progesterone make up combined oral contraceptives, or COCs. In 1957, the United States launched the first COC to treat menstrual irregularities.When there is no concurrent disease or medication that may mix with other medications, the combination oral contraceptive pill is quite successful. Most combination preparations (second-generation tablets) contain ethinylestradiol as the estrogen; however, some preparations also contain mestranol. Progestogens include norethisterone, levonorgestrel, ethynodiol, or, in third-generation pills, desogestrel or gestodene, which are more potent, less androgenic, and alter lipoprotein metabolism less than second-generation preparations, but likely carry a higher risk of thromboembolism. Typically, the estrogen concentration ranges from 20 to 50 µg of ethinylestradiol or its equivalent. A preparation with the least amount of progestogen and estrogen that is well tolerated and provides effective cycle management for each particular woman is selected. There is a withdrawal bleeding when this combination medication is used for 21 days in a row, followed by 7 days without medication. Menstruation often resumes normally very quickly after medication is stopped, and lasting infertility is uncommon.

Examples of combination birth control pills include- Azurette, Balcoltra, Beyaz, Caziant Cryselle, Gianvi, Junel, Kariva, Kelnor, Levora, Loestrin 24 Fe, Nortrel , Ocella, Velivet , Yasmin, Yaz etc.

Combined pills formulation are available as monophasic, biphasic or tri-phasic preparations.[9]

- **Monophasic:** Each tablet containing a monophasic drug contains a set dose of progestin and estrogen. Starting on the fifth day of the menstrual cycle, the pill is taken every day for 21 days, after which there is a 7-day break during which bleeding happens.
- **Biphasic**: Biphasic or triphasic oral contraceptive formulations are also offered. It tracks menstrual cycles more precisely and requires less hormones. When using biphasic pills, progestin is administered for 11 days after 10 days of estrogens. Biphasic pills are not advised because of the danger of endometrial cancer following such biphasic hormone treatment.
- **Tri-phasic:** In tri-phasic formulations, progesterone dosages increase throughout the course of three consecutive menstrual phases, while estrogen levels are somewhat higher in the middle of the cycle. Triphasic pills with low doses of progestin and estrogen are highly effective and seldom produce negative effects. To finish the cycle, a woman who forgets to take one pill should take two the next day. many times.

4. On the basis of generation[6]

A) First-generation pill

Their levels of progestin and estrogen were greater. The first generation of progesterone tablets contained several artificial progesterones, such as ethynodiol diacetate, lynesterol, norethynodrel, and norethindrone. Because of the high concentrations, this generation has been associated with several adverse effects. They are no longer available on the market.

B) Second generation pill

They have far less hormones than when they were first used in the 1970s. Levonorgestrel and norethisterone are examples of progestin. Certain medications, such Loestrin, Microgynon, and Logynon, are still available.

C) Third generation pill

They start using progestins in the 1980s, including cyproterone acetate, gestodene, desogestrel, and norgestimate. Certain medications, such as Marvelon and Cilest, are still in use.

D) Fourth-generation pill

This tablet is the newest generation of combination medications that contain progestin, such as dienogest, drospirenone, or nomegestrol acetate. Yasmin (ethinylestradiol and drospirenone), Zoely (estradiol hemihydrate and mnomegestrol acetate), and Olaira (estradiolvalerate and dienogest) are examples of fourth-generation tablets.

Table 1: Common Birth Control Pills.[10,11]

Generic Name	Example Proprietary Name(s)	Description
desogestrel and ethinyl estradiol	Apri, Azurette, Caziant, Cyred, Cyred EQ, Emoquette, others	Combination progestin and estrogen pill; some packs may be triphasic
dienogest and estradiol valerate	Natazia	Quadraphasic progestin and estrogen pill
drospirenone	Slynd	Progestin-only birth control pills ("mini-pills"); for use in breast-feeding or high risk for blood clots.
drospirenone and estetrol	Nextstellis	First contraceptive pill containing estetrol, a naturally occurring estrogen produced from a plant source. Nextstellis may be less effective in females with a BMI ≥ 30 kg/m2.
drospirenone and ethinyl estradiol	Gianvi, Jasmiel, Loryna, Nikki, Ocella, Yasmin, Yaz, Zarah, others	Drospirenone-containing birth control pills may be associated with a higher risk for rare but serious blood clots (DVT, PE) compared to other progestin-containing pills.
drospirenone, ethinyl estradiol and levomefolate	Beyaz, Safyral, Tydemy	Drospirenone-containing birth control pills may be associated with a higher risk for rare but serious blood clots (DVT, PE) than other progestin-containing pills. Contains a daily dose of folate to lower rare neural tube defect risk.
ethynodiol and ethinyl estradiol	Kelnor 1/50, Zovia 1/35	Monophasic combination progestin and estrogen pill.
levonorgestrel and ethinyl estradiol	Afirmelle, Altavera, Amethyst, Ashlyna, Aubra, and others	Combination progestin and estrogen pill; some examples are triphasic, extended-cycle pills, or continuous-cycle pill.
norethindrone	Camila, Deblitane, Errin, Heather, Incassia, others	Progestin-only birth control pills ("mini-pills"); for use in breast-feeding or high risk for blood clots.
norethindrone and ethinyl estradiol	Alyacen 1/35, Alyacen 7/7/7, Aranelle, Aurovela 1.5/30, Aurovela 1/20, others	Combination progestin and estrogen pill; some are biphasic or triphasic.
norgestimate and ethinyl estradiol	Estarylla, Femynor, Mili, Mono-Linyah, Nymyo, others	Combination progestin and estrogen pill; some options are triphasic.
norgestrel	Opill	Over-the-counter (OTC) progestin only ("mini") pill, available without a prescription in March 2024 online and on shelves at pharmacies, grocery stores and other retailers.
norgestrel and ethinyl estradiol	Elinest, Low-Ogestrel-28, Cryselle 28, Ogestrel-28, others	Combination progestin and estrogen pill

BIRTH CONTROL PILLS IMPACT ON FEMALE HEALTH

Hormone levels are impacted by birth control tablets, which can have a number of negative impacts. These side effects might last longer but normally go away in two to three months. It is advised to discuss switching to a different brand or method of birth control with a healthcare practitioner if the negative effects are severe or persistent.

A. Common side-effects[12]

1. Spotting between periods

Vaginal bleeding that transpires in between menstrual cycles is referred to as breakthrough bleeding, or spotting. It could appear as brown discharge or minor bleeding. The most typical birth control adverse effect is spotting (Trusted Source). It occurs as a result of the uterus responding to a thinner lining and the body reacting to shifting hormone levels. Bleeding between periods can be avoided by taking the tablet as directed, generally every day and at the same time.

2. Breast tenderness

Breast tenderness is a common side effect of taking birth control tablets, especially in the early going. Tenderness in the breasts can be lessened by wearing a supportive bra. The hormones in the pill can cause the breasts to enlarge in addition to increasing breast sensitivity. When experiencing significant breast discomfort or other changes in the breasts, especially a new or changing breast lump, a person should consult their healthcare professional.

3. Nausea

Many individuals have minor nausea when initially taking the pill, but this generally disappears. Taking the tablet with meals or at bedtime may help. Birth control should not make people feel nauseous all the time. If the

nausea is severe or lasts for a few months, it is recommended to talk to a healthcare practitioner.

4. Headaches and migraine
Headaches and migraines can be brought on by or made more frequent by the hormones found in birth control tablets. Migraine may be brought on by variations in the female sex hormones, progesterone and estrogen. The kind and amount of the medication may affect the symptoms. Low dosage medications, for instance, are less likely to result in this symptom. However, if a person's migraine is accompanied by PMS, using the medication can actually lessen their symptoms.

5. Weight gain
Although investigation has not yet verified it, weight gain is frequently listed as a potential adverse effect of birth control tablets. Theoretically, using birth control tablets might cause an increase in water weight or fluid retention. They could also result in gains in muscle or fat mass. On the other hand, some users of the tablet can report losing weight instead.

6. Vaginal discharge
When using the pill, vaginal discharge may change. This might be a change in the kind of discharge or an increase or reduction in vaginal lubrication. Using lubricant can help make sexual activity more pleasant if the pill causes vaginal dryness and the person want to partake. While most of the time these changes are not dangerous, variations in color or smell may indicate an illness.

7 **Missed periods**
The usage of birth control tablets may result in skipped or extremely mild periods. The hormones they contain are the reason behind this. People can safely skip a period on the pill, depending on the kind of birth control. It is important to get a pregnancy test if someone thinks they could be pregnant. Although the birth control pill is incredibly effective, mishandled use can lead to pregnancy.

8. Decreased libido
Some people's libido, or sex desire, may be impacted by the pill. Hormonal shifts are to blame for this. Some people may have more libido if, for example, their PMS symptoms go away and they no longer worry about getting pregnant.

9. Eye changes
Studies has connected the pill's hormonal side effects to an increase in corneal thickness. This might indicate that contact lenses are no longer comfortably fit, but it does not imply an increased risk of eye illness.

10. Mood changes
A person's emotions and mood are greatly influenced by their hormones. The tablet may induce changes in hormone levels, which can have an impact on a person's mood. Certain studies, such as one conducted in 2016 on a million Danish women, point to a connection between depression and hormonal contraception. A person can speak with their healthcare practitioner if they are worried about changes in their mood. Switching medications might be helpful if the symptoms are related to the pill's usage.

B. Long-term effects
1. Cardiovascular problems[12]
Combo medications may somewhat raise your risk of major cardiovascular issues, including blood clots, heart attacks, and strokes. Some medications come with an increased risk. A medical professional can offer recommendations for good choices. Individuals with uncontrolled hypertension or a family or personal history of cardiovascular disease ought to see their healthcare professional regarding other forms of birth control.

2. Cancer
Observational research, including sizable prospective cohort studies and population-based case-control studies, account for nearly all of the evidence on the relationship between oral contraceptives and cancer risk. The use of oral contraceptives as an exposure in this instance cannot be proven to cause or prevent cancer based only on observational study data. This is due to the possibility that factors other than oral contraceptive usage separate women who use oral contraceptives from those who do not, and that it is these additional variables that account for the difference in cancer risk.
All things considered, these studies have consistently shown that women who take oral contraceptives had a higher risk of breast and cervical cancer, but a lower risk of endometrial, ovarian, and colon cancer.[13–15]

- **Breast cancer:** Data from nearly 150,000 women who took part in 54 epidemiologic studies were analyzed, and the results indicated that, generally, women who had ever used oral contraceptives had a slightly higher (7%) risk of breast cancer than those who had never used them. The risk was increased by 24% for women who were presently taking oral contraceptives, although it did not rise with time. After stopping the usage of oral contraceptives, risk decreased, and ten years later, there was no discernible increase in risk.[16]
- **Cervical cancer:** Compared to women who have never taken oral contraceptives, those who have used them for five or more years are at an increased risk of developing cervical cancer. A woman's chance of developing cervical cancer increases with the length of time she utilizes oral contraceptives. In one research, the risk increased by 10% for fewer than five years of usage, by 60% for five to nine years of use, and by twice as much for ten years or more of use. However, it has been discovered that when women cease taking oral contraceptives, their chance of developing cervical cancer gradually decreases.[17–19]

- **Endometrial cancer:**Compared to women who have never used oral contraceptives, those who have ever used them are at a decreased risk of developing endometrial cancer. At least 30% less danger is involved, and the longer oral contraceptives were used, the higher the risk decrease. Even when a woman stops taking oral contraceptives, the preventive effect lasts for many years. According to an examination of women taking part in the prospective NIH-AARP Diet and Health Study, long-term oral contraception users who were obese, smokers, or infrequent exercisers showed an especially noticeable reduction in risk.[20–22]
- **Ovarian cancer:** Compared to women who have never taken oral contraceptives, those who have ever used them have a 30% to 50% decreased chance of developing ovarian cancer. It has been discovered that this protection lasts for up to 30 years after a woman stops taking oral contraceptives and increases with the duration of oral contraceptive use. Use of oral contraceptives also lowers the risk of ovarian cancer in women with deleterious mutations in the BRCA1 or BRCA2 genes.[23–28]
- **Colorectal cancer:** Oral contraceptive use is associated with 15% to 20% lower risks of colorectal cancer. [29,30]

CONCLUSION

It goes without saying that the primary goals of using birth control pills are to avoid getting pregnant and control the menstrual cycle. The pill has several advantages, such as being a very practical and safe form of birth control, promoting sexual spontaneity, reducing the pain of menstrual cramps, causing lighter periods, and enabling users to alter the date and frequency of their periods or stop them entirely. OCP effectiveness is about 99% when taken consistently in accordance with prescribed dosage schedules. For the creation of new OCPs, a great deal more study and customization are required.

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