

A Narrative Review on Hormonal and Reversible Contraception: Advances, Options, and Implications for Reproductive Health

KRUSHAN SHAH¹, BHAGYESH SAPKALE², RAJESH GODAVARTHI³, KAMLESH CHAUDHARI⁴

ABSTRACT

This narrative-based systematic review aims to examine contraception, focusing on new developments and alternative techniques. Pregnant teenagers often face challenges regarding their social standing in society. To minimise teen pregnancy, the availability of services in terms of the supply of hormonal contraceptives and Long Acting Reversible Contraception (LARC) must be improved. There are many situations that require the use of Emergency Contraception (EC) to provide preventive measures after risky encounters. As there are currently no other male contraceptive options on the market, a male hormonal contraceptive is necessary. The market is primarily driven by contraceptive biomaterials, most of which are elastomers such as ethylene vinyl acetate and polydimethylsiloxane. Keywords from the Web of Science and PubMed databases included barrier techniques, LARC, contraception, and others. To maintain reliability and academic rigor, the inclusion criteria focused solely on English language research, reviews, and articles published in the last 10 years. Exploring new hormone combinations with better metabolic properties is an important aspect of the advanced conception of contraceptives. Lower androgenicity forms of natural chemicals and progestins are employed in LARC techniques to reduce thrombogenesis. Potential alternatives include transdermal systems and other vaginal rings. The sequelae, particularly the interactions between hormonal contraceptives and antiepileptic drugs, should also be discussed. Some types of contraception include tubal ligation through hysteroscopy, the impact of antiepileptic drugs on the effectiveness of hormonal contraceptives, and improved barrier methods of contraception. In certain medical contexts, Point of Care Contraceptives (POCCs) play important roles. This paper provides a comprehensive overview of contraceptives, their forms, and key considerations. The evaluation of LARC products for patient satisfaction, superior efficacy, and the promotion of condom use for the control of Sexually Transmitted Diseases (STDs) is also illustrated. According to this framework, reversible contraceptives provide people with greater control over family planning; Intrauterine Devices (IUDs) and subdermal implants are among the most effective contraceptive methods. The use of LARC techniques is discussed in this abstract, which underlines their importance and recognises that they are considered the most effective method of contraception when used regularly.

Keywords: Adolescents, Barrier, Emergency contraceptive, Implants, Long acting contraceptive, Progestin, Transdermal contraception

INTRODUCTION

Contraception is the act of preventing pregnancy. This can involve a tool, a drug, a process, or an attitude. One of the leading causes of disease and mortality worldwide is adolescent pregnancy. Teens who become pregnant tend to be less well-off, have lower educational attainment, and are more likely to experience poverty [1]. The best way to reduce adolescent pregnancies is to make LARC and hormonal contraceptives more widely available. If nursing is not undertaken, fertility typically returns within a month after the termination of a pregnancy [2]. The World Health Organisation has long advised against getting pregnant again for at least six months following a miscarriage and for one to two years following childbirth to lower the risk of an unfavourable pregnancy outcome [1,2].

In several situations, including unprotected sexual encounters, sexual assault, and contraceptive method failure, EC may help prevent pregnancy [3]. The effectiveness of female contraceptives in preventing unexpected pregnancy is well known; however, some women cannot use them due to health issues or side effects, leaving particular couples without access to effective contraception [4]. Currently, the available methods of male contraception that work well for confident men are vasectomy and condoms. Many teenagers struggle to access confidential contraceptive care and worry about their financial capacity to pay for contraceptives [5].

The intrauterine system Mirena serves as a specialised treatment for menorrhagia in addition to being a highly effective form of contraception [6]. Male and female sterilisation is becoming increasingly common, surpassing the contraceptive pill as the most popular form of birth control among couples [7]. Since condoms provide adequate protection against STDs, they will not be entirely supplanted by alternative methods. However, it is crucial to develop effective male hormonal contraception to offer men and couples more options when selecting long-term contraception, especially when female contraception poses serious side effects or other issues.

Due to their advantageous material properties and adaptability, well-known elastomers such as polydimethylsiloxane and ethylene vinyl acetate dominate the contraceptive biomaterials market [8]. Contraceptives reduce fertility by altering the normal functioning of cells in the reproductive system. The use of Combination Oral Contraceptives (COC) in obese women who have undergone thorough screening and do not have any known cardiovascular disease risk factors is important to note. Because of their greater body mass, obese women may experience a modest decrease in the effectiveness of COCs [9].

This research aims to summarise advancements in contraceptive innovation, diverse contraceptive strategies and considerations, and the optimal aspects of LARCs.

Advancements in Contraceptive Innovation

The method of avoiding pregnancy is called contraception. This may refer to a device, a drug, a process, or an action. Due to concerns about the negative consequences of hormonal contraceptives, novel combinations with improved metabolic profiles are being researched and developed. The US Food and Drug Administration (FDA) approved Enovid™ as the first hormonal contraceptive for use in the country in 1960 [10]. The IUDs and the birth control implant are examples of LARC.

To reduce thrombotic risk, recent advancements have included the use of natural substances such as Estradiol (E2) and Estradiol Valerate (E2V) in conjunction with novel progestins derived from the progesterone structure or from spironolactone, which are less likely to have androgenic side effects [11]. Millions of women use hormonal contraception in various forms worldwide. The synthetic progestogenic ingredient (progestin) utilised in these contraceptives varies in terms of dosage and type, delivery method, and the presence or absence of oestrogenic compounds [11].

The different side-effect profiles of progestins and contraceptive methods can affect cardiovascular health, increase susceptibility to infections, and influence cancers of the reproductive system [12]. Vaginal rings and transdermal contraceptive systems are promising new methods of preventing pregnancy [13]. It is essential to consider the potential for bidirectional interactions between hormonal contraceptives and antiepileptic medications (AEDs).

Diverse Contraceptive Strategies and Considerations

Hormonal contraceptives may be less effective when combined with Enzyme-Inducing Antiepileptic Drugs (EI-AEDs). It is advised to select a COC with a high progestin dose, significantly above the level required to block ovulation, and to take the COC continuously (extended cycle therapy) if EI-AEDs are used in conjunction with the COC [14]. Although they do not cause significant side effects, long acting reversible contraceptives can modify the menstrual cycle for approximately 75% of users [15]. There are more options available for women over 40 who have completed their families, such as vasectomy for male partners and tubal sterilisation for women. Older women are less likely to wish they had never been permanently sterilised. As hysteroscopic sterilisation requires less invasive surgery than traditional laparoscopic methods, there is a lower likelihood of serious complications [16]. The oldest techniques for controlling human fertility fall under the barrier class of contraceptives, which can be used alone or in conjunction with additional spermicidal agents [17].

Contemporary advancements have significantly enhanced the effectiveness and acceptability of barrier methods, making them essential tools for regulating fertility in the modern world. As oral contraceptives and IUDs became widely accessible, the usage of traditional diaphragms and condoms declined somewhat. In cases where oestrogen has absolute or relative contraindications, adverse effects from oestrogen-containing hormonal contraception, lactation, and the need for formulations that are comfortable and feasible for long-term use, progestin only contraceptives may be desirable [18]. Progestin is currently also used for EC.

Young IUD users have a modest and potentially non clinically relevant risk of adverse outcomes associated with pregnancy, perforation, infection, severe bleeding, or removal due to bleeding. However, younger women are more likely than older women to experience expulsion, particularly with Copper Intra-Uterine Contraceptive Devices (Cu-IUDs) [19]. The etonogestrel implant is a 4 cm by 2 mm ethylene vinyl acetate single rod. The implant contains 68 mg of etonogestrel, which breaks down into the active metabolite desogestrel after being released at a rate of 60 µg each day [20]. The primary method of action of this three-year-effective contraceptive

implant is to prevent ovulation. Contraceptive strategies are presented in [Table/Fig-1] [14-20].

Topic	Information
Long Acting Reversible Contraceptives (LARC)	About 75% of users may have changes to their menstrual cycle as a result of LARC
Contraception with EI-AEDs	When coupled with EI-AEDs, COC with a high progestin dose and continued usage is advised
Hysteroscopic sterilisation	Less intrusive than conventional laparoscopic techniques, which lowers the possibility of problems
Barrier class of contraceptives	Conventional condoms and diaphragms, with or without spermicidal drugs
Progestin-only contraceptives	Suitable for long-term usage, throughout lactation, and in situations when oestrogen is contraindicated
Progestin use for Emergency Contraception (EC)	Another use of progestin is Emergency Contraception (EC)
Young intra uterine devices users	There is little chance of unfavourable outcomes; younger women are more likely to experience expulsion, mainly when using Cu-Intra Uterine Devices
Etonogestrel implant	Etonogestrel, contained in 68 mg of the implant, releases gradually over time at 60 µg daily
Three-year-effective contraceptive implant (Implanon)	The primary mechanism is to suppress ovulation

[Table/Fig-1]: Contraceptive strategies [14-20].
LARC: Long acting reversible contraceptives;
EI-AED: Enzyme-inducing antiepileptic medications;
COC: Combined oral contraceptives;
Cu: Copper

Optimal Contraceptives

The IUDs are a highly effective means of contraception following unprotected sexual activity. IUDs should always be available as an emergency contraceptive option for patients who present after unprotected sexual activity, if clinically practical, because they are safe for most women, extremely effective, and affordable when used as continuous contraception [21]. Selective Progesterone Receptor Modulators (SPRMs) are being developed for vaginal ring delivery to overcome the shortcomings of existing hormonal therapies that impact efficacy and convenience of use [22]. Women who choose not to use oestrogens or who have contraindications to them should consider this approach.

By eliminating the requirement for daily dosage, a Contraceptive Vaginal Ring (CVR) may also enhance the efficacy of contraception [22,23]. The primary method of contraception provided by SPRMs is ovulation suppression. For teens and young women, LARC are as appealing as contraceptive tablets, patches, or rings [23]. IUDs and subdermal implants are the two methods with the highest satisfaction and 12-month continuation rates [24]. Patients should be offered LARC as their first choice, as they provide the highest level of contraceptive efficacy. Encouraging condom use specifically for the prevention of STDs may be especially crucial for LARC users who are susceptible to STDs, such as teenagers and young adults [25]. Although pre visit knowledge regarding IUDs and implants was high in our group of federally qualified health centres, it was not as high as that for depo-medroxyprogesterone acetate and oral contraceptive pills [26]. Physicians may find it challenging to insert and remove IUDs and contraceptive implants due to the rising usage of LARC. Factors such as extreme anteversion or retroversion, uterine tone during the postpartum phase, and lactation can present difficulties for IUD implantation [27]. The efficacy of LARCs is mentioned in [Table/Fig-2] [21-27].

Contraception for Transgender and Gender Nonconforming Patients

Additionally, transgender or gender nonconforming patients require special consideration when getting an IUD inserted, including the

Topic	Information
Selective Progesterone Receptor Modulators (SPRMs)	Creation of SPRMs for vaginal ring delivery in order to improve the convenience and effectiveness of contraception
Long Acting Reversible Contraception (LARC)	IUDs and subdermal implants are examples of LARC techniques that are quite successful and well-liked by patients
Encouraging condom usage	It is essential to emphasise condom use among LARC users, especially adolescents and young people, in order to prevent STDs
High patient satisfaction with LARC	IUDs and subdermal implants are two examples of LARC techniques that have excellent satisfaction and continuing rates
Benefits of reversible contraceptives	Reversible contraceptives combine effective unplanned birth prevention with procreation options, giving women the freedom to plan their pregnancies
Variety of reversible contraceptive options	Convenient and secure options include injections, IUDs, contraceptive implants, and birth control pills
The effectiveness of LARC compared to birth control pills	Because LARC methods are used continuously, they are more effective than birth control tablets, with a 99% efficacy rate.

[Table/Fig-2]: Long Acting Reversible Contraceptives (LARC) and their efficacy [21-27].
 SPRMs: Selective progesterone receptor modulators;
 LARC: Long acting reversible contraception;
 STDs: Sexually transmitted diseases;
 IUDs: Intra uterine devices

management of vaginal atrophy and the provision of psychosocial assistance. The most successful forms of contraception, with the highest rates of patient satisfaction and continuation, are LARC, such as IUDs and subdermal implants [28].

Reversible methods of birth control allow individuals to time when they wish to conceive, enabling them to plan for their children. These techniques allow women to conceive in the future while simultaneously offering effective measures to avoid unwanted pregnancies. Some common reversible contraceptives include birth control tablets, IUDs, and contraceptive implants and injections [29]. These methods are easily accessible, reliable, and safe, with options available to suit diverse needs and preferences.

Safe contraception empowers individuals to plan for a family by granting them the opportunity to determine when they should conceive. A LARC is, in fact, the best birth control option available. When taken correctly, birth control tablets offer the same degree of effectiveness as LARCs, with an efficiency rating of 99%. However, many people neglect to take them consistently, leading to a decrease in their effectiveness to around 91% [30].

CONCLUSION(S)

The narrative review of contraception and current literature provides a broad overview of the topic. The history of contraception-from the first hormonal approaches in the 1960s to present findings aimed at enhancing efficacy and safety-was thoroughly considered in the article. New techniques often combine innovative progestins with natural compounds to overcome issues associated with hormonal contraception. We explored several different methods of contraception, including traditional diaphragms and condoms, hormonal products, barrier methods, and progestin-only products. Methods that come much closer to perfect acceptability and effectiveness are needed for modern fertility control. We reviewed all the broad categories of contraceptive techniques, from the classic use of diaphragms and condoms to hormonal options, barrier methods, and finally, progestin-only options. We emphasised the use of the most modern methods of contraception, such as IUDs and newer options like vaginally administered SPRM. These methods would be safe and reliable for women who cannot take oestrogen. Another option that stood out as particularly popular and effective was LARC. We encouraged the use of condoms for LARC users who are at risk for STDs. We also addressed the challenges healthcare providers may face as LARC becomes more

widely used. With reversible methods of contraception, individuals can plan for their children and exert a level of control over their reproductive lives. These methods are effective, reliable, and safe ways to prevent unwanted pregnancies. Finally, we highlighted that LARC methods have a 99% success rate and are nearly as effective as birth control tablets when used consistently.

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PARTICULARS OF CONTRIBUTORS:

1. Undergraduate Student, Department of Medicine, Jawaharlal Nehru Medical College, Datta Meghe Institute of Higher Education and Research, Wardha, Maharashtra, India.
2. Undergraduate Student, Department of Medicine, Jawaharlal Nehru Medical College, Datta Meghe Institute of Higher Education and Research, Wardha, Maharashtra, India.
3. Assistant Professor, Department of Pharmacology, Jawaharlal Nehru Medical College, Datta Meghe Institute of Higher Education and Research, Wardha, Maharashtra, India.
4. Professor, Department of Obstetrics and Gynaecology, Jawaharlal Nehru Medical College, Datta Meghe Institute of Higher Education and Research, Wardha, Maharashtra, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Krushan Shah,
Undergraduate Student, Department of Medicine, Jawaharlal Nehru Medical College, Datta Meghe Institute of Higher Education and Research, Wardha-442001, Maharashtra, India.
E-mail: shahkrushan@gmail.com

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