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INTRAVAGINAL DRUG DELIVERY AS AN ALTERNATIVE THERAPUTIC STRATEGY IN POLYCYSTIC OVARIAN SYNDROME

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Abstract

A significant number of women of reproductive age struggle with PCOS, a complicated endocrine illness that frequently results in hormonal imbalance, irregular menstruation, and infertility. Systemic drug delivery is a common component of conventional treatment procedures, which may lead to systemic adverse effects and less than ideal therapeutic results. The purpose of this project is to create and assess an intravaginal drug delivery device as a targeted, sustained-release treatment method for PCOS symptoms. Metformin and clomiphene citrate, two medications frequently used to treat PCOS, were put into a mucoadhesive intravaginal gel that was created utilizing biocompatible polymers. PH compatibility, viscosity, drug release profile, mucoadhesive strength, and in vitro cytotoxicity were assessed for the formulation.The results showed excellent mucoadhesive qualities, appropriate pH and viscosity for vaginal administration, and sustained drug release over a 24-hour period. With the promise for improved therapeutic efficacy and decreased systemic exposure, the intravaginal method offered targeted medication delivery. With the goal of enhancing patient compliance and therapeutic results, this administration method presents a viable substitute for oral medication for PCOS.

INTRODUCTION

A common hormonal condition that affects women of reproductive age is called polycystic ovarian syndrome, or PCOS. Menstrual abnormalities, infertility, hirsutism (excessive hair growth), acne, and a greater chance of metabolic illnesses are among the symptoms it causes. Oral drugs like insulin, anti-androgens, sensitizers, and oral contraceptives are frequently used in traditional PCOS therapies. However, because of their oral administration and long-term use, these therapies may be linked to systemic side effects and decreased patient compliance.

By delivering drugs directly to the site of action (the vaginal mucosa), an intravaginal drug delivery system (IDDS) shows a potential solution to these problems. This localized delivery method can improve the results of treatment by providing sustained drug release in time, increase bioavailability, and reduce the systemic side effects frequently associated with oral medications.

The Rotterdam 2003 criteria are crucial diagnostic tools used in the biochemical and clinical evaluation of PCOS. Although the exact cause of PCOS is still unknown, researchers have found a number of contributing factors, such as metabolic disorders, environmental factors, and family history. Reactive oxygen species (ROS) production increases in women with PCOS, indicating increased oxidative stress. Up to 90% of women with PCOS have a high body mass index (BMI), which worsens insulin resistance and promotes the development of diabetes.

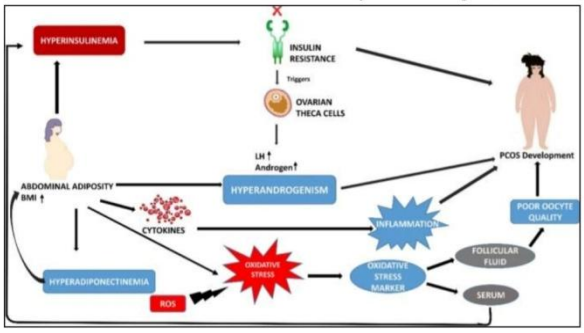

Figure 01: polycystic ovary syndrome

In clinical practice, anovulation fertility problems affect 75% of women with PCOS, and ongoing pregnancy loss affects 50% of them. The exact cause and treatment of

PCOS are yet unknown. Computed tomography scanning, magnetic resonance imaging, and ultrasound are frequently used to detect PCOS. The basic features of polycystic ovarian syndrome, such as the symptoms' variety and unpredictability throughout several ranges, make diagnosis challenging. Oligomenorrhea or amenorrhea, infertility, and an appearance of cystic ovaries-which are first seen during laparotomy and verified by biopsy-are signs of PCOS.

Because intravenous drug delivery systems provide a controlled and delayed release of medication, many patients are attracted to them. Patients find these systems interesting because of this. These systems can treat a wide range of potential health issues, including viral infections and hormone imbalances. There is a link to a significant study on intravaginal medication delivery that details special formulations and how they affect treatment outcomes after administration.

Polycystic ovarian syndrome (PCOS) is a hormonal and metabolic disorder that is not curable, poorly understood, and challenging to treat. It was unclear how much food habits affected the PCOS profile. Dehydroepiandrosterone (DHEA) stimulates ovarian fibrosis in a rat model of polycystic ovarian syndrome (PCOS) (and others 2018). This finding was made by Mr. Wang D.

OBJECTIVES

1. To understand the pathophysiology of PCOS

To review the hormonal, metabolic, and reproductive abnormalities associated with PCOS and their relevance to targeted drug delivery approaches.

2. To analyze limitations of conventional oral therapies

To critically examine the drawbacks of existing oral drug therapies used in PCOS, including first-pass metabolism, systemic side effects, and reduced patient compliance.

3. To explore the rationale for intravaginal drug delivery in PCOS

To assess the anatomical and physiological advantages of the vaginal route that makes it suitable for hormonal and non-hormonal drug delivery in PCOS management.

4. To review various intravaginal dosage forms used in PCOS

To study different vaginal drug delivery systems such as tablets, gels, suppositories, films, and vaginal rings, with emphasis on their design and drug release behavior.

5. To evaluate drug absorption and release mechanisms

To understand how drugs are absorbed through the vaginal mucosa and how formulation strategies influence bioavailability and therapeutic effectiveness.

6. To compare intravaginal delivery with conventional routes

To compare intravaginal drug delivery systems with oral and other systemic routes in terms of efficacy, safety, bioavailability, and patient adherence.

7. To assess patient acceptability and compliance

To evaluate factors influencing patient comfort, cultural acceptance, ease of use, and adherence associated with intravaginal drug delivery systems.

8. To examine challenges and formulation limitations

To identify challenges such as variability in vaginal physiology, pH changes, formulation stability, and potential irritation affecting intravaginal drug delivery.

9. To review recent advancements in vaginal drug delivery technologies

To analyze the role of bioadhesive polymers, controlled-release systems, and nanotechnology-based carriers in improving intravaginal drug delivery for PCOS.

10. To identify future research directions

To highlight gaps in current research and propose future strategies for the development of safer, more effective intravaginal drug delivery systems for PCOS.

CONCLUSION

The development of an intravaginal medication delivery system it is an option for traditional oral treatments for the treatment of polycystic ovary syndrome (PCOS). This discovery has an opportunity to give women a more convenient and effective treatment option by increasing drug absorption, reducing systemic adverse effects, and offering a focused approach to managing PCOS symptoms. The results of this study may contribute to the expanding fields of personalized medicine and localized drug administration by opening the door to the development of new intravaginal delivery methods for a range of gynecological illnesses. Additionally, the results may have greater consequences. To improve PCOS-affected women's quality of life and increase patient compliance.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

AUTHOR CONTRIBUTION

All are contributed equally

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ETHICAL CONSIDERATIONS AND INFORM CONSENT

Not Applicable.

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