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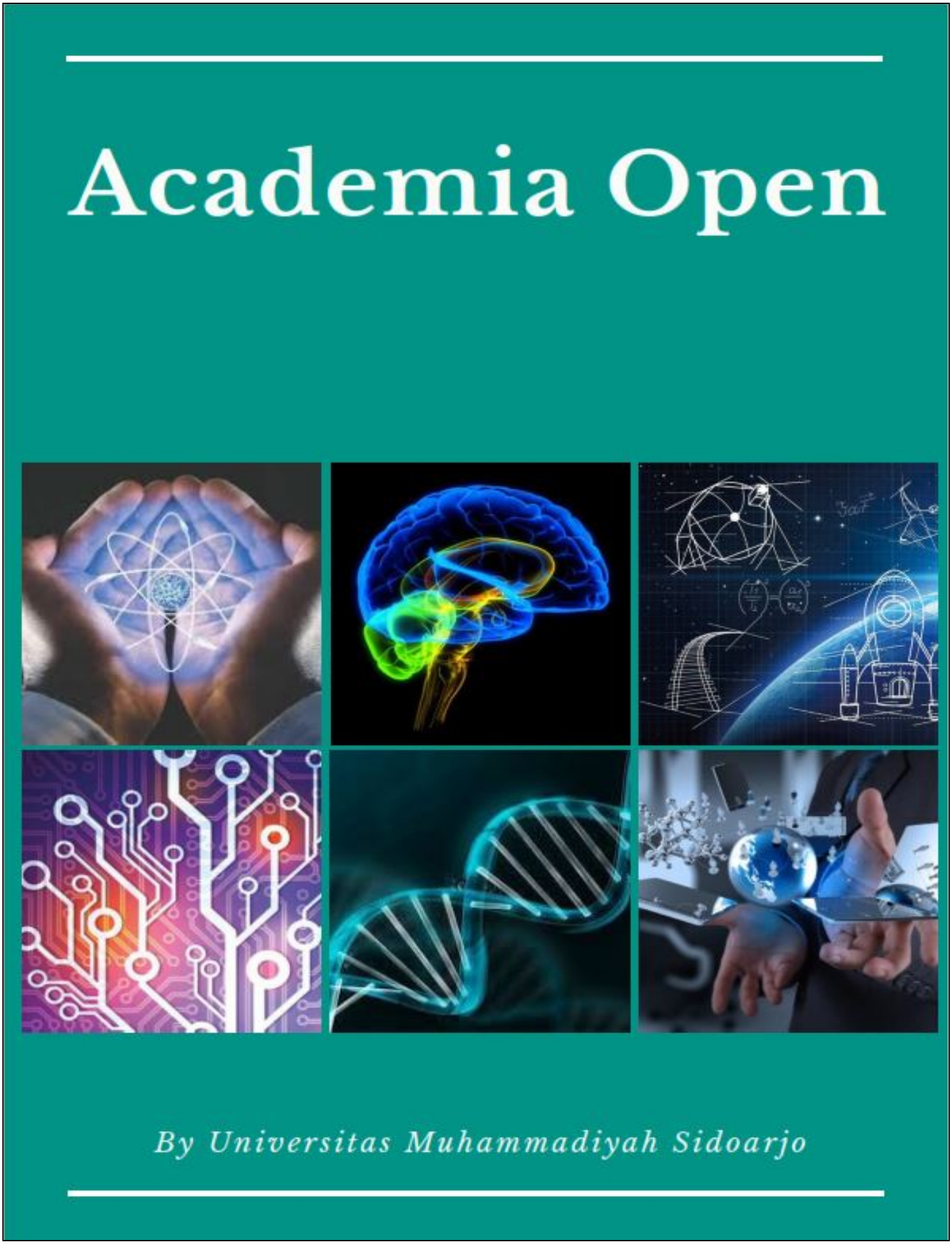

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Female Infertility: Exploring Biological Causes and Advanced Therapeutic Approaches

Ketidaksuburan Wanita: Menjelajahi Penyebab Biologis dan Pendekatan Terapi Tingkat Lanjut

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Abstract

Female infertility is a complex subject with numerous medical factors that are potentially devastating to a woman's fertility. It is caused by conditions such as hormonal imbalances, structural anomalies and genetic susceptibility. In the present review, focus will be made on the understanding of the biological factors of female infertility and presentation of recent developments in medical management, medical treatments, assisted reproductive technology and molecular and developmental biology. Thus, the goal of this paper is to improve knowledge and practice considerations regarding female infertility by presenting a broad perspective.

Highlights:

1. Causes: Hormonal, structural, genetic factors affect fertility.
2. Advances: Medical treatments, assisted reproduction, molecular biology progress.
3. Goal: Enhance knowledge and practices on female infertility management.

Keywords: Infertility in women, Women's reproductive system, Endocrine disorders, IVF treatment, Gene therapy

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Introduction

A fertility disorder in women is multifactorial and difficult diagnostic as well as therapeutic process concerning millions of women and their co partners globally(1) . Infertility is defined as the failure to achieve pregnancy within one year of unprotected, mutually satisfying sexual activity and may have biological roots that stem from hormonal incongruities, anatomical or genetic outliers. This review seeks to present a synthesis of knowledge about female infertility including its causes, presentation and method of diagnosis. Moreover, we unpack promising therapeutic approaches, including pharmacological therapies, ART, and new molecular theranostics, all of which have promises to enhance the efficiencies in therapies' deliveries. Stress is laid on the early detection and development of a tailored approach for the management of this complex health problem with an aim of improving fertility(2). In conclusion, let us draw attention to the further multiple research aimed at the discovery of the main factors of female infertility, and to create innovative therapies that target the root of the problem(3).

Methods

For this review, we searched PubMed, Web of Science, EBSCO, Scopus, Google Scholar, Directory of Open Access Journals (DOAJ), and Embase using different keywords, including: fertility disorders in women, hormonal contraception, abnormalities in the reproductive system, artificial insemination, Gene therapy and molecular medicine and hereditary factors contributing to infertility.

Result and Discussion

Etiology and Pathophysiology

Female infertility is a complex condition due to several biological factors that inhibit natural physiological masculinity of conception. Some of the recognizable predisposing factors encompass hormonal imbalances for example PCOS, thyroid diseases, and hyperprolactinemia. Among other factors, there are anatomic disorders such as, uterine fibroid, endometriosis and tubal blockage. Moreover, because many affected genes are involved in reproductive physiology, there is a genetic component to infertility in some women, such as gene mutations related to reproduction and sexually linked chromosomal disorders(4-5).

Female infertility is complex and causes include impaired ovarian follicular development, ovulation, fertilization or implantation. Hormonal factors may cause anovulation or irregular ovularity while structural factors hinder the movement of gametes or the attachment of the embryo to the wall of the uterus. When genetic factors contribute to infertility, there is often a problem with gamete or embryo development. These biological disruptions are normally interrelated and; therefore, diagnosis and treatment can be quite challenging(6-7).

Clinical Presentation

Infertility as a clinical sign in women as reflected by primary and secondary diagnoses is consequently multifaceted and closely relates to the etiology. Some of the most frequent manifestations of endocrine disorders in women are given: nonregular menstrual cycle, amenorrhea, pain in the pelvic region, manifesting hormonal dysfunction symptoms, including hirsutism or acne in women with PCOS. The disease migrates and some women may be symptomless until attempts at conception have failed, therefore the need to have checkups(8).

Application to Health Policy, Practice, Research and Medicine

Female infertility is a common problem requiring proper detection and treatment to enhance quality of childbearing among women. Diagnosis at an early stage may be a problem given the many possible etiological factors involved and that some conditions maybe asymptotic. Integration of improved efforts is required for development of fertility evaluations and treatments polices in public health to reach more patients, especially in the remote areas. To go a step further, more studies are needed to gain better insight into the biology of fertility problems and to identify and focus on the specific pathophysiological factors for which treatment could be designed(10).

This work outlines the process of diagnosing female infertility.

Female infertility assessment is normally a clinical and lab analysis as well as imaging studies for diagnosis. LH, FSH, and AMH are hormones that give information about the ovarian dynamic and reserve. Pelvic ultrasound and hysterosalpingography are some of the imaging methods used in identifying structural problems like fibroids, ovarian cysts or blocked tubes. Hypnogenic examination methods, for example, genetic, may identify chromosomal or molecular causes of infertility(11).

Non surgical treatment of female infertility

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Since the management of female infertility entails a team of gynecologists, endocrinologists, and reproductive specialists, it is recommended that the respective articles reviewed in the present paper should be read by such professionals. The management of PCOS depends on the aetiology and may involve drug treatments like hormones; ovulation induction with clomiphene citrate and gonadotropins. IVF and ICSI are preeminent for handling such cases as infertility treatments involve the use of ART. Newer methods of treatment including molecular or gene targeting also appears to be the future of therapy(12).

Leading Causes and Diagnosis of Female Infertility

Depending on the etiology the prognosis may vary, the age of the patient, and the period when the intervention was done. It helps to diagnose the problem at an early stage, then to choose the proper therapy that can increase the chances of conception. Where couples require ART there has been an improvement in the technologies alongside the protocols making higher success rate. To ensure optimal outcome and adequate managing of the complication, close long-term follow up is highly recommended(13).

Conclusion

Female infertility is a disease of complex etiology which affects a woman to the personal and social extent. Timely identification, correct and suitable treatment should be considered as significant factors in enhancing the results. It focuses on the biological factors and recent developments in the treatment of female infertility and provides recommendations for clinical and political practice to improve the approach to and management of this important health concern

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