PREDICTION OF POLYCYSTIC OVARY SYNDROME (PCOS) DIAGNOSIS USING ARTIFICIAL NEURAL NETWORK ALGORITHM

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Chapter 2

Literature Review

2.1 Introduction

Polycystic ovary syndrome (PCOS) is a common hormonal disorder affecting women of childbearing age. It typically starts during adolescence and its symptoms can change over time. PCOS can lead to hormonal imbalances, irregular menstrual cycles, elevated levels of androgens (male hormones), and the development of ovarian cysts. These irregular menstrual cycles often involve a lack of ovulation, which can make it difficult for women to conceive. PCOS is a leading cause of infertility in women. PCOS is a chronic condition without a known cure. However, lifestyle adjustments, medications, and fertility treatments can help manage some of its symptoms. The exact cause of PCOS remains unclear, but genetics and conditions like type 2 diabetes may increase the likelihood of developing it. (World Health Organization: WHO & World Health Organization: WHO, 2023)

2.2 Historical Context and Global Perspectives

Historically, the understanding of PCOS has evolved significantly. First described in 1935 by Stein and Leventhal, PCOS was initially characterized by the presence of multiple ovarian cysts. Over the decades, research has expanded this definition to encompass a broader spectrum of symptoms and associated metabolic issues. Globally, PCOS affects an estimated 5-10% of women of reproductive age, with variations in prevalence based on diagnostic criteria and population studies. (Dai et al., 2022)

In Western countries, extensive research has been conducted to understand the genetic, hormonal, and environmental factors contributing to PCOS. However, the global perspective reveals disparities in research focus and healthcare resources, particularly in developing regions where cultural, economic, and healthcare system differences influence the diagnosis and management of PCOS. The incidence of ovarian

syndrome varies among different ethnic groups, with certain populations experiencing higher rates and potentially more complications, particularly those related to metabolic issues. The physical and emotional impacts of ovarian syndrome, especially concerning obesity, body image, and infertility, can contribute to mental health challenges and social stigma.

2.3 Regional Insights and Gaps in Research

Despite the global prevalence of PCOS, there is a notable gap in research focusing on region-specific factors. For instance, in South Asia and the Middle East, cultural practices, dietary habits, and genetic predispositions may significantly influence the manifestation and management of PCOS. However, these regions often lack comprehensive studies that account for these unique factors, leading to a one-size-fits-all approach in diagnosis and treatment. Moreover, existing studies often face limitations such as small sample sizes, inadequate control groups, and inconsistent diagnostic criteria, which hinder the ability to draw definitive conclusions. This is particularly problematic in regions with limited healthcare infrastructure, where misdiagnosis or underdiagnosis of PCOS can have severe implications for women's health.

2.4 Methodological Considerations in PCOS Research

A critical review of existing literature highlights the diverse methodologies employed in PCOS research, ranging from clinical trials to population-based studies. Key studies often utilize hormone profiling, ultrasound imaging, and genetic analyses to identify markers of PCOS. However, the heterogeneity in study design, sample characteristics, and diagnostic criteria presents challenges in synthesizing findings across studies. For example, while some studies focus on the biochemical aspects of PCOS, others emphasize its clinical manifestations or metabolic consequences. This diversity underscores the need for standardized diagnostic criteria and multi-

disciplinary approaches that integrate endocrinology, gynecology, genetics, and epidemiology to fully understand the syndrome's complexity.

2.5 identifying the Research Gaps

The review of literature also reveals several critical gaps in PCOS research. Firstly, there is a lack of longitudinal studies that track the progression of PCOS symptoms and associated health risks over time. Such studies are essential to understand the long-term impacts of PCOS and the effectiveness of various management strategies. Secondly, there is a need for more research into the psychosocial aspects of PCOS. Women with PCOS often experience significant psychological distress, including anxiety, depression, and body image issues, which are not adequately addressed in many studies. Understanding these dimensions is crucial for developing holistic treatment approaches that address both the physical and mental health aspects of PCOS. Thirdly, region-specific studies that consider cultural, dietary, and genetic factors are urgently needed. These studies can provide insights into how PCOS manifests differently across populations and inform tailored healthcare strategies that are culturally sensitive and effective.