Effects of GLP-1 Receptor Agonists on Polycystic Ovary Syndrome

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Abstract

Polycystic ovary syndrome (PCOS) is a widespread endocrine disorder linked to obesity, insulin resistance, and hormonal imbalance, often resulting in both metabolic and reproductive complications. This study evaluates the potential role of GLP-1 receptor agonists, medications initially developed for type 2 diabetes and weight management, in treating obesity-related PCOS. Current evidence indicates that these therapies can support weight loss, enhance insulin sensitivity, and lower androgen levels. In individuals with PCOS, these effects may lead to improvements in both metabolic health and reproductive function. Together, these findings highlight the potential of GLP-1–based therapies as a comprehensive approach to managing PCOS, although additional research is necessary to clarify long-term outcomes. Future work should investigate appropriate dosing strategies and assess long-term safety across diverse populations. It is also important to examine their effects on fertility and ovulatory function in clinical settings. Overall, GLP-1 receptor agonists offer a promising pathway for more integrated and effective PCOS treatment.

Introduction

Polycystic ovary syndrome (PCOS) is one of the most common endocrine disorders affecting women of reproductive age, with widespread impacts on both metabolic and reproductive health[1,2]. It is characterized by hormonal imbalance, insulin resistance, and often obesity, all of which contribute to complications such as infertility, irregular menstrual cycles, and increased risk of type 2 diabetes[2,3]. Insulin resistance plays a central role in PCOS by promoting excess androgen production and disrupting normal ovarian function, creating a cycle that worsens both metabolic and hormonal dysfunction[3].

Current treatment approaches, including lifestyle modification, metformin, and hormonal therapies, primarily target individual symptoms and may not fully address the complexity of the condition[2]. This highlights the need for more comprehensive treatment strategies that target both metabolic and reproductive pathways simultaneously.

GLP-1 receptor agonists, originally developed for type 2 diabetes and weight management, have recently gained attention as a potential therapeutic option for PCOS[1,4]. These medications improve insulin sensitivity, promote weight loss, and may influence hormonal regulation. The objective of this study is to evaluate the effects of GLP-1 receptor agonists on metabolic health and hormonal balance in women with obesity-related PCOS.

Overview of PCOS pathophysiology highlighting the central role of insulin resistance and hyperandrogenism, leading to reproductive and metabolic dysfunction.

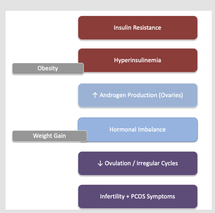

Figure 1. Overview of PCOS pathophysiology highlighting the central role of insulin resistance and hyperandrogenism, leading to reproductive and metabolic dysfunction.

Materials

This study was conducted as a structured literature review focusing on the effects of GLP-1 receptor agonists in women with obesity-associated polycystic ovary syndrome (PCOS). Peer-reviewed journal articles, systematic reviews, and randomized controlled trials were used as primary sources of data. Literature was obtained through academic databases including PubMed, Google Scholar, and MEDLINE.

Key materials included published clinical studies evaluating GLP-1 receptor agonists such as semaglutide, liraglutide, and other incretin-based therapies[2,4]. A recent meta-analysis of randomized controlled trials examining weight loss and hormonal regulation in women with PCOS was also included as a central reference. Additional review articles and clinical studies were selected to provide background on PCOS pathophysiology, insulin resistance, and current treatment approaches [1,3].

Methodology

A structured review approach was used to evaluate the impact of GLP-1 receptor agonists on metabolic and hormonal outcomes in women with polycystic ovary syndrome (PCOS). Relevant studies were identified using targeted keyword searches and screened in multiple stages. Titles and abstracts were first reviewed to remove unrelated studies, followed by full-text evaluation of remaining articles for eligibility.

Studies were included if they investigated GLP-1–based therapies in women diagnosed with PCOS and reported outcomes related to weight loss, insulin resistance, or hormonal changes[2,4]. Studies were excluded if they did not focus on PCOS populations or lacked measurable metabolic or reproductive outcomes.

Selected studies were then systematically reviewed, and key findings were organized by outcome category, including body weight, insulin sensitivity, androgen levels, and ovulatory function. Trends across studies were compared to assess consistency in therapeutic effects.

*Figure2. PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses; PCOS: polycystic ovary syndr*ome.

The PRISMA-style flow diagram outlines the multi-step screening process used to identify relevant literature for this study. Records were initially identified through database searches and subsequently screened based on title and abstract to remove unrelated studies. Full-text articles were then assessed for eligibility using predefined inclusion and exclusion criteria. Studies were included if they evaluated the effects of GLP-1 receptor agonists on metabolic or hormonal outcomes in women with PCOS. Studies that did not focus on PCOS populations or lacked relevant outcome measures were excluded.

Following this process, a final set of studies was selected for qualitative analysis. These studies were further evaluated to compare the effects of GLP-1–based therapies on key outcomes, including weight loss, insulin sensitivity, androgen levels, and reproductive function.

Results

Clinical evidence consistently demonstrates that GLP-1 receptor agonists produce meaningful improvements in weight and metabolic outcomes in women with PCOS[2,4]. As shown in Figure 3, patients treated with GLP-1–based therapies experienced significant reductions in body weight over one year, with a median weight loss of approximately 11.5%. Notably, more than half of patients (55.8%) achieved greater than 10% weight loss, highlighting the effectiveness of these medications in addressing obesity, a key driver of PCOS pathophysiology[4].

In addition to weight reduction, studies reported improvements in insulin sensitivity and glycemic control, which are critical factors in reducing hyperinsulinemia and subsequent androgen excess[2,3]. These metabolic improvements are closely linked to better hormonal regulation and may contribute to improved ovulatory function and reproductive outcomes[1].

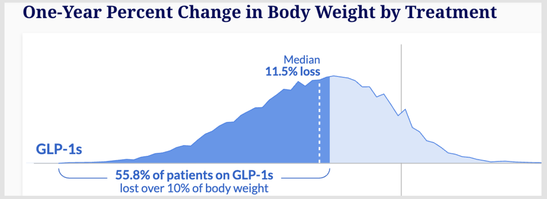

Figure 3. The average distribution of one-year weight change among patients with PCOS by treatment type.

Trends in prescribing patterns further support the increasing clinical relevance of GLP-1 therapies. As illustrated in Figure 4, the use of GLP-1–based medications, including semaglutide and tirzepatide, has increased over time among women with PCOS[2]. This shift reflects growing recognition of their dual role in managing both metabolic dysfunction and hormonal imbalance.

Overall, the findings suggest that GLP-1 receptor agonists provide a more comprehensive treatment approach compared to traditional therapies that primarily target individual symptoms. By addressing underlying metabolic dysfunction, these therapies may interrupt the cycle of insulin resistance and hyperandrogenism that characterizes PCOS[3].

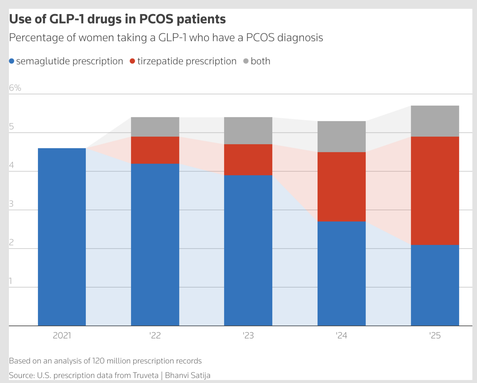

Figure 4. Trends in GLP-1 medication use among women with PCOS from 2021 to 2025. The increasing use of semaglutide and tirzepatide highlights the growing role of GLP-1–based therapies in managing metabolic and hormonal aspects of PCOS.

Conclusion

GLP-1 receptor agonists show increasing potential as an effective treatment for obesity-associated polycystic ovary syndrome (PCOS). Evidence from current studies shows consistent improvements in weight loss, insulin sensitivity, and hormonal regulation, all of which are key factors in the progression of PCOS[2,4]. By targeting underlying metabolic dysfunction, these therapies may help disrupt the cycle of insulin resistance and hyperandrogenism that contributes to both metabolic and reproductive complications[3].

Compared to traditional treatments that primarily address individual symptoms, GLP-1–based therapies offer a more comprehensive approach to managing PCOS[2]. The increasing clinical use of these medications further supports their relevance in modern treatment strategies.

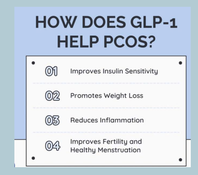

Figure 5. illustrates how GLP-1 receptor agonists support PCOS management

Recommendations

The findings from this review suggest that GLP-1 receptor agonists may serve as a valuable addition to current treatment strategies for women with PCOS, especially for those experiencing obesity and insulin resistance[2,4]. Incorporating these therapies into clinical care could provide a more comprehensive approach by addressing both metabolic dysfunction and hormonal imbalance at the same time. Healthcare providers should consider combining GLP-1–based treatments with lifestyle modifications, including nutrition and physical activity, to enhance overall effectiveness[3].

Treatment plans should also be tailored to individual patient needs, taking into account factors such as symptom severity, metabolic profile, and reproductive goals.

Further investigation is needed to better understand the long-term effects of these medications, including their safety, optimal duration of use, and potential role in improving fertility outcomes.

Increasing clinical awareness and accessibility of GLP-1 therapies may also contribute to improved management and quality of life for individuals with PCOS.

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