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The impact of GLP-1 analogues on fertility restoration in patients with Polyendocrine Metabolic Ovarian Syndrome (PMOS) - Narrative Review

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Background. The Polyendocrine Metabolic Ovarian Syndrome (PMOS), previously named as Polycystic Ovary Syndrome (PCOS) is common endocrine and metabolic disorder. It is the main cause of female infertility. The manifestation is heterogeneous and contain coexisting hyperandrogenism, obesity, insulin resistance. The PMOS-associated infertility treatment is multidisciplinary process involving pharmacotherapy, diet and lifestyle changes. Synthetic analogues of endogenous GLP-1 (GLP-1 Ras) are register for treatment of type 2 diabetes and obesity.

Aim. This study aimed to assess the effectiveness of GLP-1 RAs in improving reproductive outcomes in women with PMOS.

Material and methods. Narrative literature review was conducted through a search of electronic databases: PubMed and Google Scholar. The search covered clinical trials, observational studies and articles from 2020–2026 and used combinations of the following keywords: “polycystic ovary syndrome”, “GLP 1 analogues”, ”infertility” and related terms. Additional articles were identified by screening reference lists of key publications.

Results. Clinical study revealed that GLP-1 Ras decrease body weight as well as improve metabolic) and hormonal parameters in patients with PMOS. GLP-1 Ras contribute to restoring the function of the hypothalamus–pituitary–ovarian axis. In addition, their improve menstrual regularity, in women with PMOS as well as pregnancy and ovulation rates. GLP-1 RAs may enhance spontaneous and IVF pregnancy and ovulation rates and exert suppression of pro-inflammatory agents and recovering maternal-fetal immune tolerance.

Conclusions. Collectively, the broad metabolic, hormonal and immunometabolic effects of GLP-1 RAs make them a valuable therapeutic strategy for improving fertility outcomes in obese women with PMOS, although the further studies are required—particularly those assessing their safety during the preconception period.

Key words: polyendocrine metabolic ovarian syndrome/ PMOS/ polycystic ovary syndrome/ PCOS/ GLP-1 analogues/ fertility/ infertility/ female/ reproduction

1. Introduction

Infertility represents a major public health concern, affecting millions of individuals and couples worldwide and carrying substantial social, emotional, and economic consequences. Its prevalence continues to rise, making it one of the most significant reproductive health challenges of the modern era (World Health Organization, 2023). Among the various etiological factors, infertility associated with Polyendocrine Metabolic Ovarian Syndrome (PMOS) is particularly noteworthy, as PMOS is recognized as the leading cause of anovulatory infertility in women (Gorry et al., 2006; Tavares et al., 2025). This highlights the importance of understanding and effectively addressing reproductive dysfunction within this highly prevalent endocrine–metabolic disorder.

The Polyendocrine Metabolic Ovarian Syndrome (PMOS), previously named as Polycystic Ovary Syndrome (PCOS) is the frequent endocrine and metabolic disorder affecting 6 -10 % women of reproductive age (Escobar-Morreale, 2018; Parua et al., 2025; Teede et al., 2026). Although PMOS is common disorder the ethology remains unknown (Escobar-Morreale, 2018). The literature highlight the significance of the involvement of environment, development, genetics and epigenetics (Baranowska-Bik, 2022). Non-genetic factors such as prenatal androgen exposure, lifestyle – especially improper diet and poor physical activity, endocrine-disrupting chemicals (EDC), sleep disturbance, excessive stress or disturbance of the gastrointestinal tract microbiome are believed to play a role in PMOS development (Baranowska-Bik, 2022).

According to the International Guideline criteria for adults (aged at least 20 years), the diagnosis required clinical or biochemical hyperandrogenism, oligoovulation or anovulation, and polycystic ovaries on ultrasound or elevated anti-Müllerian hormone (AMH) (Teede et al., 2026).

Although the previous name was focused on gynaecological presentation and development of follicular cysts, the research revealed that this disorder is supported by endocrine disturbances in such hormones as: androgens, insulin, neuroendocrine and ovarian hormones (Teede et al., 2026). Considering that various hormonal imbalances PMOS manifestation is heterogeneous and it is related with metabolic, reproductive as well as psychological and dermatological disorder (Baranowska-Bik, 2022; Sanchez-Garrido & Tena-Sempere, 2020; Singh et al., 2023; Teede et al., 2018, 2026). The metabolic manifestation includes obesity, insulin -resistance, dyslipidaemia, type 2 diabetes, metabolic dysfunction-associated steatotic liver disease, cardiovascular disease and sleep apnoea (Sanchez-Garrido & Tena-Sempere, 2020; Teede et al., 2026). The existing literature indicates that although obesity is common among

40-70 % patients with PMOS, the insulin resistance is to same degree independent to obesity (Baranowska-Bik, 2022). It is related with existing hyperandrogenaemia, which supports the deposition of visceral fat and then promotes insulin resistance and obesity (Cena et al., 2020). On the other hand hyperinsulinemia is correlated with hyperandrogenism and insulin resistance (Cena et al., 2020; Sola-Leyva et al., 2024). Coexisting obesity promoting insulin resistance with previous factors create vicious cycle (Cena et al., 2020). Hyperandrogenism is responsible for dermatological symptoms like acne, alopecia hirsutism, as well as oligomenorrhea (Joham et al., 2022; Parua et al., 2025; Teede et al., 2026). The development of follicular cysts is a result improper gonadotropin releases and lead to amenorrhea.(Su et al., 2025) Psychological features contain depression, anxiety and eating disorders (Joham et al., 2022; Stener-Victorin et al., 2024).

The treatment of PMOS require multidisciplinary and personalized care with adequate pharmacological and lifestyle interventions (Teede et al., 2018; Wang et al., 2026). Metformin is widely used for managing the metabolic features of PMOS, whereas combined oral contraceptives are considered the first-line pharmacological treatment for menstrual irregularities and hyperandrogenic symptoms (Sola-Leyva et al., 2024).

Synthetic analogues of endogenous GLP 1 (GLP 1 RAs) were first introduced for type 2 diabetes and subsequently approved for obesity, but their therapeutic applications continue to broaden, now encompassing beneficial influence on cardiovascular and metabolic system, asthma, emerging neuroprotective actions against neurodegenerative diseases (Tavares et al., 2025, Voros et al., 2026). GLP 1 RAs through their pleiotropic effects on obesity, metabolic regulation, may potentially exert beneficial influences on fertility restoration in women with PMOS (Baranowska-Bik, 2022).

The purpose of this work was to evaluate both the direct and indirect effects of GLP-1 receptor agonists on female fertility in women with PMOS, focusing especially on their potential role in restoring reproductive function through metabolic, hormonal, and immunometabolic effects (Cena et al., 2020; Duah & Seifer, 2025; Sola-Leyva et al., 2024; Voros et al., 2026). In addition, this work considers the limitations and safety concerns related to the use of GLP 1 RAs in women planning pregnancy (Dao et al., 2024).

2. Research materials and methods

This article is based on a narrative literature review. It was conducted to synthesize current evidence on the impact of GLP 1 RAs on fertility restoration in patients with PMOS.

Relevant literature was identified through a search of electronic databases, such as PubMed, Google Scholar between April and June 2026. The search covered mainly publications from (2020–2026) and used combinations of the following keywords: “polycystic ovary syndrome”, “GLP-1 analogues”, “infertility”, “reproduction“, “pregnancy“ and related terms. Additional articles were identified by screening reference lists of key publications. We included clinical trials, observational studies and articles.

Instruments

Reference management and citation formatting were performed using Mendeley.

AI.

AI tools were used to assist in refining the academic English of the manuscript and ensuring proper grammar and style.

3. Research results

Infertility in PMOS

Infertility is a disease characterized by the failure to establish a clinical pregnancy after 12 months of regular, unprotected sexual intercourse or due to an impairment of a person’s capacity to reproduce either as an individual or with his/her partner (World Health Organization, 2023) PMOS is the most common cause of infertility in women, accounting for above 75% of women with anovulatory infertility (Gorry et al., 2006; Tavares et al., 2025).

The disturbance in reproductive system involved anovulation, irregular menstrual cycles, infertility, pregnancy complications, and risk of endometrial cancer (Stener-Victorin et al., 2024).

Independent of PMOS, obesity itself is recognized as a significant risk factor for infertility and pregnancy loss (Cena et al., 2020; Tavares et al., 2025). It is correlated with increased concentrations of leptin, pro-inflammatory adipokines, and cytokines (tumor necrosis factor alpha (TNF-α), interleukin-6 (IL-6), interleukin-1 beta (IL-1β)) leading to an intensified inflammatory process characterized by heightened T helper 1 cells (Th1)/ T helper 17 cells (Th17) and natural killer cells (NK-cell) cytotoxic responses and dysfunction of regulatory T cells (Tregs), (Table 1.), (Tavares et al., 2025). Consequently, these alterations negatively affect ovarian function by disrupting steroidogenesis, impairing folliculogenesis, and compromising oocyte quality, and they also reduce endometrial receptivity, thereby lowering the likelihood of

successful conception (Tavares et al., 2025). Additionally, imbalance of the immune response may lead to pregnancy complications by disrupting immunological tolerance mechanisms, intensifying the Th17 response, and negatively affecting implantation and placental development through excessive production of pro-inflammatory cytokines (Tavares et al., 2025).

Although PMOS is common disorder, it is characterized not only by anovulation, but also by endometrium disfunction, implantation failure and an increased incidence of spontaneous abortion (Sola-Leyva et al., 2024; Tavares et al., 2025).

The function of hypothalamus-pituitary-ovarian axis is disturbance by dysfunctional secretion of gonadotropin-releasing hormone (GnRH), which lead to irregular menstrual cycles or amenorrhea (Parua et al., 2025). PMOS is correlated with chronic inflammation, which lead to the development of poor-quality oocytes and as a results causing anovulatory infertility and accelerating ovarian reserve depletion (Tavares et al., 2025). In PMOS insulin resistance and hyperinsulinemia lead to exacerbate ovarian androgen production, impaired folliculogenesis and endometrial receptivity (Sola-Leyva et al., 2024; Tavares et al., 2025).

In patients with PMOS chronic inflammation affect also on endometrium by increasing infiltration of immune cells, including macrophages (increasing pro-inflammatory functional phenotype M1), dendritic cells, CD8+ T lymphocytes, and CD56+ NK cells (Romero et al., 2026, Tavares et al., 2025). The disruption of cyclic endometrial cells proliferation, tissue differentiation caused by hormonal imbalance lead to inflammatory dysregulation and affected process of angiogenesis (Sola-Leyva et al., 2024). Furthermore the risk of reproductive failure is increased by disturbances in cellular immune responses and immune tolerance (Tavares et al., 2025).

The management of infertility and restoring ovulation in PMOS included the behavioural interventions and pharmacotherapy, which included contraceptives, anti-androgens, insulin-sensitizing drugs and ovulation induction principles (such as metformin, letrozole, clomiphene citrate, gonadotropins) and sometimes laparoscopic surgery and assisted reproductive technology (Parua et al., 2025; Teede et al., 2018; Wang et al., 2026).

Letrozole is recommended as the first-line pharmacological treatment for infertility, while clomiphene in combination with metformin serves as an alternative therapeutic approach (Teede et al., 2023). Gonadotrophins and ovarian surgery are reserved as second-line therapeutic options (Teede et al., 2023). In vitro fertilization (IVF), potentially with in vitro maturation, can be considered as a third-line treatment in women with PMOS and anovulatory

infertility when previous ovulation-induction therapies have been unsuccessful and no absolute indication for IVF is present (Teede et al., 2023).

The management of excessive weight is a part of PMOS treatment also with the use of the pharmacological obesity treatment or sometimes bariatric surgery and it seems to have a positive impact on obstetric outcomes by improving reproductive function, and it (Samarasinghe et al., 2024; Teede et al., 2018). The therapeutic outcomes of these strategies are closely related to several determinants, such as the degree of obesity, patient's compliance with recommended treatment and also coexisting comorbid conditions (Tavares et al., 2025).

Combining several therapeutic strategies may enhance treatment efficacy, resulting in better outcomes compared with the implementation of individual interventions alone (Tavares et al., 2025). The study showed that the addition of diet and exercise improved ovulation rates regardless of whether patients were treated with metformin, ovulation inducers, or a combination of both (Ruiz-González et al., 2024).

GLP-1 analogues

Intestinal enteroendocrine cells are mostly responsible for glucagon-like peptide 1 (GLP-1) production (Baranowska-Bik, 2022).

The GLP-1 receptors are localized on pancreatic beta cells, adipocyte, endothelial and immune cells, lung, heart, the reproductive system and in the central nervous system (Baranowska-Bik, 2022; Tavares et al., 2025; Voros et al., 2026). In adipocytes activated GLP-1 receptors leads to decreasing activation pro-inflammatory cytokines and promoting lipolysis, browning, and the realising of adiponectin. Liraglutide, semaglutide, dulaglutide, and exenatide belong to the class of synthetic analogues of endogenous GLP-1 (GLP-1 Ras) (Voros et al., 2026). Further development of GLP-1-based therapies has led to the emergence of dual receptor agonists, such as GLP-1/Gastric inhibitory polypeptide (GIP) agonists (tirzepatide) and GLP-1/glucagon agonists (mazdutide), as well as triple GLP-1/GIP/glucagon receptor agonists (retatrutide) (Tavares et al., 2025).

Although GLP-1 RAs were initially used for the treatment of type 2 diabetes and then obesity, their therapeutic applications are now expanding to include improvements in cardiovascular risk factors and potential neuroprotective effects against neurodegenerative diseases (Tavares et al., 2025). In addition, it has shown to improvements cardiovascular risk profiles by regulating lipid profiles, lowering blood pressure and renal outcomes (Bader et al., 2024).

GLP-1 RAs stimulate insulin production and inhibiting glucagon secretions and in the result reduce hepatic glucose production (Baranowska-Bik, 2022; Sridharan & Sivaramakrishnan, 2025; Tavares et al., 2025). In addition they delay gastric emptying, supporting gradual glucose absorption, improving postprandial blood glucose fluctuations (Baranowska-Bik, 2022; Sridharan & Sivaramakrishnan, 2025; Tavares et al., 2025). According to presence GLP-1 receptors in parts of hypothalamus GLP-1 RAs are responsible for supressed appetite and promoting satiety (Baranowska-Bik, 2022; Tavares et al., 2025). Therefore they reduce the body mass and visceral fat, decrease fatty liver disease and also has beneficial influence on cardiovascular and metabolic system (Voros et al., 2026).

The most commonly reported adverse effects associated with GLP-1 receptor agonists are gastrointestinal symptoms, including vomiting, and nausea, diarrhoea or constipation, particularly during the initiation phase of treatment and they are generally dose-dependent, tend to be mild to moderate in severity (Tavares et al., 2025). Although GLP-1 receptor agonists are generally considered safe, rare but clinically relevant adverse events have been documented. These include hypoglycaemia, especially in patients receiving another antidiabetic therapies such as insulin, pancreatitis, gallbladder disease, and thyroid-related malignancies. Infrequent cases of hypersensitivity reactions and mood disorders, including depression and anxiety, have also been described (Tavares et al., 2025). GLP-1 Ras are administered once weekly in subcutaneous form, only semaglutide is also in oral form (Tavares et al., 2025).

GLP-1 RAs have demonstrated significant efficacy in promoting weight loss (Tavares et al., 2025). Liraglutide has been shown to induce an average weight reduction of 4.35% compared with placebo, whereas semaglutide has been associated with a dose-dependent reduction in body weight ranging from 11.5% to 20% (Tavares et al., 2025). Currently, tirzepatide, a dual glucose-dependent insulinotropic polypeptide (GIP) and GLP-1 RAs, appears to be the most effective pharmacological treatment for obesity, as confirmed by long-term clinical trials it could cause body weight reduction of approximately 16.5% at a dose of 15 mg (Tavares et al., 2025).

A systematic review and meta-analysis has shown that GLP-1 RAs reduce BMI and enhance anthropometric, metabolic parameters (improved triglycerides, markers of insulin resistance, postprandial glucose) and hormonal parameters - such as FAI, free testosterone, androstenedione, and SHBG levels (Scragg et al., 2024; Sridharan & Sivaramakrishnan, 2025). In the meta-analysis of randomized controlled trials Semaglutide and Liraglutide reduce the waist circumference, body mass index (BMI) and total testosterone in compare to placebo (Austregésilo de Athayde De Hollanda Morais et al., 2024). In compare to metformin the meta-

analysis revealed the GLP-1 RAs were responsible for significant reduction of the BMI in patients with PCOS, however for metabolic parameters such as LDL cholesterol and triglycerides no significant differences were observed between the groups (Forslund et al., 2026). Two studies directly compared GLP-1 RAs with metformin, and both demonstrated superior outcomes with GLP-1 RA therapy, particularly in terms of menstrual regularity and frequency (Forslund et al., 2026). Nevertheless, it must be noted that the reliability of this findings is very low or low (Forslund et al., 2026). Some studies show that therapy with GLP-1 RAs (liraglutide) combine with metformin could be more effective in BMI reduction than GLP-1 RAs (liraglutide) in monotherapy (Bader et al., 2024, Wang et al., 2026).

Remarkably in recent studies, they have also been shown to contribute to enhance function of hypothalamus-pituitary-ovarian axis (Sola-Leyva et al., 2024). It is connected to decreasing insulin resistance and thus reducing the level of production ovarian androgens, in addition mitigating the inflammatory process in adipocytes and promotes the proper functioning of the hypothalamic–pituitary–ovarian axis, which is reflected in the regulation of pulsatile secretion of gonadotropin-releasing hormone (GnRH) (Voros et al., 2026, sys rv).

It seems that GLP-1 Ras could improve pregnancy and ovulation rates (Liu et al., 2017; Sridharan & Sivaramakrishnan, 2025). In comparison to women treated with metformin alone, those receiving exenatide exhibited more favourable reproductive outcomes throughout the 12-week follow-up period. In comparison to women undergoing metformin monotherapy, those treated with exenatide showed a significantly higher natural pregnancy rate (43.6% vs. 18.7%) throughout the 12-week follow-up period (Liu et al., 2017). Early evidence from 12-month randomized small-scale study has shown similar results an association between better in vitro fertilization (IVF) pregnancy and embryo transfer rates or spontaneous pregnancies and preconception treatment with low-dose liraglutide combined with metformin in patients previously unresponsive to first-line reproductive therapies (Salamun et al., 2018). However, additional research is necessary to confirm these observations (Duah & Seifer, 2025).

Evidence from a multicentre observational study did not demonstrate a significant increase in major congenital malformations in the group of patients exposed to GLP-1RAs at first trimester in compared with diabetes (2.6% vs 2.3% and OR, 0.98 with 95% CI, 0.16 to 5.82) or to overweight/obese (2.6% vs 3.9% and adjusted OR 0.54 with 95% CI 0.11 to 2.75) (Dao et al., 2024a). The cumulative incidences among women exposed to GLP-1RAs were 59% for live births, 23% for pregnancy losses, and 18% for pregnancy terminations. Interestingly, the percentage of elective or medical pregnancy termination was significantly higher compared with the diabetes group (Dao et al., 2024a).

The use of GLP-1RAs during pregnancy remains a complex issue, given concerning findings from animal studies and the scarcity of robust human data (Sola-Leyva et al., 2024; Tavares et al., 2025).

The influence GLP-1 Ras on reproductive outcomes is related with macrophage an anti-inflammatory polarization, suppression of pro-inflammatory agents and recovering maternal-fetal immune tolerance (Table 1.) (Tavares et al., 2025). GLP-1 Ras reduce inflammatory trough promotion predominance anti-inflammatory agents such as increasing Tregs and type 2 T helper leads to decreasing proinflammatory cytokines secretion and restoration the Th17/Tregs balance. (Tavares et al., 2025) It seems that their enhancing vascularization and reducing oxidative stress at the maternal-fetal interface, critical processes for implantation and placental development (Tavares et al., 2025). However, despite these potentially beneficial effects, GLP-1RAs are still contraindicated in pregnancy due to safety considerations (Tavares et al., 2025).

Table 1. Potential immunological alterations and endometrial vascularization effects associated with GLP-1 receptor agonists, and the impact of obesity and PCOS on immune dysregulation in the context of female fertility.

	PMOS +OBESITY	GLP-1 Ras
Pro-inflammatory adipokines and cytokines activation	↑	↓
Th1/Th2	↑	↓
Th17/Tregs	↑	↓
Tregs	↓	↑
Process of angiogenesis	disturbance	enhancing
Macrophage polarization	pro-inflammatory	anti-inflammatory
Chronic inflammation	↑	↓

Source: authors' own elaboration (based on data from Tavares et al., 2025)

Tregs - regulatory T cells, Th 17- T helper 17 cells, Th1 - T helper 1 cells, Th2 - T helper 2 cells

The use of GLP-1 receptor agonists during pregnancy has not been adequately investigated, and the available evidence is predominantly based on animal studies because of safety concerns. Evidence derived from animal studies raises concerns regarding the use of GLP-1 receptor agonists during pregnancy, because of they can cross the placenta and have been associated with adverse developmental outcomes, including higher risk of pregnancy loss, skeletal abnormalities and fetal growth restriction (Tavares et al., 2025). These findings should be interpreted with caution, as the observed adverse outcomes were associated with doses exceeding those used therapeutically in humans (Tavares et al., 2025).

4. Discussion

Infertility is a widespread and socially significant health issue, affecting a growing number of females globally. A substantial proportion of cases is related Polyendocrine metabolic ovarian syndrome (PMOS), which remains the leading cause of anovulatory infertility.

Although still causal treatment remains unavailable, effective management requires a multidisciplinary approach aimed at interrupting the vicious cycle of insulin resistance, obesity and hyperandrogenism. Even in the absence of PMOS, obesity independently increases the risk of infertility and pregnancy loss by disrupting the tightly regulated metabolic, hormonal, and inflammatory systems that negatively affecting of reproductive functions.

GLP-1Ras exhibit pleiotropic actions in the reduction the body mass and visceral fat through delayed gastric emptying, supressed appetite and they regulate carbohydrate metabolism by stimulation insulin production, inhibition glucagon secretions, reduction hepatic glucose production, supporting gradual glucose absorption, thus improving postprandial blood glucose fluctuations and decreasing insulin resistance. Although GLP-1 RAs were initially developed for the treatment of type 2 diabetes and later approved for obesity, their therapeutic spectrum continues to expand, now encompassing improvements in infertility, cardiovascular risk profiles, asthma and emerging neuroprotective effects against neurodegenerative diseases. In addition, GLP-1 RAs support cardiovascular system by modulating lipid profiles, lowering blood pressure, and improving renal outcomes.

Gastrointestinal symptoms are the most frequent adverse effects of GLP-1 RAs, particularly at treatment initiation, and are generally dose-dependent.

GLP-1 RAs demonstrate multidirectional metabolic activity that is particularly relevant in obese patients with PMOS. Their metabolic, hormonal, and anti-inflammatory actions appear beneficial for improving fertility outcomes. They reduce BMI, enhance anthropometric and metabolic parameters (including triglycerides, markers of insulin resistance, and postprandial glucose), and restore key reproductive hormonal profiles such as FAI, free testosterone, androstenedione, and SHBG in compare to placebo. They demonstrate superior efficacy in terms of weight reduction and potentially in restoring menstrual regularity and frequency in compared to metformin, however, additional research is required to determine how their effects on menstruation and other relevant outcomes compare with those of metformin. By decreasing insulin resistance and thus reducing ovarian androgen production. GLP-1 Ras also mitigate the inflammatory processes within adipose tissue and promote proper functioning of the

hypothalamic-pituitary-ovarian axis (the regulation of pulsatile gonadotropin-releasing hormone secretion).

It seems that GLP-1 receptor agonists may improve both spontaneous and IVF pregnancy and ovulation rates alone or in combination with metformin, however, these observations require confirmation in further studies. GLP-1 Ras appear to exert immunomodulatory effects by promoting anti-inflammatory macrophage polarization, suppressing pro-inflammatory mediators, and supporting the restoration of maternal–fetal immune tolerance. Moreover, Accumulating data indicate that they may promote vascularization and attenuate oxidative stress at the maternal–fetal interface, both of which are fundamental for implantation and placental development. GLP-1 RAs promoting regaining homeostasis metabolic, endocrine, and immunomodulatory mechanisms that collectively contribute to weight reduction and improved metabolic health. Despite these potential benefits and early observational evidence that did not demonstrate an increased risk of major congenital malformations in the first trimester, their use during pregnancy is strictly contraindicated owing to safety considerations and evidence from animal studies.

5. Conclusions

Although GLP-1 Ras were originally used in PMOS primarily for the treatment of obesity and type 2 diabetes, accumulating evidence suggests that their therapeutic potential extends to improving female fertility outcomes. They play a beneficial role not only in reducing body weight but also in promoting hormonal and metabolic balance. In addition, GLP-1 Ras help attenuate chronic low grade inflammation and may support embryo implantation.

GLP-1 RAs exhibit pleiotropic actions in the context of obesity, promoting the restoration of metabolic, endocrine, and immunometabolism homeostasis through mechanisms that collectively contribute to weight reduction and improved metabolic parameters. Taken together, the broad metabolic, hormonal, and immunometabolic effects of GLP-1 RAs position them as a valuable therapeutic strategy for improving fertility outcomes in obese women with PMOS.

The use of GLP-1 RAs in the management of infertility in obese women with PMOS appears promising, however further studies are needed, particularly those evaluating their safety in the preconception period and their potential effects on early embryonic development, to ensure the strictest treatment safety protocols.

Author Contributions All authors have read and agreed with the published version of manuscript.

Martyna Więcławek- conceptualization, writing - rough preparation

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Makary Hejduk - resources, writing - rough preparation

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Aleksandra Pawłucka – check, resources

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