INPLASY

The Impact of Prebiotic, Probiotic, and Synbiotic on Metabolic and Hormonal Parameters in Women with Polycystic Ovary Syndrome: A Systematic Review and Meta-Analysis

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Li, H; Huang, J; Yand, DZ.

Corresponding author:
Hui Li

lihui265@mail.sysu.edu.cn

Author Affiliation:
The Sixth Affiliated Hospital, Sun Yat-sen University.

ADMINISTRATIVE INFORMATION

Support - None.

Review Stage at time of this submission - Data extraction.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 28 October 2025 and was last updated on 28 October 2025.

INTRODUCTION

Review question / Objective To evaluate the effects of probiotics, prebiotics, or synbiotics versus placebo, no treatment, or standard care on: metabolic parameters (fasting glucose, fasting insulin, insulin resistance [HOMA-IR], lipid profiles), sex hormones (total testosterone, sex hormone-binding globulin [SHBG]), inflammatory markers (C-reactive protein [CRP], hs-CRP), body mass index (BMI), free-androgen index (FAI), and Ferriman-Gallwey (FG) scores.

Condition being studied Polycystic ovary syndrome (PCOS) is a common endocrine disorder affecting reproductive-aged women, characterized by hyperandrogenism, ovulatory dysfunction, and metabolic disturbances. Emerging evidence suggests gut microbiota dysbiosis may contribute to PCOS pathogenesis. Probiotics, prebiotics, and synbiotics have shown potential in modulating gut microbiota and improving metabolic, hormonal and inflammatory profiles. However, existing randomized controlled trials (RCTs) report inconsistent outcomes. This systematic review aims to synthesize evidence on the efficacy and safety of these interventions in PCOS management.

METHODS

Search strategy Databases: PubMed, Embase, Web of Science, Chinese Biomedical Database, China National Knowledge Infrastructure and the Cochrane Library.
Timeframe: Inception to March 2025.
Language: No restrictions.
Search terms:
PCOS: "polycystic ovary syndrome," "PCOS,"
Interventions: "probiotic*," "prebiotic*," "synbiotic*,
Study design: "randomized controlled trial," "RCT."
Example PubMed search strategy will combine MeSH terms and keywords using Boolean operators.

Participant or population Study design: RCTs.

Participants: Women diagnosed with PCOS (by Rotterdam, NIH, or AE-PCOS Society criteria).

Intervention Probiotics, prebiotics, or synbiotics (any strain, dose, duration).

Comparator Comparator: Placebo, no treatment, or standard care.

Study designs to be included Non-randomized controlled trials (non-RCTs).

Eligibility criteria Study design: RCTs.
Participants: Women diagnosed with PCOS (by Rotterdam, NIH, or AE-PCOS Society criteria).
Interventions:
Experimental: Probiotics, prebiotics, or synbiotics (any strain, dose, duration).
Comparator: Placebo, no treatment, or standard care.
Exclusion criteria: Non-randomized controlled trials (non-RCTs), animal studies, or interventions that do not involve any of prebiotics, probiotics, or synbiotics.

Information sources Databases: PubMed, Embase, Web of Science, Chinese Biomedical Database, China National Knowledge Infrastructure and the Cochrane Library.

Main outcome(s) Primary outcomes included metabolic and anthropometric parameters (lipid profiles: high-density lipoprotein [HDL], low-density lipoprotein [LDL], total cholesterol [TC], triglyceride [TG]; glucose metabolism: fasting plasma glucose [FPG], fasting insulin [FIN], homeostasis model assessment of insulin resistance [HOMA-IR]; anthropometric parameters: Body mass index [BMI]); hyperandrogenism (biochemical androgen parameters: total testosterone [TT], sex hormone-binding globulin [SHBG], free androgen index [FAI]); clinical hyperandrogenism: Ferriman-Gallwey (FG) score), inflammatory markers (C-reactive protein [CRP], High-sensitivity CRP [hs-CRP]).

Quality assessment / Risk of bias analysis Revised Cochrane risk-of-bias tool for randomized trials (RoB 2).

Strategy of data synthesis Meta-analyses were performed using Review Manager (RevMan 5.4) and R software (version 4.3.1) with the “meta” and “meta for” packages. Continuous outcomes were pooled as mean differences (MDs) with 95% confidence intervals (CIs), using random-effects models (DerSimonian-Laird method).

Subgroup analysis Subgroup analysis based on different intervention measures.

Sensitivity analysis Sensitivity analyses excluded studies with a high risk of bias. Publication bias was evaluated via funnel plots and Egger’s test if ≥10 studies were included.

Country(ies) involved The Sixth Affiliated Hospital, Sun Yat-sen University, Guangzhou, Guangdong, China.

Keywords probiotics; prebiotics; synbiotics; insulin resistance; hyperandrogenism; hirsutism; randomized controlled trial; meta-analysis.

Contributions of each author
Author 1 - Hui Li - be responsible for the study conception and design, performed the systematic literature search, data extraction, statistical analysis, risk of bias assessment, and drafted the manuscript.
Email: lihui265@mail.sysu.edu.cn
Author 2 - Jia Huang - contributed to data extraction, data validation, statistical analysis, and critical revision of the manuscript.
Author 3 - Dongzi Yang - supervising the study and provided overall guidance.