INPLASY

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Antioxidant effects of tocotrienol-rich fractions supplementation on obesity-induced oxidative stress in female reproductive system: A protocol for a systematic review

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ADMINISTRATIVE INFORMATION

Review Stage at time of this submission - Formal screening of search results.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY2024100001

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 01 October 2024 and was last updated on 01 October 2024.

INTRODUCTION

Review question / Objective The aim of this systematic review is to compare tocotrienol-rich fractions (TRF) supplementation and placebo in terms of efficacy and acceptability in obesity-induced oxidative stress in the female reproductive system to better inform clinical practice. To this end, the proposed systematic review will address the following question: Which is the best choice to reduce oxidative stress in the female reproductive system in obese females, tocotrienol-rich fractions (TRF) supplementation or placebo?

Condition being studied Maternal obesity induced-oxidative stress in female reproductive systems.

METHODS

Participant or population Obese pregnant women and obese pregnant mice who have screening will be eligible for this review.

Intervention Tocotrienol-Rich Fractions (TRF) Supplementation: This is the primary intervention under evaluation for its antioxidant properties.
Placebo or No Treatment: To compare the effects of TRF against a control.

Comparator Placebo or No Treatment: To compare the effects of TRF against a control.

Study designs to be included Randomized controlled trials (parallel or crossover) were eligible for inclusion in the current systematic review if they

are (I) indexed articles, research papers, case studies, and randomized controlled trials (RCTs).

Eligibility criteria Randomized controlled trials (parallel or crossover) were eligible for inclusion in the current systematic review if they are (I) indexed articles, research papers, case studies, and randomized controlled trials (RCTs), (II) studies investigating the effects of TRF supplementation on OS and reproductive health in obese female subjects (both human and animal models), (III) studies published between 2014 and 2024. The exclusion criteria if the (I) studies are not available in English, (II) studies do not focus on the female reproductive system, and (III) reviews, editorials, and opinion pieces without original data.

Information sources A comprehensive search was conducted using databases such as PubMed, Scopus, Web of Science, ScienceDirect, and Google Scholar to identify relevant studies published between 2014 and 2024.

Main outcome(s) The outcomes of the systematic review focus on evaluating the effects of tocotrienol-rich fractions (TRF) supplementation on obesity-induced oxidative stress (OS) in the female reproductive system. Key findings indicate that TRF significantly reduces OS biomarkers, such as malondialdehyde (MDA), and enhances antioxidant enzyme activities, including superoxide dismutase (SOD), catalase (CAT), and glutathione peroxidase (GPx). Additionally, TRF improves reproductive health by enhancing oocyte and embryo quality through scavenging free radicals and reducing oxidative damage. These effects are observed over short- to medium-term interventions, and the primary measures include reductions in MDA levels and increases in antioxidant enzyme activities, which collectively contribute to the mitigation of OS and improvement of reproductive function in obese models.

Quality assessment / Risk of bias analysis The quality of the studies was assessed using standardized tools such as the Cochrane Risk of Bias Tool for RCTs and the Newcastle-Ottawa Scale for observational studies.

Strategy of data synthesis The data from the included studies in the systematic review will be analyzed using a narrative synthesis approach, given the heterogeneity of study designs and outcomes. Quantitative data, such as oxidative stress biomarker levels (e.g., MDA, SOD, CAT, GPx), will be extracted and compared across studies. For randomized controlled trials (RCTs), the Cochrane Risk of Bias Tool will be used to assess the quality, while observational studies will be evaluated using the Newcastle-Ottawa Scale. The review will focus on identifying trends in the efficacy of tocotrienol-rich fractions (TRF) supplementation in reducing oxidative stress and improving reproductive health outcomes in obese models. A meta-analysis may not be performed due to the variability in study designs, interventions, and outcome measures.

Subgroup analysis In the systematic review, subgroup analysis may be conducted to explore differences in the effects of tocotrienol-rich fractions (TRF) supplementation based on specific variables, such as the type of study model (animal vs. human), the dosage and duration of TRF supplementation, and the severity of obesity or oxidative stress. This analysis aims to identify whether certain subgroups respond differently to TRF supplementation. For example, the antioxidant effects in maternal obesity models could vary based on the specific oxidative stress biomarkers measured (e.g., MDA, SOD), or based on reproductive outcomes like oocyte and embryo quality. These subgroup analyses will help determine whether TRF's efficacy is influenced by these factors, thereby providing more tailored insights into its potential therapeutic use.

Sensitivity analysis In the systematic review, sensitivity analysis will be conducted to assess the robustness of the findings by testing the influence of various factors, such as study quality, sample size, and potential biases, on the overall results. This may involve excluding studies with high risk of bias or focusing on high-quality studies to see if the conclusions remain consistent. The sensitivity analysis ensures that the key outcomes, such as the reduction in oxidative stress biomarkers and improvements in reproductive health with tocotrienol-rich fractions (TRF) supplementation, are not disproportionately influenced by outliers or methodologically weak studies. By performing this analysis, the review will help confirm the reliability of the findings regarding TRF's efficacy in addressing obesity-induced oxidative stress in the female reproductive system.

Language restriction The studies are not available in English and are excluded from the study.

Country(ies) involved Malaysia.

Keywords tocotrienol-rich fractions, obesity, oxidative stress, female reproductive system, antioxidants.

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