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Synergistic Effects of Hyperbaric Oxygen Therapy with Medications on Male Infertility: A Comprehensive Meta-Analysis

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ADMINISTRATIVE INFORMATION

Support - Yes.

Review Stage at time of this submission - Completed but not published.

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 24 December 2024 and was last updated on 24 December 2024.

INTRODUCTION

Review question / Objective This research underscores the potential of HBOT as an adjunctive treatment in male infertility, offering valuable insights for clinical practice.

Condition being studied This study primarily aims to understand the effects of hyperbaric oxygen therapy in the treatment of various male infertility conditions. It seeks to determine whether combining this therapy with other mainstream or conventional treatment methods can yield additional benefits, improve sperm quality, and ultimately enhance male fertility.

METHODS

Participant or population The main participants included in this study are: 1. adult males diagnosed with infertility, and 2. adult males with

identified sperm abnormalities, such as oligospermia or teratospermia.

Intervention Participants were divided into two groups based on the principles of randomized controlled trials. The first group received mainstream conventional treatments for male infertility. The second group received hyperbaric oxygen therapy in conjunction with the conventional treatment methods.

Comparator Not applicable.

Study designs to be included This study will include literature written in either English or Chinese, and each included study must demonstrate the principle of randomization in its experimental design.

Eligibility criteria Inclusion and exclusion criteria for the literature

Two authors independently conducted an initial screening of all study titles and abstracts to

exclude irrelevant citations. In cases of disagreement between the two reviewers, a third researcher made the final judgment, and the third researcher's decision was considered authoritative. The specific screening process is detailed in the flowchart. The key indicators for data extraction included the authors, publication year, and the means and standard deviations of various treatment parameters for both the treatment and control groups (e.g., sperm density, motility, viability, perm abnormality rate, and pregnancy rates). The two researchers assessed the quality of the included studies on the basis of the Jadad scale.

Information sources A comprehensive search was conducted in the following databases: Cochrane, PubMed, Web of Science, CNKI, VIP, and Wangfang Data.

Main outcome(s) The main outcome indicators include the following: 1.sperm survival rates; 2.sperm density; 3.sperm abnormality rate; 4. normal sperm rates; 5.sperm motility; 6.clinical pregnancy rate.

Quality assessment / Risk of bias analysis The two researchers assessed the quality of the included studies on the basis of the Jadad scale, and the results were visualized via Stata 16.0 software. According to the Jadad scale, studies were categorized as low quality (0–2 points) or high quality (3–5 points). Given that funnel plots rely heavily on visual assessment for detecting publication bias, the Egger and Begg methods were employed for evaluation.

Strategy of data synthesis Data processing and analysis were conducted via Stata 16.0 software. The Q test and I^2 statistic were employed to assess the heterogeneity among studies. When $P > 0.1$ and $I^2 < 50\%$, there was good homogeneity among the results of the studies, and a fixed-effects model was utilized. Conversely, if $P \leq 0.1$ and/or $I^2 \geq 50\%$, heterogeneity among the results may be present, leading to the selection of a random-effects model to mitigate heterogeneity and enhance the credibility of the findings. Continuous data are represented as weighted mean differences (WMDs) with corresponding 95% confidence intervals (95% CIs), whereas categorical data are expressed as risk ratios (RRs) with 95% CIs.

Subgroup analysis Subgroup analyses were performed to reduce heterogeneity. A funnel plot was used to assess the potential for publication bias. Sensitivity analyses were conducted by

systematically excluding individual studies to observe whether the results significantly changed, thereby evaluating the robustness of the findings.

Sensitivity analysis Sensitivity analyses were conducted by systematically excluding individual studies to observe whether the results significantly changed, thereby evaluating the robustness of the findings. A sensitivity analysis was conducted via a leave-one-out approach, whereby each study was sequentially excluded to perform a reanalysis of the remaining studies in the meta-analysis.

Country(ies) involved Hunan Provincial Key Laboratory of Regional Hereditary Birth Defect Prevention and Control, Changsha Hospital for Maternal & Child Health Care Affiliated to Hunan Normal University, Changsha, Hunan 410000, China.

Keywords Hyperbaric oxygen; Male infertility; Meta-analysis.

Contributions of each author

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