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Metabolic and bariatric surgery and IVF/ICSI outcomes in women: protocol for an updated systematic review and comparator-stratified meta-analysis

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ADMINISTRATIVE INFORMATION

Support - No support.

Review Stage at time of this submission - This protocol is being registered retrospectively. Literature searching, study selection, data extraction, risk-of-bias assessment, and the principal quantitative analyses had been performed before registration. Registration is undertaken before journal submission to provide a transparent public record of the prespecified comparator-stratified analytical framework and to document any subsequent amendments. The final supplementary searches and submission-final PRISMA documentation remain to be completed.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY202680068

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 17 August 2026 and was last updated on 17 August 2026.

INTRODUCTION

Review question / Objective To determine whether previous metabolic and bariatric surgery is associated with IVF/ICSI outcomes in women and to distinguish effects according to clinically different comparator groups. The primary objective is to compare cumulative live birth after IVF/ICSI in women with previous metabolic and bariatric surgery versus non-operated women matched for current/postoperative BMI. Secondary objectives are to compare ovarian response and reproductive outcomes with obese or severely obese non-operated controls, summarize within-woman pre/post bariatric surgery evidence, and evaluate the association between postoperative weight regain and IVF success.

Rationale Obesity is associated with impaired fertility and poorer assisted reproductive technology outcomes. Metabolic and bariatric surgery produces substantial and durable weight loss, but available IVF/ICSI studies are small and use heterogeneous comparator groups. Pooling current-BMI-matched controls, persistently obese controls, within-woman pre/post comparisons, and postoperative weight-regain cohorts may combine fundamentally different estimands. This review therefore applies a comparator-stratified framework to provide clinically interpretable estimates.

Condition being studied Infertility requiring IVF and/or ICSI in adult women with a history of metabolic or bariatric surgery.

METHODS

Search strategy Electronic searches include PubMed/MEDLINE, Embase, Scopus, Web of Science Core Collection, and the Cochrane Central Register of Controlled Trials (CENTRAL). Search concepts combine controlled vocabulary and free-text terms for metabolic/bariatric surgery, gastric bypass, Roux-en-Y gastric bypass, sleeve gastrectomy, gastric banding, IVF, in vitro fertilization/fertilisation, ICSI, and assisted reproductive technology. Reference lists of eligible studies and relevant reviews will also be screened. No study-design filter will be applied during the primary searches.

Participant or population Adult women undergoing IVF and/or ICSI after a previous metabolic or bariatric surgical procedure.

Intervention Previous metabolic or bariatric surgery, including Roux-en-Y gastric bypass, sleeve gastrectomy, adjustable gastric banding, or other established bariatric procedures.

Comparator Four prespecified comparator strata will be evaluated: (A) post-bariatric surgery women versus non-operated women matched for current/postoperative BMI; (B) post-bariatric surgery women versus obese or severely obese non-operated women; (C) the same women before versus after bariatric surgery; and (D) post-bariatric surgery women with sustained weight loss versus clinically relevant postoperative weight regain.

Study designs to be included Comparative observational cohort and case-control studies and longitudinal within-woman studies will be included. Uncontrolled case series may be retained for narrative context but will not contribute to comparative quantitative synthesis.

Eligibility criteria Studies must include adult women with previous metabolic/bariatric surgery who subsequently underwent IVF and/or ICSI and report at least one relevant ART outcome. Eligible outcomes include ovarian stimulation, oocyte yield or maturation, fertilization, embryo development or quality, implantation, pregnancy, pregnancy loss, live birth, cumulative live birth, or relevant perinatal outcomes. Reviews, editorials, isolated case reports without informative ART data, non-human studies, studies without previous bariatric surgery, and studies without IVF/ICSI-related outcomes will be excluded from the structured synthesis.

Information sources PubMed/MEDLINE, Embase, Scopus, Web of Science Core Collection, CENTRAL, reference lists of included studies and

relevant reviews, and forward citation searching where appropriate.

Main outcome(s) Cumulative live birth rate after the first complete IVF/ICSI cycle, including live births resulting from fresh and subsequent frozen embryo transfers originating from the first ovarian stimulation cycle. The principal effect measure for dichotomous outcomes will be the risk ratio with 95% confidence interval.

Additional outcome(s) Live birth per initiated cycle or embryo transfer; clinical pregnancy; pregnancy loss or miscarriage; number of retrieved oocytes; mature/metaphase-II oocytes; fertilization; implantation; embryo number and quality; gonadotropin dose; stimulation duration; cycle cancellation; time to pregnancy and live birth; and relevant perinatal outcomes.

Data management Study-level data will be extracted using a standardized data extraction form. Bibliographic records will be deduplicated using DOI, PMID and normalized title matching. Extracted study characteristics, outcome data and risk-of-bias judgments will be cross-checked against the primary reports.

Quality assessment / Risk of bias analysis Non-randomized comparative studies will be assessed using ROBINS-I, including bias due to confounding, participant selection, classification of exposure, deviations from intended exposure, missing data, outcome measurement, and selective reporting. Uncontrolled case series retained only for narrative context will not contribute to pooled effect estimates.

Strategy of data synthesis Quantitative synthesis will be undertaken only when at least two clinically comparable studies report the same outcome within the same prespecified comparator stratum. Random-effects meta-analysis will be used. Dichotomous outcomes will be summarized as risk ratios with 95% confidence intervals and continuous outcomes as mean differences with 95% confidence intervals. When continuous data are reported as medians and interquartile ranges, established methods will be used to estimate means and standard deviations where appropriate. Statistical heterogeneity will be evaluated using Cochran's Q and quantified with I^2 . Comparator strata will not be combined across fundamentally different clinical estimands.

Subgroup analysis Where data permit, analyses will consider comparator type, bariatric procedure, postoperative/current BMI, and postoperative

weight trajectory. Formal subgroup meta-analysis will be undertaken only when sufficient studies are available.

Sensitivity analysis Sensitivity analyses will explore the effect of excluding studies at serious risk of bias, reconstructed or converted outcome data, and influential individual studies when the number of studies permits.

Language restriction No language restriction is planned for database searching. Reports will be assessed for eligibility irrespective of language where sufficient information can be obtained.

Country(ies) involved Hungary.

Other relevant information This is an updated evidence synthesis following an earlier systematic review of bariatric surgery and assisted reproductive technology. The present review is restricted to female IVF/ICSI outcomes and differs by using a prespecified comparator-stratified analytical framework and by incorporating subsequently published evidence.

Keywords bariatric surgery; metabolic surgery; obesity; in vitro fertilization; ICSI; assisted reproductive technology; cumulative live birth; meta-analysis.

Dissemination plans The findings will be submitted for publication in a peer-reviewed journal and may also be presented at relevant scientific meetings.

Contributions of each author

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