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Meta-analysis of First-trimester ultrasound markers for detecting fetal chromosomal abnormalities

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ADMINISTRATIVE INFORMATION

Support - National Natural Science Foundation of China.

Review Stage at time of this submission - The review has not yet started.

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 19 January 2024 and was last updated on 19 January 2024.

INTRODUCTION

Review question / Objective First- trimester ultrasound makers can provide strong evidence for predicting fetal chromosomal abnormalities. The aim of our study is to investigate the diagnostic value of ultrasound markers at 11-14 weeks gestational age for fetal chromosomal abnormalities.

Condition being studied Ultrasound makers found in first trimester are meaningful in predicting chromosomal abnormalities. Aneuploidy chromosome abnormalities, such as 21 trisomy syndrome, 18 trisomy syndrome and 13 trisomy syndrome, can be predicted through ultrasound examination in first trimester.

METHODS

Participant or population Participants: fetuses who accecpt ultrasound examination between 11+0 and 14+0 weeks gestational age. Inclusion criteria: fetuses who received karyotype analysis orchromosomal microarray. Exclusion criteria: ultrasound examination without structures parameters, or fetuses without karyotype analysis or chromosomal microarray results, and studies without available data can be extracted.

Intervention Fetal ultrasound examination between 11+0 and 14+0 weeks. Inclusion criteria: the fetal ultrasound examination. Exclusion criteria: fetuses without accurate gestational age.

Comparator Comparison: karyotype analysis or chromosomal microarray examination.

Study designs to be included Diagnostic study.

Eligibility criteria Inclusion criteria: all diagnostic studies on the detection of fetal chromosomal abnormalities through ultrasound in first trimester. Exclusion criteria: The studies were published more than 20 years ago.

Information sources A systematic electronic search of the following databases will be

performed: PUBMED, EMBASE and The Cochrane Library.

Main outcome(s) Diagnostic value of first trimester ultrasound markers for the detection of fetal chromosomal abnormalities, including sensitivity, specificity, and predictive values.

Quality assessment / Risk of bias analysis Assessment of the quality of the studies included will be performed using the Quality Assessment of Diagnostic Accuracy Studies (QUADAS-2). This will be undertaken by two independent reviewers, and any discrepancies will be resolved with consultation of a third reviewer.

Strategy of data synthesis We assessed the overall diagnostic performance by weighted independent estimation of detection rate (sensitivity), falsepositive rate (1−specificity), positive likelihood ratio (LR; sensitivity / (1−specificity)) and negative LR ((1−sensitivity) / specificity). We used both fixed and random effects models to estimate weighted detection rate, false-positive rate and positive and negative LR across studies. The fixed-effects model weighs each study by the inverse of its variance. Random effects incorporate both within-study and between-study variation. Random effects tend to provide wider CIs and are generally preferable, especially in the presence of between-study heterogeneity. Heterogeneity between studies was analyzed using both Higgins' I^2 and Q-test and was considered to be high if I^2 was over 0.50. Statistical meta-analysis was performed with R software (meta software package).

Subgroup analysis To explore the potential effect of different study populations on heterogeneity we performed such analysis for the whole dataset and in the subgroups of studies classified as high risk and screening.

Sensitivity analysis Sensitivity analysis was performed using Stata software to assess the sensitivity of the study. This involved examining the changes in the effect size after systematically removing individual studies to gauge the impact on the overall sensitivity of the article.

Country(ies) involved China.

Keywords Chromosome Aberrations; Chromosome Disorders; Diagnostic Imaging; Fetal Development; Fetal Monitoring; Fetus; Pregnancy; First Trimester; Ultrasonography; Ultrasonography, Prenatal.

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