



Bacterial Vaginosis and the Risk of First Trimester Miscarriage: A Systematic Review of Observational Studies and Meta-Analysis

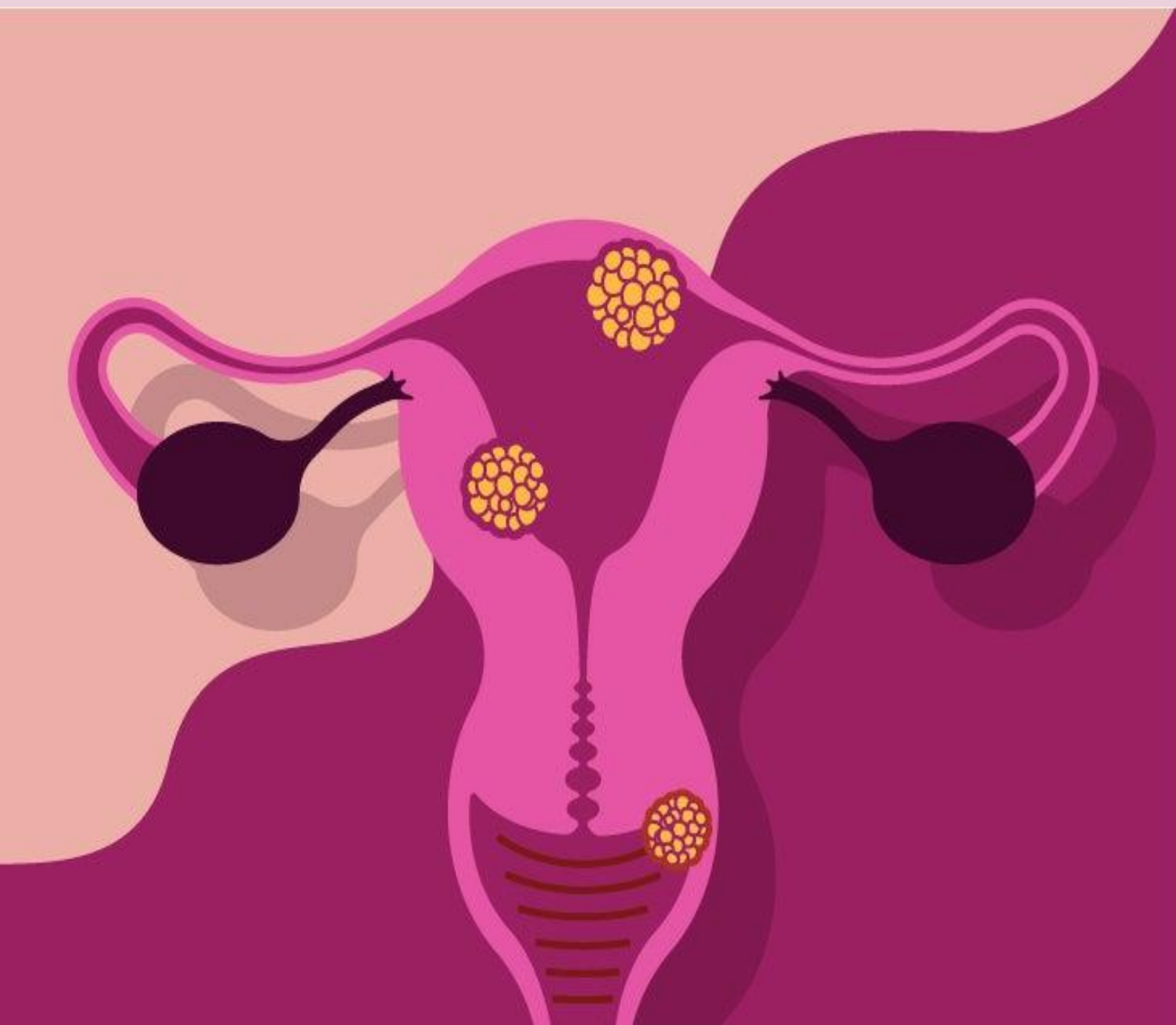
Hanah Abdel Fattah¹, Tabitha Skuodas¹ and Dr Andrea Woolner²

1. University of Aberdeen School of Medicine 2. Aberdeen Centre for Women’s Health Research, University of Aberdeen, Scotland



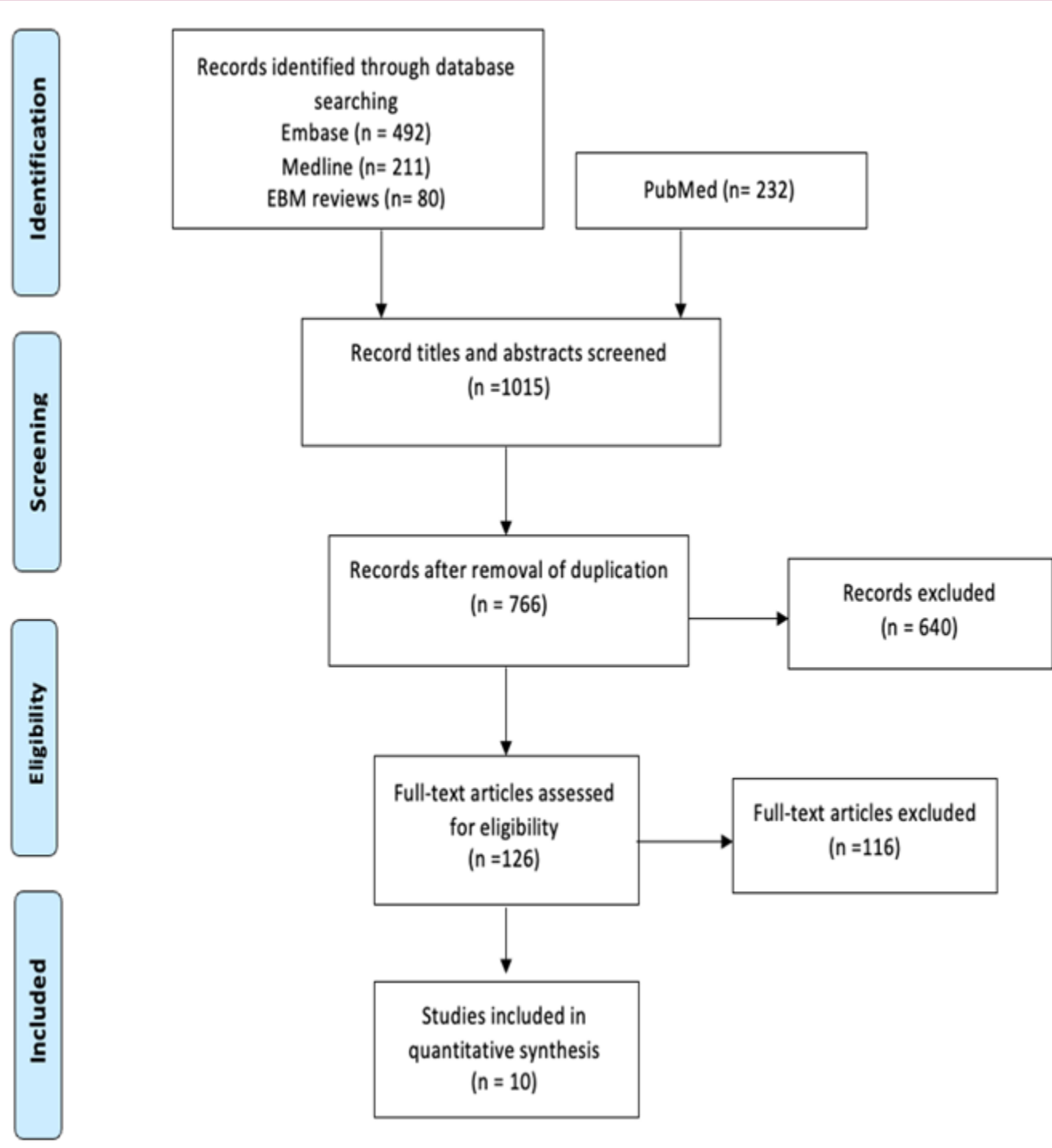
Background & Aims

- The objective of this review was to investigate the association between bacterial vaginosis (BV) and (i) first trimester miscarriage (ii) recurrent first trimester miscarriage in natural conception and in-vitro-fertilizations (IVF) pregnancies.
- Miscarriage, defined as pregnancy loss before 24 weeks, affects 10-15% of pregnancies. Risk factors include maternal age over 35, previous losses, paternal age over 40, smoking, obesity and antiphospholipid syndrome. Recurrent miscarriage definition varies – either 2 or 3 miscarriages. BV may contribute to miscarriages by altering the vaginal microbiome and increasing prostaglandins. It's recognised a lactobacilli deplete microbiome has a role in adverse obstetric pregnancy outcomes.
- While BV is linked to preterm birth and late miscarriage, its role in first trimester and recurrent miscarriages remains unclear. Current guidelines do not recommend routine BV screening in pregnancy.



Methods

- A literature search was conducted for studies investigating the association between BV and first trimester or recurrent miscarriage in natural and IVF pregnancies.
- The search was performed and updated on September 2024 using Medline, Embase, PubMed, and Google Scholar. Key terms included "bacterial vaginosis," "miscarriage," and "recurrent miscarriage." Search was performed with no language restrictions, and by two independent researchers (HA) and (TS).
- The primary outcome was miscarriage, with first trimester miscarriage (<13 weeks) and recurrent miscarriage (≥3 losses).
- Data was extracted and analyzed using RevMan™ 5.6.0. Meta-analysis was performed comparing women with BV and miscarriage versus women without miscarriage.
- Risk ratios (RR) with 95% confidence intervals (CI) were calculated, with p<0.05 considered significant. Study quality and risk of bias were assessed using CASP tools.



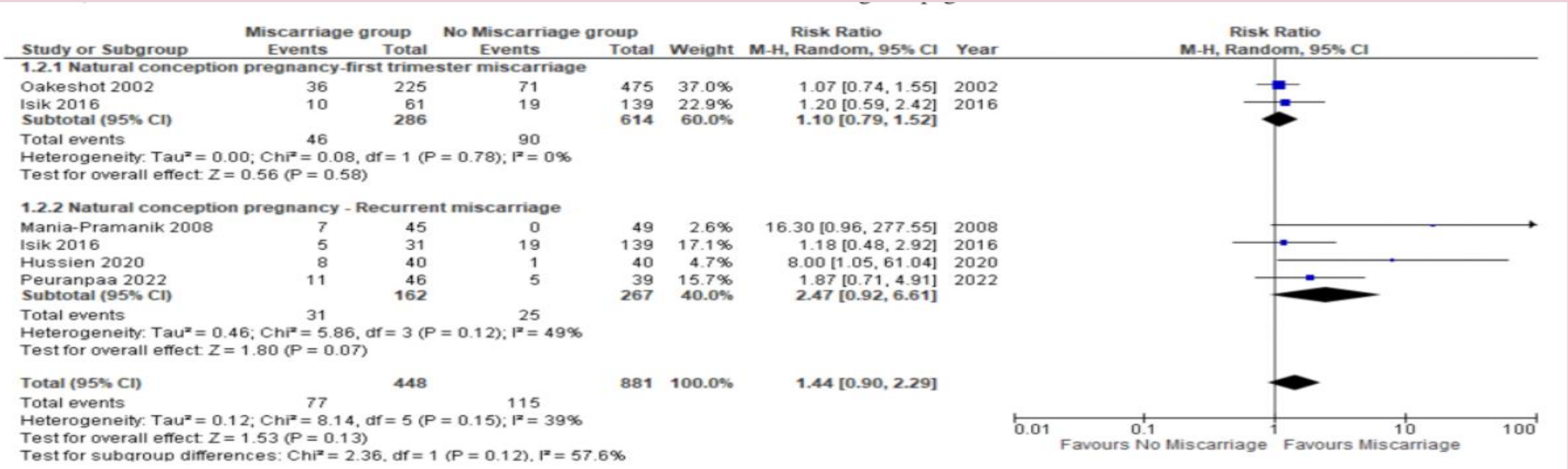
Results & Discussion

- In natural conception pregnancies, analysis of 5-eligible studies involving 1,521 participants revealed no statistically significant association between BV and miscarriage (p=0.13).
- Although there was a trend towards higher BV rates in the miscarriage group (17%) compared to the no miscarriage group (13%), the pooled-effect-size (RR 1.44, 95% CI 0.90-2.29) did not reach statistical significance. Moderate heterogeneity (I²= 39%) was observed.

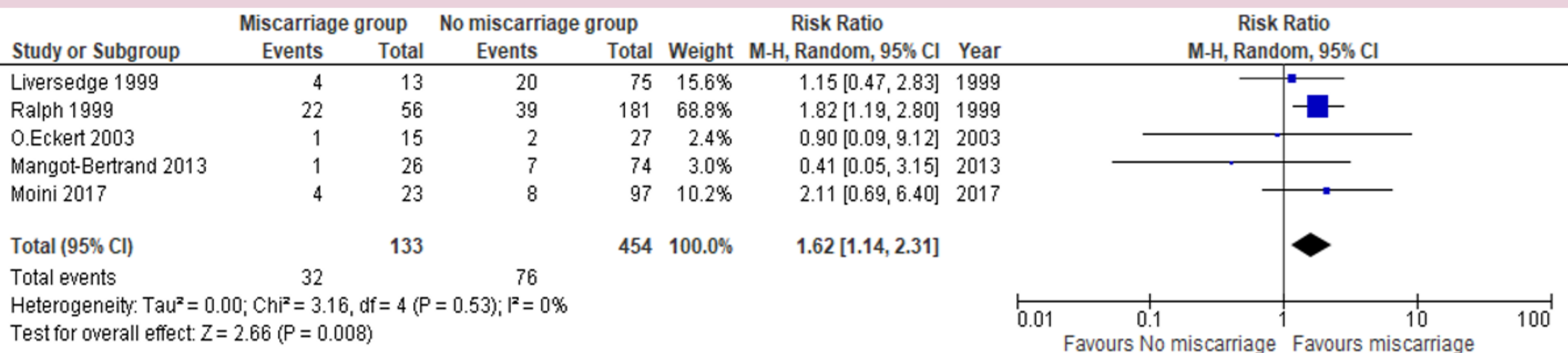
-In IVF pregnancies, analysis of 5-eligible studies with 695 participants demonstrated a statistically significant association between BV and miscarriage (p=0.008).

-BV rates were notably higher in the miscarriage group (24%) compared to the no miscarriage group (17%), with a pooled effect size of RR 1.62 (95% CI 1.14-2.31) and low heterogeneity (I² = 0%).

Natural Conception and First Trimester Miscarriage and Recurrent Miscarriage:



In-Vitro-Fertilisation and First Trimester Miscarriage and Recurrent Miscarriage:



Conclusion

- This systematic review suggests there is no clear answer to our research question. The role of BV is largely unclear in first trimester miscarriage, but our review of the evidence suggests there may be a between bacterial vaginosis and miscarriage risk in natural and IVF pregnancies, however analyses are based on unadjusted data and studies varied in quality. .
- A large prospective cohort study could be used to determine if BV has a role in first trimester miscarriage.

References

(1) Jiao X, Zhang L, Du D, Wang L, Song Q, Liu S. Alteration of vaginal microbiota in patients with recurrent miscarriage. J Obstet Gynaecol. 2022 Feb;42(2):248–255.
(2) Wilcox AJ, Weinberg CR, O'Connor JF, Baird DD, Schlatterer JP, Canfield RE, et al. Incidence of early loss of pregnancy. N Engl J Med. 1988 Jul 28;319(4):189–194.
(3) Goddijn M, Leschot NJ. Genetic aspects of miscarriage. Best Practice & Research Clinical Obstetrics & Gynaecology 2000;14(5):855–865.
(4) National Institute for Health and Care Excellence. Miscarriage - NICE Guidelines. 2023; Available at: <https://cks.nice.org.uk/topics/miscarriage/>. Accessed 25 September, 2024.
(5) Nielsen JR, Kolte AM, Bliddal S, Jørgensen HL, Johnsen MG, Krog MC, et al. Evaluating risk factors in recurrent pregnancy loss: A prospective cohort study and its impact on live birth outcomes. J.Reprod.Immunol. 2024;165:104297.
(6) Stirrat GM. Recurrent miscarriage. Lancet 1990 Sep 15;336(8716):673–675.
(7) Habayeb OMH, Konje JC. The one-stop recurrent miscarriage clinic: an evaluation of its effectiveness and outcome. Hum.Reprod. 2004;19(12):2952–2958.
(8) Colver H, Malu M. Vaginal discharge: recommended management in general practice. Prescriber 2013;24(5):19–32.
(9) Bennett PR, Rose MP, Myatt L, Elder MG. Preterm labor: stimulation of arachidonic acid metabolism in human amnion cells by bacterial products. Am J Obstet Gynecol. 1987 Mar;156(3):649–655.