Supplementary Information

PubMed Search Strategy

("Weissella"[Mesh] OR "Weissella"[tiab] OR "Weissella cibaria"[tiab] OR "Weissella confusa"[tiab] OR "Weissella viridescens"[tiab] OR "Weissella kimchii"[tiab]) AND ("Probiotics"[Mesh] OR "probiotic"[tiab] OR "microbiota"[tiab] OR "microbiome"[tiab] OR "lactobacillus"[tiab] OR "lactic acid bacteria"[tiab]) AND ("Vagina"[Mesh] OR "vaginal"[tiab] OR "vulvovaginal"[tiab] OR "bacterial vaginosis"[tiab] OR "vulvovaginal candidiasis"[tiab] OR "vaginal microbiota"[tiab] OR "vaginal dysbiosis"[tiab]) AND ("Clinical Trial"[Publication Type] OR "randomized controlled trial"[tiab] OR "controlled clinical trial"[tiab] OR "cohort study"[tiab] OR "in vitro"[tiab] OR "cell line"[tiab])

Structured **Search Strategy Concept Table** for systematic review on *Weissella* probiotics for vaginal health:

Search Strategy Concept for other databases

Concept	**Search Terms**	**Database-Specific Adaptations**
Weissella Species	"Weissella"[Mesh] OR "Weissella"[tiab] OR "Weissella cibaria"[tiab] OR "Weissella confusa"[tiab] OR "Weissella	**Embase**: 'Weissella'/exp OR 'Weissella':ti,ab

	viridescens"[tiab] OR "Weissella kimchii"[tiab]	
Probiotics	"Probiotics"[Mesh] OR "probiotic"[tiab] OR "microbiota"[tiab] OR "microbiome"[tiab] OR "lactobacillus"[tiab] OR "lactic acid bacteria"[tiab]	**Cochrane**: (probiotic* OR microbiota* OR microbiome*):ti,ab,kw
Vaginal Health	"Vagina"[Mesh] OR "vaginal"[tiab] OR "vulvovaginal"[tiab] OR "bacterial vaginosis"[tiab] OR "vulvovaginal candidiasis"[tiab] OR "vaginal microbiota"[tiab] OR "vaginal dysbiosis"[tiab] OR "vaginitis"[tiab]	**Scopus**: TITLE-ABS-KEY(vagina* OR vulvovaginal OR "bacterial vaginosis" OR "vaginal microbiota")
Study Designs	"Clinical Trial"[Publication Type] OR "randomized controlled trial"[tiab] OR "controlled clinical trial"[tiab] OR "cohort study"[tiab] OR "in	**Web of Science**: TS=("randomized controlled trial" OR "cohort study" OR "in vitro")

	vitro"[tiab] OR "cell line"[tiab]	

Standardized data extraction parameters

Study Characteristics

- Bibliographic information (first author, publication year, journal)
- Study location (country) and setting (clinical, laboratory)
- Study design (RCT, cohort, in vitro) and duration
- Sample size calculation and power analysis
- Funding sources and conflicts of interest

Intervention Details

- Weissella strain(s) used (with taxonomic verification)
- Dosage form and concentration (CFU/dose)
- Administration route and frequency
- Treatment duration and follow-up periods
- Storage conditions and viability data

Outcome Data

- Primary and secondary outcomes with measurement methods
- Raw data (means, standard deviations)

Outcome (Primary/secondary)

1. Microbiological Outcomes
    - Adhesion inhibition
    - Biofilm reduction

2. Immunological Outcomes
    - Cytokine modulation
    - NK cell activation
    - Anti-inflammatory effects
3. Pre-Clinical Outcomes
    - Tumor size reduction

Measurement Tools

- In vitro: ELISA, flow cytometry, light microscopy, SEM
- Pre-clinical: Tumor volume (mm^3)
- Molecular: qPCR, cytokine arrays

Statistical Reporting

- 5/7 studies reported p-values
- 4/7 studies included SD, % or fold change

Time-Dependent Effects

- Short-term (≤24h): Cytokine modulation
- Medium-term (48-72h): Biofilm/cell adhesion assay
- Long-term (more than 2 weeks): Pre-clinical outcomes

RISK OF BIAS ASSESSMENT (QUALITY ASSESSMENT)

1. Key Observations

Low Risk (✓):

- Oh & Lee (2021) and Lee G et al. (2024) demonstrated rigorous methodology.
- Common strengths: Cell line validation, protocol registration.

Moderate:

- Lee Y. (2005) and Thamacharoensuk (2017): Limited methodological details.

High Risk (✗):

- Industry-linked studies (Amer et al., Choi & Yun) had patent-related selective reporting.

2. In Vitro Studies Assessment

(Lee YH. 2004, Lee Y. 2005, Thamacharoensuk 2017, Oh & Lee 2021, Lee G 2024)

Tool: QUIN (Quality Assessment Tool for In Vitro Studies)

Study	Cell Line Validity	Assay Controls	Blinding	Replicates	Overall
Lee YH. (2004)	✓	✓	✗	3	Moderate
Lee Y. (2005)	✓	✓	✗	3	Moderate
Thamacharoensuk (2017)	✓	Partial	✗	3	Moderate
Oh & Lee (2021)	✓✓ (ATCC)	✓✓	✓	3	Low
Lee G (2024)	✓✓ (ATCC)	✓✓	✓	3	Low

Key: ✓ = Adequate, ✓✓ = Excellent, ✗ = Not reported

3. Experimental Studies Assessment

(Amer et al. 2021, Choi & Yun 2022)

Tool: SYRCLE (Animal) / Modified for Lab Studies

Study	Randomization	Blinding	COI	Data Completeness	Overall
Amer et al. (2021)	✗	✗	✓	Partial	High
Choi & Yun (2022)	✗	✗	✓✓	Complete	High

Key:

- COI: ✓ = Industry funding, ✓✓ = Patent application
- SYRCLE Criteria: 6/10 unmet in both studies