

Probiotics as a Preventive Strategy for Recurrent Urinary Tract Infections: Focusing on Patient Engagement and Quality of Care

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INTRODUCTION & AIM

Urinary tract infections (UTIs) are one of the most prevalent bacterial infections worldwide, particularly among women. They are usually caused by uropathogenic *Escherichia coli* and are classified as either complicated or uncomplicated, depending on host factors and the anatomical or functional state of the urinary tract. Increasing antibiotic resistance and recurrence rates have intensified the search for preventive approaches that could reduce antibiotic use and restore microbial balance. Probiotics, defined as live microorganisms that confer a health benefit to the host when administered in adequate amounts, may contribute to urogenital health by supporting the restoration of the natural microbiota and preventing pathogen colonization. This research aimed to investigate the probiotic potential in preventing UTIs via a structured, systematic review.

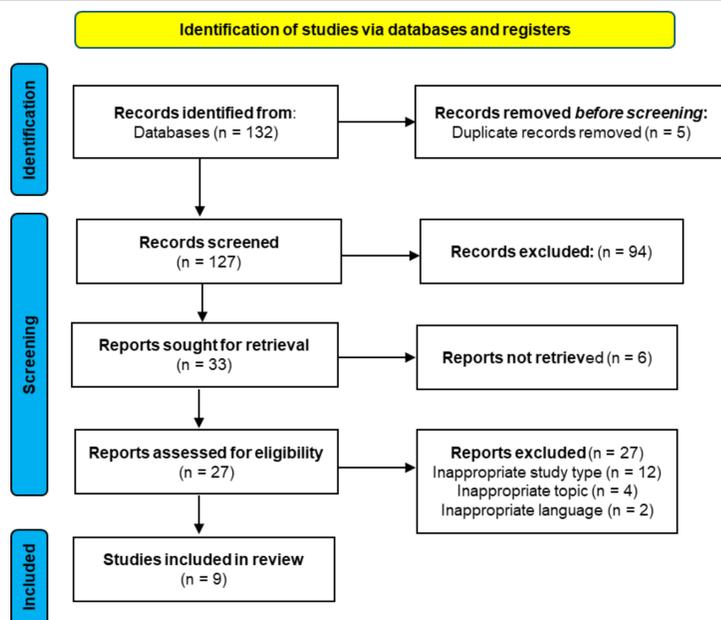
METHOD

Scientific articles were identified using the PubMed and Cochrane Library databases. Eligible studies were selected based on predefined inclusion criteria (Table 1) and analysed descriptively (Table 2). The selection process was shown in a PRISMA diagram (Figure 1).

Table 1: Inclusion and Exclusion Criteria and Limits

Databases	PubMed and Cochrane Library	
PIO	Inclusion Criteria	Exclusion Criteria
Population	Persons with diagnosed recurrent urinary tract infections.	Persons without confirmed recurrent urinary tract infections.
Intervention	Probiotics	All interventions not related to probiotics
Outcome	Preventing urinary tract infections	Not preventing urinary tract infections
Type of studies	Systematic reviews of randomized clinical trials, meta-analyses, and randomized clinical trials	Studies that do not fit the selected methodology and studies that do not include topics related to the population, intervention, and outcome of our final thesis.

Figure 1: Flow diagram of the source search process according to PRISMA guidelines (Page, et al., 2021)



Nine studies met the inclusion criteria, covering diverse populations including children (aged 4 months to 18 years), premenopausal and postmenopausal women, and individuals with spinal cord injuries. The included studies investigated different probiotic strains and formulations, primarily species of the *Lactobacillus* genus, administered orally or intravaginally.

RESULTS & DISCUSSION

The results indicate that some probiotic strains show greater potential than others in reducing the recurrence of UTIs. Importantly, probiotic efficacy appears to be strain-specific rather than universal. Many studies tend to generalize probiotic effects as if all strains should be equally effective across different conditions. However, expecting all probiotics to prevent UTIs is as unrealistic as expecting all drugs to treat diabetes; it is sufficient that specific strains demonstrate efficacy for defined indications, just as insulin works for diabetes.

Table 2: Synthesis of included studies

First Author (Year), Country	Study Design	Population	Probiotic Strain(s)	Main Findings
Abdullatif et al. (2021), USA	Systematic review & meta-analysis of RCTs	Premenopausal women	<i>Lactocaseibacillus rhamnosus</i> GG, <i>Lactobacillus crispatus</i> CTV-05, <i>Lactobacillus acidophilus</i> PXN 35, <i>Lactiplantibacillus plantarum</i> PXN 47	No significant benefit compared to placebo; positive result in one study likely influenced by cranberry extract
Daniel et al. (2024), Poland	Randomized double-blind controlled trial	Children (3–18 years)	<i>Lactocaseibacillus rhamnosus</i> PL1, <i>Lactiplantibacillus plantarum</i> PM1	Reduction in UTI episodes observed, but not statistically significant compared to placebo
Gupta et al. (2024), India	Randomized controlled trial	Premenopausal women with recurrent UTIs	Multi-strain oral probiotic + vaginal strains (<i>Lactiplantibacillus plantarum</i> FV9, <i>Ligilactobacillus salivarius</i> FV2, <i>Levilactobacillus brevis</i> CD2, others)	Vaginal and combined oral–vaginal probiotics significantly reduced UTI recurrence and prolonged time to first recurrence
Hanson et al. (2016), USA	Systematic review of RCTs	Adult women	<i>Lactocaseibacillus rhamnosus</i> GR-1, <i>Limosilactobacillus reuteri</i> RC-14, <i>Lactobacillus crispatus</i> CTV-05	Some benefit observed, particularly with <i>L. crispatus</i> in uncomplicated UTIs
Meena et al. (2021), India	Systematic review & meta-analysis	Children	Various <i>Lactobacillus</i> and <i>Bifidobacterium</i> strains	Probiotics reduced recurrence in children; similar effectiveness to antibiotic prophylaxis, but low certainty of evidence
Sadeghi-Bojd et al. (2020), Iran	Randomized controlled trial	Children (4 months–5 years)	<i>Lactobacillus acidophilus</i> , <i>Lactocaseibacillus rhamnosus</i> , <i>Bifidobacterium bifidum</i> , <i>Bifidobacterium lactis</i>	Significant reduction in recurrent UTIs compared to placebo
Schwenger et al. (2015), Canada	Systematic review of RCTs	Susceptible populations	Various <i>Lactobacillus</i> strains (e.g., GR-1, RC-14, CTV-05)	No significant reduction in recurrent UTIs vs. placebo or antibiotics
Toh et al. (2019), Australia	Randomized double-blind controlled trial	Individuals with spinal cord injury	<i>Limosilactobacillus reuteri</i> RC-14, <i>Lactocaseibacillus rhamnosus</i> GR-1; <i>L. rhamnosus</i> GG, <i>Bifidobacterium lactis</i> BB-12	No preventive effect in the reduction of UTIs compared to placebo
Wawrysiuk et al. (2019), Poland	Systematic review	Women with recurrent/complicated UTIs	<i>Lactobacillus</i> spp.	Lactobacilli may be beneficial, especially in women with recurrent or complicated UTIs

CONCLUSION

Probiotics represent a promising complementary strategy for UTI prevention. Further large-scale RCTs are required to identify the most effective strains, optimal dosage, and duration of therapy, and to establish evidence-based recommendations for clinical use.

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