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Assessment of multi-species versus single-species probiotic supplements for relief of allergic rhinitis: a systematic review and network meta-analysis

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ADMINISTRATIVE INFORMATION

Support - The authors declare that this study received no support from any organization, company, or individual.

Review Stage at time of this submission - Preliminary searches.

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 20 April 2024 and was last updated on 20 April 2024.

INTRODUCTION

Review question / Objective A systematic review and Meta-analysis were conducted to analyze the efficacy and safety of multi-species and single-species probiotics in the treatment of AR.

Condition being studied Probiotics may play an important role in the adjuvant treatment of patients with allergic rhinitis (AR). Clinical trials and several meta-analyses have shown the benefits of probiotics in the treatment of AR. However, few studies have compared multi-species versus single-species probiotics for AR. Therefore, A systematic review and Meta-analysis were conducted to analyze the efficacy and safety of multi-species and single-species probiotics in the treatment of AR.

METHODS

Search strategy Probiotics may play an important role in the adjuvant treatment of patients with allergic rhinitis (AR). Clinical trials and several meta-analyses have shown the benefits of probiotics in the treatment of AR. However, few studies have compared multi-species versus single-species probiotics for AR. Therefore, A systematic review and Meta-analysis were conducted to analyze the efficacy and safety of multi-species and single-species probiotics in the treatment of AR.

Participant or population Patients with allergic rhinitis were included in this study, whether seasonal, perennial, mild or moderate to severe.

Intervention Patients in the intervention group were treated with probiotics.

Comparator The control group received specific treatments, which were preferably placebo. Depending on the results of subsequent searches, controls using medications or other treatments may also be included.

Study designs to be included Only randomized controlled trials will be included.

Eligibility criteria Inclusion criteria were in accordance with PICOS principles. Reviews, case reports, case series, observational studies, cohort studies, animal research, conference abstracts, articles with insufcient information, and papers published in languages other than English were all eliminated.

Information sources The literature data were mainly collected from Pubmed, Cochrane library, Embse ,the World Health Organzation International Trials Registry Platform and Clinical Trials.

Main outcome(s) The primary outcome measures included patient symptom scores and rhinoconjunctivitis quality-of-life scores. The symptom score may include the rhinoconjunctivitis total symptom score (RTSS), total nasal symptom scores (TNSS), the score of the patient's nasal or ocular symptoms. rhinoconjunctivitis quality-of-life scores may have different scoring criteria.

Additional outcome(s) Other outcomes included hematological parameters and adverse events. The patient's serum IgE level and the ratio of Th1/Th2 cells may included.

Data management The literature was independently examined and crosschecked by two authors based on the inclusion and exclusion criteria. Disagreements were resolved by discussing. For incomplete data during the data collection, the data was collected by contacting the corresponding author of that study through E-mail. The author's name, publication year, country, intervention, sample size, gender, age, follow-up period, and outcome measures and so on were all retrieved.

Quality assessment / Risk of bias analysis Two authors independently evaluated the quality of studies. The Cochrane Collaboration's tool was used to assess the risks of bias and quality of RCTs. The following biases were investigated: random sequence generation, allocation concealment, blinding of participants and employees, blinding of result evaluation, incomplete outcome data, selective reporting, and others. When the methods were completely disclosed, there was a "low risk" of bias, a "high risk" when the methods were not mentioned, and an "unknown risk" when the methods were acknowledged but insufciently comprehensive.

Strategy of data synthesis Based on the Gemtc and Network packages for R, a network meta-analysis was performed under a Bayesian framework. All data were processed by a random effect model, which was divided into consistency and inconsistency models. The heterogeneity of the consistency and inconsistency models was represented by the Deviance Information Criterion (DIC). However, the DIC value does not determine the heterogeneity between studies. When the DIC difference between the two models is greater than 5, both models are considered to be significantly different, and the model with a smaller DIC value is selected to continue the data analysis. The consistency model was adopted in this study, and the model was fitted by Markov chains, and the number of Markov chains was set to 3. To eliminate the effect of the initial value, 20,000 data iterations were performed, and the simulation iteration was set to 50,000. The Potential scale reduction factor (PSRF) reflects the convergence of the model. When PSRF is 0 and 100%, it indicates the worst and best convergence of the model, respectively. The degree of convergence of the model can also be reflected in the trajectory plot and density plot. The efficacy of different interventions is ranked by ranking and cumulative probability plots, the local inconsistency of the data is shown by node splitting, and the league table shows the effect of pairwise comparisons between different interventions. The data was displayed using SMD and 95% CI.

Subgroup analysis If necessary, subgroup analysis was used to explore the efficacy and safety of probiotics in different allergic rhinitis species and different control groups.

Sensitivity analysis Sensitivity analyses may be performed to assess the stability of a study when the results of a subgroup analysis are unsatisfactory or the heterogeneity of the study is high.

Language restriction English.

Country(ies) involved China.

Keywords Allergic rhinitis; Probiotic; Meta-analysis.

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