



## Probiotics can help prevent ventilator-associated pneumonia



Ventilator-associated pneumonia (VAP) is still an important cause of morbidity and mortality in mechanically ventilated patients. A new analysis of 13 randomised controlled trials (RCTs), involving 1,969 patients, finds that probiotics are significantly associated with a decreased risk of VAP in mechanically ventilated patients.

"It seems likely that probiotics provide clinical benefits for mechanically ventilated patients. Large sample size and high-quality RCTs are needed to further evaluate the effect of probiotics on preventing VAP in mechanically ventilated patients," according to the meta-analysis published in the journal *Frontiers in Pharmacology*.

VAP is currently the second most common nosocomial infection in America and the most prevalent ICU-acquired infection worldwide. In addition, it is a costly healthcare-associated infection. Numerous studies have assessed various strategies of VAP prevention which can be classified into pharmacologic and non-pharmacologic interventions. Compared to other strategies, probiotics have been considered as a new intervention for VAP prevention in critical care medicine.

However, the efficacy of the probiotics for preventing VAP is still controversial. This meta-analysis was performed to evaluate the effectiveness and safety of probiotics for preventing VAP, thereby providing a more precise evidence for clinical practice. PubMed, Embase, and CENTRAL were searched up to September 2016 for RCTs comparing probiotics with control in mechanically ventilated patients. Risk ratios (RRs) and mean differences (MDs) with 95% confidence intervals (CIs) were estimated with fixed or random effects models. Trial sequential analysis (TSA) was performed using TSA 0.9 beta software.

Based on the study's eligibility criteria, 13 RCTs ( $n = 1,969$ ) were included. Overall, probiotics were associated with reduced incidence of VAP ( $RR = 0.73$ , 95% CI = 0.60–0.89;  $P = 0.002$ ), which was confirmed by TSA (TSA adjusted 95% CI = 0.55–0.96). Compared to the standard statistical analysis of meta-analysis, the results of TSA can adjust the false positives or false negatives. However, no significant difference was observed in 90-day mortality, overall mortality, 28-day mortality, ICU mortality, hospital mortality, diarrhoea, length of ICU stay, length of hospital stay, and duration of mechanical ventilation.

Several limitations should be taken into consideration when interpreting the results from the present meta-analysis, including: the quality of the included trials was relatively low; the limited number of included trials prevented the researchers to detect the publication bias; and the significant between-study heterogeneity was detected, which might influence the validity of the meta-analysis. "The heterogeneity might be derived from the species and dosage of probiotics as well as timing of administration," the researchers said.

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