

LETTER TO THE EDITOR

Open Access



# Efficacy of probiotics in the prevention of diarrhea in ventilated critically ill ICU patients: meta-analysis of randomized control trials: author's reply

Priyam Batra<sup>1</sup>, Kapil Dev Soni<sup>2\*</sup> and Purva Mathur<sup>3</sup>

Sir,

I thank Shimizu et al. for their interest in our paper entitled “Efficacy of probiotics in the prevention of VAP in critically ill ICU patients: an updated systematic review and meta-analysis of randomized control trials” [1]. We are thankful to the authors for their valuable re-analysis of our meta-analysis and bringing forth the additional advantage of diarrhea prevention in ventilated patients by the use of probiotics. We agree that we missed inclusion of their valuable study entitled “Synbiotics modulate gut microbiota and reduce enteritis and ventilator-associated pneumonia in patients with sepsis: a randomized controlled trial” [2] while performing the forest plot analysis of the incidence of diarrhea in ventilated ICU patients. Both the reviewers again analyzed the data and found that as the authors had used the word “enteritis” and “loose stools” in their paper in place of “diarrhea” the study was missed in the analysis.

Most previous meta-analysis such as by Su et al. and Johnstone et al. [3, 4] have missed this important finding.

A recently published randomized control study by Johnstone et al. [5] showed that there was no significant difference in diarrhea between patients in the probiotic group vs placebo group. Thus, we re-assessed the meta-analysis after adding this study also to our meta-analysis (as shown in Fig. 1). The effect was seen on a total of 3176 patients (1582 probiotic group vs 1594 placebo group). Moderate heterogeneity (OR 0.63, CI 0.38, 1.04;  $P=0.07$ ;  $I^2=65\%$ ) was seen between the studies. After adding this study, it can be seen that the trend favors probiotics in reducing the risk of diarrhea in ventilated patients though the effect is not statistically significant.

The use of probiotics has been well known to be associated with the reduction of *C. difficile*-associated diarrhea as supported by Goldenberg et al. [6] and Gokalani et al. [7]. This additional knowledge of the role of probiotics in prevention of diarrhea in ventilated patients is valuable and would encourage most clinicians in the use of probiotics in all ventilated ICU patients.

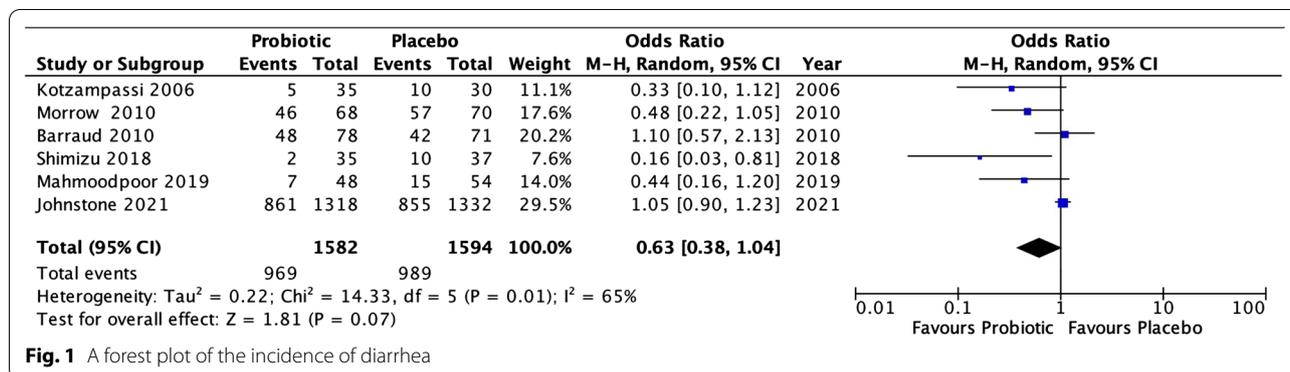
\*Correspondence: kdsoni111@gmail.com

<sup>2</sup> Department of Critical and Intensive Care, JPNA Trauma Center, AIIMS, New Delhi, India

Full list of author information is available at the end of the article



© The Author(s) 2021. **Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>. The Creative Commons Public Domain Dedication waiver (<http://creativecommons.org/publicdomain/zero/1.0/>) applies to the data made available in this article, unless otherwise stated in a credit line to the data.



**Acknowledgements**

None.

**Authors' contributions**

All authors read and approved the final manuscript.

**Funding**

Not applicable.

**Availability of data and materials**

Available with the corresponding author.

**Declarations**

**Ethics approval and consent to participate**

Not applicable.

**Consent for publication**

Not applicable.

**Competing interests**

There are no competing interests to be declared.

**Author details**

<sup>1</sup>Department of Microbiology, AIIMS, New Delhi, India. <sup>2</sup>Department of Critical and Intensive Care, JPNA Trauma Center, AIIMS, New Delhi, India. <sup>3</sup>Department of Laboratory Medicine, JPNA Trauma Center, AIIMS, New Delhi, India.

Received: 7 October 2021 Accepted: 7 October 2021

Published online: 15 October 2021

**References**

- Batra P, Soni KD, Mathur P. Efficacy of probiotics in the prevention of VAP in critically ill ICU patients: an updated systematic review and meta-analysis of randomized control trials. *J Intensive Care*. 2020;8:81.
- Shimizu K, Yamada T, Ogura H, Mohri T, Kiguchi T, Fujimi S, et al. Synbiotics modulate gut microbiota and reduce enteritis and ventilator-associated pneumonia in patients with sepsis: a randomized controlled trial. *Crit Care Lond Engl*. 2018;22(1):239.
- Su M, Jia Y, Li Y, Zhou D, Jia J. Probiotics for the prevention of ventilator-associated pneumonia: a meta-analysis of randomized controlled trials. *Respir Care*. 2020;65(5):673–85.
- Johnstone J, Heels-Ansdell D, Thabane L, Meade M, Marshall J, Lauzier F, et al. Evaluating probiotics for the prevention of ventilator-associated pneumonia: a randomised placebo-controlled multicentre trial protocol and statistical analysis plan for PROSPECT. *BMJ Open*. 2019;9(6):e025228.
- Johnstone J, Meade M, Lauzier F, Marshall J, Duan E, Dionne J, et al. Effect of probiotics on incident ventilator-associated pneumonia in critically ill patients: a randomized clinical trial. *JAMA*. 2021;326(11):1024–33.
- Goldenberg JZ, Yap C, Lytvyn L, Lo CK-F, Beardsley J, Mertz D, et al. Probiotics for the prevention of Clostridium difficile-associated diarrhea in adults and children. *Cochrane Database Syst Rev*. 2017. <https://doi.org/10.1002/14651858.CD006095.pub4>.
- Rutul A, Gokalani D. Prevention of Antibiotic-Associated Diarrhea: Role of Probiotics [Internet]. 2021 <https://medicaldialogues.in/medicine/perspective/prevention-of-antibiotic-associated-diarrhea-role-of-probiotics-81698>. Accessed 7 Sep 2021.

**Publisher's Note**

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Ready to submit your research? Choose BMC and benefit from:

- fast, convenient online submission
- thorough peer review by experienced researchers in your field
- rapid publication on acceptance
- support for research data, including large and complex data types
- gold Open Access which fosters wider collaboration and increased citations
- maximum visibility for your research: over 100M website views per year

At BMC, research is always in progress.

Learn more [biomedcentral.com/submissions](https://biomedcentral.com/submissions)

