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Psychobiotic supplementation, anxiety, and stress among clinical nurses: A double-blind randomized control study

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Background: Nurses have various health adversities impacting their health due to high stress from clinical work and shifted schedule.

Aims & Objectives: Whether the psychobiotic, heat-killed (HK)- PS23 cells, may help improve stress, anxiety, and related biological markers among high stress clinical nurses were investigated.

Methods: We conducted this double-blind randomized controlled study and invited clinical nurses scored 27 or higher on the 10-item version of Perceived Stress Scale (PSS) from a medical center in Northern Taiwan. Two capsules of HK-PS23 (contains *Lactobacillus paracasei* bacteria) per day were administered. The 14-item PSS, the State and Trait Anxiety Index (STAI), Patient Health Questionnaire (PHQ), the Insomnia Severity Index (ISI), the Job Stress Scale, Questionnaire for Emotional Trait and State, the Quality of Life Enjoyment and Satisfaction Questionnaire, theVisual Analogue Scale for Stress or Gastrointestinal Severity, blood stress markers, results from Trails Marking Tests, and sleep data from smart watch Fitbit before and after the 8-weeks trial were compared by paired- T test.

Results: Among the 70 nurses included in the trial, 35 were randomly allocated into the HK-PS-23 and 35 in the placebo group. Despite the result that scores on almost all measures showed improvements, no significant differences were found in scores changes comparing the HK- PS23 and the placebo groups. However, further subgroup analyses revealed that in subgroups with higher stress or anxiety, HK- PS23, rather than placebo, were associated with significant improvements in anxiety states after the 8-week trial. Significant results were found comparing mean differences on STAI-state in participants that took HK- PS23 (mean changes from baseline in the HK- PS23 group was -11.60 (SD12.87), p=0.004) and the placebo groups (mean changes from baseline was -5.67 (SD 9.44), p=0.062). Similar differences between HK- PS23 and the placebo were also noted among nurses with STAI $\geq$ 103 in the HK- PS23 group (F=4.21, p=0.048). In addition, HK-PS23 intervention was found to significantly reduce serum cortisol levels.

Discussion & Conclusion: This is the first double blind randomized placebo- controlled study that compared effects of the 8-week HK- PS23 intake on improvements of perceived stress or mood states among high stress clinical nurses. Although significant differences were found on almost all measures comparing endpoint and baseline results, differences in scores changes comparing the HK- PS23 and the placebo groups were not significant from our main analysis. However, our further analyses on subgroups with higher stress or anxiety did reveal that, HK- PS23, rather than the placebo, improved significantly in anxiety states, cortisol level, and positive affect after the 8-week trial. Such outcomes indicate that HK- PS23 may have a distinctive advantage in relieving anxiety in health care professionals experiencing high pressure.