CLINICAL EFFICACY OF PROBIOTICS IN ALLERGIC RHINITIS: PRELIMINARY RESULTS FROM A RANDOMIZED CONTROLLED TRIAL

Lisa Lungaro[1], Francesca Manza[1], Patrizia Malfa[2], Anna Costanzini[1], Guido Valentini[1], Elisa Viciani[3], Luisa Abate[4], Fabio Caputo[1], Giorgio Zoli[1], Umberto Volta[5], Giovanni Barbara[5], Vincenzo Stanghellini[5], Roberto De Giorgio[1], Giacomo Caio[1,6]

[1] Department of Translational Medicine, St. Anna Hospital, University of Ferrara, 44121 Ferrara, Italy.
[2]SynBalance srl, 21040 Origgio, VA, Italy.
[3]WELLMICRO SRL, Via Bruno Rizzi 1/3, 37012 Bussolengo (VR), Italy.
[4]La-statistica,Via Fratelli Bandiera 15, 40055 Villanova di Castenaso (BO), Italy.
[5]Department of Medical and Surgical Sciences, University of Bologna 40138, Italy.
[6]Mucosal Immunology and Biology Research Center, Massachusetts General Hospital-Harvard Medical School, Boston, MA, 02114, USA.

Keywords: Allergic rhinitis, Bifidobacterium, Immune system, Lactobacillus, Probiotics.

Objective: To evaluate the effects of a mixture of probiotic strains (*L. acidophilus PBS066, L. rhamnosus LRH020, B. breve BB077, and B. longum* subsp. *longum BLG240*) on symptoms and immune response in subjects with chronic allergic rhinitis.

Methods: This is a randomized, double blind, placebo controlled study on two parallel groups of subjects (aged 18-60 years) with seasonal or chronic allergic rhinitis. Group A (n=22) was treated with a placebo; Group B (n=19) was treated with probiotics for eight weeks. The effects were evaluated at the beginning (T0) and four (T1) and eight weeks (T2) of treatment, and after four weeks of follow-up from the end of the treatment (T3, total period: twelve weeks). The allergic immune response was assessed by the analysis of inflammatory blood markers, i.e., eosinophil count, eosinophil cationic protein, and total immunoglobulin E at T0, T2, and T3. Allergic rhinitis symptoms were evaluated by the Total Nasal Symptom Score (TNSS) and the Rhinitis questionnaire score Control Assessment Test (RCAT). The Quality of Life (QoL) was assessed by the Mini Rhinoconjunctivitis Quality of Life questionnaire (MiniRQLQ), at each time point. Fecal microbiome profiling variations were determined by 16S rRNA gene sequencing analysis (SA) at T0, T2, and T3.

Results: The probiotic-treated subset (Group B) showed a statistically significant improvement in TNSS symptoms and MiniRQLQ at T3 *vs.* placebo (Group A) and statistically significant intra-group differences between T0 and T3. SA revealed constant gut taxa richness and phylogenetic diversity in both groups at each time point. At T2, Group B showed an increase of *Dorea*, which was inversely associated with atopy, and *Fusicatenibacter*, known for its anti-inflammatory properties. Conversely, Group A showed an increase of pro-inflammatory species (*Bilophila* and *Bacteroides*) and an increase of *Ruminococcus unassigned* and *Bacteroides* at T3, likely associated with allergies.

Conclusion: Our preliminary results show that this specific mixture of probiotic strains improves the symptomatology and QoL in subjects suffering from chronic and seasonal

allergic rhinitis. Furthermore, the probiotic mix used in this study appears to positively affect gut microbiota by promoting the increase of bacterial species with anti-inflammatory and anti-allergic properties.