

## Fungal and bacterial skin microbiota in healthy and dandruff subjects

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Human skin is inhabited by a variety of microorganisms, including Bacteria and Fungi, that under certain circumstances might play a role in the development of skin diseases. Dandruff is a chronic inflammatory skin condition that affects approximately 50% of the adult population worldwide, causing itching and desquamation mainly on the scalp. This disease has been associated with *Malassezia* yeasts, although their role is not completely elucidated. The aim of this study was to analyze the bacterial and fungal microbiota from scalp and forehead, comparing healthy and dandruff subjects. A total of 48 samples from 13 dandruff and 11 healthy subjects were obtained. A 16S rDNA fragment from Bacteria and ITS1 rDNA from Fungi were amplified and sequenced using Illumina MiSeq platform. Sequences were analyzed using Qiime, and OTU assignment was done using Greengenes, UNITE and Genbank databases. Multivariate analyses such as non-metrical Multi Dimensional Scaling (nmMDS) and ANalysis Of Similarities (ANOSIM) were used for comparing microbial communities from different samples. Diversity was evaluated using Shannon-Weaver index. Over 2 million bacterial sequence reads and over 1 million fungal sequence reads were obtained after size and quality filtering. Actinobacteria, Firmicutes and Proteobacteria were the most common phyla. More than 600 bacterial genera were detected, and *Propionibacterium*, *Staphylococcus* and *Corynebacterium* were found in larger proportions. *Malassezia* sp. comprised the vast majority of Fungi, and were abundant in all samples. It was studied at species level, and 9 different species were detected, as well as uncharacterized phylotypes. *M. restricta* was the predominant species followed by *M. globosa*. Samples from healthy subjects significantly differed from dandruff subjects for Bacteria ( $p < 0.0001$ ) and *Malassezia* microbiota ( $p < 0.05$ ), although there is partial overlap. Our data may contribute to the understanding of dandruff etiology, and the relation between microorganisms and skin diseases.

Keywords: *Malassezia*, microbiota, skin, dandruff, scalp, next generation sequencing

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