

Gut microbiota composition in osteopenia and osteoporosis patients

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Background: Osteoporosis is a systemic disease of the skeleton characterized by a reduction in bone mass and deterioration of bone structure. As a consequence, bones become more fragile, and the risk of fractures is increased. In recent years, the importance of the gut microbiota for health and disease has been intensively studied. Some of intestinal microbiota products lead to pH reduction consequently promote calcium absorption and elevate the calcium content of the bone, so it can play an important role in the bone health maintenance. The current study explores the bacterial community composition in patients with osteoporosis and osteopenia compare to healthy controls based on 16S rRNA gene sequencing.

Methods: Thirty six subjects were involved (eight osteoporosis, eight osteopenia and twenty normal controls). Serum biochemical parameters, bone mineral density, fecal short chain fatty acids (SCFAs) composition and gut bacterial pattern were measured.

Results: Firmicutes, Bacteroidetes, Proteobacteria and Actinobacteria constituted the four dominant phyla in all samples. Intestinal enterotypes, Bacteroides2 were the highest in osteopeniapatients while Bacteroides1 washigher in the healthy controls. In genus level, *Butyricicoccus* (P -value = 0.03), *Allisonella* (P -value = 0.08), *Anaerosporobacter* (P -value = 0.05), *Alloprevotella* (P -value = 0.09) and *Holdmania* (P -value = 0.05), were enriched in the control group, while *Subdoligranulum* (P -value = 0.08) and *Odoribacter* (P -value = 0.07) were more abundant in osteoporosis and osteopenia patients respectively. Moreover osteoporosis group had the highest amount of acetate while osteopenia was enriched in butyrate and total short-chain fatty acids compare to control group.

Conclusion: The results of current research was show that the alpha diversity indices decreased from control group to patients. Due to the high frequency of the five bacterial genera mentioned in the control group, further studies on the role of these bacteria in bone metabolism and their use as probiotics for the prevention or treatment of osteoporosis are needed.