

## **Role of Gut Microbiota in Treating Obesity and Type II Diabetes Mellitus (T2DM)**

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### **Abstract**

Diabetes has become the cause for several health issues in the recent years, which affects millions of people around the world every year in various ways. Lot of reasons contribute to this and a recent research has shown that, the bacterial residents of human intestine play an important role in preventing diabetes. This present article mainly focuses on the bacteria residing in human intestines and also on the substance produced by them which is held responsible in the prevention of type II diabetes.

**Keywords:** Diabetes; T2DM; Intestinal Microbiome; Clostridium Sporogenes; Bifidobacterium; Indole-3-Propionic Acid

### **Introduction**

Diabetes, one of the world's most leading life style diseases has seen a substantial increase in the number of cases. Call it globalization, or lack of common sense among the modern day educated society, many a life style disease has become a well-known relative to the mankind. Lack of physical exercise and an unwanted addiction to the junk food are common sights to behold today. Added to this, the attitude of the affluent to go for advertised medical products and bariatric surgery instead of indulging in physical activity is leading to a humongous increase in the numbers of Diabetes and Obesity. Of the latter, type II diabetes is the most prevalent than type I, affecting more than 90% of the cases. Gut microbiota have a substantial role in the prediabetes conditions and their progression [1].

Thanks to the research scholars, many a discovery has been made in the recent times. Of all those, one recent finding takes us to knowing deeply about the Intestinal Microbiome. These are endogenous species deep rooted in the forgotten of our intestines. The compositions of the intestinal micro-organisms vary a lot between obese and non-obese subjects. When Ley et al. in their study did a comparison of gut micro biota of obese humans to lean controls and in the process; they found similar differences in this ratio. However, some studies have revealed interesting and contemporary data. This may have been due to the various types of diet patterns among people and their geographical locations on this planet. For example, there will be a huge difference in the biochemical and clinical information among people from North India and South India. Conflicting arguments may arise when a discussion among scientists and scholars come to fore. However, it is up to our good brains to understand that the nature of research is such that, it is prone to give comforting and binding results, often smoking 'em off. A recent study revealed that, a new technique named as Faecal Microbiota Transplantation (FMT). This is used to dissect association from causality for a number of diseases. In the most recent times, owing to the side effects of drugs to improve glucose and insulin resistance, natural products extracted from plants are gaining much more importance as they possess no side effects [2].

A study by S Devaraj and his team showed that, commensal bacterial species, such as *Bacteroidetes thetaiotaomicron*, *Akkermansia muciniphila* and *Escherichia coli*, were showed to have different influence on the intestinal mucus and glycocalyx layer, affecting the intestinal permeability [3]. H. Panwar and his team of researchers revealed that, some probiotic strains are able to modulate blood glucose homeostasis, and hence improve T2DM. In this context, it is more than advisable to understand the complications of T2DM (Type II Diabetic Mellitus) [4]. They are,

- a) Diabetic retinopathy,
- b) Renal toxicity and kidney stones,
- c) Hypertension,
- d) Atherosclerosis,
- e) Cystic fibrosis,
- f) Diabetic foot ulcers and
- g) Alzheimer's disease.

They include, polyphenols, tea, coffee, wine and fruits and vegetables. It has also been proven that the microbiota is very important from the polyphenol metabolism [5]. Human gut bacteria also aid in the production of various vitamins such as the vitamin k, Folate, biotin etc [6]. The bacterial species (*clostridium sporogenes* is mainly effective in this process *in vivo*, when present in the gastrointestinal tract) of human intestine are found to be responsible for the production of the metabolite Indole-3-propionic acid using tryptophan as the source of indole, which is further converted to indole propionic acid [7]. Apart from its effect on insulin levels, indole propionic acid also aids in prevention of Alzheimer's disease and also provides neuroprotective effect against cerebral Ischemia.

### Conclusion

Human gut is blessed with a wide variety of protective and useful microbial flora which carries out most important metabolic activities and has proved a boon to the humanity. The dimension of research has been expanded to a great deal and, we see it as a welcoming sign for leading us to learn more and in depth about gut microbiota. Intestinal bacteria were linked to the risk of disease in overweight people previously and the major output of this current research is to show that increased levels of indole propionic acid produced by intestinal bacteria in the presence of fibre rich foods is an efficient way to prevent diabetes. In this review, we've tried our best to provide scientific evidence of gut microbiota and their role in obesity and T2DM. We also feel that, research in endemic and epidemic expansion is the need of the hour. Should that happen, a day of finding intriguing solutions to many life style diseases will be in our vicinity.

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