

Metabolic syndrome: Dietary therapy of probiotic and prebiotic

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ABSTRACT

Metabolic syndrome is a collection of interrelated complex health problems like high blood pressure, abdominal obesity, insulin resistance, high triglycerides and low HDL level, severely leads towards the risk of cardiovascular disease (CVD) and type 2 diabetes mellitus. With this view, different kind of dietary therapies have been proposed for the management of metabolic disease. However, without any adverse health effects, dietary strategies found more appropriate for the management of metabolic disease. Metabolic disorders might result from an alteration in hosts gut microflora composition. A regulated diet controls the composition of these bacteria, which are crucial in the development of metabolic disorders. Recently application of diet therapy of probiotic and prebiotic is a new emerging area in regulation of metabolic process and alteration in gut microflora. Probiotic and prebiotic diet is related to energy harvesting work of gut bacteria so directly effects metabolic disease.

Key Words : FOS (fructooligosaccharides), Gut microflora, SCFA (Short Chain fatty Acid), AXOS (arabinoxylan-oligosaccharides)

INTRODUCTION

Metabolic syndrome is quite common. Approximately 35% of the adult population in the U.S. (2011-2012) has metabolic syndrome, and about 85% of those with type 2 diabetes have metabolic syndrome. The prevalence of metabolic syndrome increases with age, and about 50% of people over 60 are affected (JAMA, 2015). Metabolic syndrome is a group of risk factors: high blood pressure, high blood sugar, unhealthy cholesterol levels, and excess fat in the abdomen. Having these risk factors drastically raises the risk of diabetes, blood pressure, obesity and heart disease. However, any of these conditions increases the high risk of serious disease.

As it is true in the development of the metabolic syndrome with the type of different medical conditions, both genetics and the environment play important roles. Mostly a person with the family history of type 2 diabetes, hypertension, and early heart diseases greatly increases the chance to develop the metabolic syndrome. Metabolic syndrome present in, About 5% of people with normal body weight, 22% of those who are overweight and 60% of those considered obese, it shows how obesity affects metabolic disease. Adults who continue to gain five or more pounds per year raise their risk of developing metabolic syndrome by up to 45%. In the present scenario, many of dietary

strategies are designed for the better result in metabolic syndromes. Recently for 15 years, new dietary therapy has come in light is called prebiotic and probiotic. We can prevent metabolic syndrome in the same way we would treat it. We need to make sensible changes in our lifestyle, including changes in diet.

What is probiotic and prebiotic ? :

Probiotics are live microorganisms that can be consumed through fermented foods or supplements. These include the benefit of weight loss, digestive health, immune function and more (Shah, 2004). However, prebiotics should not be confused with probiotics. Prebiotics are types of dietary fiber that feed the friendly bacteria in our gut (Roberfroid, 2000). This helps the gut bacteria produce nutrients for your colon cells and leads to a healthier digestive system (Klaenhammer, 2007). Prebiotic “a selected type of CHO (dietary fiber) that allows specific changes, both in the composition and/or activity in the gastrointestinal microflora, that confer benefits.” Prebiotics mostly targets lactobacilli and bifidobacteria genera (Lenoir-Wijnkoop *et al.*, 2007). Changes in bifidobacteria are more likely to be seen compared to lactobacilli that can be because of the fact that more number of bifidobacteria are lives in the gut and there is less number of lactobacilli (Gibson and Roberfroid, 1995). These are such kind of dietary fibers which comes in the list of resistant starch and non-starch polysaccharides (e.g., hemicelluloses, cellulose, inulin, pectin and gum) non-digestible oligosaccharides, and sugar alcohols. However, some of the fiber content of these foods may be altered during cooking, so try to consume them raw rather than cooked.

Probiotic and prebiotic natural dietary supplement :

Probiotic diet :

Called “pro” because they’re believed to promote benefits to our health (Tuohy *et al.*, 2003), Although the science behind it has yet to prove how. Most of fermented food family like yogurt, pickles, kefir is one of the best source of probiotics. Yogurt, a milk product that has been fermented by gut friendly bacteria, like lactic acid bacteria and bifidobacteria (Cruz *et al.*, 2013). Kefir is a fermented probiotic milk drink. It is made by adding kefir grains to cow’s or goat’s milk. Kefir grains are cultured product of lactic acid bacteria and yeast look a bit like vegetable cauliflower, not a cereal grains. Kefir contains several major strains of friendly bacteria and yeast (Farnworth, 2006). Sauerkraut is finely cut cabbage that has been fermented by various lactic acid bacteria, the bacteria ferment the sugars in the cabbage (Beganovia *et al.*, 2011). Pickles cucumbers that have been pickled in a solution of salt and water. Pickled cucumbers are a great source of healthy probiotic bacteria, which may improve digestive health (Çetin, 2011). It is important to note that pickles made with vinegar do not contain live probiotics. Soy, probiotic food, naturally contains some benefits (Wang *et al.*, 2006). Tempeh, miso, natto are fermented soybean products that are much rich in probiotic. Meso is made from fermented rye, beans, rice or barley, a quick probiotic-rich soup.

Good bacteria can produce, by the aging process in some type of cheeses, including gouda, mozzarella, cheddar and cottage cheese (Saxelin *et al.*, 2010). Cheese is highly nutritious and is a very good source of protein, also rich in important vitamins and minerals, including calcium, vitamin B12, phosphorus, selenium. Moderate consumption of dairy products, such as cheese, lowers the risk of heart disease and osteoporosis. Buttermilk is a soothing drink, a fermented milk item, very low in fat and calories but have a very high amount of several important vitamins and minerals, such as vitamin B12, riboflavin, calcium, phosphorus. However, there are two main types of

buttermilk: traditional and cultured. Traditional buttermilk is simply the leftover liquid from making butter, only this version contains probiotics (Kumar *et al.*, 2015). Dark chocolate contains probiotics and antioxidants to keep your stomach healthy.

Prebiotic diet :

Prebiotics is a type of dietary fiber that feeds the friendly bacteria in our gut. It helps the gut bacteria in the process of production of nutrients for colon cells and leads to a healthier digestive system. Inulin, fiber in chicory root nourishes the gut bacteria, improves digestion and helps relieve constipation, increases bile production, which improves fat digestion also an antioxidant compound that protects the liver from oxidative damage. Dandelion greens rich in inulin fiber, increases gut-friendly bacteria and boosts the immune system, reduces constipation also beneficial for their diuretic, inflammatory antioxidant, anti-cancer and cholesterol-lowering effects. Jerusalem artichoke helps to boost the the immune system and prevent metabolic disease (Slavin, 2013). About 11% of garlic's fiber content comes from inulin and 6% from a sweet, naturally occurring prebiotic called fructooligosaccharides (FOS), promotes the growth of beneficial bifidobacteria in the gut. It prevents disease-promoting bacteria from growing, effective for reducing the risk of heart disease, asthma and has shown antioxidant, anti-cancer and antimicrobial properties (Cardelle-Cobas *et al.*, 2010). Onion, similar to garlic, inulin accounts for 10% of the total fiber content of onions, while FOS makes up around 6%. FOS, type of fiber give energy and strength to gut flora, helps in fat metabolism and by increasing nitric oxide production in cells boosts the immune system, beneficial for the cardiovascular system. It is also rich in the flavonoid quercetin, which gives it antioxidant and anticancer. Asparagus promotes friendly bacteria and prevents from certain type cancers (Tuohy *et al.*, 2001).

Bananas are rich in fiber that promotes the growth of healthy bacteria and reducing bloating. Barley and oats are high in beta-glucan fiber, which promotes healthy bacteria, lower cholesterol, and blood sugar levels. As it is said "an apple a day keeps doctor away", it has anti cancer properties also decrease level of harmful cholesterol LDL. Polyphenols, and pectin in apple have been linked to improved digestive health and fat metabolism. Flavanols present in cocoa increase healthy gut bacteria, decrease cholesterol level and improve heart health. In burdock root inulin and FOS decreases harmful bacteria, improve digestion and strengthen immune function. The fiber in flaxseeds promotes healthy gut bacteria, regular bowel movements and reduces the amount of dietary fat (Hijová *et al.*, 2012). AXOS [arabinoxylan-oligosaccharides] fiber from wheat bran has been shown to boost healthy bifidobacteria in the gut. AXOS is highly soluble in water, very beneficial to gut, have antioxidant and anti-cancer quality also reduce digestive problems such as flatulence, cramping and abdominal pain (Rastall and Gibson, 2015).

Metabolic disease and probiotic and prebiotic diet :

More and more studies shows that the balance or imbalance of bacteria in your digestive system is linked to overall health and any kind of metabolic disease (Guarner and Malagelada, 2003). Prebiotic foods are high in special types of polysaccharides that support digestive health. They promote the increase of friendly bacteria in the gut, help with various digestive problems and even boost your immune system. Together with the gut immune system, colonic and mucosal microflora contributes significantly to the barrier that prevents pathogenic bacteria from invading the gastrointestinal (GI) tract. Bacteria in gut produce energy by the fermentation of CHO (prebiotic), which remains undigested in upper part of the digestive tract. They ultimately got converted in

short-chain fatty acids like butyrate, acetate and propionate in colon by gut microflora (den Besten *et al.*, 2013). These fatty acids may provide 10% of calorie involved in metabolic process and can also be absorbed into the bloodstream and improve metabolic health and even help prevent certain diseases. It also helps in regulation of electrolyte level in body with sodium, magnesium, calcium which are responsible for controlling blood pressure for retaining strong bone and preventing fracture or osteoporosis. By the earlier researchers, prebiotics can diminish free radicals by reducing glycation, triggers inflammation and lowers insulin resistance. Prebiotic foods promote a sense of fullness or satiety, prevent obesity and which results in weight loss (Everard and Cani, 2013). Probiotics promote a healthy balance of gut bacteria and have been linked to a wide range of health benefits. Probiotics may positively affect hypertension via the mediation of phytoestrogens. It may also improve lipid profiles and insulin resistance, both which can be antihypertensive. Regulated activities of microbiota promote bile acid biotransformation to regulate fat digestion that affect on metabolism of lipid resulting decrease in serum lipids. In diabetic person, probiotic foods are known for the reduction of the core inherent problems in guts: excess gut permeability, endotoxemia and inflammatory response (Delzenne *et al.*, 2011). A healthy microbiota may increase insulin sensitivity and reduce autoimmune response.

Conclusion :

By these data it can be said that probiotic and prebiotic may become a key in cure of metabolic disease. It reveals that there is a strong relationship between gut microbes, probiotic and prebiotic food items and metabolic disease. There is a need of more scientific vision for application of these dietary therapies for more appropriate result. Nevertheless, previous studies indicated that prebiotic and probiotic can help in modulation of gut flora that surely results automatic reduction in risk of epidemic kind of metabolic disease. So do yourself and your gut bacteria a favor by eating plenty of these prebiotic and probiotic foods.

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