

Introduction

Gwynneth: Hello everyone and welcome to the first episode of the MMI podcast series- Medicine and Wellness. I am Gwynneth and in today's episode, we will be talking about, the wonder food - probiotics. Today, it is our honor to have Dr Madhu here, a medical officer who has specialized in Geriatric Medicine, who has also obtained a master degree in Natural Medicine and Yoga Sciences in India, and a diploma in lifestyle and dietary sciences, as well as the author of the book "The Wonder Food- Probiotics". In our discussion later, we will be gaining a deeper insight of what probiotics are and the importance of it. Let us welcome, Dr Madhu!

Dr Madhu: Am good, thanks!

Gwynneth: Dr, before we begin, **can you please enlighten us on what exactly probiotics are?**

Dr Madhu: The word pro-biotics comes from the Latin words pro ("for") and the Greek bios (meaning "life"). So, 'for life'

The World Health Organization defines probiotics as "live microorganisms, when administered in recommended amounts, bestow a health benefit on the host" (Fijan, 2014).

Our body has millions of bacteria naturally living on various parts of our skin and mucous membranes and in our intestines. These used to be called "Commensals."

In 1908, a Russian scientist named Élie Metchnikoff reported, for the first time, the positive role played by certain bacteria to health. Metchnikoff was looking for the 'elixir of life' and noted that fermented milk products had anti-aging health benefits. He named the organism found as "Lactobacillus bulgaricus." Metchnikoff won the Nobel prize for his research, and is called the father of "probiotics."

We now know that our gut microbiome has actually evolved as humans have undergone evolution and have shaped and interacted with our body for thousands of years, influencing our physiology and have a metabolic activity equal to a virtual organ within an organ.

Gwynneth: Thank you doctor for the explanation! It certainly sounds like an amazing discovery by Metchnikoff. At a time when bacteria were widely regarded as harmful to the body, and yet he actually had the confidence to continue on with his research. However, it seems that this sentiment has stayed on till now and many still believe in the myth, that all bacteria are harmful. Since these bacteria are already present in our body, **is probiotic required for all people?**

Dr Madhu: At birth, a baby's intestines are sterile. During normal delivery, the baby gets exposed to many microbes in the birth canal and maternal skin. By 3–4 days of age, the baby's gut microbiota composition resembles that of colostrum and breast milk. By about the age of three, the composition of intestinal microbiota becomes that of adult humans and becomes relatively stable, depending on the diet (Liu, 2016).

What do we mean by this? Microbiologists have known for some time that different diets create different gut flora. Human microbiota are composed of bacteria, yeasts and viruses.

These microbes survive on the undigested foods that reach the large intestine or colon.

It has been seen that eating a mainly plant based diet supports probiotic microbes. Our microbiome can change incredibly fast in the human gut—within three or four days of a big shift in what we eat.

Gwynneth: Hmm, so humans and certain bacteria actually need each other to co-exist! Since the human microbiota consists of so many microorganisms, **are there different types of probiotic bacteria?**

Dr Madhu: Different types of probiotics have different functions. Health benefits have mainly been demonstrated for specific probiotic strains.

- a) Bacterial genera: Lactobacillus, Bifidobacterium, Lactococcus, Enterococcus, Streptococcus, Prevotella spp.
- b) Fungi: The genus Saccharomyces
- c) Viruses: many plant-derived viruses reside in our gut, and our gut virome in turn, **can change the resident bacterial flora.**

Our gut microbes depend on what we eat and also our **geographical location in the world.**

Gwynneth: That is surprising to know. **I wonder how they really work in our body?**

Dr Madhu: The probiotic micro-organisms live in a 'symbiotic' or give and take relationship with us. If we give them the right food to eat, they thrive and give us many benefits in return. As I mentioned earlier, these microorganisms survive on the insoluble fibers that we eat but cannot digest.

To recap our knowledge of carbohydrates, this food group can be divided into Monosaccharides, disaccharides, oligosaccharides, and polysaccharides.

Plant polysaccharides are of two types:

Plant starches are digestible (staple cereals, where we get our energy from) or resistant to digestion (starches like pectins, dextrans and gums) AND

Non- starch Polysaccharides (NSP) which are complex carbohydrates that we humans also cannot digest (soluble fiber, like Inulin, fructans and glucans and insoluble fibers like Cellulose, hemicellulose and lignans).

These last two carbohydrates (indigestible starches and NSPs) are called PREBIOTICS because they feed the useful PROBIOTIC bacteria living within us.

The probiotic bacteria act by themselves, and prevent pathological disease causing harmful bacteria from colonizing our intestines by competitive inhibition.

They also produce short chain fatty acids (SCFAs) from the prebiotics they feed on. The benefits of probiotics in the rest of the body are through the SCFAs they produce in our large intestines.

Gwynneth: That sounds very interesting! So, what we eat definitely matters! **What therapeutic effects does probiotics have?**

Dr Madhu: The mechanisms of action of healthful benefits of probiotic micro-organisms are:

Direct benefits like:

- a) Competitive inhibition of pathogenic bacteria
- b) Up-regulation of intestinal water and electrolyte absorption
- c) Enhancing the intestinal immune response
- d) Prevent colon cancers by improving colonocyte health (cells lining the colon)
- e) Plants phytochemicals like polyphenols (known to have antioxidant benefits) are generally poorly absorbed in the gastrointestinal tract. Gut bacteria, can increase their bioavailability.
- f) Production of short-chain fatty acids (SCFAs).

SCFAs, mainly acetate, propionate, and butyrate are absorbed into the portal and systemic circulation. Benefits via short-chain fatty acids (SCFA), –

- a) Butyrate is the major energy source for colonocytes and protective against colorectal cancer.
- b) SCFAs are absorbed into the portal circulation and regulate the balance between fatty acid synthesis, and lipolysis in the body, especially on visceral adipose tissue. The net result is a reduction of the concentrations of free fatty acids in plasma.
- c) Butyrate decreases the transformation of primary to secondary bile acids, thereby reducing reabsorption of bile-acids. There is less enterohepatic circulation of bile, so the liver has to mop up more cholesterol to make bile acids. This, secondarily reduces serum cholesterol.
- d) SCFAs reduce obesity-associated inflammation by inhibiting pro-inflammatory hormones secreted by peritoneal/visceral fat.
- e) They can inhibit the proliferation and activation of some T cells, thus preventing allergy and autoimmunity.
- f) SCFAs increase the incretin hormones PYY and GLP-1 via activation of the receptors, which regulates insulin release, slows down stomach motility (GLP 1), and stimulates the brain satiety centre (PYY), therefore making us feel full longer. These help prevent metabolic syndrome.
- g) Regulation of the 'gut-brain axis.' SCFAs can regulate brain chemistry and influence neuro-endocrine systems associated with stress response, anxiety and memory function.

Gwynneth: Wow, I never knew probiotics had such great effects on the body. **So, In what kind of conditions would they be useful as treatment?**

Dr Madhu: When we speak of treatment, it means using supplements, as medicine.

Probiotic supplements are most commonly used in the treatment of different diarrhoeas like Acute Infectious Diarrhoea, travellers' diarrhoea and antibiotic associated diarrhoea.

They are also effective in the treatment of the chronic phase of inflammatory and irritable bowel disease, H. pylori infection (cause of peptic ulcer and gastric cancer), and even for simple constipation and colon cancer prevention (since they nourish the colonocytes).

They have been useful in preventing atherosclerosis and cardiovascular disease, autoimmune diseases, metabolic syndrome and T2 diabetes mellitus.

Research from the Washington University School of Medicine in St. Louis, USA, have revealed that cancer patients undergoing radiotherapy or chemotherapy, who take probiotics before the procedure have a reduced incidence of radiation and chemotherapy induced diarrhoea. (*Lactobacillus rhamnosus*).

In one interesting study, 3 groups of 2 year-old children were studied. Those toddlers with a higher number of *Bacteroides* in their stools showed better cognitive development at 2 years of age. This is probably through the influence of the gut-brain axis.

In another study, **depressed women who were given probiotic supplements felt better** than the control group who had none.

Even intestinal worms can help! In a study done in Malaysia, patients who had *Trichuris suis* (whipworm) infestation, the population of the good bacteria were significantly higher. This led to a **reduced incidence of Crohn's disease**.

Gwynneth: While the benefits are plenty, **should we be worried about any side effects? Are there certain cases where probiotics shouldn't be taken, immunosuppressed people for example?***

Dr Madhu: hm, that's a good question! Generally speaking, no naturally occurring probiotic bacteria have been seen to cause any dangerous side effects. Live microorganisms from fermented foods have been used for centuries without causing illness in people. Most Probiotics' side effects tend to be mild such as gas or bloating.

However, probiotics' safety of genetically modified strains used as **supplements** (FDA approved food products) usually need further studies. The safety of each strain needs to be guaranteed and strictly monitored.

In an important study on the use of probiotics in patients suffering severe acute pancreatitis, a significantly higher mortality was observed for the probiotics group than for the placebo.

In another study, preterm infants who were supplemented with probiotics developed sepsis. Therefore, probiotic supplementation should be used with caution in populations at risk. Who are the **'at risk' people**?

- a) Those on anti-rejection medication after organ transplant, those taking immunosuppressive drugs for autoimmune disease; or those on corticosteroids and cancer chemotherapy.
- b) Patients with structural heart disease, valve abnormality or valve replacement or history of infective endocarditis.
- c) Presence of an active intestinal perforation and leak, or active intestinal disease like acute colitis.
- d) Presence of neutropenia.
- e) Patients suffering from AIDS
- f) Preterm infants

Gwynneth: So probiotics certainly gives us a lot of benefits, but we should still be careful in certain conditions. alright, let's move on to the next question! We would like to understand a

bit more about the food intake that induces probiotics. **What kind of food can be rich in probiotics? Can we rely solely on food to achieve the amount of probiotics we need or is it better to use supplements instead?**

Dr Madhu: So, Probiotics are available in two main forms: food and dietary supplements. Dietary supplements are regulated by the Food and Drug Administration (FDA).

Dietary sources of probiotics are *fermented foods*.

Common foods we all can eat that contain probiotics are **curd, yoghurt, live/active cheeses, buttermilk, yoghurt drinks, khimchee or sauerkraut and live soy sauce.** Other foods which are rich in probiotics are **Kefir (a fermented Turkish milk drink), Kombucha, a Chinese mushroom drink, and miso, a Japanese soup and sauce.** Remember, that if you cook probiotic foods, you can lose the bacteria and fungi, since they are live organisms.

Studies have shown that bacteria in our intestines can change within hours depending on our diet. If we eat a lot of sugars and simpler starches and meats, we change our intestinal bacteria to pro-inflammatory types like Clostridium species. These bacteria are capable of proteolytic fermentation and create branched chain fatty acids (BCFA) (isovalerate and isobutyrate) from amino acid degradation. These BCFAs can increase the risk of atherosclerosis, colon cancers and autoimmune diseases.

We all need to have good bacteria in our system to maintain our health and immunity. However, **those who are generally healthy and eat a plant based diet do not need extra probiotics.** When we take a lot of fiber, the good bacteria have lots of food and their numbers increase. So we don't really need to take a continuous source of probiotics, only eat healthy!

How about Supplements? Probiotic supplements come in tablet, powder, capsule, and liquid forms. Many supplements are readily available in the market. It is very important to note that some brands require refrigeration and some need to be stored in a dark, cool place.

Supplements should only be used in the treatment of disease, as mentioned earlier. Supplements can be prescribed if indicated by evidence based medical guidelines.

Gwynneth: Besides the benefits that you mentioned earlier, **is it also alright for us to have it if we have indigestion?**

Dr Madhu: As mentioned earlier, probiotic supplements can be used in the **treatment of traveller's diarrhoea, antibiotic induced diarrhoea as well as mild infectious diarrhoeas.** Curd rice is often used in India to treat simple diarrhoeas. **It is also useful in general indigestion and helps with digestion of complex carbohydrates to prevent flatulence.** So, if I were to suddenly change from a low fibre to a high fibre diet, I might get a lot of flatulence at first. As my gut microbiome changes, my body will adjust. So, for this purpose, natural probiotic sources are sufficient. Supplemental probiotics are often combined with antibiotics to prevent diarrhoea.

Gwynneth: So we hear about the goodness of probiotics in our digestive system, **are they helpful to other parts of the body? There are allegations that they can cure skin allergy and vaginal issues too! So it is true?**

Dr Madhu: Probiotics have been successful in the treatment of some autoimmune skin conditions like atopic dermatitis, psoriasis and lupus, as an adjunct therapy. It can also prevent and cure mild vaginal candidiasis in young women. They can also help prevent allergic conditions of the respiratory tract, like hay fever. But studies have shown it is ineffective in the treatment of asthma.

Gwynneth: Doctor, this has suddenly occurred to me but is there a possibility that people might develop any allergic reactions towards probiotics?

Dr Madhu: Natural probiotic foods are not known to cause allergies. In fact, lactobacilli can actually help prevent seasonal allergies. However, certain components of supplements like colouring or capsule-content may trigger an allergic reaction in some people. They must immediately stop taking that particular preparation.

Gwynneth: okay, what about patients who are on medications, for example, hypertensive patients who are on ace inhibitors, does it interfere with the bioavailability of drugs?*

Dr Madhu: Probiotic and prebiotic foods can be safely consumed with any medicine. However, if the source is a milk product, remember that dairy can reduce the absorption of certain medicines. The doctor should explain this to the patient. (thyroid meds, antibiotics like doxycycline)

Gwynneth: Alright! That was our last question. Before we conclude our episode, Dr Madhu, is there anything you would like to say to our listeners?

Dr Madhu: (conclusion) So, probiotics are really a wonder food, making and keeping us healthy. However, remember, although just taking probiotics will provide many benefits, the main benefits come from the production of SCFAs. So we must give our probiotics the fibre food they need, if we want to see the long term benefits of this brilliant food. Make sure you feed your probiotics right!

Gwynneth: That's all for the episode today. Thank you Dr Madhu for joining us and thank you everyone for tuning in! If you are interested in our talks, please follow and evaluate our podcast on Spotify and iTunes. Please let us know if you have any questions for our speaker by leaving a comment on the Malaysian Medics International (MMI) page. see you~