



Healthy blood glucose levels matter to our immunity

21002m-PGH06.08.2021

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Almost every day, news agencies report about the COVID-19 coronavirus and the large numbers of people being infected. While there are many uncertainties about this coronavirus, there seems to be a link between diet and overall health, including a well-functioning inner defence system. People are now more aware of the importance of having a strong immunity to fight infections. However some may not realise that having healthy blood glucose levels are equally important, since high blood glucose levels for even a short time can harm our immunity (Jafar et al. 2016). Studies have shown, for example, a link between a severe progression or fatality of COVID-19 and underlying conditions, such as obesity, high blood glucose levels, diabetes, metabolic syndrome and cardiovascular diseases, often connected to poor dietary habits. This has raised consumer awareness of the importance of healthy nutrition, in particular, the benefits this can offer in terms of blood glucose management and metabolic health.

Studies conducted in several thousand patients admitted to hospitals in China and the UK show the importance of having good blood glucose control when infected with the COVID-19 virus. In China, a study conducted in 7,337 patients admitted to 19 hospitals in Hubei Province for coronavirus infection found that those with diabetes not only needed more medical treatment, they also had a higher risk of dying (Zhu et al. 2020). However in patients with good control of their blood glucose levels, they did not require as much medical treatment since the coronavirus infection was less severe and their risk of dying was also lower. The results indicate that the infection is a greater challenge especially for people with high blood glucose levels, such as diabetes.

Another large study included 20,133 patients infected with the coronavirus in in the UK (Docherty et al. 2020). Similarly to the Chinese study it demonstrated, that patients that already suffer from a disease like diabetes or obese people had a higher risk for severe progression and dying from the virus infection. Also recently reported was a study done in China that diabetes during pregnancy combined with COVID-19 is a severe risk factor for both mother and child (Capobianco et al. 2020).

Blood glucose management is key for our immunity system

It has been shown that high blood glucose levels weaken our immunity system which then may lead to the fact that a virus, like in the case of COVID-19, is harder to fight and thus takes longer to recover. It might also be, that this virus may thrive in an environment of elevated blood glucose (International Diabetes Federation 2020).

While blood glucose management is key for immune health, diabetes is very prevalent in Malaysia. According to data from the latest National Health and Morbidity Survey 2019, 18.3% or 1 out of 5 Malaysian adults has diabetes (Institute for Public Health 2020). Worryingly, nearly half are unaware they have raised blood glucose levels. So what could we do to achieve better blood glucose levels?

The good news is improved blood glucose levels can be achieved by a smart diet including the right type of carbohydrates, ie. high quality carbohydrates (Salvatore et al. 2019). Carbohydrates are important foods in our diet and are the preferred source of energy for the body and brain. However, many of the carbohydrates that we usually eat in Asia are of poor physiological quality, as they are rapidly digested in the body and raise our blood glucose levels very fast and high, eg. white rice and its products, white bread, foods made from wheat flour and starches, glucose, maltodextrin, sucrose. Currently, in the market there are only some carbohydrates that are of high physiological quality.

Quality carbohydrate for balanced blood glucose levels

One example of a high quality carbohydrate is Palatinose™ (also called isomaltulose). It is a slowly, yet fully digestible low glycaemic carbohydrate that delivers energy in a slow and sustained way (Maresch et al. 2017).

Palatinose™ naturally occurs in small amounts in sugar cane juice and honey, and is manufactured on a large scale from sugar beets. Its brand name, Palatinose™, comes from the region Palatinate in Germany, where these sugar beets are grown and Palatinose™ was discovered.

The beneficial effect of Palatinose™ on blood glucose levels and its corresponding insulin response have been demonstrated in various human clinical studies and in all groups of people, including those who are healthy, people with diabetes, during pregnancy, and those who have a normal weight or are overweight.

In a study conducted by the Agency for Science, Technology and Research (A*STAR) in Singapore, Asians seem to benefit even more from Palatinose™. It was demonstrated that it led to an even lower blood glucose response as compared to Caucasians (Tan et al. 2017).

Another study done by the same research group in A*STAR showed a lower blood glucose response in Asian adults over 24 hours after meals when Palatinose™ was eaten as part of a low glycaemic diet as compared to the group who consumed a high glycaemic diet with sucrose (Henry et al. 2017). The results demonstrated that overall, blood glucose levels throughout the day were lower and more balanced in the group with the low glycaemic diet who consumed Palatinose™ as compared to the group on the high glycaemic diet.

One study showed that a simple and innovative way to improve the nutritional quality of food products is by using low glycaemic carbohydrates to substitute high glycaemic carbohydrates, such as sucrose or maltodextrin (Kaur et al. 2020). Even though the original food product was already low glycaemic,

substituting part of the sucrose with a low glycaemic carbohydrate resulted in an even lower blood glucose and insulin response.

Isomalt, a polyol to make sugar-free confectionary or sugar-reduced baked goods, is another carbohydrate that is of a high physiological quality. It is used in a number of food applications to replace sugars and provide bulk to the product at the same time. Due to the stable glycosidic bond, isomalt is hardly digested or absorbed in the body's small intestine, leading to a lower caloric value (Sentko and Bernard 2012). As such, isomalt provides half the calories of sugar, at the most 2kcal/gram, while sugar and other fully digestible carbohydrates provide 4kcal/gram. Because isomalt is hardly absorbed in the small intestine, it has a very low to negligible effect on blood glucose and insulin levels. Based on a gram-to-gram comparison with glucose, a value of 2 is laid down for isomalt in the glycaemic index database of the University of Sydney, Australia (www.glycemicindex.com). Further, isomalt is an excellent tooth-friendly ingredient that does not cause tooth decay. Tooth decay is due to microorganisms fermenting carbohydrates, such as sucrose, glucose or starch, into decay-causing acids, which erode the teeth enamel and causing tooth demineralisation (Sentko and Bernard 2012).

Besides Palatinose™ and isomalt, chicory root fibres can also be used as a tool to achieve healthier blood glucose levels. Chicory root fibres are one of the few scientifically-proven prebiotics (Gibson et al. 2017). They are special nutrients for the gut microbiota and confer numerous benefits to human health. These prebiotics are non-digestible and reduce blood glucose response when used to replace sugars. Human studies show that the more sugar is replaced with chicory root fibres, the lower the blood glucose response and the corresponding insulin response (Lightowler et al. 2018). Just a 20% sugar replacement already shows a significant reduction in blood glucose levels. This makes chicory root fibres ideal for replacing sugars, and at the same time, enriching the diet with fibre and providing a prebiotic for gut microbiome support. Further research is ongoing related to the additional mechanisms of how this prebiotic lower blood glucose levels. This includes its fermentation by beneficial gut microbes, resulting in the production of short-chain fatty acids that stimulate gut hormones and, in turn, influence insulin regulation and thus blood glucose management (Ho et al. 2019). Additionally, prebiotic chicory root fibres strengthen the body's inner defence by selectively promoting the growth of beneficial gut microbes, notably bifidobacteria (Gibson et al. 2017; Lohner et al. 2018). Beneficial gut microbes help regulate and influence the immune system.

These carbohydrates of high physiological quality leading to slower and lower blood glucose and insulin responses as demonstrated with Palatinose™, isomalt and chicory root fibres, are a smart choice indeed.

Smart choice

During these days, taking good care of our blood glucose levels at every stage of life is all the more important as it influences how well our body's immune system is working. Choosing high quality carbohydrates, such as Palatinose™, isomalt and chicory root fibres for use in food and beverage products to achieve an overall lower blood glucose response, is a step into the right direction – also beyond the current pandemic.

References

- Capobianco G, Sadari L, Aliberti S, Mondoni M, Piana A, Dessole F, Dessole M, Cherchi PL, Dessole S, Sotgiu G (2020) COVID-19 in pregnant women: A systematic review and meta-analysis. *Eur J Obstet Gynecol Reprod Biol* 252:543–558.
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7363619/pdf/main.pdf>
- Docherty AB, Harrison EM, Green CA, Hardwick HE, Pius R, Norman L, Holden KA, Read JM, Dondelinger F, Carson G, Merson L, Lee J, Plotkin D, Sigfrid L, Halpin S, Jackson C, Gamble C, Horby PW, Nguyen-Van-Tam JS, Ho A, Russell CD, Dunning J, Openshaw PJ, Baillie JK, Semple MG (2020) Features of 20 133 UK patients in hospital with covid-19 using the ISARIC WHO Clinical Characterisation Protocol: Prospective observational cohort study. *BMJ* 369:m1985.
<https://www.bmj.com/content/bmj/369/bmj.m1985.full.pdf>
- Gibson GR, Hutkins R, Sanders ME, Prescott SL, Reimer RA, Salminen SJ, Scott K, Stanton C, Swanson KS, Cani PD, Verbeke K, Reid G (2017) Expert consensus document: The International Scientific Association for Probiotics and Prebiotics (ISAPP) consensus statement on the definition and scope of prebiotics. *Nat Rev Gastroenterol Hepatol* 14(8):491–502.
<https://www.nature.com/articles/nrgastro.2017.75.pdf>
- Henry CJ, Kaur B, Quek RYC, Camps SG (2017) A low glycaemic index diet incorporating isomaltulose is associated with lower glycaemic response and variability, and promotes fat oxidation in Asians. *Nutrients* 9(5):473. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5452203/pdf>
- Ho J, Nicolucci AC, Virtanen H, Schick A, Meddings J, Reimer, Raylene A., Huang C (2019) Effect of Prebiotic on Microbiota, Intestinal Permeability, and Glycemic Control in Children With Type 1 Diabetes. *J Clin Endocrinol Metab* 104(10):4427–4440.
<https://www.ncbi.nlm.nih.gov/pubmed/31188437>
- Institute for Public Health, National Institutes of Health, Ministry of Health Malaysia (2020) National Health and Morbidity Survey (NHMS) 2019: Vol. I: NCDs – Non-Communicable Diseases: Risk Factors and other Health Problems.
https://iku.gov.my/images/IKU/Document/REPORT/NHMS2019/Report_NHMS2019-NCD_v2.pdf
- International Diabetes Federation (2020) COVID-19 and diabetes.
<https://www.idf.org/aboutdiabetes/what-is-diabetes/covid-19-and-diabetes/1-covid-19-and-diabetes.html>. Accessed 3rd Sep 2020
- Jafar N, Edriss H, Nugent K (2016) The Effect of Short-Term Hyperglycemia on the Innate Immune System. *Am J Med Sci* 351(2):201–211. <https://pubmed.ncbi.nlm.nih.gov/26897277/>
- Kaur B, Koh M, Ponnalagu S, Henry CJ (2020) Postprandial blood glucose response: Does the glycaemic index (GI) value matter even in the low GI range? *Nutr Diabetes* 10(1):15
- Lightowler H, Thondre S, Holz A, Theis S (2018) Replacement of glycaemic carbohydrates by inulin-type fructans from chicory (oligofructose, inulin) reduces the postprandial blood glucose and insulin response to foods: Report of two double-blind, randomized, controlled trials. *Eur J Nutr* 57(3):1259–1268. <https://rd.springer.com/content/pdf/10.1007%2Fs00394-017-1409-z.pdf>

Lohner S, Jakobik V, Mihályi K, Soldi S, Vasileiadis S, Theis S, Sailer M, Sieland C, Berényi K, Boehm G, Decsi T (2018) Effect of prebiotic inulin-type fructans on acute infectious diseases in children: a randomized explorative study

Maresch CC, Petry SF, Theis S, Bosy-Westphal A, Linn T (2017) Low glycemic index prototype isomaltulose - update of clinical trials. *Nutrients* 9(4):381.
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5409720/>

Salvatore T, Nevola R, Pafundi PC, Monaco L, Ricozzi C, Imbriani S, Rinaldi L, Sasso FC (2019) Incretin Hormones: The Link between Glycemic Index and Cardiometabolic Diseases. *Nutrients* 11(8)

Sentko A, Bernard J (2012) Isomalt. In: O'Brien Nabors L (ed) *Alternative Sweeteners Fourth Edition, Fourth Edition*. CRC Press Taylor & Francis Group, Boca Raton London New York, pp 275–297

Tan WSK, Tan S-Y, Henry CJ (2017) Ethnic Variability in Glycemic Response to Sucrose and Isomaltulose. *Nutrients* 9(4):347. <https://pubmed.ncbi.nlm.nih.gov/28368311/>

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