

Newsletter

Nutrition Society of Sri Lanka



**Don't Throw Banana
Peels Away!**

**Phytoestrogens:
Are They Really
Beneficial?**

**Forgotten Foods
Neglected &
Underutilized Fruit and
Vegetables In Sri Lanka**

**Iodine Nutrition
During Pregnancy**



Message from the President

Dear Members of the Sri Lanka Nutrition Society,

I am delighted to welcome you to the Sri Lanka Nutrition Society's newsletter. As the president of the society, I am proud to be part of such a vibrant and dedicated group of professionals. The Nutrition Society of Sri Lanka is committed to promoting the importance of nutrition and health in our country. We strive to provide our members with the latest research and information on nutrition and health, as well as opportunities to network and collaborate to build up a healthy nation. As a medical officer and a sports nutritionist, I am passionate about helping people make informed decisions about their diets and health. I believe that the work of the Nutrition Society of Sri Lanka is essential in helping to create a healthier and more informed population.

Society is working towards promoting healthy eating habits and nutrition education in Sri Lanka. This year the society successfully conducted the annual scientific sessions in collaboration with scholars, practitioners, and industry stakeholders. Importantly, the society has developed Nutritional guidelines for 5-10 years old children in Sri Lanka which was made with immense efforts of our members.

Our society is dedicated to promoting nutrition education and research in Sri Lanka, and in the coming years, we have several initiatives planned to further our mission. Also, we will be launching a series of webinars and workshops to provide nutrition education to the public in the upcoming months that can aid the public to tackle their nutritional problems under the current resource-limited context.

I would like to take this opportunity to wish you all the best for the upcoming events of the Nutrition Society of Sri Lanka. May it be a success and bring about positive changes in the nutrition sector of Sri Lanka.

Thank you!



Dr. Dhammika Senanayake
President
Nutrition Society of Sri Lanka

Editors Message

Dear Readers,

It is indeed a wonderful opportunity and a great privilege to be this year's Newsletter Editor for the Nutrition Society of Sri Lanka (NSSL) and it is an immense pleasure to launch this first edition of the Newsletter for the year 2023.

In this issue, we will recount the various projects and activities in which NSSL and its members partook and a few special features such Nutri-Puzzel and Nutri-Toon to add more color and flavor to this year's Newsletter. Likewise, we have taken the initiative to promote trilingual articles from the membership to appeal to a diverse crowd.

I would like to take this opportunity to thank all the writers for contributing to the articles, and Mr. Nisal Baddage for editorial support to publish this issue timely and smoothly.

Last but not least, I would like to thank President NSSL, Dr. Dhammika Senanayake and all my fellow council members for their never-ending support throughout this process.

In the future, we hope to expand our purview and I invite all the membership to contribute to the next Newsletter issue this year.

Also, please keep an eye out for the NSSL Annual Sessions 2024. The council will be in touch with regarding the Annual Sessions.



Dr. Thushanthi Perera

Editor NSSL

Senior Lecturer

Department of Applied Nutrition

Faculty of Livestock, Fisheries & Nutrition

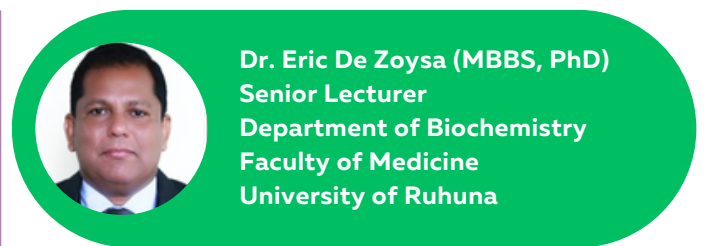
Wayamba University of Sri Lanka



Iodine Nutrition During Pregnancy: Are We in the Right Direction of Eliminating Iodine Deficiency in Fetus and Early Childhood

“Nearly 19 million babies born globally every year – 14 percent – are at risk of permanent yet preventable brain damage and reduced cognitive function due to a lack of iodine in the earliest years of life, according to a new joint report by UNICEF and GAIN released today. More than 1 in 4 of these children – 4.3 million – lives in South Asia. Insufficient iodine during pregnancy and infancy results in neurological and psychological deficits, reducing a child’s IQ by 8 to 10 points. This translates into major losses in the cognitive capital of entire nations and thus their socio-economic development.”

UNICEF and Global Alliance for Improved Nutrition (GAIN) report contained the above-mentioned statement to highlight the importance of iodine nutrition from the intrauterine life and the real burden of iodine deficiency: after many years of implementation of universal salt iodization (USI) programme as a measure of elimination of iodine deficiency disorders (IDD) worldwide.



Dr. Eric De Zoysa (MBBS, PhD)
Senior Lecturer
Department of Biochemistry
Faculty of Medicine
University of Ruhuna

History of Iodine in Medicine

Iodine has a very long history in medicine. It was recorded in early Chinese medical writings in 3600 B.C. that the size of the goiter decreases upon ingestion of seaweed and burnt sea sponge. Iodine was discovered in 1811 by Bernard Courtois as a violet vapour arising from seaweed ash while manufacturing gunpowder for Napoleon’s army. English chemist Sir Humphry Davy did some experiments on this and he described this substance’s qualities as being similar to chlorine, and that it was quite analogous to both fluorine and chlorine. He named it “iodine” from a Greek word for “violet coloured”.

The Swiss physician Dr. Jean François Condet, in 1813, hypothesized that traditional treatment of goiter with seaweed was effective because of its iodine content and successfully treated patients who had goiters with iodine and this was the first step that iodine made its leap into medical history.



Bernard Courtois (1777 - 1838)

Iodine is a vital micronutrient required at all stages of life; fetal life and early childhood being the most critical phases of requirement. It is an essential component of the hormones produced by the thyroid gland and thyroid hormones (thyroxin and triiodothyronine) are essential for many aspects of human metabolism.

Iodine Deficiency is a Global Problem

In 1980, the first global estimate from the World Health Organization (WHO) on the prevalence of goitre was estimated that 20–60% of the world’s population were iodine deficient and/or goitrous. Most of the burden was in developing countries and the importance of addressing IDD on a global basis was first recognized at the World Summit for Children in 1990. To eliminate IDD, the iodization of edible salt (USI programme) was introduced as a low-cost intervention in 1990 and since then it has been an integral part of many national nutrition strategies. Although substantial progress has been made over the last several decades, iodine deficiency remains a significant health problem worldwide and affects both industrialized and developing nations. Emerging issues at present regarding iodine nutrition include the problem of re-emerging iodine deficiency in parts of the developed world, regions of iodine excess, and the potential effects of initiatives to lower population salt consumption due to health reasons on iodine intake.



Iodine Nutrition during Pregnancy

Pregnancy has a profound impact on the thyroid gland and thyroid function and it is a stress for the thyroid gland. Production of thyroid hormones increases by 50%, along with a 50% increase in the daily iodine requirement. In addition, fetal thyroid hormone production increases during the second half of pregnancy, further contributing to increased maternal iodine requirements. Therefore, adequate iodine supply should be maintained to meet the increase demand during pregnancy.

Maternal thyroid dysfunction during pregnancy has been shown to be associated with several adverse outcomes. For example, reduced thyroid hormone levels during pregnancy have been associated with an increased risk of pre-term birth, placental abruption, fetal death, and impaired neurological development in the child. The effect of maternal iodine status and thyroid function on neonates was described long ago. In 1888 the Clinical Society of London issued a report underlining the importance of normal thyroid function on the development of the brain and since then, numerous studies have reinforced this concept.

During the first trimester of pregnancy, the developing foetus is completely dependent on the mother for thyroid hormones that are critical for optimal development. It is important to note that maternal iodine deficiency is one of the major causes for children not to reach their full potential and iodine deficiency has been identified as the single most important preventable cause of brain damage worldwide. Because of these reasons, it is very important to maintain proper iodine nutrition throughout the pregnancy to ensure optimal maternal thyroid function and brain development of children.

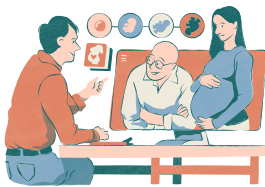
Status of Iodine Nutrition in Sri Lanka

Studies done over the past decades in Sri Lanka identified the existence of goiter and iodine deficiency as a public health problem. The overall goiter prevalence rate was 18.8%, varied by district; from 6.5% to 30.2% according to a national prevalence survey done among schoolchildren in 17 districts in 1987 in Sri Lanka. This study indicated that all 17 districts should be considered endemic, with about 86% of the countries’ population at risk of goiter.

In view of all these findings, in 1995, the government of Sri Lanka launched USI as the mainstay of control of iodine deficiency. In order to support the implementation of the salt iodization programme, the government has passed a law that regulates the production and distribution of iodized salt in the country.

a law that regulates the production and distribution of iodized salt in the country. This was incorporated into the Food Act and enforced in July 1995. According to that act salt sold for human consumption should be iodinated to have an iodine content of 50 ppm at the factory and 15- 30 ppm at the consumer level.

Several surveys have been carried out in Sri Lanka to assess the iodine nutritional status after the initiation of the salt iodization programme. According to a report published by the WHO in 2004 iodine intake in Sri Lanka was categorized as adequate and iodine nutrition as optimal. Surveys carried out in 2003 and 2005 showed that the prevalence of goiter had been reduced and the majority (75 to 94%) of households used iodized salt.



In many countries including Sri Lanka, population iodine nutritional status was assessed by estimating urinary iodine levels in school-aged children and it is not a very good indicator of iodine nutrition in vulnerable groups, especially in pregnant women. Even though Sri Lanka was declared as a country with good iodine nutrition a study done in 2013 revealed that the median urinary iodine level in pregnant women was 113.7 µg/L, which is far below the WHO recommendation (between 150 and 249 µg/L), indicating an inadequate iodine status of pregnant women in the country. Further, it was also found in 2010 that only 69.4% of salt at the household level contained an adequate iodine concentration of >15 ppm. A follow-up study done on a group of pregnant women from the first to third trimesters revealed that there is a significant reduction in maternal urinary iodine levels in the third trimester when compared to the first trimester. In those pregnant women, the median UI concentration was 175.16µg/L in the 1st trimester indicating an adequate UI level. But in the 2nd trimester, it was reduced to 125.90µg/L and in the 3rd trimester, it was further reduced to 105.95µg/L which was below the currently recommended threshold (i.e., 150 µg/L). The reduction in urinary iodine level with the advancement of gestational age in this study is quite compatible with the results of studies done in Bangladesh, Congo, Nigeria and in some other countries too. Even in countries with very good iodine nutrition, there is evidence that pregnant women are susceptible to iodine deficiency. This progressive decrease in urine iodine concentration can be attributed to the mismatch between the increased demand and the supply of iodine as a result of the advancement of pregnancy.

These findings raised a question about the iodine nutrition status at present especially in pregnant women, after many years of salt iodization and the result suggests that the consumption of iodized salt has not met the increased demand for iodine during pregnancy. Mild iodine deficiency will not cause gross maternal hypothyroidism but it definitely affects the brain development of the babies and sometimes that damage may be irreversible.



What may be the possible reasons for not maintaining iodine levels in pregnant women throughout the pregnancy? In Sri Lanka, several studies found that iodine content in significant brands of salt did not have iodine levels within the specified range indicating problems with the sustainability and the proper monitoring of the salt iodization programme. In Sri Lanka iodized salt is one of the main sources of iodine available during pregnancy. Drinking water has varying amounts of iodine and other food items which are rich in iodine such as seafood are very expensive. Therefore, maintaining iodine levels during pregnancy is a challenge. One of the studies carried out in Sri Lanka found that there were 42 different brands of salt available in a small study area and that is a large number for one commodity. From those salt brands, more than 50% of the brands did not have iodine levels within the specified range and from the total number of samples (table/crystalline salt) only 64% of samples had iodine levels within the recommended range. Further, some of the studies found that the knowledge of pregnant women on the importance of iodine and iodized salt and their practices regarding the usage of iodized salt was unsatisfactory. Similar results have been reported in studies done in other developing and underdeveloped countries such as Iraq, Ghana, etc.

In summary, it is obvious that iodine nutrition in pregnant women is not satisfactory in Sri Lanka and many other countries according to the available data and the role of iodized salt in maintaining optimum iodine levels throughout the pregnancy is questionable. As indicated in the statement at the beginning of this article sub-optimal iodine nutrition during pregnancy and infancy causes neurological and psychological defects and a significant reduction of IQ in affected children. This might affect the intellectual development of children and finally, it may badly affect the socio-economic development of the country as well. Therefore, prompt action to be taken by the relevant authorities to defeat this silent enemy of iodine deficiency during pregnancy after proper analysis of the present situation to prevent even mild cognitive defects in children.

References

· American Chemical Society., 2013. Chemical & Engineering News. Available at <http://pubs.acs.org> [Accessed 10th November 2014].

· Angela, M. L., Lewis, E. B., Elizabeth, N., 2012. History of U.S. iodine fortification and supplementation. *Nutrients*, 4, pp. 1740-1746.

· Buxton, C., Baguune, B. 2012. Knowledge and practices of people in Bia District, Ghana, with regard to iodine deficiency disorders and intake of iodized salt. *Archives of Public Health*. 70:5 Available: at <http://www.archpublichealth.com> [Accessed 16th March 2013].

· Caldwell, K.L., Pan, Y., Mortensen, M.E., Makhmudov, A., Merrill, L., Moye, J., 2013. Iodine status in pregnant women in the National Children's Study and in U.S. Women (15–44 Years), *National Health and Nutrition Examination Survey 2005–2010*. *Thyroid*, 23(8); pp. 927-937.

· Casey, B.M., Dashe, J.S., Wells, C.E., McIntire, D.D., Byrd, W., Leveno, K.J., Cunningham, F.G., 2005. Subclinical hypothyroidism and pregnancy outcomes. *Obstetrics and Gynaecology*. 105, pp. 239–245.

· de Escobar, G.M., Obregon, M.J., Escobar del, R. F., 2004. Maternal, thyroid hormone early in pregnancy and fetal brain development. *Best Practice and Research. Clinical Endocrinology and Metabolism*, 18, pp. 225–248.

· Deo, M.G., Subramanian, T.A.V., 1971. Iodine metabolism in children and women with goiter in Ceylon. *British Journal of Nutrition*, 25, pp. 97-105.

· De Zoysa GED, Hettiarachchi M, Jayathilaka KAPW, Liyanage KDCE. 2015. Knowledge and practices of iodized salt consumption among pregnant women in Galle district. *Galle Medical Journal*. Vol. 20: No. 1

· Ebrahim, S., Muhammed, N., 2012. Consumption of iodized salt among households of Basra city, South Iraq. *Eastern Mediterranean Health Journal*, 18(9), pp. 980–984.

· E. De Zoysa, M Hettiarachchi, C Liyanage. 2016, Iodine content of the marketed products of Iodized Salt. *Sri Lanka Journal of Diabetes, Endocrinology and Metabolism*. Volume 6, No.2

· Eric De Zoysa, Manjula Hettiarachchi, Chandrani Liyanage. 2016. Urinary iodine and thyroid determinants in pregnancy: a follow up study in Sri Lanka. *BMC Pregnancy and Childbirth*

· Fernando, M.A., Balasooriya, S., Herathy, K.B., Katugampola, S., 1989. Endemic goiter in Sri Lanka. *Asia Pacific Journal of Public Health*, (3) pp. 11-18.

· Global Alliance for Improved Nutrition (GAIN) 2018. <https://www.unicef.org/rosa/press-releases/nearly-19-million-newborns-risk-brain-damage-every-year-due-iodine-deficiency>

· Habimana, L., Twite, K.E., Wallemacq, P., Nayer, P.D., Daumerie, C., Donnen, P., Kalenga., Robert, A., 2013. Iodine and iron status of pregnant women in Lubumbashi, Democratic Republic of Congo. *Public Health Nutrition*, 16(8), pp. 1362–1370.

· IDD Newsletter, 22(4), pp. 1-3.

· Jayatissa, R., Gunathilaka, M.M., 2012. Third national survey on iodine deficiency status in Sri Lanka. UNICEF and Ministry of Health, Sri Lanka.

· Jayatissa, R., Gunathilaka, M.M., Ranbanda, J.M., Peiris., P., Jayasingha, J., Ekanayaka, P., Kulathunga, H., 2013. Iodine status of pregnant women in Sri Lanka. *Sri Lanka Journal of Diabetes, Endocrinology and Metabolism*, 3, pp. 4-7.

· Mahadeva, K., Seneviratne, D.A., Jayatilake, D.B., Shanmuganathan, S.S., Premachandra, P., 1968. Further studies on the problem of goiter in Ceylon. *British Journal of Nutrition*, (22) pp. 527-34.

· Medhi, T., Hoquei, M., Nasreen, Z.A., Shirin, F., Hakimkhan, M., 2009. Maternal iodine status and thyroid function during pregnancy. *Journal of Medicine*, 10, pp. 56-59

· Mansourian, A.R., 2011. A review on the metabolic disorders of iodine deficiency. *Pakistan Journal of Biological Sciences*, 14(7), pp. 412-24.

· Ord, W.M., 1888. Report of a committee of the Clinical Society of London nominated

· December 14, 1883, to investigate the subject of myxoedema. *Trans Clinical Society of*

· London 21 [Suppl]:1–215

· Pathak, P., Singh, P., Kapil, U., Reghuvanshi, R.A., 2003. Prevalence of Iron, Vit-A and iodine deficiency amongst adolescent pregnant mothers. *Indian Journal of Pediatrics*, 70, pp. 299-301

· Pearce, E.N., Andersson, M., Zimmermann, M.B., 2013. Global iodine nutrition: Where do we stand in 2013? *Thyroid*, 23(5), pp. 523-8

· Rosenfeld, L., 2000. Discovery and early uses of iodine. *Journal of Chemical Education*. 77, pp. 984–987

· Rt Stricker, Echenard, M., Eberhart, R., Chevailer, M-C., Perez, V., F A Quinni, F. A., Rn

· Stricker., 2007. Evaluation of maternal thyroid function during pregnancy: the

· importance of using gestational age-specific reference intervals. *European Journal of*

· Endocrinology. 157, pp. 509–514.

· Shekar, M., Somanathan, A., Lidan, Du., 2007. Malnutrition in Sri Lanka: Scale, Scope, Causes, and Potential Response. Health, Nutrition and Population Human Development Network, Human Development Unit South Asia Region; Report No. 40906-LK.

· WHO, 2004 b. Iodine status worldwide. *Global Database on Iodine Deficiency*. Department of Nutrition for Health and Development. WHO, Geneva.

· Wilson, D.C., 1954. Goiter in Ceylon and Nigeria. *British Journal of Nutrition*, 8, pp. 90-9.

· Zimmermann, M.B., 2008. Research on iodine deficiency and goiter in the 19th and early 20th centuries. *The Journal of Nutrition*, 138(11), pp. 2060-2063.

· Zimmermann, M.B., Jooste, P.L., Pandav, C.S., 2008. The iodine deficiency disorders. *Lancet*, 372, pp. 1251–1262.



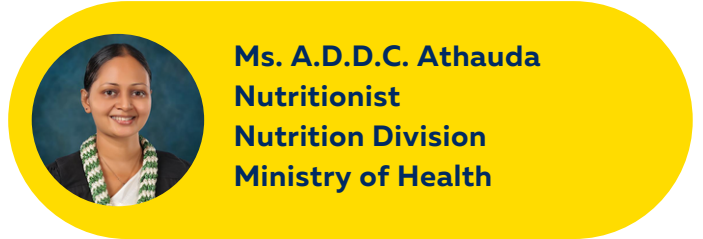


Don't Throw Banana Peels Away!

Banana (*Musa sapientum*) is the most widely cultivated fruit, which shares 54% of total fruit cultivation lands in Sri Lanka. Bananas are derived from two species namely, *Musa acuminata* and *Musa balbisiana*. *Musa acuminata* is a sweet dessert, which is peeled and eaten type banana, while *Musa balbisiana* is a starchy banana, which is also known as plantain (Zaini et al., 2022).

Banana peel represents 35-50 % of total fruit mass which is usually discarded. However, the banana peel has traditionally been used as a remedy for burns, anaemia, diarrhoea, ulcers, inflammation, diabetes, cough, snakebite and excessive menstruation (Pereira & Maraschin, 2015). Banana peel is rich in lipids, fibre, carbohydrates, protein and phenolic compounds. Further, it has high antioxidant, antibacterial and antibiotic activities (Fidrianny & Insanu 2014).

Many studies have found that banana peels are rich in polyunsaturated fatty acids such as linoleic acid (Omega-6) and α -linolenic acid (Omega-3), which are essential fatty acids that account for more than 40% of the total fatty acids content (Khawas & Deka, 2016; Emaga et al., 2007). A diet enriched with linoleic acid has shown a reduction in liver fat (Marangoni et al., 2020). Meanwhile, [clinical](#)



Ms. A.D.D.C. Athauda
Nutritionist
Nutrition Division
Ministry of Health

studies have demonstrated that α -linolenic acid has an anti-inflammatory effect on obesity

(Faintuch et al., 2007). These essential fatty acids may have a cardio-protective benefit due to their antiatherogenic, antithrombotic, anti-inflammatory and anti-arrhythmic properties. In spite of these, essential fatty acids may reduce the risk of serious diseases, such as cardiovascular disease, cancer, osteoporosis and diabetes (Zaini et al., 2022).

Banana peel is a good source of amino acids since 18 amino acids (nine essential amino acids and nine non-essential amino acids) are present in a banana peel. Essential amino acids such as leucine and lysine are abundant in plantain peel. Dietary leucine consumption has been suggested to the reduction in diet-induced weight gain, hyperglycemia and hypercholesterolemia (Zaini et al., 2022).

Banana peels have been found to contain bioactive compounds such as flavonoids, tannins, phlobatannins, alkaloids, glycosides, anthocyanins, and terpenoids, which affect various biological and pharmacological (antibacterial, antihypertensive, antidiabetic, and anti-inflammatory) functions (Pereira & Maraschin, 2015). Phenolics are important secondary metabolites, which are present in banana peels at high levels relative to other fruits. Rutin and myricetin are the predominant phenolic compounds in the flavonol profile of plantain and dessert banana peels (Tsamo et al., 2015). Further, phenolic compounds, such as gallic acid, catechin, epicatechin, tannins and anthocyanins, are found in banana peel (Sidhu & Zafar, 2018). Since phenolic compounds consist of a significant number of hydroxy groups, it may boost ROS scavenging capability. Several studies have revealed the association between ROS with a number of chronic diseases, such as neurodegeneration, cancer, diabetes and inflammation (Swietek et al., 2019). In addition, banana peel is high in gallic acid, which is an antioxidant compound (Someya et al. 2002). The phenolic content, flavonoid content and antioxidant capacity of mature and overripe fruit peel are lower than those of green peel (Sundaram et al. 2011). The flavonoid content in banana peel contributes to its anticancer properties. Flavonoids inhibit the ROS-scavenging enzyme activities, induce apoptosis, arrest the cell cycle and subsequently suppress tumor production.



Banana peel contains several anti-nutritional factors such as tannins, oxalate and phytate. A high oxalate diet increases the risk of hyperoxaluria (Hulton, 2016), which can result in renal inflammation and acute renal failure in individuals with impaired kidney function (Getting et al., 2013). However, the oxalate content in banana peel falls below the threshold value that can be taken by the body (40–50 mg/day). The thermal treatment might destroy the total oxalate content of banana peel (Lawal & Adebawale, 2004). Moreover, phytate in the diet lowers blood glucose and lipid levels and aids in preventing calcium crystallization in renal organs, such as the kidney (Schlemmer et al. 2009). The phytate content was consistently low in banana peels, with long-term levels between 1% and 6%, which can impair mineral bioavailability. Banana peel contains a safe amount of phytate comparable to cereals.

Based on previous studies, several food products incorporated with banana peel have shown enhanced nutritional value and functional properties compared with conventional foods. For instance, the increased fibre content in chicken sausages by adding banana peel powder, low carbohydrate bread substituted with 5-10% of banana peel and edible food wrappers using banana peel. Thus, by suppressing anti-nutrient factors by using different food processing methods, banana peel can be added to improve the nutritional value of the diet and prevent an array of diseases.

References

- Emaga, T. H., Andrianaivo, R. H., Wathélet, B., Tchango, J. T., & Paquot, M. (2007). Effects of the stage of maturation and varieties on the chemical composition of banana and plantain peels. *Food Chemistry*, 103(2), 590–600.
- Faintuch, J., Horie, L. M., Barbeiro, H. V., Barbeiro, D. F., Soriano, F. G., Ishida, R. K., & Cecconello, I. (2007). Systemic inflammation in morbidly obese subjects: Response to oral supplementation with alpha-linolenic acid. *Obesity surgery*, 17(3), 341–347.
- Fidrianny, I., & Insanu, M. (2014). In vitro antioxidant activities from various extracts of banana peels using ABTS, DPPH assays and correlation with phenolic, flavonoid, carotenoid content. *International Journal of Pharmacy and Pharmaceutical Sciences*, 299–303.
- Getting, J. E., Gregoire, J. R., Phul, A., & Kasten, M. J. (2013). Oxalate nephropathy due to 'juicing': Case report and review. *The American journal of medicine*, 126(9), 768–772.
- Hulton, S. A. (2016). The primary hyperoxalurias: A practical approach to diagnosis and treatment. *International Journal of Surgery*, 36, 649–654.
- Khawas, P., & Deka, S. C. (2016). Comparative nutritional, functional, morphological, and diffractogram study on culinary banana (*Musa ABB*) peel at various stages of development. *International Journal of Food Properties*, 19(12), 2832–2853.
- Lawal, O. S., & Adebawale, K. O. (2004). Effect of acetylation and succinylation on solubility profile, water absorption capacity, oil absorption capacity and emulsifying properties of mucuna bean (*Mucuna pruriens*) protein concentrate. *Food/Nahrung*, 48(2), 129–136.
- Marangoni, F., Agostoni, C., Borghi, C., Catapano, A. L., Cena, H., Ghielli, A., Vecchia, C. L., Lercker, G., Manzato, E., Pirilo, A., Riccardi, G., Risé, P., Visioli, F., & Poli, A. (2020). Dietary linolenic acid and human health: Focus on cardiovascular and cardio metabolic effects. *Atherosclerosis*, 292, 90–98.
- Pereira, A., & Maraschin, M. (2015). Banana (*Musa* spp.) from peel to pulp: Ethno pharmacology, source of bioactive compounds and its relevance for human health. *Journal of ethno pharmacology*, 160, 149–163.
- Schlemmer, U., Frølich, W., Prieto, R. M., & Grases, F. (2009). Phytate in foods and significance for humans: Food sources, intake, processing, bioavailability, protective role and analysis. *Molecular nutrition & food research*, 53(S2), S330–S375.
- Sidhu, J. S., & Zafar, T. A. (2018). Bioactive compounds in banana fruits and their health benefits. *Food Quality and Safety*, 2(4), 183–188.
- Someya, S., Yoshiki, Y., & Okubo, K. (2002). Antioxidant compounds from bananas (*Musa Cavendish*). *Food chemistry*, 79(3), 351–354.
- Sundaram, S., Anjum, S., Dwivedi, P., & Rai, G. K. (2011). Antioxidant activity and protective effect of banana peel against oxidative hemolysis of human erythrocyte at different stages of ripening. *Applied biochemistry and biotechnology*, 164(7), 1192–1206.
- Swiętek, M., Lu, Y. C., Konefał, R., Ferreira, L. P., Cruz, M. M., Ma, Y. H., & Horák, D. (2019). Scavenging of reactive oxygen species by phenolic compound-modified maghemite nanoparticles. *Beilstein journal of nanotechnology*, 10(1), 1073–1088.
- Tsamo, C. V. P., Herent, M. F., Tomekpe, K., Emaga, T. H., Quetin-Leclercq, J., Rogez, H. & Andre, C. M. (2015). Effect of boiling on phenolic profiles determined using HPLC/ESI-LTQ-Orbitrap-MS, physico-chemical parameters of six plantain banana cultivars (*Musa* sp). *Journal of Food Composition and Analysis*, 44, 158–169.
- Zaini, H.M., Roslan, J., Saallah, H., Munsu, E., Sulaiman, N.S. & Pindi, W. (2022). Banana peels as a bioactive ingredient and its potential application in the food industry. *Journal of Functional Foods*, 92, 1-12.



Forgotten Foods

Neglected & Underutilized Fruit and Vegetables in Sri Lanka

“Low fruit and vegetable consumption contributes to nearly 2.7 million deaths worldwide each year. Fruit and vegetables are therefore an essential component of a healthy diet. According to WHO and FAO of the UN, the recommended intake of fruit and vegetables for adults is at least five servings per day or a daily intake of 400 grams of fruit and vegetables. Components and nutrients in fruits and vegetables are the reason for their contribution to the reducing risk of chronic diseases.

According to Food Based Dietary Guidelines for Sri Lankans, the national recommendation is given for fruits as 2-4 portions per day, for vegetables as 3-5 portions per day and as a whole, for fruit and vegetables as more than 5 servings per day or mentioned as to consume at least two vegetables, one green leafy vegetable and two fruits daily.

People in Sri Lanka have both over-nutrition and under-nutrition as serious health concerns. These health-related problems can be an effect of the diet of the people.



Ms. Suraji Pamoda
Department of Applied Nutrition
Wayamba University of Sri Lanka

Sri Lankans' daily intake of fruit and vegetable is below national recommendations. Only 3-5 % of adults consumed the recommended 5 portions of fruits and vegetables per day. Therefore, increasing the consumption of fruit and vegetables is important.

Why should we eat fruit and vegetables?

One's daily diet should include plenty of fruit and vegetables. For instance, they are nutritious naturally and include vitamins and minerals that can help to stay healthy. The nutrients in these foods, like fiber, potassium, folate, vitamin C, and vitamin A, are crucial. They can aid in illness prevention as well.

A healthy diet must contain fruit and vegetables. At all ages, they promote bodily functioning, development, and the physical, mental, and social well-being of people with the help of nutrients in fruit and vegetables. They can lessen the risk of non-communicable illnesses and assist in preventing all types of malnutrition, including undernutrition, micronutrient deficiencies, overweight, and obesity.



Neglected or underutilized fruit and vegetables

Currently, there is a high demand for nutrient-rich fruit and vegetables to support metabolic and nutritional human health. Compared to the main commercially farmed crops, underutilized fruit and vegetables have significant advantages in terms of ease of growth, hardiness, and resilience to climate fluctuations. They also have therapeutic use and are extraordinarily rich in significant compounds. Therefore, consuming them may assist rural populations—including those in vulnerable arid and semi-arid regions of the world—meet their nutritional demands. The nutritional and therapeutic benefits of these crops are also widely known to the locals. So that the future food basket may be expanded for more people, focus must be placed on the thorough study of the conservation and nutritional profile of these crops.

Neglected and underused crops are domesticated plant species that have been used for centuries or even millennia for their food, fiber, fodder, oil or medicinal properties, but have been reduced in importance over time owing to particular supply and use constraints. These can include, poor shelf life, unrecognized nutritional value, poor consumer awareness and reputational problems and modernization of agricultural practices. These species have to ensure food security, nutrition, health, income generation and environmental services. Sri Lanka has over 60 varieties of underutilized fruit crops.

Some of the underutilized fruit and vegetables crops in Sri Lanka;



Katuanoda (*Annona muricata*). Katuanoda fruit has strong anti-cancer effects. It has been found Katuanoda can kill cancer up to 10,000 times more effectively than strong chemotherapy drugs, without harming the healthy cells. One of its cancer cure properties that has been found out is 'annonacin'. Also, Katuanoda is high in carbohydrates, especially fructose and it has large amounts of vitamins C, B1, and B2.



Madan (*Syzigium cumini*) barks and seeds are used to treat diabetes and the leaf juice is used for gingivitis conditions.



Lavalu (*Pouteria campechiana*) fruit acts as a bulk laxative agent



Beli (*Aegle marmelos*) fruit contains gastro-protection properties and controls diabetes, cholesterol, constipation, dysentery and diarrhea.



Nelli (*Emblica officinalis*) fruit enhances immunity and is high in antioxidants, reduces inflammation and is good for digestion.



Kekiri (*Cucumis sativus*) or Cooking Melon is used to treat urinary tract infections and is known to prevent the formation of stones in the urinary system.



Thibbatu (*Solanum torvum*) has antibacterial and anti-fungal properties.



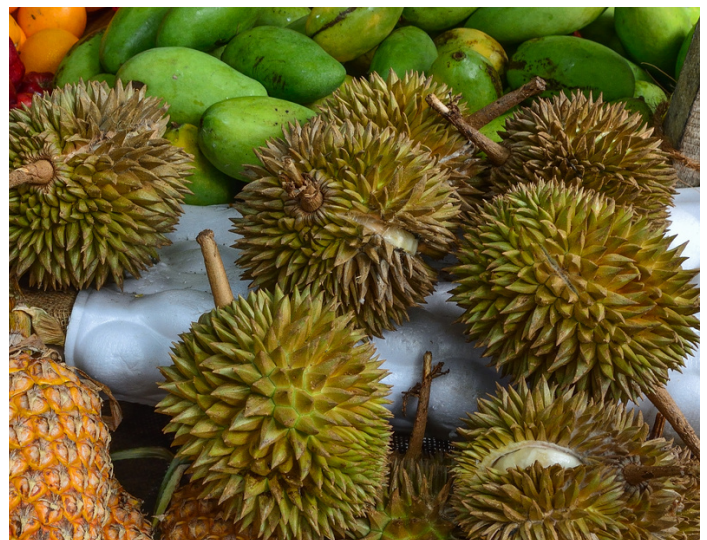
Bitter gourd (*Momordica charantia L.*) a rich source of vitamin C, which helps fight many diseases, and wound healing and is crucial for development and growth.

Recent trends in underutilized fruit and vegetable processing in Sri Lanka

- New products: This has been achieved by new heating (e.g. UHT, microwave) and freezing techniques combined with new packaging materials and technologies (e.g. aseptic, modified atmosphere packaging).
- Heat processed products - Canned fruits and vegetables, Fruit juices, Crisps, Glass packed fruits and vegetables.
- A fresh look at dried fruit - Perceived as a "value-added" ingredient, dried fruit adds flavor, color, texture and diversity with little alteration to an existing formula.

Conservation strategy


Conservation of these underutilized fruit and vegetable crops must be done. To do that, identifying and collecting live samples of neglected and underutilized crop species found in Sri Lanka, establishing of plant arboretum for neglected and underutilized vegetables, fruits and other crop species and promoting studies, research and multiplication for the benefit of future generations, conducting awareness creation and educational workshops on the medicinal and nutritional values of identified underutilized species, conducting field research and studies to identify the most suitable techniques for the growing of these plant species and introduction of identified underutilized vegetables and other crop species to the rural home gardens and facilitate the community contribution for conservation of such crop species, can be done.





තනනම් උත්තේජක භාවිතයෙන් තොර ජීවිතයේ ක්‍රීඩා පරිසරයක් නිර්මාණය කරමු

අපගේ ජීවිතයට ක්‍රීඩාව මෙතරම් සමීප වන්නේ කායික මානසික නිරෝගීකම වඩවා, ආධ්‍යාත්මික ශික්ෂණයෙන්ද, මනා පෞරුෂයෙන්ද හෙබි පරිපූර්ණ මිනිසකු බිහි කිරීමට එමගින් ලැබෙන මහඟු දායකත්වය නිසාය. ශතවර්ෂ 25 කටත් වඩා ඇතට දිවෙන අතිමානවත්, ප්‍රොඩි ඉතිහාසයක් හිමි ජාත්‍යන්තර ක්‍රීඩාව වර්තමානය වන විට අතිශය දියුණු හා ඉතා සංකීර්ණ තත්ත්වයකට පත්ව තිබේ. එය කෙමෙන්, කෙමෙන් නවීකරණයටත්, වාණිජකරණයටත් ලක් වන විට එහි ප්‍රමුඛ තේමාවක් ව දිගු කාලීනව පැවති "ක්‍රීඩාශීලී සහභාගිත්වය" නමැති සංකල්පයේ වැදගත්කමද ටිකෙන් ටික යටපත් වී, "හුදු ජයග්‍රහණයම" හඹා යෑමේ නියත ඉලක්කයක් හා ඒකායන අභිලාශයක් නූතන ක්‍රීඩා ක්ෂේත්‍රය තුළ දැකගත හැකිය.



වෛද්‍ය ශිරෝමි පිලපිටිය අධ්‍යක්ෂිකා උත්තේජක මර්දන නියෝජ්‍ය ආයතනය

තනනම් උත්තේජක කියන වචනය ඇසූ පමණින්ම අපට හිතැතින්ම සිතියට නැගෙනුයේ ලාන්ස් ආම්ස්ට්‍රොන්ග්, මේරියන් ජෝන්ස්, බෙන් ජොන්සන් වැනි ලෝක ප්‍රසිද්ධ ක්‍රීඩක ක්‍රීඩිකාවන් ය. වර්ෂ 1999 සිට 2005 දක්වා නොකඩවා වසර 7ක් ප්‍රංශ පාපැදි සවාරිය ජයගත් ලාන්ස් ආම්ස්ට්‍රොන්ග් එවකට ඕනෑම ක්‍රීඩාවකින් ලෝකයේ බිහිවූ විශිෂ්ටතම ක්‍රීඩකයා ලෙස සළකන ලදී. පසු කාලීනව ඔහුට ජීවිතාන්තය දක්වා තරඟ තනනමක් පැනවූ අතර ලැබූ ජයග්‍රහණද අහිමි විය. 2000 සිඩ්නි ඔලිම්පික් උළෙලේදී ලොව වේගවත්ම කාන්තාව බවට පත්වූ මේරියන් ජෝන්ස්ගේ තනනම් උත්තේජක ලබා ගැනීමේ පුවත අපට අතිශයින් සමීපය. ඒ අප මාතෘ භූමිය වෙනුවෙන් සුසන්තිකා ජයසිංහ ලබාගත් ලෝකඩ පදක්කම රිදී පදක්කමක් ලෙස උසස් වූ බැවිනි. වර්ෂ 1988 සෝල් ඔලිම්පික් උළෙලේදී ඇමරිකානු ජාතික ධාවන ශූර කාර්ල් ලුවිසි ගේ රන් පදක්කම් තුනේ සිහිනය බොදා කෙරු කැනේඩියානු ජාතික බෙන් ජොන්සන් එක රැයකින් බිත්දුවට වැටුණු පුවත අප අසා ඇත.



මේ ආකාරයට තනනම් උත්තේජක භාවිතය හේතුවෙන් තම ජීවිත කාලය පුරා උපයාගත් කීර්ති නාමය හා ධනය විනාශ කරගත් ක්‍රීඩක ක්‍රීඩිකාවන් සැම රටකම පාහේ ඇත. තනනම් ද්‍රව්‍ය හා තනනම් ක්‍රම භාවිතයේ ඇති අතිශය භයානක ප්‍රතිඵල වනුයේ එමගින් අතිදක්ෂ ක්‍රීඩක ක්‍රීඩිකාවන්ගේ මුලුමහත් ක්‍රීඩා දිවියම අකලට මිලිනවී යෑමත්, ඒ තුළ ඔවුන්ගෙන් ලැබීමට තිබෙන ජාත්‍යන්තර මට්ටමේ වටිනා ක්‍රීඩා ජයග්‍රහණ නිරපරාදේ රටට අහිමි වීමත්, ජගත් කෙළවිමේදී ප්‍රසිද්ධියට පත්වන මෙවැනි ආන්දෝලනාත්මක සිදුවීම් නිසා මුලුමහත් රටටත්, ජාතියටත් බලවත් අවමානයක් හා අපකීර්තියක් සිදුවීමත්ය. මෙය මෙතරම් හානිදායක ප්‍රථිපල ගෙන දෙන්නේ නම් මේ පිලිබද ගැඹුරින් කටීකා කිරීම සමාජ අවශ්‍යතාවයක් ලෙස සලකා අප සැම කටයුතු කිරීම වටී.



මෙම ලිපිය කියවන ඔබට හිතෙන්න පුලුවන් මේ තනනම් ලැයිස්තුවක්, තනනම් උත්තේජක හා සම්බන්ධ හිතී රිති තුලින් ක්‍රීඩක ක්‍රීඩිකාවන් ගේ දක්ෂතා වලට බාධාවක් සිදුවෙනවායි කියා ඇත්තටම එහෙම නැත. මෙම හිතී ක්‍රියාත්මක වනුයේ ක්‍රීඩක ක්‍රීඩිකාවන්ගේම යහපත වෙනුවෙනුයි. ක්‍රීඩාවට තිබෙන වානිජමය වටිනාකම සහ ප්‍රේක්ෂක ආකර්ෂණය වේගයෙන් වර්ධනය වී, එහි තරගකාරී බවද වැඩිවී අතිනවීන හා දියුණු තාක්ෂණික උපක්‍රම හා මෙවලම් හුනනයේදී ඊට අනුබද්ධ වන විට, ඒවා ක්‍රමවත්ව මෙහෙයවීමේ, හැසිරවීමේ හා පාලනය කිරීමේ පොදු හිතීරිති පද්ධතියක අවශ්‍යතාව හා වැදගත්කම දැඩිව ඉස්මතු වී ඇත. ක්‍රීඩාවේදී තනනම් ද්‍රව්‍ය හා තනනම් ක්‍රම භාවිතා කිරීම පාලනය කිරීමට අදාල හිතීරිති දෙස්-විදෙස් ක්‍රීඩා ක්ෂේත්‍රයන් තුළට ඇතුලත් වී ඇත්තේ මෙහි ප්‍රතිඵලයක් වශයෙනි.

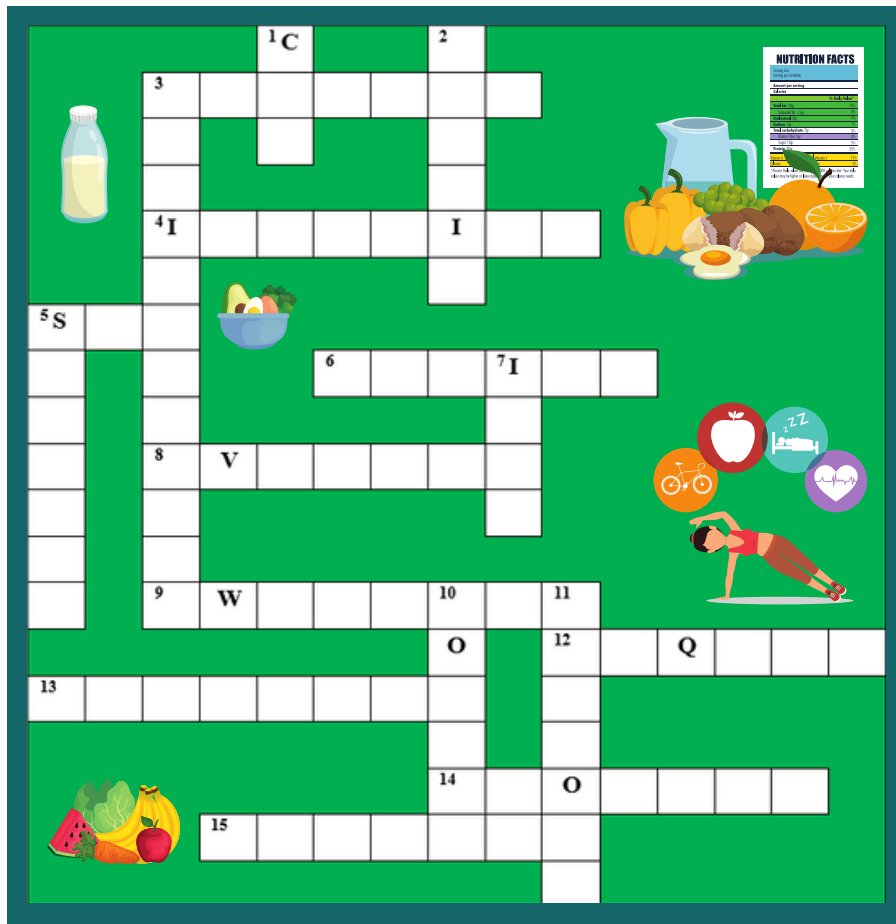
ලෝක උත්තේජක මර්දන ආයතනය විසින් සැම වසරකදී ජනවාරි 1 වන දින බලපවත්වන පරිදි පෙර වසරේ ඔක්තෝබර් මස 1 වන දින යාවත්කාලීන වූ තනනම් ද්‍රව්‍ය ලැයිස්තුව එලිදක්වන අතර ඒ තුලදී ප්‍රධාන කාණ්ඩ 3ක් යටතේදී ක්‍රීඩාවේ තනනම් කරන ලද තනනම් ද්‍රව්‍ය හා ක්‍රම ඇතුලත් වේ. ඒ පිලිබද වැඩිදුර තොරතුරු අපි ඉදිරි ලිපි වලදී සාකච්ඡා කිරීමට බලාපොරොත්තු වේ. තනනම් ලැයිස්තුවේ අඩංගු තනනම් ද්‍රව්‍ය හා ක්‍රම භාවිතා කිරීම නිසා සැමවිටම සෞඛ්‍යමය හානි ඇති වන අතර එය කුඩා අතුරු ආබාධයක සිට මරණය පවා ඇති විය හැකි පරාසයක පවතී. තවද මෙම ද්‍රව්‍ය භාවිතා කිරීම නිසා ක්‍රීඩාවේ දක්ෂතා තාවකාලිකව වැඩි වන අතර එය සාධාරණව තම හැකියාවෙන් තරග කරන ක්‍රීඩක ක්‍රීඩිකාවන්ට සිදු කරන දැඩි අසාධාරණයකි. තනනම් ද්‍රව්‍ය හා ක්‍රම භාවිතා කිරීම තුලින් ක්‍රීඩාවේ ජීවගුණයට හානියක් සිදුවන අතර වැරදි ආදර්ශයක් අනාගත ක්‍රීඩා පරපුර වෙත සම්ප්‍රේශණය වීම සිදුවේ. මේ කරුණු 3 මූලික කොට ගනිමින් සැමදෙනාටම සාධාරණ වූ ක්‍රීඩාවක් සහ සෞඛ්‍යසම්පන්න ක්‍රීඩා පරපුරක් බිහි කිරීමට සැම රටකටම අවස්ථාව හිමි වේ. අනෙක් අතට, වත්මන් ක්‍රීඩාවෙහි නියැලෙන රටේ ජීවනාලිය බඳු ජාතියේ මතු පරපුරෙහි ශාරීරික හා මානසික නිරෝගීතාවය හා යෝග්‍යතාවය පිරිහී ගොස් රෝගී සමාජයක් අනාගතයේදී බිහිවීමට ඇති ඉඩකඩ වැඩිවීමද දිගුකාලීන වශයෙන් මෙහි පවත්නා තවත් ගැටලුවකි. එබැවින් තනනම් උත්තේජක භාවිතයෙන් වැළකී සිටීමේ වැදගත්කම අවධාරණය කරමින් මෙරට ක්‍රීඩක පරපුර සහ ඔවුන්ගේ සියලු අනුගාමික පිරිස් දැනුවත් කිරීම අප සැමගේ වගකීමකි.

මීලග ලිපියේදී අප තනනම් උත්තේජක හා සම්බන්ධ හිතී උල්ලංඝනය කිරීම් පිලිබදව සාකච්ඡා කරමු.





Nutri-Puzzle



ACROSS

3. The major bioactive compound of garlic
4. Vitamin C helps in strengthening the _____
5. The number of months the infants should be exclusively breastfed
6. Helps to keep the mouth wet
8. A fruit rich in monounsaturated fatty acids
9. An inflammatory response happening in tissues in response to tissue damage
12. Unsaturated fats are _____ at room temperature
13. Sunlight is a good source of _____
14. "Newborn child"
15. Disease in children caused by the deficiency of Calcium

DOWN

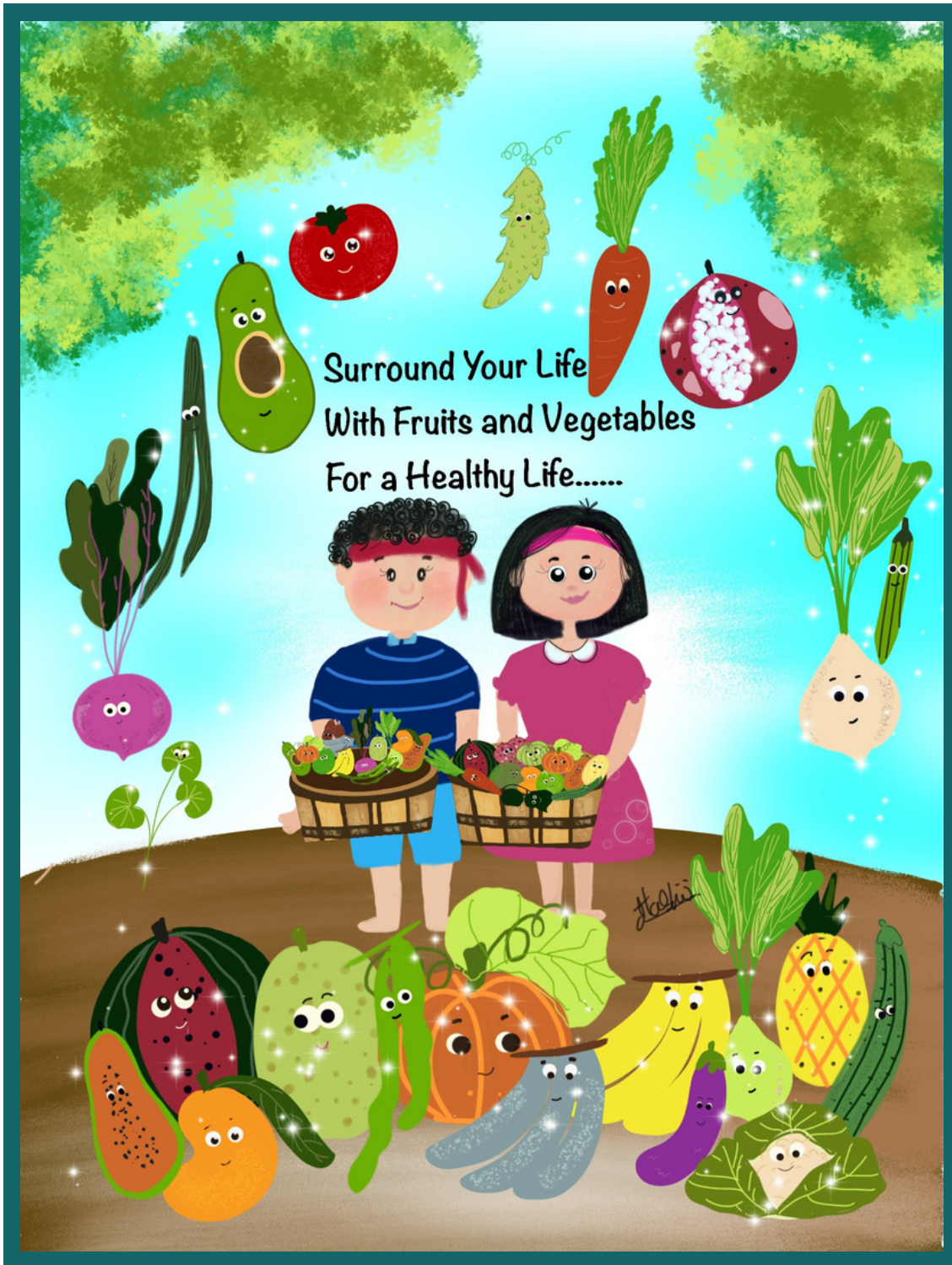
1. An abbreviation for a "good" trans fatty acid
2. A water-soluble vitamin
3. Helps to fight against free radicals
5. This can be a risk factor for cardiovascular diseases
7. A critical nutrient for adolescents
10. An essential nutrient for the synthesis of thyroid hormone
11. Simple sugar which is the body's main source of energy



Prepared by:
Ms. Shehari Wijesinghe
Wayamba University of Sri Lanka



Nutri-Toon

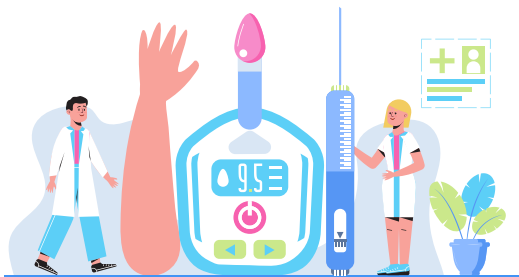


Drawing by:
Ms. Hashini Gunasena
Wayamba University of Sri
Lanka



நீரிழிவு நோய் பற்றிய கட்டுக்கதைகளும் உண்மைகளும்

நீரிழிவு என்பது ஒரு நீண்ட கால தொற்றா நோயாகும், இதில் உடல் இன்சுலினை திறம்பட உற்பத்தி செய்யவோ அல்லது பயன்படுத்தவோ முடியாது. நீரிழிவு நோய் உலகம் முழுவதும் அதிகரித்து வரும் ஒரு பிரச்சினையாகும், மேலும் நீரிழிவு பற்றிய பல கட்டுக்கதைகள் உலகம் முழுவதும் பரப்பப்படுகின்றன. நோய் பற்றிய உண்மைகளை தவறாகப் புரிந்துகொள்வது நோயாளிகளுக்கு தீங்கு விளைவிக்கும். நீரிழிவு ஒரு தீவிர நோய் அல்ல, ஆனால் புற்றுநோய்கள் மற்றும் பல நோய்களுடன் ஒப்பிடும்போது ஒரு வருடத்திற்கு அதிகமான இறப்புகளை ஏற்படுத்துகிறது. மற்ற நோய்களைப் போலல்லாமல், நீரிழிவு நோயைக் கட்டுப்படுத்தலாம்.



Dr. Anusha Jatheesan
Senior Lecturer
Faculty of Health Sciences
The Open University of Sri Lanka

நீரிழிவு பற்றிய சில பொதுவான கட்டுக்கதைகள் பின்வருமாறு

கர்ப்பகால நீரிழிவு: பிரசவத்திற்குப் பிறகு இந்த நீரிழிவு நிலை மறைந்துவிடும் என்று சிலர் நினைக்கிறார்கள். ஆனால் என்ன நடக்கிறது என்றால், கர்ப்பத்திற்குப் பிறகு இரத்த சக்கரை இயல்பு நிலைக்குத் திரும்புகிறது, ஆனால் எதிர்கால நீரிழிவு வகை II நோய்க்கான ஆபத்து பல மடங்கு அதிகரிக்கிறது. எனவே வகை II நீரிழிவு நோயைத் தடுக்க ஆரோக்கியமான உணவுப் பழக்கம் மற்றும் வழக்கமான உடற்பயிற்சியைப் பேணுவது மற்றும் கர்ப்பத்திற்கு முந்தைய எடைக்கு படிப்படியாகத் திரும்புவது குறித்து விழிப்புடன் இருப்பது அவசியம்.

நீரிழிவு நோயாளிகள் எந்த வகையான இனிப்புகளையும் சாப்பிடக்கூடாது: உங்கள் கலோரிகளை எண்ணி, உங்கள் உணவில் விழிப்புடன் இருந்தால், எப்போதாவது குறைந்த அளவு இனிப்புகளை உட்கொள்வதால் எந்த பிரச்சினையும் இல்லை. பழங்களைத் தேர்ந்தெடுப்பதன் மூலமும் இனிப்புகளை உண்ண வேண்டும் என்ற ஆர்வத்தை நிவர்த்தி செய்ய முடியும்.

நீரிழிவு நோயாளிகள், சிறப்பு நீரிழிவு உணவுப் பொருட்களைக் கருத்தில் கொள்ள வேண்டும்:

நீரிழிவுக்கு உகந்த உணவுகள் என்று பரிந்துரைக்கப்படும் உணவுகள் விலை உயர்ந்தவை, ஆனால் ஊட்டச்சத்து உள்ளடக்கத்தை நீங்கள் கருத்தில் கொள்ளும்போது அவை சாதாரண உணவுப் பொருட்களை விட சிறந்ததாக இருக்காது. எனவே, நீங்கள் உணவுப் பொருட்களைத் தேர்ந்தெடுப்பதற்கு முன், தேவையற்ற செலவு மற்றும் உடல்நலப் பிரச்சினைகளைக் குறைக்க ஊட்டச்சத்து லேபிள்களை/labels இருமுறை சரிபார்க்கவும். இருப்பினும், பதப்படுத்தப்பட்ட உணவுகளை உட்கொள்வதைக் குறைக்கவும், பழங்கள் மற்றும் காய்கறிகளின் நுகர்வுகளை அதிகரிக்கவும், ஆரோக்கியமான வாழ்க்கையை எப்போதும் பராமரிக்க முயற்சிக்கவும்.

நீரிழிவு நோயாளிகள் உருளைக்கிழங்கு சாப்பிட முடியாது: நிச்சயமாக உருளைக்கிழங்கில் கார்போஹைட்ரேட்டுகள் அதிகம் ஆனால் அவற்றை குறைந்த அளவு அல்லது மற்ற கார்போஹைட்ரேட்டுகளுக்கு பதிலாக வைத்திருப்பது உங்கள் கலோரி எண்ணிக்கையை அதிகமாக மாற்றாது. எனவே, அவற்றை சரியான அளவுகளில் பயன் படுத்துவது ஏற்றுக்கொள்ளத்தக்கது.

சக்கரையை அதிகமாக உட்கொள்வது நீரிழிவு நோயை ஏற்படுத்துகிறது: மரபணு குறைபாடுகள், சமநிலையற்ற வாழ்க்கை முறை, முறையற்ற உணவு நடத்தை மற்றும் உடற்பயிற்சியின்மை போன்ற காரணங்களால் நீரிழிவு நிலை உருவாகிறது. சக்கரையை அதிகமாக உட்கொள்வதால் மட்டும் நீரிழிவு நோய் வராது.



சக்கரை நோய் பற்றி செய்ய வேண்டியது மற்றும் செய்யக்கூடாது பலரால் பல வழிகளில் பேசப்படுகிறது. நீங்கள் ஒரு குறிப்பிட்ட யோசனையைப் பின்பற்றுவதற்கு முன், இரண்டு முறை யோசித்து, இந்தத் தகவலை தெளிவுபடுத்த ஒரு நிபுணரை அணுகவும். உதாரணமாக, வகை I நீரிழிவு நோயாளிகள் எந்த வகையான உடற்பயிற்சிகளிலும் அல்லது விளையாட்டுகளிலும் பங்கேற்க முடியாது, நீரிழிவு நோயாளிகள் சில வேலைகளைச் செய்ய முடியாது, சக்கரை நோயாளிகள் கர்ப்பம் தரிக்கக் கூடாது போன்ற மற்றும் பல.

ஒரு ஊட்டச்சத்து நிபுணராக, நோயாளியின் நண்பர்கள் அல்லது குடும்ப உறுப்பினர்களால் தவறாக வழிநடத்தப்பட்ட பல நிகழ்வுகளை கண்டறிந்துள்ளேன், ஏனெனில் அந்தத் தகவலை அவர்களின் மருத்துவர்களிடம் ஆலோசிக்கவில்லை. எப்பொழுதும் அறிவியல் பின்னணியைச் சரிபார்த்து, மேலும் தெளிவுபடுத்த உங்கள் மருத்துவர் அல்லது உணவியல் நிபுணரிடம் கலந்துரையாடுங்கள்.





Understanding Consumer Perceptions of the Relationship between Food Consumption and Non-Communicable Diseases: Insights From an Online Survey

Introduction

Food consumption is influenced by various factors, including availability, accessibility, choice, geography, demography, income, socioeconomic status, urbanization, globalization, marketing, religion, culture, and consumer perceptions and attitudes. Unhealthy dietary patterns coupled with sedentary lifestyles contribute to high levels of obesity and the increased incidence of NCDs. Non-Communicable Diseases, such as cardiovascular diseases, cancers, diabetes, and chronic respiratory diseases, pose a significant health burden in Sri Lanka. Unhealthy lifestyle factors, including imbalanced diets, physical inactivity, tobacco use, and harmful alcohol consumption, contribute to the rise of NCDs. Consumer perceptions significantly influence knowledge, behavior, and attitudes toward food consumption. However, studies have shown that consumer perceptions may not always align with actual diet quality. Factors such as affordability and attitudinal and perceived environmental barriers can hinder healthy eating practices. Understanding consumer perceptions is crucial in addressing the prevalence of NCDs and promoting healthy food consumption.



Ms. Kumudi Chamalka Siriwardana
Department of Applied Nutrition
Wayamba University of Sri Lanka



Prof. Ananda Chandrasekara
Department of Applied Nutrition
Wayamba University of Sri Lanka

Methodology

A cross-sectional online survey was conducted, collecting data from 160 participants aged 20 years and above. The participants were conveniently sampled from the adult population. The survey questionnaire was self-administered and developed by modifying pre-tested and validated questions from previous studies. The questionnaire consisted of four sections focusing on demographic information, perceptions of NCDs, dietary behaviors and food choice factors, and perceptions of food consumption. The survey was available in both English and Sinhala languages. Descriptive analysis was performed using Excel and SPSS, and frequencies and percentages were used to summarize the data.

Results

The demographic characteristics of the participants revealed that the majority were females (68.1%) and aged between 20-29 years (71.9%). Most participants identified themselves as Sinhalese (91.9%), and a significant portion had a degree as their highest educational attainment (65%). In terms of income, the participants represented various income categories, with 33.1% choosing not to answer. The sample included participants from 23 out of the 25 districts in Sri Lanka.

Regarding perceptions of NCDs, the majority of participants (93.1%) perceived that the prevalence of NCDs has been increasing. When asked about the NCD causing the highest number of deaths in Sri Lanka, cardiovascular diseases were identified by 63.1% of participants, followed by cancer (26.9%) and diabetes (5%). The perception that NCDs are preventable through lifestyle modifications was acknowledged by 98.8% of participants.

In terms of dietary behaviors, 75.6% of participants reported consuming fruits on a daily basis, while only 29.4% reported consuming vegetables daily. When asked about the frequency of consuming high-fat foods, 41.3% of participants reported consuming such foods at least once a week, with 19.4% consuming them daily. Notably, 39.4% of participants reported consuming fast food at least once a week. When asked about physical activity, 58.1% of participants reported engaging in physical activity for at least 30 minutes a day.

Regarding perceptions of food consumption, 89.4% of participants recognized a high-fat diet as a major risk factor for cardiovascular diseases. However, only 45.6% and 57.5% of participants identified low fiber and high carbohydrate diets, respectively, as risk factors for cardiovascular diseases. When asked about the recommended daily servings of fruits and vegetables, 53.1% and 51.3% of participants, respectively, had a positive perception of consuming the WHO-recommended servings. However, approximately 50% of participants lacked a clear understanding of these recommendations.

Misconceptions were also observed among the participants. For instance, 50.6% of participants believed that all types of margarine and fat spreads are detrimental to cardiovascular health. Moreover, 79.4% of participants perceived organic foods as reducing the risk of cancer, while 80.6% perceived organic foods as reducing the risk of kidney diseases.



Discussion and Conclusions

The study findings highlight the importance of consumer perceptions in shaping dietary behavior and their potential impact on the prevalence of NCDs. The majority of participants recognized the association between unhealthy eating habits and NCDs, emphasizing the significance of adopting a healthy diet and lifestyle to reduce the burden of these diseases. However, gaps in understanding were observed regarding certain types of fats and the recommended intake of fruits and vegetables. These findings indicate the need for targeted educational interventions and awareness campaigns to address these misconceptions and improve knowledge about healthy eating practices.

This study provides valuable insights into consumer perceptions of the relationship between food consumption and NCDs in Sri Lanka. The findings emphasize the importance of addressing misconceptions and improving knowledge about healthy eating practices to promote long-term behavior change and reduce the prevalence of NCDs. Public health initiatives and interventions can utilize these insights to tailor strategies that meet the specific needs of the population and promote healthier food consumption patterns. By improving consumer understanding and awareness, it is possible to positively influence dietary behavior and contribute to the overall well-being and health of the population.

References

- Ministry of Health (2021). Annual Health Statistics. [Provide the specific publication details if available]
- Bayram, I., & Ozturkcan, S. (2021). High Sodium Levels in Processed Foods and Their Implications on Public Health: A Case Study in Turkey. [Provide specific publication details if available]
- Haileamlak, A. (2019). Physical inactivity: A global pandemic. *BMC Public Health*, 19(1), 553.
- Azadnajafabad, S., et al. (2021). Major Risk Factors of Non-Communicable Diseases among Iranian Populations: A Systematic Review. *Iranian Journal of Public Health*, 50(2), 183-198.
- Abeywickrama, H. M., et al. (2020). Dietary Patterns, Nutritional Status, and Associated Factors Among Adults in the Dry Zone of Sri Lanka. *Ecology of Food and Nutrition*, 59(5), 563-578.
- Jayawardena, R., et al. (2013). Low fruit and vegetable consumption is associated with insulin resistance and dietary fat intake among Sri Lankan adults. *BMC Public Health*, 13(1), 976.
- Krauss, R. M., & Kris-Etherton, P. M. (2020). Public Health Guidelines Should Recommend a Reduction in Saturated Fat Consumption Based on the Available Scientific Evidence. *Journal of Nutrition*, 150(6), 1025-1030.
- Nimesh, G. (2015). Assessing the Knowledge and Awareness on Dietary Fats among Sri Lankan Adults. *International Journal of Scientific and Research Publications*, 5(3), 1-6.
- 'Purchase Intention of Customers: the Role of Labels and Certifications in The Sri Lankan Organic Food Market.' (2016). *South Asian Journal of Social Studies and Economics*, 2(2), 1-12.
- Kapuge, K. (2016). Determinants of Purchase Intention of Organic Food in Sri Lanka. *International Journal of Scientific and Research Publications*, 6(6), 231-238.
- Sugano, M., & Matsuoka, R. (2021). Cholesterol-lowering effects of egg phospholipids and egg white proteins in animal trials and human clinical studies. *Nutrients*, 13(3), 889.
- Yu, L., Zou, T., & Dong, X. (2014). Consumption of Fish and Long-chain Omega-3 Fatty Acids in Relation to Risk of Cancer: A Meta-analysis of Prospective Cohort Studies. *Scientific Reports*, 4(1), 1-10.
- Townsend, N., et al. (2017). Physical Activity and Non-communicable Diseases: A Review of Epidemiological Evidence. *World Health Organization*.



Phytoestrogens: Are they Really Beneficial?

Phytoestrogens are plant-derived dietary compounds, found in a wide variety of foods. They show structural similarity to 17- β -estradiol, the primary female sex hormone. Phytoestrogens represent a diverse group of naturally occurring phytochemicals such as isoflavones, lignans and coumestrols. Isoflavones such as genistein, daidzein, glycitein, formononetin and biochanin A act as phytoestrogens while lignan precursors include pinoresinol, lariciresinol, secoisolariciresinol and matairesinol. The bioactivity of phytoestrogens is based on their ability to bind to estrogen receptors. Phytoestrogens appear to exert an estrogenic or anti-estrogenic effect depending on the circulating estrogen level. They exert an anti-estrogenic effect when the circulating estrogen level is high, but when the estrogen level is low, their effect becomes more estrogenic. The binding upregulates the promoter regions of DNA and therefore the expression of specific genes. Therefore, phytoestrogens can potentially affect all the processes regulated by oestrogens.



Mrs. Hasanga Rathnayake
Senior Lecturer
Department of Biochemistry
Faculty of Medicine
University of Ruhuna

Food sources rich in phytoestrogens

Numerous fruits, vegetables, legumes, cereals and nuts contain phytoestrogens. Among them, several food items are available in the local market. Soybean, soy flour and soy-based food products consist of the highest amount of phytoestrogens (i.e isoflavones) among all food types (Table). Legumes like chickpea and mung bean also consist of higher amounts of phytoestrogens. Among the fruits, pomegranate and dried dates consist of the highest amount of phytoestrogens. Passion fruit, guava, pineapple and dried grapes consist of moderate levels of phytoestrogens. Vegetables like green gram sprouts, sweet potato, parsley, asparagus, pumpkin, green beans, and carrot consist of substantial levels of phytoestrogens.

Most foods consist of a lesser amount of isoflavones than lignans and only small amounts of coumestrol. Green tea and whole grain bread also have low levels of phytoestrogens. However, there are a lot of un-investigated plant varieties potentially rich in phytoestrogens.

Health benefits of phytoestrogens

Various beneficial health effects have been ascribed to phytoestrogens, such as a lowered risk of menopausal symptoms like hot flushes, risk of osteoporosis, risks of cardiovascular disease, obesity, metabolic syndrome and type 2 diabetes mellitus, brain function disorders, breast cancer and other forms of cancer including prostate cancer.

Effect of phytoestrogens on bone health:

Estrogen plays an important role in maintaining bone density by regulating bone formation and resorption. Since lower circulating estrogen levels are found during menopause, calcium is lost from the bones leading to osteoporosis. It is proven that phytoestrogens are fairly effective in maintaining bone mineral density (BMD) in postmenopausal women. Phytoestrogens promote the activation of osteoblasts and hence bone mineralization. It is reported that the consumption of soy isoflavones contributes to beneficial effects on improving BMD of lumbar spine and femoral neck regions.

Effect of phytoestrogens on cardiovascular health:

Reduced estrogen levels following menopause may influence the development of obesity, abnormalities of lipid profile and rheological properties of plasma and platelet function. Experimental studies have shown the beneficial effects of phytoestrogens on endothelial cells, vascular smooth muscle, and extra-cellular matrix.

Phytoestrogens show decreased arterial stiffness and anti-atherosclerotic effects via nitric oxide production. Phytoestrogens also contribute to reducing LDL cholesterol, angiogenesis, inflammation and tissue damage by reactive oxygen species. These effects could delay the progression of atherosclerosis. Epidemiological studies suggest that dietary intake of soy isoflavones may contribute to the decreased incidence of cardiovascular diseases and thromboembolic events.

Effect of phytoestrogen on cancer:

Anti-cancer effects of a number of phytoestrogens present in fruits, vegetables, soy, and green tea have been reported. People who consume high amounts of isoflavonoids in their diets have lower rates of several cancers including breast, prostate and colon cancer. A high plasma concentration of the lignan precursors is

Table: Phytoestrogen content in different types of foods.

Name	Phytoestrogens * (µg/100 g)†	Isoflavones (µg/100 g)	Lignans (µg/100 g)	Coumestrol (µg/100 g)
Legumes				
Soya bean	17556	17544	11	<1
Chick pea	420	416	4	<1
Mung bean	323	32	289	2
Red-lentils	14	13	<1	-
Fruits and nuts				
Dried dates	599	14	584	<1
Pomegranate	304	<1	304	<1
Dried grapes	88	7	81	<1
Passion fruit	71	43	26	2
Avocado	43	9	34	-
Grape fruit	39	17	21	<1
Pineapple	38	21	17	-
Peanut	34	7	27	<1
Lemon	29	4	25	<1
Mango	20	1	19	-
Vegetables				
Mung bean sprouts	798	351	86	<1
Sweet potato	259	1	258	<1
Parsley	197	59	137	<1
Asparagus	154	2	152	-
Pumpkin	154	<1	154	<1
Green beans	147	50	94	3
Carrot	125	4	121	<1
Garlic	99	2	97	<1
Broccoli	96	3	90	3
Okra	86	2	84	<1
Leek	61	9	52	-
Onion	31	<1	31	-
Cauliflower	15	<1	14	<1
Cabbage	12	<1	11	<1
Cucumber	12	<1	12	-
Beetroot	10	<1	10	<1
Other products				
Green tea	13	1	12	<1
Whole wheat bread	10	1	9	<1
Black tea	9	1	8	<1
Coffee	6	<1	6	-

Kuhnle et al, 2009 and Thompson et al, 2014

* Amount in µg per 100 g of wet weight of the food

† Sum of isoflavones, lignans and coumestrol (Isoflavones: Daidzein Genistein Glycitein Biochanin A; lignans: Formononetin Secoisolariciresinol Matairesinol)

correlated with a reduced risk of breast and prostate cancer. There is a growing body of experimental evidence that shows the inhibition of human cancer cells by genistein through the modulation of genes that are related to the control of cell cycle and apoptosis. Furthermore, genistein has been found to have antioxidant properties, and shown to be a potent inhibitor of angiogenesis and metastasis. Long-term studies showed the potential benefits of soy isoflavones in the prevention of colon, endometrial, and ovarian cancer.

Effect of phytoestrogen on brain function disorders:

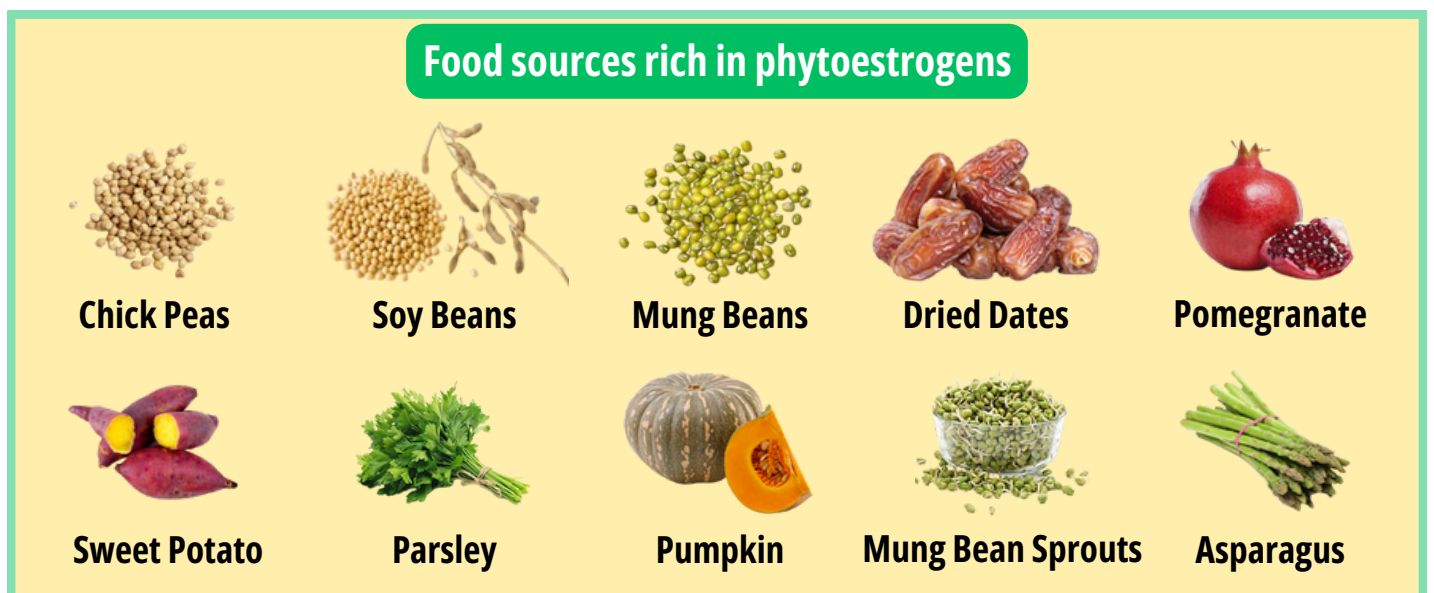
Phytoestrogens stimulate estrogen receptors and increase the survival of brain cells and prevent Alzheimer’s disease. They are shown to increase blood supply to the brain and promote recognition and memory. By their antioxidant properties, also, phytoestrogens can help prevention of neurodegenerative diseases.

Summary

Phytoestrogens represent a diverse group of naturally occurring phytochemicals such as isoflavons, lignans and coumestans. Dietary phytoestrogens and their derivatives diminish menopausal symptoms such as hot flushes, night sweats, sleep disturbances and vaginal dryness. Phytoestrogens are known to protect the bones by optimizing bone turnover and bone mineralization. Dietary phytoestrogens show protective effects on endothelial cells and vascular smooth muscle. They also contribute to reducing LDL cholesterol, angiogenesis, inflammation and tissue damage by reactive oxygen species. Thus phytoestrogens delay atherosclerosis and cardiovascular disease. Furthermore, dietary phytoestrogens and their derivatives are known to have anti-cancer effects.

References

- ANDRES, S., ABRAHAM, K., APPEL, K. E. & LAMPEN, A. 2011. Risks and benefits of dietary isoflavones for cancer. *Crit Rev Toxicol*, 41, 463-506.
- CORNWELL, T., COHICK, W. & RASKIN, I. 2004. Dietary phytoestrogens and health. *Phytochemistry*, 65, 995-1016.
- EDEN, J. A. 2012. Phytoestrogens for menopausal symptoms: a review. *Maturitas*, 72, 157-9.
- GENCEL, V. B., BENJAMIN, M. M., BAHOU, S. N. & KHALIL, R. A. 2012. Vascular effects of phytoestrogens and alternative menopausal hormone therapy in cardiovascular disease. *Mini Rev Med Chem*, 12, 149-74.
- GHANBARI GOHARI, F. & AKHLAGHI, M. 2018. The Effect of Phytoestrogens on Cognitive Function and Alzheimer's Disease %J *International Journal of Nutrition Sciences*. 3, 172-176.
- IORGA, A., CUNNINGHAM, C. M., MOAZENI, S., RUFFENACH, G., UMAR, S. & EGHBALI, M. 2017. The protective role of estrogen and estrogen receptors in cardiovascular disease and the controversial use of estrogen therapy. *Biol Sex Differ*, 8, 33.
- KIM, J. Y., LEE, M. Y. & PARK, H. M. 2015. The Effect of Equol, a Metabolite of Isoflavone, on Endothelial Cell-independent Vasodilatation of Human Uterine Artery In Vitro. *J Bone Metab*, 22, 57-69.
- LEGETTE, L. L., LEE, W. H., MARTIN, B. R., STORY, J. A., ARABSHAHI, A., BARNES, S. & WEAVER, C. M. 2011. Genistein, a phytoestrogen, improves total cholesterol, and Synergy, a prebiotic, improves calcium utilization, but there were no synergistic effects. *Menopause*, 18, 923-31.
- MARINI, H., MINUTOLI, L., POLITO, F., BITTO, A., ALTAVILLA, D., ATTERITANO, M., GAUDIO, A., MAZZAFERRO, S., FRISINA, A., FRISINA, N., LUBRANO, C., BONAIUTO, M., D'ANNA, R., CANNATA, M. L., CORRADO, F., ADAMO, E. B., WILSON, S. & SQUADRITO, F. 2007. Effects of the phytoestrogen genistein on bone metabolism in osteopenic postmenopausal women: a randomized trial. *Ann Intern Med*, 146, 839-47.
- RIETJENS, I., LOUISSE, J. & BEEKMANN, K. 2017. The potential health effects of dietary phytoestrogens. *Br J Pharmacol*, 174, 1263-1280.
- THOMPSON, L. U., BOUCHER, B. A., LIU, Z., COTTERCHIO, M. & KREIGER, N. 2006. Phytoestrogen content of foods consumed in Canada, including isoflavones, lignans, and coumestan. *Nutr Cancer*, 54, 184-201.
- WARD, H. A. & KUHNLE, G. G. 2010. Phytoestrogen consumption and association with breast, prostate and colorectal cancer in EPIC Norfolk. *Arch Biochem Biophys*, 501, 170-5.
- THOMPSON, L. U., BOUCHER, B. A., LIU, Z., COTTERCHIO, M. & KREIGER, N. 2006. Phytoestrogen content of foods consumed in Canada, including isoflavones, lignans, and coumestan. *Nutr Cancer*, 54, 184-201.





Revolutionizing the Dietary Assessments Using Digital Innovations

The world is passing through a digital era, while Sri Lanka has also shown a rapid tendency toward it. The use of digital technology for the medical and public health aspects which can be known as eHealth is an ongoing trend at present. However, the use of mobile wireless technologies for public health, or mHealth, is an integral part of eHealth, which refers to the cost-effective and secure use of information and communication technologies in support of health and health-related fields. As the World Health Organization (WHO) cited, mHealth has been shown to improve the quality and coverage of care, increase access to health information, services and skills, as well as promote positive changes in health behaviors to prevent the onset of acute and chronic diseases. In this milieu, at present the interventions aiming at people's dietary modifications are also becoming popular through mHealth accessories such as mobile apps. According to the literature, personal informatics and self-tracking systems based on mhealth are most useful and effective in personal dietary modification and self-reflection towards healthy eating. The use of food journaling and food tracking practices is an emerging field in food-related self-reflection. Maintaining a weighed food diary is known as the gold standard of food journaling.



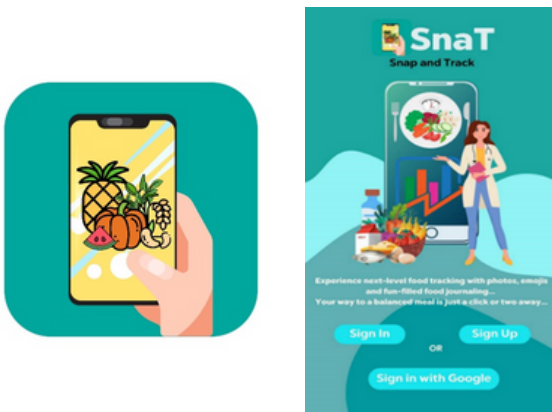
Ms. Parami Prabuddhini Weerasinghe
Research Assistant
Faculty of Medicine
University of Colombo



Dr. Thushanthi Perera
Senior Lecturer
Department of Applied Nutrition
Faculty of Livestock, Fisheries & Nutrition
Wayamba University of Sri Lanka

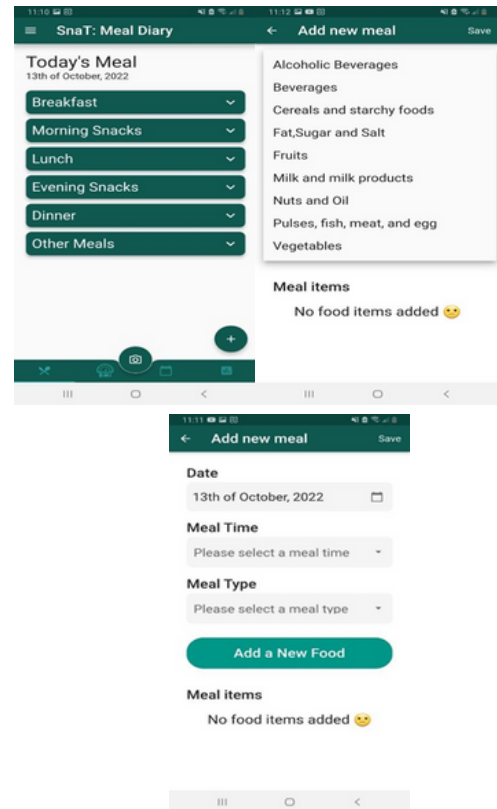
But nowadays, traditional food journaling is replaced by food journaling mobile apps due to their high effectiveness. As smartphones, and/or other smart devices, have become the most used personal and intimate tools among people in their everyday life rather than maintaining a book or a journal, it is very convenient and cost-effective to maintain a food journal on their smartphones. However, photo-based food journaling and meal tracking using mobile apps is in a primary place among all these due to its potential to mitigate challenges in traditional tracking methods such as by lowering the tracking burden, enabling photo sharing, providing contextual information, and enhancing self-awareness of their meals.

With this, the concept of photo-based food journaling has become a much-talked topic in the field of nutrition. Presently there are many food journaling digital tools available in the world including Make My Plate, MyFitnessPal, MyFoodDiary, Bitesnap, and You Ate, etc. In this backdrop as a developing country, Sri Lanka manages to maintain a pattern of food consumption and food selection that is unique to its culture and society. Also, many people in the Sri Lankan community are familiar with the Sinhala language and due to the language burden, they are refusing to use foreign apps. Consequently, It has been identified that there is an urgent need to develop a food tracking app for the Sri Lankan community that is more suited to the Sri Lankan community, easier to handle, and primarily tailormade to Sri Lankan food. Therefore SnaT (Snap and Track) is a novel meal-tracking app that has been developed in a Sri Lankan context to fulfill those identified gaps in the community.



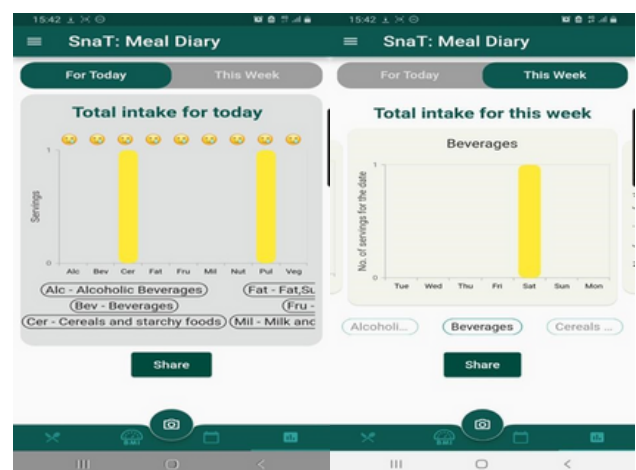
Logo & outlook of the SnaT smartphone-based food tracking app

SnaT meal tracking app was developed with the concept of photo-based food journaling to promote self-reflection in adults in a Sri Lankan context. It provides guidance for the users to follow a balanced diet within the day according to the data entered by the users as meal photographs and the initial body anthropometrics. About 280 food items have been inserted into the app, and users can pick the particular food item that they eat for a meal. The meal tracking process in this application proceeds under 7 food groups (cereals, vegetables, fruits, pulses, fish, meat and poultry, beverages, milk, and milk products, nuts, oil and fat, sugar, and salt) according to the food base dietary guidelines (FBDG) Sri Lanka. Once the user adds the food data it will provide the results accordingly by using color codes (red - exceeded the reference guidelines, green - within the reference range, and yellow - below the reference range of each food group) and interactive emoji whether the user is within the reference range or not. Tracking throughout the day will guide the user into a balanced diet during the day and ultimately it directs the user to SMART eating.



Data entry interface of the SnaT smartphone app

SnaT app was developed and tested as a research project in the Department of Applied Nutrition, Wayamba University of Sri Lanka. The research outcomes showed that the SnaT was well received by the users and aided the self-reflection on SMART eating in Sri Lankan adults. With the support of this evidence, the research team is planning to launch the SnaT app to the public as an intervention aimed at dietary modification bolstering the development of dig-tech nutrition education system in Sri Lanka. We expect that SnaT will make a great contribution to promoting a healthy diet in the Sri Lankan community in the future.



Results interface of the SnaT smartphone app

Mobile Photography Challenge - 2022 Winners

Award Category	Winners
Best Mobile Photograph	GRSS Gamlath
Most Innovative Photograph	MAPK Jayasekara
Most Creative Photograph	MRM Rizlin
Merit Place -1	MNF Rushda
Merit Place -2	LHP Premarathna
Merit Place -3	T Saranya
Merit Place -4	Sammani Navarathna
Merit Place -5	Anjani Perera



Few of the Submitted Photographs to the Mobile Photography Challenge



ANNUAL SCIENTIFIC SESSIONS 2023

The Annual Scientific Sessions of the Nutrition Society of Sri Lanka was held on 21st – 22nd January 2023 at Hotel Mandarina, Colombo 3, under the theme ‘Exploring New Horizons and Strengthening the Food Systems for Health and Nutritional Well-being’.



Launch of Nutrition Guidelines for 5 - 10 Years Old Children in Sri Lanka





NUTRITION GUIDELINES FOR 5-10 YEARS OLD CHILDREN IN SRI LANKA



CNG 1

Add good quality proteins adequately



CNG 2

Eat a variety of fruits and vegetables



CNG 3

Encourage healthy snacks



CNG 4

Hydrate often



CNG 5

Be active daily



CNG 6

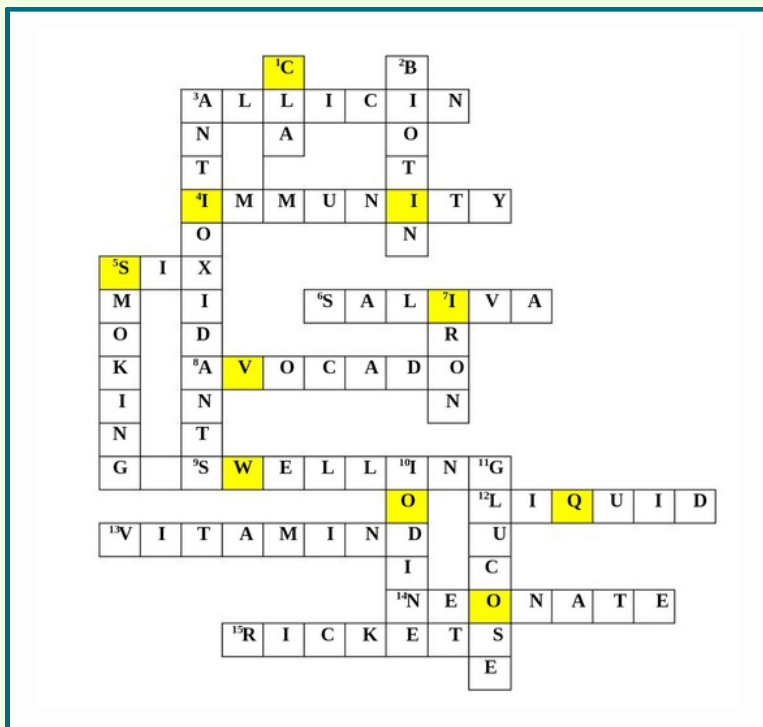
Get good quality sleep at night time

Promote safe food and healthy food behaviour



CNG 7

Answers for the Nutri-Puzzle



For more information and updates please visit Nutrition Society of Sri Lanka Website



Editorial Support/
Graphic Designing for NSSL
Newsletter Issue 01



Mr. Nisal Baddege

Eat at least 2 vegetables, one green leafy vegetable and 2 fruits daily.



Eat at least five varieties of vegetables and fruits everyday.
Eat 6 table spoons from two different vegetables, 3 table spoons from green leafy vegetables, and two fruits daily.



Healthy Life Through Proper Nutrition

Add fish or egg or lean meat together with pulses in each meal.



Eat three table spoons of pulses such as dhal, chickpeas, green grams, soya etc. in each meal.
A healthy adult can consume one egg daily.



Healthy Life Through Proper Nutrition

Add Color to your daily meals balancing the correct amounts.



Add rainbow colours to give variety to your daily meals



Healthy Life Through Proper Nutrition

Access the updated Sri Lankan Food Based Dietary Guidelines

<https://nutrition.health.gov.lk/english/resource/1317/>