Lychee Fruit: The Good, the Bad and the Ugly

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A CUTE Encephalitis Syndrome (AES) is a type of brain fever where a part of the brain becomes inflamed and the symptoms appear to be similar to fever. Though lychee fruits are consumed throughout the world due to their rich chemical composition and nutraceutical properties, in the past decade several speculations have come out connecting AES to the consumption of lychee fruit, mainly by children below 10 years of age, leading to fatal outcomes.

Lychee (litchi) is a tropical tree belonging to the Sapindaceae or soapberry family which consists of over 2,000 species and 150 genera. It is a medium-sized tree that can grow up to 40 to 50 feet in height. Lychee can also be grown as a source of food and even for ornamental purposes.

Growth and Export

The total production of lychee worldwide was estimated to be around 2.11 million tons, of which more than 95% of the production area is shared by Asian countries majorly China, India, Taiwan, Thailand and Vietnam. China and India together account for 91% of the world’s total lychee production as well as productivity.

In India due to soil and climatic limitations, lychee production is limited to Bihar, Tripura, West Bengal, Uttar Pradesh, Punjab and Haryana states among which Bihar dominates with 44.5% of the total lychee production in India.

India being the second-largest producer in the world next to China, fruits like mango and grapes still dominate the domestic and export trade. Though lychee is widely grown, it still has many unexplored potentials in both domestic and global market. As it has high demand in the Middle East countries, an appropriate boost to its foreign export can generate a remarkable economic gain.

Health Benefits

Studies have suggested that a low molecular weight polyphenol called oligonol is abundantly found in lychee fruits and is responsible for its antioxidant and anti-influenza virus activity.

Like citrus fruits, lychee is also a good source of vitamin C, consumption of which helps the human body to develop resistance against several infectious agents. It is also a good source of vitamin B-complex and many minerals like potassium and copper which have a major role in controlling heart-related problems.

Apart from the lychee fruit, its peel and seeds have also attracted attention due to the presence of many beneficial substances that exhibit antioxidant, cancer preventive, antimicrobial, and anti-inflammatory effects.

Lychee fruit contains a high amount of carbohydrates and fibres and low amounts of lipids and proteins (Table 1). Several reports have shown a series of health benefits of lychee fruits including antioxidant, cancer preventive, antimicrobial, anti-inflammatory activities, and so on.

Association with Health Complications

Lately, lychee fruit has become associated with some health complications associated with its consumption which have even led to death. Recent researches have mentioned the presence of a chemical methylene cyclopropyl glycine in lychee fruits which can cause hypoglycaemia (abnormally low blood sugar). Its consumption was also associated with encephalopathy (disorder or disease of the brain) also known as chamki bukhar in local language from patients majorly residing in the Northern part of India.

Deaths due to the consumption of lychee fruits have been reported regularly in India especially in Bihar and West Bengal. The affected individuals mainly belong to the age group of less than 10 years.

These outbreaks are suspected to be associated with Acute Encephalitis Syndrome (AES) or Japanese Encephalitis (JE) commonly referred to as brain fever. Early symptoms of
AES are visible within a few minutes to hours which can be similar to those of flu, with high temperature or headache. With delay in taking treatment measures, the symptoms may worsen leading to seizures, paralysis and even coma.

The cause may be associated with the ingestion of phytotoxins present in lychee fruit, specifically alpha-(methylenecyclopropyl) glycine, the lower homologue of the neurotoxic L-amino acid hypoglycin. Apart from AES, anaphylactic reactions have also been reported after the consumption of lychee fruit. Anaphylaxis is a serious allergic reaction that is rapid in onset and may lead to death.

The consumption of lychee fruits has also been linked to hypoglycemia. The fruits and seeds contain hypoglycin A and Methylene Cyclopropyl-glycin (MCPG), compounds that inhibit the synthesis of glucose and can cause acute hypoglycemia. These chemicals are found in higher concentration in unripe fruits, and their effects seem to be compounded in undernourished children or when consumed after a period of fasting.

Asthana and team made a study on the effect of ingestion of the lychee seeds and reported a dose-dependent toxic hypoglycemic encephalopathy in undernourished children in Muzaffarpur, Bihar. A case-control study reported in the journal The Lancet justified the significant epidemiological association between lychee consumption and illness and ruled out the role of infectious pathogen, pesticide, and heavy metal relating to the cause of illness suggesting that routinely washing fruit or vegetables was not directly related to a toxin or infectious agent.

**Preventive Measures**

The most appropriate preventive measure is providing safe drinking water and proper sanitation facilities. There is also a need to improve the nutritional status of children at risk of JE/AES.

As per Govt of India guidelines, two doses of JE vaccines are to be given with UIP and measles vaccines to children below 9 months and the next dose with DPT booster at the age of 16-24 months.

The National Family Health Survey (2015-16) states almost half of the children fewer than five in Bihar, particularly Muzaffarpur, are stunted, almost 60 per cent are anaemic, and more than 40 per cent are underweight. It is well known that Acute Encephalitis Syndrome (AES) appears in a population consisting of undernourished children who are already having a deficiency of sugar in their body. Consumption of unripe or semi-ripe lychee pulp along with seeds by such undernourished children worsened the situation resulting into acute hypoglycemic encephalopathy.

The scientific panel on sampling and analysis at FSSAI (Food Safety and Standards Authority of India) suggested that the hypoglycemia or low blood sugar is due to the natural toxins present in unripe lychee fruits and can be a contributing factor for these deaths. The toxins reduce or even disappear on the maturation of the fruit.

Though lychee being hypoglycemic, its consumption by adults does not cause serious health problems due to the presence of abundant glucose reserves but consumption by glucose-deficient children will further deplete the leftover sugar and sustenance of such hypoglycemic state followed by extended sleep during the night becomes fatal for children. So, even though lychee fruit has enormous health benefits, its consumption with lower sugar content in the body may lead to serious health complications sometimes even leading to death.

**Acknowledgement**

The author thanks Director, CSIR-CFTRI; Dr Ramesh SR, Professor (Retd.), Department of Studies in Zoology, University of Mysore; and Dr Nandini P. Shetty, Principal Scientist, CSIR-CFTRI, Mysuru for their support. The author also thanks DST-SERB for extending their support for the project: PDF/2018/00237