

CHAPTER 2
REVIEW OF LITERATURE

Review of literature

2.1. Bottle gourd (*Lagenaria siceraria*)

Bottle gourd belongs to the Cucurbitaceae family. This family consists of 118 genera and 825 species, all of which may be found in the warmer areas of the planet and are extensively dispersed among them. The plants in the family Cucurbitaceae are grown for their medicinal and nutritional value and offer most of the domesticated species that are commercially significant. The *Lagenaria* species is the most well-known and widespread of all the plants that belong to the Cucurbitaceae family. *Lagenaria siceraria* (Molina), also known as bottle gourd or lauki in Hindi, is a species of the genus *Lagenaria*. The genus *Lagenaria*, of which the bottle gourd is a member, gets its name from the Latin word *lagena*, which may be translated as "the bottle." The bottle gourd is native to the woods of India, the Moluccas, and Ethiopia, among other places. It has been determined that the coastal regions of Malabar (North Kerala) and the damp forests of Dehradun are the places where the outbreak began (North India). As a vegetable, both the plant's aerial portions and its fruits are often eaten by humans. Because of its cardiogenic, general tonic, and diuretic characteristics, it has been traditionally used in the medical systems of India, China, European nations, Brazil, the Hawaiian Islands, and other places [14].

Lagenaria siceraria is a plant that has a long history of usage as a traditional medicine in a variety of different nations, particularly in tropical and subtropical regions. Since ancient times, the climber has been recognized for its medicinal virtues, and it has been employed for the treatment of a wide variety of conditions, including jaundice, diabetes, ulcer, piles, colitis, insanity, hypertension, congestive cardiac failure (CCF), and skin problems. The fruit pulp of this plant is used for a variety of medicinal purposes, including as an emetic and purgative, as well as for its cooling, diuretic, antibilious, and pectoral effects. This pulp, after being boiled in oil, is used as a treatment for rheumatism as well as sleeplessness. This species has been used to isolate a broad variety of chemical components, some of which include sterols, terpenoids, flavonoids, and saponins. It has been discovered that the extracts of this plant contain a variety of pharmacological properties. Its prospective applications in pharmaceuticals are studied more thoroughly by paying special attention to its analgesic, anti-inflammatory, antihyperlipidemic, diuretic, hepatoprotective, anthelmintic, and antibacterial activities [18]. In high-fat diet-induced

obese mice, administration of fruit extract from *Lagenaria siceraria* reduced fat accumulation and blood TNF levels [16].

2.2. Semi thermal pasteurization of plant product

In order to mitigate the negative consequences of thermal pasteurization, such as the loss of vitamins and taste, as well as browning that is not caused by enzymes, it is possible to use alternative techniques that are also capable of killing germs. In order to accomplish this goal, semi-thermal technologies, such as pasteurization using high hydrostatic pressure processing (HPP), electric fields, and ultrasonic waves [11], are of particular interest.

The term "microwave" refers to an innovative form of thermal processing that makes use of a heating mechanism different from the direct thermal approach. The food sector makes extensive use of microwave heating because of its many benefits, including a reduction in processing time and costs, an improvement in product consistency and yields, an enhancement of the food's one-of-a-kind microstructure, and protection against surface browning and crusting [6, 20].

2.3. Toxicity study of plant products

Since many cultures and civilizations make use of medicines produced from plants, plants have always played an important role in the medical practises of various countries across the globe. The traditional uses of herbs as medicine are deeply ingrained in the cultures of most underdeveloped nations, where they also constitute the primary modality of therapeutic intervention. These treatments, which are successful to a significant degree, are well recognised by society, are economically feasible, and are, for the most part, the only source that is accessible [16]. Because of this, plants that are used in traditional medicine play an important role in the upkeep of people's health all over the globe. Since the beginning of time, those who practise traditional medicine have relied on medicines derived from plant, herbo-mineral, and animal sources in order to preserve health and cure illness. These kinds of treatments are used extensively throughout Asia and Africa, notably in India and China. In wealthy nations as well as developing ones, the usage of medications produced from plants is gaining popularity [3]. This is due to the unpleasant side effects of synthetic pharmaceuticals as well as the development of resistance to these drugs. However, recent research indicates that several therapeutic herbs have negative side effects

[15]. Because of this, there is cause for worry over the possibility of harmful effects coming from the prolonged use of therapeutic herbs. The evaluation of the toxicological effects of any medicinal plant extract that is planned for use clinically or preclinically is, as a result, an essential component of the assessment of the possible hazardous effects [17].

2.4. Sensory studies of processed food product

With the nutritive property of a food product, the sensory property is also important for consumer's satisfaction of the product [4]. In the works of [7], sensory evaluation has been explained as an important scientific discipline to analyze characteristics of foods. Sensory study is very important for development and selection among similar foods [8]. Sensory evaluation comprises of methods for interpreting human responses to different stimulus that is developed due to different senses [1].

An individual lacking appropriate training to assess the linguistic parameter frequently tends to be very dubious. Another huge restriction of customer sensory assessment is its abstract nature. Based on this aspect, fuzzy logic can be applied for the evaluation of sensory scores [21].

2.5. Anti diabetic and anti-inflammatory analysis

The enzyme α -glucosidase is found in a broad variety of species, each of which has a distinct preference for a certain substrate [10]. Its inhibitors are classified as polyhydroxylated N-substituted heterocyclic compounds, polyhydroxylated cycloalkenes, and oligomers of pseudo sugars. These are the three forms that may be distinguished from one another. The inhibition of α -glucosidase and α -amylase has emerged as a topic of interest for several research pertaining to the management of diabetes. Dipeptidyl-peptidase-4, also known as DPP-4, is an enzyme that is extensively dispersed throughout the body and is responsible for the fast degradation of incretin hormones [22]. Therefore, enhanced GIP and GLP-1 production as well as the inhibition of DPP-4 are essential processes that are clinically relevant for regulating hyperglycemia in type 2 diabetes [9,2]. A test is described in [24], which is based on the direct incubation of mammalian cells with a fluorescent d-glucose analogue known as 2-[N-(7-nitrobenz-2-oxa-1,3-diazol-4-yl) amino]-2-deoxy-d-glucose (2-NBDG), and after the treatment, flow cytometry was used to measure the cells' fluorescence.

2.6 Probiotic incorporation and survival in food product

It has been recommended that for probiotic bacteria to provide health benefits, either the probiotic must be present at a minimum level of 10^6 c.f.u/g of food product or 10^7 c.f.u /g at the point of delivery [12], or the probiotic must be consumed in sufficient quantities to yield a daily intake of 10^8 c.f.u [13]. Both recommendations can be found in the World Health Organization's (WHO) Food Standards Code. There have been several studies that have demonstrated that particular strains of lactic acid bacteria, such as *Bifidobacterium bifidum* [23] and *Lactobacillus gasseri*, may protect against disorders that are associated with the digestive system. The nondigestible dietary elements known as prebiotics have an effect on the host by selectively promoting the development, activity, or both of one or a restricted number of bacterial species that are already established in the colon [5]. The idea of symbiosis came from the fact that when prebiotics and probiotics work together, they have synergistic effects [19].

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