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Development and sensory evaluation of a value added food product for prevention of diabetes

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Abstract---A healthy lifestyle is a way of life that includes a healthy diet, good eating habits, adequate sleep, and some physical activity in order to achieve a two-fold goal: to make the body fit and disease-free. Diabetes mellitus is ranked seventh among the world's leading causes of death, and third when its fatal complications are factored in. The alarming rise in diabetes mellitus prevalence in India has been attributed to changing demographic patterns as well as the environment. Kidney failure, cardiovascular disease, obesity, nephropathy, and neuropathy are all complications of diabetes. Diabetes can be caused by a variety of factors, including a lack of physical activity and healthy eating habits, among others. As a result, The focus of this paper is on the development of a value-added food product using a combination of amla, bael, and stevia. The trained panel judges conducted an organoleptic evaluation, which was rated on a 9-point hedonic scale. As a result, the experimental cookies were found to be more accepted by the panel than the control, indicating that diabetics can eat it as part of their meal.

Keywords---cookies, food, product, diabetes, sensory, evaluation.

Introduction

Diabetes

Diabetes has increased to become one of the world's most serious health issues, with its prevalence rising at an alarming rate. According to the World Health Organization (WHO), the number of people living with diabetes is rapidly rising around the world, and it has become a major public health concern (Zaman et al, 2011). Diabetes will increase from 463 million to 700 million people aged 20 to 79

years old by 2045, according to a World Health Organization (WHO) report. According to the Centers for Disease Control and Prevention (CDC), 12.2 percent of adults in the United States had Type 2 Diabetes Mellitus in 2017. On the other hand, Type 2 Diabetes Mellitus (T2DM), is a disease of exclusion, meaning it only exists when other diseases are present (such as Type 1 diabetes and what is referred to as "other specific types of diabetes" in both the World Health Organization Classification (2019) and the American Diabetes Association Classification (2020)).

Despite the importance of genetic predisposition, ageing, obesity, and a sedentary or dietetic lifestyle are all important risk factors for T2DM development. Obesity is seen in the majority of people who have T2DM (Ramarao and Kaul, 1999). To treat diabetes mellitus hyperglycemia, a variety of medications, such as biguanides and sulfonylureas, are currently available (Mutalik et al., 2005). Because of the medications' side effects, finding a new medicine, chemical, or method to treat diabetes complications is a top priority. (Noor and colleagues, 2008). Diabetes, like many other diseases, is treated with herbal medicines and plants, particularly in India. This prompts the novel idea of looking into alternative medicine for diabetes in the form of herbal remedies. Wood-apple, also known as Bael, Gooseberry, or amla, and honey leaf, also known as stevia, are among the leading contenders.

Amla (Gooseberry)

Amla, also known as *Emblica officinalis* (Eo) or *Phyllanthus Emblica*, is a plant used to treat a variety of ailments in Indian medicine. Amla is a member of the *Emblica* genus (Euphorbiaceae). It grows in tropical and subtropical climates in India, Sri Lanka, China, Indonesia, and the Malay Peninsula. amla (Indian gooseberry) are bitter, cooling, diuretic, and laxative. Diabetes, bronchitis, hyperacidity, peptic ulcer, dermatitis, haematogenesis, inflammations, anaemia, liver diseases, gastrointestinal tract problems, menorrhagia, and cardiac illnesses. Amla is thought to reduce oxidative stress and improve glucose metabolism in Type 2 diabetics. As a result, amla provides a significant amount of vitamin C in both fresh and dried form (Krishnaveni, 2010).

Bael (Wood apple)

The Rutaceae family includes the Wood-apple or Stone apple, a medium-sized deciduous tropical tree. The word Bael is used in Hindi, but the word *Bilva* is used in Sanskrit. It's an up to 18-meter-tall slender, aromatic, armed, gum-bearing tree with thorns and fragrant blossoms. It is primarily found in tropical and subtropical climates. Bael can be found growing along the East Coast in the Himalayan foothills of Uttarakhand, Jharkhand, and Madhya Pradesh. It's common in dry areas of India, as well as some wetlands in Sri Lanka (Simons et. al., 2005).

Stevia (*Stevia rebaudiana*)

Stevia Rebaudiana, a member of the Asteraceae family, is a nutrient-dense plant. Stevia is a powerful natural sweetener that is also known as Honey Leaf in India.

It is safe for daily consumption in drinks, not just once or twice a day, but several times a day, with no side effects, but dried leaves cannot be used in domestic cooking due to their green colour (Rajbhandari and Roberts, 1985; Tsanava et. al., 1991) One gram of stevia can be used once a day to help reduce blood glucose levels without having any negative side effects (Rayaguru and Khan, 2008).

Methodology

After experimenting with different combinations of extracts on diabetic rats, various products were developed using a combination of Amla, Bael, and Stevia. The main ingredient in the development of value-added food product was a combination of amla, Bael, and stevia.

Method of Preparation

Different methods of cooking, such as preservation, baking, and roasting, have resulted in a variety of food products. The development of Cookies with the above combination is the focus of this study.

Sensory evaluation of developed products

The acceptability of the product was assessed by a panel of ten judges who used the 9-point Hedonic Scale (Larmond, 1970) to determine whether the product was liked or disliked. The panelists were asked to record their level of liking or disliking by assigning points to various product characteristics. The samples were graded on a 9-point Hedonic Scale for quality attributes such as appearance, colour, flavour, texture, taste, and overall acceptability and scoring by using the following grade descriptions.

Table 1: Mean Sensory Score of Cookies

COOKIES	Colour	Apperarence	Texture	Aroma	Taste	Overall Acceptibility
Control	5.2	5.5	5.8	4.3	6.5	6.3
Experimental	6.9	7.6	7.5	5.4	7.3	7.5

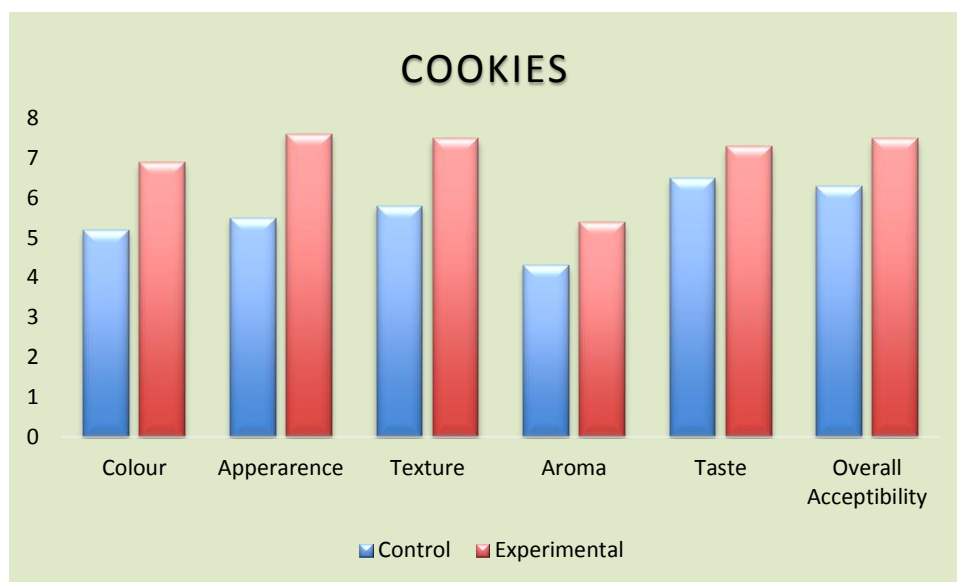


Figure 1: Mean sensory Score of Cookies

Result and Discussion

Development and Distribution of value-added Products (Cookies)

Cookies were created using a combination of amla, Bael, and stevia, and the Food Product's physiochemical and shelf-life were assessed. Cookies were made from a combination of Amla, Bael, and stevia in this study. The mean sensory scores of acceptability of cookies for diabetes are tabulated in (Table 1) using a nine-point hedonic rating scale. Control (C) sample and experimental value-added product (cookies) were used for evaluation. Each parameter of sensory evaluation was found to be well-performed by the experimental sample. The mean score revealed that cookies prepared as a value-added product (experimental sample) have organoleptic scores of 6.9, 7.6, 7.5, 5.4, 7.3 for colour, appearance, texture, aroma, and taste respectively.

The corresponding scores for the control sample were 5.2, 5.5, 5.8, 4.3, and 6.5, respectively. Overall Acceptability was found to be higher for experimental sample (7.5), while Control had the same value at 6.3. The incorporation of combination has the greatest impact on the appearance parameter, followed by colour and texture. The taste parameter had the smallest difference (Fig.1). According to the data presented in above table and figure, the panel opted experimental Cookies with a combination of amla, bael, and stevia for further investigation of the study, such as physiochemical and shelf-life assessment.

Conclusion

Diabetes Mellitus is a carbohydrate, lipid, and protein metabolic condition characterised by a complete or partial insulin shortage, resulting in hyperglycemia, obesity, hypertension, and cardiovascular disease as a result of a poor lifestyle, inactivity, poor dietary habits, and a high intake of unprocessed

foods. As a result, people are increasingly interested in herbal products and organic foods that have few side effects and are safe to consume. As a result, this study focuses on the development of a value-added food product (cookies) containing a combination of amla, Bael, and stevia after testing on diabetic rats. Furthermore, it was evaluated by the panel members on a 9-point hedonic scale on the variables colour, texture, taste, and so on, in addition to overall acceptability (7.5) of Cookies.

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