

**STUDY OF FUNCTIONAL BEVERAGE PREPARED
FROM BITTER GOURD, AMLA AND LEMON JUICES**

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BY

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ABSTRACT

The present study was an attempt to develop functional beverage from bitter gourd with the incorporation of lemon and amla at different levels for diabetic people. Diabetes is a most common disorder in developed and developing countries which is marked by high levels of blood glucose resulting from defects in insulin production, insulin action or both. Medicinal plants and their products become an important therapeutic aid for alleviating diabetes in human. Bitter gourd (*Momordica charantia*) has received the most attention for its anti-diabetic properties and its fruits are widely used in all over the world for the treatment of diabetes. Also amla (*Embilica officinalis*) and lemon (*Citrus limon*) have potential in treating diabetes due to their chemical constituents. In preparation of functional beverage these vegetable and fruits were used in the form of juices to improve the palatability as well as nutritional and functional value of the developed beverages. Also storage stability of the developed beverages was studied for two months of storage.

Most commonly available varieties of bitter gourd were Thinnavelly white (light green) and Matala green (dark green). And the juice of Thinnavelly white was found to be most acceptable than the juice of Matala green based on sensory evaluation done with a panel of 15 semi-trained members and this juice was used further in preparation of functional beverage. Optimum levels of ingredients used in preparation of functional beverage were determined by preliminary trials. The amount of water and amla were fixed at 85ml and 3ml respectively per 100ml of beverage. The quantity of bitter gourd juice varied from 13-5ml for each 100ml of beverage depending upon the concentration of lemon juice (0-5ml per 100ml of beverage). Black salt, black pepper, cinnamon, chemical preservative (sodium benzoate) and

citric acid were the common ingredients. Six beverage formulations of ready to drink functional beverage were prepared by blending different ratios of bitter gourd: lemon: amla (13:0:0, 9:1:3, 8:2:3, 7:3:3, 6:4:3, 5:5:3). Juice blends were preserved by pasteurization (85°C, 20 min) and by addition of sodium benzoate (100 ppm).

Sensory evaluation, chemical analysis and microbial analysis were done for the fresh products immediately after the preparation. Data of chemical analysis revealed that mean values of titrable acidity (4.56-5.66) and ascorbic acid content (37.66-51.63) increased among treatments while pH (3.68-3.3) and total soluble solids (6.5-5.16) decreased among treatments with the corresponding increase in concentration of lemon from 0-5%. Results of sensory evaluation indicated that some beverage formulations were different significantly from other formulations and control with respect to colour, taste, aroma, appearance and overall acceptability and some were not different significantly. Findings of microbial analysis revealed that there were no microbial populations on freshly prepared functional beverage. Based on the sensory results most preferred three formulations (8:2:3, 6:4:3, 5:5:3) were selected for further storage studies. The selected beverage formulations were stored in 200ml colourless glass bottles for the period of two months storage at ambient temperature (30±2°C).

Physico-chemical parameters like titrable acidity, pH, total soluble solids and ascorbic acid content were evaluated for two months of storage at ambient temperature at two weeks interval. Significant decrease in titrable acidity (5.1-4.5), total soluble solids (5.2-3.7) and ascorbic acid contents (45.81-30.48) and increase in pH (3.5-4.0) were observed in all beverage formulations. Further beverage formulation with 6% bitter gourd juice + 4% lemon juice + 3% amla juice was found to be most effective

formulation for minimum changes in TSS (5.4-4.8), titrable acidity (5.33-4.99), pH (3.42-3.82) and ascorbic acid (48.91-40.62). Sensory evaluation done after two months of storage indicated a gradual decrease in all sensory parameters in all beverage formulations. However regarding sensory attributes functional beverage prepared with 6% bitter gourd juice+ 4% lemon juice+3% amla juice scored maximum for all sensorial quality attributes such as colour, taste, aroma, appearance and overall acceptability.

Findings of microbial study performed at monthly interval revealed there was no microbial growth up to two months of storage in all beverage formulations. Considering all the results obtained from chemical analysis, microbial analysis and organoleptic evaluation, it was concluded that functional beverage prepared with 6% bitter gourd juice+ 4% lemon juice+3% amla juice was found as most acceptable beverage formulation than other formulations in maintaining physico chemical and organoleptic characteristics and it could be stored for two months at ambient temperature ($30\pm 2^{\circ}\text{C}$) without any significant quality changes.

Key words: Functional beverage, bitter gourd, amla, lemon, chemical and sensorial parameters.

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