

**QUALITY EVALUATION OF FINGER MILLET CHOCOLATE  
BISCUITS (*Eleusine Coracana*) WITH DIFFERENT RECIPIES**



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## ABSTRACT

Nutritional deficiencies such as protein-energy malnutrition and micro nutrient deficiencies are major problems especially among children in developing countries including Sri Lanka. Consumption of nutritious snacks could help to reduce protein-energy malnutrition especially in school children. Production of biscuits using finger millet and cocoa powder with different recipes including Wheat flour, Kasa Kasa (Basil) seeds, Green apple and Coconut provide better nutritional and healthy value for the children and adults in developing countries like Sri Lanka. Therefore, this research study was carried out to produce quality biscuits using finger millet and cocoa powder with different recipes of above ingredients.

This study was aimed at reducing the protein-energy malnutrition, micro nutrition deficiencies and gluten-intolerance by substituting wheat flour for developing nutritionally enriched finger millet biscuits. Biscuits prepared from different recipes vs: T1- Wheat flour + Cocoa powder, T2- Finger millet + Wheat flour + Cocoa powder, T3- Finger millet + Soaked Kasa Kasa seeds + Cocoa powder, T4- Finger millet + Green apple puree + Cocoa powder and T5- Finger millet + Grated coconut + Cocoa powder were subjected to analysis of nutritional, physical, organoleptic and microbial qualities to evaluate the suitability of these finger millet chocolate biscuits for consumption.

The nutritional qualities vs: moisture, ash, fiber, fat, protein and total sugar and physical properties vs: diameter, thickness, volume, density and spread ratio were analyzed according to AOAC (2002) methods. Analysis were carried out for three replicates for each parameter.

Organoleptic qualities were evaluated using a sensory panel consisting of 30 semi-trained panelists. The taste, colour, texture, flavor and overall acceptability were evaluated using a seven-point hedonic scale. Total plate count was done for the fresh and stored samples to find out microbial quality. Results of the nutritional and organoleptic qualities of freshly prepared biscuits were analyzed statistically by ANOVA using computer aided SAS statistical analysis package to evaluate the significance at  $p < 0.05$ . Comparison of means of sensory evaluation, nutritional and physical properties analysis were done by Tukey's Standardized Range Test (TSRT) and Duncan Multiple Range Test (DMRT) respectively.

The nutritional qualities of the freshly prepared chocolate biscuits revealed that moisture, ash, protein, fat, fiber and total sugar content were significantly different from different treatments. The physical properties of biscuits revealed that there were significant differences between the treatments of biscuits at 5% level of significance. According to Tukey's test, the mean scores for all assessed organoleptic characters varied significantly ( $P < 0.05$ ) in freshly made chocolate biscuits. No harmful micro-organisms were observed in the freshly made biscuits.

Based on the nutritional and organoleptic qualities of freshly made finger millet chocolate biscuits, most preferred treatments such as, T2- Finger millet + Wheat flour + Cocoa powder, T3- Finger millet + Soaked Kasa -Kasa seeds + Cocoa powder, T4- Finger millet + Green apple puree + Cocoa powder were selected and subjected to storage studies at ambient conditions at 30°C and 70%-80% RH for one month to evaluate shelf life of the biscuits. Nutritional analysis of stored finger millet chocolate biscuits were carried out at one week intervals throughout the storage period. The results of nutritional analysis showed that, there were significance differences ( $P < 0.05$ ) between the tested treatments. These



results revealed the difference in moisture, ash, fat, fiber, protein and total sugar of the chocolate biscuits. The organoleptic analysis carried out at the end of four weeks revealed that there were significant ( $P < 0.05$ ) differences for the organoleptic characters between the formulations. From overall acceptability rating, the biscuit sample prepared from Finger millet with Green apple puree had the highest mean value compared with other treatments. There were no remarkable changes in organoleptic qualities observed up to four weeks of storage at  $30^{\circ}\text{C}$  and RH of 70%-80% in this treatments. Microbial analysis was done after one month of storage. Products were not affected by any microbial activities because of low moisture content. There was no harmful effect during storage on the quality of the product due to microbial growth at ambient temperature. Processes such as roasting and baking at high temperature destroy larger number of micro-organisms. Therefore, it is safe for the consumption upon one month of storage.

Based on the nutritional, organoleptic and microbial qualities, the biscuit sample prepared from Finger millet with cocoa powder and green apple puree was the best treatment compared to other combinations at the end of storage period.

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