ABSTRACT
STANDARDIZATION OF A METHOD FOR PREPARATION OF WHEY-BASED 
TROPICAL FRUIT BEVERAGES CONTAINING PROBIOTIC ORGANISMS AND EFFECT 
OF ITS FEEDING ON GASTROINTESTINAL MICROFLORA OF CHILDREN

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ABSTRACT

The investigation was planned and executed to standardize a method to prepare a whey-based tropical fruit beverage containing proven probiotic organisms and evaluation of its suitability for feeding to the children to modulate their gastrointestinal microbiota. Use of whey in its liquid state is one of the best ways for its utilization. Value-added food commodities including dairy products especially probiotic foods can play an important role in promoting health and reducing public health care costs in a developing country like India.

The paneer whey, a proven probiotic Lactobacillus rhamnosus, Alfonso and fig pulps are the four basic
materials used in this investigation. Growth pattern of the probiotic was studied. It was observed that a viable count of 8.27 CFU/ml and acidity of 0.7% (LA) was obtained at 24h incubation at 40°C.

While standardizing the methodology importance was focused on the viable counts of the finished product. As earlier recommended, \(10^5\) CFU of the probiotic culture per single dose was maintained for its possible health benefits. It was observed that the whey-based probiotic beverage containing 15% fig pulp and that with 15% Alfonso pulp was attracted highest score assigned in the range of “extremely liked” category in the 9-point Hedonic scale.

The positive implantationability of the strain in the GIT of the test subjects was confirmed by conducting a feeding trial wherein twenty one randomly selected children of 2-5 years were involved in three groups. Among the two test groups children were receiving 200 ml/volunteer/day of the freshly prepared whey-based tropical fruit beverage containing \(10^5\) cfu/100 ml of the probiotics. The control group of the volunteers was receiving 200 ml freshly prepared whey-based tropical fruit beverage containing same quantum of fig and
Alfonso pulp (15%) containing no any probiotic organisms in it. This feeding trial was continued for a period of 21 days. The faecal microbiota of lactobacilli, total bacterial counts and coliform organisms was determined before commencing the feeding trial and 7 days intervals during the twenty one days feeding trial and at same interval after stopping the feeding trial.

It was observed that the faecal lactic acid bacteria (LAB) counts at beginning were 1.18 CFU/g, coliform counts were 5.76 CFU/g and total bacterial counts were 7.98 CFU/g. No any change in the LAB counts was observed in control group of volunteers. Feeding of whey-based probiotic beverage containing tropical fruit pulp for seven days resulted into three-fold increases in LAB counts and the coliform counts were declined to almost 50% of the initial value. The faecal LAB counts after 21 days of feeding were 6.83 CFU/g, which is six-fold more than the counts prior to commencement of the feeding trials. The coliform counts at this stage were just 0.68 CFU/g i.e. nine-times less than the initial values. It was further observed that termination of feeding trial resulted into declines in the LAB counts and gradual increases in the coliform counts. These
findings indicate positive implantationability of the probiotic culture in the GIT of children.

To investigate the in vitro antimicrobial activity, cell-free culture filtrate (CFC) of beverages containing probiotic was obtained. It was seen that the pathogenic strains of \textit{Ps. aeruginosa} and \textit{Y. enterocolitica}, \textit{E. coli} and \textit{Staph. aureus} were inhibited by the CFC. The highest inhibitory effect for fig-based beverage was observed against \textit{Y. enterocolitica}. However Alfonso beverage exhibited highest antibacterial activity against \textit{E. coli} followed by \textit{Ps. aeruginosa} and \textit{Y. enterocolitica} while \textit{Staph. aureus} showed the least inhibition in both the cases.

It is concluded that an acceptable beverage can be obtained from \textit{paneer} whey by fortifying it with 15% fig pulp/Alfonso pulp and 10% cane sugar and \textit{L. rhamnosus}-LBKV3. The product has demonstrated its positive implantationability in children of 2-5 years.

Further studies are necessary for scaling up the technology for industrial production of this value-added functional product.

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