Sensory and nutritional evaluation of milk based weaning food

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ABSTRACT

The weaning period is crucial for the maintenance and continued growth and development of the child. Weaning foods should have good acceptability by both the mothers/care givers and the infants. The main objective of the study was to formulate nutritious rich composite blend, based on locally available ingredients by blending with milk to produce a highly nutritious weaning food to reduce the malnourishment among children. Four different treatments were prepared using the locally available (Wheat flour, chickpea, potato, carrot, linseed and milk) ingredient namely T₁, T₂, T₃ and T₄ in different ratio. The different treatments were subjected to organoleptic analysis for testing various sensory attributes via Nine Point Hedonic Scale. Nutritional analysis was done by using standard method of AOAC. Statistical techniques Anova and Critical Difference were used for analyzing the data. The result shows that T₂ was liked very much while T₁, T₃ and T₄ were moderately liked by the panel of judges. The result shows the significant (P<0.05) difference between the overall acceptability of all the treatments. Energy, Protein, fat, ash, Moisture, Carbohydrate, Iron and of formulated weaning foods was higher. Thus it was concluded that formulation of the milk-based weaning food is a good approach to alleviate the malnutrition associated with conventional stipulated cereal-based weaning flour mixtures given in liquid-gruel form.

Key words: Nutritional analysis, Nutritional rich composite blend, Organoleptic analysis, Sensory attributes, Weaning period

INTRODUCTION

The weaning period is crucial for the maintenance and continued growth and development of the child. Weaning foods should have good acceptability by both the mothers/care givers and the infants. The formulation and development of nutritious weaning foods from local and readily available raw materials have received a lot of attention in many developing countries. Thus, weaning food plays a vital role in the all round growth, development and mental health of children.

Similarly, the report by UNICEF, (1998), indicated that breast milk, even from well-nourished mothers, might be inadequate to meet the nutritional needs of the infant after the first three months of life; hence the need for a supplementary or weaning food. This weaning period is a very critical period in the life of a child and if not well managed, might lead to malnutrition and other health implications (Tontisrin et al., 1981; Pedersen et al., 1989; Keithod and Udipo, 1999 and Ozumba et al, 2002).

Poor dietary quality or diversity is a significant contributing factor to malnutrition, specifically, micronutrient deficiencies. Malnutrition is defined as the condition of nutritional deficiency, including under-nutrition and micronutrient deficiencies. Malnutrition is a major health problem in developing countries and contributes to infant mortality, poor physical and intellectual development of infants as well as lowered resistance to disease.

According to a study malnutrition in children is the consequence of a range of factors, which are often related to poor food quality, insufficient food intake, severe and repeated infectious diseases; or frequently it involves some combination of three (deOnis, et al., 1993). These conditions are, in turn, are closely linked to the overall standard of living and whether a population can meet its basic needs, such as access to food, housing and health care (WHO, 1997). Thus, protein-energy malnutrition is a common problem among infants and children in the poor socio-economic groups of developing countries (Gopalan and Srikantia, 1973; Darwich, 1983). Meaningfully, weaning food is intended to bridge the wide gap between infants’ breast feeding and adult (Nout, 1993). So weaning period is ultimately defined as the whole period during which breast milk is being replaced by other foods (Knodle, 1980). Additionally commercial weaning foods are priced beyond the reach of the majority of the population in less developed countries. These foods are mostly manufactured using high technology and sold in sophisticated fancy packing (Brandtazaeg, et al., 1981). Hence, these foods are too expensive for low income families. It is very difficult for them to provide their children with imported weaning food. Considering these entire
problems an attempt has been taken to prepare weaning food from available sources, and to evaluate the nutritional quality and sensory attributes of the prepared weaning food.

Therefore, to overcome these problems of malnutrition, a study is designed to develop weaning food using locally available ingredients with the objectives; to formulate milk based nutritional rich composite blend, using locally available ingredients, to evaluate the sensory acceptability of the prepared milk based weaning food and to analyze the nutrient composition of prepared milk based weaning food.

MATERIALS AND METHODS

Procurement of raw materials: Germinated Whole Wheat flour, germinated chickpea flour, potato flour, carrot flour, linseed flour and jaggery were purchased from the local market of Allahabad district.

Preparation of Wheat/Chickpea flour: Wheat/chickpea were cleaned and then washed. They were soaked for 4-6 hours and germinated. After the germination process, the germinated grains were dehydrated and finally ground to obtain the flour. (Srivastava and Kumar, 2002) (Fig 1)

Preparation of linseed flour: Firstly linseed was cleaned. They were roasted and then ground to obtain the flour. (Srivastava and Kumar, 2002) (Fig 2)

Preparation of Potato/Carrot flour: Potato/carrot were firstly washed then peeled. After peeling they were cleaned to remove the dirt and cut into thin slices. Then they were blanched in 2% salt solution at boiling temperature, 100°C for the prevention of browning reaction. The blanched slices of potato/carrot were then spread on trays for dehydration. After dehydration they were ground to obtain potato/carrot flour. (Srivastava and Kumar, 2002) (Fig 3)

Development of weaning food: Four different treatments (T₁, T₂, T₃ and T₄) were prepared using the locally available ingredients namely whole wheat, linseed, jaggery, chickpea, potato and carrot (Table 1). The ratio of wheat flour: chickpea: potato: carrot: linseed in the treatments was as follows:

Sensory analysis: The prepared weaning food was evaluated organoleptically by a panel of judges selected from Ethelind School of Home Science, SHIATS, Allahabad. The judges were requested to score the products with the help of score cards based on the Nine Point Hedonic Scale (Srilakshmi, 2007).

Nutritional analysis: Protein analysis of prepared weaning food was determined by Lowry’s method (1951), carbohydrate by difference method. Moisture, total ash, fat, fibre, calcium and iron were done by using AOAC (2005) and beta-carotene by Ranganna (1986).

Statistical analysis: The data obtained from sensory evaluation were statistically analyzed by using analysis of variance technique (two way classification) and critical difference test (Gupta and Kapoor 2002).

RESULTS AND DISCUSSION

All prepared weaning foods were accepted in terms of colour and appearance, consistency, taste and flavour and overall acceptability. The results obtained from the analysis were presented and discussed in the following sequence.

The above table shows the mean scores of weaning food in relation to colour and appearance which indicates that T₂ (8.33) had the highest score followed by T₁ (7.66) T₃ (7.00) and T₄ (6.66) respectively (Table 2). Scoring shows that the treatment T₂ was liked very much while T₁, T₃ and

Table 1: Treatment and replication of the prepared weaning food

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Ingredients</th>
<th>Germinated whole wheat flour (%)</th>
<th>Jaggery (%)</th>
<th>Chickpea flour (%)</th>
<th>Potato flour (%)</th>
<th>Carrot flour (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T₁</td>
<td>35</td>
<td>5</td>
<td>40</td>
<td>30</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>T₂</td>
<td>40</td>
<td>5</td>
<td>40</td>
<td>25</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>T₃</td>
<td>45</td>
<td>5</td>
<td>40</td>
<td>25</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>T₄</td>
<td>50</td>
<td>5</td>
<td>40</td>
<td>20</td>
<td>15</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 2: The average sensory scores of different parameters of different treatments of prepared weaning food with milk

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Colour &amp; appearance</th>
<th>Consistency</th>
<th>Taste &amp; flavour</th>
<th>Overall acceptability</th>
</tr>
</thead>
<tbody>
<tr>
<td>T₁</td>
<td>7.66±0.27</td>
<td>8.00±0.00</td>
<td>7.00±0.00</td>
<td>7.50±0.08</td>
</tr>
<tr>
<td>T₂</td>
<td>8.33±0.27</td>
<td>8.66±0.27</td>
<td>8.66±0.27</td>
<td>8.40±0.07</td>
</tr>
<tr>
<td>T₃</td>
<td>7.00±0.00</td>
<td>7.00±0.27</td>
<td>7.33±0.27</td>
<td>7.11±0.19</td>
</tr>
<tr>
<td>T₄</td>
<td>6.66±0.27</td>
<td>6.00±0.00</td>
<td>6.00±0.00</td>
<td>7.20±0.08</td>
</tr>
<tr>
<td>Fcal</td>
<td>34.41*</td>
<td>21.46*</td>
<td>24.34*</td>
<td>11.57*</td>
</tr>
<tr>
<td>Ftab</td>
<td>4.76</td>
<td>4.76</td>
<td>4.76</td>
<td>4.76</td>
</tr>
<tr>
<td>C. D.</td>
<td>0.13</td>
<td>2.80</td>
<td>0.16</td>
<td>0.19</td>
</tr>
</tbody>
</table>

*Significant at 0.05%
T4 were moderately liked by the panel of judges. The calculated value of F (34.41) was greater than the table value of F (4.76) at 5% probability level. Therefore, it is calculated that there is a significant difference between the treatments of colour and appearance. The consistency of weaning food clearly indicates that the treatment T2 (8.66) had the highest score for the consistency of weaning food followed by T1 (8.00), T3 (7.00) and T4 (6.00) respectively (Table 3). The calculated value of F (21.46) was greater than the table value of F (4.76) at 5% probability level. Therefore, it is calculated that there is a significant difference between the treatments of consistency. The mean score of taste and flavour of weaning food indicates that treatment T2 (8.66) held the maximum scores as compared to T1 (7.33), T3 (7.00) and T4 (6.00). The calculated value of F (24.34) was greater than the table value of F (4.76) at 5% probability level. Therefore, it is calculated that there is a significant difference between the treatments of overall acceptability.
Similar findings were also reported by Khatun, et al. (2013), that utilization of 40% germinated whole wheat flour, 5% Linseed flour, 40% jaggery, 25% Chickpea flour, 20% Potato flour and 10% Carrot flour for the preparation of weaning food was found to be best among the formulated product and equally acceptable as Cerelac.

CONCLUSION
It can be concluded that germinated whole wheat flour, dehydrated carrot flour and potato flour, germinated chickpea flour, linseed with jaggery can be used for the preparation of nutritious weaning food that can be served in the form of porridge prepared with milk.

REFERENCES
UNICEF (1998); The State of World’s Children – Focus on Nutrition. 9-10