STUDIES ON FORMULATION OF READY-TO-USE WEANING FOODS MIXES WITH SOYWHEY

Sangita Sood, Sonia Minhas, Manoranjan Kalia and Rajni Modgil
Department of Food Science and Nutrition
CSKHPKV Palampur-176062, India

ABSTRACT

Ready to use mixes were prepared by using cereals, pulses, vegetables/fruits and nuts with soy-whey. Different products like idli, dhokla, halwa, sattu and upma were prepared and analyzed for mineral and other nutritional parameters. The calcium content was found highest in sattu i.e. 213.33 mg/100g, whereas the sodium value was recorded in halwa as 19.33 mg/100g. The potassium were obtained as in idli (42.00 mg/100g) and phosphorous in upma was 245.00 mg/100g. Moisture content was highest in sattu, crude protein was highest in upma, crude fat was highest in dhokla and crude fibre was highest in sattu were 8.87 percent, 12.75, 7.66 and 3.57 per cent respectively. Soy-whey based products are nutritious as they are good sources of proteins and minerals.

Key words: Weaning food mixes, Ready-to-use, Soy-whey, Sattu, Dhokla, Halwa

INTRODUCTION

Weaning is a transition period when the diet changes from complete breast feeding (after 4-6 months) until the child is able to eat normal family food. Such a shift involves not only a change in the texture but also in the nutrient constituents in the diet of the infant. Cereals and pulses constitute an important source of calories and protein in the diet after majority of the world’s population, especially in developing countries. Besides being good sources of protein and energy, they are good sources of minerals in the diet. Up to fifth-sixth month of age, breast milk is adequate for meeting the calorie and nutrient requirements of the infant. Thereafter, the breast milk supply is inadequate to meet the requirements (Devadas et al., 1974). Such foods should be nutritionally well balanced and should have a soft texture with very low fibre content (Chandrasekhar et al., 1988). In general, as a complete substitute for human milk, an infant formula should provide protein 7-16 per cent and fat 30-54 per cent of calories whereas, the remaining calories being supplied by carbohydrates (Dodd and Dutta, 1988).

Soywhey has proven to be an extraordinary nutritional material with immense therapeutic value. Since it is complete protein with the presence of all essential and non-essential amino-acids, it has very high biological value as compared to most of the animal proteins and soybean. At the same time it has very high biological oxygen demand causing pollution hazards. Although whey is nutritious and easily digested by the lactose intolerance children. So, an effort was made to prepare weaning food by using soy-whey because whey contains minerals, water-soluble vitamins and about 20 per cent of milk proteins. Whey proteins have a high biological value and protein digestibility.

MATERIAL AND METHODS

Quality Evaluation of Raw-materials

In order to ascertain the quality of the products, the proximate analysis like idli, dhokla, halwa, sattu and upma and their mineral content of raw ingredients were determined for certain traits. The standard techniques and methodology (AOAC, 1990) were used in the evaluation of quality parameters.

Standardisation of Cheese-whey and Soy-whey

An effort was made to standardize cheese-whey and soy-whey. For the purpose, different coagulants were tried at different levels. Cheese-whey and soy-whey were obtained by curdling milk and soymilk by using citric acid and magnesium sulphate @ 0.5 g/100 ml.
Preparation of ready to use mixes

Recipes for weaning foods were standardized by following Square method (Sood and Kalia, 2007). Ready to use mixes were prepared by using cereals, pulses, vegetables/fruits and nuts were used by using soy-whey. The recipes were formulated for the preparation of idli, dhokla, halwa, sattu and upma. The prepared products were analyzed for mineral and nutritional constituents.

Cereal (rice) (50 g) and pulse (green gram dhal) (30 g each)

Roasted in an open container at 70°C for 2 minutes

Cereal and pulses was ground to a fine powder

Added dried peas (8 g), nuts (12 g) and jaggery to the mixture (10 g)

Dried in a oven for 6 hours at 60°C

Packaging in glass jars

Flow chart for the preparation of ready-to-use mixes (sattu, halwa and upma)

RESULTS AND DISCUSSION

Development of ready to use mixes and their evaluation

Mineral Constituents

The mineral content of prepared mixes are given in Table 1. The samples were tested for various minerals such as Ca, Na, K and P constituents as well as other nutritional parameters and the pertinent results are depicted in the Tables 1. Soy whey was found better nutritionally in comparison to cheese whey. For the reason products were prepared by using soy whey. Table 1 presents...
that the Ca, Na, K and P content of halwa was 205.00, 19.33, 32.00 and 215.00 mg/100g. Respectively Whereas, in upma the values were recorded as 183.00, 5.33, 40.33 and 238.33 mg/100g. Respectively However the same constituents in idli were 193.66, 10.66, 42.00 and 223.33 mg/100g respectively. The dhokla attained the values for the same constituents as 207.66, 7.00, 43.66 and 245.00 mg/100g respectively. While the values recorded in sattu were 213.33, 10.33, 39.33 and 233.33 mg/100g respectively. However, the value for potassium was maximum in dhokla. The results observed by Chandrasekhar et al. (1988) for phosphorous are in line with the present findings.

**Quality evaluation of Cheese-whey and Soy-whey**

Cheese-whey and soy-whey were analysed for crude protein, crude fat, pH, TSS and ash. As is evident from Table 2, the crude protein recorded in cheese-whey and soy-whey was 0.70 and 0.97 per cent. This might be because soybean contains more amount of proteins than cow’s milk. The present findings are also supported by Shukla et al. (2004).

The crude fat value recorded was 0.25 and 0.31 per cent for cheese-whey and soy-whey respectively. The soy-whey recorded more amount of fat as compared to cheese-whey. This might be due to soybean contains the more amount of fat as compared to cow’s milk. The present values are close to the values reported by Shukla et al. (2004).

Whereas, pH and TSS of cheese-whey and soy-whey were calculated as 4.50, 5.00 and 8.0 and 3.0 °Brix. This might be due to use of citric acid used for the curdling of milk. Acidity in cheese-whey was 3.50 and soy-whey was 0.38. This might be due to use of citric acid used for the curdling of milk and ash was found 0.40 and 0.46 in cheese-whey and soy-whey respectively. The values of soy-whey are high as compared to cheese-whey as soybean contains the more amount of minerals than cow’s milk.

**Proximate composition**

The results of proximate analysis of ready-to-use mixes are presented in Table 3. Quality evaluation of ready-to-mixes was also affirmed on the basis of proximate analysis of various parameters viz. moisture, ash, fat, crude protein, and crude fibre.

**Moisture**: Data in Table 3 envisaged the moisture content in ready-to-use prepared by various blends of cereals, pulses, fruits and vegetables. Idli obtained the lowest value of moisture. Among the other four products the values obtained for the same constituents in case of sattu as 8.87, halwa as 8.71, dhokla as 7.33 per cent and in upma as 7.06 per cent respectively. This is due to the green grams which have high moisture. The moisture content of instant mixes was significant in respect of storage stability of dried products. Gopaldas et al. (1982) reported 7.08, 7.52, 7.62, 8.10, 8.38 per cent moisture in roasted and malted multimixes which were formulated from wheat, bengal gram and groundnuts in the proportion of 4:1:1, 8:1:1, 4:1:0 and 8:1:0. Whereas, Srivastava et al. (2001) reported moisture in malted and popped mixes as 6.66 and 5.16 per cent. However, Shanthi et al. (2000) reported higher values of 12.00 and 11.90 per cent moisture for instant idli mixes. The values in the present studies are also in line with the results reported by other workers discussed above.

<table>
<thead>
<tr>
<th>Products</th>
<th>Ca(mg/100g)</th>
<th>Na(mg/100g)</th>
<th>K(mg/100g)</th>
<th>P(mg/100g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Halwa</td>
<td>205.00</td>
<td>19.33</td>
<td>32.00</td>
<td>215.00</td>
</tr>
<tr>
<td>Upma</td>
<td>183.00</td>
<td>5.33</td>
<td>40.33</td>
<td>238.33</td>
</tr>
<tr>
<td>Idli</td>
<td>193.66</td>
<td>10.66</td>
<td>42.00</td>
<td>223.33</td>
</tr>
<tr>
<td>Dhokla</td>
<td>207.66</td>
<td>7.00</td>
<td>43.66</td>
<td>245.00</td>
</tr>
<tr>
<td>Sattu</td>
<td>213.33</td>
<td>10.33</td>
<td>39.33</td>
<td>233.33</td>
</tr>
<tr>
<td>CD at 5%</td>
<td>0.60</td>
<td>0.20</td>
<td>0.25</td>
<td>0.70</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Products</th>
<th>Crude Protein(%)</th>
<th>Crude Fat(%)</th>
<th>pH</th>
<th>TSS°Brix</th>
<th>Acidity (%)</th>
<th>Ash (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cheese-whey</td>
<td>0.70</td>
<td>0.25</td>
<td>4.50</td>
<td>8</td>
<td>3.50</td>
<td>0.40</td>
</tr>
<tr>
<td>Soy-whey</td>
<td>0.97</td>
<td>0.31</td>
<td>5.00</td>
<td>3</td>
<td>0.38</td>
<td>0.46</td>
</tr>
</tbody>
</table>
Table 3: Proximate composition of ready-to-use mixes.

<table>
<thead>
<tr>
<th>Ready to eat mixes</th>
<th>Moisture (%)</th>
<th>Ash (%)</th>
<th>Crude Protein (%)</th>
<th>Crude Fat (%)</th>
<th>Crude Fibre (%)</th>
<th>NFE(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Halwa</td>
<td>8.71</td>
<td>2.18</td>
<td>9.70</td>
<td>6.96</td>
<td>2.06</td>
<td>70.39</td>
</tr>
<tr>
<td>Upma</td>
<td>7.06</td>
<td>1.52</td>
<td>12.75</td>
<td>2.13</td>
<td>2.33</td>
<td>74.21</td>
</tr>
<tr>
<td>Idli</td>
<td>6.23</td>
<td>1.85</td>
<td>12.26</td>
<td>2.43</td>
<td>2.35</td>
<td>74.88</td>
</tr>
<tr>
<td>Dhokla</td>
<td>7.33</td>
<td>1.57</td>
<td>10.34</td>
<td>7.66</td>
<td>1.89</td>
<td>71.21</td>
</tr>
<tr>
<td>Sattu</td>
<td>8.87</td>
<td>2.12</td>
<td>12.43</td>
<td>2.15</td>
<td>3.57</td>
<td>70.86</td>
</tr>
<tr>
<td>CD at 5%</td>
<td>0.27</td>
<td>0.34</td>
<td>0.37</td>
<td>0.23</td>
<td>0.32</td>
<td></td>
</tr>
</tbody>
</table>

Ash

Table 3 reveals that the ash content in the products was maximum in halwa (2.18 per cent) and minimum in upma (1.52 per cent). Whereas, in case of idli, dhokla and sattu the ash content was found to be 1.85, 1.57 and 2.12 per cent respectively. The values of ash content of ready-to-use mixes were significant in the sense as they show the insight mineral composition of the product. Similar values in ash content of instant mixes have been observed by Srivastava et al. (2001). However, Swaminathan et al. (1972) reported higher amount of ash content. The results obtained by Chandrasekhar et al. (1988) are pretty close to the present investigation.

Crude protein

As is clear from the same Table (3) the crude protein were found to be highest in upma (12.75 per cent) among other products. The crude proteins of other ready-to-use mixes were recorded as 9.70 per cent (halwa), 12.26 per cent (idli), 10.34 per cent (dhokla) and 12.43 per cent (sattu) respectively. Highest protein content was observed in upma. This may be attributed due to the presence of peas in sattu and semolina in upma having higher amount of proteins as compared to other products. Chandrasekhar et al. (1988) reported the protein content of various products. The values reported by these workers varied slightly from the values obtained in this study. Moreover, a close value of proteins has also been reported by Shanthi et al. (2000).

Crude fat

A wide variability was also observed with respect to crude fat contents of different materials. Dhokla contained maximum crude fat as 7.66 per cent. Whereas, the crude fat contents of halwa, upma, idli and sattu were observed to be comparatively less than dhokla and were observed as 6.96, 2.13, 2.43 and 2.15 per cent respectively. Higher crude fat content observed in ready-to-use mixes was maximum in dhokla. This is due to the high fat content of bengal gram dhal in dhokla. Shanthy and Neelakantan (1979) observed a very close value of fat content. Similarly Chandrasekhar et al. (1988) reported a fat content of 1.5 per cent, so present findings are in agreement with the reported results.

Crude fibre

Table 3 illustrates that sattu, upma and idli were rich in crude fibre with the values of 3.57 per cent, 2.35 per cent and 2.33 per cent. The lowest value of crude fibre was recorded in halwa as 2.06 per cent, in dhokla as 1.89 per cent. Among all the products sattu contains the highest crude fibre. This is attributed to the high crude fibre content of bengal gram dhal. The values were found to be significant. The results pertaining to crude fibre contents of ready-to-use mixes are supported by Kshirsagar et al. (1994). The results of crude fibre analysis are in close agreement with those reported by Malleshi and Desikachar (1981).

CONCLUSION

It can be safely concluded from the aforesaid discussion that soy- whey based products are not only nutritious but could be used as a substitute of cheese-whey based products by the children who are suffering from the lactose intolerance or allergic to cow’s milk.

REFERENCES


