Implementation of the Healthy Concepts in Home Made Baby Food Formulas Preparation

Alanowd Omar Ali Mehder

Food technology assistant professor, College of Medical Applied Science, Umm Al-Qura University, Ministry of Higher Education, Kingdom of Saudi Arabia

ABSTRACT

During the period covering 4–6 months to 3 years, breast milk, an ideal baby food, no longer meets the increasing nutritional requirements of the child. In response to this deficiency, complementary foods are usually given to infants. In developing countries, complementary foods are based on local staple foods, usually cereals that are processed into porridges. Apart from their bulkiness reported as a probable factor in the etiology of malnutrition, cereal-based gruels are of poor nutritional value and therefore have some implications in the incidence of protein–energy malnutrition. Therefore, incorporation with vegetables, fruits, herbs, eggs, dairy products and other miscellaneous materials to formulate complementary diets for different stages of age children is a vital role in feeding the baby at different steps of age. Nutritional (with respect to chemical composition, i.e., protein, carbohydrates, ether extract, ash and crude fiber, vitamins, β carotene, vitamin C and vitamin E and mineral content, i.e., iron, phosphorus, sodium, calcium and potassium) were determined in the tested formulas to explain the most nutritional one. Estimation of the heavy metals (lead, zinc and arsenic) and antinutritional (tannin and phytic acid) as undesirable factors components in the tested formulas were, also, extended in the current studies.

Key words: babay foods, complementary, formulation, nutritional, antinutritional factors.

Introduction

In a detailed article, Fehily (2003) explained that weaning is the name given to the process by which infants progress from a diet composed only of breast milk or infant formula milk to a family diet containing a wide variety of foods. It is necessary to insure that nutrient intakes continue to be adequate for healthy growth and development throughout childhood. Infants vary in the age at which they are ready for weaning. Advice from medical experts is that the majority of infants should not be given solid foods before 4 months of age and that a mixed diet should be offered by 6 months of age. Ideal first foods are rice-, maize-, or maize-based cereals, fruit, vegetables, and potatoes. The range of foods offered can then be gradually increased, such that by the age of 1 year the diet should be mixed and varied.

The types of foods used during weaning, special diet considerations, the nutrient composition of weaning foods, legislation requirements for the composition of commercial weaning foods, and methods of preparation of weaning foods were discussed in numerous studies. At the start of weaning, foods should be of a very smooth, thin consistency such that they can be sucked from a spoon. The food needs to be sufficiently liquid for the infant to transfer it to the back of the mouth for swallowing, but not so runny that it becomes unmanageable. Foods should be of small particle size and have a bland flavor. At this stage, the aim is to introduce the infant to a wide variety of tastes. As weaning progresses, the infant is introduced to an increasing variety of foods, providing a range of tastes and textures. Once the infant has become used to taking food from a spoon, pureed foods of a thicker consistency can be introduced and later foods with small soft lumps and soft finger foods. From about 1 year of age, most infants will be enjoying a regular pattern of meals and snacks made up of family foods. During weaning the infant is introduced to a wide variety of foods. In this way, the eventual diet is more likely to provide all the nutrients needed for continued healthy growth and development. One of the best ways of insuring that an infant’s intake of vitamins and minerals is adequate is to offer a wide variety of foods.

Anti-nutritional factors are natural or synthetic substances found in the human diet or animal feed that have the potential to adversely affect health and growth by preventing the absorption of nutrients from food (Trev 2012).

Some components of the diet bind to iron and thereby hinder iron absorption: phytic acid from cereals, legumes, and other vegetables; phosphoproteins in cows’ milk and egg yolk; tannin in tea; and polyphenols in spinach and coffee. Phytic acid, for instance, has a storing binding affinity to minerals such as calcium,
magnesium, iron and zinc; this results in precipitation, making the minerals unavailable for absorption in the intestines. Phytic acids are common in the hulls of nuts, seeds and grains (Ekholm et al., 2003).

Vitamin C, on the other hand, improves the absorption of iron from the diet. Vitamin C also enhances the absorption of other minerals from the diet – zinc and copper. Protein also helps to improve iron absorption, by reducing the inhibitory effect of phytic acid. If using commercial baby foods, it is usually easy to identify products suitable for a milk-free, egg-free, gluten-free, or vegetarian diet, as labels of suitable products often carry a statement to this effect.

Preparing weaning foods at home is largely a matter of adapting normal cooking processes. If a meal is being cooked for other members of the family, it is usually possible for a suitable weaning food to be prepared from the same basic ingredients. The first foods added to the diet are generally staple foods. These might include cereals and tubers such as maize, rice, millet, or sweet potato. The simplest recipe for weaning foods is one which has only two ingredients, for example a cereal or root mixed with a legume. Other foods can be added to this basic mix to make a complete meal. Such recipes are known as multimixes and consist of four basic ingredients:

1. A staple as the main ingredient – preferably a cereal,
2. A protein supplement from a plant or animal food – beans, groundnuts, meat, milk, chicken, fish, eggs, etc.
3. A vitamin and mineral supplement – a vegetable and/or fruit.
4. An energy supplement – fat, oil, or sugar to increase the energy concentration of the mix.

The objective of this study is to produce high-protein–energy weaning foods based on locally available protein-rich food materials such as cereals and legumes and proteinized seeds. Manufacture of the tested formulas in canned and dehydrated forms and estimation of the impact of storage at ambient temperature was, also, extended in the current study.

Materials and Methods

All the raw materials were purchased form the “Whole some baby food” electronic commercial site for baby foods commercialization at Kingdom of Saudi Arabia.

Formulation of preparation of the tested formulas:

The following tested formula ingredients were designed based on the UNICEF (1998) regulations and other related published researches (Fehily 2003) which require the existence of all recommended nutrients in quality and quantity manners. In addition to that, it should be acceptable to the target consumers with respect to their sensory attributes. The current formulas were sensory pretest, not published, before put under investigation. It was designed as follows:

The first formula was consisted of full mature mushroom body (453 g), Daucus carota L. peeled carrot (180 g), Solanum tuberosum full mature potatoes (520 g) and Apium graveolens celery (15 g). The ingredients were mixed together, blanched and appreciated amounts of table salt and water were added to get the suitable consistency.

The second formula was consisted of blanched peeled carrot (750 g), blanched brown rice (750 g), Petroselinum crispum parsley (15 g), Thymus vulgaris thyme (15 g), skimmed dried cow milk (250 g), boiled egg (125 g) and baramyzan cheese. The previous ingredients were mixed with the appreciated amounts of table salt and water were added to get the suitable consistency.

The third formula was consisted of blanched puree Cucurbita moschata pumpkin (333 g), full fat cow milk (250 g) and boiled egg (125 g). All the formula ingredients were mixed with the appreciated amounts of table salt and water were added to get the suitable consistency.

The fourth formula was consisted of blanched Ipomoea batatas sweet potatoes (250 g), Musa sapientum banana (125 g), skimmed dried cow milk (250 g), brown sugar (30 g), whipped yellow egg yolk (66g) and raisins (62 g). The ingredients were mixed together, blanched and appreciated amounts of table salt and water were added to get the suitable consistency.

The fifth formula was consisted of steam blanched spinach (681 g), olive oil (30 g), full fat cow yoghurt (250 g) and Mentha piperita spearmint (10 g). The ingredients were mixed together and the appreciated amount of table salt was added to get the suitable consistency.

The sixth formula was consisted of blanched Persica vulgaris puree peach (452 g), blanched sweet potatoes puree (962 g), brown sugar (125 g), wheat flour (15 g), margarine (30 g), Juglans regia walnuts powder (125 g) and marshmallow (125 g). The ingredients were mixed together and the appreciated amounts of table salt and water were added to get the suitable consistency.

The seventh formula was consisted of deseeded unpeeled Malus domestica apple (360 g), sweet potatoes (460 g), black raisins (62 g), butter (60 g), whole wheat flour (30 g), chicken sauce (750 g), apple juice (339 ml)
and soy sauce (15 ml). The ingredients were blanched and mixed together and the appreciated amounts of table salt and water were added to get the suitable consistency.

The eighth formula was consisted of steam blanched broccoli (424 g), whole cow milk (187 g) and home made low fat low salt *Lentinus edode* cream soup (contained 375 g algae, 7.5 ml olive oil, 7.5 g wheat flour, 187 ml vegetable broth, 62 g free fat milk, 62 g free fat sour cream, 8.5 g white youlk). The ingredients were mixed together and the appreciated amounts of table salt were added to get the suitable consistency.

**Analytical methods:**

The formula samples were estimated with respect to chemical composition (moisture, protein, ether extract, ash and crude fiber) as a good mirror for the nutritional status of the tested formula. Total carbohydrates were calculated by difference as follows: %Carbohydrates = 100 - the sum of (% moisture + % crude protein + % fat + % ash + % crude fiber according to the procedures of the AOAC (2000). β carotene, vitamin E and vitamin C content were the representative factor to the presence of the vitamins in the tested formulas. The aforementioned vitamins were estimated by the method described by Ngkok and Solcha (1991), Kirk and Sawyer (1991) and AOAC (2000), respectively. Iron, phosphorus, calcium, sodium and potassium were selected as an indication for the existence of the most important minerals. Lead, arsenic and zinc were selected to represent the contamination with the heavy metals. All the tested minerals were determined according to the AOAC (2000) method by using Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES) instrument. Antinutritional (tannin and phytic acid) factor contents were determined by the methods of Price *et al*., (1978) and Wheeler and Ferrel (1971), respectively.

**Results:**

The weaning period, also known as food-accustomed period, is the most critical one in the life of infants and preschool children (Egounlely 2002). Consequently, it is of importance to prepare a highly nutritional diets to be sensory accepted to infants and preschool children.

Table (1) shows the data of chemical composition of the tested home made baby food formulas.

Such results showed that the moisture content was ranged between 40.03 and 48.35% in the tested baby food formulas.

The tested formulas contained a very wide range difference in carbohydrates content. The first formula possessed the highest carbohydrates amount (21.13%), while the fifth, third, second and fourth possessed the lowest amount (8.20, 8.13, 7.24 and 6.61%, respectively). Meanwhile, the seventh, sixth and eighth formulas came in between the carbohydrates content (15.98, 15.64 and 13.35%, respectively).

On contrary, the first formula possessed the lowest ether extract (6.96%) and the eighth formula contained the highest (17.02%) one. All the other formula came in between and ranged between 16.96 and 12.00%, with a very high variation. It could be, also, noticed that the higher carbohydrates content, the lower ether extract content.

The tested formulas possessed higher amount of protein, each of them was higher than 16.82% (the first formula). The highest protein content (26.27%) was detected in the seventh formula. The fourth formula was the closest one to the seventh fourth (25.73%) followed by second, third, sixth and eighth, with a reverse gradual order with respect to protein contents (21.47, 21.27, 20.0, 19.32 and 18.60%, respectively).

The fiber contents of the tested formulas were estimated. The fifth and third formulas contained the higher crude fiber contents (8.60 and 6.53%, respectively) but the eighth, first, fourth and seventh formulas contained the lowest crude fiber contents (3.61, 3.63, 4.51 and 4.52%, respectively) with a minor variation among them. The other formula (the third and second) contained intermediate crude fiber contents (6.53 and 5.99%, respectively).

With respect to the ash contents, the same Table showed, also, that the tested formulas could be divided into two groups. The first one contained a reasonable high content and the other contained the lower content. Each individual group showed a slightly variation in the ash content. In other word, the first, third, second and fifth contained the highest ash amounts (3.11, 2.76, 2.31 and 2.20 %, respectively). On the other hand, the fourth, eighth, seventh and sixth formulas contained 1.46, 1.44, 1.20 and 1.18%, respectively.

**Table 1:** Chemical composition (g/100 g on wet weight basis) of the fresh home made formulas prepared.

<table>
<thead>
<tr>
<th>Nutrients</th>
<th>Moisture</th>
<th>Carbohydrates*</th>
<th>Ether extract</th>
<th>Protein</th>
<th>Crude fiber</th>
<th>Ash</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>First</td>
<td>Second</td>
<td>Third</td>
<td>Fourth</td>
<td>Fifth</td>
<td>Sixth</td>
</tr>
<tr>
<td></td>
<td>48.35</td>
<td>48.03</td>
<td>45.73</td>
<td>44.73</td>
<td>45.00</td>
<td>46.11</td>
</tr>
<tr>
<td></td>
<td>21.13</td>
<td>21.27</td>
<td>21.0</td>
<td>20.0</td>
<td>19.32</td>
<td>18.60</td>
</tr>
<tr>
<td></td>
<td>6.96</td>
<td>14.96</td>
<td>15.58</td>
<td>16.96</td>
<td>16.0</td>
<td>14.18</td>
</tr>
<tr>
<td></td>
<td>16.82</td>
<td>21.47</td>
<td>21.27</td>
<td>25.73</td>
<td>20.0</td>
<td>19.32</td>
</tr>
<tr>
<td></td>
<td>3.63</td>
<td>5.99</td>
<td>6.53</td>
<td>4.51</td>
<td>8.60</td>
<td>3.57</td>
</tr>
<tr>
<td></td>
<td>3.11</td>
<td>2.31</td>
<td>2.76</td>
<td>1.46</td>
<td>2.20</td>
<td>1.18</td>
</tr>
</tbody>
</table>

Data presented in Table (2) showed that the eighth formula contained a very high content (113.2 mg/100 g) of Vitamin C, which could not be comparable to the other formulas. The other formulas possessed unmeasurable amounts in relative to the eighth formula. Such amounts ranged between 28.58 and 9.40 mg/100 g.

On contrary, the tested formulas possessed low amounts of vitamin E in relative to vitamin C. The vitamin E contents in the present formula ranged between 5.26 in the fifth formula (the highest amount) and 0.32 in the sixth formula (the lowest amount). The other formulas contained in between amounts of vitamin E.

A moderate amounts of β carotein, in relative to both of vitamins C and E, was found in the tested formulas. The highest amounts (19.69, 19.20, 16.72 and 16.20 mg/100g) were detected in the second, fourth, third and fifth, respectively.

Table 2: Vitamins contents (mg/100 g on wet weight basis) of the fresh home made formulas prepared.

<table>
<thead>
<tr>
<th>Nutrients</th>
<th>Formula Name</th>
<th>First</th>
<th>Second</th>
<th>Third</th>
<th>Fourth</th>
<th>Fifth</th>
<th>Sixth</th>
<th>Seventh</th>
<th>Eighth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin C</td>
<td></td>
<td>12.57</td>
<td>12.52</td>
<td>9.40</td>
<td>24.95</td>
<td>28.54</td>
<td>11.15</td>
<td>18.07</td>
<td>113.20</td>
</tr>
<tr>
<td>Vitamin E</td>
<td></td>
<td>1.05</td>
<td>2.92</td>
<td>0.95</td>
<td>2.73</td>
<td>5.26</td>
<td>0.32</td>
<td>2.25</td>
<td>1.92</td>
</tr>
<tr>
<td>β carotein</td>
<td></td>
<td>4.68</td>
<td>19.69</td>
<td>16.72</td>
<td>19.20</td>
<td>16.20</td>
<td>8.42</td>
<td>2.11</td>
<td>7.42</td>
</tr>
</tbody>
</table>

Table (3) shows the minerals (iron, phosphorus, calcium, sodium, and potassium) contents of the tested formulas. It revealed that calcium, potassium and phosphorus were presented in higher amounts in most of the tested formula but the other minerals were existed, in relative, in lower quantities.

The iron contents were higher in the eighth, fourth, third and fifth formulas (112, 1.10, 1.02 and 0.99 ppm, respectively). The other formulas contained lower amounts of iron ranged between 0.86 and 0.16 ppm.

The second and fourth formulas possessed higher amounts of phosphorus (22.43 and 19.19 ppm) but the other formulas had a relatively lower amounts (ranged between 13.54 and 1.20 ppm).

The calcium contents in the tested formulas could be classified in three groups, i.e., higher as in the third, lower as in fourth, fifth and second and moderate as in the other formulas (Table 3).

The highest sodium contents were detected in fifth and fourth (45.20 and 39.69 ppm) followed by second, seventh first and third (24.50, 22.78, 15.60 and 14.23 ppm, respectively) and then eighth and sixth (7.05 and 5.30 ppm).

Table 3: Minerals contents (ppm on wet weight basis) of the fresh home made prepared formulas.

<table>
<thead>
<tr>
<th>Nutrients</th>
<th>Formula Name</th>
<th>Iron</th>
<th>Phosphorus</th>
<th>Calcium</th>
<th>Sodium</th>
<th>Potassium</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td></td>
<td>0.16</td>
<td>9.09</td>
<td>37.41</td>
<td>15.60</td>
<td>30.16</td>
</tr>
<tr>
<td>Second</td>
<td></td>
<td>0.86</td>
<td>22.43</td>
<td>21.98</td>
<td>24.50</td>
<td>17.50</td>
</tr>
<tr>
<td>Third</td>
<td></td>
<td>1.02</td>
<td>13.54</td>
<td>71.86</td>
<td>14.23</td>
<td>39.72</td>
</tr>
<tr>
<td>Fourth</td>
<td></td>
<td>1.10</td>
<td>19.19</td>
<td>23.23</td>
<td>39.69</td>
<td>38.35</td>
</tr>
<tr>
<td>Fifth</td>
<td></td>
<td>0.99</td>
<td>10.82</td>
<td>22.23</td>
<td>45.20</td>
<td>62.07</td>
</tr>
<tr>
<td>Sixth</td>
<td></td>
<td>0.87</td>
<td>11.78</td>
<td>22.25</td>
<td>5.30</td>
<td>32.80</td>
</tr>
<tr>
<td>Seventh</td>
<td></td>
<td>0.68</td>
<td>1.20</td>
<td>2.56</td>
<td>22.78</td>
<td>14.42</td>
</tr>
<tr>
<td>Eighth</td>
<td></td>
<td>1.12</td>
<td>12.47</td>
<td>1.18</td>
<td>7.05</td>
<td>33.48</td>
</tr>
</tbody>
</table>

The fifth formula had the highest (62.07 ppm) potassium level, followed by third, fourth, eighth sixth and first (39.72, 38.35, 33.48, 32.80 and 3016 ppm, respectively) and the then second and seventh which possessed the lowest amounts (17.50 and 14.42 ppm).

Heavy metals existence in the tested formulas was checked and the data were recorded in Table (4). It shows that lead was detected in a minor amount ranged between 0.36 and 0.03 (in third and seventh formulas). Zinc was detected found only in the second formula in a very low amount, meanwhile the arsenic was completely absent in all the tested formulas.

Table 4: Heavy metal contents (ppm on wet weight basis) of the fresh home made prepared formulas.

<table>
<thead>
<tr>
<th>Heavy metal</th>
<th>Formula Name</th>
<th>Lead</th>
<th>Zinc</th>
<th>Arsenic</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td></td>
<td>0.12</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Second</td>
<td></td>
<td>0.25</td>
<td>0.078</td>
<td>0.00</td>
</tr>
<tr>
<td>Third</td>
<td></td>
<td>0.36</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Fourth</td>
<td></td>
<td>0.06</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Fifth</td>
<td></td>
<td>0.12</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Sixth</td>
<td></td>
<td>0.05</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Seventh</td>
<td></td>
<td>0.03</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Eighth</td>
<td></td>
<td>0.19</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Table 5: Antinutritional (tannin and phytic acid) factors content (g/100 g on wet weight basis) of the fresh home made prepared formulas.

<table>
<thead>
<tr>
<th>Antinutritional component</th>
<th>Formula Name</th>
<th>Tannin</th>
<th>Phytic acid</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td></td>
<td>0.45</td>
<td>1.19</td>
</tr>
<tr>
<td>Second</td>
<td></td>
<td>0.62</td>
<td>1.71</td>
</tr>
<tr>
<td>Third</td>
<td></td>
<td>0.82</td>
<td>2.17</td>
</tr>
<tr>
<td>Fourth</td>
<td></td>
<td>0.42</td>
<td>1.80</td>
</tr>
<tr>
<td>Fifth</td>
<td></td>
<td>0.75</td>
<td>4.52</td>
</tr>
<tr>
<td>Sixth</td>
<td></td>
<td>0.30</td>
<td>1.19</td>
</tr>
<tr>
<td>Seventh</td>
<td></td>
<td>0.55</td>
<td>2.80</td>
</tr>
<tr>
<td>Eighth</td>
<td></td>
<td>0.68</td>
<td>1.38</td>
</tr>
</tbody>
</table>

Antinutritional (tannin and phytic acid) factors content of the tested formulas was found in Table (5). It revealed that tannin amounts in all the tested formulas were higher than phytic acid amounts. The highest

*Calculated by difference.
amount (lower nutritional) of the former and latter was detected in the third and fifth formula (0.82 and 4.52 g/100g), respectively. The lowest amount (higher nutritional) of the tannin was detected in the sixth formula (0.30 g/100g), while in case of pyritic acid it was found in first and sixth formulas (1.19 g/100g for both).

Discussion:

Remarks on the formulation of the blends design:

Despite many nutritional intervention programs for infant feeding, protein–energy malnutrition (PEM) and diarrhea are still the major factors responsible for the high under-five child mortality in tropical countries estimated at more than 15 million per year (Nout, 1991). Main causes of PEM are inadequate total food or imbalanced food intake. During that period, especially the critical weaning period, i.e. 6–12 months, infant foods are made of high moisture fermented cereal-based porridges with such a low-protein value that cannot even support the growth of experimental rats (Akinrele, 1970). Other causes are socio-cultural constraints that forbid the use of high protein foods by children especially during diarrhoeal episodes (UNICEF, 1998).

Weaning is a period of transition for the infant during which the diet changes in terms of consistency and source. From a liquid milk-based diet, the child is gradually introduced to semi-solid foods (Draper, 1994). Such semi-solid foods are referred to as complementary foods. A complementary food should ideally be easily digestible, have high energy density and low bulk (Ezeji and Ojimelukwe, 1993). The formulation and development of nutritional weaning foods from local and readily available raw materials has received a lot of attention in many developing countries (Ijarotimi and Aroge, 2005).

However, many food resources are produced, and are available throughout the year (MDR, 2000). In addition, fermentation techniques are known since many centuries to produce and preserve foods (Cooke et al., 1987 and Sasson, 1988). The application of fermentation techniques in this study resulted in production of high-protein–energy infant foods with a high nutritive value. Similar results were obtained by Ojofeitimi et al., (1984), Akobundu and Hoskins (1987) using the fermentation techniques and cowpea, melon seeds and a mixture of legume and proteinized seeds.

In reviewing the technologies for production of high protein–energy weaning foods in developing countries, Adeyemi (1989) described the co-fermentation of cereals and grain legumes as an appropriate, low-cost and safe technique. In addition, ripe fruits may be incorporated in the process to increase the resultant weaning foods. The mineral and vitamin levels of the high protein–energy in weaning foods developing countries, which should be exist in moderate amounts to save the life of thousands of children suffering protein–energy malnutrition in this part of the World, are generally lacking (Egounlety and Aworh, 1991).

Remarks on the existence of the recommended nutrients:

The numerous and variation ingredients of the tested formulas are a good tool to offer diets from local and readily available raw materials has received a lot of attention in many developing countries as advised by Ijarotimi and Aroge (2005).

The higher moisture contents in the tested formulas were compatible with the observation of Draper (1994) to offer an acceptable balanced diet in a semi-solid foods to be suitable for 6–12 months, infant foods.

The higher carbohydrates and ether extract in the-tested formulas is a good response to the recommendation of Ijarotimi and Aroge (2005) and Ezeji and Ojimelukwe (1993) in preparing a complementary, easily digestible, high energy density and low bulk food.

The differences in the protein contents in the tested formulas are preferable either in case the higher or lower levels. While the higher protein contents are required for body growth and maintaining but the lower protein contents are required for some children especially during diarrhoeal episodes (UNICEF, 1998).

Excessive intake of required nutrients can also result in them having an anti-nutrient action. Excessive intake of fiber, for instance, can reduce the transit time through the intestines to such a degree that other nutrients cannot be absorbed. Because calcium, iron, zinc and magnesium shares the same transporter within the intestine excessive consumption of one of these minerals can lead to saturation of the transport system and reduced absorption of the other minerals (Thompson et al., 2007).

In spite of the lower amounts of some of the high importance minerals and vitamins, they are in an adequate amount according to the Recommended Daily Allowances. It also apply the suggestion of Egounlety and Aworh (1991) who stated that the mineral and vitamin levels of the high protein–energy in weaning foods developing countries should be exist in moderate amounts to save the life of thousands of children suffering protein–energy malnutrition in this part of the World, are generally lacking (Egounlety and Aworh, 1991).

Because phytate from some grains and beans (such as maize and soybeans) is unavailable for absorption, the unabsorbed phytate passes through the gastrointestinal tract, elevating the amount of phosphorus in the manure (Klopfenstein et al., 2002).
When a mineral binds to phytic acid, it becomes insoluble, precipitates and will be nonabsorbable in the intestines. This process can therefore contribute to mineral deficiencies in people whose diets rely on these foods for their mineral intake, such as those in developing countries (Hurrell 2003).

On contrary, phytic acid may be considered a phytonutrient, providing an antioxidant effect (Anonymous 2004), enable the breast cancer patients feeling better (Bačić et al., 2010), listed by FDA among the b187 fake cancer cures consumers should avoided (Trev 2012) and is one of few chelating therapies used for uranium removal (Cebrian et al., 2007).

Phytic acid is found within the hulls of nuts, seeds and grains (Hussein 1988). In home food preparation techniques can reduce the phytic acid in all of these foods. Simply cooking the food will reduce the phytic acid to some degree. More effective methods are soaking in an acid medium, lactic acid fermentation and sprouting (Reddy et al., 1989).

The antinutritional factors (tannin and phytic acid) amounts in the tested formulas were in a lower level to overcome the problems of availability of some essential minerals (i.e., iron and calcium,…etc.).

Conclusion:

A complementary high-protein–energy weaning food formulas for baby could be prepared from blends of cereals (such as rice and wheat flour,), vegetables (such as carrot, potatoes, celery, parsley, pumpkin, sweet potatoes, spinach and broccoli), fruits (such as banana, raisins, peach and apple), herbs (such as thyme and spearmint), eggs (whole and whipped yellow egg yolk), dairy products (such as skimmed dried cow milk, full fat cow milk, full fat cow yoghurt, home made Lentinus edode cream soup and baramyzan cheese) and other miscellaneous materials (brown sugars, olive oil, margarine, butter, walnuts, marshmallow, chicken sauce and soy sauce).

The differences in the amounts of nutrients (higher in some formulas and lower in others) may be required to deal with the normal and special baby status whom suffering from specified nutrients disorder metabolisms. Efforts should also be made to transfer this information and technique to household women.

Estimation of the stability of such home made preparing in the traditional storage conditions should put under investigation.

Work should continue, also, to assess the nutritional value of the developed foods as well as their clinical properties.

References


