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MANUFACTURING OF BABY'S FOOD FROM LOCAL SOURCES AND STUDY OF CHEMICAL AND SENSORY PROPERTIES

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Abstract

Three manufacturing of baby's food, which are free gluten, have been prepared and can be used by children with allergy to gluten. Chemical analysis of mixtures the percentage of protein in the first, second and third mixtures was significant among the mixtures (19.51, 16.38 and 18.16)% respectively, while the ratio of fat, moisture, ash, fiber and carbohydrates in the first mixture and the second mixture and the third mixture and the difference between the three mixtures (5.75, 4.56, 5.75)% (5.25, 6.45, 5.31)%, (5.33, 4.14, 4.8) %, (10.59, 8.54, 9.31)%, (53.76, 59.86 and 56.6)% respectively. While the calories in the first mixture and the second mixture and the third mixture (345.78, 346.1, 349.3) K cal, respectively. The ratio of some mineral elements (calcium, sodium, zinc phosphorus, iron) in the first mixture was (0.57, 0.32, 0.14, 0.26 and 0.37)% respectively, while in the second mixture (0.55, 0.31, 0.12, 0.20, 0.34)% Respectively, while in the third mixture it was (0.55, 0.36, 0.13, 0.24 and 0.35)% respectively. The amount of T.S.S in the first, second and third mixtures varied significantly (18.40, 20.25, 17.60) respectively. The results of the sensory evaluation showed a significant difference between the mixtures and the second mixtures obtained the highest degree of sensory evaluation.

Key words: baby's food, chemical, sensory.

Introduction

The nutritional needs of individuals vary according to gender, age and body weight, in response to physiological functions. Children need more nutrition especially to cope with the rapid growth of their bodies. The World Health Organization recommends breastfeeding for six months of age with the addition of aiding foods after six months with continued breastfeeding for up to 2 years (Hamner *et al.*, 2016). The milk that the baby takes after the fourth month of age does not meet the increasing nutritional requirements as it needs to grow rapidly at this stage, so it should shift the food from milk only to foods similar to what the family and continue to eat milk (Shrimpton *et al.*, 2001). The World Health Organization (WHO) recommended introduced the cereals complementary foods be starting from the sixth month to supplement dietary requirements and to fill the shortfall of some nutrients that are not sufficient for processing milk (Aggarwal *et al.*, 2008). It is known that the age of 6-24 months is one of the most critical periods of child development, especially in developing countries, for high rates of malnutrition (UNICEF 2015). Most children in developing countries are often insecure and inadequate Nutrition and often young children and infants are at increased risk of malnutrition in those developing countries (World Health Organization, 2003). As developing countries rely on cereals and legumes as a source of protein, weaning food must be developed and meet the essential needs of available raw materials. Many of these foods have received attention in many developing countries (Plahar and Annan, 1994). The most important sources of protein used in the manufacture of baby's foods are grains, including rice. Rice protein has a protein efficiency ratio of 1.38 - 2.56 compared to the standard milk protein of 3. Rice is characterized by the fact that it is free of glutin (main wheat protein) so it is an alternative food for baby of those who suffer from the sensitivity Celiac Disease (Stoven *et al.*, 2012). Cereal proteins are deficient in some essential amino acids and in order to have a nutritionally nutritious diet, children's food was made from a mixture of cereals and pulses. Lupine is a nutritious meal rich in nutritional values of protein, minerals, vitamins, dietary fiber and low-calorie. Lupine is free of gluten food. It is a dietary alternative for sensitivity Celiac Disease. Because it contains

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minerals such as calcium, phosphorus, magnesium and manganese, in promoting the health and growth of bone (Lara-Rivera *et al*., 2017). Lupine is characterized by high protein content of up to 40%, good functional characteristics and high quality recipes as well as health benefits (Oliete *et al*., 2017). Most baby foods are prepared at home or manufactured, they must be subject to specific specifications so that they can be safely taken care of by children, as confirmed by the FAO and WHO. The baby food should contain sodium content not exceeding 30 mg /100 g of the product. The protein should be within 15% of the dry weight. The fat content in the baby food should not exceed 6 g / 100 kg. Calories are available, as they should be free from pathogenic microorganisms. In addition to the daily needs of vitamins and minerals necessary for growth at this stage naturally, for example vitamin D must be at least 400 IU, Thiamine 0.4 mg, Riboflavin 0.8 mg, Niacin 5 mg, Calcium 0.5 g, Iron 10 mg / day (Dewey and Adu-Afarwuah, 2008). The infant consumes about 25% of the energy needed for its movement and activity, while this ratio is about 15% in the case of children who are inactive but increases to about 40% in the case of very active children (Wilson *et al*., 1974). Ariful *et al*., (2013) indicated that the daily protein content of infants during the first 6 months of age was 2.2 g / kg body weight and decreased to 1.6 g during the following six months. Therefore, the aim study to manufacture some mixtures of children's food in order to meet some of the nutritional needs of such children especially in their early stages of development. These foods have some characteristics such as being of high nutritional value, good manufacturing properties, Chemical tests and sensory evaluation of these mixtures.

Materials and Methods

Materials used

• Sweet white lupine powder: *Lupinus albus* sweet white seeds were used from local markets. The seeds of the lupine were washed and washed. The water was soaked at 5:1 at room temperature and the water was soaked for more than once and for 5 hours and then dried with a vacuum oven. The temperature of 60 was then grinded by the laboratory mill and was sieved by an 80 mash sieve and stored in polyethylene bags until use at refrigerator temperature.

• Iraqi amber rice: obtained from the local markets and soaked in water and then dried and grinded and stored in bags of polyethylene for use.

• Sugar, pectin, powdered milk (Nido) and vanilla flavor sourced from local markets.

Table 1: Shows the types and proportions of the various ingredients involved in the preparation of the prepared baby food for 100g.

Ingredients	Sample		
	T1	T2	T3
Lupine(g)	50	30	40
Rice(g)	30	50	40
Milk(g)	20	20	20
Sugar(g)	10	10	10
Water(ml)	400	400	400
Flavor of vanilla(g)	0.5	0.5	0.5
Pectin(g)	1	1	1

Preparation of Baby food

Baby food mixes were prepared by following the Iqdaim, (2005). The mixture was mixed in the proportions shown in table 1 of each mixture. The water was then added and the samples were applied in a 100°C water bath with continuous stirring for 30 minutes. After the cooking, the mixture was spread over slippery paper and dried under 60°C for 7 hours then grinded and subjected to heat in the oven for 4 minutes at a temperature of 85°C and finally the product in polypropylene bags and keep the temperature of the refrigerator at a temperature of 5°C until the assessment of sensory.

Chemical analysis

Proximate analysis of samples was determined according to AOAC, (2005). The Treatment were analyzed for moisture, protein, fat, ash, Total carbohydrate content (%) was calculated by subtracting moisture, crude protein, crude fat and ash from total weight (100%-(moisture% + protein% + fat% and ash%). The energy content of food product was calculated from the protein, fat and carbohydrate content of finished product. Mineral elements in sample were determined by using atomic absorption spectrophotometer SHIMADZU (Jap). The pH was estimated using a pH meter. Total soluble solids were estimated using Abbe Refractometer (AOAC, 2005).

Sensory evaluation

The sensory evaluation of the children's food mix was conducted by a number of residents, including mothers with a baby. The recovery rates were 4:1 (w/v),

Table 2: Proximate analyses.

Proximate analyses of sample	Treatment			LSD value
	T1	T2	T3	
Protein	19.51	16.38	18.16	2.073 *
Moisture	5.25	6.45	5.31	1.188 *
Fat	5.75	4.56	5.75	1.094 *
Ash	5.33	4.14	4.80	0.942 *
Fiber	10.59	8.54	9.31	1.863 *
Carbohydrate	53.76	59.86	56.6	4.921 *
Calorie (K cal)	345.78	346.1	349.3	27.58 NS
* ($P<0.05$).				

powdered and water and sensory scores were given according to the method used Iqdaim, (2005).

Statistical analyses

The complete random design (CRD) was used to analyze the different parameters of the experiment. Morale differences were tested between the mean and the least significant difference (LSD) at P<0.05. Using the SAS, (2012) program for statistical analysis.

Results and Discussion

Chemical analysis of Baby food compounds

Table 2, shows the chemical composition of children's food mixes by estimating moisture, ash, fat, protein, fiber and carbohydrates. The results showed that the moisture content in the mixtures was close to the first mixture, the second mixture and the third mixture (5.25, 6.15, 5.74) % Respectively. The highest percentage of protein in the first mixture and a significant difference from the mixtures, (contains the highest proportion of lupine powder) at 19.56%, while the percentage of protein in the third mixture, (has an equal content of the proportion of lupine powder and amber rice flour) at 18.15% and the lowest proportion of protein in the second mixture, (contains the highest proportion of rice flour) 16.34% we find that all the mixtures were the proportion of protein in conformity with the recommendations of the Committee. The Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO) confirmed that the protein content should not be less than 15% on the basis of dry weight. The difference in percentages may be due to the proportions of the ingredients in the composition. The lupine powder is characterized by high protein content, with a protein content of 36% (Lara *et al.,* 2017).

The percentage of fat in the mixtures was the highest in the third mixture (5.84%), followed by the first and second mixtures (5.75, 4.55%), respectively. The percentage of ash in the mixture was the highest in the first mixture, followed by the third mixture and finally the second mixture was (5.31, 4.72, 4.12%), respectively. The highest percentage of fiber was in the first mixture and then the third mix and finally came the second mix, reaching 10.53, 9.25, 8.55%, respectively. Results showed that the highest percentage of carbohydrates was in the second mixture followed by the third mixture and finally came the first mixture reached (59.86, 56.6, 53.76), respectively.

Table 3: Mineral elements for baby food mixes.

Mineral elements in sample	Treatment			LSD value
	T1	T2	T3	
Calcium(ca)%	0.57	0.55	0.55	0.042 NS
Sodium%	0.32	0.31	0.36	0.057 NS
Zinc	0.14	0.12	0.13	0.059 NS
Phosphorus	0.26	0.20	0.24	0.055 *
Iron	0.37	0.34	0.35	0.048 NS
* (P<0.05).				

Table 4: Physicochemical properties of baby food mixes.

Treatment	T.S.S	pH
T1	18.40	5.80
T2	20.25	6.25
T3	17.60	5.65
LSD value	2.156 *	0.772 NS
* (P<0.05).		

Table 3, shows the ratio of some mineral elements present in the mixtures. It is noted from the results that the highest percentage of the mineral elements was for the calcium component by no significant difference between the three treatments (0.57, 0.55 and 0.55) for the first, second and third transactions, respectively. The iron component was ranked second, but with no significant difference between the first, second and third mixtures (0.37, 0.34, 0.35) respectively. Then, the sodium component was no significant between the first, second and third mixtures with (0.32, 0.31, 0.36%) respectively and it is within the Egyptian Standard No. 1159/1977. As for the phosphorus component, there were significant differences between the mixtures, with the highest percentage in the first mixture, followed by the third mixture and finally the second mixture came in (0.26, 0.24, 0.20%) respectively. The table shows the ratio of the zinc element since there were no significant differences between the first, second and third mixtures (0.14, 0.12, 0.13%) respectively and the results are almost consistent with what is stated in Syrian Standard 366/2013.

Table 4, shows significant differences between the mixtures, with the highest value of the total solids in the second mixture reaching 20.25 and the first mixture reaching 18.40 and finally the third mixture reaching 17.60. Which is less than what Al-Marhaik, (2016) found the results almost fall within the Syrian standard 366/2013. The pH values did not show any significant differences

Table 5: Mineral elements for baby food mixes.

Adjective		Treatment			LSD value
		T1	T2	T3	
Odor	20	13.40	17.11	15.45	3.082 *
Flavor	20	15.1	16.2	16.55	2.175 NS
Color	20	14.80	17.33	15.51	2.066 *
Textures	20	13.6	16.83	16.02	2.538 *
General acceptance	20	11.70	17.11	15.28	3.569 *
Total	100	68.53	84.46	78.86	8.152 *
* (P<0.05).					

between the mixtures, which were close to the equalizer of the acid or basal, in the first, second and third mixtures (5.80, 6.25 and 5.65) respectively. The slight differences in the pH values may be due to the ingredients in the mixtures.

Table 5, shows the results of the sensory evaluation of the three mixtures which include odor, flavor, color, tissue and general acceptance. The results showed significant differences between the mixtures in the odor. The second mixture obtained the highest grades followed by the third mixture and finally the first mixture. As for the flavor, there were no significant differences between the three mixtures and the results showed significant differences in the color and Textures and the highest scores for the second mixture and then the third mixture and finally the first mixture, the table shows the results of general acceptance by the residents there were significant differences between the mixtures, with the highest results for the second mixture, which contained equal proportions of lupine powder and amber rice flour, followed by the third mixture and finally the first mixture.

Conclusions

The research shows that it is possible to manufacture baby food mixtures from local sources that are available and have a high nutritional value for their ideal content of protein, nutrients and vitamins to meet the needs determined by who as well as the ease of manufacturing these mixtures n addition to the possibility of use by children who have a Celiac Disease allergy because it is free of gluten, but we must point out that these foods are complementary foods and not substitute for breast milk.

Reference

Aggarwal, A., S. Verma, M.M.A. Faridi and Dayachand (2008). "Complementary feeding reasons for inappropriateness in timing, quantity and consistency". *Indian J. Pediatr.*, **75:** 49-53.

Al-Marhaik, Fatima Abdel Salam, Omar Masoud Al-Murhaj, Faraj Al-Hadi Abu-Alish and Hadi Amhamed Qanbeij (2016). Evaluation of the chemical and sensory properties of some baby food mixtures manufactured by the laboratory. *First Scientific Conference on Food Security and Food Safety*. on 17 October 2016.

AOAC (2005). Association of Official Analytical Chemists. Official Methods of Analysis. 3rd. ed. USA.

Arif-ul Alam. Md., Md. Tanvir Sarwar, Md. Hafizur Rahman and A.Y.K. Masud Rana (2013). Formulation of low coast complementary baby food to improve the nutritional status of the malno urished children in bangladesh. *Interbational Journal of Nutrition and food sciences*., **2(4):** 200-206.

Dewey, K.G. and S. Adu-Afarwuah (2008). "Systematic review of the efficacy and effectiveness of complementary feeding interventions in developing countries". *Matern Child Nutr.*, **4(Suppl 1):** 24-85.

Dewey, K.G. and S. Adulfarwuah (2008). Systamic review of the efficacy and effectiveness of complementary feeding interventions in developing countries. *Matern Child Nutr.*, **4(Su ppl 1):** 24-85.

Egyptian Standards Authority (1977). Specification, No. 1159.

FAO/WHO (1974). Energy and protein requirements. Nutrition Meeting Rep., No.52, FAO, Rome.

Hamner, H.C., C.G. Perrine and K.S. Scanlon (2016). Usual Intake of Key Minerals among Children in the Second Year of Life, NHANES 2003-2012. *Nutrients*., **8(8):** 10.3390 /nu 808 0468.

Iqdaim, Basher Mohammed (2005). The chemical composition on of some of local soybean and the possibility of using then in manufacture of supporting cereal foods. Thesis of Master, College of Agriculture. University of Tikrit.

Lara-Rivera, A.H., M.A. Ruiz-Lopez, R. Rodriguez-Macias, C. Soto-Velasco, P.M. Garcia-López, L. Barrientos-Ramirez and J.F. Zamora-Natera (2017). Grain yield and chemical and protein composition of Lupinus angustifolius varieties grown in Mexico. FYTON ISSN 0031 9457 86: 89-96.

Oliete, B., E. Cases and R. Saurel (2017). Improvement of the Techno-Functional Properties of Pea Proteins by Microfluidization. *International Journal of Food and Biosystems Engineering.*, **4(1):** 57-68.

Plahar, W.A. and N.T. Annan (1994). "Development of balanced protein energy weaning foods based on local legumes and cereals". Report submitted to the Association of African Universities by Food Research Institute. Accra, Ghana

SAS (2012). Statistical Analysis System, User's Guide. Statistical. Version 9.1th ed. SAS. Inst. Inc. Cary. N.C. USA

Shrimpton, R., C.G. Victora, M. de Onis, R.C. Lima, M. Blossner and G. Clugston (2001). "Worldwide timing of growth faltering: implications for nutritional interventions". *Pediatrics.*, **107(5):** E75.

Stoven, S., J.A. Murray and E. Marietta (2012). Celiac disease: Advances in treatment *via* gluten modification. *Clin. Gastroenterol Hepatol.*, **10:** 859-62.

Syrian Standards and Metrology Organization (2013). Specification, No. 366.

UNICEF (2015). The State of the World's Children: Executive Summary. Available online: http://data.unicef org/ resources/the-state-of-the-worlds-children-report-2015-statistical-tables/ (accessed on 18 April 2018).

Wilson, D., H. Fsher and E. Enqua (1974). Principles of Nutrition. 3rd ed. John Wiley and Sons, Inc., New York, London, Sydney, Toronto.

World Health Organization (2003). Global strategy for infant and young child feeding. Geneva,WHO. http://www.who. int/nutrition/publications/infant fee ding/infant feeding.