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PREPARATION OF SOME SNACKS FOR SCHOOL CHILDREN

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ABSTRACT

Date syrup 'dibis' was used to prepare some snacks for school children such as cup cake and fermented milk drink. Dibis and some medical plants, as flavouring agents, were added to snacks at different percentages. Chemical composition and organoleptic evaluation were estimated for all formulas. The results indicate the nutritional value and the levels of some minerals especially iron of cake were increased. Total carbohydrate content and energy were also increased in fermented milk formulas. Whilst, the protein content in fermented milk formulas was decreased compared with the control. Organoleptic evaluation of the cake made by substituting 50 % of sugar with dibis scored higher values than the control. The cake of best flavour was induced by cinnamon bark. The results didn't show significant differences between the cakes formulas. While, the result indicated that strawberry had the best flavour then cinnamon bark for fermented milk drink formulas. The results showed highly significant difference between formulas samples and taste (p=0.05).

INDRODUCTION

Many people like to eat some kinds of food between meals which are called snacks. These meals are daily used such as chips, nuts, popcorn and crackers. About 20 % of the daily calories are obtained from these tasty foods. Nowadays, despite the fact that people may consume more than once daily from such snacks but its contents from protein, fat and carbohydrates are imbalanced (sloan,1996).

It is widely accepted that in childhood and adolescence, diet influences, not only the immediate health of children but may also have an important impact on adult health. The childhood diet must be adequate to support normal growth development and appropriate amount of minerals are required since a deficient intake of certain minerals can produce diseases and lead abnormal development (Cámara *et al.*,2005).

Most school age children and adolescent have their main meal of the day in the school lunchroom and this meal often constitutes the principal minerals contribution to the daily recommended intake (Cámara *et al.*,2005).

In many developing countries, iron deficiency is the most common nutritional deficiency and in most other countries it is the second most after protein-energy deficiency as result of malnutrition. There is a consistency in results from studies on iron deficiency and functional behaviour. Iron deficiency affect selective learning aptitude in the classroom such as concentration and the appropriate selection of information. Providing iron is supplement to school children with iron deficiency results in improvement in selective learning and school achievement tests. In areas manifesting high prevalence of iron deficiency anemia, iron deficiency is contributing to poor school learning and inefficiencies in educational systems. For educational and other reasons iron deficiency should be prevented and treated in all children (Pollitt, 1990).

Nowadays, the consumption of fruits and vegetables is regarded as important and good for health. Indeed, recent epidemiological studies have indicated that a high intake of fruits and vegetables is associated with reduced risk for a number of chronic diseases (Nicoli *et al.* ,1999).

The fruit of the date palm *(phoenix dactylifera)* is considered to be an important fruit for the population living in the Algerian Sahara. It is considered a vital component of their daily diet. This fruit has great importance from nutritional and economic point of view (Mansouri *et al.* ,2005). Experimental production of date products has been reported by a number of researches. The researchers have indicated the importance of processed date products like pickles, chutney, jam, butter, date-in-syrup, beverages, syrup, paste and a host of miscellaneous items (Al-Hooti *et al.* ,1996). Also, the date paste has been used to replace wheat flour at various levels in the manufacture of bread and cookies (Youisf and Mustafa (1993) and Mustafa *et al.* ,(1986)).

Rizk (2004) used date products such as date drinks and date pies and found that these products are highly nutritional compounds. Therefore, these prepared products would be recommended for school children, especially those of Seina who need to be supported with more food of good value.

This study is carried out to evaluate different prepared cake formulas and fermented milk which it supplemented by dibis. Such formulas were supposed to have the requirements of protein, iron and calories for children school. For this reason the present investigation is focused on the preparation some of snacks for school age children to overcome some of mineral deficiency. Hence, popular products for children school such as cake as cookies and fermented milk as drinks were prepared.

MATERIALS AND METHODS

Materials:

Fresh nature date fruits *(phoenix dactylifera)* of maturity were obtained from the local market in Giza, Egypt. Milk powder, sugar, vanillin, baking powder, corn oil, salt and fresh whole eggs were purchased from the supermarket in Giza. Wheat flour *(tricium aestivum L.)*72 % extraction rate was obtained from the South Cairo Company of Milling. Okara(residue of soy milk production) was obtained from Soy Products Factory, and fermented milk was obtained from Dairy Factory in Food and Technology Research Institute, Agricultural Research Centre, Giza, Egypt. Date residue was obtained after dibis extraction from fresh dates. The materials as flavouring agents such as Basil *(ocinnum basicilicum)*, Mint *(menthe spp.)*, Cinnamon bark *(cinnamomum zeylanicum)*, Carnation *(dianthus caryophylus)* and Strawberry *(arbutus unedo L.)* were obtained from Horticulture Research Institute, Agricultural Research Centre, Giza, Egypt.

Methods:

The dibis was prepared by according to the method described by Arafa *et al.* (2006).

I. Preparation of cake's formulas:

1. Preparation of flour mixture: The ingredients of flour mixture are shown in table (1).

Table (1): Ingredients of flour mixture (g/ 100g)

Ingredient	Control	D(flour mixture)
Wheat flour (72 % extr.)	90	69
Milk powder	10	10
Date residue		15
Okara		5
Flavour*		1

*Cinnamon bark as flavour.

The first experiment in this investigation, the sugar was replaced by dibis at various levels (25 %, 50 %, 100 %) using the flour mixture "D" and cinnamon bark as a flavour. The cakes were prepared by using the micro-method for cake backing (Raeker and Johnson,1995) as shown in table(2).

Table (2) : Ingredients of cake formulas.

Ingredient	Control	D*	Cake formula		
			1	2	3
Wheat flour mixture(g)	100	100	100	100	100
Sugar(g)	60	60		30	45
Dibis(g)			75	38	19
Corn oil(g)	50	50	50	50	50
Salt(g)	1	1	1	1	1
Baking powder(g)	5	5	5	5	5
Vanillin(g)	1	1	1	1	1
Whole egg**(g)	100	98	98	102	98
Water (g)	30	25	10	5	5
Total(g)	347	340	330	304	305

* Cake formula by flour mixture without dibis. **two whole fresh eggs.

The whole fresh eggs and vanillin (a) were well mixed and whipped. The sugar and corn oil (b) were well mixed and whipped using a blender then added to whole fresh eggs. The flour blend and water were added gradually to the mixture (a+b) [quantity of water as shown in table (2)].Then, beaten for 15-20 minutes and, the prepared cakes were placed in cup cake and backed at 180℃ for 35 minutes. The addition of dibis at 50 % level was chosen as an excellent ratio then different of flavouring agents was added in the second experiment.

II. Preparation of fermented milk drink:

In this set of experiments the fermented milk was mixed with dibis at different ratio ,(95 :5, 90 : 10, 85 : 15 and 80 : 20,v/v). The third formula was prepared with different flavours.

Methods:

Moisture, crude proteins, total lipids, crude fiber and ash were determined according to the methods described in the A.O.A.C.(2000). Total carbohydrates were obtained by difference. Total sugars were determined according to the method of James (1995). Approximate calorific value of the snacks products were calculated using the appropriate factor as described by Lawrence (1965). The minerals were determined according to the method described by A.O.A.C. (2000) using the dry ashing method for the preparation of samples. A Perkin Elmer Model 4100 ZL Atomic Absorption

Spectrophotometer was used for determination of minerals. The viscosity of fermented milk mixed with dibis and different flavours, which reflects its consistency is measured according to the method described by Mohamed and Ahmed (1981) using viscometer Model DV.III Programable-Rheometer by using 250 ml for each tested sample. The spindle was at 50 RPM and results were automatically recorded as centipoises (cp). Total soluble solids (T.S.S.) 0f fermented milk drinks was determined using Hand Refractometer (Atago Co.,Ltd. Tokyo, Japan) as described by Mohamed and Ahmed (1981). The pH value of fermented milk drinks was determined directly without dilution at 20℃ by using Orian pH meter Model 501.

Organoleptic evaluation:

I. Fresh cake samples prepared from wheat flour using different supplementary materials were assessed for their quality attributes by 10 panelists from the staff of Especially Food and Nutrition Department, Food and Technology Research Institute, Agriculture Research Centre, Giza. The quality score of the evaluated cake were given according to Soliman (1996) as follows:

Quality score of prepared cake samples

Characteristic	Maximum score
Crust colour	10
Crumb colour	20
Flavour	15
Texture	15
Taste	20
Grains	20
Overall acceptability	100

II. Prepared fermented milk samples were organoleptically evaluated for their;

1- Taste, colour, odour and overall acceptability for fermented milk mixed with different percentages of dibis.
2- Taste, colour and flavour for fermented milk + dibis (85 :15, v/ v) of different of flavours were assessed according to the method of Faridi and Rubenther (1984) by ten panelists using a numerical basis of one to ten [where 9-10 = high desirable, 7-8 = desirable, 5-6 = acceptable, 4 = fair, 2-3 = undesirable and 1 = unacceptable].

Statistical analysis:

The collected data of organoleptic evaluation for cake samples and fermented milk samples were statistically analyzed by the least significant difference [LSD] at the 0.05 % level of probability according to Snedecor and Cochran (1984).

RESULTS AND DISCUSSION

Minerals deficiency is usually caused by a low mineral content in the diet when rapid body growth is attained and/ or when there is a poor minerals absorption from the diet (Favier,1993 and Cámara *et al.*,2005). For this reason the present investigation is focused on the preparation of snacks for

school age children to overcome some of mineral deficiency. Hence, popular products for children school such as cake as cookies and fermented milk as drinks were prepared.

I.Chemical composition of cake formula:

The chemical composition of cake formulas are shown in table (3). The data indicate that the addition of soy milk okara and milk powder increased the protein and Fe contents of the "D" formula. Also, the addition of date residue increased the fiber content. However, the additional of dibis was decreased the added water during dough making and moisture content too. The results show that the formula "D" had the highest levels of proteins (12.79 %) and fats (27.49 %) compared with protein and fat contents of control, respectively. The addition of various quantities of dibis caused an increase of total carbohydrates. The rise of protein levels were about 27 %, 4.67 %, 18.57 % and 20.36 % for formulas prepared by flour mixture and supplemented by dibis. However, the energy was slightly increased. The cake formula "D" had 210 % increase when compared with control. Also, the 100 % substituting sugar by dibis syrup had 30.40 % increase compared with cake formula "D" and it had the highest level of Zn.

Table (3): Chemical composition of cake formulas (g/100 g):

Item	Control	D*	Cake formula		
			1	2	3
Moisture (g)	28.46	26.55	25.06	23.51	23.01
Proteins (g)	10.07	12.79	10.54	11.94	12.12
Fats (g)	26.15	27.49	27.21	26.43	26.15
Fiber (g)	0.34	0.51	0.51	0.48	0.45
Ash (g)	3.16	3.28	3.71	3.54	3.92
Total carbohydrates**(g)	31.62	29.40	32.97	34.10	34.35
Energy (Kcal/100g)	402	416	419	422	421
Ca (mg)	30.82	31.15	31.07	31.84	31.79
P (mg)	14.28	7.02	11.37	13.07	4.22
Fe (mg)	2.20	5.23	6.82	5.80	3.79
Zn (mg)	1.78	1.47	4.45	2.63	1.96

*** Cake formula by flour mixture without dibis.**
****Carbohydrates were calculated by difference.**

Organoleptic evaluation for cake formula:

Tables 4 & 5 showed the organoleptic evaluation for cake products. Table (4) indicates the data of the best chosen formula of prepared cake with different flavours and table (5) was shows the assessment of the cake prepared with the desirable flavour. The results indicate that cake made by substituting 50 % of sugar with dibis scored higher values compared with control regarding crumb colour, crust colour, texture, taste, flavour, grains and overall acceptability.

Quality characteristics of cake made by substituting 50 % of sugar with dibis didn't show significant differences compared with control sample. However, scores of the quality attributes of cake made by completely substituting sugar with dibis showed the lowest values but the product was still accepted by panelists as shown in table (4). These findings are in agreement with Khalil *et al.*(2002) who found that the completely substituting

sugars with dibis were accepted by panelists and quality characteristics of cake made by substituting up to 75 % of sugars with dibis didn't show significant differences compared with control sample.

Table (4) : Organoleptic evaluation for cake formulas.

Item	Crust colour	Crumb colour	Flavour	Texture	Taste	Grains	Overall acceptability
Control	9.6 ± 0.52^{a}	19.0 ± 0.82^{a}	12.2 ± 2.39^{ab}	13.8 ± 1.32^{a}	16.6 ± 2.8^{a}	18.9 ± 0.88^{a}	92.0 ± 4.81^{a}
Formula "D"*	8.3 ± 1.42^{ab}	17.0 ± 2.11^{b}	11.5 ± 2.17^{b}	13.0 ± 1.33^{a}	15.4 ± 3.37^{ab}	17.6 ± 2.01^{ab}	84.1 ± 7.7^{ab}
Cake formulas containing dibis							
1	7.7 ± 1.64^{b}	16.2 ± 2.35^{b}	12.4 ± 1.84^{ab}	12.7 ± 1.57^{a}	13.0 ± 3.43^{b}	16.7 ± 3.02^{b}	79.6 ± 10.33^{b}
2	8.2 ± 1.87^{ab}	16.9 ± 2.47^{a}	12.0 ± 3.33^{ab}	13.0 ± 1.33^{a}	16.4 ± 2.91^{a}	17.3 ± 2.03^{ab}	85.8 ± 9.25^{ab}
3	8.2 ± 1.75^{ab}	17.1 ± 2.47^{ab}	13.8 ± 1.14^{a}	13.2 ± 1.23^{a}	15.3 ± 2.79^{ab}	17.1 ± 2.03^{ab}	82.7 ± 11.77^{b}
L.S.D. $_{0.05}$	1.37	1.92	2.06	1.23	2.77	1.88	8.19

*** Cake formula by flour mixture without dibis**

Each value in a column followed by the letter are not significantly different at p=0.05.

Moreover, the results indicate that the exchange crumb colour to brown induced colour for cake formulas was induced by substituting sugars with dibis "all additional". This result might be attributed to a set of complex chemical reactions involving sugar caramelization and/or Maillard reactions. This result was in agreement with Alnji *et al.* (1988) who found the change of crumb colour to brown colour as a result of substituting sugars with dibis.

The results in table (5) show that there were no significant differences between samples for all characteristics studied. The sample mixed with cinnamon bark as flavour had high scores for flavour, texture, grains and overall acceptability. The panelists have chosen the cinnamon bark as the best flavour in cake, followed by basil and carnation.

Table (5): Organoleptic evaluation for cake formulas containing different plant flavours*.

Item	Crust colour	Crumb colour	Flavour	Texture	Taste	Grains	Overall acceptability
Control	8.5 ± 0.53^{a}	17.5 ± 1.43^{a}	12.5 ± 1.18^{ab}	12.7 ± 1.25^{b}	17.8 ± 1.14^{a}	17.8 ± 0.63^{a}	86.8 ± 3.49^{ab}
Basil	8.1 ± 0.32^{a}	17.7 ± 1.25^{a}	11.9 ± 1.79^{b}	12.8 ± 1.32^{ab}	17.1 ± 1.10^{a}	17.8 ± 0.42^{a}	85.4 ± 3.86^{b}
Mint	8.1 ± 0.88^{a}	18.3 ± 0.82^{a}	12.8 ± 2.04^{ab}	12.9 ± 1.29^{ab}	16.9 ± 1.37^{a}	17.2 ± 1.55^{a}	86.2 ± 5.41^{ab}
Cinnamon bark	8.3 ± 0.82^{a}	18.1 ± 1.52^{a}	14.0 ± 1.25^{a}	14.0 ± 1.24^{a}	17.4 ± 0.97^{a}	18.1 ± 0.99^{a}	89.9 ± 3.21^{a}
Carnation	8.3 ± 0.82^{a}	17.4 ± 1.35^{a}	12.8 ± 1.96^{ab}	13.0 ± 1.05^{ab}	17.1 ± 1.29^{a}	17.4 ± 1.35^{a}	85.6 ± 3.24^{b}
L.S.D. $_{0.05}$	0.64	1.17	1.52	1.11	1.06	0.97	3.54

Each value in a column followed by the letter are not significantly different at p=0.05.

***Cake formula with 50 % dibis.**

II. Fermented milk supplemented by dibis:

Many people prefer drink fermented milk with their meals and many children like the fermented milk with some fruits such banana or strawberry because they believe that fermented milk is digestible and comfortable. So, the present study was conducted using fermented milk mixed with of dibis at 15 % level. As mentioned before, dibis was added at different percentages to choose the best percentage. All percentages were accepted, but the

panelists were chosen the 15 % of dibis : 85 % of fermented milk as the preferred drink.

Table (6) shows that the chemical composition for fermented milk plus dibis with different flavours. The results indicate that addition of dibis (15 %) increased the total carbohydrates and energy. The increasing of total carbohydrates and energy were 107.16 % to 109.93 % and 43.86 % to 51.76 % , respectively. The decreased amounts of proteins and calcium were 31.98 % to 39.07 % and 17.62 % to 35.35 % , respectively.

Table (6): Chemical composition of fermented milk (g/100 g).

Item	Control	Milk+25 % dibis	Fermented milk (85 %) + dibis (15 %) + flavour (0.3 %)				
			Basil	Carnation	Mint	Strawberry	Cinnamon bark
Moisture (g)	84.6	86.6	84.00	83.88	83.33	82.99	82.29
Proteins (g)	4.94	4.34	3.17	3.33	3.04	3.01	3.36
Fats (g)	0.99	0.88	1.17	0.83	0.90	0.75	0.83
Fiber (g)	–	0.001	0.03	0.03	0.03	0.01	0.07
Ash (g)	0.81	0.88	0.88	0.88	0.87	0.86	0.87
Total carbohydrates (g)	8.66	17.94	18.10	18.15	18.07	17.96	18.18
Energy (Kcal/100g)	63	92	96	93	93	92	94
Ca (mg)	48.69	34.20	31.75	40.11	31.48	33.24	39.19
P (mg)	2.47	2.47	2.47	2.37	2.32	2.29	2.43
Fe (mg)	0.43	0.46	0.47	0.46	0.55	0.57	0.45
Zn (mg)	0.79	0.69	0.72	0.72	0.73	0.71	0.76

The data in table (7) show some of the physicochemical properties of fermented milk plus dibis such as pH value, viscosity, total sugars, total soluble solids and purity. The viscosity ranged between 185.8 to 305.1 for fermented milk with dibis plus (0.3 %) different flavours.

The pH values were slightly different between the drink samples. The results of the purity were in the range 1.81 5% to 22.91 % only for fermented milk samples.

Table(7): Physicochemical properties of different samples of fermented milk.

Item	pH value	Viscosity 20℃ (cp)	Total sugars	T.S.S.*	Purity**
Control	4.52	282.9	0.85	4.70	18.09
15% dibis +85%fermented milk	4.67	250.2	2.48	19.1	12.98
Samples with flavours: a. Basil	4.68	268.8	0.77	19.3	3.99
b. Carnation	4.67	256.6	1.80	14.8	12.16
c. Mint	4.69	248.1	0.17	19.0	0.89
d. Strawberry	4.61	185.8	0.26	14.4	1.81
e. Cinnamon bark	4.65	305.1	4.10	17.9	22.91

***Total soluble solids.**

****Purity= calculated as [total sugars/T.S.S.] x 10**

Organoleptic evaluation for fermented milk samples:

Data in tables (8 & 9) revealed the organoleptic evaluation for fermented milk samples. In this set of experiments dibis was added at different percentages to disclose the best taste. The results in table (8) show that the

best dibis addition was 15 %. It is worth noting that there were no significant differences for colour, odour and overall acceptability of all fermented milk samples. While, there was a high significant difference (p = 0.05) between samples for taste.

Table (9) shows the organoleptic evaluation for [dibis(15 %) : fermented milk (85 %)] mixed with some different flavours. The results indicate that there was a high significant difference (p = 0.05) for taste score of different samples of fermented milk. The drink with strawberry as flavour had a high score then cinnamon bark for taste, color and flavours. While, basil as a flavour had the lowest score.

Table (8): Organoleptic evaluation for fermented milk mixed different percentages of dibis

Item	Taste	Colour	Odour	Overall acceptability
Control (fermented milk)	9.5 ± 0.71^{a}	7.9 ± 0.99^{a}	8.6 ± 0.97^{a}	8.3 ± 1.06^{a}
Fermented milk + dibis (95 : 5)	7.4 ± 1.43^{b}	7.4 ± 1.08^{a}	7.5 ± 1.65^{ab}	7.4 ± 1.58^{a}
Fermented milk + dibis (90 : 10)	7.5 ± 1.08^{b}	7.2 ± 0.79^{a}	7.5 ± 1.51^{ab}	7.2 ± 1.32^{a}
Fermented milk + dibis (85 :1 5)	8.5 ± 085^{ab}	8.2 ± 1.03^{a}	7.6 ± 1.65^{ab}	7.7 ± 1.49^{a}
Fermented milk + dibis (80 : 20)	7.2 ± 2.15^{b}	7.2 ± 1.93^{a}	6.9 ± 1.52^{b}	6.9 ± 1.79^{a}
$L.S.D._{0.05}$	1.21	1.11	1.33	1.32

The values in a column followed by the same letter are not significantly different at p = 0.o5

Table (9): Organoleptic evaluation for fermented milk mixed with different flavouring agents[1].

Item	Taste	Colour	Flavour
Control[2]	8.1 ± 0.99^{a}	8.5 ± 0.97^{a}	8.3 ± 1.16^{a}
Basil	7.1 ± 1.37^{ab}	7.1 ± 1.1^{b}	7.5 ± 1.08^{a}
Carnation	6.2 ± 1.23^{b}	7.8 ± 1.23^{ab}	7.6 ± 1.27a
Mint	7.3 ± 1.77^{ab}	7.3 ± 1.16^{ab}	7.7 ± 1.7^{a}
Strawberry	8.4 ± 1.43^{a}	7.9 1.37[ab]	8.2 ± 1.03^{a}
Cinnamon bark	7.9 ± 1.52^{a}	7.9 ± 0.99^{ab}	8.1 ± 1.52^{a}
$L.S.D._{0.05}$	1.26	1.03	1.18

The values in a column followed by the same letter are not significantly different at p = 0.o5

1 (0.3 %) as flavour.

2 15 % dibis : 85 % fermented milk.

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تجهيز بعض الوجبات الخفيفة لأطفال المدارس

امانى عبد الفتاح سالم – سحر احمد عرفة – يحيى صابر العطوى
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تم استخدام عسل البلح (الدبس) فى عمل بعض الوجبات الخفيفة لأطفال المدارس مثل الكيك ، اللبن الرايب (مشروب) · اضيف الدبس بنسب مختلفة لأختيار أفضل النسب و ادخال بعض النكهات لهذة العينة المختارة باستخدام بعض النباتات الطبية · أجرى التحليل الكيميائى لهذة الخلطات و الاختبارات الحسية ·دلت النتائج على ارتفاع القيمة الحيوية للكيك (البروتين و بعض الأملاح المعدنية و بالأخص الحديد) · كما ارتفعت كمية الكربوهيدرات الكلية و الطاقة فى خلطات مشروب اللبن الرايب · و لكنه حدث نقص فى كمية البروتين الموجود باللبن الرايب بالمقارنة بالعينة الحاكمة · و من قيم الاختبارات الحسية للكيك تم اختيار العينة (التى استبدل ٥٠ % من السكر بعسل البلح) كافضل عينة كيك · و تبين أن أفضل نكهة كانت لنبات القرفة ، كما لم توجد أى فروق معنوية بين خلطات الكيك تحت الدراسة · بالنسبة للبن الرايب كانت أفضل نسبة هى اضافة ١٥ % من عسل البلح ، أفضل نكهة كانت للفراولة ثم للقرفة ، كما وجدت فروق معنوية فى الطعم على درجة احتمالية(٠,٠٥ %) ·