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PREPARATION OF INSTANT DRIED RICE/MILK BLENDS FOR QUICK USE (ORZ BELLABAN)

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ABSTRACT

Four blends of rice/milk meals "Orz bellaban" were prepared by mixing the instant dried whole milk with non-cooked and pre-cooked white rice (in forms of coarse and fine grits; also broken rice; by-product of rice milling) was used. So, milk, rice and sucrose were mixed at ratios of 29.50, 33.00 and 37.00% based on dried weight respectively, also 0.50% vanilla was added.

The chemical composition of the prepared blends for proteins, fats, crud fibers, minerals and total carbohydrates was evaluated; tabulated data revealed that these components had the ratios of 9.45, 7.34, 0.10, 1.84, and 74.70% for the first blend and 9.38, 7.56, 0.09, 1.76 and 74.92% for the second blend. These values were 9.36, 7.48, 0.10, 1.88 and 74.50% for the third blend and 9.37, 7.46, 0.08, 1.85 and 74.82% for the control. Riboflavin contents achieved 0.63, 0.65, 0.60 and 0.42 mg/100 gm of the three blends and the control respectively. The preparing time of these blends for service as an important parameter was decreased from 30 min. for the control to 10 min. for the first treatment; 7 min. for the second one and 15 min. for the third treatment.

INTRODUCTION

Rice and its products had been considered a chief and staple crop from ancient times till now. It is a universal and favorable food item especially in the Middle East and developing countries. By virtue of its nutritional quality; many studies have been achieved on its chemical and physiochemical composition Fujino (1977); Sato *et al.* (1977); Hagelid *et al.* (1991) and El-Aidy *et al.* (2000). The first indicated that lipids in white rice are low and the principal fatty acids are linoleic, oleic and palmitic acids and both proteins and lipids are affected by polishing.

The current work has been outlined to formulate an instant dried cooked rice/milk blends as ready quick meals. The composite formulas could be served as a meal for the pre-school children and as a favorable dessert for adults due to it contains a large quantity of both macro and minor nutrients of proteins, lipids, ash and carbohydrates. Such prepared meals could be considered also as interest source of energy for the consumers Hagelid *et al.*, (1991) and Bon and Gauthier (1994). Rice has also its health benefit of those who are suffering from wheat allergy that rice does not contain gluten Emam *et al.* (1999). Also, milk is another important item in human nutrition having a great health benefit for human body especially as main source of calcium which affect the skeletal growth of human body and was particularly beneficial to pubescent girls (average age 8 years) with lower spontaneous calcium intake (Dairy Industries International, 1998). On the other hand, milk and dairy products consumption improves dental health and the stability of appetite which are considered a good source for the decalcification process,

and has strong anti-cariogenic effects (Konig, 1997). On contrary to popular opinion that consumption of milk fat and confectionery fats cause risks to health. Gurr, (1996) proved that these fats may have protective effects on gastric mucosa, teeth health; and the effects on heart disease depend on the effects of processing. Many biological studies suggested that milk proteins, especially whey proteins, have anti carcinogenic properties Parodi (1998).

The recent trends of feeding trials were conducted on developing the infant foods based on rice and milk. These trials indicated that products containing 20-40% rice and 60-80% cows' milk had PER near to that of cows' milk. Moreover, the cost of rice/milk products was substantially lower than that of cows' milk without rice Lam-Sanchez *et al.*, (1993). However, supplementation of infant food formulas with rice enhance the blends with lysin; where rice contains a considerable amount of this essential amino acid (14.90 M/100 gm of amino acid), Ann-Charlotte (1993).

This work aimed to prepare an instant dried rice/milk blends as quick meals for use by many categories of consumers such as children, adults, hospitals, hotels, ... etc. The study also extended to evaluate the main components of prepared meal from these blends compared to the control. The participation of such meals in covering a part of the daily requirements of the macro nutrients (Proteins, fats, minerals and vitamin B_2 for adults and pre-school children was concerned. The time of preparing such meals for service was also determined.

Therefore, the current study included the formulation of some pre-cooked dehydrated rice/milk meals suitable for quick use with evaluation its chemical composition.

MATERIALS AND METHODS

Materials :

White rice (Sakha 101), full cream instant milk powder (Nido, Nestlé), sugar and vanilla were obtained from the local market.

Methods :

1. Preparing the rice/milk formulas :

The rice was washed three times with tap water and full cooked with suitable amount of water (rice: water; 1:1.5 v/v) in an open pan for 20-25 min. according to Brenda *et al.*, (2000) with little modification since he used steam pressure pan in cooking process. The cooked rice was then spread in thin-layer on a clean aluminum trays covering with a white clean cheese cloth and sun-dried at 35-37°C for 12-15 hr) according to the method of Wongwises and Thongprasert (1990) and Hary W. Von Loesecke (2001). A part of dry cooked rice was then grinded in a blender at the first case for 15 sec. and the other part was grinded for 45 sec. to obtain coarse and fine rice grits. Also, the raw broken rice obtained from the broken rice (a by-product of rice milling) was cleaned, washed three times with tap water, then dried in a hot air oven at 60°C for 6-8 hrs. and used for preparing the rice/milk blend (3) as shown in Table (1). All ingredients were blended together at ratios as indicated in Table (1).

Table (1): Formulations of the rice/milk blends.

Formulas	Ingredients per gm/100 gm			
	Rice	Dried milk	Sugar	Vanilla
Blend (1): Coarse pre-cooked rice grits	33.00	29.50	37.00	0.50
Blend (2): Fine pre-cooked rice grits	33.00	29.50	37.00	0.50
Blend (3): Broken rice (by-product of rice milling)	33.00	29.50	37.00	0.50
Blend (4): (Control) whole milled rice/milk blend	33.00	29.50	37.00	0.50

2. Cooking test:

A suitable amount of water (200 ml) was put in an open pan and heated for boiling point, then the amount of formed mix (100gm) was added to the boiling water with continuous stirring for the proper time to obtain the final cooking point with maximum sensory quality. The control mix was prepared according to the method of Abd Ellateif (1985).

3. Sensory evaluation:

The four blends were prepared for service and judged by ten panelists including children and adult consumers for flavour, colour, body and texture, mouthfeeling and over all acceptability according to El-Gammal (2001) with modification with the scale of scores for the examined parameters.

4. Chemical analyses:

Total proteins, fats, crude fibers, ash and moisture contents of raw materials (rice, milk and sugar as well as the prepared cooked blends were determined according to James (1995). Also total carbohydrates was calculated by difference, while energy was calculated as Kcal/100 gm of the prepared meals according to Swaminathan (1993). Riboflavin content was determined according to AOAC, (1995), these estimates were performed based on the dry weight.

RESULTS AND DISCUSSION

A. The chemical composition of main ingredients used in Preparing cooked rice/milk blends :

Table (2) illustrates the chemical composition of the whole instant milk powder (Nido; Nestlé) obtained from the local market. Obtained data revealed that all the analysed parameters almost agreed with the standard chemical composition of the used whole instant milk powder registered on the label of the Nido; Nestlé produced during 2001 (Nestlé company, Ernest Vanston and Bristow (1960), Mohamed *et al.*, 1985 and Harry W. Von Loesecke (2001). The average values of proteins, fats, fibers, total carbohydrates, ash and moisture achieved 25.20, 27.60, 0.00, 38.50, 5.90 and 2.80%, respectively. The same table showed that the same estimates for rice gave 7.06, 0.22, 0.29, 79.55, 0.48 and 12.40% and these values had an agreement with the work of Kent (1975), Ann Charlotte (1993) and El-Aidy *et al.*, (2000). On the other hand, the chemical analyses of the used sugar (sucrose) gave 98.20% of total carbohydrates, 1.80% moisture and traces of ash, while the other estimates had the zero values. These analysed ingredients were the main materials used in our study to prepare the rice/milk blends.

Table (2): The chemical composition of the whole Dried Milk, Rice and Sucrose.

Ingredients	Components (gm/100 gm) of dry matter						Riboflavin (mg)
	Proteins	Fat	Fibers	Total carbohydrates	Ash	Moisture	
Milk	25.20	27.60	0.00	38.50	5.90	2.80	1.37
Rice	7.06	0.22	0.29	79.55	0.48	12.40	0.23
Sucrose	0.00	0.00	0.00	98.20	Traces	1.80	0.00

B. Preparation of dehydrated cooked rice/milk blends and chemical evaluation of prepared blends:

1. Preparation of cooked blends :

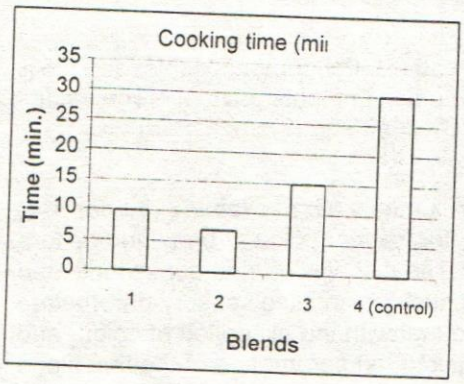
Four blends were prepared as shown in Table (1). These blends were subjected to cooking test under controlled conditions. The cooking test was carried out as follow: 100 gm of each dried blend were added to 200 ml boiling water and the mixture was heated to achieve full cooking with continuous stirring. From Table (3), data indicated that blend (1) composed of 100 gm dried mix and 200 ml tap water needed 10 min. for full cooking at boiling temperature. While blend (2) needed 7 min. to achieve full cooking under the same conditions and blend (3) and (4) needed 15 and 30 min. respectively. From such data, it is clear that blend (2) containing fine pre-cooked rice grits was cooked in a very short time (7 min) compared to the control (30 min.) followed by blend (1) (10 min.) and blend (3) (15 min.). So, the use of pre-cooked fine, coarse, and broken rice in preparing this meal minimized the time of cooking to less than ¼ - ½ time needed for cooking the control sample.

Table (3): Evaluating cooking time and final yield of Rice/Milk, Mixes (*Orz bellaban*).

Blends	Cooking time (min.)	Yield (gm)
1	10	280
2	7	290
3	15	275
4 (control)	30	250

Also, table (3) demonstrates the final yield of cooked blends (*Orz bellaban*). Obtained data showed that blend (2) possessed the highest yield of all blends (290 gm), followed by blend (1); 280 gm and blind (3) 275 gm, while the control gave the lowest yield (250 gm). The high yield of cooking treatment No. (2) was due to the short time used and little loss of moisture during cooking process.

Figure (1) a and b illustrate the relationship between the time needed for cooking the prepared rice/milk meals and the yielded amounts of the four prepared blends using the same amount of water (200 ml).



a

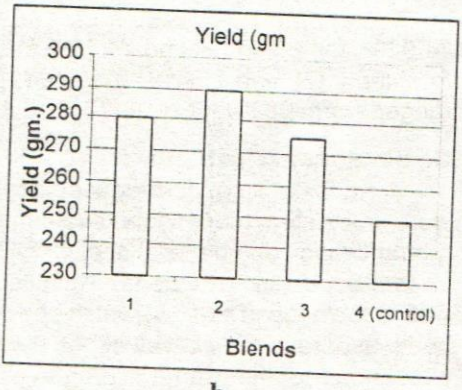


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Fig (1): a - The time needed for cooking the prepared rice/milk meals.
b - Yielded amounts of the prepared rice/milk meals.

2. Chemical evaluation of prepared cooked meals (*Orz bellaban*):

For caring out the chemical evaluation of cooked prepared blends, dried samples of each produce was subjected for chemical analysis of proteins, Total carbohydrates, fats, ash, fibers, moisture and v.B_2 (riboflavin) were concerned. Also, total energy of 100 gm consumed (on dry basis) was calculated. The obtained data of such determinations are cited in Table (4) which illustrates that the protein contents of 100 gm of dried cooked prepared rice/milk (*Orz bellaban*) were nearly at the same level. Concerning riboflavin (v.B_2) content, there was a relationship between the cooking time and riboflavin contents since the v.B_2 content was slightly decreased with increasing the cooking time. For example, v.B_2 content was 0.65 mg/100 gm of dried *Orz bellaban*, while the same titer of the control was 0.42 mg/100 gm.

Table (4): The chemical evaluation of cooked prepared rice/milk blends (*Orz bellaban*).

Prepared blends	% Gross chemical composition						Riboflavin mg/100 gm	Energy Kcal
	T. protein	T. carbo-hydrates	Fat	Ash	Fibers	Moisture content		
Blend (1) Pre-cooked coarse rice grits	9.45	74.70	7.34	1.84	0.10	6.57	0.63	402.66
Blend (2) Pre-cooked fine rice grits	9.38	74.92	7.56	1.76	0.09	6.29	0.65	405.24
Blend (3) Broken rice (by product of rice milling)	9.36	74.50	7.48	1.88	0.10	6.68	0.60	402.76
Blend (4) (Control) Whole rice/milk blend.	9.37	74.82	7.46	1.85	0.08	6.40	0.42	403.95

The other tabulated parameters had irregular behavior since the maximum and minimum average values of protein contents were 9.45% for the blend (1) and 9.36% for blend (3), Total carbohydrates ranged from

74.92% for blend (2) and 74.50% for blend (3). Fat contents achieved 7.56% for blend (2) and 7.34% for blend (1) and ash contents gave average values ranged from 1.88% for blend (3) and 1.76% for blend (2).

C. Sensory evaluation :

After cooking the produced rice/milk meals (*Orz bellaban*); (blends 1-4) were subjected to sensory evaluation for flavor, colour, body and texture mouthfeeling and general acceptability. The test was carried out as indicated in (materials and methods). Results of such destructive sensory parameters was shown by Table (5) which showed that with the exception of colour and body and texture, all values of the illustrated parameters of the first blend were near to the same average values of the control blend. For flavour, the blend (1) achieved the same sensory evaluation of prepared and cooked Rice/Milk Blends (*Orz bellaban*). (8.70 degrees) of the control meal and the blend (2) gave 8.00 degrees, while the blend (3) possessed the lowest score of all blends for this parameter (6.00). The values of colour, body and texture mouthfeeling and final acceptability for blend (1) were nearer to the control; these values were 7.40, 7.90, 7.80 and 8.00 for the blend (1) and 8.80, 8.4, 8.00 and 8.50 for the control. The total score was also correlated significantly with the control (39.80 and 42.00 degrees respectively.

The first blend was more preferable to adults while the second blend scored higher acceptability when judged by children. This result had an agreement with the results of Elaine *et al.* (1997) and Brenda *et al.* (2000) who found that the flavour and texture of the cooked rice affected by milling degree, drying condition, final moisture content and cooking method. On the other hand, the third blend had an irregular behavior and was more sensitive for colour, mouthfeel and acceptability.

Table (5): Sensory evaluation of the final prepared Rice/Milk blend.

Treatments	Central value and dispersion	Flavor 10	Colour 10	Body & texture 10	Mouth-feeling 10	General acceptability 10	Total score 50
(Control)	Maximum	9.50	9.50	9.00	10.00	9.50	47.50
	Minimum	8.00	7.50	7.50	7.00	7.50	37.00
Whole rice/milk	Average	8.70	8.80	8.40	8.00	8.50	42.00
blend.	SD	0.57	0.83	0.65	1.27	0.79	-
Blend (1)	Maximum	9.50	8.50	9.50	9.00	9.00	45.50
Pre-cooked	Minimum	7.50	6.50	6.50	6.50	6.50	33.50
Coarse rice	Average	8.70	7.40	7.90	7.80	8.00	39.80
grits	SD	0.90	0.74	1.14	0.97	1.00	-
	P value	--	0.002	--	--	0.034	--
Blend (2)	Maximum	9.00	8.50	9.00	8.50	7.50	39.50
Pre-cooked	Minimum	6.50	5.50	6.00	4.50	4.00	23.50
Fine rice	Average	8.00	7.20	7.50	6.10	5.90	31.70
grits	SD	1.00	1.20	1.11	1.56	1.55	-
	P value	--	0.083	0.001	0.005	0.027	--
Blend (3)	Maximum	7.50	7.00	9.00	5.00	6.50	35.00
Broken rice (by	Minimum	4.50	3.00	6.00	3.50	4.00	21.00
product of rice	Average	6.00	5.10	7.70	4.40	5.30	28.50
milling)	SD	1.27	1.51	1.20	065	1.03	-
	P value	0.007	0.019	---	0.011	0.003	---

* $0.05 \geq P \geq 0.01$ ** $P \leq 0.01$ NS $P > 0.05$

It had a weaker and a softer body compared to the first and the control blends; moreover, it achieved the lowest scored for flavour, colour, mouth feeling, general acceptability and total score (6.00, 5.10, 4.1, 5.30 and 28.50 degrees) respectively. These results had an agreement with Arai and Watnabe (1994). Finally, the result and data of Table (5) illustrated that blend (1) possessed the highest total score compared to the control.

D. The nutritional evaluation of produced *Orz. bellaban* meals from the view point of daily requirements for consumers:

Table (6) shows the contribution of 100 gm consumed dried meals to the daily requirements for pre-school children and adults of proteins, fat, riboflavin (mg) and energy (Kcal). Obtained data in this table revealed that consumption of 100 gm. of the previously mentioned dried meals covered nearly 31.30, 37.30, 52.27 and 28.17% as average values of the daily requirements of proteins, fats, riboflavin and energy, respectively for pre-school children. These average values of contributions for adult males achieved 16.77, 49.73, 35.94 and 14.93% of the daily requirements, respectively of the same parameters. Finally, the same average values of this previously mentioned parameters contributed with 20.41, 49.73, 47.92 and 20.15% respectively of the daily requirements for adult females.

CONCLUSION

Finally, it could be concluded that the prepared pre-cooked dehydrated *Orz bellaban* (fast meal) save about 60-70% of the time needed for preparing *Orz bellaban* meal by the common home method. The pre-cooked dehydrated product needs about 7-10 min. for reaching full cooking, while the control product needed about 30 min for cooking under the same conditions. Also, the chemical, sensory and nutritional evaluation of the produced blends indicated a high quality and acceptability. Therefore, the authors suggested the production of such quick meals on industrial scale for serving in hospitals, hotels, public collections (workers in factories, students in university cities and also for solders in every where.

Table (6): Contribution of 100 gm Consumed Dried Meals to the Daily Requirements for Pre-School Children and Adults.

Treatments	Items				Contribution to daily requirements**											
					Children pre-school (4-6) years				Adults							
									Males (23-50 years)				Females (23-50 years)			
	Proteins %	Fats %	Riboflavin mg	Energy (Kcal)	Contrib. of proteins	Contrib. of fats*	Contrib. of v.B_2	Contrib. of energy	Contrib. of proteins	Contrib. of fats*	Contrib. of v.B_2	Contrib. of energy	Contrib. of proteins	Contrib. of fats*	Contrib. of v.B_2	Contrib. of energy
					30gm	20gm	1.1mg	1430 Kcal.	56gm	15gm	1.6mg	2700 Kcal.	46gm	15gm	1.2mg	2000 Kcal.
Blend (1) Pre-cooked Coarse rice grits	9.45	7.34	0.63	402.66	31.5	36.70	57.27	28.16	16.88	48.93	39.37	14.91	20.54	48.93	52.50	20.13
Blend (2) Pre-cooked fine rice grits	9.38	7.56	065	402.72	31.27	37.80	59.09	28.16	16.75	50.40	40.63	14.92	20.39	50.40	54.17	20.14
Blend (3) Broken rice (by product of rice milling)	9.36	7.48	0.60	402.76	31.20	37.40	54.55	28.17	16.71	49.87	37.50	14.92	20.35	49.87	50.00	20.14
Blend (4) control Whole rice/milk blend.	9.37	7.46	0.42	403.90	31.23	37.30	38.18	28.20	16.73	49.73	26.25	14.96	20.37	49.73	35.00	20.20

* Recommended Dietary Allowances for Indians Swaminathan (1993).

** Food and Nutrition Board (1974).

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إعداد مخاليط أرز بلبن مجففة للإستخدام السريع

أم السعد اسماعيل الجمال

كلية الإقتصاد المنزلى – جامعة الأزهر – طنطا

استهدف هذا البحث تجهيز مخاليط أرز بلبن مجففة سريعة الذوبان كوجبات سريعة للإستخدام لفئات مختلفة من المستهلكين كالأطفال والكبار ومرضى المستشفيات ونزلاء الفنادق .. الخ. أمتدت الدراسة أيضاً لتقييم المكونات الرئيسية للوجبة المعدة من هذه المخاليط بالمقارنة بالكنترول، وكذلك المساهمة الجزئية لمثل هذه الوجبات لتغطية جزء من الإحتياجات اليومية من المغذيات الكبرى (البروتينات – الدهون – الطاقة، فيتامين B_2) لكل من الشباب والأطفال قبل سن المدرسة قد أخذت أيضاً فى الإعتبار كما تم أيضاً تحديد الوقت اللازم لتجهيز مثل هذه الوجبات للتقديم.

تم تحضير المخاليط بخلط اللبن المجفف كامل الدسم سريع الذوبان مع الأرز الأبيض سابق الطهى والتجفيف فى صورة حبيبات خشنة أو ناعمة الجرش وكذلك الكسر المتخلف من عملية تبييض الأرز، وبذلك فقد تم خلط اللبن والأرز وسكر السكروز بالنسب الأتية: ٢٩,٥، ٣٣,٠٠، ٣٧,٠٠% على أساس الوزن الجاف على الترتيب، كما أضيف أيضاً ٠,٥% فانيليا الى المخلوط كمادة مكسبة للطعم.

تم تقييم التركيب الكيماوى للمخاليط المجهزة بالنسبة للبروتين والدهون والألياف الخام والمعادن والكربوهيدرات. وقد أظهرت البيانات المجدولة أن هذه المكونات حققت النسب الأتية: ٩,٤٥، ٧,٣٤، ٠,١٠، ١,٨٤، ٧٤,٧% للمخلوط للمخلوط الأول، ٩,٣٨، ٧,٥٦، ٠,٠٩، ١,٧٦، ٧٤,٩٢% للمخلوط الثانى، وكانت هذه القيم ٩,٣٦، ٧,٤٨، ٠,١٠، ١,٨٨، ٧٤,٥% بالنسبة للمخلوط الثالث. أما الكنترول فقد حقق القيم الأتية ٩,٣٧، ٧,٤٦، ٠,٠٨، ١,٨٥، ٧٤,٨٢%. هذا وقد سجلت محتويات الريبوفلافين ٠,٦٣، ٠,٦٥، ٠,٦٠، ٠,٤٢مجم لكل من المخاليط الثلاثة والكنترول على الترتيب.

ومن ناحية أخرى، تناقص الوقت الذى استغرقه تحضير هذه المخاليط للتقديم كمتغير هام من ٣٠ق للكنترول الى ١٠ق للمعاملة الأولى، ٧ق للثانية، ١٥ق للمعاملة الثالثة.