INGREDIENTS AND CHEMICAL COMPOSITION OF BISCUITS AVAILABLE IN PESHAWAR AND MARDAN DIVISIONS

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ABSTRACT

Data for ingredient formulation and ingredient composition of nineteen types of biscuits, available at 106 randomly selected bakers' shops of Peshawar and Mardan divisions, was collected. Samples of these biscuits, collected from 10% of the 106 randomly selected bakers shops, were analyzed for chemical composition. The caloric values of these biscuits were determined by multiplying the protein, carbohydrate and fat contents of these biscuits with 4, 4 and 9. The major raw ingredients used for preparation of biscuits were flour, water, sugar, egg, milk and milk products. The minor ingredients, which usually gave name to the biscuit type, were vanilla, peanut, almond, ginger, cinnamon, jam, chocolate The average ingredients composition of biscuits was 44% flour, 23% sugar, 3% milk, 11% fat and 4% egg. The minor ingredients, used for taste and quality development of biscuits were added in trace amounts. The average chemical composition of biscuits was 5.58% protein 28.05% fat, 0.47% ash, 1.46 fiber % and 57.27% carbohydrates. The average energy content of biscuits was 518 Kcal/100g. In general, the biscuits analyzed were low in protein, high in fat and energy. Obese individuals are advised to use biscuits with care because it will enhance their obesity. It is a good supplementary food for energy malnourished children and adults.

INTRODUCTION

Biscuits are important ready to eat food products. Biscuits are mainly used as supplementary food items for growing children. The adults use them as snacks between meals. Biscuits are also used as refreshment item in meetings and for guests' entertainment. Matz, (1985) and Kardar (1993) have reported that the major raw ingredients used for the preparation of biscuits are flour, fat, oil, sugar eggs, milk and milk products. Hanneman (1980) has reported that food colors, nuts and spices are added to biscuits as minor ingredients. These authors have not reported the ingredient composition of biscuits. Some researchers (Hussain, 1985; Aurangzeb et al. 1989; Goplan et al. 1981) have reported the chemical composition of some selected biscuits in particular areas.

There is a need to investigate the formula, chemical composition and energy content of all biscuits available in the bakery and confectionery shops of Peshawar and Mardan divisions. Formulation, chemical composition and caloric values of biscuits are important for businessmen in the field of bakery and confectionery for the purpose of their business and for consumers, nutritionists and dieticians

for the purpose of health. This study reports the formulation, chemical composition and caloric values of biscuits available in Peshawar and Mardan divisions (NWFP).

MATERIAL AND METHODS

Location and Sample Selection for the Study

The study was conducted in the Districts of Peshawar, Charsadda, Nowshera (Peshawar Division), Mardan and Swabi (Mardan Division). Three cities/towns were selected in each district. Because bakers and confectioners are mainly located in cities/towns, so the capital city/town and two other cities/towns from each district were selected in a way that the selected sample covered the geographical locations and ethnic differences. The list of bakers and confectioners in each selected city/town was prepared. Thirty three percent (33%) shops from each district/town were selected for the purpose of survey. In total there were 307 bakery and confectionery shops in the area of the study and 106 were selected for the study. Information about ingredients, and ingredient composition were collected from the cook men of the bakery and confectionery shops. The weight of ten biscuits of each type in each selected shop was determined using a digital balance.

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Compilation of Data

For the purpose of simplicity, uniformity and easy comparison, the flour used in biscuit preparation was fixed and the remaining ingredients were calculated in the ratio from the information provided by cook men of bakery and confectionery shops. The data was coded as 1-24 for the two divisions, 5 districts and 17 cities/towns and fed to the computer for calculation of mean weight of ingredients and weight per piece of biscuits.

Chemical Analysis and Calculation of Caloric Values

For chemical analysis of biscuits, 10% of the selected bakers and confectioners were randomly selected. Samples of nineteen types of biscuits were collected from the selected bakers and were taken to the Food Laboratory of Nuclear Institute for Food and Agriculture (NIFA), Tarnab, Peshawar. The methods of Association of Analytical Chemists (AOAC, 1984) were used for chemical composition. The caloric values of biscuits were calculated by multiplying the carbohydrate, protein and fat contents of biscuits by factors 4, 4 and 9, receptively.

RESULTS AND DISCUSSION

Ingredients Composition

The major ingredients for biscuits were flour, water, sugar, fat/oil and milk. Flour, sugar, fat/oil and milk are mainly responsible for the nutritional and caloric values of biscuits. Milk improves the protein and mineral contents of biscuits. Egg, a minor ingredient in biscuits, is mainly added for the rheological properties of biscuits. The minor ingredients, which usually give the name to the biscuits, were vanilla, peanut, almond, ginger, cinnamon (*darchini*), jam, chocolate and *zeera*. These ingredients were added for development of particular taste of biscuits. The minor ingredients have no appreciable contribution to the nutritional quality of biscuits. The major ingredients of a special type of biscuits called Biscuit Marring were milk, egg and sugar. Flour was not used in this type of biscuit.

It should be pointed out that only one of the minor ingredients was added to the general ingredients of biscuits. The biscuits then carried the name after that minor ingredient e.g., Almond biscuits, Zeera biscuit etc. However, naming of biscuits could vary. For example, the name 'Kajoor biscuit' did not mean that it had Kajoor (dry dates) in its formulation as a minor ingredient rather it meant that its shape was like kajoor. Matz (1972), Hanneman (1980), Kardar (1993) and Ashraf (1992) have reported that flour, sugar, fat/oil, milk or milk products, eggs, baking powder and flavoring agents are used in the preparation of biscuits.

Weight and Ingredients Composition of Biscuits

Nineteen types of biscuits were available on bakery and confectionery shops of Peshawar and Mardan divisions (NWFP). The weight and ingredient composition of these types is given in Table I. The weight per piece of various types of biscuits ranged from 8.4 g for marring biscuit to 69.7 g for Doughnuts biscuit. The average weight per piece for all types of biscuits was 18.6 g. The ingredient formulation for biscuits ranged from 38% flour for Egg biscuit to 55 % flour for *Zeera* biscuits. The sugar content ranged from 8% in *Kajoor* biscuits to 63 % in marring biscuits. The milk content ranged from 0.3% in *Ringo* biscuit to 8 % in *Jamwala* biscuits. The fat content ranged from 6% in *Kajoor* biscuits to 20 % in *Zeera* biscuits. On the average, the ingredient composition of biscuits was 44 % flour, 23 % sugar, 3 % milk, 11 % fat/oil and 4 % eggs. The amounts of vanilla, common salt, peanut, almond, ginger, cinnamon, almond, jam, chocolate, coconut and *Zeera* were 0.8, 3, 5, 4, 2, 1, 5, 7, 7, 8 and 6 percent, respectively. This study took the lead to report the names of biscuits, weight per piece of biscuit and ingredient formulation. The available literature is silent about such information. The knowledge of ingredient formulation is important for designing new nutritious recipes of biscuits.

Table I   *Weight and ingredients composition of biscuits**

Name of Biscuit	Weight of Biscuits (g)	Major Ingredients				Minor Ingredients	
		Flour (%)	Sugar (%)	Milk (%)	Fats (%)	Egg (%)	Others (%)
Sada	13.2	54	18	3	12	4	-
Vanilla	13.1	44	24	3	14	4	Vanilla 0.8
Ringo	11.3	44	20	0.26	12	3	-
Namkeen	12.3	51	23	3	12	4	Salt 3
Peanut	56.9	44	19	2	13	4	Peanut 5
Toy	13.8	49	21	2	11	4	-
Almond	12.0	48	21	3	13	8	Almond 4
Ginger	12.6	50	21	2	12	3	Ginger 2
Darchini	13.5	44	23	2	12	7	Cinnamon 1
Khataee	23.3	43	27	2	12	3	-
Khataee Almond	22.7	41	23	2	13	2	Almond 5
Jamwala	10.1	49	21	8	9	3	Jam 7
Kajoor	12.0	48	8	2	6	5	-
Chocolate	12.9	49	20	2	8	2	Chocolate 7
Egg	11.3	38	20	2	13	6	-
Coconut	11.9	47	22	2	14	4	Coconut 8
Doughnuts	69.7	42	27	3	8	0.3	-
Zeera	12.0	55	24	2	20	8	Zeera 6
Marrings	8.4	-	63	11	-	3	-
Average	19	44	23	3	11	4	-

*   The figures presented in the row of each biscuit type are the average values based on the information collected from 106 selected shops of Peshawar and Mardan Divisions.

Chemical Composition and Caloric Values of Biscuits

The chemical composition and caloric *values* of 19 types of biscuits are presented in Table II. The moisture contents ranged from 2.01% for Biscuit Marring to 7.84% for Biscuit Egg with an average value of 5.81% for all types of biscuits. The protein content of the biscuits ranged from 3.15% for *Jamwala* biscuit to 11.03% for *Sada* biscuits, with an average value of 5.58% for all types of biscuits.   The fat contents of various types of biscuits ranged from 1.00% Marring biscuits to 34.70% for coconut biscuit with an average value of 28.05% for all 19 types. The ash content of various types of

biscuits was in the range of s0.02% for Vanilla biscuit to 1.90% for *Namkeen* (salty) biscuit with an average value of 0.47% for all types. The crude fiber content ranged from 0.89% for Marring biscuits to 2.90% *Khataee* Almond biscuit with an average value of 1.46%. The carbohydrate contents were in the range of 48.43% for *Khataee* Almond biscuits to 90.13% for marring biscuits, with an average value of 57.27%. The percent energy contents were in the range of 392 Kcal/100 g of Marring biscuits to 580 Kcal/100 g of Egg Biscuits, with an average value of 5.18 Kcal/100 g of all 19 types of biscuits. The findings of this study are in fair agreement with Aurangzeb *et al.* (1989) who

reported 3.3%, 6.8%, 28.9% and 60.2% moisture, protein fat and carbohydrate respectively in biscuits. The findings of this study are also in line with the findings of Goplan *et al.* (1981). However, the moisture values

(37.7%) reported by Hussain (1985) were very high. He also reported a very low fat content (9.1%) in biscuits. He might have analyzed very fresh and very special types of biscuits.

Table II   *Chemical composition and caloric values of biscuits**

Name of Product	Moisture (%)	Protein (%)	Fat (%)	Ash (%)	Crude Fiber (%)	Carbohydrates (%)	Energy (Kcal/100g)
Biscuit							
Sada	5.01±0.28	11.03±0.02	28.000.22	0.13±0.002	2.00±0.009	60.84±0.53	511
Vanilla	6.31±0.19	5.98±0.09	27.90±0.01	0.04±0.005	1.77±0.005	58.01±0.52	507
Ringo	4.62±0.15	4.80±0.11	32.50±0.01	0.02±0.001	1.73±0.006	57.75±1.32	535
Namkeen	3.01±1.00	4.73±0.22	33.00±0.61	0.06±0.005	1.79±0.008	57.42±0.98	546
Peanut	7.01±1.02	5.60±0.08	34.20±0.05	1.90±0.008	0.27±0.004	50.03±0.56	531
Toy	4.50±0.65	6.48±0.14	31.50±0.93	0.19±0.003	2.01±0.006	55.32±0.96	531
Almond	4.51±0.36	6.30±0.16	34.20±0.06	0.32±0.005	2.00±0.005	52.15±0.54	544
Ginger	3.83±0.78	5.96±0.12	31.90±0.08	1.55±0.006	1.09±0.005	55.70±0.47	533
Darchini	5.84±0.10	6.45±0.25	30.70±0.01	0.08±0.004	1.03±0.01	55.94±0.65	526
Jamwala	5.82±0.58	3.15±0.36	34.30±0.08	0.49±0.007	1.93±0.006	54.34±1.01	539
Kajoor	6.03±1.01	3.68±0.14	30.80±0.01	0.60±0.006	1.00±0.008	57.92±1.05	524
Chocolate	6.61±0.69	5.50±0.25	30.20±0.33	0.05±0.001	1.21±0.006	53.84±1.25	517
Egg	7.84±0.97	7.35±0.25	33.77±0.09	0.44±0.004	1.79±0.004	49.25±0.89	580
Coconut	7.02±1.00	5.95±0.17	34.70±0.04	0.44±0.007	1.11±0.007	50.80±0.17	539
Doughnuts	13.98±0.88	5.95±0.07	20.50±0.16	1.20±0.006	1.86±0.007	56.51±0.18	434
Zeera	3.01±0.66	6.80±0.29	20.40±0.06	0.07±0.006	1.15±0.005	64.58±1.09	485
Marrings	2.01±0.55	5.69±0.18	1.00±0.04	0.30±0.001	0.89±0.006	90.13±0.98	392
Khataee							
Sada	5.01±0.69	5.30±0.36	35.18±0.26	0.08±0.008	2.00±0.004	55.44±0.47	559
Almond	5.91±0.88	5.70±0.14	37.20±0.02	0.07±0.006	2.90±0.003	48.23±0.65	551
Average	5.81	5.58	28.05	0.47	1.46	57.27	518

*   Each type of biscuit, collected from the 14 selected shops, was mixed to make a composite sample for that biscuit. The determination on the composite samples were done in triplicates

Supplementation of soy flour and basin (rich sources of lysine) to wheat flour for preparation of biscuits will improve the

nutritional quality of biscuits, (Aurangzeb *et al* 1989 and Akbar *et al.* 1986).

REFERENCES

A.O.A.C. 1984. Methods of analysis of the Association of official analytical chemists. 14th edition, Washington DC, USA.

Akbar, S., M. Siddiq and P. Iqbal. 1986. Nutritional and organoleptic evaluation of wheat bread supplemented with chick pea flour. Pak J. Sci. Ind. Res. 29(2) 126-129.

Ashraf, A. 1992. Raw ingredients of bakery, ghee, cream, cutting machines, and pastry. In: Jahangir Bakery Guide, pp 25-28 and 119. Niaz Jahangir printer Lahore, Pakistan.

Aurangzeb, M. Ahmad, N. Bibi, A. Badshah, M.A. Chaudhry and I. Khan. 1989. Nutrient composition of some commercial bakery products. Pak. J. Sci. Ind. Res. 32(9): 646-648.

Goplan, C., B.V. Sastri. and S.C Balasubramanian. 1981. Nutritive values of Indian foods. pp. 557 and 603-604. National Instt. of Nut. Indian Council of Medical Res. Hyderabad, India.

Hanneman, L.J. 1980. Bakery, bread and fermented goods. First Ed; pp. 2-5, 14-15. 32-35, 59. W. Hann. Ltd. London.

Hussain, T. 1985. Food composition table for Pakistan. Deptt. of Agric. Chem. & Hum. Nut. NWFP Agric. Univ. Peshawar, Pakistan. pp. 4, 14, 32.

Kardar, I. 1993. Raw materials, manufacturing process, cake processing, In: Bakery Industry. 1st Ed. Hamdard Kutab. Urdu Bazaar, Lahore, Pakistan. pp. 9, 47, 92.

Matz, S.A. 1972. Bakery technology and engineering. 2nd Ed. The AVI Publ. Co. Connecticut, USA. pp 1-2, 49-51, 82-83.