

DEVELOPMENT AND QUALITY EVALUATION OF COOKIES FORTIFIED WITH DATE PASTE (*Phoenix dactylifera* L)

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ABSTRACT

Fruits of date palm (*Phoenix dactylifera* L.) are consumed throughout the world and are a vital component of the diet in most Arabian countries. Dates have less fat content, hence heart patients can consume dates as such or their products. Dates contain high amount of dietary fibre. This fibre helps to control diabetes by decreasing the blood glucose levels and helps to lower the blood cholesterol level. Baked products are the most important sources of dietary fibre in the total food consumption. The effect of partial replacement of wheat flour with date palm paste on qualitative and quantitative properties of cookies was studied. Levels of date paste used were 10%, 15%, and 20%. Qualitative (ash, moisture, protein, fat, carbohydrates, and calorific value) and qualitative properties (colour, texture, taste and flavour) were assessed. Results obtained indicated that ash and fibre contents gradually increased from 0.35% in T₀ to 0.75% in T₃ and 1.24% in T₀ to 2.26% in T₃ respectively due to increase in mineral content by addition of date paste. Crude fibre and protein showed a slight increase with increasing date paste ratio but carbohydrates (T₀=76.09 to T₃=70.75) and overall calorific value (T₀=384.85 to T₃=377.86) decreased simultaneously. Organoleptic properties revealed that highly acceptable cookie could be obtained when 15% of date paste was used in the formulation. Calorific value evaluation showed that calorific value decreases from 384.85 in T₀ to 377.86 in T₃ with increase in date paste concentration.

Index Terms: Wheat Flour; Wheat Flour: Palm Date Paste, Organoleptic quality, Calorific value

1. INTRODUCTION

The bakery industry has an important role to play in the economic development of the country in fuller utilization of its wheat resources and in building up the health of its people. It is one of the largest organized food industries all over the world. Humans have consumed bakery products from hundreds of years. Much attempt is being made to popularize bakery products among all because these products are considered easy, convenient, and rather inexpensive means of taking foods in hygienically prepared ready to eat form. In India about 90 percent of wheat is consumed in the form of chapattis and 10 percent as bread, cookies, biscuits, buns and other bakery products. Cookies have now become loved fast food products for every age group. These are easy to carry, tasty to eat, cholesterol free and reasonable at cost. In India about 25% of the wheat is used in the preparation of baked goods (Kamaljit et al 2010). States that have large intake of biscuits and cookies are Maharashtra, West Bengal, Andhra Pradesh, Karnataka, and Uttar Pradesh. Cookies are one of the best known quick snack products. They are characterized by a formula high in sugar and shortening and low in water. The main ingredients of cookies are wheat, flour, fat, and sugar. Water is also added, helping the process of making cookies but is not a final ingredient, that is it is not a component of final food product. The chemical composition of cookies is of significance importance as they contain 22-30% of fat, 4-8% protein contents and 60-70% carbohydrates. These constituents also impart desirable quality characteristics to final produce. Sugar

is present in a very small amount in wheat flour as natural component and some starch is converted to sugar during fermentation process. The natural sugar content of flour is very limited in amount and for the most forms of bakery products sugary agent must be added to meet the yeast requirements during fermentation process and also supply the necessary sweetness. Many sugar substitutes are available for use in baking namely rice syrup, raw honey, agave nectar, date sugar and organic sugar. Date palm (*Phoenix dactylifera* L.) fruit locally called 'debino' in Hausa language, is from the family of Arecaceae (Al-daihan and Bhat, 2012). Dates have less fat content, hence heart patients can consume dates as such or their products (Panda 2001). The date is a sweet edible fruit. The fruit is a drupe in which an outer fleshy part consists of pulp and pericarp surround a shell (the pit of stone) of hard endocarp with a seed inside. Ahmed et al. (1995) and Vandercook et al (1980) documented that date fruits are high energy food sources with 72 to 80% sugar content at maturity. Al-Shahib and Marshal (2003) stated that the fruit of the date palm contains a high percentage of carbohydrates (total sugar, 44 to 88%), fat (0.2 to 0.5%), 13 salts and minerals, protein (2.3 to 5.6%), vitamins and a high percentage of dietary fiber (6.4 to 11.5%). Ahmed et al (1995) and Vandercook et al (1980) reported that date fruit are good sources of iron and potassium, a fair source of calcium, chlorine, copper, magnesium and sulphur, and a minor source of 16 amino acids and vitamins A, B1, and B2. Researchers found that date consumption might be of benefit controlling glycaemia and lipid in diabetic patients. Dates have high

phenolic content and antioxidant activity. . Dry or soft dates are eaten out of hand or may be seeded and stuffed, or chopped and used in great variety of ways on cereal pudding, bread, cakes, cookies, ice -cream or candy bars and can be made into juice, vinegar, wine ,beer, sugar ,syrup ,honey , pickle, paste, dip and food flavour.

The objective of this paper is to study nutritional, sensory and shelf life characteristics of cookies fortified with date palm paste using qualitative and quantitative analysis techniques.

2. MATERIALS AND METHODS

2.1 MATERIALS

Refined wheat flour, shortening, milk powder, sugar ,salt and date palm fruits were purchased from local market. The date palm fruits were soaked in water for 30 minutes, pits were removed and grinding was carried in grinder until a fine paste was obtained. Flour was sifted through 60 mesh (340 microns) to remove coarse bran. Blends of wheat flour and date palm paste were prepared by replacing wheat flour with date palm paste at 0, 10, 15 and 20%.

2.2 Methods

2.2.1 Preparation of cookies

Cookies were prepared using the modified recipe for digestive biscuits as described by **Okaka (1997)**..The ingredients were sifted, kneaded and made into dough. The dough was sheeted and shaped as. The cookies were baked at 150°C for 30 minutes in microwave oven. Cookies were prepared from blends containing date paste at different levels (10, 15, 20%).After baking, cookies were cooled to room temperature in a dessicator, packed in LDPE bags and sealed. The cookies were then used for subjective and objective evaluation purposes and all experiments were carried in triplicate.

2.2.2 Treatment Combination

Table 1: Treatment combination used for the preparation of cookies

S. No.	Ingredients(g)	T0	T1	T2	T3
1.	Refined wheat flour	100	90	85	80

2.	Date palm paste	0	10	15	20
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2.3 EVALUATION OF COOKIES

2.3.1 Proximate composition of cookies

Moisture (air oven method), ash, crude fat (Soxlet extraction method) crude fibre, and protein (microKjeldhal method, N×6.25) were determined as per **AOAC(1990)**, and carbohydrates were determined by difference(100-% moisture+%Crude fat+%crude protein+%ash +% Crude fibre). Experiments were carried in triplicates and averaged.

2.3.2 Theoretical calculation of energy

The energy values were calculated theoretically using the following conversion factors 4.0, 4.0, and 9.0kcal/g for protein, carbohydrates and fat respectively according to the method described by Paul and Southgate.

2.3.3 Sensory evaluation of cookies

Cookie samples in pouches coded with different numbers were presented to 9 panelists who were asked to rate each sensory attribute by assigning a score for surface colour(10), taste(10) ,texture(10), flavour(10) using Hedonic Scale as described by (*).A scorecard describing the desirable and undesirable quality characteristics for surface colour, texture, flavour, taste and overall quality was given to panellists. The panellists assigned scores for each parameter as against the maximum score of 10 for each parameter.

2.3.4 Statistical analysis of data

The statistical analysis was conducted using the SAS package (**SAS, 2003**).The sensory and proximate analysis was statistically analysed. Each experiment (in triplicate) was repeated at least thrice and the values were presented in terms of means± standard error (**Steel and Dickey 1996**).

3. RESULTS AND DISCUSSION

3.1 PROXIMATE COMPOSITION OF FORTIFIED COOKIES (%)

The proximate composition and theoretical value of fortified date cookies are presented in Table 2.Three trials are taken for all readings and mean is obtained as average of the three trial readings.

Table 2. Proximate composition of fortified cookies (%).

Treatment level (WF:DP)	Moisture	Fat	Protein	Crude Fibre	Ash	Carbohydrates	Calorific value Kcal/100g
Control(T0)	8.82±0.15	5.06±0.20	8.68±0.15	1.23±0.09	0.34±0.12	75.92±0.18	384.85±0.12
90:10(T1)	9.79±0.05	6.11±0.21	9.11±0.10	2.02±0.10	0.35±0.10	72.53±0.15	382.31±0.18
85:15(T2)	9.78±0.23	6.20±0.0.14	9.31±0.14	2.14±0.13	0.69±0.20	71.61±0.17	381.31±0.11

80:20(T3)	10.34±0.12	6.27±0.10	9.62±0.12	2.27±0.11	0.74±0.09	70.77±0.12	377.86±0.16
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WF: wheat flour, WFDP: wheat flour: date powder (1:1) Values are means ± standard deviations (n = 3)

3.2 CHEMICAL ANALYSIS

Mean values of all the samples are tabulated in Table 2. The proximate chemical analysis of the fortified date cookies from the table shows that moisture content of fortified cookies increases from 8.82% in the control sample with 0% date paste to 10.34% in T3 with 20% date paste. The increase in moisture content in the cookies is may be due to increase in date paste since dates are intermediate moisture foods. Fat shows a slight increase from 5.06% in T0 to 6.27% in T3. The increase in fat is due to increase in date paste, addition of milk powder and shortening. Protein increases slightly from 8.68% in T0 to 9.62% in T3. Dates are rich in fibres and minerals which can be seen from the increase in crude fibre and ash content from the table. The crude fibre increases from 1.23% in T0 to 2.27% in T3 and the ash content increases from 0.34% in T0 to 0.74% in T3. However it is concluded from the table that carbohydrate content decreases with increase in date palm paste. The calorific value also decreases from

384.85kcal/100g in T0 to 377.86kcal/100g in T3. These results are in agreement with those reported by **Abd El-lateef (2003)**

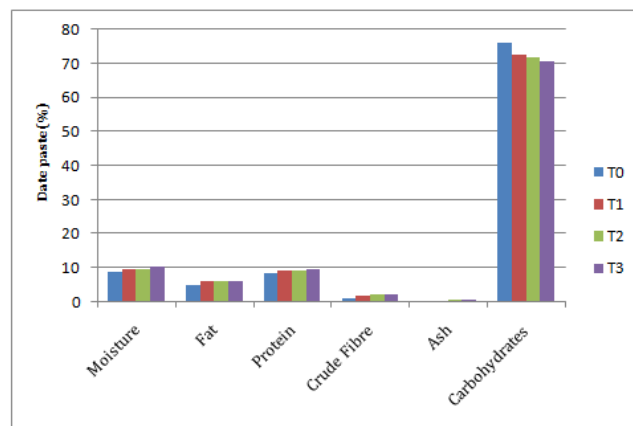


Chart-1: Proximate composition of fortified date cookies

3.3 SENSORY EVALUATION OF FORTIFIED COOKIES

3.3.1 Table 3. Organoleptic acceptability of fortified cookies

Treatment level(WF:DP)	Colour (10)	Texture (10)	Flavour (10)	Taste (10)	Total Score
Control (T0)	7.36	7.05	7.5	7.18	29.09
90:10 (T1)	7.66	7.30	7.4	7.51	29.87
85;15 (T2)	7.83	7.40	7.56	7.95	30.74
80:20 (T3)	7.15	7.15	7.05	7.80	29.15

As shown in table3 colour, texture and flavour had a low score as a result of increasing the level of date paste. At 20% level of date paste; cookies had a dry mouthfeel and a bit hard texture. However at 10 and 15% mixture, the quality of cookies was not adversely affected. The colour, texture, crumb colour, taste and mouthfeel were acceptable at 15% mixture.

4. CONCLUSION

The study was carried out on the development and quality evaluation of fortified date cookies. The samples were analysed organoleptically and physio chemically. The sensory analysis showed that the cookies were highly acceptable at 15% date paste concentration and 20% concentration showed a slightly dry mouthfeel and a harder texture. The colour of cookies became darker with increasing level of date paste. The obtained results are in complete agreement with those of Vetrmani and Leelavathi (2007).

Ash and fibre contents were increased due to high percentage of minerals and fibre present in dates. The protein content was increased due to protein present in milk powder and dates. The fat content increased from to due to shortening used in formulation and fat present in milk powder and dates. Moisture content showed a slight increase due to date paste used and moisture retention in dates (Intermediate Moisture Food).

Addition of date palm paste to the wheat flour affected the sensory and quality attributes of cookies. The primary objective of using date paste in cookies was to make use of the reducing sugars which are present in dates. Dates provide excellent source of reducing sugars and are thus instant energy sources. In the present research work, prepared cookies by using 10%, 15%, and 20% date paste concentration showed high acceptability at 15% concentration used in the formulation. The dietary composition of these cookies showed that fibres, which play an important role could be enriched in cookies made from date paste. These

studies have shown the potential of developing fibre-rich cookies in order to increase the dietary fibre intake.

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