JOURNAL OF FOOD QUALITY & HAZARDS CONTROL
SHAHID SADOUGHI UNIVERSITY OF MEDICAL SCIENCES & HEALTH SERVICES

Journal of Food Quality and Hazards Control 2 (2015) 107-110

Production of a New Formulated Ready-to-Eat Food Product Based on Date Paste

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Article type
Original article

Keywords
Phoeniceae
Food, Formulated
Sensation

Received: 5 Mar 2015
Revised: 14 Apr 2015
Accepted: 26 May 2015

Abstract

Background: Date (*Phoenix dactylifera* L.) is one of the most important agricultural crops in Iran. This study was carried out to determine the possibility of using date paste for manufacturing a new ready-to-eat food product.
Methods: Various formulations were prepared by mixing Mazafati date paste, bread, oil (animal and olive), nuts and spices; but only six formulas were chosen according to sensory evaluation. The six formulations consisted of different ratios of the date paste (40, 50, and 60%), Sangak bread (25, 35, and 45%), nuts (9%), spices (1%) and animal or olive oil (5%). The research was conducted in a completely randomized design test with three replications. Statistical analysis of the data was carried out using SAS software (ver. 9.1).
Results: The formulas contained various ranges of fat (13.20-15.86%), reducing sugars (25.16-32.50%), sucrose (2.90-6.63%) and protein (5.85-7.80%). The pH value of the formulas ranged from 5.65 to 5.79. The formulations containing 60% date paste had significantly higher amounts of moisture, sucrose and reducing sugars (p<0.05). Although there were no significant difference in the sensorial attributes (taste, texture, odour) between the formulas 3 and 6 (60% date paste, 25% bread and 5% animal or olive oil), they gained the highest score in comparison to other formulas.
Conclusion: According to the results, the formulas 3 and 6 possessed desirable quality and high nutritional value and therefore, are recommended to be used in the manufacture of the new ready-to-eat food product.

Introduction

The date palm (*Phoenix dactylifera* L.) is considered as an important and strategic crop in arid and semiarid regions of Iran which is placed in the package of non-petroleum exports (Ahmadnia and Sahari, 2008). The provinces of Kerman, Khuzestan, Sistan and Baluchistan, Bushehr, Fars and Hormozgan are the main date producing regions of Iran. In spite of annual production of 1000000 tons date product in the country, its domestic consumption is 350-400 thousand tons and about 100-150 thousand tons of fresh dates are exported to other countries (Akbari et al., 2012). Therefore, annually there is a 400-500 thousand tons excess of date. On the other hand, 30% of the date produced in the country is of low quality (Ahmadnia and Sahari, 2008) which cannot be directly supplied in the market due to hygienic and economic problems. Utilisation of such surplus by date proc-

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essing companies into more value added derivatives and also by being used for production of new food products is very important in increasing the income of the sector. On the other hand, date fruit is rich in carbohydrates and has a high nutritional value which makes it suitable for being used as an ingredient in confectioneries.

There are no scientific reports on the studied subject but a considerable amount of works on the development of new date based food products has been published. Several studies have been carried out to incorporate dates in production of different food products such as bread (Al-Zubaydi et al., 1983; Obiegbuna et al., 2013), biscuit (El-Sharnouby et al., 2012), tomato ketchup (Mikki et al., 1987), low caloric cakes (Tufail et al., 2002), chocolate toffee (Ahmadnia and Sahari, 2008), and yogurt (Gad et al., 2010).

In recent years, due to development of marketing and interest of Iranian consumers to ready-to-eat foods, more attention is paid to date products. This study was carried out to determine the possibility of using date paste for manufacturing a new ready-to-eat food product.

Materials and methods

Preparation and formulation of the product

Mazafati rutab, Sangak bread, nuts, spices, oils, coconut and sesame were supplied from the local market. Mazafati date is one of the most popular kinds of date fruit in Iran which is harvested in the rutab stage. It has about 30% moisture content and 55-65% sugar content depending on the cultivation region (Golshan Tafti and Fooladi, 2005).

To start and present new formula, preliminary searching and studying in scientific databases were performed and some information on preparation of products from date fruit was gathered. Then, different formulations of the new product were prepared by mixing Mazafati date paste or date syrup, Sangak bread, oils (animal, olive), nuts (walnut, pistachio), sesame, coconut, and spices (ground ginger, cinnamon, cardamom). These formulations were studied separately and finally six formulas were selected according to sensory evaluation and professionals advices. The selected formulas based on sensory evaluation (texture, appearance, colour, flavour) by professionals are presented in Table 1. They were prepared in three replications and as observed, three out of these six formulas contained olive oil. The formulas were analyzed for chemical composition (moisture content, pH value, sucrose, reducing sugars, fat, ash, and protein; AOAC, 1990) and evaluated for sensorial attributes.

Sensory evaluation

A total of 15 trained panels (ages 20-50, both sexes) participated in the study. The panellists were asked to evaluate coded samples using a questionnaire for sensory quality (taste, texture, odour, and overall acceptability). The sensory evaluation form consisted of five distinct points on hedonic scales (5=excellent, 4=very good, 3=good, 2=acceptable, 1=inferior). Panellists rinsed their mouths with tap water between each evaluation.

Statistical analysis

All tests were measured in triplicate. The data were analyzed using a completely randomized design test and compared using analysis of variance and by Duncan's multiple range test with the probability of $p<0.05$. Statistical analysis of the data was carried out using SAS software (ver. 9.1).

Results

A sample of the new food product is shown in Fig. 1. There was significant difference ($p<0.05$) among the formulas with regard to all chemical composition with exception of fat (Table 2). The highest pH value was found in the formula 6. Moisture contents were 18.66% and 17.73% in the formulas 3 and 6, respectively. There was no significant difference in fat content among the formulas and it ranged from 13.2% to 15.86%. The protein content was in the range of 5.85% to 7.8% in different formulas. The reducing sugars content and sucrose content in the formulas were reported in the range of 22- 32.5% and 2.9-6.63%, respectively.

The results of the sensory evaluation showed that there was significant difference ($p<0.05$) in the sensory attributes (taste, texture, odour, and overall acceptability) among the formulas. Means of sensory attributes are shown in Table 3. There was no significant difference in taste among the formulas 3, 4, 5, and 6. These formulations gained higher scores for taste. The formulas 3 and 6 had a desirable texture and gained the highest scores. The formulas 3, 5, and 6 did not show significant difference in odour and gained higher scores. The highest score in overall acceptability (4.33 out of 5) was obtained for the formula 6.



Fig. 1: The new ready-to-eat food product based on date paste

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Table 1: Proportions of date paste in the new ready-to-eat food product formulas

Formula	Date paste (%)	Sangak bread (%)	Olive oil (%)	Animal oil (%)	Sesame (%)	Cardamom (%)
1	40	45	-	5	9	1
2	50	35	-	5	9	1
3	60	25	-	5	9	1
4	40	45	5	-	9	1
5	50	35	5	-	9	1
6	60	25	5	-	9	1

Table 2: The chemical composition of the new ready-to-eat food product formulas containing date paste

Formula	pH value	Moisture content (%)	Fat (%)	Proteins (%)	Ash (%)	Reducing sugars (%)	Sucrose (%)
1	5.76 ^{b}	13.40 ^{c}	13.20 ^{a}	7.70 ^{a}	1.76 ^{d}	25.16 ^{e}	5.83 ^{b}
2	5.77 ^{b}	12.03 ^{f}	15.86 ^{a}	7.80 ^{a}	1.96 ^{ab}	32.50 ^{a}	5.23 ^{c}
3	5.68 ^{d}	17.73 ^{b}	13.86 ^{a}	6.40 ^{d}	1.90 ^{bc}	30.47 ^{b}	6.63 ^{a}
4	5.73 ^{c}	12.32 ^{e}	15.47 ^{a}	7.46 ^{b}	1.81 ^{cd}	22 ^{f}	3.76 ^{d}
5	5.65 ^{e}	13.10 ^{d}	15.76 ^{a}	6.70 ^{c}	1.71 ^{d}	26.40 ^{d}	2.90 ^{e}
6	5.79 ^{a}	18.66 ^{a}	13.33 ^{a}	5.85 ^{e}	2.02 ^{a}	28 ^{c}	6.53 ^{a}

Means with similar letters within the same column are not significantly different (p>0.05)

Table 3: Sensory evaluation of the new ready-to-eat food product formulas containing date paste

Formula	Taste	Texture	Odour	Overall acceptability
1	3.37 ^{c}	2.91 ^{d}	3.08 ^{c}	3.33 ^{e}
2	3.66 ^{bc}	3.54 ^{bc}	3.06 ^{b}	3.71 ^{cd}
3	4 ^{ab}	4.16 ^{a}	3.83 ^{ab}	4.12 ^{b}
4	4 ^{ab}	3.25 ^{c}	3.62 ^{b}	3.62 ^{d}
5	4.12 ^{ab}	3.75 ^{b}	3.79 ^{ab}	3.79 ^{c}
6	4.25 ^{a}	4.33 ^{a}	3.95 ^{a}	4.33 ^{a}

Means with similar letters within the same column are not significantly different (p>0.05)

Discussion

In this research, a new ready-to-eat food product based on date paste with 6 different formulations was prepared and then their chemical composition and sensory attributes were analyzed. In a similar study, El-Sharnouby et al. (2012) studied the rheological properties of the biscuit dough produced by the replacement of wheat flour with a 1:1 mixture of wheat bran and date powder. Another research showed that the date pulp was effective in improving ash, protein, fat, fibres and also the mineral contents of the tomato ketchup sauce (Mikki et al., 1987). Tufail et al. (2002) used date syrup in production of low caloric cakes and reported that 50% replacement of sucrose with date syrup could be recommended in the preparation of low caloric cakes with acceptable sensorial attributes.

According to data obtained in current investigation, the pH value of the formulas ranged from 5.65 to 5.79. The pH value of food has an important effect on the growth of microorganisms. Most bacteria grow at pH values around 7 (6.6-7.5), while yeasts grow best at pH values of 4 to 4.5 (Jay et al., 2005). Therefore, this new food product may be subject to more fungal than bacterial spoilage. The moisture content increases as the date paste level increases in the formulation. The formulations contained 5.85-7.8% protein which this amount of protein may be due to other ingredients except date paste in the formulations. Increasing the level of date paste in the formulation resulted in an increase of reducing sugars. The formulas 3 and 6 had the highest reducing sugars content. The sucrose content in comparison to reducing sugars content was low in the formulas. This can be due to the higher level of reducing sugars in Mazafati date fruit and also hydrolysis of sucrose during the heating process. Mikki et al. (1987) reported that using date pulp as completely substituent for sugar in ketchup sauce formulation increases the reducing sugars from 15.15% to 21.56%.

In the case of sensory evaluation, the formulas containing 60% date paste, 25% Sangak bread, and 5% animal or olive oil (formulations 3 and 6) gained the highest

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sensory scores that are similar with findings of Gad et al. (2010) who used date syrup in formulation of yogurt. Also, Obiegbuna et al. (2013) stated that substituting sugar with date palm fruit pulp meal in bread production increased the nutritional value and had no adverse overall effect on the acceptability of bread loaves. The use of olive oil in formulation 6 showed its preference in comparison to formulation 3. Olive oil provides essential fatty acids, reduces cholesterol, regulates blood pressure and also prevents cardiovascular diseases (Covas, 2007). Therefore, health benefits beyond nutritional value have probably been associated with consuming this new product.

Conclusion

Two formulas of new ready-to-eat food product based on date (formulas 3 and 6) were achieved which possessed desirable quality and high nutritional value and therefore could be recommended to be used in the manufacture of this new product. For commercial manufacturing, more researches are needed to evaluate the effect of packaging and storage condition on quality of this product.

Conflicts of interest

The authors declare that they have no conflict of interest.

Acknowledgements

The authors would like to thank Kerman Agricultural and Natural Resources Research Centre for providing chemical analysis facilities and also financial support. We are also grateful to Mr. Mehdi Ali Mohammadi for his kind help during this work.

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