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Preparation and quality evaluation of date seed powder

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Abstract

The present study focused on preparation and quality evaluation of date seed powder. Proximate composition and physical analysis for the date seed powder were analysed. Moisture, protein, carbohydrates, fat, ash and fiber content of the date seed powder was found to be 5.75%, 5.92%, 58.62%, 7.5%, 0.96% & 21.25% respectively. True density, bulk density, porosity and water absorption capacity was found to be 0.68 g/ml, 0.45 g/ml, 33% and 108% respectively. Date seed powder has high nutritional value; thus it can be used in the preparation of innovative products.

Keywords: Preparation, evaluation, powder, Date, nutritional

1. Introduction

Date palm plays a major role in the economic and social life of the people in the date producing countries (Basuni *et al.*, 2010) [5]. *Phoenix dactylifera* (date palm) is a flowering plant species belongs to the palm family of *Arecaceae* (Chitra devi venkatachalam *et al.*, 2016) [6]. The date palm fruit is composed of a fleshy pericarp and seed that is usually oblong, ventrally grooved, with a small embryo and a hard endosperm. Date seeds constitute about 10-15% of the weight of date fruit.

The world production of dates was 7.5 million tons in 2011 (Guizani *et al.*, 2014) [8], meaning that approximately 750 thousand tons of date seeds were produced during that year. A large number of date seeds are being obtained from the date industries or the waste products annually. The new studies reported that dates seeds have high level of phenolic compounds, Flavonoids, antioxidants, Dietary fibers of date seeds are higher than those are reported in flesh part. there are high levels of α -Tocopherol, Ascorbic acid and Glutathione and of polyphenol compounds such as Sinapic acid, Caffeic acid with quantities of protocatechic acid (Kristbergsson *et al.*, 2016, also it is diagnosed multi-aromatic in dates seeds includes alcohols, citrates, aldehydes, Ketones, saturated and unsaturated hydrocarbonates (Saafi *et al.*, 2012) [12]. Date seeds do not have a smell or odorless and has a slightly bitter taste blend. In general, it has a light and dark brown (Wahini *et al.*, 2016) [11]. Date seeds contain many minerals such as sodium, potassium, magnesium, calcium, phosphorus, iron, manganese, zinc, copper, nickel, cobalt, chromium, lead and cadmium (Golshan Tafti *et al.*, 2017) [7]. Dates provide a good source of energy (213 and 314 kcal/100 g-fresh and dried respectively) mostly due to the high carbohydrate content, averaging 54.9 and 80.6 g/100 g for fresh and dried fruit, respectively. Date seeds were found to be excellent source of dietary fiber and their variety level was between 64.5 and 80.15 g/100 g fresh weight (Al-Farsi *et al.*, 2008) [1].

Dietary fibers are particularly well-known for their potential benefits on cancer and type 2 diabetes prevention (Anderson *et al.*, 2009) [2]. Polyphenols, including chemical compounds like phenolic and flavonoids, are common constituents of the human diet, with fruits and vegetables being the major dietary sources of these bioactive compounds. Their possible health benefits have been suggested to derive from their antioxidant properties by chelating redox-active metal ions, inactivating lipid free radical chain reactions, preventing hydro peroxide conversion into reactive oxradicals, and from their anti-inflammatory properties (Joseph *et al.*, 2005) [9].

2. Materials and Methods

2.1 Experimental materials

The raw materials dates were procured from the local market at Rudrur, Nizamabad. Chemicals such as Mercuric oxide, Potassium sulphate, Sodium hydroxide, Boric acid, Hydrochloric acid, Petroleum ether and Sulphuric acid were purchased from M/s Telangana scientific Pvt. Ltd, Hyderabad, Telangana state.

2.2 Preparation of date seed powder

Dates were purchased from the local market at Rudrur. Dates were de-seeded, solar dried and milled.

Dates

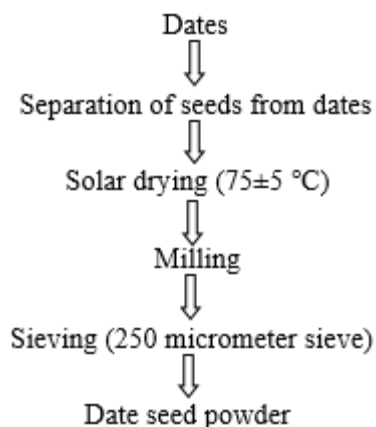


Fig 1: Flow diagram for preparation of date seed powder

2.3 Physical properties of date seed powder

2.3.1 Bulk density

The bulk density of flours is determined by measuring the weight of a sample of known volume. The sample is placed in a container of regular shape, and excess on the top of the container is removed by sliding a string or stick along the top edge of the container. After excess is removed completely the weight of the sample is measured. The bulk density of the sample is obtained simply by dividing the weight of the sample by the volume of the container. The bulk density gives a good idea of the storage space required for a known quantity of particular sample. Bulk density is defined as the dry weight of material per unit volume of material. Bulk density considers both the solid and void spaces. Bulk density also influences the effective conductivity and other transport properties. (FAO/INFOODS Density Database Version 2.0, 2012)

Bulk density (g/cm³) = weight of the sample/ volume of the sample

2.3.2 True density

The true density of a material is defined as the ratio of mass of sample to the solid volume occupied by the sample. (FAO/INFOODS Density Database Version 2.0, 2012)

True density(g/cm³) = mass of the sample / volume of the sample

2.3.3 Porosity

Porosity is defined as the ratio of the total pore volume to the apparent volume of the particle or powder (excluding interparticle voids)

Porosity=true density - bulk density/ true density×100

2.3.4 Water absorption capacity

About 1g of powder was mixed with 10ml distilled water in a test tube. It was then shaken for 1 min and allowed to stand for 30min at 24°C before it was centrifuged at 2000 RPM for 25 min. the retained sample in a test tube after discarding the excess water was measured.

Water absorption capacity= final weight - initial weight / initial weight×100

2.4 Chemical analysis of date seed powder

2.4.1 Estimation of moisture content

Moisture content of the developed products was measured by using standard method (AOAC 2016) [3]

2.4.2 Estimation of Protein content

Protein estimation by micro-kjeldahl method

Nitrogen is the major element next to carbon, hydrogen and oxygen found in living things. Nitrogen occurs in amino acids, purine and pyrimidine bases, vitamins, amino sugars, alkaloids, compound lipids etc. However the major nitrogen source is proteins. In most proteins, nitrogen constitutes 16% of the total make up and hence, the total nitrogen content of a sample is multiplied by 6.25 to arrive at the value of the crude protein. By and large macro-kjeldahl technique is adopted to estimate the total nitrogen content in variety of sample ranging from microbial cells to meat. The procedure described here is highly suitable for food samples such as cereals and pulses flour. In addition, procedures for non protein nitrogen, protein nitrogen and amino nitrogen are also included.

2.4.3 Estimation of Fat content

Fat content was estimated by Soxhlet method AOAC (2000) [3] using the automatic SOCS Plus Solvent Extraction System.

2.4.4 Estimation of Ash content

The total ash content of given food sample was estimated by using AOAC (2016) [3] method.

2.4.5 Estimation of Crude fiber

Crude fiber content was determined by standard method (AOAC 2016) [3].

2.4.6 Estimation of carbohydrate content

Carbohydrate is done by difference method. Carbohydrates can also define chemically as neutral compounds of carbon, hydrogen and oxygen.

Carbohydrate (%) = 100 - (% Moisture + % Ash + % Fat + % Protein)

Net carbohydrates= Actual carbohydrates- fiber

3. Results and Discussion

3.1 Proximate composition of date seed powder

The parameters like moisture content, protein content, ash content, carbohydrates content, fat content and crude fiber content were evaluated in proximate analysis of cookies shown in table 2.

Table 1: Proximate composition of date seed powder

S.no	Parameter	Value
1	Moisture (%)	5.75±0.32
2	Protein (%)	5.92±0.21
3	Carbohydrates (%)	58.62±0.34
4	Fat (%)	7.5±0.24
5	Ash (%)	0.96±0.02
6	Fiber (%)	21.25±0.19

Values are means ± SD of three independent determinations

3.2 Physical analysis of date seed powder

Physical parameters such as true density, bulk density, porosity and water absorption capacity of date seed powder were evaluated and shown in table-2.

Table 2: Physical analysis of date seed powder

S.no	Parameter	Value
1	True density (g/ml)	0.68
2	Bulk density (g/ml)	0.45
3	Porosity (%)	33
4	Water absorption capacity (%)	108

It was observed that the true density, bulk density, porosity and water absorption capacity of date seed powder from the table. The true density of the powder was obtained as 0.68g/ml, whereas the bulk density obtained was as 0.45g/ml. The porosity of the powder was recorded as 33%. The water absorption capacity is the indicator of ability to physically hold water against gravity. The water absorption capacity was obtained as 108%.

4. Conclusion

From the study it can be concluded that date seed powder is the good source of all nutrients. Date seed powder can be used in the preparation of variety of products.

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