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Studies on Development of Process Technology for Preparation of Ready-To-Cook (Instant) Carrot Dessert (Halwa) Incorporated with Stevia

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Abstract-The present investigation entitled "Studies on formulation and preparation of Ready-to-cook (Instant) Carrot dessert (Halwa) incorporated with stevia" was carried out in Department of Food Processing Technology. The aim to prepare carrot instant dessert (Halwa) incorporated with stevia to provide more nutrition and low calories to fast way of cooking food rather than spending too much time on cooking. The formulation was made with dehydrated carrot-based product along with other ingredients like milk solids, stevia, coconut, dry fruits. The product has gained its importance because of its taste, flavour, it contains no sugar, nutrition, health benefits and sweet taste to the consumers. The purpose of this research was to provide tasty, delicious, and nutritive food dessert for those peoples who is suffering from sugar problems as well as normal people in affordable price. The developed carrot instant dessert (Halwa) incorporated with stevia was subjected to sensory evaluation it showed that T2 sample is more superior to others. For preparation, all ingredients are mixed and packed in laminated aluminium pouch. The proximate compositions of carrot instant dessert (Halwa) incorporated with stevia were moisture content (7.26 0.05%), fat (3.06 0.06%), protein (11.76 0.05%), carbohydrate (76.20 0.09%), energy (378.66 Kcal) and ash (4.36 0.05%). carrot instant dessert rich in Carbohydrate. It was concluded that carrot instant dessert stored for 6 months in laminated aluminium pouches. So, it can be satisfying the consumer.

Keywords- dehydrated carrot, milk powder, dry fruits, ready-to-cook, sensory evaluation, proximate composition, packaging material, laminated aluminium pouch.

I. INTRODUCTION

The demand for ready-to-eat or ready-to-cook food is rising due to changing in lifestyle. To cater this need, a range of chilled food products is being introduced in the market continually. Ready-to-cook products are developed by food companies to answer the need of fast preparation; consumers desire high quality, health-conscious products, quickly prepared meal to enjoy at home or office. However, maintenance of quality of complex food dishes is of key importance for success of this sector (A.L Incoronato et al., 2016).

Ready-to-Eat food has made people's life easier. Initially, these foods were consumed by defensemen, disaster victims, trekkers, hikers, and hunters who needed food in a short time and on the road. But now, RTE food has become popular among most busy people in modern cities. Consumers are becoming more aware of food products and so intentions and perceptions of Ready-to-Eat food products are changing in the Food Retail Industry.

Ready-to-Eat meal demand has outpaced a huge amount of India's food retail market (Garima G et. al, 2021Increasing affluence and leisure are among the most pervasive trends in contemporary society. Affluence, a function of accelerating technology, and leisure, the by-product of emerging economic abundance, increasingly characterize the social environment within which the society's life style is given expression studied the drying properties of carrots and their suitability for producing various value-added products.

Chemical properties of carrots indicated their suitability for drying and the feasibility of using carrot shreds for further processing. Leaching losses were observed in reducing sugars and total sugars during pre-treatments and an adverse effect was seen on beta-carotene content in all samples. Reconstitution ratio of dried carrot shreds was higher in pre-treated samples than untreated.

Carrot shreds dried in open air had a lower reconstitution ratio. It was suggested that dried carrot shreds could be used as a base material for preparation of carrot halwa. Conducted experiments to develop dehydrated carrot halwa and studied the effect of milk to carrot ratio, sugar, sodium metabisulphite, and temperature on the quality of dehydrated carrot. (Dr. Deeba S. Jairajpuri et. al, 2013).

Carrot (Daucus carota L.) is the most important crop of Apiaceae family. It is a root vegetable that has world-wide distribution. Carrots were first used for medical purposes and gradually used as food. Written records in Europe indicated that carrots were cultivated prior to the tenth century. The colours of the carrot root flesh may be white, yellow, orange, red, purple, or very dark purple.

The first cultivated carrots were yellow and purple fleshed cultivars. Orange carrots, today more popular, were developed in the 15th and 16th centuries in Central Europe. A rapid rise in the popularity of orange carrots was observed with the recognition of its high provitamin A content. Carotenoids and anthocyanins are the major antioxidant pigments found in carrots. Cultivar differences in carrots rely in the type of pigments present. Carotenoids are the yellow, orange, or red coloured phytochemicals found in most yellow and orange fleshed cultivars.

The widely used orange carrot is high in α- and β-carotene and is a rich source of provitamin A. Yellow carrot colour is due to lutein which plays an important. (João Silva Dias, 2014). The reported that extracts of carrot which contain different amounts of falcarinol, falcarindiol, and falcarindiol 3-acetate had significant inhibitory effects on both normal and cancer cell proliferation. The study suggests that the aliphatic C17-polyacetylenes are the potential anti-cancer principles of carrots and that the synergistic iteration between bioactive polyacetylenes may be important for their bioactivity. Other studies have reported that falcarinol exerts cytotoxic activity against several human tumor cell lines in vitro, destroying pre-cancerous cells in the tumors.

Assessed the immunomodulatory effect of carrot-extracted carotenoid using 24 albino rats. The percentage variation in lymphocytes, eosinophils, monocytes and platelet count was evaluated. Interestingly, carotenoid administered rats showed a significant increase in lymphocytes, eosinoplils, monocytes and platelet concentration. The beneficial effect was due to carrot's α- and β-carotenoids. A deficiency in vitamin A can cause eye's photoreceptors to deteriorate, which leads to vision problems. β- Carotene (the carotenoid with the most provitamin an activity) in carrots helps to protect vision, especially night vision and also provides protection against macular degeneration and development of senile cataract, the leading cause of blindness in aged people.

Eating carrots rich in β-carotene may restore vision, lending truth to the old adage that carrots are good for your eyes. Carrots are one of the richest sources of provitamin A and a hight intake of carotenoids linked with a significant decrease in post-menopausal breast cancer. Research has shown also that smokers who eat carrots more than once a week have a lower risk of lung cancer, while a β-carotene rich diet may also protect against prostate cancer.

The curative effect of carotenoids and anti-oxidant polyphenols, and dietary fibers against bladder cancer and other carcinomas has also been reported by Hung et al. Carotenoids of carrots that have no vitamin A activity (lycopen, lutein, and zeaxanthin) may shrink also a di-abetic's risk of developing diabetic retinopathy since as observed recently type 2 diabetics who had lower levels of no vitamin A activity carotenoids, lycopene, lutein and zeaxanthin, had corresponding higher levels of reti-nopathy.

Besides cart loads of β-carotene and other carotenoids, carrots contain vitamins such as vitamin C and K, thiamin (B1), riboflavin (B2), pyridoxine (B6) and folates (B9), necessary for metabolism of carbohydrates, proteins and healthy growth. Vitamin C promotes the absorption of non-heme iron and is required for fighting infections and vitamin K helps preventing bleeding. Thiamin (B1) has highly beneficial effects on our nervous system and mental attitude; riboflavin is necessary for cell respiration, and red blood cell formation; pyridoxine inhibits the formation of homocysteine and reduces the risk of heart disease; and folates may reduce the risk of heart attack by lowering homocysteine levels. High levels of homocysteine have been found to be associated with an increased risk of hardening of arteries due to the accumulation of fatty plaques. It also pro-tects against birth defects in babies (João Carlos da Silva Dias 2014).

Stevia rebaudiana is a small perennial growing up to 65-80 cm tall, with sessile, oppositely arranged leaves. Different species of Stevia contain several potential sweetening compounds, with S. rebaudiana being the sweetest of all. Stevia is a semi-humid subtropical plant that can be grown easily like any other vegetable crop even in the kitchen garden Stevia has been successfully cultivated in recent years in many areas of Indian states: Rajasthan, Maharashtra, Kerela and Orissa. The increasing demands for natural sweeteners have driven the farmers in India toward large-scale Stevia cultivation. Diterpene glycosides are the group of natural sweeteners that have been extracted from Stevia. (S. K. GOYAL, 2009).

Stevia Contain several potential sweetening compounds, with S. rebaudiana Berton being the sweetest of all the use of S. rebaudiana as a sweetener can be found in many parts of Central and South America, where this species is indigenous, as well as in Japan. People in Japan have been using Stevia as a sweetener in products such as seafood, soft drinks, and candies.

This plant has been used in several areas of the world, such as in Brazil and Paraguay, as a natural control for diabetes. Stevia also has been used to help control weight in obese persons. (S. K. GOYAL, 2009). Stevia rebaudiana is a nutrient rich natural sweetest plant of Asteraceae family. The leaves naturally contain diterpene glycosides sativoside, rebaudiosides A-F, steviolbioside

and dulcoside, which are responsible for its sweet taste and have commercial value all over the world as sugar substitute in foods, beverages or medicines. It is a magical plant which offers sweetness with fewer calories and do not show any side effects after consumption on human health.

Stevia has many pharmacological and therapeutic applications as suggested by many preclinical and some clinical studies; these are nontoxic and possess antioxidant, antimicrobial, antifungal and anticarcinogenic activity.In future Stevia is likely to become a major source of high potency low calorie sweetener for growing natural food market. This review article presents beneficial role of Stevia and its metabolites on health promotion properties. (Ena Gupta et. al, 2013).

II. MATERIALS AND METHODS

1. Procurement of Raw Material for instant carrot dessert incorporated with stevia:
Raw materials required during present investigation were procured from local market of Kalyan (MH) such as carrots, milk solids, dry fruits, coconut, stevia etc. Most of the chemicals and equipments used in this investigation were of analytical grade which are obtained from College of Food Technology Saralgaon, Thane. The raw material were cleaned and made free from foreign matters.

2. Physical Properties of instant carrot dessert incorporated with stevia:
The colour of carrot dessert was determined by visual observations; the temperature of carrot dessert was measured by thermometer. The weight of Dhokla was measured on analytical weighing balance.

3. Chemical Properties of instant carrot dessert incorporated with stevia:
Proximate composition such as moisture, ash, crude fat, crude protein and crude fibre of all the Ingredients and product was determined according to the procedures given in AOAC (2000). For moisture determination samples were dried in hot air oven at 110ºC for 4 hrs. For ash determination samples were placed in muffle furnace at 550ºC for 5hrs to burn out all carbon compounds leaving in organic part (ash). Fat was determined by Soxhlet extractor by using petroleum ether.

For fibre determination, samples were treated with 1.25% Sulphuric acid and Sodium Hydroxide solution. After filtration of digested material, it was washed with hot water and then ignited. By calculating loss of weight after ignition, crude fibre contents were determined. Protein contents were determined by using Kjeldahl unit.

4. Sensory Evaluation of instant carrot dessert:
Prepared product was evaluated for sensory characteristics in terms of appearance, color, flavor, after taste, texture and overall acceptability by 10 semi-trained panel members comprised of academic staff members using 9-point Hedonic scale. Judgments were made through rating the product on a 9-point Hedonic scale with corresponding descriptive terms ranging from 9 ‘like extremely’ to 1 ‘dislike extremely’. The obtained results were recorded in sensory score card.

5. Preparation of dehydrated carrot shreds:
Before the preparation of recipe, the carrots shreds were blanched at 100 0C for 2 min in boiling water. In a solution of 1% calcium chloride, which acted as a firming agent and 0.1% sodium Meta bisulphate, used as a preservative and an antioxidant then remove carrot shreds from hot water. The carrot shreds were then dehydrated in tray dryer at 550C for 7-8 hrs. (Temperature is suitable for carrot dehydration process it can prevents colour, carotenoids, vitamins content etc.), finally desirable dehydrated carrot shreds were obtained.

6. Flow chart for Preparation of pre-mix:

Dehydrated carrot shreds
↓
Dry fruits + coconut powder (10:10)
↓
Mix well
↓
Milk solid + stevia (20:10)
↓
Mixing
↓
Packaging
↓
Storage

7. Formulation of instant carrot dessert incorporated with stevia:
Instant carrot dessert prepared with carrot, milk solid, dry fruits, dry coconut powder and stevia powder were investigated. The formulation was made by varying levels of stevia and carrot shreds viz., 00:00, 05:60, 10:50 and 15:40 percent respectively and T2 sample was selected because it got highest score in sensory evaluation.

III. RESULTS

1. Physicochemical Properties of carrot:

Table 1.physicochemical properties of Carrot

Parameter	Units	Parameter	Units
length	154.55mm	Ash	1.1%
Width	28.61mm	Moisture Content	86%
Mass	72.74g	Fat	0.2%
Volume	70cm^3	Protein	0.9%
True density	1.04g/cm^3	Carbohydrate	10.6%

The physical parameters of carrot were found to be length (154.55mm), width (28.61mm), mass 72.74g, volume (70cm3) and true density (1.04g/cm3) and the chemical parameters of carrot was found to be moisture content (86 %), fat (0.2 %), protein (0.9 %), ash (1.1%) and carbohydrate (10.6%). The value of physical and chemical parameters which was related to the review paper of (ahmad jahan bakhshi et.al, 2018) and (Monica gallo et.al, 2018).

2. Physical and chemical Properties of stevia leaves:

Table 2.Physical and chemical Properties of stevia leaves

Parameter	Units	Parameter	Units
length	7.05mm	Ash	12.6%
Width	5.22mm	Dietary fiber	5.03%
Thickness	1.51mm	Fat	6.13%
Diameter	2.80mm	Protein	10.7%
		Carbohydrate	63.1%
		Reducing sugar	4.5%

The physical parameters of stevia leaves were found to be length (7.05mm), width (5.22mm), thickness (1.51mm), diameter (2.80mm). and the chemical parameters of carrot was found to be fat (6.13 %), protein (10.7 %), ash (12.6%), carbohydrate (63.1%), reducing sugar (4.5%), and dietary fiber (5.03%), The value of physical and chemical parameters which was related to the review paper of (Monica gallo et.al., 2018) and (Krishna datt sharma et.al., 2012).

3. Physicochemical properties of carrot dessert:

Table 3.Physicochemical properties of carrot dessert

Parameter	Result
Colour	Orange
Quality	Opaque
Cookingtime	6 min
Ash	4.36± 0.05
Moisture	7.26 ± 0.05
Calories	378.66 Kcal
Fat	3.06± 0.06
Carbohydrate	76.20± 0.09
Protein	11.76± 0.05

It was evident that the colour of carrot dessert was orange which was determined by visual observation. The cooking time of premix to product is 6min. measured by stopwatch. Quality of carrot dessert is opaque (not capable of having light pass through) measured by visual observation. It concludes that Ash value of carrot dessert was found to be 4.36%, Moisture content7.26%, Fat content 3.06%, Protein content 11.76%, Carbohydrate content 76.20% and Energy value 378.66Kcal respectively. It concluded that carrot dessert rich in Carbohydrate and protein and low in calories.

IV. SENSORY EVALUATION

Table 4. Sensory Evaluation of Carrot Dessart

parameter	Sample T0	Sample T1	Sample T2	Sample T3
Colour	7	8	9	8
Flavour	8	6	8	7
Taste	7	6	9	6
Texture	6	7	9	8
Overallacceptability	7	6.7	8.7	7.2

It was concluded that sample T2 has highest score as compared to other samples. The overall acceptability of sample T2 was selected by 8.7 points whiles another sample. T2 more acceptable on its sensory attributes. The colour of T2 sample as per graph is 9 point while samples T0 (07), T1 (08), T3 (08). The flavour of sample T2 was acceptable with 8 while samples T0 (08), T1 (06), T3 (07). The taste of sample T2 was selected by 9 points while another sample are T0 (07), T1 (06), T3 (06).

The texture of sample T2 was selected by 9 points while another sample are T0 (06), T1 (07), T3 (08). The overall acceptability of sample T2 was selected by 8.7 points while other samples points are T0 (7.3), T1 (6.7), T3 (7.2).

V. MICROBIAL TESTS FOR PREMIX

(Day 1, 14, and 28 stored at 28°C which is expressed in cfu/g.

Table 5.Microbial Count for Premix

Microorganisms	Day 1	Day 14	Day 28
Yeast	0.04×10^1	1.02×10^1	1.03×10^1
Moulds	1.01×10^1	1.02×10^1	1.03×10^1
Coliforms	$<1.00 \times 10^1$	$<1.00 \times 10^1$	$<1.02 \times 10^1$

The microbial test parameters of premix were found to be, yeast day 1 (0.04 × 101), day 14 (1.02 × 101) and day 28 (1.03 × 101) and Moulds found day 1 (1.01 × 101), day 14 (1.01 × 101) and day 28 (1.03 × 101) and coliform found day 1 (<1.00 × 101), day 14 (<1.00 × 101), and day 28 (<1.02 × 101).

VI. CONCLUSION

In the present study finally, it is concluded that instant carrot dessert premix prepared from different variation of ingredients such as carrot, milk solids, Dry fruits, coconut powder, stevia has high Nutrition quality and also it is rich in carbohydrates and low in calories and we using stevia it is contain no sugar. Carrot desert supplemented with stevia was successfully produced. The present investigation carried out for information of Instant carrot dessert in which T2 sample found more superior than sample T1 and T3. T2 sample is more acceptable on its sensory attributes.

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