

Original Research Article

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## Development and Sensory Evaluation of Biscuit by Incorporation of Carrot Powder

G. Mounika<sup>1\*</sup> and Srinivas Maloo<sup>2</sup>

<sup>1</sup>Food Processing Technology, University College of technology, Osmania University, Hyderabad, Telangana, India

<sup>2</sup>University College of technology, Osmania University, Hyderabad, Telangana, India

\*Corresponding author

### ABSTRACT

#### Keywords

Carrot-carotenoids,  
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Functional products

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Carrot is one of the important root vegetables rich in bioactive compounds like carotenoids and dietary fibers with appreciable levels of several other functional component shaving significant health-promoting properties. The consumption of carrot and its products is increasing steadily due to its recognition as an important source of natural antioxidants having anticancer activity. The purpose of this paper is to develop biscuit incorporated with carrot powder to enhance the nutritional value of it. The proportion of refined wheat flour and carrot powder were 97:3, 94:6, 91:9 and with these flour blends and used for making biscuit samples were 0, 3, 6, 9% respectively. The biscuits were evaluated for its sensory test.

### Introduction

The carrot (*Daucus carota*) is a root vegetable. Carrot is also an excellent source of calcium pectate an extraordinary pectin fiber that has the cholesterol lowering properties. It has a property to reduce the risk of high blood pressure, stroke, heart disease and some type of cancer.

Carrot (*Daucus carota*) is one of the nutritious vegetable consumed in raw and processed form throughout the world. In recent years, the consumption of carrot and its related products have increased steadily due to recognition of

antioxidant and anticancer activities of beta-carotene in carrot, which is also a precursor of vitamin A (Kotecha *et al.*, 1998; Speizer *et al.*, 1999). Carrot is the richest source of c, iron, pectin, dietary fibres, complex carbohydrates and various minerals. Carrot could be consumed raw or in processed form or can be fortified in a variety of food products. Lee *et al.*, (2003) found decreased lipid oxidation rate in carrot powder added in fried dough. Different workers have successfully utilized antioxidant properties of carrot.

Vegetables are good sources of fibers, minerals and vitamins. They are cheaper and

easily available, but are seasonal and highly perishable. Nearly 40 per cent of vegetables go waste due to their perishable nature, lack of appropriate post-harvest infrastructure and transportation, inadequate marketing set up and processing.

The red variety of the carrot root has been reported to contain higher concentrations of lycopene (10 mg/100g) even higher than tomatoes (Grassman *et al.*, 2007) and almost absent in  $\alpha$ -carotene (Koch and Godman, 2005). The study based on five European countries showed ingestion of carrots in the diet contributed 60-90 % of total  $\beta$ -carotene taken by the humans (Maiani *et al.*, 2009).

Biscuit is one of the oldest commonly consumed non fermented baked snacks. Biscuits are anytime munching breakfast or snacks item. It is a quick hunger satisfying food. Working class face shortage of time, so biscuits become handy snacks for them. Biscuits are considered as best option for students, given their pocket money constraints.

Respondent of different age group were selected to know their eating habits and perception towards healthy and nutritious biscuits, because biscuits are consumed across all age groups (Dr. Jigna Chandra Kant Thrived *et al.*, 2016).

The word 'Biscuit' is derived from the Latin words 'Bis' (meaning 'twice') and 'Coctus' (Meaning cooked or baked). The word 'Biscotti' is also the generic term for cookies in Italian (Dr. Jigna Chandra Kant Thrived *et al.*, (2016).

The objective of this study on Preparation of Carrot powder from dried carrot, Preparation of biscuit from wheat and carrot mixed powder, Sensory evaluation of biscuit by incorporation of carrot powder.

## **Materials and Methods**

Refined wheat flour, carrots, RBD (brand name "BRITE"), sugar, salt, milk powder, ammonia bicarbonate used for biscuit making were purchased from local market in Hyderabad (India).

### **Drying method**

#### **Tray dryer**

Selected carrots that are fresh and crisp, peel them, and cut them into 5 to 6 mm thick slices. The sliced carrots dried in a Tray drying at 80°C for 6-8hr. The dried carrot was grinding in mixer and sieved with a 2mm sieve and was packaged in polythene bag for further uses.

### **Sample preparation**

Ingredient formulations for biscuit products are given in Table 1. Fine wheat flour was replaced with carrot powder at levels of 0%, 3%, 6% and 9%.

The ingredients were mixed in the same food processor with mixer attachment. All the ingredients were again mixed in the same food processor for 10 minute based on preliminary study.

The weighed quantity of refined wheat flour, carrot powder and sugar powder is sieved and is then mixed properly with above mix with RBD and invert syrup. Then milk powder, ammonia bicarbonate and salt are added to it. It is mixed well with to a proper consistency like a soft dough.

Then a spoon full of dough is poured on a greased tray. It is then baked in oven at temperature maintained 180°C -200°C for 15 minutes. The baked biscuits were cooled for about 30 minutes, packed in polybags till the evaluation of responses and sensory analysis.

## Results and Discussion

### Sensory analysis of biscuits

Sensory Evaluation for the biscuits was conducted using 3 formulation of carrot powder. The sensory scores suggested that sample B (6%Carrot powder) had maximum acceptability. Compare to Control sample, sample A (3 % carrot powder) and sample C (9% carrot powder)

### Control biscuits

Appearance of control biscuit is 0th day scored 7 and 5th Month having 6.5.

Similarly Colour, flavor, taste, texture and Overall acceptability of the control biscuit scores were decreased.

Compared to 0th day to 5th month the sample score was decreased. When increasing the storage period appearance, Colour, flavor, Taste, Texture and overall acceptability changes were observed.

### Sample -A (3%)

The score for taste was found highest in 0<sup>th</sup> day with a score of 7.2 as compared to 1<sup>st</sup> to 5<sup>th</sup> months of biscuit sample- A (3%)

Appearance of sample- A is 0<sup>th</sup> day scored 7 and 5<sup>th</sup> Month having 6.9. Similarly Colour, flavor, taste, texture and Overall acceptability of the sample A scores were decreased. Compared to 0<sup>th</sup> day to 5<sup>th</sup> month the sample score was decreased. When increasing the storage period appearance, Colour, flavor, Taste, Texture and overall acceptability changes were observed.

**Table.1** Composition of biscuit with incorporation of carrot powder

S. No.	Ingredients	Controlled (0%)	Sample-A (3%)	Sample-B (6%)	Sample-C (9%)
1	Maida (refine wheat flour) (g)	100	97g	94g	91g
2	Carrot powder	-	3g	6g	9g
3	RBD	15g	15g	15g	15g
4	Sugar	40g	40g	40g	40g
5	Salt	1g	1g	1g	1g
6	Water	20ml	20ml	20ml	20ml
7	Milk powder	5g	5g	5g	5g
8	Ammonia bicarbonate	1g	1g	1g	1g

**Table.2** Sensory score of control biscuits

Sensory attributes	0 <sup>th</sup> day	1M	2M	3M	4M	5M
Appearance	7	6.5	7.2	6.8	6.5	6.5
Colour	6.9	6.8	6.7	6.8	6.9	6.8
Flavour	6.8	6.7	6.5	6.3	6.8	6.5
Taste	6.5	6.8	6.5	7	6.7	6.9
Texture	6.9	6.8	7	6.8	6.9	6.8
Overall acceptability	7	7	6.8	7	6.9	6.5

**Table.3** Sensory score of biscuit sample-A (3%)

Sensory attributes	0th day	1M	2M	3M	4M	5M
Appearance	7	7	6.9	6.8	7	6.9
Colour	6.7	6.5	6.3	6.8	6.5	6.7
Flavour	6.8	6.8	6.5	6.3	6.3	6
Taste	7.2	7	6.8	6.5	6.8	6.5
Texture	7	6.5	6.3	6	6.3	6.2
Overall acceptability	6.9	6.7	6.5	6.3	6.8	6.9

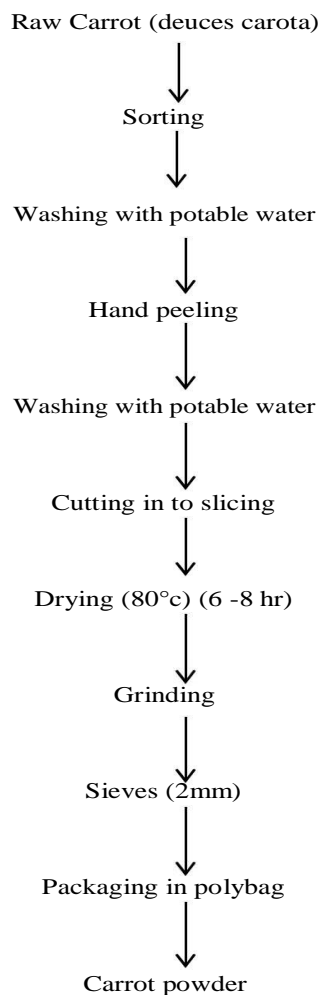
**Table.4** Sensory score of biscuit sample-B (6%)

Sensory attributes	0th day	1M	2M	3M	4M	5M
Appearance	7.6	7.3	7.4	7.3	7.1	6.9
Colour	7.3	7.2	7.1	7	6.9	6.7
Flavour	7.1	7	6.8	6.5	6.2	6.3
Taste	7.4	7.3	7.1	6.9	6.3	6.5
Texture	7.1	7	6.9	6.7	6.5	6.2
Overall acceptability	7.3	7.2	7	6.9	6.8	7

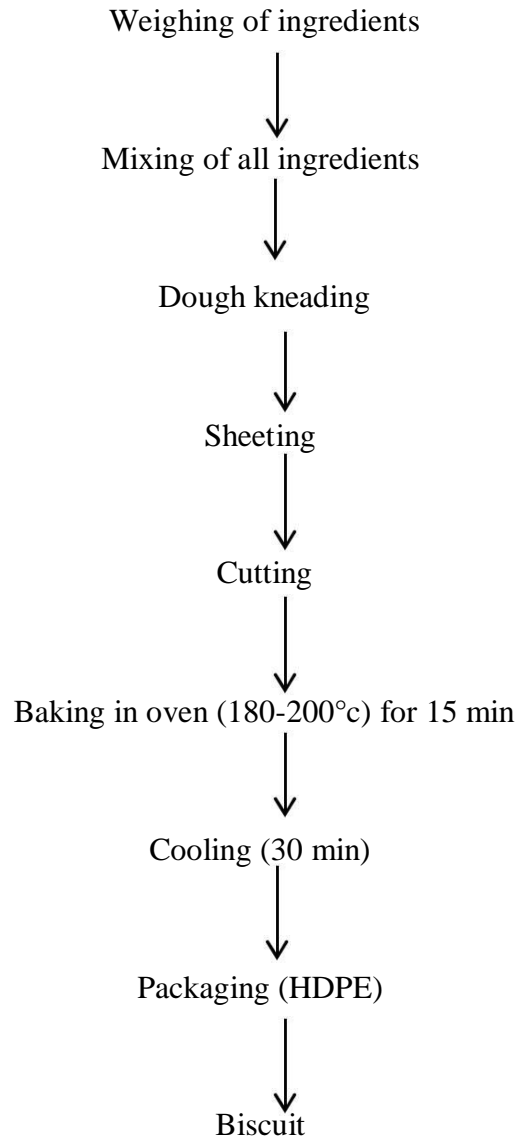
**Table.5** Sensory score of sample-C (9%)

Sensory attributes	0th day	1M	2M	3M	4M	5M
Appearance	7.4	7	6.8	6.7	6	6
Colour	7.2	7.1	7.2	6.9	6.7	6.5
Flavour	7.1	7.1	6.8	6.5	6.3	6
Taste	7	6.8	6.7	6.5	6	6
Texture	7	7	6.9	6.7	6.8	6.2
Overall acceptability	7.2	7	7	6.8	6.5	6

**Process flow chart for the carrot powder**



**Process flow chart for the Biscuits**



**Fig.1** Carrot slices before and after drying



Fig.2 Sensory characteristic of control biscuits

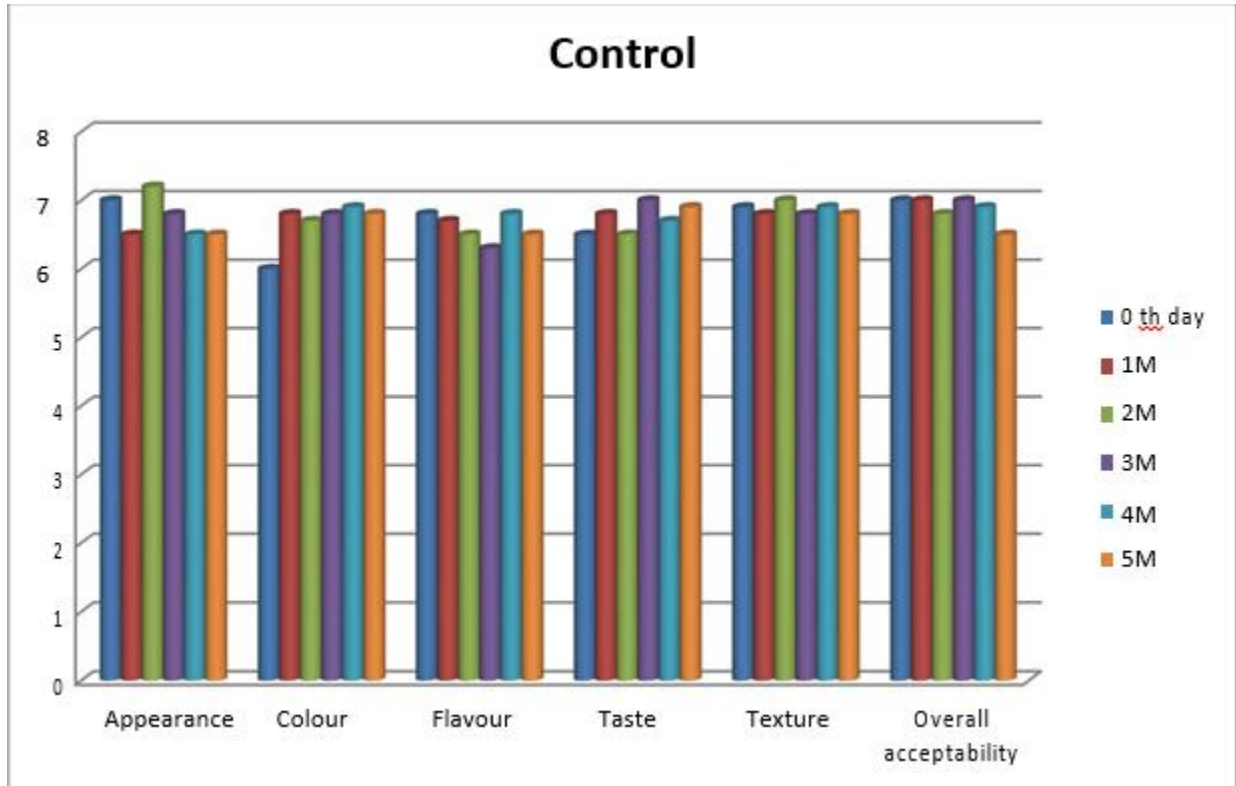
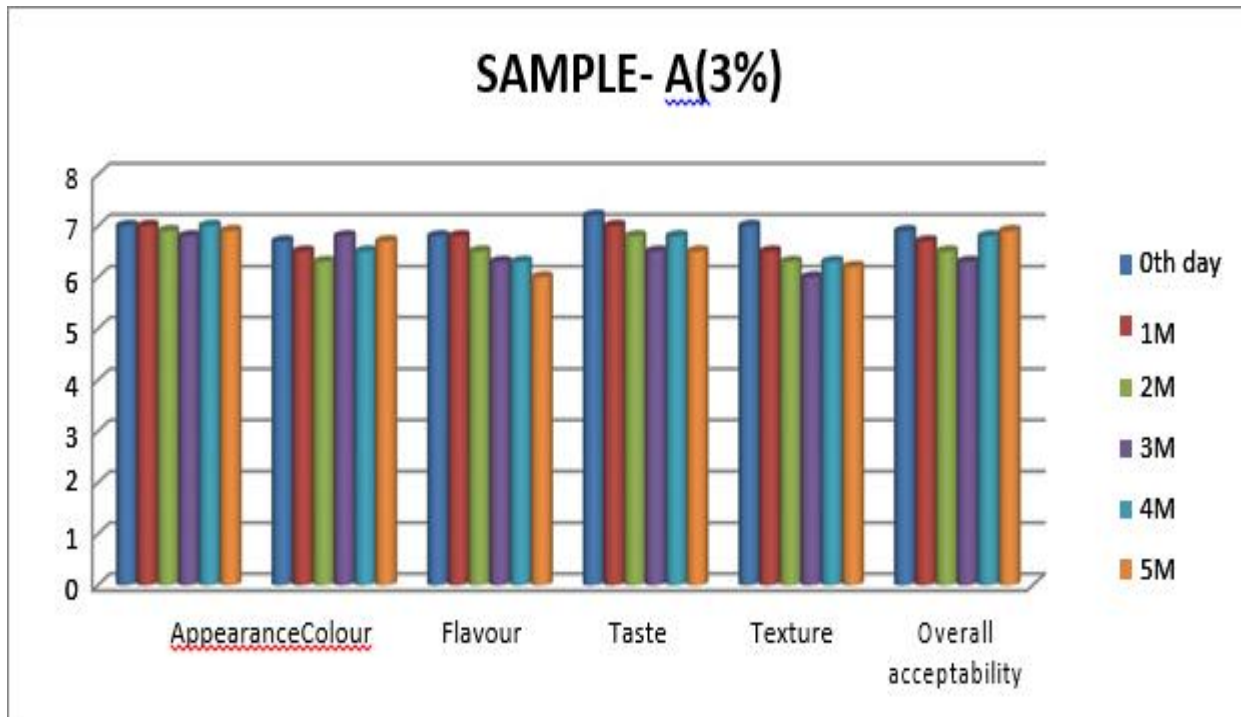
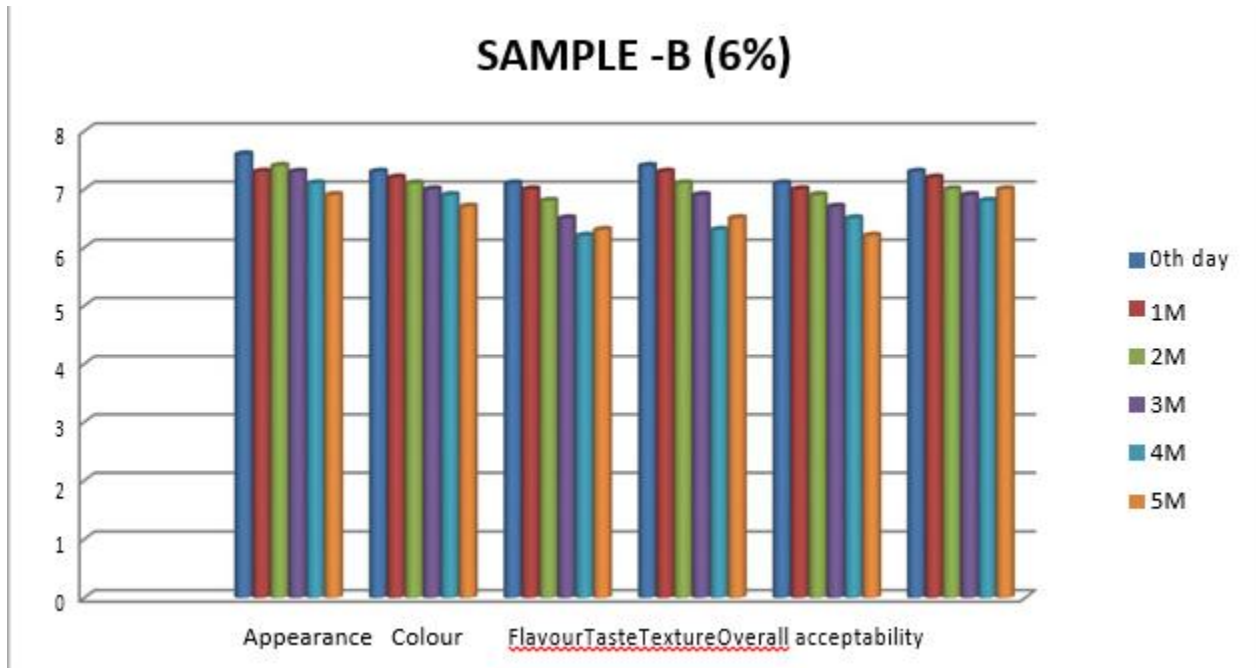


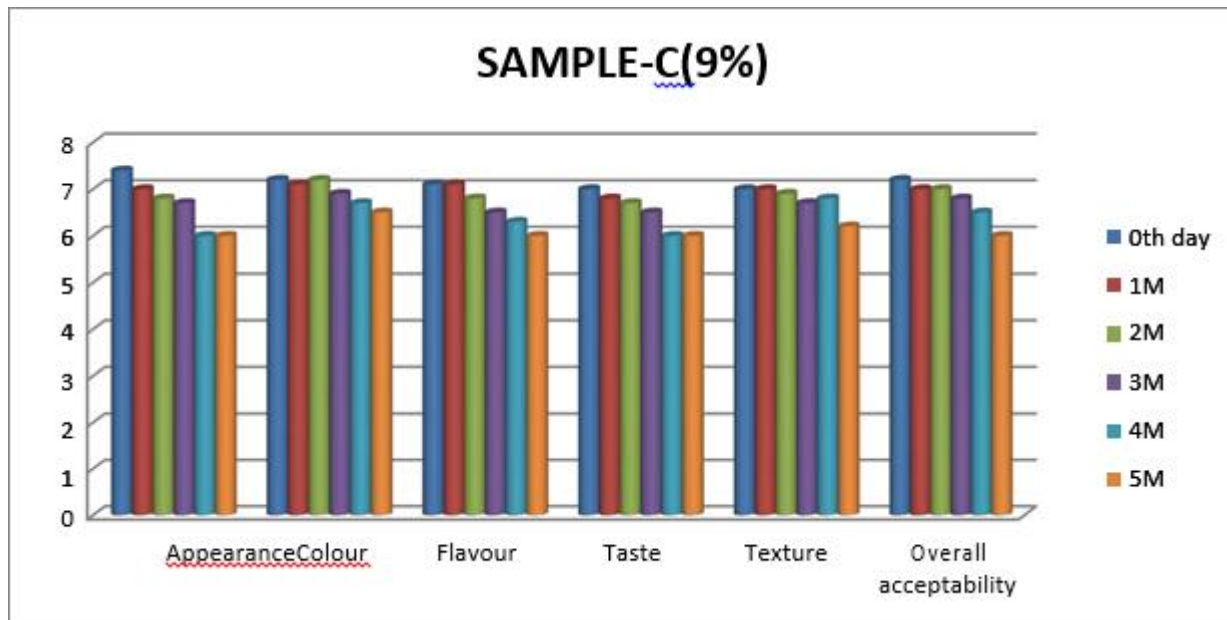
Fig.3 Sensory characteristic of biscuit sample-A (3%)



**Fig.4** Sensory characteristic of biscuit sample-B (6%)



**Fig.5** Sensory characteristic of biscuit sample-C (9%)



**Sample-B (6%)**

The score for Appearance, taste and colour, was found highest in 0th day with a score of 7.6, 7.4 and 7.3 as compared to Other Biscuit samples. Appearance of e sample-B is 0th day

scored 7.6 & 5th Month having 6.9.similarly Colour, flavor, taste, texture & Overall acceptability of the sample B scores were decreased. Compared to 0th day to 5th month the sample score was decreased. When increasing the storage period appearance,



Colour, flavor, Taste, Texture and overall acceptability changes were observed.

### **Sample-C (9%)**

The score for appearance and colour was found highest in 0<sup>th</sup> day with a score of 7.4 and 7.2 as compared to other Biscuit samples

Appearance of e sample-C is 0<sup>th</sup> day scored 7.4 and 5<sup>th</sup> Month having 6.similarly Colour, flavor, taste, texture & Overall acceptability of the sample-C scores were decreased. Compared to 0<sup>th</sup> day to 5<sup>th</sup> month the sample score was decreased. When increasing the storage period appearance, Colour, flavor, Taste, Texture and overall acceptability changes were observed.

The acceptability of carrot powder and wheat flour mixed biscuit were evaluated interns of colour, flavor, texture and overall acceptability by taste panel members. As per sensory analysis it was found that sample-B (6% Carrot powder) secured the highest score. Compare to other biscuit samples (control, sample-A (3%), Sample-C (9%)) (Fig. 1–5; Table 2–5)

This research finally leads to the formulation of healthy biscuits incorporated with carrot Powder as functional ingredients. On the basis of nutritional and sensory quality, biscuit when incorporated with 6% carrot powder resulted in better quality.

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