

# Dark chocolate as a antioxidant food: Product development and sensory evaluation

Kiran Agrahari and Ritima Baranwal

The objective of present investigation was to develop dark chocolate based products like chocolate brownie and chocolate pudding. Dark chocolate contains 50-90 per cent cocoa solids. Cocoa is rich in plant chemicals called flavanols that may help to protect the heart. Dark chocolate contains upto 2-3 times more flavanol-rich cocoa solids than milk chocolate. Flavanols have been shown to support the production of nitric oxide (NO) in the endothelium (the inner cell lining of blood vessels) that helps to relax the blood vessels and improve blood flow, thereby lowering blood pressure. The developed products were given to the panel of 10 judges products were tested for flavour and taste, body and texture, colour and appearance and over all acceptability. The organoleptic evaluation of products was done by using score card method (9-point hedonic scale). The result of dark chocolate based products *i.e.* chocolate brownie and chocolate pudding, ( $T_0$ ) and ( $T_1$ ) was best in all treatments in case of all sensory attributes. The over all acceptability ( $T_1$ ) chocolate brownie and chocolate pudding were 9.0, 8.95, respectively.

**Key Words :** Dark chocolate, Antioxidant food, Product development, Sensory evaluation

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## INTRODUCTION

Dark chocolate is high in calories (150-170 calories per ounce) and can contribute to weight gain if eaten in excess. However, chocolate, like nuts can induce satiety, so the longer term implications for weight control are not clear. It also contains a moderate amount of saturated fat, which can negatively affect blood lipid levels, though its heart-protective effects from flavanols appear to outweigh the risk. Choosing dark chocolate and eating

modest quantities may offer the greatest health benefits. Known as a great energy booster, dark chocolate is filled with essential nutrients that make it a healthier chocolate option to satisfy your sweet cravings. The nutrients you get from the dark chocolate is better emphasized in the Healing Foods Pyramid, which shows what food to take to nourish the body, among many other benefits. Dark chocolates are rich in dietary fibre, a carbohydrate that makes you feel full faster. So it is a great food for people who want to lose weight but could not cut off sweets instantly. For every 100 grams of dark chocolates is 28 per cent daily value of dietary fibre. Dark chocolates are also very rich in calcium, magnesium and iron. The 5 per cent DV of calcium for healthy functioning of bones, muscles and blood vessels. Magnesium, at 36 per cent DV, keeps a healthy immune system and assists in the production of energy and protein. The 44 per cent DV of iron is very important to transport

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oxygen through the body.

### Objective:

- To standardize and develop the products.
- Organoleptic evaluation of developed products.

## METHODOLOGY

The present investigation on dark chocolate as a antioxidant food: Product development and sensory evaluation” was carried out to develop the products. The study was conducted in Department of Food and Nutrition, Faculty of Home Science, Kamla Nehru Institute of Physical and Social Science, Sultanpur.

Justified, judicious and scientific methodological considerations is indispensable for any investigation to deduce meaningful interferences concerning the objectives of the study. The study design reflects to the logical manner in which units of study are assessed and analyzed for the purpose of drawing generalization. Thus, with the view of the available resources, the best procedures for taking correct observation should be first sorted out in a logical manner so that unbiased interference can be drawn. This chapter delineates information pertaining to the research design and methodological steps used for investigation.

The research procedure has been distinctly described as under in the following heads:

- Procurement of material.
- Development of dark chocolate based products.
- Sensory evaluation.
- Statistical analysis.

Ingredient	Amount	Experimental
	Control	
Cocoa powder	½ cup	½ cup
Chocolate syrup	-	2 tbsp
Melted butter	½ cup	½ cup
Condensed milk	5 tbsp	5 tbsp
Curd ( <i>Dahi</i> )	1½ tbsp	1 ½ tbsp
Vanilla essence	1 tsp	1 tsp
Plain flour (maida)	1 cup	1 cup
Baking soda	¼ tsp	¼ tsp
Baking powder	½ tsp	½ tsp

### Method:

- Combined the melted butter and condensed milk

in a deep bowl and mix well using a spatula.

- Added curds and vanilla essence and mix well using a whisk or till no lumps remain.
- Added the cocoa powder and mix well using a spatula.
- Added the plain flour, baking soda and baking powder and fold gently using a spatula.
- Added the chocolate syrup and mix well.
- Transferred the chocolate-plain flour mixture into a greased and dusted baking tray of 225 mm. x 125 mm. (9" x 5") and tap it lightly.
- Baked it in a pre-heated oven at 180°C (360°F) for 20 minutes. Cool and cut into equal squares. Serve warm or use as required.
- Decorated with chocolate syrup.

Ingredients	Amount	Experimental
	Control	
Milk	2 ½ cup	1 cup
Cornflour/cornstarch	3 tblspn	2 tblsp
Cocoa powder	-	2 tblspn
Vanila extract	1 teaspoon	-
Salt	-	a pinch
Sugar	½ cup	½ cup

### Method:

- Taked all the ingredients except milk in a bowl and use a whisk to mix well.
- Added milk slowly and mix till no lumps is formed.
- Now pour this entired mix into a sauce pan and heat on very low heat till it gets thick and creamy. It will take 5 mins or so.
- Now removed it from heat and cool it a bit while you mix every now and then, so a crust is not formed.
- Pour it into serving glasses and serve warm or chill it for a hour or so.

## OBSERVATIONS AND ASSESSMENT

The data were collected on different aspects per plan were tabulated and analyzed statistically. The result from the analysis presented and discussed chapter in the following sequence.

Organoleptic evaluation of dark chocolate based products.

- Flavour and taste.
- Body and texture.
- Colour and appearance.
- Overall acceptability.

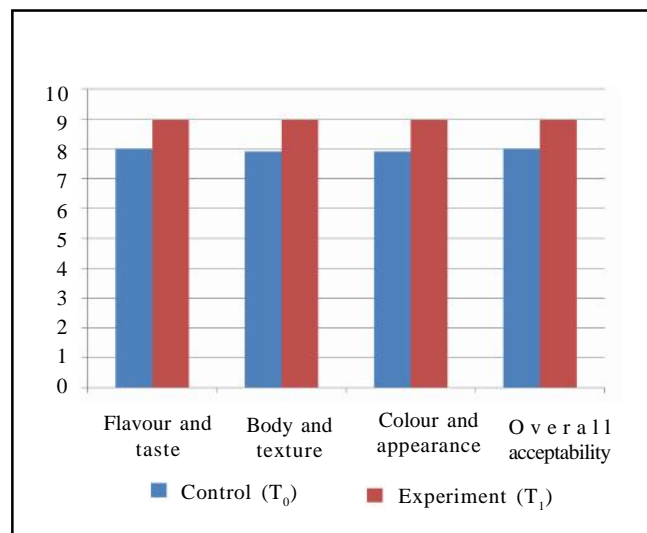
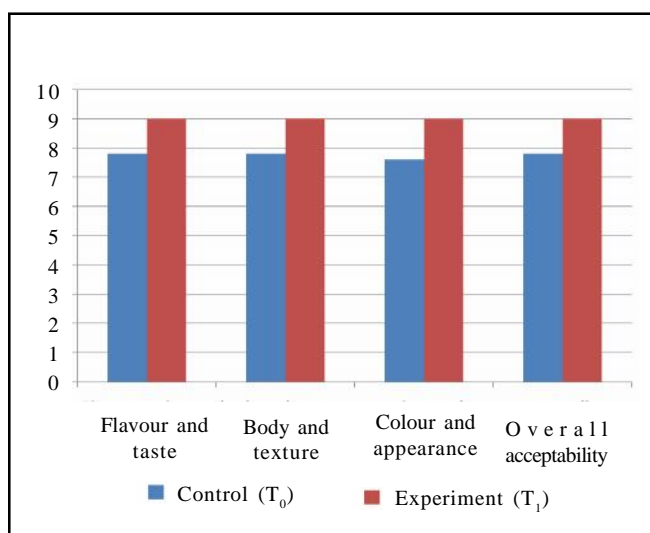
Table 1 shows that the experimental (T<sub>1</sub>) obtained maximum 9.0, 9.0, 9.0 and 9.0 for flavour and taste, body and texture, colour and appearance, overall acceptability; while control (T<sub>0</sub>) 7.8, 7.8, 7.8 and 7.8 for flavour and taste, body texture, colour and appearance, overall acceptability, respectively. This indicated that the experimental (T<sub>1</sub>) Soup was found to be fallen under category of “Liked very much to liked extremely”.

Engler and Engler *et al.* (2006) conducted that cocoa and chocolate have recently been found to be rich plant-derived sources of antioxidant flavonoids with beneficial cardio-vascular properties. These favourable physiological effects include: antioxidant activity, vasodilation and blood pressure reduction, inhibition of platelet activity and decreased inflammation. Increasing evidence from experimental and clinical studies using cocoa-derived

products and chocolate suggest an important role for these high-flavanol-containing foods in heart and vascular protection.

Table 2 shows that the experimental (T<sub>1</sub>) obtained maximum 8.95, 8.95, 8.95 and 8.95 for flavour and taste, body and texture, colour and appearance, overall acceptability; while control (T<sub>0</sub>) 8.0, 7.9, 7.9 and 8.0 for flavour and taste, body texture, colour and appearance, overall acceptability, respectively. This indicated that the experimental (T<sub>1</sub>) Korma was found to be fallen under category of “Liked very much to liked extremely”.

Balzer *et al.* (2008) assessed that Our goal was to test feasibility and efficacy of a dietary intervention based on daily intake of flavanol-containing cocoa for improving vascular function of medicated diabetic patients. A single ingestion of flavanol-containing cocoa was dose-dependently associated with significant acute increases in circulating flavanols and FMD (at 2 h: from 3.7 +/- 0.2% to 5.5 +/- 0.4%, p < 0.001). A 30-day, thrice-daily consumption of flavanol-containing cocoa



**Table 1 : Organoleptic evaluation of dark chocolate brownie**

Product	Flavour and taste	Body and texture	Colour and appearance	Overall acceptability
T <sub>0</sub> (Controlled)	7.8	7.8	7.8	7.8
T <sub>1</sub> (Experimental)	9.0	9.0	9.0	9.0

**Table 2: Organoleptic evaluation of dark chocolate pudding**

Product	Flavour and taste	Body and texture	Colour and appearance	Overall acceptability
T <sub>0</sub> (Controlled)	8.0	7.9	7.9	8.0
T <sub>1</sub> (Experimental)	8.95	8.95	8.95	8.95

increased baseline FMD by 30% ( $p < 0.0001$ ), while acute increases of FMD upon ingestion of flavanol-containing cocoa continued to be manifest throughout the study. Treatment was well tolerated without evidence of tachyphylaxia. Endothelium-independent responses, blood pressure, heart rate and glycemic control were unaffected. Diets rich in flavanols reverse vascular dysfunction in diabetes, highlighting therapeutic potentials in cardio-vascular disease.

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