

# Formulation and Quality Evaluation of Value-added Instant Halwa Mixes

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**Abstract**—The current study was conducted to formulate and assess the sensory acceptability of instant halwa mixes. Halwa is a sweet confectionery, prepared using four different seeds (watermelon, pumpkin, poppy, and cucumber). The selected seeds were cleaned, dried and milled using a pulveriser. Sensory evaluation was carried out using a 5-point hedonic scale. Physical and physicochemical parameters such as true density, bulk density, porosity, water absorption index, and moisture content were analyzed. Storage stability for the selected variation was assessed for 30 days under ambient conditions. Each processing steps are checked for safety and the principles of Hazard Analysis and Critical Control Points (HACCP) were applied throughout the production. The pumpkin seed instant halwa mix recorded the highest sensory acceptability ( $4.1 \pm 0.58$ ) among all variations. The bulk and true density of the product were found to be 0.45 and 0.63 and has a pH value of 6, water absorption index and oil absorption index was 1.2 and 0.9 respectively. Storage studies showed that the standardized mix has a stable sensory quality for up to 30 days. HACCP analysis confirmed that the processing steps were free from critical hazards, ensuring a safe and quality product.

**Index Terms**—Instant Halwa mix, Pumpkin seeds, Sensory evaluation, HACCP.

## I. INTRODUCTION

Instant food mixes are made by combining processed grains and pulses with spices, condiments and other food items in a variety of combinations. Currently, the Indian food market is witnessing a vast range of instant food mixes. Dry mixes of various traditional

recipes, including Rava Idli mix, instant Gulab jamun mix, instant khichdi mix, and instant Sooji upma mix are widely available [1]. Halwa is a type of rich and sweet confections made in northern part of India. It is a dessert with the consistency of very thick pudding made with various types of fruits, vegetables, grains, nuts, and lentils [2].

Watermelon is an excellent natural source of lycopene and the seeds are rich in various micronutrients with increased antioxidant activity and several health advantages [3]. Pumpkin seeds are stronger in nutritional content, providing good quality oil and an excellent source of protein [4]. Pumpkin seeds are high in phosphorus and may be utilized to reduce the risk of bladder stones [5]. Poppy seeds had an earthy aroma and a nutty flavor. Poppy seeds possess a flavoring component called 2-pentyl furan. Opium poppy contains primary and secondary alkaloids, neutral elements, and organic acid [6]. Cucumber seeds contain phytonutrients such as flavonoids, lignans, and triterpenes, which have antioxidant, anti-inflammatory, and anti-cancer properties. Cucumber seeds are also an essential source of zinc and calcium.

## II. MATERIALS AND METHODS

Watermelon seeds, pumpkin seeds, poppy seeds, cucumber seeds, sugar, and milk powder were procured from supermarket. Seeds are cleansed, dehydrated, milled and thoroughly cleaned to prevent infection. The sugar and seeds are ground into a powder using a pulveriser and mixed in specific

proportions. Halwa mix prepared using maida was served as control II and commercially available instant halwa mix served as control I. The seed powder (80g) and sugar powder (20g) are combined to form a homogenous mixture and stored in polypropylene pouches for later use.

Sensory evaluation of formulated instant Halwa: The sensory evaluation was carried out at 11.00 am in the morning by 20 semi-trained panel members using 5-point hedonic scale. The organoleptic qualities like color, appearance, flavor, taste, texture and overall acceptability of the products were analyzed.

Quality parameters for formulated instant halwa mix: The physical and physio-chemical parameters like true density, bulk density, porosity, water absorption index, oil absorption index, moisture content and pH were evaluated for highly accepted variation in the laboratory. The bulk and true density of the selected formulation was determined using standard equipment. The moisture content was estimated by drying the weighed sample (3g) to a constant weight using hot air oven. The pH is measured using pH meter. Water absorption index and oil absorption index are measured using standard procedures.

Storage studies of formulated instant halwa mix: 100g of selected instant halwa mix powder was packed in polyethylene pouches and stored under ambient conditions. They were withdrawn periodically every 15 days and checked for any degradations. Halwa was prepared from the mix and their sensory studies were carried out.

Application of HACCP plan: HACCP is defined as hazard analysis of critical control point which has 7 principles and 5 preliminary steps. It was implemented in each processing step of formulated instant halwa mixes.

Cost of the formulated instant halwa mix was calculated using a standard price list from the market.

### III. RESULTS AND DISCUSSIONS

Results of sensory analysis were shown in table I where, control I (Commercial Bombay Halwa) scored the highest overall acceptability at  $4.85 \pm 0.36$  and achieved a perfect  $5.0 \pm 0$  for Color and Appearance, followed by control II (Homemade Bombay Halwa) scoring  $4.5 \pm 0.6$  in overall acceptability. In terms of color and appearance, V-I scored higher than other variations compared to control. Among the four variations, Variation-II made with the Pumpkin Seeds, scored the highest value for texture ( $4.35 \pm 0.67$ ), flavor ( $4.3 \pm 0.86$ ), taste ( $4.65 \pm 0.67$ ) and overall acceptability ( $4.1 \pm 0.58$ ) compared to other variations. These results were consistent with Dhiman et al., 2017, where they reported that incorporation of dehydrated pumpkin along with seeds in instant halwa mix achieved good sensory scores. Kamble et al., 2024 also reported that sweet Potato based instant halwa mix has scored highest sensory acceptability ( $8.2 \pm 0.6$ ). Conversely, Variation IV, the Cucumber Seeds Halwa (CSH), received the lowest scores across all attributes, resulting in the lowest overall acceptability of  $3.1 \pm 0.55$ .

Table I Sensory evaluation of formulated Instant Halwa

Variations	Color and Appearance	Texture	Flavor	Taste	Overall Acceptability
Control I (CBH)	$5.0 \pm 0$	$4.8 \pm 0.36$	$4.9 \pm 0.30$	$4.7 \pm 0.47$	$4.85 \pm 0.36$
Control II (HBH)	$4.6 \pm 0.58$	$4.5 \pm 0.60$	$4.35 \pm 0.74$	$4.3 \pm 0.83$	$4.5 \pm 0.60$
Variation I (WaSH)	$4.6 \pm 0.59$	$3.9 \pm 0.88$	$3.6 \pm 0.75$	$3.8 \pm 0.89$	$3.9 \pm 0.85$
Variation II (PuSH)	$4.1 \pm 0.48$	$4.35 \pm 0.67$	$4.3 \pm 0.86$	$4.65 \pm 0.67$	$4.1 \pm 0.58$
Variation III (POSH)	$4.1 \pm 0.78$	$3.9 \pm 0.71$	$4.0 \pm 0.60$	$4.0 \pm 0.72$	$3.85 \pm 0.58$
Variation IV (CuSH)	$3.5 \pm 0.82$	$3.3 \pm 0.92$	$3.0 \pm 0.45$	$2.9 \pm 0.51$	$3.1 \pm 0.55$

CBH-Commercial Bombay Halwa  
 HBH-Homemade Bombay Halwa  
 WaSH-Watermelon Seeds Halwa  
 PuSH-Pumpkin Seeds Halwa  
 PoSH-Poppy Seeds Halwa  
 CuSH-Cucumber Seeds Halwa

Physical and physiochemical parameters of selected variation

Further the selected variation was evaluated for its physical and physiochemical parameters in which the bulk and true density values are 0.45 and 0.63 whereas, the porosity is about 0.28. The pH, moisture content, water absorption index and oil absorption index values are 6, 1.5%, 1.2 and 0.9 respectively. Meanwhile Suryawanshi et al.,2023; Chaudhary et

al.,2025 reported almost similar values of physical and physiochemical parameters in instant wheat semolina halwa mix and instant multi millet halwa mix.

Table II Effect of storage studies of Instant Halwa Mix

On storage of pumpkin seeds instant halwa mixes, there was no significant changes in the sensory attributes which was tested up to 30 days only due to time constraints. Table-II shows the sensory profiles on 1<sup>st</sup> day, 15<sup>th</sup> day and 30<sup>th</sup> day under ambient storage conditions. Kumar et al.,2015 in their shelf-life study on fibre enriched instant halwa mix showed that the product remained stable and acceptable for 12 months irrespective of packaging materials.

Criterion	1 <sup>ST</sup> Day	After 15 <sup>th</sup> Days	After 30 <sup>th</sup> Days
Color and Appearance	4.15±0.48	4.3±0.57	4.2±0.61
Texture	4.35±0.67	4.15±0.60	3.95±0.60
Flavor	4.3±0.86	4.05±0.68	4.2±0.52
Taste	4.65±0.67	4.1±0.78	4.0±0.64
Overall Acceptability	4.1±0.58	4.05±0.68	4.05±0.51

Table III Hazard identification and risk analysis

By using 7 principles of HACCP, each step is identified for Hazard and risk analysis which was tabulated in (Table III)

and showed that there is no potential hazards and Critical Control Points (CPP).

#### IV. CONCLUSION

Among the developed instant halwa mixes using four seeds, the pumpkin seed formulation was the most acceptable in terms of sensory attributes. The pumpkin seed halwa mix showed an excellent shelf stability for one month and met all HACCP safety standards, confirming its quality and safe processing. The production cost of the 200 g mix was calculated as ₹82. This can be further reduced by sourcing seeds directly from fresh pumpkins rather than buying them from stores, which cost around ₹150/100g. The pumpkin seed instant halwa mix offers enhanced nutritional value and superior sensory attributes. Hence, it is a promising functional food and a healthier alternative to traditional halwa.

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Principle 1						
Process step	Description	Hazards	Cause	Likelihood	Severity	Control measures
Raw material and Storage	Raw materials are received and stored for a certain period of time before processing	Microbial, physical, chemical	Dust, dirt, stones	1	1	Proper building setting, proper storage condition setting, pest control
Washing	Seeds are washed for 3 times in water	Microbial	Uncleaned water, dust, dirt	1	3	The washing water should be clean and should not contain any toxic substances
Drying	Seeds are dried under sunlight	Physical	Birds, rodents, pests	1	1	The drying yard should have a shed and should be clean pest control
Milling	It is done using hammer mill	Physical, chemical, microbial	Dust, dirt, uncleaned vessels, metal pieces	1	3	There should not be any dust, impurities in mixer. The surface of mixer should not cause any cross contaminations with the product. The mixers should be cleaned properly
Blending	Blender	Physical	Dust, dirt, metal pieces	1	3	Proper cleaning of the equipment before using
Packing	It is usually packed in polyethylene pouches	Microbial and physical	Dust, dirt, metal pieces	1	2	Proper personal Hygiene and handling
Storage	The product is stored	Microbial, chemical, physical	Pests, rodents, insects	1	2	Proper personal hygiene and handling. Proper building and setting proper storage condition, pest control