

# PREPARATION AND EVALUATION OF *KAMAL KAKADI* (LOTOUS STEM) BASED DEEP FRIED CHIPS

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**Abstract**—The main objective of the present study was to produce crispy deep-fried chips from *Kamal Kakadi* plant with acceptable organoleptic qualities. *Kamal Kakadi* was a small aquatic herb, which are widely distributed in China, India, Japan and in some parts of South-East Asia. *Kamal Kakadi* encompasses rich amount of polyphenolic compounds, which exhibit high amount of antioxidant, anti-diabetic, ant-obesity, hypoglycemic, and antipyretic properties. Here in this study two samples of *Kamal Kakadi* stems, one is blanched and other one is unblanched were used for preparation of chips. Further, the prepared chips were salted with plain salt and Indian chat masala and analyzed for moisture content, ash content and sensory analysis. The result showed that the moisture content and ash content of untreated chips was higher than to treated chips. Results on textural studies showed that treated *Kamal Kakadi* stems chips were crispier as compared to untreated sample. Sensory quality results revealed that high acceptability for chips produced by treated sample with Indian masala showed good sensorial properties among all other samples.

**Keywords:** *Kamal Kakadi* (lotous stem), Chips, Stem, Herbs, Sensory quality, texture etc.

## INTRODUCTION

Lotus plants (*Nelumbo nucifera Gaertn. family; Nymphaeaceae*) are large aquatic herbs, which are widely distributed in India and some parts of South-East Asia. *Kamal Kakadi* (Lotus plant) parts (seeds, flowers, stem and rhizome) find wide applications and are used either as vegetable or manufacturing of medicines (Bhat and Sridhar, 2008; Mukherjee et al., 2009). Traditionally, *Kamal Kakadi* stems are consumed after roasting or are used as vegetable for preparation of curries, pickles and other food products in Asian countries. *Kamal Kakadi* plant consist a large amount polyphenol, with high amount of antioxidant activity and shows a good anti-diabetic, ant-obesity, hypoglycemic, antipyretic properties (Bhat et al.,2008). *Kamal Kakadi* stems have a crunchy texture and contain a high amount of starch which make them suitable for preparation of chips. In modern days peoples are highly attracted towards the 'ready-to-eat'

foods (Morsyer et al., 2014). The most popular among these are the potato chips, which are mostly consumed by all over the world's (Koby et al., 2006). Here in this present study we are going to provide an alternative to traditional potato based chips and developed a new *Kamal Kakadi* based deep fried healthy chips which have good sensorial and functional properties.

## MATERIALS AND METHODS

### Raw material

Fresh *Kamal Kakadi* stems, vegetable oil, sea salt (Plain salt) and Indian Masala (Chat Masala) were procured from local market of Jaipur.

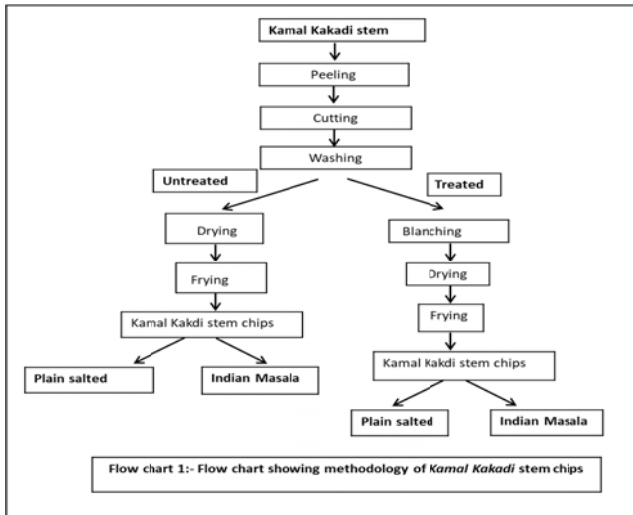
### Proximate analysis

Parameters such as moisture content, ash content were performed by using (AOAC, 1990). Further the quality of chips was evaluated by sensorial method. Sensory analysis of prepared *Kamal Kakadi* based chips were essential for the efficacy and safety determination. Sensory analysis was performed by using nine points hedonic rating scale by a panel of ten trained member. The parameters for evaluation includes colour, taste, texture, and overall acceptability of *Kamal Kakadi* fried chips (Murray et al., 2001)

### Methodology For preparation of *Kamal Kakadi* Chips

Fresh *Kamal Kakadi* stems were firstly cleaned by running tap water to remove the dirt and all other impurities. After washing the *Kamal Kakadi* stem was peeled and wiped using a clean cloth. Further, with the help of a knife, *Kamal Kakadi* stems were peeled and thinly sliced. After that the stem pieces were clean and washed several times to remove the all impurities. The cut stems were then divided equally in two sections for processing. The processing of *Kamal Kakadi* stem chips was done with two methods one that given the blanching treatment is referred as treated and second was only processed

with tray drying is referred as untreated shown in Fig 1. After drying the *Kamal Kakadi* stem chips were kept in air for 5 minutes and after that chips were deep fried in soyabean oil around 1-2 minutes shown in Fig 2, till the chips get crispy. Then the chips were separated in two parts for adding the seasoning, In first the sea salt was added as a seasoning and termed as Plain Salt and In another the chat Masala was added and termed as Indian Masala Fig 3. The complete methodology for preparation of *Kamal Kakadi* chips were showing in flowchart 1.



**RESULTS AND DISCUSSION**

The *Kamal Kakadi* stem chips were prepared and for validation moisture content were checked. The sample was taken in pestle and mortar and crushed in fine powder. From this 5gm crushed powder was taken in petri plate and kept in hot air oven at 100 °C for 1 hours. Again the weight of the sample was observed on weighing balance, it was find a sudden change in weight. This process was done for all the samples in treated as well as untreated process. The results of moisture content were showed in Table 1, which revealed that untreated sample has higher moisture content as compare to the treated samples.

**Table 1: Moisture content of prepared *Kamal Kakadi* chips.**

Samples	Moisture content (%)
Plain Salted (Untreated sample)	4.49±0.2 %
Indian Masala (Untreated sample)	4.43±0.5 %
Plain Salted (Treated sample)	2.76 ±0.2%
Indian Masala (Treated sample)	2.34 ±0.1%



**Fig 1: A) Untreated *Kamal Kakadi* stem chips before kept in oven, B) Untreated *Kamal Kakadi* stem chips after hotter oven**



**Fig. 2:- A) *Kamal Kakadi* stem chips after blanching, B) Deep frying of treated *Kamal Kakadi* stem chip.**



**Fig. 3 A) Untreated *Kamal Kakadi* stem chips having two samples: plain salted and Indian masala, B) Treated *Kamal Kakadi* stem chips having two samples: plain salted and Indian masala.**

**Ash Content:-**

5 g sample was weighed into silica crucible and heated at low flame till all the material was completely charred and cooled. Then was kept in muffle furnace for about 4hr at 550°C. Again cooled in desiccator and weighed and repeated until two consecutive weights were constant. The per cent ash was calculated by knowing the difference between the initial and final weight (AOAC, 1990). The ash content of untreated sample is higher than to the treated sample the were showed in Table 2.

**Table 2: Ash content of prepared *Kamal Kakadi* chips.**

Sample	Ash content (%)
Plain Salted (Untreated Sample)	1.4±0.5 %
Indian Masala (Untreated Sample)	1.33±0.1%
Plain Salted (Treated Sample)	1±0.2 %
Indian Masala (Treated Sample)	0.95±0.2 %

**Sensory Analysis :-**

The sensory evaluation of prepared *Kamal Kakadi* based deep fried chips was observed. The *Kamal Kakadi* chips were observed for parameters like color and appearance, aroma, taste, texture and overall acceptability. The results of sensory analysis were presented in Table 3, which shows that seasoning of chips with Indian chat masala shows good taste, texture and overall acceptability among all other samples.

Characteristics	Treatments			
	Plain salted (Untreated)	Indian masala (Untreated)	Plain salted (Treated)	Indian masala (Treated)
Color and Appearance	7	8	8	8
Aroma	6	7	7	8
Taste	7	8	8	8
Texture	6	7	7	7
Overall Acceptability	7	8	7	8

## CONCLUSIONS

The study showed that treated sample of *Kamal Kakadi* with Indian chat masala were highly acceptable organoleptically qualities. The prepared *Kamal Kakadi* chips were healthy and tasty. Further, they might become future alternative for a potato chips which were mostly consumed by all over the world. The result showed that the moisture content and ash content of untreated chips was higher than the treated samples. Results on sensorial analysis showed that texture of treated *Kamal Kakadi* stems chips were crispier as compared to untreated. The reported work being a preliminary study, further research works is warranted to standardized the protocols for industrial scale production of *Kamal kakadi* based deep fried stem chips, with improved taste and flavor, keeping in mind the safety and quality issues.

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