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Proximate Analysis and Storage Stability of Spice Tikki (Vaer) influenced by Oil using Different Packaging Materials

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ABSTRACT: Spice Tikki known in Kashmir as *Vaer* is the amalgation of different spices used for stuffing different veg and non veg dishes. The current study was aimed to assess the impact of oil addition and packaging material on proximate analytical values and sensory evaluation of prepared spice tikki at different storage periods (0, 3, 6, 9 & 12 months). Considering all the parameters *viz.,* Moisture content, Ash content, Crude fat and sensory parameters like colour, Flavour and overall acceptability the best suited aid for stable spice tikki, *Vaer,* was addition of oil at 10% and packaging with aluminium foil which retained most of the optimum characteristics for its storage and overall acceptability.

Keywords: Spice Tikki, Moisture content, Ash content, Crude fat, Sensory evaluation.

INTRODUCTION

The word spice originates from the Latin word species, meaning specific kind. This refers to that all parts of a plant, including the seed, berry, leaf, stem or root, may be used to add aroma, fragrance or pungency. Spices and condiments are essential natural products from dried plants parts used to enrich taste and enhance nutritional contents of foods and beverages for the benefit of human daily life. Spices constitute an important group of horticultural commodities, since antiquity have been considered indispensable in the culinary arts for flavoring foods. According to the U.S. Food and Drug Administration (FDA), spice is an "aromatic vegetable substance in the whole, broken, or ground form, the significant function of which in food is seasoning rather than nutrition" and from which "no portion of any volatile oil or other flavoring principle has been removed" (Sung *et al.*, 2012). The unique aromatizing, flavorful, antibacterial, preservative, and antioxidant properties of spices are well known for their appeal (Syamilah *et al*., 2022). Additionally, they are often utilized as food additives to enhance digestion because they are nutritionally significant elements (Derbie *et al*., 2018). According to Pop *et al.* (2019), common herbs and spices are generally recognized as safe (GRAS) for use as food additives. Herbs and spices bioactive components have therapeutic, health promoting, or disease prevention effects in addition to being utilized to enhance their organoleptic qualities (Guldiken *et al*., 2018; Shahidi & Hossain 2018). The colorful sections of herbs, vegetables, fruits, nuts, legumes, whole grains, and seeds are highly concentrated sources of phytochemicals, which are naturally occurring, non-nutritive secondary metabolites of plant-based bioactive compounds (Nigussie and Zemede 2020). Due to their antioxidant and preservation properties, they may have positive effects on human health (Yusuf *et al.,* 2018). Consuming phytochemicals as part of a healthy diet can have positive effects on one's health in the form of antibacterial, anticancer, anti-inflammatory, antiviral, and high antioxidant activity (Embuscado, 2019; Guldiken *et al.,* 2018). Carotenoids, phenolic compounds, phytosterols, organosulfur compounds, phytoestrogens, glucosinolates and their degraded products, and dietary fiber are just a few of the many phytochemicals that can be found in functional foods and dietary supplements (Syamilah *et al*., 2022), in addition to terpenoids, vitamins, minerals, and nitrogen-containing compounds (Embuscado, 2019). They significantly contribute to plant growth or protection against competitors, pathogens, or predators (Almotayri *et al*., 2020).

More than 100 varieties of spices are produced throughout the world. Asia is the main leader for the production of spices, particularly of cinnamon, pepper, nutmeg, cloves, and ginger, while Europe grows mainly basil, bay leaves, celery leaves, chives, coriander, dill tips, thyme, and watercress. In America, instead, pepper, nutmeg, ginger, allspice, and sesame seed are mainly produced (Prasad *et al*., 2011). India is rightly called as "the home of spices" as it produces and exports almost all the spices except some leaf spices and herbs. A part from major spices like pepper, ginger, turmeric, cardamom, cumin, celery seed, chilli, fenugreek and clove, many minor spices are grown in

India. Blessed with appropriate soil and climate and a wide knowledge about the use of spices in foods, medicine, perfumes, etc., the country has the potential to develop into a quality market in spices. In terms of production, our country contributes 25-30% of the world production. During 2002-2003, India has exported spices to more than 100 countries and the exports are expected to go up further. Most of the trade is in bulk packages.

With the advent of changing food habits to ready to use foods there has been changes in food ingredient uses. Whole spices where ground at home which has been replaced by spice powder. Using dried spices entails advantages such as easy handling, longer shelf life and higher taste intensity compared to fresh ones. However, the aroma of dried spices is less than for fresh, and the flavours can be oxidised resulting in losses during milling and storage. The usage of ready-to-use spice blends are becoming more and more popular since these kinds of products are easy to use, saves time in the kitchen and gives the possibility of experiencing new flavours from different parts of the world (Kalemba & Wajs 2011).

Now, in recent times the customer is demanding spice-mix paste which consists of dry spice-mix as well as wet components such as ginger, garlic, onion and tomato. Thus, there is a need for a pre-processed ready-to-use and shelf stable spice mix formulation for the preparation of varieties of plant-based and muscle-based food products in order to minimize the drudgery of processing in kitchen and food preparation time to cater to the needs of increasing population of working couples, single persons living, etc. The spice paste usually consists of green chilli, galangal rhizome, shallot, cumin, lemon grass, kaffir lime, garlic and black pepper. The spices/ingredients used in the curry paste may differ from home to home or region to region. Many ingredients used in the curry paste have been found to contain antimicrobial, antioxidant, and have medicinal value. Garlic, one of the ingredients, is reported to possess allicin, a highly reactive volatile compound, which is unstable in the presence of heat. It has antimicrobial and antioxidant compounds with health benefits. Spices mix is a new type of convenience food. Spices mix has been used in cooking for vegetarian and non- vegetarian recipes. The commercial demand of these ready mix spices has increased significantly throughout the years as need of urban or faster life style. Use of such products avoids collection and preparation for individual items. Kashmiri spice mix locally Known as Vaer is akin to the region has been used in both vergetarian and non-vegetarian dishes from ancient times. This spice mix is a good source of antioxidants and nutrients. The spices in the blend have been shown to have a variety of health benefits including reducing inflammation, boosting immune system anti-cancer properties. The spices/ingredients used in the Vaer are coriander seeds, fennel seeds, cinnamon, garlic, ginger, cloves, Kashmiri chilli powder and vegetable oil. Standardization of the method of preparation and enhancing storage by way of using proper packing material is needed to improve the shelf life and enhancing profitability of this product. When producing spice mixtures, addition of oil is necessary as processing aid. The oil has a significant impact on the properties of spice mixtures, especially vegetable oil prevents oxidation and stops discoloration, improves shelf life and enhance flavour. Vegetable oils are used in a wide variety of food products, putting many requirements to the finished oil in order to guarantee a high quality product. Some of the most important properties are bland taste, long shelf life, bright colour and suitable crystallisation and melting behaviour.

Food products undergo numerous physical, chemical and microbiological changes during storage. The protective coating or barrier provided during processing, storage and handling not only retards deterioration of food, but may also enhance its quality. Suitable packaging can slow the deterioration rate and also may extend product shelf life. In recent years, a wide variety of packages and approaches have been employed to interact with the food and provide desirable effects.

Packaging plays an important role in protecting, slowing down, and limiting the growth of harmful microorganisms in the product from the environment to extend the product's shelf life. Aluminium foil has excellent air tightness, flexibility, opacity, tastelessness, odorless, non-toxic, gas permeability, and conductivity, so it can be used for packaging greasy light-sensitive materials Polyethylene (PE) packaging, on the other hand, is plastic packaging that is used daily. Syarief *et al.* (1989) stated that polyethylene packaging has flexible properties. It is resistant to bases, acids, alcohols, detergents, other chemicals, water, and steam. It also has high tear strength and is easy to heat. In order to develop a marketable Spice tikki (Vaer) the pacakaging material and proper quantity of vegetable oil included in the blend is to be established and hence this work was undertaken to study the impact of packaging material and oil quantity on the storability of Spice Tikka, Vaer.

EXPERIMENTAL

MATERIALS

The material used for the spice-mix paste (Vaer) were coriander seeds, fennel seeds, cinnamon, garlic, ginger, cloves, Kashmiri chilli powder and vegetable oil. These materials were procured from the local market.

Product Preparation. Spices like coriander seeds, fennel seeds, cinnamon, garlic, ginger & cloves were roasted for 10 to 15 minutes and allowed to cool. Chilli and garlic powder were mixed to the roasted mix and grinded in a grinder till consistent powder form was attained. The oil was mixed in accordance with the treatment details at 5 & 10 per cent. The mixtures were shaped to a round patties form. Two packaging materials, aluminium foil and polyethylene cups were used and the packed tikkis were stored at different storage periods (0, 3, 6, 9 & 12 months).

Proximate analysis. The proximate analysis of the prepared mix samples were carried out at different storage periods using standard procedures. The

parameters considered were moisture content, Crude fat& ash content.

Moisture Content. Moisture content of sample was measured in accordance with AOAC (2012). Approximately 5g sample was taken in previously dried and weighed petridish. The sample was then dried in a hot air oven at a temperature of 70°C until a constant weight was obtained. The sample was analysed in triplicates and the mean was recorded. The percent moisture content was calculated as:

Moisture (%) = (W2 − W3)/ (W2 − W1) × 100

W1 = weight of container with lid; W2 = weight of container with lid and sample before drying; and W3 = weight of container with lid and sample after drying.

Ash content. The ash content was evaluated using the AACC technique (2010). Three grams of each replicate sample were placed in a pre-weighed crucible and maintained in a muffle furnace for around six hours at 600°C. The crucibles were then weighed after cooling in a desiccator. The following equation was used to calculate the ash content:

$$\text{Ash}\,(\%) = \frac{\text{Weight of crucible (g)} - \text{weight of crucible with ash (g)}}{\text{Weight of sample (g)}} \times 100$$

Crude fat. According to the AACC technique (2010), crude fat of each test sample was quantified using petroleum ether as a solvent in the Soxhlet apparatus (SCS2, Pelican equipment, Chennai). A thimble containing 5g of material was placed in the extraction unit. The extractor was attached to an extraction flask containing 2/3 of the entire volume of petroleum ether. On a water bath, the sample was extracted for 6 h. Distillation was used to evaporate the petroleum ether, after which the extraction flask was cooled and weighed. The following equation was used to compute crude fat as a percentage of total fat:

$$\text{Crude fat}\,(\%) = \frac{B - A}{C} \times 100$$

Where, A= Weight of clean dry flask (g)

B = Weight of flask with fat (g)

C = Weight of sample (g)

Sensory analysis. The sensory evaluation of tikki was done on a 5-point scale by a panel of 20 semi-trained assessors. Before the test began, the judges were familiar with the rating criteria and language. The judges were given coded samples at random to evaluate for several sensory aspects such as appearance, mouthfeel, colour and crispness. After analysing each sample, panel lists rinsed their taste buds with potable water. The samples were evaluated under laboratory circumstances according to ISO (1994) criteria by the panel lists. The average of sensory scores collected for appearance, flavour, mouthfeel, colour and crispness was used to assess overall acceptability (Mudgil *et al.*, 2017).

RESULTS AND DISCUSSION

Moisture Content. Moisture content is one of chief variables for assessing shelf life. Moisture content of the spice tikki was significantly affected by the treatments combinations evaluated at different storage periods. The decrease in moisture content during storage was positively affected by the added oil and the packaging material as presented in Table 1. Irrespective of the packaging material increase in oil content increased the moisture content and aluminium foil packaging maintained the higher moisture levels and the optimum moisture content of 18.38 % was maintained by adding 15% oil content to the spice tikki packaged in aluminium foil. Impact of LDPE packaging on storage stability and moisture content of spice curry was also reported by Karadbhajne & Patil (2020).

Table 1: Moisture content (%) of Spice Tikki During storage during storage.

Treatments	Storage (months)					
	0	3	6	9	12	Mean
T1=5% Oil Content + Polythene Packaging	29.80	18.55	17.08	13.28	13.05	**18.35**
T2=5% Oil content + Aluminium Foil Packaging	30.16	19.01	17.59	13.63	13.33	**18.74**
T3=10% Oil Content + Polythene Packaging	29.23	20.00	18.17	14.08	13.98	**19.09**
T4=10% Oil content + Aluminium Foil Packaging	29.20	20.57	18.37	14.59	14.11	**19.37**
T5=15% Oil Content + Polythene Packaging	30.80	23.45	19.30	15.32	14.80	**20.73**
T6=15% Oil content + Aluminium Foil Packaging	30.90	26.18	22.32	18.38	16.57	**22.87**
Mean	**30.01**	**21.29**	**18.80**	**14.88**	**14.30**	**19.86**
$CD_{(p\leq0.05)}$	**O=0.06**	**O*S=0.12**	**P= 0.05**	**P*S=0.10**	**S= 0.08**	**O*P=0.08 O*P*S=0.18**

Ash Content. The amount of ash content in food products depends on the amount of mineral content of the ingredients used. As many as 96% of food ingredients come from organic materials and water. The rest consists of mineral elements or ash content (Winarno, 2004). Ash content is related to the mineral content of a material. If the ash content is high, then the mineral content in the food is also high. In this study there was not significant difference in ash content of Spice tikki (Table 2) across the storage period irrespective of the treatment conditions. As far as the effect of oil content and packaging material is concerned both of them had a significant impact on ash content of the spice tikki. Increase in oil content from

5- 10% increased the ash content. Only at 10 percent oil content aluminium foil packaging was superior in terms of ash content of spice tikki. Thus treating the spice tikki at 10% and packing in aluminium foil maintained higher ash content of this product. Raleng *et al.* (2014), observed the higher retention of moisture and ash content in sesame with use of oil treatment and packaging with aluminium foil in both ambient and refrigerated conditions.

Table 2: Ash Content (%) of Spice Tikki during storage.

Treatments	Storage (months)					
	0	3	6	9	12	Mean
T1=5% Oil Content+ Polythene Packaging	0.94	0.95	0.94	0.94	0.96	**0.94**
T2=5% Oil content +Aluminium Foil Packaging	0.95	0.95	0.94	0.94	0.96	**0.95**
T3=10% Oil Content+ Polythene Packaging	1.00	0.98	0.98	0.94	0.94	**0.97**
T4=10% Oil content +Aluminium Foil Packaging	1.00	0.99	1.00	0.99	1.00	**1.00**
T5=15% Oil Content+ Polythene Packaging	1.05	1.05	1.06	1.05	1.05	**1.05**
T6=15% Oil content +Aluminium Foil Packaging	**1.07**	**1.06**	**1.07**	**1.06**	**1.06**	**1.06**
Mean	**1.00**	**0.99**	**1.00**	**0.98**	**0.99**	**0.99**
$CD_{(p\leq0.05)}$	**O=0.01**	**O*S=0.03**	**P=0.01**	**P*S=0.02**	**S=0.02**	**O*P=0.02 O*P*S=0.04**

Crude Fat percentage. The crude fat percentage of the spice tikki during the storage period as presented in Table 3 got decreased significantly. However increased oil treatment at 10% and packing with aluminium foil maintained more fat percentage hence less decrease during the storage. The maximum fat percentage (10.99) of the spice tikki was observed with oil treatment at 10% and packaging with aluminium foil. Girija and Kamalasundari (2020) studied the higher percentage of crude fat in different food materials during the storage using aluminium foil packing as compared to LDPE and PET packaging.

Sensory Evaluation. Sensory evaluation parameters like colour, flavour and overall acceptability are presented in Table 4. The score of all the three sensory evaluation parameters decreased significantly towards the 12 month of storage period. The score on evaluation parameters was significantly affected by both oil treatment and packaging material thus higher score was provided for 10% oil treatment and spice tikki packaged with aluminium foil. Thus to maintain the colour, flavour and overall acceptability of prepared tikki with 10 % oil treatment packed in aluminium is considered best.

Table 3: Fat (%) of Spice Tikki During storage.

Treatments	Storage (months)					
	0	3	6	9	12	Mean
T1=5% Oil Content+ Polythene Packaging	4.87	4.21	3.91	3.61	3.07	**3.93**
T2=5% Oil content +Aluminium Foil Packaging	4.88	4.39	4.13	3.82	3.37	**4.12**
T3=10% Oil Content+ Polythene Packaging	9.98	9.18	8.29	7.82	6.37	**8.33**
T4=10% Oil content +Aluminium Foil Packaging	9.96	9.44	8.71	8.00	7.32	**8.68**
T5=15% Oil Content+ Polythene Packaging	15.18	14.46	13.62	11.78	10.47	**13.10**
T6=15% Oil content +Aluminium Foil Packaging	15.16	14.74	13.86	12.12	10.99	**13.37**
Mean	**10.00**	**9.40**	**8.75**	**7.86**	**6.93**	**8.59**
$CD_{(p\leq0.05)}$	**O= 0.04**	**O*S=0.09**	**P= 0.04**	**P*S=0.08**	**S= 0.05**	**O*P*S=0.13 O*P=0.05**

Table 4: Sensory evaluation of Spice Tikki during Storage Fat (%) of Spice Tikki During storage.

Treatments	Storage (months)																	
	Colour						Flavour						Overall Acceptability					
	0	3	6	9	12	Mean	0	3	6	9	12	Mean	0	3	6	9	12	Mean
T1=5% Oil Content+ Polythene Packaging	3.74	3.50	3.38	3.27	3.22	**3.42**	3.47	3.35	3.18	3.04	3.00	**3.21**	3.69	3.48	3.55	3.46	3.23	**3.48**
T2=5% Oil content +Aluminium Foil Packaging	3.74	3.53	3.39	3.28	3.24	**3.43**	3.49	3.35	3.19	3.05	2.52	**3.12**	3.69	3.64	3.59	3.54	3.45	**3.58**
T3=10% Oil Content+ Polythene Packaging	3.74	3.53	3.39	3.29	3.25	**3.44**	3.49	3.36	3.20	2.93	2.89	**3.17**	3.71	3.66	3.58	3.54	3.48	**3.59**
T4=10% Oil content +Aluminium Foil Packaging	3.76	3.55	3.42	3.30	3.26	**3.45**	3.49	3.38	3.24	2.93	2.90	**3.19**	3.71	3.66	3.60	3.56	3.48	**3.60**
T5=15% Oil Content+ Polythene Packaging	3.74	3.54	3.41	3.30	3.27	**3.45**	3.49	3.35	3.18	3.04	3.00	**3.21**	3.70	3.67	3.60	3.57	3.51	**3.61**
T6=15% Oil content +Aluminium Foil Packaging	3.75	3.56	3.42	3.31	3.28	**3.46**	3.49	3.39	3.24	3.14	3.11	**3.27**	3.71	3.68	3.62	3.58	3.53	**3.62**
Mean	**3.75**	**3.53**	**3.40**	**3.29**	**3.25**	**3.44**	**3.49**	**3.36**	**3.20**	**3.02**	**2.90**	**3.19**	**3.70**	**3.63**	**3.59**	**3.54**	**3.44**	**3.58**
CD(p≤0.05)	**O=0.02**	**O*S=0.05**	**P=0.02**	**S=0.03**	**O*P=0.03**	**P*S=0.04 O*P*S=0.06**	**O=0.03**	**O*S=0.08**	**P=0.03**	**P*S=0.06**	**S=0.05**	**O*P*S=0.11 O*P=0.05**	**O=0.02**	**P=0.02**	**P*S=0.04**	**S=0.03**	**O*S=0.05**	**O*P*S=0.07 O*P=0.03**

CONCLUSIONS

The prepared spice Tikki commonly known as *Vaer* in Kashmiri language used in most of the dishes, retains the most of the properties like moisture content, crude fat and ash content with longer shelf life when treated with 10 percent vegetable oil and packed in aluminium foil which was further substantiated by the sensory evaluation score for colour, flavour and overall acceptability by using these processing aids.

FUTURE SCOPE

There has been traditional preparation of the Kashmiri Spice Tikki (Vaer), which needs some technological interventions, to upgrade the quality and storage stability of this product. There is need to develop a package for better preparation and its evaluation for use in different cuisines. The storage stability depends upon the various environmental factors which needs to be evaluated for the standardization.

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