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Effect of Incorporation of *Tribulusterrestris* (Gokshura) on pH of Cooked Chevron Sausages

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Abstract

A Study was undertaken to explore the possibility of utilization of *Tribulusterrestris*(Gokshura) as an alternative to synthetic preservatives in meat products. Chevron sausages were used as a model meat product and incorporated with different concentrations of *Tribulusterrestris* (0.25%, 0.50%, 0.75%) and were vacuum packed and assessed for pH under refrigerated ($4\pm 1^{\circ}\text{C}$) conditions at regular intervals of 0, 14, 28, 42 and 56 days. Incorporation of *Tribulusterrestris* significantly ($P<0.05$) lowered pH as compared to control.

Key words: *Tribulusterrestris*, pH, chevon sausages, vacuum packaging, storage studies

Introduction

Tribulusterrestris (small calotrops) is an annual herb, commonly found throughout India, China and Vietnam. Popularly it is known as *Gokshura* or *puncture vine* and shows worldwide distribution. *Tribulusterrestris* is known for its great medicinal value since ancient times. It has diversified medicinal activities such as antioxidant, antimicrobial, antitumor and antifungal properties in addition to its beneficial claims on various ailments such as renal infection, skin disorders, cardiac disorder, cancer and many general diseases and for stimulating appetite (Kokate *et al.*, 2009). Leaf extract of *Tribulusterrestris* contains different phyto-chemicals, polyphenols and possess strong radical scavenging, antioxidant activity and lipid peroxidation inhibitory property (Dimitrova *et al.*, 2012 and Lokhande *et al.*, 2014). pH is considered as, an important factor in maintaining meat quality (Clarke *et al.*, 1988). Various physico-chemical characteristics of meat and also the sensory attributes of the product prepared are influenced by pH. The present study was conducted to explore the possibility of utilization of *Tribulusterrestris* as an alternative synthetic preservative in meat products and its influence on pH.

Materials and Methods

Methodology for preparation of chevon sausages

Lean meat from goat was cut into smaller chunks and minced twice in a Sirman Mincer with 6 mm plate. The common salt, vegetable oil, refined wheat flour (maida), nitrite, sodium tripolyphosphate, spice mixture and condiment mixture were added to weighed meat in ratios used in standard method

of sausage preparation. *Tribulusterrestris* was procured from “The Himalaya Drug Company”. The chevon sausages were prepared by incorporating *Tribulusterrestris* extract viz. 0.25% (T₁), 0.5% (T₂) and 0.75% (T₃). The sausages thus prepared were packed in laminate pouches (polyethylene and aluminum), stored at refrigeration temperature (4±1°C) and were analyzed at a regular interval of 0, 14, 28, 42 and 56 days for pH values.

The sensory evaluation of stored samples was carried for various attributes namely appearance and colour, flavour, juiciness, texture and overall acceptability by a panel of ten experts of the division based on a 8-point hedonic scale (Keeton, 1983).

pH determination

The pH of was measured soon after its preparation by the method of Keller *et al.* (1974) . 10 grams of the sample was homogenized with 50 ml distilled water by using pestle and mortar for 1 minute. The pH of the suspension was recorded by immersing combined glass electrode of digital pH meter (Systronics Digital pH meter 802, Serial No. 603).

Statistical Analysis

The data generated was analyzed using Statistical Package for the Social Sciences version 16.0 software program (SPSS Inc., Chicago, IL, USA) ,using two-way analysis of variance (ANOVA) with Duncan *post-hoc* multiple comparisons test to determine significant differences among treatments at each storage time and also among storage times at each treatment at 5% level of significance (Snedecor and Cochran, 1997).

Results and Discussion

The results of the present study are depicted in table 1

Table-1: Effect of addition of *Tribulusterrestris* on pH of chevon sausage (Mean ±e SE)

Treatments	STORAGE PERIOD (DAYS)				
	0	14	28	42	56
pH					
Control	6.37±0.027 ^a	6.28±0.046 ^a	6.18±0.019 ^b	6.10±0.228 ^{Ab}	5.84±0.008 ^{Ac}
T₁ (0.25%)	6.30±0.006 ^a	6.25±0.045 ^a	6.12±0.017 ^b	6.08±0.016 ^{ABb}	5.81±0.007 ^{ABc}
T₂ (0.50%)	6.28±0.006 ^a	6.23±0.065 ^a	6.15±0.044 ^{bc}	6.05±0.013 ^{Bc}	5.78±0.021 ^{BCd}
T₃ (0.75%)	6.35±0.067 ^a	6.30±0.043 ^a	6.11± 0.045 ^b	6.04±0.016 ^{Bb}	5.75±0.016 ^{Cc}

*Mean ± SE with different superscripts in a row wise (lower case alphabet) and column wise (upper case alphabet) in a subgroup differ significantly (P<0.05), n = 6 for each treatment

The data presented in table showed a significant (P<0.05) decreasing trend in pH values from day 0 to day 56 in case of control as well as treated samples (T₁, T₂ and T₃). The decline in pH may be attributed to the accumulation of acids produced by the bacteria, predominantly anaerobic and lactic acid bacteria, during vacuum storage and depends on the available carbohydrates in the meat products (Hernández-Macedo *et al.*, 2011). Dua *et al.* (2015) recorded a similar decline in the pH values of *Tabaq-Maz* treated with oleuropein which attributed the decline in pH to the acidic and polyphenolic compounds present in the extract. Although, mean pH values followed a decreasing trend with storage in all groups, however, values of the products incorporated with *Tribulusterrestris* (T₂ and T₃) were significantly (P<0.05) lower than control on day 42 and 56 of storage. The highest values were observed for control samples and lowest values were observed for T₃ on all days of storage. Decline in pH after incorporation of broccoli powder extract in goat meat nuggets and *Aloe*

vera in chicken nuggets has been reported by Banerjee *et al.* (2012) and Bhat *et al.* (2015) respectively.

Tribulusterrestris successfully improved the shelf life of the products by decreasing the pH during storage at refrigerated temperature ($4\pm 1^\circ\text{C}$). So on the basis of sensory evaluation (data not shown) and significant decrease in pH value, it is suggested that *Tribulusterrestris* may be used commercially by the meat industry as an efficient alternatives to synthetic preservatives.

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Conflict of Interest: All authors declare no conflict of interest.

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