

# MODIFYING QUALITY ATTRIBUTES OF BEEF BURGER PATTIES USING MORINGA AND OLIVE SEED POWDERS

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**Abstract – Two different plant materials were tested for improving the quality characteristics of beef burger patties. Different proportions of *Moringa* seed flour (MSF) and destoned olive seed cake powder (DOC) were used in beef patties formulations. MSF showed non-significant effects whereas DOC caused significant improvements in protein and fat contents of beef patties. DOC also showed significant improvements in phenolic contents and antioxidant activities of beef patties. Both types of natural additives significantly reduced total plate count in addition to improving color and reducing 2-thiobarbituric acid reactive substances (TBRAS) and dimensional shrinkage in stored beef patties. The sensory attributes of patties containing MSF and DOC showed less decrease in panelist scores with storage as compared to controls.**

**Key Words – *Moringa* seed flour; Olive seed cake powder: Beef burger patties**

## I. INTRODUCTION

Beef products, such as burger patties, have been extensively used globally with increasing trends in production due to rapid growth of fast food industry and also due to the fact that they are good sources of protein, minerals and vitamins. Mincing of beef for patty formulation results in increasing the surface area of meat due to which the chances for lipid oxidation and microbial growth, particularly during storage, also increase [1]. Different types of synthetic chemical additives are being used for preventing lipid peroxidation and retarding microbial growth in meat products. These are generally unsafe for human health and legally regulated for their use in food products which has prompted the interest and research in the use of natural additives of plant origin that includes [2]. *Moringa oleifera* plant is being cultivated in different parts of the world and its leaves, seeds, fruit and flowers have been studied with reference to nutritional quality and their health effect [2]. Olive fruit is well known for different health benefits and while obtaining oil, significant amount of cake is produced which is also known to contain important phenolics and antimicrobials [3]. The current study was designed to present the effects of MSF and DOC on different quality attributes and physico-chemical characteristics of beef patties.

## II. MATERIALS AND METHODS

Moringa seed flour (MSF) and destoned olive seed cake powder (DOC) were added at a ratio of 0, 2, 4 and 6% as substitute to lean meat and mixed with other ingredients that included fat, water, salt, white and black pepper and garlic and onion powders and approximately 100 g patties were formed using a patty former machine and cooked for 20 min at 160 °C in a convention oven until the internal temperature was 80 °C. Studies were carried out on raw and cooked patties about proximate composition, cooking properties (yield, fat/moisture retention and dimensional shrinkage), TBARS or 2-thiobarbituric acid reactive substances, total phenolics, antioxidant activities (diphenyl 2-picrylhydrazyl (DPPH) radical scavenging activity), color and sensory evaluation for different storage intervals 90, 7 and 14 days). Treatments were triplicated and data obtained were means  $\pm$  standard error and data was analyzed using Duncan's Multiple Range Test for comparison of means. Significance was defined as  $P < 0.05$

## III. RESULTS AND DISCUSSION

As explained previously various physico-chemical characteristics, cooking properties, color parameters, sensory attributes and phenolic contents of were measured where required for raw and cooked beef patties formulated after substituting minced beef with either MSF or DOC and during storage at 0, 7 and 14<sup>th</sup> days. The proximate composition beef patties containing MSF were not significantly affected however cooking properties were observed to improve

with increasing MSF. TBARS values of MSF containing patties were lower than control after storage [4]. There was slight reduction in the pH of patties due to MSF however it significantly ( $p < 0.05$ ) reduced the aerobic plate counts throughout the storage period (Figure 1 A). The beef patties showed higher lightness ( $L^*$ ) and yellowness ( $b^*$ ) values but lower redness ( $a^*$ ) values than control. There was reduction in sensory quality attributes of MSF containing and control patties however it was higher in case of control ones [4].

The results about use of DOC in beef patties showed significant ( $P < 0.05$ ) improvements in fat and protein contents, retention of fat and moisture after cooking and cooking yield. The contents of total phenolic compounds and antiradical activities of beef patties with DOC increased significantly [5]. The value for shrinking of patties' dimensions, TBARS and pH were reduced. The aerobic plate count was significantly ( $P < 0.05$ ) low in patties containing DOC while compared to control during storage (Figure 1B). The values of color parameters ( $L^*$ ,  $a^*$  and  $b^*$ ) decreased in both during storage. In terms of sensory parameters like general appearance, flavor, juiciness, taste, tenderness and overall acceptability of patties, those containing DOC showed significantly higher scores during storage [5].

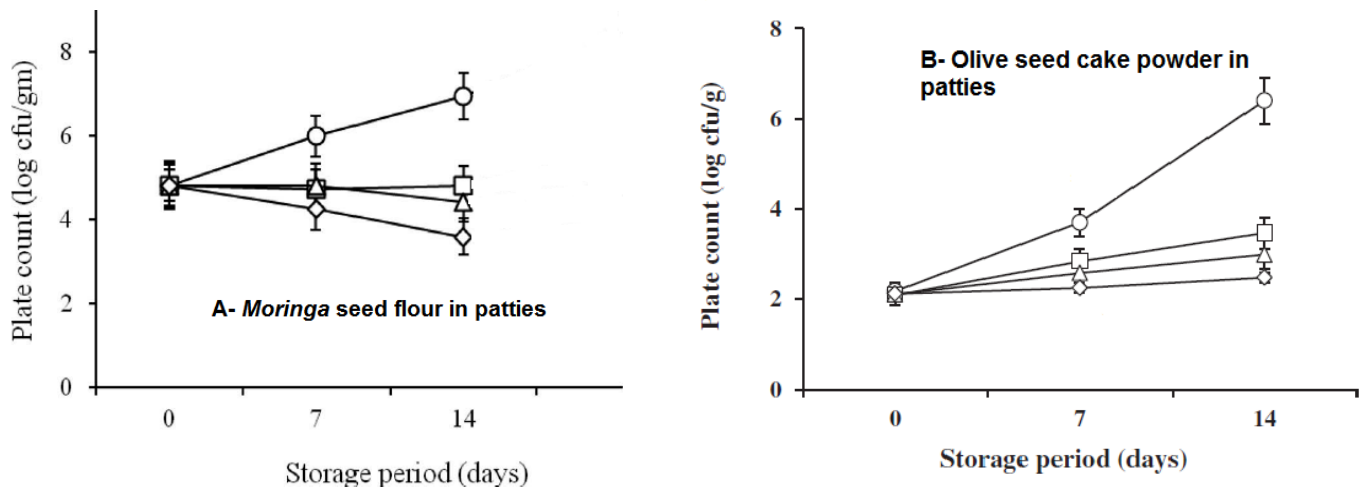


Figure 1. Aerobic plate count of beef patties in raw form stored from 0-14 days and containing either A- *Moringa* seed flour (MSF) or B- destoned olive cake powder (DOC) at different levels (0%, ○; 2%, □; 4%, △ and 6%, ◇). Data is shown using error bars which represent the means  $\pm$  standard deviation of triplicate measurements.

#### IV. CONCLUSION

Both types of natural plant materials were successfully utilized in the formulation of beef patties and promising results were obtained for increasing the shelf life, improving sensory and physical characteristics during two weeks storage. Owing to the possible antimicrobial and antioxidant properties of these natural additives, both MSF and DOC can be recommended for use in beef patties and other similar meat products after more studies.

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