

# Awareness on effective use of meat tenderizers among chefs in Chennai

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## ABSTRACT

**Background:** The objective of the study was to create awareness about meat tenderizers among chefs. **Materials and Methods:** A questionnaire-based survey study was carried out among 30 chefs working in different hotels in Chennai on the awareness of meat tenderizers and its effect on taste and cooking time. A well-structured questionnaire was prepared, distributed and collected after it was filled by the chefs. The questionnaire evaluated the knowledge and awareness among chefs about the usage of meat tenderizers, factors affecting the tenderization and its effect on the taste, quality, and cooking time. **Results and Conclusion:** The results was statistically analyzed. Chefs were aware of the use and presence of meat tenderizers in the market, and only some of them were well-versed with its effects. Regarding the mechanism of action of meat tenderizers, there may be a need for raising awareness and about the tenderizing techniques.

**KEY WORDS:** Bromelain, Meat tenderization, Chefs

## INTRODUCTION

Consumption of meat around the world has increased ten-folds with developing technology and mass media promoting various new methods to cook. In India, the meat industry values up to the US \$ 31,000 million.<sup>[1]</sup> According to chefs, consumer acceptance of meat due to its varying degrees of toughness has been one of the main obstacles in the food business. The average consumer rates tenderness of meat as one of the most important deal-breakers and no other palatability factor has been widely studied as tenderness.<sup>[2]</sup> The impression of tenderness to the palate includes three facets; first, the ease of penetration of the meat by the teeth, second, the ease with which the meat breaks into fragments and finally, the amount of residue remaining after chewing.<sup>[3]</sup> To reduce the tenderness of meat, various chemical and physical methods have been employed to make the meat more palatable to the consumer. Wier (1960) reported that prolonged cooking time at relatively low temperature converted collagen to gelatine resulting in more tenderness of meat, whereas, Lawrie (1991) reported that cooking coagulated the proteins of myofibrils resulting in toughness. McCrae and Paul

(1974) stated that microwave cooking preferentially increased the solubilization of collagen.<sup>[3-5]</sup>

### Measurement of Tenderness

The extent of tenderness can be measured by physical methods such as stretching, biting, mincing, penetrating, measuring of force for shearing, and etcetera. Chemical methods of measuring tenderness include determining the amount of connective tissue and its solubility and digestion by enzymes.<sup>[4]</sup> There are other instruments solely created for measuring such as the Warner Bratzler shear force instrument which tends to evaluate the amount of shear muscle fibers which works by the principle of the amount of force being directly proportional to the toughness of the meat. The standard unit of measuring the toughness of meat is in a kilogram of force needed to shear a 1 cm<sup>3</sup> muscle sample.<sup>[2]</sup> There was also the idea of a sensory panel test wherein trained panelists and normal population were subjects who were asked to consume the meat and asked about their perception of tenderness or toughness.<sup>[6]</sup> This technique seemed to be highly subjective and cannot be entirely relied on. However, on recent times, other methods have come into play which is capable of providing reliable results such as hydroxyproline measurement, scanning electron microscopic studies, enzyme activity estimation, conductivity measurement, and myofibrillar fragmentation index.<sup>[7]</sup>

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## Methods of Tenderization

Essentially, there are two methods of tenderization, i.e., physical and chemical. Physical methods of meat tenderization includes mechanical methods of applying force causing deformation or breakdown of the meat's structural proteins such as blade tenderization (applying a set of needles or blades spaced at a given interval distance which weakens the structure of meat's protein network), wrapping, stretching, or tender stretching, using hydrodynamic pressure known as hydrodyne (a postmortem meat processing treatment using small amounts of explosives to create a hydrodynamic shockwaves in water), ultrasound, electrical stimulation, using the mallet, and etcetera.<sup>[8]</sup> Chemical methods include tenderization by proteolytic enzymes derived from papaya– papain, pineapple– bromelain, fig– ficin, phosphates, salts, calcium chloride, and everyday essentials such as yogurt and lemon are also used. However, proteolytic plant enzymes are superior to bacterial derived enzymes mainly due to safety problems such as pathogenicity or other disadvantageous effects.<sup>[9]</sup> The added advantage of using proteolytic enzymes derived from plants is the antioxidative property inherent in these enzymes (given that the cooking temperature is not too high) even though it takes more time.

The rates of tenderness vary and in the Eastern countries, they are named and used commercially by people such as rare, medium rare, medium, medium well, and well to describe the amount of tenderness required pertaining to steak. This description is based on the temperature and time required to cook the meat and is well known by chefs and experienced cooks.

This study aims at evaluating the awareness among chefs from different restaurants about the use of meat tenderizers and their mechanism to provide a better understanding of the people's preferences when it comes to palatability.

## MATERIALS AND METHODS

A cross-sectional study was conducted in Chennai, India. The sampling frame for this study comprised 30 chefs from 30 different restaurants with a work experience period of more than 10 years. Informed consent was taken from the participating subjects.

The subjects were administered with a structured questionnaire encompassing their knowledge, awareness, attitude, and practice of meat tenderizing. The multiple-choice questionnaire developed had 12 questions and it was made sure that individuals gave their first natural response and attempted all the questions spontaneously.

This cross-sectional study was conducted with 30 chefs as subjects, and their answers were evaluated

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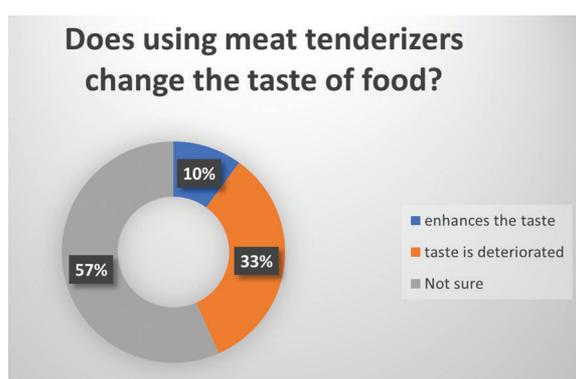
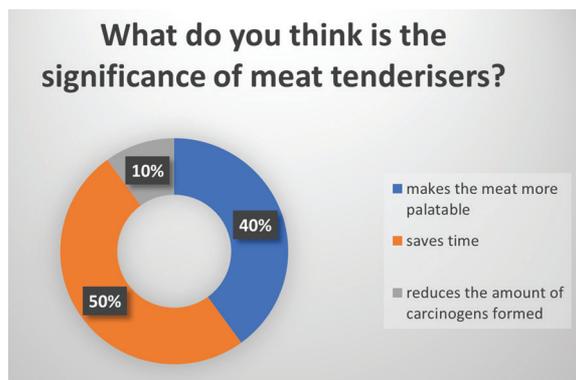
1. Are you aware of meat tenderizers in the market?
  - Yes
  - No
2. Do you use meat tenderizers in your restaurant?
  - Yes
  - No
3. What do you think is the significance of meat tenderizers?
  - Makes the meat more palatable
  - Saves time
  - Reduces the number of carcinogens formed
4. Did you know about natural products such as papaya or pineapple extracts being used as meat tenderizers?
  - Yes
  - No
5. Are you aware that these meat tenderizers do not work at high temperatures?
  - Yes
  - No
6. Does using meat tenderizer change the taste of food?
  - Enhances the taste
  - Taste is deteriorated
  - Not sure
7. How does using meat tenderizer change the cooking time?
  - Increases the cooking time
  - Decreases the cooking time
  - Not sure
8. Does using meat tenderizer decrease the nutritional quality of the food?
  - Yes
  - No
  - Not sure
9. How much time is required for meat tenderizers to work?
  - 30–45 min
  - 1–2 h
  - More than 2 h
10. Are you aware of physical methods of meat tenderization such as pressure treatments, blade tenderization, and electrical stimulation?
  - Yes
  - No
11. Do you feel that using plant products such as ficin and bromelain are as effective as the physical methods?
  - Yes
  - No
12. What do you think is a disadvantage with the excessive usage of meat tenderizers?

to create a circle graph (pie charts) which analyzed their attitude and knowledge about the usage of meat tenderizers.

## RESULTS

A total of 30 chefs participated in this study. To secure authentic results, non-answered questions

were excluded from the questionnaires. The age of the subjects varied from 32 to 55 years of age and the sampling group involved 27 males and 3 females.



Regarding the usage of meat tenderizers in their everyday practice, an expected 93% of the subjects were aware of the concept of meat tenderizers being sold in the market. Moreover, a lesser percentage of chefs, as compared to the former, were advocating and using meat tenderizers in their everyday practice. On knowledge about the natural, home produced elements such as papaya (papain), fig (ficin), and pineapple (bromelain) being used as meat tenderizers, a good percentage of 96.6% were aware. Regarding the effects of meat tenderizing products on the meat as such, not many were well educated. When asked about the effect of meat tenderizing products on the cooking time, 23.3% were not sure about its effect whereas 20% of the subjects felt it would increase the cooking time and only close to 50% of the individuals were right about its effect. In total, 63.3% were aware of the effects of meat tenderizers on the nutritional quality of the meat, 16% were not sure of its effects of decreasing the nutritive value in meat. According to the survey results, 90% (27 chefs) were well aware of the other physical methods of tenderizing and softening meat such as blade tenderization, pressure treatments, and electrical stimulation. When asked about the comparison of chemical and physical methods, 73% felt natural plant products prove to be better at meat tenderizing than physical methods.

## DISCUSSION

The process of tenderization begins immediately following the death of the animal and is followed by the disruption of the muscle structure by endogenous proteolytic systems. This slow and natural process can be influenced and speeded up by pre- and post-slaughter interventions. Pre-slaughter interventions include the physical and chemical (including natural techniques) methods of tenderization such as electrical stimulation, pressure treatments, using exogenous enzymes, or plant products which act as catalases and breakdown the protein content of the meat. In current trends, newer, advanced methods have come into the scene which employs hydrodynamic pressure, ultrasound, and pulsed electric field etcetera which claim to be quick, economical, and energy efficient. Flavor, juiciness, and tenderness are the three main attributes which influence the sensory enjoyment of meat.<sup>[10-12]</sup> This implies that there is a need for improving the techniques used for tenderizing meat. It is also the most variable of all meat palatability traits and is influenced by a range of biological and environmental factors. The high level of variation in sensory qualities represents a major cause of consumer dissatisfaction with beef with the variability of tenderness as the largest concern.<sup>[13]</sup> The tenderness of a piece of meat is a result of several factors which can be considered sequentially. The “background toughness” is determined by the characteristics of the muscle particularly its connective tissue (collagen), both its amount and type.<sup>[14]</sup> This, in turn, depends on factors such as animal age, state of nutrition, species, and muscle type.<sup>[15]</sup> Different muscle fibre types differ in their substance of collagen and thus muscles with different fibre type structure also vary in their tenderness.<sup>[16]</sup> There is also a correlation with fiber diameter and muscles with small fibers have been reported as more tender.<sup>[17]</sup> There have also been studies correlating the overall amount of lipid, level of intramuscular fat, and the intrafibre water content affecting the tenderness of meat while cooking.<sup>[18]</sup>

According to the results of the survey, the chefs were aware of the presence and usage of meat tenderizers, but their knowledge about its mechanism or the concept, its advantages and disadvantages and its effects were not well-versed. When asked about the significance of meat tenderizers, one of the unknown facts about meat tenderizers is its effective use in the reduction of carcinogens that may be formed during cooking meat. However, this effect is only applicable to natural plant products being used as meat tenderizers, and only 10% were aware of this. Chemical meat tenderizers work only up to a threshold temperature beyond which they get inactivated, and 70% of the subjects were aware of this. The only downfall with tenderizers is the decrease in nutritional quality of

the meat when used in excess as the meat tenderizers work by breaking down the protein content of meat and thus making it more palatable, and more than 50% of the subjects were aware.

Overall, chefs were aware of the use and presence of meat tenderizers in the market, and only some of them were well-versed with its effects. Regarding the mechanism of action of meat tenderizers, there is a need for raising awareness and spreading knowledge about the tenderizing techniques. Educating the chefs about the usage and ill-effects of meat tenderizers can further the studies and research done in the field of meat science.

## CONCLUSION

There is a need for conducting seminars and workshops for chefs and restaurant owners about the products used in their everyday work practice as the industry of meat and food as such values to billions of dollars and are increasing day by day. This calls for detailed studies into the science of meat tenderization and inventing advancements which can further its development. Creating awareness can bring into light the practical problems faced by them, and we can work toward developing a meat tenderizer which does not affect the nutritional quality of the food.

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