Health & Medical Sciences Volume: 2, Number 3, 2025, *Page*: 1-6

Effect Of Date Seed Powder On The Time Taken To Tenderize Meat and The Sensory Characteristics

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DOI:
https://doi.org/10.47134/phms.v2i3.408
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Received: 05-03-2025
Accepted: 25-04-2025
Published: 07-05-2025

Abstract: This study was conducted to investigate the effect of adding date seed powder to red meat on the time taken to tenderize meat and the sensory qualities. The powder was added at four different levels (0, 10, 20,and 30) %, so that each level represents a separate treatment (T_0, T_{10}, T_{20}, T_{30}) % respectively, and with three replicates for each treatment, distributed randomly during cooking, which was done by preparing 300 g of meat for each treatment, at a rate of 100 g / 500 ml of water for each replication, and by the wet cooking method, and using a digital laser cooker; to measure cooking time and evaluate sensory qualities. The results indicated a significant improvement ($P \leq 0.05$) in favor of the treatment that included adding 30% of date seed powder in reducing the time taken to tenderize the meat. The powder treatments also contributed to improving the sensory qualities such as color, odor, taste, texture, juiciness, and overall acceptability, specifically when adding the powder at a rate of T_{20}% to the meat sample.

Keywords: Meat Tenderization, Date Pits, Sensory Properties, Taste Buds, Cooking.

Introduction

Meat is a major source of proteins, vitamins and essential minerals; therefore, it plays a vital role in human nutrition; because it provides proteins of high biological value, which contribute to building muscles, in addition to its essential role in supporting various body functions, if consumed in a manner; to avoid health risks resulting from excessive consumption of these meats (Wyness, 2016; Lescinsky et al., 2022).

Given the biological importance of meat and its vital role in human consumer nutrition, which is considered an essential part of the diet, it is necessary to pay attention to cooking methods; to preserve nutritional value and enhance flavor, palatability and texture, in addition to the most important role of the cooking method, which is to kill harmful bacteria that cause diseases transmitted through meat, and these interests, in general, require more time and effort than usual; to ensure even and safe cooking (Li et al., 2021;

Zhou et al., 2023), Which prompted some researchers to make various attempts, using some plant product powders, to tenderize meat and give it a distinctive flavor, as we will focus in this study on the use of date seed powder, which is considered an agricultural waste rich in nutritional value (Al-Khalili et al., 2023), as these attempts were represented in adding date seed powder to meatballs and burgers, and all of them led to a significant improvement in the sensory properties of tasters (Ammar et al., 2014; Abdel-Maksoud et al., 2022; Alqahtan et al., 2022).

In continuation of previous studies conducted on meat that was subjected to physical treatment (exposed to grinding, which contributes to the breakdown of connective tissues), the current study came to be different from its predecessors; This is done by adding date seed powder directly to meat during cooking without any physical treatment of the meat, with the aim of studying the effect of adding the powder to meat on the time taken for the cooking process, as well as revealing the extent of the effect of the addition on the sensory qualities of tasters at different levels (0, 10, 20,and 30)%, in an effort to reduce cooking time and obtain meat characterized by flavor, texture and tenderness, especially in some red meats that contain a high percentage of connective tissue, which are tough after cooking despite consuming a long time during the cooking process and the subsequent significant loss of nutritional value, as well as to encourage and spread the culture of recycling important agricultural waste and using safe organic materials, and to reject the use of some chemicals that have a negative effect on the consumer and are used in tenderizing meat.

Methodology

Experimental treatments

Date seed powder was added to red meat at four different levels (0, 10, 20, and 30) %, so that each level represents a separate treatment (T0, T10, T20, and T30) % respectively, with three replicates for each treatment, distributed randomly during cooking; to ensure accuracy in the results.

Cooking method

300 g of meat were prepared for each treatment, at a rate of 100 g / 500 ml of water for each replicate, using the wet cooking method, and using the German Silver Crest digital laser cooker; to measure the cooking time and in preparation for evaluating the sensory qualities.

Sensory evaluation

The sensory evaluation was conducted by 15 experienced and specialized arbitrators according to a special form prepared for this purpose (Abdel-Maksoud et al., 2022).

Statistical analysis

The data were analyzed statistically using the SPSS (2018) program, and the significant differences between the means were compared using Duncan's multiple range test at a significance level of 0.05.

Result and Discussion

Effect Of Date Seed Powder On The Time Taken To Tenderize Meat

The effect of date seed powder on the time taken to tenderize meat is clear from Table 1. The date seed powder treatments recorded a significant (P≤0.05) superiority over each other in reducing cooking time according to the level of addition, and at the same time all date seed powder treatments significantly (P≤0.05) superiority over the control treatment, and the highest rate in reducing the time required for cooking and tenderizing meat was recorded by the fourth treatment T4 with the addition of 30% of date seed powder to the meat sample.

Table 1. Effect of date seed powder on the time taken to tenderize meat

Treat.	Start time (minutes)	End time (minutes)	Cooking time (minutes)
$T_{0\%}$	10:00±0.00	11.15±0.10 [a]	01:15±0.03 [a]
$T_{10\%}$	10:00±0.00	11.03±0.15 [b]	01.03± 0.05 [b]
$T_{20\%}$	10:00±0.00	10.53±0.08 [c]	53.00 ±0 .02 [c]
$T_{30\%}$	10:00±0.00	10.40±0.12 [d]	40.00±0.05 [d]
Sig.	N. S	*	*

*Different letters in the same column indicate the significant differences between the averages.
N.S: Indicates that there are no significant differences between the averages.

The reason for shortening the time required and increasing the cooking speed of date seed powder treatments may be due to the role of the powder in containing fatty acids that contribute to accelerating the cooking of meat by distributing heat effectively, in addition to its role in completing the reaction with proteins and muscle tissues in the meat, which leads to the breakdown of some of the interconnections within these tissues, and this breakdown makes the meat softer and speeds up the cooking process. It can also affect the acidity (pH) of the meat, which helps to tenderize it and increase the speed of its ripening, as these effects combined contribute to making the meat cook faster when adding date seed powder (Purslow, 2014).

The Effect Of Date Seed Powder On The Sensory Qualities

Table 2 shows the effect of date seed powder on the sensory qualities of tasters, as it is noted that there was a significant improvement (P≤0.05) in the sensory qualities of date seed powder treatments compared to the control treatment, as the T20% treatment recorded the best values in the studied sensory qualities, which included: color, odor, taste, texture, juiciness and overall acceptability, while there were no significant differences between the date seed powder treatments in the following qualities: texture, juiciness and overall acceptability.

The date seed powder treatment with the addition of T30% gave poor results in each of the following qualities: color, odor, taste and overall acceptability, compared to the other studied treatments.

Table 2. The effect of date seed powder on the sensory qualities of tasters

Treat.	Color	Odor	Taste	Texture	Juiciness	Overall acceptability
$T_{0\%}$	7.33±0.36 [b]	7.66±0.13 [a]	7.16±0.16 [a]	6.33±0.33 [b]	5.66±0.33 [b]	7.33±0.88 [ab]
$T_{10\%}$	7.50±0.28 [ab]	7.83±0.26 [a]	7.33±0.33 [a]	7.50±0.28 [ab]	7.16±0.16 [ab]	7.83±0.44 [ab]
$T_{20\%}$	8.33±0.17 [a]	8.16±0.16 [a]	7.50±0.28 [a]	7.83±0.60 [a]	7.66±0.88 [a]	9.00±0.57 [a]
$T_{30\%}$	6.16±0.44 [c]	6.50±0.30 [b]	6.00±0.23[b]	8.00±0.28 [a]	7.66±0.44 [a]	6.66±0.33 [b]
Sig.	*	*	*	*	*	*

*Different letters in the same column indicate the significant differences between the averages.

The results of this study were consistent in terms of the contribution of date seed powder to improving sensory properties, with what was reached by (Ammar et al., 2014; Abdel-Maksoud et al., 2022; Alqahtan et al., 2022). The reason for the improvement in the sensory properties of meat samples to which date seed powder was added is attributed to the interaction between the meat sample and the natural components contained in the seed powder that contribute to completing the positive chemical reaction, such as natural sugars such as glucose and fructose, which interact with proteins in the meat during the cooking process, leading to the formation of brown compounds (Maillard), which gives the meat an attractive golden color tending to a bright natural red color; due to the interaction of the amount of iron with proteins (Listrat et al., 2016).

These interactions also contribute to enhancing the natural flavour of the meat and giving it a sweet and distinctive flavour, due to the amino acids it contains, which play an important role in forming the flavour. When these acids are exposed to heat, they break down and react with sugars to form compounds with a diverse flavour and a distinctive odor (Alfaifi et al., 2023).

Date seed powder also contains fatty acids that play a role in increasing the ability of meat to hold water and thus contribute to retaining moisture inside the meat during the cooking process, which prevents the meat from drying out and maintains its tenderness (Juárez et al., 2012).

Conclusion

We conclude from this study that adding date seed powder contributes to reducing the time taken to tenderize meat, when added at a rate of 30% to the meat sample, and also contributes to improving the sensory qualities such as color, odor, taste, texture, juiciness and overall acceptability when added at a rate of T_{20}% to the meat sample, without recording any negative effects on the sensory criteria. The addition of T_{30}% gave poor results in each of the following qualities: color, odor, taste and overall acceptability, compared to the other studied treatments.

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