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(Enhancing Homemade Burger Recipes with Chia Seed Integration)

Research Project

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1. Introduction:

chia seeds can be used in meat products. Chia seeds can act as a binder or a substitute for breadcrumbs, helping to improve the texture and moisture content of ground meat products like meatballs, burgers, or meatloaf. To use chia seeds in meat products, you can mix them with water or another liquid to create a gel-like consistency, and then add the mixture to the meat mixture. This can help to improve the nutritional profile of the dish by adding additional fiber, protein, and healthy fats from chia seeds. It's important to note that chia seeds will absorb liquid and expand, so it's necessary to adjust the recipe accordingly (Boyacı et al., 2021).

Chia Burgers is the meat products where chia seeds can be used:

Chia Burgers: Add chia seeds to your homemade burger patties to improve moisture retention and increase nutritional content. Combine ground meat, chopped onion, spices, chia seeds, and an egg as a binding agent. Shape the mixture into patties and grill or cook on a stovetop (Boyacı et al., 2021).

1.2 The benefits of adding chia seeds to meat products:

Adding chia seeds to meat products offers several benefits:

1. **Nutritional Boost:** Chia seeds are rich in essential nutrients such as protein, fiber, calcium, iron, and omega-3 fatty acids. By incorporating chia seeds into meat products, you enhance their nutritional profile, increasing the overall intake of these beneficial nutrients.

2. **Moisture Retention:** Chia seeds have the ability to absorb and retain liquid, forming a gel-like consistency. This property can help improve the moisture content of meat products, preventing them from becoming dry during cooking.
3. **Texture Improvement:** Chia seeds act as a binder, helping to improve the texture of meat products. They can enhance the cohesiveness and structure of the meat mixture, resulting in meatballs, burgers, or meatloaf that hold together better.
4. **Binding Agent Replacement:** Chia seeds can act as a substitute for breadcrumbs or other binding agents. This can be particularly useful for individuals who follow a gluten-free or low-carb diet, as chia seeds provide the necessary binding without the need for wheat-based ingredients.
5. **Fiber Addition:** Chia seeds are an excellent source of dietary fiber. By adding chia seeds to meat products, you increase their fiber content, which can contribute to improved digestion and help promote feelings of fullness.
6. **Omega-3 Fatty Acids:** Chia seeds contain omega-3 fatty acids, which are beneficial for heart health and have anti-inflammatory properties. Incorporating chia seeds into meat products allows you to introduce these healthy fats into your diet (Masood, 2022).

In addition to the nutrients mentioned earlier, chia seeds contain various other beneficial nutrients.

1.2 Additional nutrients found in chia seeds:

1. **Antioxidants:** Chia seeds are rich in antioxidants, including flavonoids and phenolic compounds. These antioxidants help to protect the body against oxidative stress and inflammation, contributing to overall health and well-being.
2. **Vitamins:** Chia seeds are a good source of vitamins, particularly vitamin B complex, including thiamin (B1), riboflavin (B2), niacin (B3), and folate (B9). These vitamins play essential roles in energy production, brain function, and cell metabolism.
3. **Minerals:** Chia seeds contain various minerals necessary for the body's functions. They are particularly high in calcium, magnesium, phosphorus, and manganese. These minerals are essential for strong bones, muscle function, nerve signaling, and enzyme activity.
4. **Zinc:** Chia seeds provide a significant amount of zinc, which is involved in immune function, wound healing, and DNA synthesis. Zinc also acts as an antioxidant and supports reproductive health.

5. Iron: Chia seeds contain iron, a mineral necessary for the production of hemoglobin and the transport of oxygen throughout the body. Iron is vital for preventing iron-deficiency anemia and maintaining overall energy levels.
6. Potassium: Chia seeds are a good source of potassium, an essential mineral involved in maintaining fluid balance, proper heart function, and nerve transmission.

Including chia seeds in your diet can help ensure a diverse intake of nutrients, supporting overall health and vitality (Dinçoğlu and Yeşildemir, 2019).

2. Material and Methods:

The basic recipe for a chia seed burger was a simple and nutritious option for a chia seed-infused burger according to: (Antonini et al., 2021, Paula et al., 2019, Karpińska et al., 2021, Zaki ,2018) with simple modification.

2.1 Ingredients:

- 1000 ground meat (beef)
- 16g chia seeds
- 36.21g finely chopped onion
- 1.2g paprika
- 2g salt

- 0.44g black pepper

The evaluation of sensory characteristics of beef burger was conducted by students of Food technology department -University of salahaddin. They were asked to score deterrent parameters of the burgers based on the intensity perceived. Panelists were asked to compare two coded samples at one sitting. Each sample was presented twice to every panelist. were whom asked to evaluate the color, Juiciness, odor, taste, flavor, texture and overall acceptance of burgers which are served warm to the panelists. A nine-points system was used for evaluating burger quality (1– extremely unacceptable,9 extremely acceptable).

A nine-point hedonic scale

9 Like Extremely

8 Like Very Much

7 Like Moderately

6 Like Slightly

5 Neither Like nor Dislike

4 Dislike Slightly

3 Dislike Moderately

2 Dislike Very Much

1 Dislike Extremely

Prior to each evaluation preparatory meetings were held to discuss in detail the characteristics of burgers that were to be evaluated. The presented data were mean scores of evaluations (Jeon et al., 2010).

Table (1) Evaluation survey sample which gave to panelists.

Sample		Color Juiciness	Odor- Taste- Flavor	Texture	Overall Acceptance
Dislike Extremely	1				
Dislike Very Much	2				
Dislike Moderately	3				
Dislike Slightly	4				
Neither Like	5				
Like Slightly	6				
Like Moderately	7				
Like Very Much	8				
Like Extremely	9				

2.2 Instructions:

1. In a small bowl, the chia seeds were being combined with 4 tablespoons of water. They were left to sit for about 10 minutes to allow the chia seeds to absorb the liquid and form a gel-like consistency.
2. In a mixing bowl, the ground meat, chopped onion, paprika, salt, and black pepper were being combined. They were mixed well until all the ingredients were evenly incorporated.
3. The chia seed gel was being added to the meat mixture. It was mixed again until the chia seeds were evenly distributed throughout the mixture.
4. The meat mixture was being shaped into even-sized burger patties, either using hands or a burger press. Care was taken to make sure the patties were compact and held their shape.
5. A grill, skillet, or stovetop griddle was being heated over medium-high heat. The burger patties were being cooked for approximately 4-5 minutes per side, or until they reached the desired level of doneness.
6. Once cooked, the burger patties were being removed from the heat and left to rest for a few minutes.
7. The burger was being assembled by placing the chia seed-infused patties on burger buns. Any desired toppings and condiments, such as lettuce, tomato,

cheese, or sauces, were being added. The chia seed-infused burgers were being served hot.

3. Result and discussion

The sensory evaluation results of fried burgers, post-preparation with Chia seed integration in sample one (8gm), sample two (16gm), and the control, are comprehensively depicted in the figure below. Throughout the sensory evaluation process, panelists were tasked with scoring diverse parameters of the patties. This included color, juiciness, odor, taste flavor, texture, and the overall acceptance of the burgers, utilizing a meticulously calibrated nine-point hedonic scale.

In terms of color and juiciness, the fried burgers prepared with Chia seed garnered notably high scores, with sample one and two receiving respective scores of 7.62 and 8.25. In stark contrast, the control burger scored 6.62 for both color and juiciness. A parallel trend was observed in the evaluation of odor and flavor, with sample one and two recording scores of 7.50 and 7.62 for Chia seed burgers, while the control obtained a score of 7.37. The results of our study were in an agreement with study of (Karpińska et al, 2021) that they evaluated the effect of the addition of chia seed gel as egg replacer and storage time on the quality of pork patties. Similar results were reported by (Paula et al. 2019) who observed that chicken burgers, prepared with chia seeds, were characterized by better juiciness parameter than control samples.

An intriguing aspect emerged in the assessment of the texture of the burgers, wherein panelists assigned mean scores of 7.37 and 8.25 for samples one and two, respectively, surpassing the control's score of 6.5. This suggests a discernible preference for the texture of burgers prepared with Chia seed integration (Mohamed & Safaa, 2019).

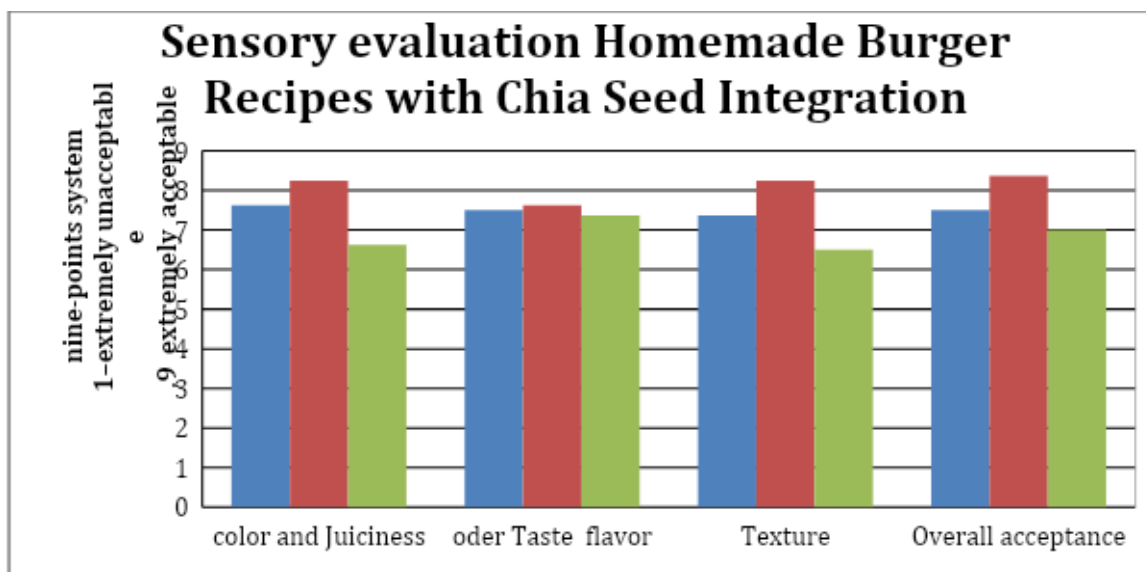


Figure (1) Sensory evaluation Homemade Burger Recipes with Chia Seed Integration

Noteworthy is the final parameter considered—overall acceptance. Burgers prepared with Chia seed, both at 8gm and 16gm, exhibited substantial popularity, securing scores ranging between 7.5 and 8.37. In contrast, the control burger scored 7. This observation prompts consideration of the potential influence of the Chia seed quantity in samples one and two on the overall acceptance of the burgers. The correlation between Chia seed content and the heightened acceptability of the

burgers adds an insightful layer to the interpretation of the sensory evaluation results. All the samples had typical sensory characteristics of burgers based on the Identity and Quality Standards (Brasil, 2000).

4. Conclusion

In summary the sensory evaluation results of fried burgers prepared with Chia seed integration in two samples (8gm and 16gm) and a control. Panelists assessed various parameters such as color, juiciness, odor, taste flavor, and texture, using a nine-point hedonic scale. Chia seed burgers received higher scores in color, juiciness, odor, flavor, and texture compared to the control. Notably, the texture of Chia seed burgers was preferred by panelists. The overall acceptance of burgers with Chia seed (8gm and 16gm) was also higher than the control, suggesting a positive correlation between Chia seed quantity and burger acceptability.

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