Effect of Natural preservatives on Quality and Shelf-Life of Hummus Product

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Progression of food processing due to evolution of life leads to increase demand on ready to eat food
Introduction

- Over time, it is normal for microbes to multiply due to their presence in a nutritious environment in the food product and leads to *(2)*:
  - Food borne illness
  - Food spoilage

![Foodborne illness](image1)
![Food spoilage](image2)

![M.O. that cause problems of food](image3)
The addition of antimicrobial agents has become necessary in food manufacturing to:

- prevent increasing of microbial load
- **extend the shelf life** of finished product
- maintain the **quality and safety** of products

The concentrations of preservatives in food should be regulated by international bodies to protect health consumers.
Chemical preservatives

Chemical structure of E (211)

Sodium benzoate (E211)*8

Chemical structure of E(211)

Potassium sorbate (E202)*8

Chemical structure of E(202)
Health concerns

- But these artificial preservatives (E202, E211) can cause adversial health effect on consumers*(8)

- dermatis
- Itching
- urticaria
Natural preservatives

- With growing concerns about chemical preservatives, natural preservatives could be desirable alternative. *(12)*

- Natural preservatives come from plant origin, animal origin, microbial origin *(Nisin, Natamycin)*. *(13)*
Nisin E(234)

- is a polypeptide bacteriocin produced by LAB bacteria consists of 34 amino acids.*(1)
- Molecular formula C_{143}H_{230}N_{42}O_{37}S_{7} *(GRAS) by FDA.*(1)
- Non toxic, high soluble, heat stable, doesn’t contribute to off flavor.
- Effective against G+ bacteria, but has no effect on G- bacteria, molds and yeast. *(10)
- Inactivation by proteolytic enzymes in GI tract*(1)

Chemical structure of Nisin

Mode of action for NISIN
Natamycin E(235)

- Polyene antimycotic macrolide produced by *Streptomyces natalensis*\(^{(1)}\)
- Molecular formula is C\(_{33}\)H\(_{47}\)NO\(_{13}\)
- Molecular mass is 665.725 g/mol
- (GRAS) by the FDA\(^{(1)}\)
- Non toxic, no influence on taste or appearance, active at low concentration.
- Effective against **fungus** growth, not effective against bacteria.\(^{(1)}\)
Objectives

- Add natural preservatives (Nisin, Natamycin) to hummus product
- Compare new samples with control to check product stability for 30 days
- Check the extend of shelf life for natural preservatives sample for 45 days
Methodology

50 kg of hummus mixture was made with chemical preservatives and other natural preservatives *(7)

7 samples were taken at a size of 180g and stored at 4°C *(11)

Microbiological tests*(5)
Sensory tests

For check stability of product*(6) | Check Extend of shelf life
Microbiological tests

**TPC**
To determine microbial quality of food product*(4)

**OGAY**
For enumeration of molds and yeast*(4)

**VRBA**
For enumeration and identification of coliform*(4)

**EMP**
For enumeration of E.coli bacteria*(4)

Microbiological tests

During microbial examination for 2 samples of Hummus product*{(4)}
Sensory evaluation

- The products were sensually tested by Hedonic scale

<table>
<thead>
<tr>
<th>Gender M......... F........</th>
<th>Age.........</th>
<th>Date.........</th>
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<tbody>
<tr>
<td>Like a lot</td>
<td>Like a little</td>
<td>Neither like nor dislike</td>
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<tr>
<td>Appearance</td>
<td>Colour</td>
<td>Texture</td>
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- The results of the sensory evaluation were analyzed by ANOVA test
Table 1: results of microbiological tests

<table>
<thead>
<tr>
<th></th>
<th>standard*</th>
<th>0 DAY</th>
<th>7 DAY</th>
<th>14 DAY</th>
<th>21 DAY</th>
<th>28 DAY</th>
<th>35 DAY</th>
<th>42 DAY</th>
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<td>Control Samples</td>
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<td>(Chemical preservatives)</td>
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<td>TPC (&lt;1x10^5)</td>
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<td>&lt;1x10^3</td>
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<td>&lt;1x10^3</td>
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<td>OGAY (&lt;1x10^2)</td>
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<td>&lt;1x10^2</td>
<td>&lt;1x10^2</td>
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<tr>
<td>VRBA (&lt;1x10^3)</td>
<td>&lt;1x10^2</td>
<td>2.0x10^2</td>
<td>5.0x10^2</td>
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<td>EMP (Nil)</td>
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<td>Nil</td>
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<td>Treatment Samples</td>
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<tr>
<td>(Natural preservatives)</td>
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<tr>
<td>TPC (&lt;1x10^5)</td>
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<td>OGAY (&lt;1x10^2)</td>
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<td>VRBA (&lt;1x10^3)</td>
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<td>EMP (Nil)</td>
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* According to the Palestinian standard No. (PS_134_2012) according to the sixth item (6. health conditions)
Results

Figure 1: comparison of sensory evaluation between A & B product at (0 day)
Results

Figure 2: comparison of sensory evaluation between A & B product at (14 day)
Conclusion

- Chemical preservatives have been replaced by natural preservatives due to health problems caused by chemical preservatives.

- Until 14th day, natural preservatives were more effective against microbial growth than synthetic, and hummus product with natural preservatives was more sensually acceptable.

- The effectiveness of Nisin and Natamycin in extend the shelf life of hummus is unclear until the experiment is completed.
Recommendations

- Studying consumer demand for food products with natural preservatives

- Educating consumers about the dangers of eating processed foods frequently with artificial additives. Foods with natural additives are a better option

- Study the effect of these substances on many national food products
Thanks for
References

1. Francesco Contò, Matteo A. Del Nobile et.al (2018), advances in dairy products
3. Maria Manuela Silva*, Fernando Cebola Lidon2, 2016, Food preservatives – An overview on applications and side effects
5. According to the Palestinian standard No. (PS_134_2012) according to the sixth item (6_health conditions)
6. According to the Palestinian standard No. (PS_59_2014)
7. According to Palestinian Standard No. (PS_134_2010) according to item (9_2_4) in the standard
• (8) European Food Safety Authority, (2015), Scientific Opinion on the re-evaluation of sorbic acid (E 200), potassium sorbate (E 202) and calcium sorbate (E 203) as food additives. (2016), Scientific Opinion on the re-evaluation of benzoic acid (E 210), sodium benzoate (E 211), potassium benzoate (E 212) and calcium benzoate (E 213) as food additives

• (9) According to the data sheet provided to us by the supplier (Midal Import and Export Company / Nablus)

• (10) Emre HASTAOĞLU*, Meryem GÖKSEL SARAÇ1, Zehra SEBA KESKİN1, Fazıl YOZGAT2, (2017), The Effects of Nisin and Natamycin on the Microbiological, Chemical and Sensorial Qualities of Meatballs

• (11) According to the specification No. (PS_134_2012) according to the seventh item in Related to packing and storage No. (7_6_1)