APPLICATION OF PICKLING FOR PRESERVATION OF PANEER

M. Rani, R.S. Dabur, S. Khanna*, S. Potliya and S. Verma
College of Veterinary Science,
Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar-125 004, India
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ABSTRACT

The present study was conducted to investigate the effect of pickling on preservation of paneer at room temperature. Two types of pickles were prepared i.e. brine pickle (BP) and spice vinegar pickle (SVP). BP was prepared by dipping paneer in brine solution (20%) and SVP in acetic acid (4%). Both these products were packed in sterile glass bottles with moisture proof laboratory seal films and lids. The products were stored at room temperature and analyzed for nutritional composition and microbial quality at 15 days interval. Microbial safety was assessed by determining standard plate count (SPC), coliform count, yeast and mould count (YMC) and pathogens. SPC and YMC showed increasing trend during entire storage but were within the limits. Pickling was effective in keeping bacterial and yeast and mold count at low level. BP was microbiologically stable for 1 month and SVP had a shelf life of 2 months.

Key words: Microbiological, Nutrition, Paneer, Pickles, Shelf life

INTRODUCTION

Paneer, a popular heat and acid coagulated indigenous dairy product, is a rich source of milk protein at comparatively lower cost. Its high protein content and high digestibility, biological value of protein (82-86%) make it a good source of protein. Paneer is vulnerable to contamination by different microorganisms. Low-temperature storage is an effective method to control pathogenic decay. The refrigerated storage of paneer maintains its keeping quality up to 6 days, color and appearance are affected after 3 days. Thus, chilling also limits the storage period. Therefore, it is necessary to find out suitable means of extending its shelf life by pickling. Pickle technology based on fruits and vegetables is well established (Sandhu and Shukla, 1996) and standardized at industrial scale.

MATERIALS AND METHODS

Preparation of paneer: Standardized milk (6% fat, 8.5% SNF) obtained from the institutional dairy production unit was used and paneer was prepared as per the method suggested by Sachdeva and Singh (1988) with some modifications.

Preparation of brine paneer pickle (BP): One kg paneer cubes (1cm×1cm×1cm) were immersed in brine solution (20%) and was prepared.

Preparation of spiced acetic acid paneer pickle (SVP): One kg paneer cubes (1cm×1cm×1cm) were immersed in heated acetic acid solution (4%) containing muslin bag with ground spices (clove, coriander, mustard seeds, ginger root powder, mace-3g). After removing spice bag, sugar was dissolved in vinegar.

Storage study of paneer pickles: The paneer pickles (BP and SVP) formulations were filled in sterile glass bottles and sealed with films and lids.

Chemical analysis: The samples were analyzed for total energy (by calculation), fat, cholesterol, Moisture and ash and measured by Majonnier method (AOAC, 1995). The analysis for protein, cholesterol, Ca and Mg was done by auto analyzer (Erba Mannheim) using fully auto analyzer kits. Standardized paneer obtained from the Department of Livestock Products Technology, Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar was used as control.

Microbiological analysis: Microbiological analysis of the samples was carried out by the methods prescribed by Bureau of Indian Standards (1989). The samples were examined for standard plate count (SPC), coliform count, yeast and mould count (YMC) and pathogens. SPC and YMC showed increasing trend during entire storage but were within the limits. Pickling was effective in keeping bacterial and yeast and mold count at low level. BP was microbiologically stable for 1 month and SVP had a shelf life of 2 months.

*Corresponding author’s e-mail: joykhanna20@gmail.com
counts (SPC), yeast and mold counts (YMC) and
coliform counts.

RESULTS AND DISCUSSION
Nutritional composition of products: Loss of
moisture during pickling was due to the presence of
salt, sugar and spices in the pickles (Table 1). These
ingredients lowered the percentage moisture, due to
increase in total solids percentage due to diffusion
of various ingredients of pickles into paneer cubes
and diffusion as governing transport mode in the
process of salt transfer during short term brining of
white pickled cheese. Rao and Patil (1999) reported
diffusion of NaCl and citric acid into paneer cubes
immersed in brine (8%) and citric acid (5%) for more
than four hours and the rate of diffusion of NaCl
was higher than that of citric acid due to lower weight
of NaCl than that of citric acid. This explains why
total solid percent were more in BP containing 20%
NaCl than in SVP containing 40% sucrose and 4%
acetic acid. Second reason of loss of moisture during
pickling may be due to movement of water molecules
along concentration gradient. As pickle media were
highly concentrated, therefore water moved out of
paneer cubes to media. Bajwa et al. (2005) reported
that cheese lost water during brining, resulting in
surplus of dilute brine. The total fat content of BP
and SVP was 28.3 g and 28.7g per 100g, respectively
in comparison to 25.55g per 100g in standardized
paneer which was well above the level of prescribed
values (FSSR, 2011). Vaid et al. (2004) also reported
33.1 per cent fat in oil and vinegar based paneer
pickle samples. Total protein content on fresh bases
was found to be 18.7 g and 18.6g per 100g in BP
and SVP respectively as compared to 18.63g per
100g in fresh paneer, which was in close agreement
with Vashista (2000). BP contained significantly high
ash content (11.9%) than in SVP (2.9%) as
compared to ash content of standardized paneer
(2.21%). High ash content in BP was because of
penetration of salt from pickle media into paneer
cubes due to diffusion as also reported by Bajwa et
al. (2004), since in case of SVP, only spice extract
was added therefore its ash content was similar to
fresh paneer. It was calculated that 17 per cent of
Daily Reference Value (DRV) of energy, 37 per cent
DRV of protein, 23.7 per cent of calcium and 5.5-
6.0 per cent of magnesium could be met from a single
serving of 100g of BP and SVP. The people who
want to take lower carbohydrates can include these
products in their diet plan.

Microbiological quality and effect of storage at
room temperature: Microbiological quality of the
products is shown in Table 2. Yeast and moulds were
not detectable till 15 days of storage in SVP but
visible in BP on 15th day. SPC was well within the
permissible limits under FSSR Regulations (FSSR,
2011) for paneer i.e. 50,000/g. There was gradual
rise in the SPC in BP and SVP products, upto 60th
day. Pal (1998) observed bacterial count in fresh
paneer 3.03 log cfu/g which increased to 4.5 log cfu/
g on day 5th in paneer samples stored at 10°C. Pickling
process was effective in keeping bacterial count low. Coliform counts also showed gradual rise in
numbers in both the products and the numbers

![FIG 1: Standard plate count of paneer pickles (BP and SVP)](image)

TABLE 1: Nutritional composition of brine paneer pickle (BP) and spice vinegar pickle (SVP)

<table>
<thead>
<tr>
<th>Nutritional constituents(Per 100g)</th>
<th>Standardized paneer</th>
<th>BP</th>
<th>SVP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total energy (Calories)</td>
<td>311.47± 1.10</td>
<td>338.70± 1.20</td>
<td>339.00± 1.17</td>
</tr>
<tr>
<td>Total fat (g)</td>
<td>25.55± 0.28</td>
<td>28.30± 0.31</td>
<td>28.71± 0.25</td>
</tr>
<tr>
<td>Total cholesterol (mg)</td>
<td>134.30± 0.07</td>
<td>124.40± 1.50</td>
<td>125.40± 1.20</td>
</tr>
<tr>
<td>Total proteins (g)</td>
<td>18.63± 0.29</td>
<td>18.70± 0.32</td>
<td>18.61± 0.30</td>
</tr>
<tr>
<td>Total carbohydrates (g)</td>
<td>1.75± 0.14</td>
<td>1.40± 0.11</td>
<td>2.50± 0.12</td>
</tr>
<tr>
<td>Total ash (g)</td>
<td>2.21± 0.28</td>
<td>11.90± 0.30</td>
<td>2.91± 0.29</td>
</tr>
<tr>
<td>Calcium (mg)</td>
<td>233.02± 1.10</td>
<td>237.00± 1.11</td>
<td>236.90± 1.15</td>
</tr>
<tr>
<td>Magnesium (mg)</td>
<td>23.89± 0.82</td>
<td>22.20± 0.75</td>
<td>24.21± 0.90</td>
</tr>
<tr>
<td>Moisture (%)</td>
<td>54.00± 0.27</td>
<td>49.00± 0.25</td>
<td>48.50± 0.29</td>
</tr>
</tbody>
</table>

Values are mean ± SE of five replications
TABLE 2: Microbiological count (log cfu/g) of brine pickle (BP) and spice vinegar pickle (SVP) during storage at room temperature

<table>
<thead>
<tr>
<th>Microbial count</th>
<th>Products</th>
<th>Storage (Days)</th>
<th>0</th>
<th>15</th>
<th>30</th>
<th>45</th>
<th>60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard plate count</td>
<td>BP</td>
<td></td>
<td>2.11</td>
<td>2.95</td>
<td>3.25</td>
<td>4.77</td>
<td>5.17</td>
</tr>
<tr>
<td></td>
<td>SVP</td>
<td></td>
<td>2.30</td>
<td>2.93</td>
<td>3.09</td>
<td>3.29</td>
<td>4.31</td>
</tr>
<tr>
<td>Coliform count</td>
<td>BP</td>
<td></td>
<td>1.69</td>
<td>2.39</td>
<td>2.92</td>
<td>3.05</td>
<td>3.35</td>
</tr>
<tr>
<td></td>
<td>SVP</td>
<td></td>
<td>1.90</td>
<td>2.43</td>
<td>2.91</td>
<td>3.06</td>
<td>3.34</td>
</tr>
<tr>
<td>Yeast and mould count</td>
<td>BP</td>
<td></td>
<td>ND</td>
<td>2.04</td>
<td>2.38</td>
<td>3.69</td>
<td>3.98</td>
</tr>
<tr>
<td></td>
<td>SVP</td>
<td></td>
<td>ND</td>
<td>ND</td>
<td>1.84</td>
<td>2.27</td>
<td>2.36</td>
</tr>
</tbody>
</table>

ND- Not Detectable

FIG 2: Coliform count of paneer pickles (BP and SVP)

were found well beyond FSSR limits i.e. more than 1.95 log cfu/g (fig-2). This may be because of post processing contamination while dipping of paneer in water. Yeast and moulds were not detected initially because of the action of essential oils from the various spices, which cause their inhibition (Shukla and Tripathi, 1987). While yeast and mold in paneer kept at 10°C was 2.19 log cfu/g on 5th day (Pal, 1998). Yeast and moulds were detectable in BP (110/g) and SVP on and after 15th days. Therefore, pickling process reduced yeast and mold growth in paneer. Colour, appearance and odour of these pickles were initially in range of ‘like extremely’ upto 1 month and started declining in second month. However, these were ‘liked very much’ in terms of all sensory attributes (Vaid et al. 2004). Vaid et al. (2004) have also reported similar changes in microbiology for oil and vinegar based paneer pickle sample on storage.

CONCLUSION

SPC and YMC showed increasing trend during entire storage but were within the limits prescribed by FSSR (2011). Pickling process was effective in keeping bacterial and yeast and mold count at low level. Coliform counts revealed that there is further scope of improvement in hygiene. Acetic acid preserved paneer was shelf stable for two months at ambient temperature. The technologies generated may be explored for value addition for producing a safe paneer with convenience to the consumers.

ACKNOWLEDGEMENT

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REFERENCES


