Preparation of Instant Tomato Ketchup Powder and Comparison of its Physiochemical Composition with Different Brands of Tomato Ketchup Available in Market

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Abstract: Instant tomato ketchup powder was prepared on cabinet dryer. The quality of prepared product was also compared with three commercial brands of tomato ketchup. Among physiochemical characteristics; total sugars, reducing sugars, total acidity, total soluble solids, moisture, protein, ash, NaCl % and fat were determined. The prepared tomato ketchup powder moisture was 5.20%, ash was 4.2%, acidity was 4.9%, vitamin C was 9.5 mg/100 g, NaCl was 7.2%, protein was 6.1%, total sugar was 67.1%, reducing sugar was 22.1% and ether extract was 1.89%. The product was highly acceptable regarding taste and texture when reconstituted with water.

Key words: Tomato • Vitamin C • Ingredients • Sugars • NaCl

INTRODUCTION

Tomato (Lycopersicon esculentum Mill) is one of the most popular and versatile vegetable all over the world. It plays a vital role in providing a substantial quantity of vitamin C and A in human diet. The fruits are eaten raw or cooked. It is most popular as salad in the raw state and is made into soups, juice, ketchup, pickles, sauces, conserves, puree, paste, powder and other products [1].

Tomatoes are one of the most widely used and versatile vegetable crops. They are consumed fresh and are also used to manufacture a wide range of processed products [2]. Tomatoes and tomato products are rich in health related food components, as they are good sources of carotenoids (in particular, lycopene), ascorbic acid (Vitamin C), vitamin E, folate flavonoids and potassium [3, 4]. The main antioxidants in the tomatoes are the carotenoids, ascorbic acid and phenolic compounds [5].

Consumer demand for highly quality, minimally processed products has increased remarkably in recent years. Preference have shifted towards the fresh, healthy and rich flavored ready to eat food with and enhanced shelf life. Tomato powders are often used as an ingredient in the food such as sauces and soups. Several food technology studies have been carried out to optimize the processing and storage of the tomato products by preventing the heat and oxidative damage on the antioxidants [6]. On the other hand a useful optimization criterion requires a global approach that includes all the quality characteristics of the tomato products. Hence, it is necessary both to minimize the damage to the sensory and nutritional quality and to maximize the safety and shelf life of the products.

In the present work an attempt has been made to break the conventional mode of tomato ketchup preparation and a new approach has been adapted in order to make the product not only more economical but also more convenient in handling and transportation.

MATERIALS AND METHODS

Raw Materials Collection: Fresh tomatoes of good quality were purchased from the vegetable market Peshawar city and were transported to the Food Technology Center, PCSIR Laboratories Complex Peshawar an, where tomato paste was prepared.
**Sorting:** Tomatoes were thoroughly sorted. Diseased, insect damaged, reddened and immature were discarded. Tomatoes and all other ingredients (garlic, onions, cinnamon, red chilies, cloves, salt, sugar and vinegar) were purchased from the local market. Several approaches were made to prepare instant tomato powder. In the first instant the conventional process for tomato ketchup has been utilized (Ref.??) and the liquid product was subjected to dehydration.

Secondly, only tomato paste in combination with fresh vegetable constituent like garlic, onions, cinnamon, red chilies, cloves, salt, sugar and vinegar were homogenized and dehydrated as usual. To the dehydrated mass were added finely ground ingredients garlic, onions, cinnamon, red chilies, cloves, salt, sugar and vinegar, mixed thoroughly and then packed. Thirdly all individual constituents were dehydrated separately and then formulated in to the final products.

The product immediately after its preparation was subjected to analysis as were the commercial (fluid) ketchup samples obtained from the local market.

Total sugars, reducing and total acidity were determined by the method of Ruck [7]. Moisture, fat, protein and ash were determined by AOAC methods [8]. Ascorbic acid was determined by indophenols method [9].

**RESULTS AND DISCUSSION**

The product obtained was of reasonably good quality as regard its color, flavor and taste etc. Organoleptic evaluation was also performed through taste panel which not only confirmed the above findings but also adjudged it to be quite acceptable. The chemical composition of the instant tomato ketchup was also determined. The results were given in Table 1. The moisture content of the tomato ketchup powder as can be seen from table 1 was 5.2 % which is not sufficiently low to guarantee a good prolonged shelf life as such. It can be further lowered through the utilization of some efficient and economically viable system such as bin dryer or fluid bed dryer. By taking other specific measures such as controlling the atmospheric conditions during the final stages of the products preparations i.e. during blending together of the solid constituents and packing etc, could result in a product having moisture contents well below 3% which is generally considered as a safe limit (Ref.??). An in packet desiccant (silica gel) used provisionally in the laboratory has shown encouraging results for reducing the moisture content and enhancing useful shelf life and maintaining the quality of the product during storage. These results are also coinciding with the results of de Sousa et al. [10].

By taking a glance at table 1, it is clear that even in this moisture free basis the tomato ketchup powder were richer than the commercial product as for as the energy producing compound (Sugar and fats).

The reducing sugars were some what higher in the instant products as compared to commercial I, II and III. Ether soluble fraction of the ketchup powder is considerably higher than the commercial marketed products. The explanation for which could be found in the differences in processing technology. Whereas the seeds that considered the richer in lipids were generally removed in the processing of commercial ketchup production. The higher ash content in the dehydrated ketchup could be attributed to the incorporation of inorganic compounds like silicate, as anticaking agent for guarding against the absorption of moisture and the lumps formation in the final product. Total acidity has been purposely kept higher in the instant product as it was only considered useful for preservation but also improve the flavor. Ascorbic acid content was lower in the dehydrated tomato ketchup but similar is the case with the commercial fluid product (Sample III).

<table>
<thead>
<tr>
<th>S #</th>
<th>Parameters</th>
<th>Sample I</th>
<th>Sample II</th>
<th>Sample III</th>
<th>Tomato Ketchup Powder (PCSIR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Moisture %</td>
<td>31.7</td>
<td>29.3</td>
<td>32.9</td>
<td>5.20</td>
</tr>
<tr>
<td>2</td>
<td>Ash %</td>
<td>1.08</td>
<td>1.02</td>
<td>1.1</td>
<td>4.2</td>
</tr>
<tr>
<td>3</td>
<td>Total Soluble Solids %</td>
<td>34.8</td>
<td>33.2</td>
<td>37.9</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>Acidity %</td>
<td>1.09</td>
<td>0.9</td>
<td>1.31</td>
<td>4.9</td>
</tr>
<tr>
<td>5</td>
<td>Ascorbic Acid (mg per 100 gm)</td>
<td>47</td>
<td>6.4</td>
<td>9.14</td>
<td>9.5</td>
</tr>
<tr>
<td>6</td>
<td>NaCl %</td>
<td>3.4</td>
<td>3.6</td>
<td>3.72</td>
<td>7.2</td>
</tr>
<tr>
<td>7</td>
<td>Protein %</td>
<td>1.75</td>
<td>2.0</td>
<td>2.44</td>
<td>6.1</td>
</tr>
<tr>
<td>8</td>
<td>Total Sugar %</td>
<td>22.57</td>
<td>21.34</td>
<td>24.67</td>
<td>67.1</td>
</tr>
<tr>
<td>9</td>
<td>Reducing Sugar %</td>
<td>7.95</td>
<td>14.5</td>
<td>7.3</td>
<td>22.1</td>
</tr>
<tr>
<td>10</td>
<td>Pet. Ether Extract %</td>
<td>0.14</td>
<td>0.16</td>
<td>0.15</td>
<td>1.89</td>
</tr>
</tbody>
</table>
Keeping in view the labile nature of vitamin C and a long exposure of the tomato ketchup to higher temperature and air, the decrease in ascorbic acid content in the dehydrated product is understandable. Previous study has also reported loss of ascorbic acid during the dehydration and storage of tomatoes [11]. This however does not seem to be a problem since it can be incorporated exogenously without affecting the cost to any great extent. The dehydrated product is also to be found comparatively richer in protein content than the products commercially marketed since seeds are also included in the former. In general it could be seen that the instant product compare favorably with the commercial product with regard to acceptability and nutritional values.

The shelf life of the products has not been studied thoroughly for want of proper packaging arrangement however the preliminary studies carried out in the product packed in glass bottles etc, do indicates the shelf life of more than six month. This however could be improved upon when the packing is performed under proper conditions and with the proper equipments and suitable packaging material.

CONCLUSIONS

In common, preparation of traditional chutney is a simple process. Instant Tomato Ketchup Powder using dehydrated tomato past and other spice ingredients had a greater advantage to employ the raw material throughout glut seasons. The end product was a good nutritional component may be useful in human health point of view.

REFERENCES


