

Studies on Antioxidant Properties of Muffins Developed by Mango Dietary Fibre

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Abstract. Consumption of natural bioactive compounds such as polyphenols, carotenoids and dietary fibre offers health benefits including protection against cardiovascular diseases, cancer and other degenerative diseases. The present study was made with an attempt to develop a fibre rich muffin with antioxidant properties. Thus, for the same, mango was chosen as the basic ingredient. From the literature cited mango contains a variety of phyto-chemicals and nutrients. The fruit pulp is high in prebiotic dietary fibre, vitamin C, diverse polyphenols and pro-vitamin. It contained 51.2% of total dietary fibre, 96 mg GAE/g of polyphenols and 3092 mg/g of carotenoids. Hence mango dietary fibre (MDF) was extracted and powdered. The muffins was prepared at different treatment (T₁ 5%, T₂ 10%, T₃ 15%) of MDF and physiochemical, microbial, and sensory characteristic were evaluated. The total dietary fibre content increased from 3.44 to 9.07% with incorporation of 15% MDF. The antioxidant activity increased from 52.45 to 98.83 mg/g of muffin with incorporation of 15% of MDF. As far as sensory attributes are concerned, T₁ sample, MDF incorporated 10% was found to be more favourable. Thus, the results indicated that all purpose flour incorporated with MDF yielded dietary fibre enriched muffin with improved antioxidant properties.

Keywords: Antioxidant, mango dietary fibre, muffin.

1. Introduction

Muffin is a type of semi-sweet cake or quick bread that is baked in portion appropriate to one person. They are similar to cupcakes, although they are usually less sweet and lack icing. Muffin gets their characteristic rise from baking powder or sometime baking soda instead of yeast. Muffins are often eaten for breakfast, alternatively they may be served for tea or at other meals. Dietary fibres (DF) are the indigestible portion of food derived from plants. These are of great interest because of its several physiological and metabolic effects. DF plays an important role in the prevention and treatment of obesity, atherosclerosis, coronary heart diseases, colorectal cancer and diabetes. Mango dietary fibre (MDF) concentrate has been used in the preparation of many bakery products to increase the total dietary fibre content of the product [1]. It is used in the preparation of muffins, cookies, cakes, bread etc. The products made out of MDF have a high phenolic and antioxidant activity. The present study is done to prepare a high dietary fibre muffin to increase the nutritional quality and also to check the antioxidant content of the MDF muffin.

2. Material and Methods

First of all, mango dietary fibre (MDF) was obtained by cutting raw mangos into small pieces. After grinding it was boiled in water at 60 °C till it is clear. Then the water is drained and the mass was pressed. Now the mass was dried at 60 °C for 4-5 hours and the obtained MDF was grinded. Now the flour (maida) and MDF were mixed with different ratio viz, 100:00(T₀), 95:5(T₁), 90:10(T₂) and 85:15(T₃). Milk was then added @ 25%, followed by egg (13%), vegetable oil (12%), sugar (18%), salt (0.01%), baking powder (0.8%)

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and yeast (0.05%). The ingredients were mixed till it became smooth in texture. The batter (mix) was leavened for 15 minutes. Then it was baked at 180 °C for 20 minutes and cooled in pan for 10 minutes. The product was ready to serve. The samples were analyzed for physicochemical and organoleptic qualities as per procedure laid down by AACC [2] , AOAC [3], ICAR manual in Dairy chemistry [4] and Dairy Bacteriology [5].

3. Results and Discussion

The data collected on different aspects as per plan were tabulated and statistically analyzed as per chandel [6]. Table 1 showed average data obtained on different parameters.

3.1. Physicochemical Properties

The highest mean for carbohydrate percentage in MDF muffin was in T₃=41.53, followed by T₂(41.35), T₁(41.09) and T₀(40.36). The difference between T₀, T₁, T₂ and T₃ were significant. The highest mean for protein percentage in MDF muffin was in T₃=16.52, followed by T₂(15.80), T₁(15.58) and T₀(15.52). The differences between the treatments were significant. The highest mean for fat percentage in MDF muffin was in T₂=8.22 followed by T₃(8.21), T₁(8.20) and T₀(8.19). The difference among the treatments were non significant. The highest mean for ash percentage in MDF muffin was in T₃(2.80), followed by T₂(2.61), T₁(2.46) and T₀(2.34). The differences among the treatments were significant. The highest moisture percentage in MDF muffin was in T₀(28.55), followed by T₁(27.58), T₂(27.36) and T₃(26.32). The difference among the treatments T₀, T₁, T₂ and T₃ were significant. The highest mean for total solids percentage was in T₃(73.67), followed by T₂(72.64), T₁(72.42) and T₀(71.44). The treatments differed significantly.

Table 1. Average of different physicochemical parameters.

| Parameters (%) | Treatments | | | |
|----------------|----------------|----------------|----------------|----------------|
| | T ₀ | T ₁ | T ₂ | T ₃ |
| Carbohydrate | 40.36 | 41.09 | 41.35 | 41.53 |
| Protein | 15.52 | 15.58 | 15.80 | 16.62 |
| Fat | 8.19 | 8.20 | 8.22 | 8.21 |
| Ash | 2.34 | 2.46 | 2.61 | 2.80 |
| Moisture | 28.55 | 27.58 | 27.36 | 26.32 |
| Total Solids | 71.44 | 72.42 | 72.64 | 73.67 |

3.2. Organoleptic Parameters

As per table-2 the highest mean for colour and appearance in MDF muffin was in T₂(8.01), followed by T₀(8.00), T₁(7.75) and T₃(7.63). The differences among the treatments were significant. The highest mean for body and texture were in T₁(8.06), followed by T₂(7.93), T₀(7.88) and T₃(7.19). The differences among the treatments were significant. The highest mean for flavour and taste was in T₁(8.3), followed by T₀(7.9), T₂(7.5) and T₃(6.5). There were significant differences found among the treatments.

Table 2. Organoleptic Parameters

| Parameters | Treatments | | | |
|-----------------------|----------------|----------------|----------------|----------------|
| | T ₀ | T ₁ | T ₂ | T ₃ |
| Colour and Appearance | 8.00 | 7.75 | 8.01 | 7.63 |
| Body and Texture | 7.88 | 8.06 | 7.94 | 7.19 |
| Flavour and Taste | 7.90 | 8.30 | 7.50 | 6.50 |

3.3. Dietary Fibre Content

As per table-3 and Fig. 1 the highest mean for dietary fibre content was found in T₃(9.01), followed by T₂(6.10), T₁(3.14) and T₀(0.44). The differences among the treatments were significant.

Table 3. Dietary fibre percentage in control and experimental MDF Muffin.

| Replication | Treatments | | | |
|----------------|----------------|----------------|----------------|----------------|
| | T ₀ | T ₁ | T ₂ | T ₃ |
| R ₁ | 0.46 | 3.66 | 5.98 | 9.01 |
| R ₂ | 0.48 | 3.60 | 6.01 | 9.30 |
| R ₃ | 0.40 | 3.00 | 6.20 | 8.90 |
| R ₄ | 0.41 | 3.50 | 6.21 | 9.05 |
| Mean | 0.43 | 3.44 | 6.10 | 9.05 |

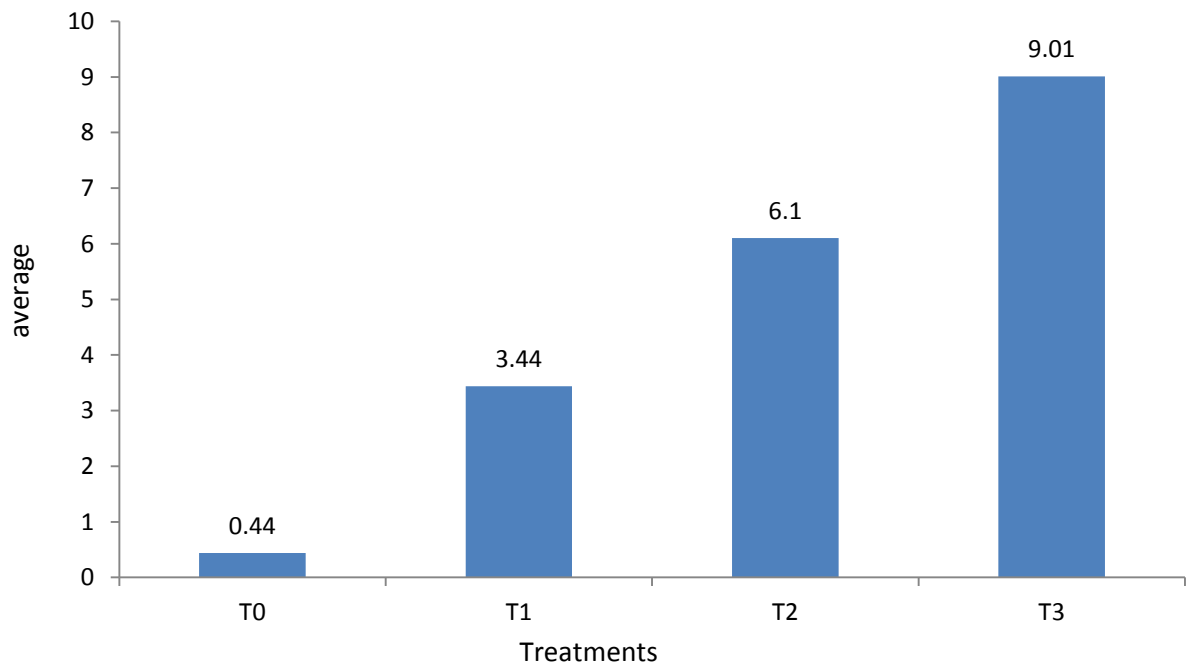


Fig. 1: Dietary fibre percentage in MDF Muffin

3.4. Antioxidant Content in MDF Muffin

As per table-4 and Fig. 2 the highest mean for Antioxidant content was found in T₃(98.83), followed by T₂(77.10), T₁(52.45) and T₀(0.00). The treatments differed significantly.

Table 4. Antioxidant content in MDF Muffin.

| Replication | Treatments | | | |
|----------------|----------------|----------------|----------------|----------------|
| | T ₀ | T ₁ | T ₂ | T ₃ |
| R ₁ | 0.00 | 52.0 | 78.8 | 97.5 |
| R ₂ | 0.00 | 54.0 | 75.8 | 98.0 |
| R ₃ | 0.00 | 51.5 | 78.2 | 101.4 |
| R ₄ | 0.00 | 52.3 | 75.6 | 98.4 |
| Mean | 0.00 | 52.45 | 77.10 | 98.83 |

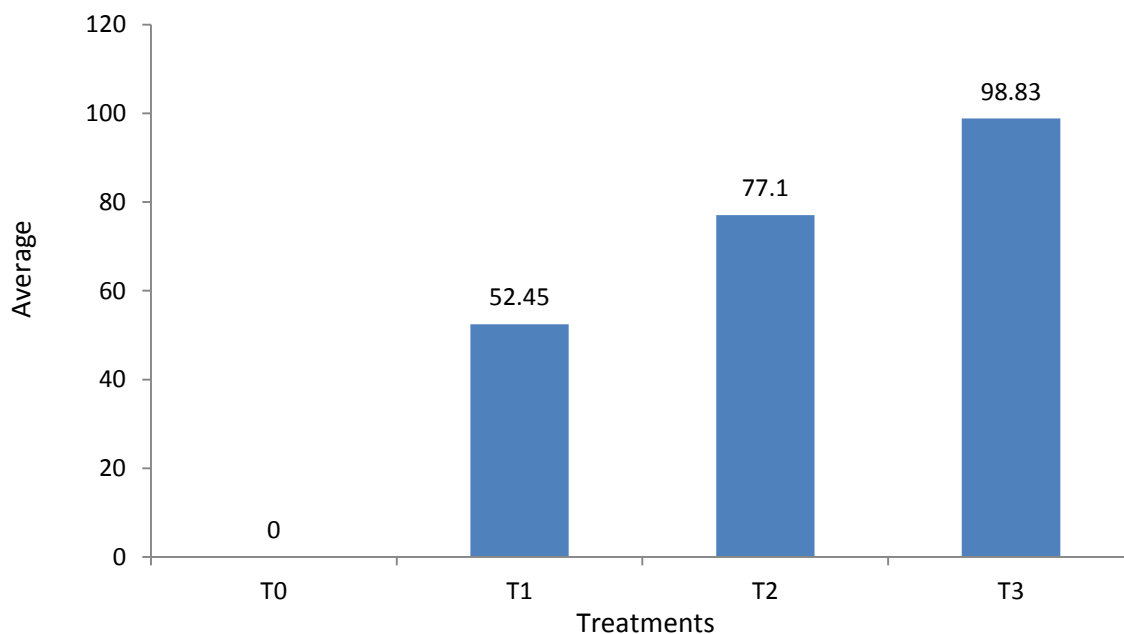


Fig. 2: Antioxidant content in MDF muffin

4. Conclusion

Thus from the result obtained it is concluded that the different treatments had a major effect on the level of antioxidant activity as well as the total dietary fibre (TDF). The Antioxidant activity level and TDF was found to be increasing with increase in the percentage of MDF. Thus, it can be concluded that the enrichment of the muffin with MDF will enhance the antioxidant properties as well as dietary fibre content. As far as MDF and antioxidant content, T₃ was found to be best among all the treatments.

5. References

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