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VALUE ADDED TOMATO-SAUCE FORTIFIED WITH CHLORELLA PROTEIN ISOLATES

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Abstract. Protein isolates are refined form of protein containing the greater amount of protein which have recently emerged as food fortifiers, to supplement protein deficiency in certain foods[1]. The current work aimed at developing a form of tomato sauce fortified with *Chlorella vulgaris* protein isolates. Chlorella was used due to its high protein content rich with essential amino acids, exploiting its application in the food industry[2]. Tomato sauce was identified as food product due to its popular use in fast food restaurants with fries, chicken, beef, eggs, and many other food products.

Protein isolates were isolated from *C. vulgaris* using isoelectric precipitation method using 2M sodium hydroxide and 1M hydrochloric acid[3]. Protein isolates were freeze dried and the mass was 30.4g representing 50.75% yield. Protein concentration of the isolates was determined by Lowry method. The concentration of soluble proteins was 67.5mg/27.4g. The isolates were stored at -4^{0}C in a refrigerator.

Sauce was prepared using the following ingredients: 400g tomato paste, Olive oil (extra virgin) 150g, sucrose 140g, fresh onions 100g, pickle ginger 40g, Salt 25g, Soy sauce 10g, Citric acid 2.5g, Soy sauce 1g and cinnamon 2.5g. A total mass of 1200g of sauce was obtained and partitioned into A, B, C and D. For each 100g of D, 5.0g of chlorella protein isolates were added, 2.5 g to C, 1.0 g to B, while A served as a control with no protein isolates addition. Sensory, physicochemical and microbial analyses were carried out on the sauce samples. Microbial analysis was carried out for 1 month at 7 days interval.

Regarding physicochemical properties A had the highest titratable acidity of 36.45±2.64 SD and the least was C with 33.72±0.02 SD. Total ash content was 2.5% constant for all the samples. Moisture content was very high in sauce B with 55%±2.5SD, and lowest in sauce C with 47.5%±1.25SD of moisture composition. The pH for all the sauce samples was 3.0. In terms of polyphenols content the control A had the highest phenolic content; 7.7µg/ml ±0.3SD Gallic acid equivalent and D was the lowest with 4.6µg/ml±0.7SD equivalent of Gallic acid concentration. The polyphenol content of sauce samples in decreasing order was A>C>B>D. flavonoids content was high in sauce sample B with 217.06µg/ml±86.78 SD and lowest in the control sample A with 176.68µg/ml±8.9SD equivalent of quercetin concentration respectively. The trend was as follows B>D>C>A. The antioxidant activity in the samples was determined by DPPH assay method, hydrogen peroxide scavenging and total antioxidant activity was determined by phosphomolybdenum assay method. DPPH radical scavenging was high in sample C with 84.35% and lowest in D with 71.74% activity. On the other hand sauce sample A displayed high hydrogen peroxide scavenging activity of 90.57% and D was the lowest with 41.05% of activity. Total antioxidant activity was observed to be high in sauce sample B with the absorbance value of 0.14±0.006SD, and sauce sample D was the second with the absorbance of 0.13±0.004.

Microbiological analysis for over one month revealed the absence of coliform bacteria, yeast and mold in all the sauce samples petri dishes that were cultured. All colony forming units that were formed on the petri dishes were way below 300 colony forming units.

References

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