

Separation and Purification of Glycomacropeptide from Whey Protein of Cow and Goat Milk and its Characterization as Antioxidant

By
Bashaer Abd Al-Motalib Muhammed

Summary

This study was conducted in order to purify glycomacropeptide from both whey goat and cow. Thereafter, The molecular properties of purified glycomacropeptide and its effects as antioxidant were studied. Furthermore, the ability of pasteurized milk, unpasteurized milk, and whey protein for each used milk were studied to measure their effects as antioxidants. The results were as follow:

1 - Glycomacropeptide protein was separated using TCA method and boiling temperature method with alcohol. The TCA method showed sufficient results by giving more production with high activity for isolated protein compared to temperature method with alcohol, thus TCA method was used in this study. Sephadex G-25 was used to purify both whey goat and cow. After that, electrophoresis technique was assigned by using polyacrylamide gel in order to be sure about the purity of isolated protein (one band).

2 - The percentage of carbohydrate, protein, sialic acid of glycomacropeptide from both whey goat and cow were 27.5%, 32 %, 19.9%, 25%, 12% and 17 %, respectively.

3 - The molecular weight of glycomacropeptide protein was 27 kDa and 29 kDa for both cow milk and goat milk, respectively.

4 - The ability of pasteurized milk, unpasteurized milk, and whey protein for each used milk were studied to measure their effects as antioxidants. The results were as follow:

A: The antioxidant activity of glycomacropeptide protein from goat milk was more effective to prevent linoleic acid oxidation compared to cow milk, while whey protein had less antioxidant activity compared to glycomacropeptide.

B: Glycomacropeptide protein exhibited high values of H₂O₂ scavenging activity. The scavenging activity was 92.145 % and 95.678 % at concentration 5 mg/ml compared to ascorbic acid and rutin, which were 76.955 % and 66.920%, respectively.

C: The reducing power was 139.21 % and 96.13 % compared to others samples, while the reducing power was less than tocopherol and BHT, which were 195.8 % and 226.48 %, respectively.

D: Glycomacropeptide protein exhibited higher ferric-reducing activity at 5 mg/ml, while ferric-reducing activities of goat and cow milk were 89.696 % and 98.269 % for EDTA and citric acid, respectively.

E: The stability of Glycomacropeptide protein and whey protein was determined as antioxidants through controlling three variables (temperature, pH and synergistic factor). Glycomacropeptide protein of goat milk showed higher stability compared to the whey at 75 mg/ml in all used variables

F: Glycomacropeptide protein from goat and cow milk was added to stored fish oil at 0.04, 0.06 and 0.08 g/ g at 45 C for 50 days. The results revealed that the hydrogen peroxide and TBA were decreased using 0.08 g/g .