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Extended Abstract

Euro Pharma Chemistry 2019: Effects of Ascorbic and Cinnamic Acids on the Albumin Glycation Level in Breast Cancer Patients- Israa G Zainal- Kirkuk University

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Abstract

Introduction

Glycation is a common spontaneous posttranslational modification of proteins that become non-enzymatically glycated after binding it with aldose sugars. The *invivo* glycation has been described in proteins such as albumin, ferritin, collagen, Apolipoprotein, and crystalline. In addition to glucose, sugars such as the fructose, ribose, mannose, sialic acid, glucose-6-phosphate, glyceraldehyde, galactose and fructose have been used in the *in-vitro* as glycating agents, sometimes to speed up the process. Early glycation processes result in the formation of Schiff bases and Amadori products.

Further glycation of protein causes molecular rearrangements that lead to the generation of AGEs. Nowadays, numbers of studies have confirmed that AGEs are associated with the development or worsening of many degenerative diseases such as diabetes, Parkinson's disease, atherosclerosis, cataracts, Alzheimer's disease, chronic renal failure, amyotrophic lateral sclerosis, and cancer.

There is evidence that enzymes, such as" glyoxalase-1", have the ability to detoxify AGE precursors and inhibits AGE production, as evidenced by the presence of deoxyglucose, a reduction product of 3-deoxyglucosone in human urine and plasma.

The formation of AGEs includes the rate of turnover of proteins for glycol oxidation, the degree of hyperglycemia, and the extent of oxidant stress in the environment If one or more of these conditions are present, both intracellular and extracellular proteins may be glycated.

The Maillard reaction begins from Schiff bases and the Amadori product, produced by the reaction of the carbonyl group of a reducing sugar "glucose", with amino groups of proteins, " albumin". The reaction of result's in denaturation, browning, and crosslinking of the targeted proteins. This study aimed to evaluate the glycation level of albumin in the sera of breast cancer patients compared to normal subjects and study the inhibitory effect of vitamin C and cinnamic acid on the glycation reaction of "HSA and BSA".

Materials and Methods

Blood Samples

Five milliliters of venous blood was withdrawn by vein puncture using plastic syringe with gauge 21 stainless needles. Blood was separated in plain polyethylene tube, left to clot at room temperature then the tube was centrifuged at (704 xg) for 10min, then serum was obtained by frozen at (-20°C) until analysis. Haemolysed samples were discarded. Fifty samples of blood, (25) from both breast cancer and healthy subjects with age ranged between(20-63) were used in this study.

Those women visited the medical city, Kirkuk oncology hospitals during the period from 1st December 2016 to end July 2017, the disease diagnosed from subspecialty doctors. Any case may interfere with this study were discarded which include "diabetes mellitus, hypertension and heart disease".

Measuring the levels of glycation*In vitro* Glycation of Albumin Using BSA and GlucoseInhibition Study Using Vitamin C and Cinnamic Acid Measurement of Free Amino Group Level

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Discussion

The process of glycation involves nonenzymatically addition of reducing sugar to protein. The results of this study indicated that there were non–significant increases in the glycated HSA in breast cancer patients compared to healthy subjects, this increase may be attributed to the metabolic disorders which cause sugar increase in the glycation levels of the protein. These results were in agreement with Tesarová, et al, they found that AGEs were high in the sera of patients with breast cancer compared to healthy subjects. The results showed that the BSA was glycated in the presence of glucose and the level of glycation was depended on time of exposure to glucose, these results were agreed with the results obtained by safari *et al* ,they studied the BSA as negative control in the same method, but when "0.15 g/ml" of BSA was incubated with "0.1M" of D-glucose in a sterilized conditions for (24,48 & 72) h at 37°,there was increase in the glycation level with the increase in time, this may attribute to the binding of the carbonyl group of "D-glucose" with the free amine group of "Lys, Arg and His" in the albumin.An intermediate composite component called Amadori product was formed.

The results indicated that the glycation levels decrease with increase in the concentration of vitamin C. Khatami's found in his study when used ascorbic acid in different conditions cause < 80% inhibits protein glycation. Davie *et al* found that vitamin C could also inhibit haemoglobin glycation. Also, Kim *et al* found that glycated albumin resulting from antioxidants such as ascorbic acid reduced this cytotoxicity and cell death in cultured bovine retinal pericytes.

This study also evaluates the effect of various concentrations from cinnamic acid (1,0.5&0.1)Mm, on the BSA glycated with Dglucose and incubate for 72 hours at 37 °C as presents in fig 1(B), Cinnamic acid was found to be stronger inhibition effect than of vitamin C on "HAS & BSA". Inhibition of glycation was observed and found that the inhibition increased with increased cinnamic acid concentration and time.

Finally, also the inhibition of glycation levels of BSA after using different concentrations of vitamin C and cinnamic acid for (24,48 and72) h were studied, table 3.The results indicated that the effect of different concentrations of "vitamin C and cinnamic acid" decreased the glycation levels when the concentration of inhibitor increase revealed the concentration of free amino groups of" HSA in the sera of patients and glycated BSA) respectively, the results indicated that the free amino groups levels in the" HSA in the sera of patients and glycated BSA) were increased with the decrease in the inhibitor concentration.

Conclusion

The inhibition of glycation levels of "BSA & HAS" after using different concentrations from vitamin C and cinnamic acid for (24,48 & 72) h were studied. The results indicated that the inhibition of glycation were increase with increase the concentration of "vitamin C and cinnamic acid" Further work is required to investigate the glycation reaction *in vivo* using "vitamin C and cinnamic acid" in order to evaluate whether these inhibitors can be used therapeutically to treat the chronic complications occurring in breast cancer.

This work is partly presented at 4th Pharmaceutical Chemistry Conference on June 27-28, 2019 at Amsterdam, Netherlands.