Some salivary constituents changes in anemic patients

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Abstract

Anemia is one of the world's most prevalent health problems. Saliva is the most promising biofluid to monitor the physiological state of many systemic diseases. In this study salivary glutathione(GSH), super oxide dismutase (SOD), Zinc (Zn), Calcium (Ca) and magnesium(Mg) were assessed. Salivary analysis was done by atomic absorption and color photometric method. The results show significance difference between healthy control and anemic patients. Salivary glutathione (GSH) activity, Zinc (Zn), Calcium (Ca) and magnesium (Mg)concentrations were significantly decreased in patients with anemia in comparison to healthy control subjects. While only super oxide dismutase (SOD)activity was significantly increased in anemic patients.

Keywords: Anemia, Salivary SOD, salivary GSH.

Introduction

Anemia is global health problems and common medical conditions seen in everyday clinical practice. It considered as is the most common systemic complication and extra intestinal manifestation of inflammatory bowel disease [1]. Saliva has some advantages compared to blood and urine, two of the most used diagnostic fluids in laboratory setting. Saliva collection is easy and non-invasive requiring relatively simple instructions for collection and it possesses lower protein content, less complexity and varying composition than serum [2, 3].

The potential use of saliva in clinical trials has motivated many research groups. Studies have demonstrated great possibilities of saliva to monitor bodily changes, such as metabolic disorders [4], anemia [5], DNA markers [6] and other physiological changes in the body.Interest in rapid and less invasive diagnostic tests has grown exponentially in the past decade, which has led to extensive research on saliva as a

biological fluid for clinical diagnosis [7]In this study, we aimed to evaluate the levels of salivary glutathione (GSH), super oxide dismutase (SOD), Zinc (Zn), Calcium (Ca) and magnesium (Mg) in saliva of anemic patients.

Materials and Methods

Samples

The study was conducted involving sixty subjects (male and female) their age range between (20 -50) years old. Thirty subjects were patients with anemia and the other thirty subjects were healthy control person. All the subjects were obtaining from patients reporting to the Mrjan teaching hospital in Babylon province Iraq.

Collection the saliva

Five ml unstimulated saliva samples were collected. Collection of saliva was including their agreement to

enroll the study and it was performed between 8.00 A.M to 12.00 P.M. The subjects were request not to eat, drink or chew gum 60 minutes prior to saliva collection and instructed not to speak or swallow. Saliva was collected by standard drooling method then saliva collected in a plane tubes, centrifuged 5 minutes at 4000 rpm, The clear supernatant was separated by micropipette be stored in plane tubes at (-20C) till being assessed.

Salivary constituent's measurement

Salivary constituents that assessed in this study were salivary glutathione (GSH), super oxide dismutase (SOD), Zinc (Zn), Calcium (Ca) and magnesium (Mg). Analysis for salivary Zn, Ca and Mg concentration was done by atomic absorption spectrometer while spectrophotometric method used to evaluate concentrations of GSH and SOD.

Statistical Analysis

All statistical analyses were performed using computer program Excel and SPSS. Student's t-test was used for equality of means of two independent groups. Results were expressed as mean ±SD.

Results

The mean level of salivary constituents and standard deviation measured in unit part per million (ppm) and the p-value for all the salivary constituents(GSH, SOD, Mg , Ca, and Zn) that are taken in this study for both group healthy control subjects and patients with anemia (table 1).

Table 1: salivary constituents levels in healthy controls and anemic patients.

Salivary constituents	Control subjects (ppm) Mean ± SD	Patients with anemia (ppm) Mean ± SD	p-value
GSH	8.92 ± 1.62	6.12 ± 0.89	< 0.05
SOD	0.015 ± 0.003	0.09 ± 0.01	< 0.05
Mg	3.11 ± 0.62	2.11 ± 0.38	< 0.05
Ca	2.93 ± 0.73	1.73 ± 0.69	< 0.05
Zn	3.35 ± 0.91	1.96 ± 0.73	< 0.05

The level of glutathione (GSH) activity was significantly decreased in anemic patients as compared with healthy control subjects (fig. 1)
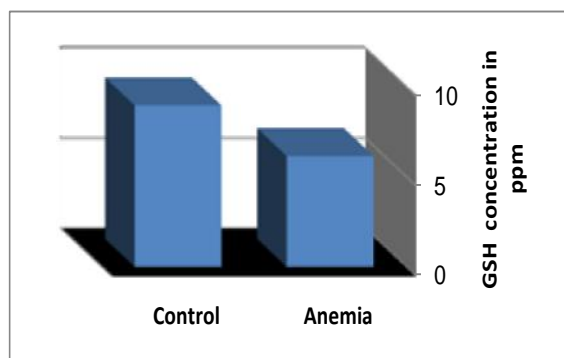

Fig. 1: The decreased level of GSH in saliva of anemic patients in comparison to healthy control.

While the mean level of salivary super oxide dismutase (SOD) activity was significantly increased in anemic patients as compared with healthy control group as shown in fig. 2.
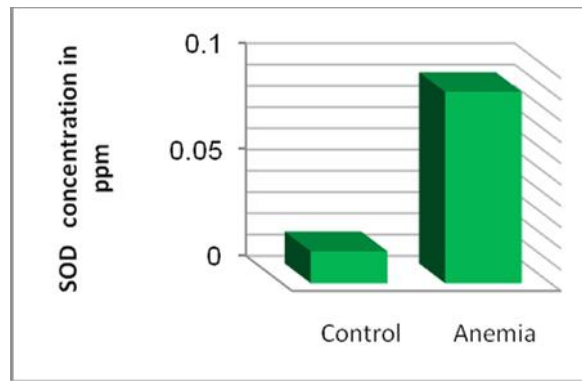
Fig. 2: The increased level of SOD in saliva of anemic patients in comparison to healthy control.

The mean level of salivary magnesium (Mg) was significantly increased in anemic patients as compared with healthy control subjects. Fig 3.
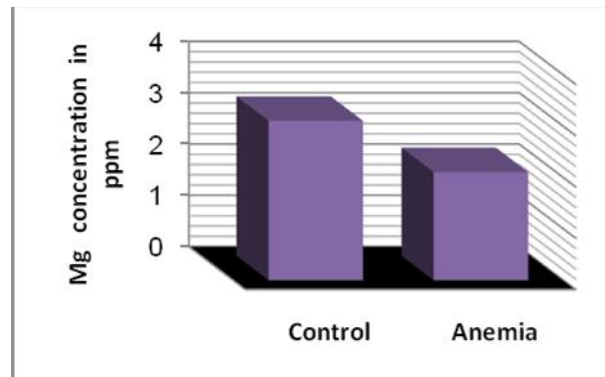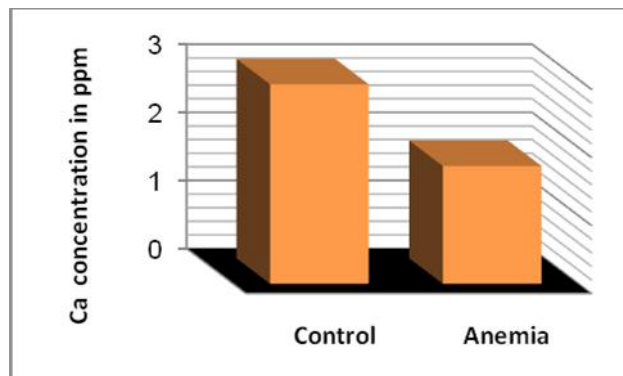

Fig. 3: The decreased level of Mg in saliva of anemic patients in comparison to healthy control.

While the mean level of calcium in saliva (Ca) was significantly decreased in anemic patients as compared with healthy control subjects. Fig. 4.

Fig. 4: The decreased level of Ca in saliva of anemic patients in comparison to healthy control.

The average or mean level of zinc (Zn) concentration in saliva was significantly decreased in anemic patients as compared with healthy control subjects. Fig. 5.
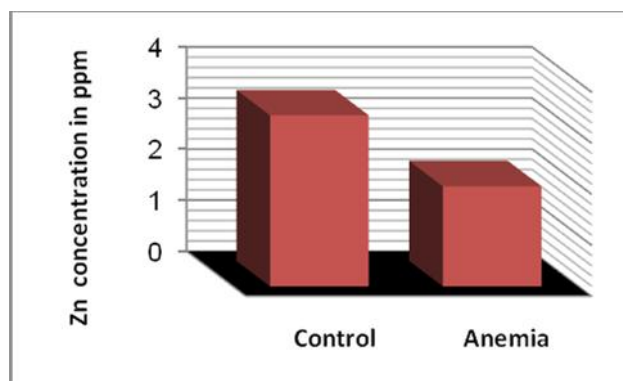
Fig. 5: The decreased level of Zn in saliva of anemic patients in comparison to healthy control.

Discussion

Erythrocytes are equipped with a highly effective antioxidant defense system. In comparison with other cell types, they possess highly active antioxidant enzymes, such as SOD and GSH. However, it is reported that antioxidant capacity of erythrocytes is reduced anemia [8]. The results of this study disagree with Mehmet *et al* ., 2002[9], who show decrease SOD concentration in anemic patients.SOD is an antioxidant enzyme that acts against superoxide, an oxygen radical that is released in inflammatory pathways and causes connective tissue breakdown, this enzyme is released as a homeostatic mechanism to protect the tissues, and it can be detected in extra- and intracellular compartments[10]. This may explained the increase concentration of salivary SOD in anemic patients as shown in table 1 and fig. 2. For the concentration of magnesium, zinc and glutathione which was decrease in anemic patients in comparison to healthy control subjects and this completely coincide to Saira Baloch *et al*., 2013[11], who show Serum magnesium, zinc and antioxidant levels were significantly lower in anemic patients that prove saliva is a good substitute for serum samples. Decrease concentration of zinc in anemic patients agree with Sondstrom, 1990[12],who show Zn deficiency may be a contributing factor in anemia Zn deficiency in developing countries is due to low consumption of meat and fish along with food rich in phytate, food rich in phytate significantly reduce the absorption of Zn, increasing the chance of Zn deficiency, trace elements (Mg, Ca and Zn) mainly provided from nutrition and the normal results of anemia that produced from malnutrition was associated by decrease of all these elements as it shown in many articles.

Conclusion

This study revealed the possibility for using saliva samples in diagnosis of anemia as substitutes for serum, and also conclude the decreasing of trace elements and glutathione results in anemia.

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