A Study of Some Biochemical Parameters in Saliva of Hemodialiesed Patients

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Abstract

Background: Analysis of saliva contents may be used as diagnostic tool for the localization and assment of various systemic disease like end stag renal failure (ESRF).
Objectives: Saliva from patients of end stage renal failure undergoing Hemodialysis from both sex and healthy control group ,used to detect different parameter like PH, Na, K, Ca, Total-protein, urea, creatinine and amylase
Methods: Unstimulated whole saliva were collected from patients during dialysis session ,the PH was determined within (5 min) after saliva collection. Biochemical analysis of saliva includes (Na, K, Ca) and (total-protein ,urea, creatinine, amylase)
Results: There were significant different in PH, Na, K, Ca, total-protein, urea, creatinine, amylase in contrast to control group ($p<0.01$)but for Ca there were no significant different with control group($p>0.05$).

Key words: Chronic renal failure (CRF) , Hemdialysis (HD), Unstimulated whole saliva (UWS)
http://doi.org/10.33091/AMJ.1600812010

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Introduction :

The kidney play an essential role in the maintenance of homeostasis by their capacity to remove metabolic waste products ,electrolytes ,and water from the body [(1).]

Chronic renal failure (CRF) results from the progressive and chronic deterioration of Nephrones ,which happens over years and the patients with renal disease have to undergo kidney replacement therapy such as Hemodialysis (HD) [(2)].

The aim of HD treatment is to remove metabolic waste products such as urea ,and to remove excess fluid from the body of patients to restore circulatory volume.

HD treatment which is carried out on average three times a week during a three to four hours session , has major effects on the serum composition and fluid balance. Further more ,it had been shown to affect the flow rate and biochemical composition of saliva [(3,4).]

HD- patients several serum components such as total protein or urea show an equilibrium with the concentration of saliva ,Therefore ,saliva can potentially be used as a monitor change in this case[(5).]

Measurement of biological markers that demonstrate distinguishable and regular changes in dialysis states can enable necessary monitoring of dialysis efficacy and the level of renal function in patients with the end stage renal disease [6].

Various components of saliva are either passively diffused or actively transported directly from the serum in to the saliva though the oral mucosa .The composition of such components in saliva may or may not reflect their serum composition [7,8].

Analysis of saliva composition may be used as a diagnostic tool for the localization and assessment of various systemic disease such as end stage renal disease (ESRD)so this study was for such purpose .

Thus analysis must be based on a broad understanding of specific concentration and origins of the various biochemical components of saliva [9,10].

The watery component and the electrolytes in saliva are derived from serum ,but various enzyme and proteins may originate in the serum moreover, measurement of urea nitrogen is the gold standard test for evaluating dialysis efficacy ,accordingly ,monitoring of urea concentration should certainly be considered as part of routine saliva assessment in patients undergoing dialysis , also the potential role of K ,Na and other ions that diffuse into saliva from the serum should be evaluated [11].

Patients & Methods:-

Twenty four (24) patients with ESRD undergoing HD treatment were attending General Hospital in Ramadi city , Hemodialysis unit, aged between (18-70) years from both sexes during the period from September 2009 till June 2010.

All patients were followed by using special questionnaire for this study, Questionnaire were instructed to refrain from smoking ,eating ,drinking and tooth brushing for one hour prior to the saliva collections .

Unstimulated whole saliva (UWS) were collected after one hour after the start of dialysis (during dialysis session) according to spitting methods [12] ,start of dialysis (during dialysis session),UWS were collected according to the spitting methods [12],Before collection ,the mouth was rinsed with distilled water .Saliva was allowed to accumulate on the floor of the mouth and the patients were spit out into the preweight test tubes every (30 seconds), each saliva collection period was(5 min). The volume of saliva was determined (assuming 1 g=1 ml), and the PH was determined within (5 min) after saliva collection.

Hereafter , saliva was homogenized by shaking for one minute using a vortex mixer and centrifuged (10 min) at (10000 rpm) to eliminate cellular debris . The supernatant was frozen at (- 70 ^{0}c) and stored until further analysis .PH detected by using specific reagent strip .

Biochemical analysis of saliva passed on determined the total protein , urea , creatinine, sodium ,potassium , calcium , amylase enzyme .

Total protein was measured by using Biuret reaction [13]were colored complex with protein in sample .

Electrolytes determine by using specific biochemical kit for each one , Na determine by using photometric method (Mg-Uranylacetate method , color test), K determined by using photometric Turbid method test , Calcium ion measured by using quantitative determination method (O-cresolphtalein , color test) .

The average concentration of urea were determine by using enzymatic method (unease – modified Berthelot reaction) creatinine determine by using Jaffe reaction salivary α-amylase determination depends upon the ability of this enzyme to hydrolyze the starch to its simple sugar (Maltose +Glucos)[13].

Table (1):- PH and Electrolytes Mean Values in(UWS) During Dialysis and Control Group

	Groups	No	Mean	St.deviation ± SD
PH	control	15	6.8	0.26
	patient	24	8	0.885
Na (mmol/L)	control	15	66.04	14.6
	patient	24	108.75	18.32
K(mmoI/L)	control	15	16.47	1.08
	patient	24	127.54	25.45
Ca(mg/dl)	control	15	3.22	0.31
	patient	24	2.87	0.65

Table (2):- Biochemical Composition in UWS During Dialysis and Control Group

	Groups	No	Mean	± SD
Total protein(g\dl)	control	15	3.3	0.33
	patient	24	2.51	0.17
Urea (mg\dl)	control	15	4.47	1.49
	patient	24	126.1	34.4
creatinine (mg/dl)	control	15	0.25	0.103
	patient	24	1.73	0.406
Amylase Somogy\dl	control	15	101.87	14.5
	patient	24	631.54	42.68

Results:

Twenty four patients with end stage renal disease (ESRD) were undergoing HD-treatment (15 males , 9 females) and 15 healthy controls included in this study .

The PH –values and electrolytes which includes (Na, K , Ca) are presented in table (1), and the biochemical composition which includes (Total – protein , urea , creatinine , amylase) are presented in table (2).

* Statistically their were significant difference in PH mean value as companied with control group ($p < 0.01$)
*The electrolytes showing higher significant difference with the control group (Na, K), but for (Ca) there were non-significant difference with the control group ($p > 0.05$) .
*Total protein showing a significant difference as compared with control group ($p < 0.01$).
*Urea and creatinine also were showing higher significant difference with control group ($p < 0.01$) .
*α-amylase showing a higher significant difference with control group ($p < 0.01$) .

Discussion:

According to the result of the following, this is the study to investigate acute effects of renal replacement therapy such as HD-treatment on salivary composition , the concentration of the biochemical constituents in whole saliva change markedly [15].

In the present article , the patients with renal failure undergo HD-treatment show a significant increase in urea concentration as compared with control group , that agree with previous studies which suggest the increase in urea level of HD-patients saliva [16,17]because in this patients there were a high urea level in serum , also display high urea level in saliva , since urea is passively distributed from serum to saliva [18] and saliva play a protective roles to remove the toxic material in different case such as renal failure , and lead to decrease its toxicity

The increasing in creatinine level in this study as compared with control group potentially could be used with urea level as monitor the efficacy of HD-treatment in saliva , which regarded as the first line investigation of renal function [19].

Besides this study there were high significant increase in salivary PH than in control group and this result agree with previous studies that showed the same thing , and this occur because salivary urea , which increase in this ease, split to form ammonia and carbon dioxide and this lead to raised (PH-value) a above the critical level for demineralization of dental animal [20].

The total protein in saliva decrease significantly according to control group and this result agree with previous studies that suggest the decrease of salivary total protein during HD-treatment [15] and this result may explained on the fact that the total protein in renal failure was falls , and this come from the daily losing of protein throw urine[19].

Additionally there were significant increase in salivary α- amylase level and this agree with earlier studies which prove the increase in saliva (α-amylase) in HD-patient[20] because HD-procedure is thought to be a physical stresses in the majority of HD-patient .,so, at this study suggest that the elevated of salivary α- amylase level may correlated with psyclogical and physical stress condition of HD-treatment , and there studies used the elevated of α- amylase in saliva as a biomarker for investigated biological stress reactivity during HD-treatment [21].

The concentration of electrolytes (Na,K) showed a significant increase as compared with control group and this agree with previous studies [5] that suggest the increase in potassium concentration in saliva and this may explained as the HD-patients are dialyzed against solutions contain sodium bicarbonate which could have influenced on the electrolyte management in salivary glands, other studies that showed increase in sodium concentration in HD-patient [28] because

the salivary secretion is primarily controlled by the mechanism for Na and Cl secretion , saliva passed through the striated ducts before reabsorption of Nacl is complete ,therefore this increase resulting in highly PH-value for saliva .

Despite the decrease of calcium level in saliva as compared with control group and this may due to increase load reaching the kidney lead to increase the renal calcium loss in HD- patient or may by due to low dietary calcium intake **(19).**

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