Salivary Constituents in Relation to Oral Health Status among a Group of (Type 1) Diabetic Children

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Abstract

Background: Diabetes mellitus is a metabolic disorder of multiple etiology. Effects of the disease include long-term damage, dysfunction and failure of various organs in addition to oral complications.

Aims of this study: These were to investigate percentage of occurrence, and severity of both dental caries and gingivitis among insulin dependent diabetic children in relation to salivary physico-chemical properties and immune factors.

Materials and Methods: The study group consisted of 60 diabetic children (30 with long duration) and (30 newly diagnosed), in addition to 30 control healthy non diabetic children, with a mean age of 11.2±1.2 years. Dental caries was recorded by lesion severity through the application of decayed, missing and filled surfaces index (d$_1$-$_4$mfs, D$_1$-$_4$MFS) (Muhlemman, 1976), while the oral hygiene and gingival health status were recorded by application of plaque index (Sillness and Löe, 1964), calculus index (Ramfjord, 1967) and gingival index **(**Loe and Sillness, 1963**)**. Stimulated salivary samples were collected and the following variables were recorded; flow rate, pH and buffer capacity. Salivary samples were chemically analyzed, for the detection of electrolytes (calcium & phosphorus), glucose, total protein, and peroxidase enzyme. Immunoglobulin, insulin hormone, interleukin-6 and tumor necrosis factor alpha were also explored. In addition, serum samples were taken from diabetic children for biochemical analysis.

Results: A higher percentage of caries - free children was recorded among the control group (56.66 %) compared with the long duration diabetic children (26.66 %) and (40.00 %) in the newly diagnosed diabetics. In relation to dmfs fractions, higher mean values were

recorded in the long duration diabetic children (8.96±5.12), and (7.21±3.97) for newly diagnosed diabetics, compared to the control group (5.94±3.87) respectively. For permanent teeth also higher mean values were recorded in the long duration diabetic children (13.70±5.95), and (11.37±3.09) for newly diagnosed diabetics, compared to the control group (7.27±4.00) respectively, with highly significant differences between control and study groups. For all, initial caries (d_1, D_1) were the highest, while frank cavitations were the lowest (d_4, D_4).

Regarding dental plaque index, the mean plaque value, was higher in the long duration diabetic children (1.39±0.73), and (1.25±0.66) in the newly diagnosed diabetics, compared to the control group (1.12±0.57). While the results showed a high mean value of gingival index in the control group (1.166±0.637), compared to the long duration diabetic group (1.072±0.514) and newly diagnosed diabetics (1.111±0.571). Statistically no significant differences were recorded between the three groups in relation to the plaque and gingival indices.

In regarding to salivary variables, salivary pH, revealed a higher values among the control group (6.99±0.41) compared with the long duration diabetic children (6.80±0.38) and newly diagnosed diabetics (6.72±0.42) with statistically significant difference between groups. Salivary flow rate (ml/min) showed a lower mean value among long duration diabetic children (0.68±0.23) and newly diagnosed diabetics (0.86±0.19) compared with the control group (0.83±0.30) with statistically highly significant difference. Salivary buffer capacity recorded a higher mean value among control group (5.14±0.87) compared with the long diabetic group (4.49±0.81) and newly diagnosed diabetics (4.21±0.52), with statistically a highly significant difference between groups.

Salivary calcium recorded a higher value (mmol/L) in the control group (1.08±0.52) compared to the long duration diabetic children (0.77±0.38) and newly diagnosed diabetics (0.95±0.40), with statistically significant difference was recorded between groups. Statistically significant correlation was recorded in calcium ion with (DMFS, DS) fractions in the long duration diabetic group only. In regarding to salivary peroxidase enzyme, a higher mean value (U/ml) was recorded among the newly diagnosed diabetic group (1.20±0.50) compared to (1.15±0.63) in the control group, with no significant difference between groups. However, statistically significant correlation was seen in peroxidase enzyme with (DMFS, DS) in the long duration diabetic group. Salivary phosphorous recorded an increase concentration (mmol/L) in saliva of the long duration diabetic group (3.76±0.65) compared to the control group (3.07±0.70) and the newly diagnosed diabetics (3.14±0.73), with statistically highly significant difference was recorded between groups. Salivary glucose demonstrated a higher mean value (mg/dl) among the long duration diabetic group (110.96±40.17) and (71.25±10.73) in the newly diagnosed diabetics, compared to (51.07±21.18) in the control group, differences were significant between the examined groups. Salivary total protein showed its highest value (mg/dl) in the control group (261.09±138.44) and (243.06±111.63) in the long duration diabetics, compared to (211.77±096.86) in the newly diagnosed diabetic group, difference was statistically not significant. A negative statistically significant correlations were recorded in total protein with (ds) fraction in the control group and GI in the newly diagnosed diabetic group.

Salivary IgA recorded a higher mean value (26.98±6.35) (mg/dl) among the long duration diabetic group and (19.46±4.54) in the newly diagnosed diabetics, compared with the control group (10.07±2.27), with statistically highly significant difference. IgG in saliva, recorded

statistically no significant difference between groups. Regarding IgM in saliva, a higher mean value among the control group (0.47±0.22), compared to (0.36±0.23) in the long duration diabetic group and (0.31±0.16) in the newly diagnosed diabetics, differences were highly significant. Statistically no significant correlations were detected between salivary immunoglobulin with caries- experience and GI in the diabetic groups.

Salivary TNF-a and IL-6, higher mean values (pg/ml) were recorded in the long duration diabetic groups (142.6±125.9) & (460.1±264.7) and (114.708±147.537) & (417.445±184.212) in the newly diagnosed diabetics, compared with the control groups (113.8±167.7) & (118.5±103.5) respectively. Differences were statistically highly significant in salivary IL-6 between groups. Statistically significant correlation was found in insulin hormone with (DS) fraction in the long duration diabetic group. While no significant correlations were detected in salivary cytokines with caries –experience in all groups.

In regarding to serum analysis in the present study, results showed high values of whole levels with advancing disease, statistically significant differences were seen in serum IgA, IgM and insulin hormone between different groups. No significant correlations were reported between salivary and serum parameters in the present investigation.