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Bucco-dental manifestations of sickle-cell anemia in Cameroonian children and adolescents

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Abstract

A total of 126 patients were included in the study- 65 girls and 61 boys. The mean age of the subjects was 8±4 years (ranging from three to sixteen years). The most represented age group was that from 3-4 years of age. Most of the participants were from the Central Region (46%). All of the subjects were homozygous for hemoglobin SS. Subjects with yearly frequency of three vaso-occlusive crises represented 42.9% of the sample. 57.9% of the patients had been poly-transfused within the past 3 years (> 2 transfusions). Up to 45.2% of the patients had been hospitalized within the past year. Ninety-eight percent (98%) of the patients used toothbrushes as main tool for bucco-dental hygiene. Sixty-nine percent (69%) of the patients brushed their teeth at least once daily and 53.2% of them brushed their teeth in the horizontal direction. Average plaque control was found in 47.6%. Mixed dentition was found in 41.3% of the patients. At least one dental anomaly was found in 65.9% of them with dental structural anomalies being the most frequent (43.4%) type of anomaly. The mean DMF (number of obstructed, absent or teeth with caries) was 4.12±12. The mean plaque index was 1.3±0.6 with average plaque control in 47.6%. All the patients had gingival inflammation to various degrees. Mucosal hypertrophy was found in 59.3% Pale (light) pink was found in 42.1% of them. Periodontitis was found in 27.8% of the patients.

Keywords: Bucco-dental manifestations, Sickle-cell, Child, Adolescent, Cameroonian.

INTRODUCTION

Sickle-cell anemia (SCA) is a hereditary hemoglobinopathy characterized by the presence of hemoglobin S inside red blood cells [1]. It is very widespread throughout the world with a peculiar geographical distribution [2]. According to the WHO, about 5% of the world's population bears the genes that are characteristic of hemoglobinopathies [3], 2.9% carry mutations for sickle-cell anemia; about 120 million people [4].

SCA manifestations can affect all tissues with slow blood circulation. They involve cranio-facial bones and the mouth where the most described manifestations include gingival hypertrophy, parodontopathies, dental caries, pulp necrosis and tonsillar hypertrophy, and a light-pink coloration of the mucosa. [5-7]. These consequences have physical, emotional and social impacts which often compromise the quality of life of these patients, leading to the involvement of several medical specialties in the management of this pathology [2]. Meanwhile, because of genetical and hematological differences, socio-economic specificities and different levels of access to healthcare, the clinical forms of these manifestations vary according to place and time. In Cameroon, bucco-dental manifestations of SCA are not well known owing to the paucity of studies carried out on these subjects. It is in the bid to study these different manifestations in our context that we chose to identify the different bucco-dental manifestations of SCA in Cameroonian children and adolescents and to find a correlation between these bucco-dental pathologies and SCA.

MEANS AND METHODS

We carried out a cross-sectional, descriptive and analytical study. It involved children and adolescents with SCA consulting at the Mother and Child Center of the Chantal Biya Foundation from the 14th November 2014 to April 2015 and those sensitized during monthly meetings of the Cameroonian Sickle-cell Association within the same period. Sampling was consecutive and non-randomized. Included were patients aged 3 to 16 years with no sex distinction whose parents gave consent for participation. Excluded

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were patients with incomplete medical files and those with other associated pathologies. A data form was used to collect epidemiological and clinical data from these patients. Eligible patients were required to have done beforehand work-up including a complete blood count (CBC) and reticulocyte count during a stable period, conjugated, unconjugated and total bilirubin and serum LDH.

1. Interview
   During the interview, the following data were collected:
   - Patient identification: name, first name, sex, region of origin
   - Mean of dental hygiene
   - Frequency of brushing of teeth
2. Medical files:
   These files provided information about:
   - Baseline hemoglobin values dating less than 3 months prior.
   - Reticulocyte count
   - Hemolysis work-up
   - Anthropometric parameters
   - Type of SCA on the hemoglobin electrophoresis results.
   - Yearly frequency of hospitalization and number of blood transfusions during the past 3 years.
3. Clinical observations:
   Enabled description of:
   - Type of dentition (temporary, mixed or permanent)
   - Dental anomalies (number, structure, position, form)
   - State of dentition: number of dental caries, extracted because of dental caries, number of obstructed teeth. The mean DMF index which is defined by the sum of decayed, missing and filled teeth to the number of subjects examined. This ratio is obtained by counting teeth with cavities, extracted and filled teeth in each individual in the sample. This index was then interpreted according to WHO criteria of severity. We therefore should have:
   - DMF< 1: very low prevalence of dental caries.
   - 1.2<DMF<2.6: low prevalence of dental caries.
   - 2.7<DMF<4.4: moderate prevalence of dental caries.
   - 4.5<DMF<6.5: moderately high prevalence of dental caries.
   - DMF>6.6: very high prevalence of dental caries.

Evaluated next were:

- Level of mouth hygiene: it was done using the Silness-Löe (PII) index [19]. This index is used to quantify deposits on dental surfaces. The scores are as follows:

0	No plaque
1	A film of plaque adhering to the free gingival margin and adjacent area of the tooth. The plaque may be seen in situ only after application of disclosing solution or by using the probe on the tooth surface.
2	Moderate accumulation of soft deposit s within the gingival pocket, or the tooth and gingival margin which can be seen with the naked eye.
3	Abundance of soft matter within the gingival pocket and/or on the tooth and gingival margin.

The vestibular sides of 11, 12, 16, 26, 31 and 32 as well as the lingual sides of 36 and 46 were examined after drying them with a cotton bud. A score was attributed to each tooth. In the case of loss of a tooth, non-eruption or significant or total coronary destruction, we did not attribute any score. The mean plaque index for each patient was obtained by getting the relationship between the sum of the scores obtained for each patient and the number of teeth examined. Interpretation of the index was done following the recommendations of Martin and Bercy (2002) which permitted the quantification of plaque control according to the following values [76].

- PII = 0 = excellent plaque control
- PII between 0.1 to 0.6 = good control
- PII between 0.7 to 1.9 = average control
- PII between 2 to 3 = poor control

  - The state of the gingival mucosa
    The gingival mucosa was evaluated by inspecting the volume and coloration around the gums.

  - The state of the gums
    Evaluation of the state of the gums was done via the gingival index (GI) of Silness-Löe which permits evaluation of the level of gum inflammation and the detection of the presence of bleeding on application of a probe [19]. The scores were as follows:
    - ✓ 0 = normal gums
    - ✓ 1 = mild inflammation; mild change in coloration and volume; no bleeding on application of probe.
    - ✓ 2 = moderate inflammation: redness, edema, bleeding on application of probe.
    - ✓ 3 = severe inflammation, redness and marked edema, ulceration; tendency to bleed on application of probe.

The vestibular, lingual, mesial and distal sides of the incisors and first molar were examined and a score attributed to each tooth. The highest score was retained for each patient. In case of tooth loss, non-eruption or partial or total coronary destruction, no score was given. Interpretation of the index was done according to the recommendations of Martin and Bercy [76] which permits quantification of gingival inflammation according to intervals which are:

- ✓ GI = 0 = no inflammation
- ✓ GI between 0.1 and 0.6 = mild inflammation
- ✓ GI between 0.7 and 1.9 = moderate inflammation
- ✓ GI between 2 and 3 = severe inflammation.

Periodontal probing for determination of clinical attachment loss (CAL) and pocket depth (PD) were done: 2 measurements were made for each tooth present with the aid of a graduated periodontal probe, one on the vestibular face and the other on the lingual face or palatine face. The CAL corresponded to the distance between the amelo-cementary junction and the bottom of the gingivo-dental groove or the palatine pocket. The PD corresponds to the distance between gingival marginal crest and the bottom of the pocket. Calculation of CAL and PD means were done for each individual. Diagnosis of periodontitis was established for CAL > 3mm in at least one probing site. Gingival recession was measured: it is the difference between values of the CAL and the PD. calculation of mean gingival recession was done.

Tooth mobility:

Muhlemann's index was measured to determine the degree of mobility of each tooth present [77]:

Degree 0 = absence of mobility
Degree 1 = mobility perceptible in between two fingers
Degree 2 = mobility < 1mm in the transverse direction
Degree 3 = mobility > 1mm.

Calculation of the mean was done following the same principle as that of the plaque index and gingival index.

For each patient, data collected was recorded using Epi Info version 3.5.3, 2011 software. Statistical analysis was then done using the R and EPI Info 3.5.4 software.

RESULTS

The study was carried out on 126 homozygous SS patients. The mean age was 8 ± 4 years (range from 3 to 16 years). The most represented age group was the 3-4 years group. The most represented region was the Center Region which made up 46.0% of the study population (N = 58) followed by the Western Region with 16.7% (N =21). The least represented region was the South West Region comprising 2.4% of the study population (N = 3). The mean percentage of hemoglobin S was 78.8 ± 12.2%; 15.5 ± 10.4% for hemoglobin F and 12.8 ± 8.6% for

hemoglobin A2. The patients had regenerative anemia with a low mean baseline hemoglobin (7.4 ± 1.02 g/dl) and elevated mean reticulocyte count (268.1 ± 128.4 G/L). LDH and indirect bilirubin levels were also elevated. The mean weight of the patients was 24 ± 9kg with a minimum of 12kg and a maximum of 49kg. The mean height was125.6 ± 17cm with a minimum of 80cm and a maximum of 160cm. On average, 42.9% (N = 54) of the patients had three vaso-occlusive crises per annum and 38.9% (N = 49) had at least four crises per annum. Twenty-eight (28) patients (22.2%) had been transfused at least once during the past three years, most of the patients had been hospitalized at least once during the year (45.2%).

One-hundred-and-twenty-four (98.4%) used toothbrushes and 1.6% used chew sticks. Twice-daily brushing was adopted by 31.0% (N =39) of the patients. Meanwhile, 69.0% (N = 87) brushed their teeth only once daily. Sixty-seven (53.2%) of the patients brushed their teeth horizontally while 59 (46.8%) brushed theirs vertically. Fifty-two (41,3%) had mixed dentition and 83 (65.9%) suffered from at least one dental anomaly. Of these 83 patients with at least one dental anomaly, structural problems were the most frequent (43.4%) of cases). The mean DMF was 4.12 ± 1.2. seventy-five (59.3%) of the patients had gingival hypertrophy and pink coloration of the mucosa was present in 64 (50.8%) of them. The mean plaque index was 1.3 ± 0.6 with a minimum of 0.4 and a maximum of 2.5. Average plaque control was observed in 47.6% of the patients and none had excellent plaque control. The mean gingival index of the sample was 1.2 ± 0.5 with a minimum of 0.4 and a maximum of 2.2. All of the patients had gingival inflammation which was moderate in 70.6% of them.

The mean CAL was 2.5 ± 0.7mm with a minimum of 1.3mm and maximum of 4mm. the mean pocket depth was 2.2 ± 0.7mm with a minimum of 1mm and a maximum of 3.6mm. Mean periodontal recession in our study was 0.3 ± 0.1mm with a minimum of 0.2mm and maximum of 0. 6mm.Mean dental mobility in our study was 1.2 ± 0.9 with a minimum of 0.3 and a maximum of 1.8. The frequency of periodontitis was 27.8%.

Correlation tests between certain qualitative variables in our study showed that there were statistically significant links between the number of transfusions and the following qualitative variables: plaque control, gum control and CAL. This study revealed a statistically significant correlation between age and plaque index, gingival index, mean CAL and PD. The measuring indices for gingival state (gingival index and plaque index) showed strong correlation with indices of deep periodontal measurement (CAL PD, mean dental mobility). The DMF was linked to the mean CAL and PD. Representation of correlation between quantitative variables is provided in the tables below. Statistically significant correlation between age and plaque control and type of dentition was observed. No association between parameters evaluating bucco-dental pathologies and baseline hemoglobin was evidenced. This study however showed weak correlation between LDH levels and the plaque and gingival indices.

DISCUSSION

The mean age of the sample was 8 ± 4 years (range from 3 to 16 years). The predominant age group was that from 3 to 4 years. A similar mean age was found in the Ivory Coast by Kple-Farget et al [8] who in a similar group, reported a mean age of 8 ± 3 years. Similarly, Benoist et al in Senegal in 2006 found a mean age of 9 ± 3 years which is close to our finding [9]. Female sex was predominant with a sex ratio of 0.9 in favor of girls. This was similar to that found by Ramatoulaye in Senegal in 2006 in her doctoral thesis which showed a sex ratio of 0.89 in favor of girls [9]. On the contrary, Kondani et al found equal sex distribution in their own study [11]. Inversely, Nembe in Cameroon in a doctoral thesis working on a similar sample found male predominance with a sex ratio of 1.2 [12]. The divergence of these results shows that SCA is a hereditary disease of autosomal transmission, which means the anomaly is not sex-related. The most represented region was the Center Region comprising 46% of the participants followed by the Western Region with 16.8%. The South West Region was the least represented (2,4%). This distribution was similar to that found by Mendouga in Cameroon in a group of children with SCA (Center Region: 42.9%; Western Region 17.1%; South West Region 2.9%) [13]. This shows inhomogeneity of SCA throughout the national territory. The very high frequency of participants from the Center Region could be justified by the fact that the study was carried out in this region.

The sample was completely made up of homozygous SS SCA patients. This concord with the studies carried out by Ngone [14] and Mendouga in Cameroon [83]. However, it was different from that of Kple-Farget et al [8] in the Ivory Coast who had 67% of homozygous SS patients, 24.2% of SC heterozygotes and 8.8% of patients with Sβ- Thalassemia. These results show that the major sickle-cell syndromes are made up essentially of homozygous SS form as Bardakdjian et al have suggested [4]. This study population had a mean hemoglobin S percentage of 78.8 ± 12.2%; 15.5 ± 10.4% for hemoglobin F and 12.8 ± 8.6% for hemoglobin A2. These results are close to that described in literature which shows that in homozygous SS individuals, electrophoresis reveals three migratory bands with HbS: 75 to 95%; HbA2: 2 to 4% and HbF: 1 to 15% [15]. The mean baseline hemoglobin was 7.4 ± 1.02 g/dl. This result was like that of Nembe [82] who found mean baseline hemoglobin of 7.44 ± 1.55 g/dl. The low mean baseline hemoglobin in our patients is due to anemia which is pathognomonic for their disease. The mean platelet count was 372.3 ± 126.3 G/L and did not correspond with that of Mendouga [13] who found a mean platelet count of 499.5G/L. The mean leucocyte count was 16.4 ± 9.8 G/L. Mendouga found a mean of 12.4 G/L. Despite the disparity in these results, it remains that the white cell count was high in our patients. The Mean Corpuscular Volume was averagely 87.7 ± 11.4fl, and the mean reticulocyte count was 268.1 ± 128.4 G/L. These results were close to that of Ramatoulaye who found a mean of 80.7 ± 16.2 fl for the MCV and mean reticulocyte count of 233.4 ± 120 G/L. High reticulocyte counts signify regenerative anemia in these patients. Mean LDH was 1437 ± 551 IU/L while mean unconjugated bilirubin levels were 61.7 ± 38.4 µmol/L. Elevated levels of unconjugated bilirubin and LDH are due to intra-tissular hemolysis principally in the spleen and which is a consequence of destruction of falciform red cells [16].

The mean weight of our patients was 24 ± 9kg and their mean height was 125 ± 17cm. Our results were similar to that of Ramatoulaye who found a mean weight of 24.7 ± 9.2kg and a mean eight of 131.5 ± 18.9cm [10]. The weight and height in our study were reported without calculation of the Body Mass Index (BMI).

Yearly frequency of 3 vaso-occlusive crises was found in 42.9% of the patients and no patient was free from vaso-occlusive crises. Our results were different from that Rakoto Alson et al in Madagascar who found that 23.5% of their subjects had 3 crises a year and 35.3% had no crises [17]. This can be justified by the difference in climatic conditions from one place to another as we know that exposure to cold, high altitude and humidity increase the risk of vaso-occlusive crises [16]. In our study, 57% of patients were poly-transfused while only 22.2% had one transfusion each. These findings were similar to that of Kplz-Farget et al in the Ivory Coast who found that 65% of their subjects were poly-transfused [8]. This can be justified by the fact that blood transfusion is considered a therapeutic measure in these patients who suffer from chronic anemia. The frequency of yearly hospitalization in our subjects was 45.2%. Nembe et al also found a frequency of hospitalization of 74.1% [12]. This can be explained by the early management and follow up of the patients by their parents. It could have positive repercussions on the life expectancy of these patients.

This study showed that the use of toothbrushes as a tool for bucco-dental hygiene is relatively common. Aside from the 1.6% who used

exclusively chew sticks, the rest of the patients used toothbrushes. This result was similar to that of Massamba et al in Senegal [18]. It shows the importance that is given to brushing, certainly because of the fact that the study was carried out in an urban milieu where access to information is easier. The patients brushed their teeth once a day in 69% of cases and twice daily in the remaining 31% of cases. This was relatively low and indicated a degree of negligence in bucco-dental hygiene in these patients. The study also showed that 53.2% of the patients brushed their teeth horizontally as against 46.8% who did so in the vertical direction. Given that the better technique should in the vertical sense, our finding could be justified by the absence of routine dentist consultations. Mixed dentition was the most frequent (41.3%). These findings were similar to those found by Alioune et al in Senegal who also found a majority of their subjects had mixed dentition (52.7%) [19].

Our study showed that 65.9% of patients had at least one dental anomaly. This finding was close to that of Ramatoulaye who found a value of 60% in a Senegalese study [10]. Structural dental anomalies were the most frequent (28.6%). Contrarily, Ramatoulaye found more of associated abnormalities, (29.1%) something we did not evaluate in our study. The mean DMF in our group was 4.12 ± 1.2. it corresponded with a moderate prevalence of dental caries. Absa Sow in his study in Senegal also found a moderate prevalence of dental caries but with mean DMF of 3.72 ± 1.8 [20]. This poor state of oral hygiene could be justified by the lack of information amongst parents with respect to dental hygiene and bucco-dental health. In effect, despite the high number of patients using toothbrushes as tools for dental hygiene, the frequency of brushing was low and the technique poor in most patients. Meanwhile, some authors like Laurence B et al have shown that people suffering from SCA are more susceptible to developing dental caries [21]. In our sample, 40.7% of patients had normal gum volume while 59.3% had hypertrophied gums. Pink coloration of the mucosa was found in 50.8% of patients and pale pink coloration was found in 42.1%. These results were similar to that of Rakoto et al who found normal gums in 53.0% and pale pink gums in 41.2% [17]. These modifications in color and volume of the gums are linked in part to inflammatory processes in the gums leading to edema and hyperemia [17]. On the other hand, SCA is a hemoglobinopathy that deforms red cells. They take the shape of a “sickle” and will either be retained by the filter at the level of the spleen, or be destroyed. This destruction causes reduction in total number of red blood cells and consequently, regenerative anemia which manifests as gingival pallor at the level of the mouth [22]. The relatively high mean plaque index of 1.3 ± 0.6 clearly shows a high level of plaque accumulation and deficient dental hygiene. In our study, 79.3% of patients had moderate to poor plaque control. Our results were similar to that of Ramatoulaye et al (76.4%), Massamba et al (80.8%) and Alioune et al (80%) [10, 18, 19]. These results show that bucco-dental hygiene was inadequate in spite of many of our patients using toothbrushes and could be explained by lack of microbial plaque control probably due to poor brushing technique and the low frequency of daily brushing. The mean gingiva index was 1.2 ± 0.5, denoting an inflammatory state which could be attributed?? to hemolytic anemia. All of the patients in our sample had gingival inflammation and it was moderate in 70.6% of them. Our finding was similar to that of Rakoto et al [17]. Massamba found in his study that 92% of his subjects had gingival inflammation [18]. This could be due to poor plaque control in our study population because the microbial factor is the most recognized when it comes to development of these inflammatory phenomena. However, the hypothesis that gum inflammation in SCA patients could also be due to anemia cannot be excluded. The loss of mean CAL in our group was 2.2 ± 0.7mm, the mean PD was 2.5 ± 0.7mm, mean periodontal recession was 0.3 ± 0.1mm and mean dental mobility was 1.2 ± 0.9. These results were close to those reported by Massamba (2.3 ± 0.7mm for mean CAL, 2.2 ± 0,5mm for mean PD, 0.1 ± 0.4mm for mean recession and 1.1 ± 0.6 for mean dental mobility) [18]. Mean gingival recession is very low and shows that esthetic problems dues to alteration of gum state are minimal. Periodontitis, defined by CAL > 3mm in at least one site, was found in 27.8% of cases. Rakoto et al found 38%. Ramatoulaye found 45.5% [17, 10]. The difference in results could be explained by the fact that the conditions and intensity for expression of periodontal disease do not depend solely on bacterial aggression but also upon other factors like the response of the host immune system and environment [23]. During our study, significant correlation between number of transfusions and the following qualitative variables: plaque control, gingival control and CAL > 3mm in at least one site was found. Blood transfusion permits the avoidance of hypovolemia and anoxia in SCA patients with low hemoglobin levels which occur due to erythroblastopenia or acute splenic sequestration [24]. Studies investigating the above associations were not found so we could not compare our results. However, this correlation could be explained by the fact that acute anemia which is an indication for blood transfusion in sickle-cell patients has an effect on the periodontium. During hemolytic phenomena in SCA, falciform erythrocytes obstruct small vessels [16]. The periodontium because of its rich vascularization is thus affected during vaso-occlusive crises. Obstruction of blood vessels in the periodontium impairs its defensive mechanisms leading to the development of infectious foci [16]. Statistically significant correlation between number of hospitalizations and plaque control could be explained by the fact that being bed-ridden is increases susceptibility to poor attention to bucco-dental hygiene. Ramatoulaye found by cross-examining diverse periodontal clinical parameters with the two forms of sickle cell anemia (homozygous and composite heterozygote) that in terms of proportion, homozygotes had more periodontal affliction [10]. Correlation between age and periodontal parameters including mean CAL, mean PD and mean dental mobility could be explained by the fact that during a child’s growth, it’s periodontium is subject to physiological modifications caused by eruptive movements of permanent teeth and inflammatory phenomena [25]. The plaque index and the gingival index are linked to mean CAL, mean PD, mean dental mobility and age. Benoist et al in their own study found very strong positive correlations between plaque index and gingival index [9]. This can be explained by the fact that microbial plaque is the factor most responsible for inflammation and bleeding which progressively causes dental mobility and CAL [23]. Significant correlation between type of dentition and age was established in our study. Temporary dentition is found in children between 6 months and 6 years of age from the appearance of the first central incisor to the appearance of the first molar. Mixed dentition is found children aged 6 to 12 years. It begins from the eruption of the first molar and ends when all temporary teeth have been replaced by permanent teeth. No association between parameters evaluating bucco-dental pathologies and baseline hemoglobin was put into evidence. Alioune in his study found partial negative correlation between hemoglobin levs and CAL in homozygotes but none in controls. This indicates that CAL increases when anemia is more severe even if it is not statistically significant [20]. Poor correlation between the LDH and plaque and gingival index was found. This demonstrates that hemolysis is linked to accumulation of microbial plaque and gingival inflammation even though the correlation is weak.

CONCLUSION

These bucco-dental lesions are early but sometimes asymptomatic. They should therefore be systematically investigated for in each child suffering from homozygous sickle-cell anemia. In summary, follow-up should be regular, thorough and multidisciplinary in order to prevent complications in different organs.

TABLES

Table 1: Correlation between qualitative variables

	Plaque control	Gingival control	CAL>3mm in at least one site
Sex	p – value = 0.69	p – value = 0.7	p – value = 0.3
Yearly frequency of VOC	p – value = 0.3	p – value = 0.3	p – value = 0.18
Number of transfusions	p – value = 0.001	p – value = 0.02	p – value = 0.0003
Yearly frequency of hospitalization	p – value = 0.003	p – value = 0.3	p – value = 0.06
Daily frequency of mouth brushing.	p – value = 0.9	p – value = 0.4	p – value = 0.7

Table 2: Correlation between quantitative variables

	Mean CAL	Mean PD	Mean dental mobility	Age
Age	Cor=0.68	Cor=0.67	Cor=0.42	Cor=1
Mean CAL	Cor=1	Cor=0.98	Cor=0.67	Cor=0.68
Mean PD	Cor=0.98	Cor=1	Cor=0.66	Cor=0.67
Mean dental mobility	Cor=0.67	Cor=0.66	Cor=1	Cor=0.42
DMF	Cor=0.56	Cor=0.56	Cor=0.43	Cor=0.47
Gingival index	Cor=0.83	Cor=0.81	Cor=0.63	Cor=0.53
Plaque index	Cor=0.83	Cor=0.81	Cor=0.63	Cor=0.53

Table 3: Correlation between bucco-dental parameters, age and sex

	Plaque control	Gingival control	CAL>3mm	Type of dentition	Caries index
Age	η^2 =0.5	η^2 =0.16	η^2 =0.2	η^2 =0.7	η^2 =0.01
Sex	Ƥ=0.69	Ƥ=0.7	Ƥ=0.3	Ƥ=0.06	Ƥ=0.5

Table 4: Correlation between bucco-dental parameters and hemoglobin????? LDH and Bilirubin???

	Plaque index	Gingival index	Mean CAL	Mean DMF
LDH	Cor= 0.3	Cor= 0.28	Cor=0.24	Cor=0.17
Unconjugated bilirubin	Cor=0.21	Cor=0.18	Cor=0.19	Cor=0.03

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