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The relationship between juvenile and non-juvenile periodontitis, ABO blood groups and haemoglobin types

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Summary
This study was carried out to investigate the relationship between juvenile and non-juvenile peridontitis (JP, non-JP), ABO blood groups and haemoglobin types. The heamoglobin electrophoresis was determined by routine technique using cellulose acetate paper and tris buffer at pH 8.5. Tile blood grouping was carried out on all specimens. Forty Nigerian adolescent individuals were investigated, twenty of which were diagnosed as having JP while the remaining 20 were diagnosed as having plaque-induced chronic periodontitis (non JP). This latter group was used as the control group. All the JP patients were either of blood group B/AB, rhesus positive while the non-JP subjects had B rhesus positive/negative, O rhesus positive/negative or AB rhesus positive. The differences between the results of the test and the control groups were statistically significant $P<0.05$. All the forty subjects (JP and non-JP) had the haemoglobin type A and none of them exhibited the S and C haemoglobin types. There is a need to further investigate the relationship between juvenile periodontitis , ABO blood group and the common haemoglobin types (A, AS, S, C, and SS) at molecular level.

Keywords: *Blood groups, haemoglobin types, and juvenile periodontitis*

Résumé
Cette etude a ete faite dans le but d'examiner la relationentre la peridonite juvenile et non juvenile, (JP, non-JP) ABO des groupes sanguins ABO et les types d'hemoglobines. L'electrophorese de l' hemoglobine etait determinee par des techniques de routine utilisant le papier de cellulose acetate et les tris butoir an pH 8.5. Les carres de groupe sanguins etaient faits sur tons les specimens. 40 adolescents Nigerians ont ete investigues. Vingt desquels ont ete diagnosticques comme ayant (PJ) alors que le reste (20) avaients la peridontite des plaques induites chroniques (non PJ). Ce dernier groupe etait utilize comme groupe de controle. Tous les patients PJ etaient soit de groupe sanguine B/AB, rhesus positif alors que les sujets non-PJ etaient du group B rhesus positif/negatif, O rhesus positif/negatif on AB rhesus positif. La difference entre les resultants du test et le groupe de contole etait statistiquement significatif $P < 0.05$. Tous les 40 sujets (PJ et non-PJ) avaient l'hemoglobine du type A et personne d'entre eux ne possidont les types S et C. Il ya le bession davantage d'investiguer la relation entre la peridontite juvenile, le groupe sangium ABO et les-types communs d'hemoglobine (A, AS, C, C et SS) an nivean molcculaire.

Introduction

Juvenile periodontitis (JP) is a chronic disease of the periodontium occuring in an otherwise healthy adolescent [1]. The disease usually progresses painlessly leading to loss of many teeth at an early age. This finding is not commensurate with the amount of local irritant present clinically. It is one of the most debilitating periodontal diseases [2]. Bacterial plaque deposit and some specific invading microorganisms have been implicated in the progress of this disease [3-5]. The relatively few direct genetic analyses of JP classify the disease into familial patterns and consanguinity determinant, possibly involving HLA antigens and ABO blood groups [6-8]. Adherence of some bacteria to periodontal tissues is inhibited by secretory IgA which is part of the oral immunologic defence system [9]. Salivary antibody A (anti-A) and antibody B (anti-B) are among the secretory IgA antibodies. Some bacterial cell walls contain substances with close serological relationships to A and B erythrocyte antigens [10]. Salivary anti-A and anti-B could agglutinate such bacteria preventing bacterial adherence, subsequent bacterial colonisation and the development of periodontal disease. Patients of blood group O have anti-A and anti-B in their sera and could have both antibodies in their saliva [11]. High antibody titres might be a result of periodontal disease or might be protective against it.

A recent study in Nigeria by Falusi et al [12] confirmed the racial differences in blood groups and also documented that blood group A individuals constitute 21% of the Nigerian population in the South West.

While some studies among Caucasians have reported that some individuals of blood groups O and B tend to have greater severity of periodontal disease and that individuals of blood group A tend to have greater resistance of periodontal disease [13,14], no such study has been reported among Nigerian JP patients and hence the purpose of this study.

This study was to investigate the preference of the incidence of JP to any particular ABO blood group. Comparisons were made with results derived from non-JP adolescent patients that had plaque-induced chronic periodontitis as controls.

Materials and methods

The study was carried out at the Periodontology Unit of the Dental Centre and the Haematology Department of the University College Hospital, Ibadan. Forty subjects were selected on the basis of the following criteria:

1. Adolescents within the age range of 15-25 years with established chronic periodontal disease. The periodon tal clinical parameters were: missing teeth sequel to periodontal involvement; mobile teeth; pathologically migrated teeth; gingival recession; periodontal abscess formation; furcation involvement; alveolar bone loss as seen from periapical radiographs.
2. The most important criteria for selection of the subjects into the study was the chronic periodontal clinical features and not the sex.
3. No medical history of diabetes, leukemia or epilepsy requiring dilantin therapy.
4. Not pregnant

The forty subjects were divided into two groups; the first group consisted of individuals diagnosed as having juve-

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nile periodontitis while the second group had the plaque-induced chronic periodontitis based on the criteria listed above. The subjects who met the criteria were consecutively recruited into the study. Verbal informed consents were obtained from the participants before recruitment. Miller's mobility index [15] was used to assess the degree of mobility of the teeth. Oral hygiene status of the subjects was examined and recorded using the Gingival Index (Loe & Silness) [16], Plaque Index (Silness and Loe) [17}, Calculus Index and Oral Hygiene Index - simplified (Green and Vermillion) [18].

Table 1: Means and standard deviation of the periodontal clinical parameters at presentation.

Clinical parameters measured	JP subjects	Non-JP subjects	P Value level of significance
1. *Oral hygiene status indices*			
a. Gingival index (GI) (Loe and Silness)	1.24±0.45	2.04±0.42	0.0414 Significant
b. Plaque index (PI) (Silness and Loe)	1.50±0.47	2.48±0.44	0.0029 Significant
c. Calculus index (CI) (Greene and Vermi llion)	1.19±0.46	2.16±0.46	0.0039 Significant
d. Oral hygiene index simplifted (OHI-S) (Greene and Vermi llion)	2.68±0.86	4.62±0.85	0.000 Significant
2. Number of missing teeth	6.833±2.391	3.35±1.526	0.0022 Significant
3. Number of mobile teeth	10.583±2.746	6.937±2.346	0.7975 Significant
4. Mobility index	2.081±0.053	1.873±0.066	0.7975 Not Significant
5. Number of pathologically migrated teeth	3.417±1.109	2.247±1.101	0.0029 Significant
6. Number of teeth with gingival recession	7.083±0.288	7.672±2.325	0.5794 Not Significant
7. Number of teeth with periodontal abscess formation	1.417±0.975	2.603±1.896	0.0022 Significant
8. Number of teeth with furcation involvement	1.917±0.738	2.019±1.716	0.0724 Not Significant
9. Number of teeth with alveolar bone loss seen on peri-apical radiograph	11.083±2.644	9.678±2.665	0.0559 Not Significant
10. Number of teeth with pathologic periodontal pocket.	11.083±2.644	9.678±2.665	0.0559 Not Significant
11. Periodontal pocket probing	5.70±1.052	5.60±0.933	0.2860 Not Significant

Five millimetres of blood were drawn from all the subjects under aseptic conditions and aliquoted into EDTA and plain specimen bottles tubes for the various haematological parameters. For all the subjects, the haemoglobin electrophoresis was determined by routine technique using cellulose acetate paper and tris buffer pH 8.5 [19]. Tile blood grouping was carried out on all specimens.

Ethical clearance was obtained from the UCH/College of Medicine Ethical Committee. Analyses of the clinical parameters were performed on a microcomputer using the stapac gold statistical analysis package. The means and standard deviations of each clinical parameter were determined for the two groups. Independent t-test was used to determine significant differences between the means of each parameter for both groups.

Results

The test group of 20 individuals comprused those diagnosed as having juvenile periodontitis while the control group, a of 20 individuals, were those diagnosed as having plaque induced chronic periodontitis.

Table 1 shows the means, standard deviation and levels of significance of each periodontal clinical parameter as seen in both groups. The differences in the number of missing and mobile teeth were observed to be statistically significant ($P<0.05$). Number of teeth with periodontal abscess formation were also seen to be significantly different ($P<0.05$). All other periodontal clinical parameters were not statistically significant ($P>0.05$).

Table 2: ABO/RH blood group distribution of all the subjects

Subjects	ABO/RH blood group	
	JP	Non-JP
1	B+ve	0-ve
2	AB+ve	B+ve
3	B+ve	B+ve
4	B+ve	B+ve
5	B+ve	0-ve
6	B+ve	0+ve
7	AB+ve	AB+ve
8	AB+ve	B+ve
9	B+ve	AB+ve
10	B+ve	0-ve
11	B+ve	0+ve
12	B+ve	0-ve
13	AB+ve	B+ve
14	AB+ve	B+ve
15	B+ve	B+ve
16	B+ve	0-ve
17	B+ve	0+ve
18	B+ve	B+ve
19	B+ve	AB+ve
20	B+ve	B+ve

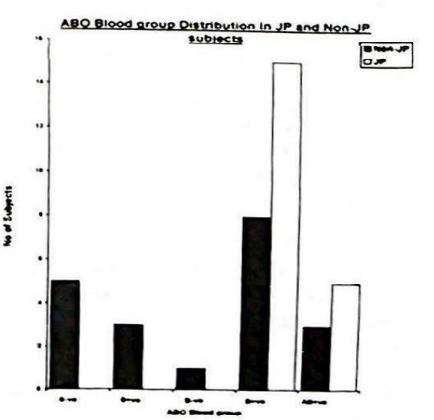

Fig. 1:

Table 2 shows the haemoglobin electrophoresis and ABO/RH blood group distribution of JP and non-JP subjects. JP subjects were observed to be either B+ve or AB+ve while the non-JP subjects had a more variable distribution (O+ve, B+ve, AB+ve, O-ve and B-ve). Figure 1 shows the graphical representation of distribution of these blood groups in JP and non-JP subjects. All the forty subjects were however observed to have haemoglobin type A and hence no table was constructed.

Discussion

Juvenile periodontitis patients were found to have all the clinical periodontal features that are not commensurate with the amount of local irritants present clinically [2]. This was demonstrated in the JP subjects in this study as the means of their oral hygiene status indices were observed to be significantly different ($P<0.05$) from those of the non-JP subjects. The control group (non-JP) subjects had similar chronic periodontal features but exhibited heavy deposit of local irritants that were commensurate with these clinical findings [3]. This explains the reason for the chronic clinical findings in the control group, differentiating it from the JP subjects that had minimal deposits. In this study we observed that the number of missing and mobile teeth were significantly higher in JP subjects than that non-JP subjects. This could be because of the reported rapid progression of JP disease being almost painless as the disease progresses and sometimes discovered fortuitously on examination of routine radiographs leading to gross destruction of the periodontium and hence loss of teeth and grossly mobile teeth at presentation [19,20]. The plaque-induced chronic periodontitis patients tend to have dull radiating pain that disturbs mastication and periodontal abscess which are rarely seen in JP patients [21]. The periodontal abscess formation was observed to be significantly more in the non-JP subjects than in the JP subjects which agrees with the findings of Baer [21]. Baer and Benjamin [22] reported that the bone loss in JP patients is about 3-4 times faster than that in plaque-induced periodontitis which could account for the significant increase in the number of mobile teeth in JP than non-JP subjects. It could be said that JP and non-JP chronic periodontitis patients have different highly implicating microorganisms from the findings of Gibbons and Salgie *et al.* [4] and without bacterial adherence and colonization, plaque formation do not occur, thus blocking an essential step in the pathogenesis of periodontitis [23].

Hardman and Hardman [24] reported that the titres of salivary Anti-A and Anti-B might be expected to vary as a result of an antigenic stimulus from bacterial cell walls containing determinants, chemically similar to the A and B antigens on human erythrocytes.

When the ABO blood group of the two groups in this study were compared, JP patients were found to be of blood group B and AB rhesus positive (B+ve, AB+ve) while the blood groups of the non-JP subjects (control group) were varied, none of the 40 subjects had the A blood group.

These results might be partially due to the differences in the microorganism highly implicated in both groups since many of the bacteria implicated may have surface antigens which are not A-like or B-like. Scott and Coring [25] also reported that there are more than 150 identified natural occurring monosacharide microbial antigenic determinants which may be another explanation for our result in this study. According to Gawrzweska [13], individuals of blood group O and B tend to have greater severity of periodontal disease than individuals with blood group A to have greater resistance of periodontal disease. Pradham *et al* [14] also found significant difference when ABO blood groups were related to four grades of periodontal involvement. However, Carmichael [26] and Kaslick *et al* [27] reported no significant differences in terms of ABO groupings between a periodontitis group and either a study group or the general population.

In this study while none of our subjects had the A blood group and hence supporting the findings of Gawrzewska [13], some of them had the AB group. The supposed resistance of A blood group against specific bacteria implicated in periodontal disease could be tested on Nigerian JP patients for A and B antigens. This might be accomplished by testing the ability of bacteria from pure cultures to decrease the activity of anti-A and anti-B reagents with indicator cells as described by Tregellas and Oakes [28].

Although Arowojolu [29] reported that sickle cell anemia is not associated with a difference in alveolar bone levels as compared to non-sickle cell adolescents in the Nigerian population, there has been no report on the haemoglobin type of chronic periodontitis patients from the literature. In this present study, we found that all the forty subjects (juvenile periodontitis non-juvenile periodontitis) were typed haemoglobin A. Further research need, to be carried out to find the possible relationship of the common haemoglobin (e.g,. A, AS, SC and SS) to the bacterial cell wall of the specific implicating microorganisms in chronic periodontitis. The result from such study may further explain why none of the subjects in this study had haemoglobin types S and C.

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