

Bacteriological agents of oral infections in Human Immunodeficiency Virus (HIV) negative and Human Immunodeficiency Virus (HIV) positive patients in Minna, Niger State, Nigeria

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Abstract This study was carried out to investigate the profile of species of bacteria associated with oral infections in Minna in HIV positive and negative patients, to determine the profile of oral diseases in Minna, Niger State and to compare the manifestations of these diseases in HIV positive and negative individuals. Three hundred and fifteen questionnaires were administered to Dental clinic attendees (including heart to heart clinic referrals) at the General Hospital Minna, of this number, 200 were properly filled and returned. The response rate was 63.50%. One hundred and seven (53.50%) were females and ninety three (46.50%) males. One hundred and ninety (95.00%) had a single lesion and ten (5.00%) had multiple lesions. Seventy nine (39.50%) were HIV positive of which fifty (46.73%) were females and twenty nine (31.18%) males. The age ranged between three months and seventy years. The bacteria isolated were 3 (1.50%); *Bacillus licheniformis*, 11 (5.50%); *Bacillus subtilis*, 31 (15.50%); *Escherichia coli*, 7 (3.50%); *Klebsiella pneumoniae*, 15 (7.50%); *Lactobacillus bulgaricus*, 4 (2.00%); *Micrococcus luteus*, 5 (2.50%); *Pseudomonas aeruginosa*, 7 (3.50%); *Staphylococcus aureus*, 11 (5.50%); *Streptococcus faecalis*, 85 (42.50%); *Streptococcus mutans* and 15 (7.50%); *Streptococcus pyogenes*. A total of 60 (28.57%) had dental caries, 33 (15.71%); chronic marginal generalized gingivitis, 20 (9.52%); acute apical periodontitis, 37 (17.62%); chronic apical periodontitis, 20 (9.52%); angular stomatitis, 7 (3.33%); dentoalveolar abscess, 10 (4.76%); bleeding gum, 10 (4.76%); recurrent aphthous ulcers, 5 (2.38%); halitosis, 5 (2.38%); oral candidiasis and 3 (1.43%); hairy leukoplakia were the oral lesions diagnosed. Chronic apical periodontitis, angular stomatitis, recurrent aphthous ulcers, bleeding gum and halitosis occurred more among HIV seropositive patients. On the other hand, dental caries, chronic marginal generalized gingivitis, acute apical periodontitis and oral candidiasis occurred more in HIV seronegative subjects. More than half of the participants had dental caries and periodontitis.

Keywords Bacteriologic agents, oral infections, Human Immunodeficiency Virus (HIV), Minna

1. Introduction

The human oral cavity is maintained at a relatively constant temperature (35°C – 36°C) thus providing suitable conditions for a large number of micro-organisms (Nwhator and Ayanbadejo 2011).

The mouth presents two types of surfaces for colonization by bacteria, which are the soft tissues and hard tooth surfaces. These surfaces are modified by the coating of saliva and by the pellicle formed on the hard surfaces (Griffin *et al.*, 2009).

The ecological conditions in the mouth are never stable

for long periods of time being unavoidably affected by intermittent feeding and age. With change in the natural ecosystems like use of antibiotic, contribute to the variations in microbial communities. Apart from exposure to contamination during and immediately after birth, the mouth of the new born baby is usually sterile. From the time of the first food, the oral cavity becomes progressively colonized especially from mother's saliva, (which is a major regulatory factor, it decreases to 0.0ml/minute during sleep, approximately 0.4ml/minute at rest and it increases to 2.0ml/minute after stimulation). The initial microbiota consist mainly of Streptococci of which *Streptococcus salivarius* is dominant and a few other aerobes and facultative anaerobes such as species of *Neisseria* and *Veillonella*. However, by one year the oral microbiota of the child resembles that of the adult (Clasen and Steel, 2000).

Oral diseases are conditions found in the mouth. The mouth includes not only the teeth and the gums but their supporting connective tissues, ligaments, bones, hard and soft palates. These conditions are generally grouped into three main categories. These are Diseases of the teeth, Diseases of the gums and Oral cancers. Most oral health problem can be found in people who are either HIV positive or negative. A few conditions are seen almost exclusively in people with HIV, while some that are found in both populations are more problematic for people with HIV, especially those with advanced disease (Abel, 2009). A diminished immune system can alter the cause of oral disease and require more aggressive treatment to prevent minor troubles to escalating into major health problems (Arendorf *et al.*, 1997). However, there is a paucity of comparative information regarding groups or sub-groups that may differ in their oral disease profile. A study that oral lesions were markedly more prevalent in male homosexuals than in other risk groups with more, severe periodontal attachment loss in HIV – positive Blacks compared with HIV – positive whites were reported (Arendorf *et al.*, 1998).

In Nigeria in general and Minna, Niger State in particular, there is a paucity of information regarding the oral manifestation of both normal and compromised individuals. Any health condition faced by HIV positive individual, early identification and treatment should be emphasized. In many cases referral to a dental surgeon should be made as soon as possible.

Oral diseases are major public health problems in all regions of the world. Their impact on individuals and communities

as a result of the pain and suffering, impairment of function and reduced quality of life they cause is considerable. In several industrialized countries there have been positive trends in the reduction of oral diseases in children and reduction of tooth loss among adults but this is far reaching in developing countries like Nigeria. Therefore, global strengthening of public health oral disease, preventive measures and health promotion is urgently needed to abort the rising trend.

This research work was undertaken to determine oral manifestations that are prevalent in Minna, Niger state, Nigeria, compare the manifestation of these diseases in HIV positive and negative individual and document the profile of species of bacteria associated with oral infections in Minna, Niger state, Nigeria.

2. Materials and Methods

2.1. Study Area

The study was carried out in Minna, Niger state. Minna is the capital of Niger state which is part of North Central Geopolitical Zone of Nigeria. It is made up of two Local Government Areas i.e. Chanchaga and Bosso Local Government Areas. This makes it a cosmopolitan area with different ethnic groups living together. Dental services in Minna are rendered in government owned dental centres and private dental clinics with no subsidy for children and pregnant mothers.

2.2. Study Population

Patients (3 months – 70 years) who are Dental clinic attendees (including heart to heart clinic referrals) at the General Hospital Minna, participated in the study. Patients included those that had oral lesions with male to female ratio of 1:1.2. A total of two hundred (200) cases were investigated. Some clients referred from heart to heart clinic were already on Highly Active Anti-Retroviral Therapy (HAAT).

2.3. Study Design: The study was a descriptive cross sectional survey

2.4. Sample Size Determination

The minimum sample size (n) was determined using the formula $n = \frac{z^2 p q}{d^2}$ (1)

Where 'n' = the desired sample size.

z = the standard deviation, set at 1.96 corresponding to 95% confident level.

Computing the formula:

z = 95% confidence interval which is 1.96

p = prevalence of HIV in antenatal clinic at General Hospital Minna is 7.8% = 0.078

$$q = 1 - p = 1 - 0.078 = 0.922$$

d = degree of acceptable error is set at 5% = 0.05

$$\text{Therefore } n = \frac{z^2 pq}{d^2} = \frac{1.96^2 \times 0.078 \times 0.922}{0.05^2} = 110.5$$

a total of 122 participants was the expected minimum sample size after adding 10% to make up for non response. A total of 315 patients were served with questionnaire and counselled but only 200 gave consent giving a recruitment rate of 63.5%.

2.4. Sampling Method

All patients who gave their consent were recruited during the period of the study

2.5. Ethical Consideration

Ethical clearance to conduct this research was sought from the hospital ethics committee. Informed consent was obtained from each respondent before the conduction of physical examination and subject less than 18 years, had their consent sought from their relatives or guidance.

In addition, confidentiality and privacy was respected during and after the history taking. This was further confirmed by making the questionnaire anonymous so that they cannot be matched with the respondents and they were clearly informed that there are no penalties or loss of benefit for refusal to participate in the study or withdrawal from it. Subjects were guarantee of no risk of harm or injury during or after the conduct of the study and all data were kept secured and would be available only to the researcher.

2.6. Physical Examination of Subjects

The subjects for this research were clinically examined with the aid of examination set (Mouth mirror, Dental probe and a twizer). Each subject mouth was examined by retracting the cheek intra – orally with the help of the mouth mirror while the dental probe locates dental cavities, pocketing, mobility of dentition and abscesses. With the aid of the twizer, cotton wool or gauze were used to debride any bloody surface. Radiographs like periapical, upper occlusal, posterior anterior (PA) and oblique laterals were also used for examinations with the film fixed to the particular tooth or quadrant affected before snapping. This radiographs also helped in confirming diagnosis. Histopathology through incisional and excisional biopsy was also used. In incisional biopsy, a small portion of the tissue was cut for histological studies, while excisional involves the removal of the entire affected tissues for studies, however, this method is rare.

2.7. Collection of Specimen

Pus, Blood, Cystic fluid, Saliva and debris from decayed tooth substance were the different specimens collected from two hundred (200) individuals within the space of six months. Each patient's samples were collected based on the pathological presentation.

Specimen from patients with dental abscesses and tooth decay were collected by rubbing the lesion with a sterile swab stick. For those with periodontal and dentoalveolar abscess, a three sided gingival flap incision was made and reflected to get to the discharging sinus and again rubbed with the sterile swab stick. The swab sticks were introduced into an ice pack and then transported to the microbiology laboratory for analysis.

Structured questionnaire were also used to extract information for the research.

2.8. Laboratory Analysis

2.8.1. Preparation of Media

Commercially prepared powdered media were used. The quantity of medium dissolved per litter of distilled water was based on manufacturer specification and most of them after dissolving in conical flask and corked they were sterilized using autoclave at 121°C for 15minutes. Most of the media used are Oxoid brand.

2.8.2. Culturing

The swab sticks were inoculated into nutrient broth and incubated at 37°C for 24 hours. These were then sub cultured into Nutrient Agar and Macconkey agar using streaking method and was incubated for 48hours.

The colonies were then sub cultured into Nutrient Agar and incubated at 37°C for 48hours to obtain pure isolates. The pure isolates were then characterized by Gram's staining and biochemical test as follows:

2.8.3. Gram's Staining

This was done using 24hours / old culture liquid or solid. A smear was made and fixed by passing over the flame three times and allowed to air dry. Crystal violet was flooded on smear for 30seconds. It was drained and then flooded with gram's iodine for 30seconds which act as a mordant, decolorize with 70% alcohol for 1 minute then flooded again with safranin for 1 minute (60 seconds) i.e. counter staining. Finally washed with distilled water and mopped with Whitman filter.

2.8.4. Microscopy

The stained slides were viewed using binocular microscope at X100 objective lens (oil immersion objective). The cells,

shape and Gram's reactions of the bacteria was noted and recorded, and the colour also either gram positive (dark purple) or gram negative (reddish), the shape also either spherical (cocci) or cylindrical (rod) and the arrangement of the cell was also been noted either joining together (chain)

2.8.5. Biochemical Test

The following biochemical test were carried out for the identification of isolates: Catalase, Coagulase, Sugar fermentation, Indole production, Voges proskauer, Citrate utilization, Hydrogen sulphide production, Starch hydrolysis, Haemolysis and Methyl red test.

2.9. Retro-Viral Screening Procedures.

The materials (spirit, lancet blade, gauze) were collected, a less callous finger was selected, Pressure apply to the finger. Clean finger with spirit and allow to dry, the sterile lancet blade was firmly placed off centre on the finger tip. Wiped off the first drop with gauze, then specimen collected (about 2ml.). A strip per test was used, with client's identification number. A drop of blood (whole) applies on absorbent pad, a drop of chase buffer then added. Result read and recorded after 15 minutes, Patient is +ve if 2 red lines (patients area and control area) show. Result is invalid if no line shows, then repeat the experiment. Same step goes.

2.10. Data Analysis

The data obtained from the experiment was subjected to statistical analysis using SPSS 16.0 version (2006). The data were presented in simple frequencies percentage and bar charts.

Chi square test was chosen for checking the significant difference in the data obtained from the 200 individuals because the data was non-parametric.

3. Results

A total of three hundred and fifteen questionnaires were administered to

or singly (clusters), or two joining together (pairs). All these aid in identification of isolate. The results obtained were then compared with known taxa of Cowain and Steel.

patients attending the dental clinic at the General Hospital Minna including those referred from heart to heart department of the hospital. Of this number 200 were properly filled and returned giving a response rate of 63.5%. All the 200 patients that participated in the study presented with one form of oral le-

Sam- ples	Gram Stain	C A T	C O H	S H R	H ₂ S	I N D	M R P	V P I	C T	Sugar Fermentation				Haemolysis			Organisms	
										L	S	G	F	A	B	γ		
1	+R	+	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	<i>Bacillus licheniformis</i>
2	+R	+	-	+	-	-	-	+	+	-	-	-	-	-	-	-	-	<i>Bacillus subtilis</i>
3	-R	-	-	-	-	+	+	-	+	+	+	+	-	-	-	-	-	<i>E. coli</i>
4	-R	+	-	-	+	-	-	+	+	+	+	+	-	-	-	-	-	<i>Klebsiella pneumoniae</i>
5	+R	+	-	+	-	-	-	-	-	+	+	+	-	-	-	-	-	<i>Lactobacillus bulgaricus</i>
6	+R	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	<i>Micrococcus luteus</i>
7	-R	-	-	-	-	-	-	+	-	+	+	+	-	-	-	-	-	<i>Pseudomonas aeruginosa</i>
8	+C	+	+	-	-	-	-	-	-	-	-	-	+	-	-	-	-	<i>Staphylococcus aureus</i>
9	+C	-	-	-	-	-	-	-	-	+	+	-	-	-	-	+	-	<i>Streptococcus faecalis</i>
10	+C	-	-	-	-	-	-	-	-	+	+	+	-	-	+	-	-	<i>Streptococcus mutans</i>
11	+C	-	-	-	-	-	-	+	-	+	+	+	-	+	-	-	-	<i>Streptococcus pyogenes</i>

sion or the other.

Table 1: Biochemical characteristics of bacterial isolated.

Table 1 shows the biochemical characteristic of bacterial isolated. Of the 11 organisms isolated, 4 were gram positive rod, 3 were gram negative rod and 4 were gram positive cocci.

Key for table 1

GR = Gram reaction

MR = Methyl test

CAT = Catalase test

CIT = Citrate test

VP = Voges Proskauer

SHR = starch hydrolysis test

HAE = Haemolysis test

COU = Coagulase test

IND = Indole test

H₂S = hydrogen sulphide production test

G = Glucose sugar fermentation test

L = Lactase sugar fermentation Test

F = Fructose Sugar Fermentation

Test

S = Sucrose sugar fermentation

test

β = Beta haemolysis production

α = Alpha haemolysis production

γ = Gamma haemolysis

production

+ C = Gram positive cocci

-R = Gram negative rod

- = Negative (no reaction)

+ R = Gram positive rod

+ = Positive (has reaction).

The profile of bacteria associated with the various oral manifestation is shown in Table 2; a variety of bacteria namely: *Bacillus licheniformis*, *Bacillus subtilis*, *Escherichia coli*, *Klebsiella pneumoniae*, *Lactobacillus bulgaricus*, *Micrococcus luteus*, *Staphylococcus aureus*, *Streptococcus faecalis*, *Streptococcus mutans*, *Streptococcus pyogenes* and *Pseudomonas aeruginosa* were associated with the different clinical conditions. *Streptococcus mutans* was recovered from all the different manifestations.

Table 2: Frequencies of bacteria agents associated with Oral Manifestation in Minna Niger State.

Oral mani- festation	Bacterial agents										
	<i>Bacillus licheniformis</i>	<i>Bacillus Subtilis</i>	<i>Escherichia Coli</i>	<i>Klebsiella Pneumoniae</i>	<i>Lactobacillus Bulgaricus</i>	<i>Micrococcus Luteus</i>	<i>Staphylococcus Aureus</i>	<i>Streptococcus Faecalis</i>	<i>Streptococcus Mutans</i>	<i>Streptococcus Pyogenes</i>	<i>Pseudomonas Aeruginosa</i>
Dental caries	2(3.33)	6(10.00)	16(26.67)	4(6.67)	2(3.33)	1(1.67)	4(6.67)	5(8.33)	25(41.67)	4(6.67)	1(1.67)
Chronic marginal generalized gingivitis	-	-	-	-	7(21.21)	-	-	2(6.06)	10(30.30)	2(6.06)	2(6.06)
Acute apical Periodontitis	-	-	-	-	-	-	1(5.00)	4(20.00)	12(60.00)	4(20.00)	-
Chronic apical Periodontitis	1(2.70)	2(5.41)	15(40.54)	-	6(16.22)	-	-	-	13(35.14)	5(13.51)	2(5.41)
Angular stomatitis	-	-	-	2(10.00)	-	-	-	-	2(10.00)	-	-
Dentoalveolar abscess	-	3(42.86)	-	-	-	-	-	-	4(57.14)	-	-
Bleeding gum	-	-	-	-	-	-	-	-	7(70.00)	-	-
Recurrent apthous	-	-	-	1(10.00)	-	1(10.00)	-	-	4(40.00)	-	-
Ulcer Halitosis	-	-	-	-	-	2(40.00)	-	-	3(60.00)	-	-
Oral can- didiasis	-	-	-	-	-	-	-	-	4(80.00)	-	-
Hairy leukoplakia	-	-	-	-	-	-	2(66.67)	-	1(33.33)	-	-

Table 3. shows that 190 (95.00%) individuals had single lesion while 10 (5.00%) had multiple lesions. Organisms isolated from single lesion were: *Bacillus licheniformis*, *Bacillus subtilis*, *Escherichia coli*, *Klebsiella pneumonia*, *Lactobacillus bulgaricus*, *Micrococcus luteus*, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Streptococcus faecalis*, *Streptococcus mutans* and *Streptococcus pyogenes*. While those isolated from multiple lesions are: *Streptococcus mutans*, *Streptococcus pyogenes*, *Streptococcus faecalis* and *Micrococcus luteus*.

Table 3: Frequency and occurrence of oral lesions among dental clinic attendees in Minna

Type of lesion	No (%) of Individuals	Organisms
Single lesion	190 (95.00)	<i>Bacillus licheniformis</i> , <i>Bacillus subtilis</i> , <i>Escherichia coli</i> , <i>Klebsiella pneumonia</i> , <i>Lactobacillus bulgaricus</i> , <i>Micrococcus luteus</i> , <i>Pseudomonas aeruginosa</i> , <i>Staphylococcus aureus</i> , <i>Streptococcus faecalis</i> , <i>Streptococcus mutans</i> and <i>Streptococcus pyogenes</i>
Multiple lesions	10 (5.00)	<i>Streptococcus mutans</i> , <i>Streptococcus pyogenes</i> , <i>Streptococcus faecalis</i> and <i>Micrococcus luteus</i>
Total	200 (100.00)	11

The oral manifestations among dental clinic attendees at the General Hospital Minna with their corresponding percentage of occurrence are shown in Table 4. Eleven different oral lesions were diagnosed. These were: dental caries 60 (28.57%); chronic marginal generalized gingivitis 33

(15.71%); acute apical periodontitis 20 (9.52%); chronic apical periodontitis 37 (17.62%); angular stomatitis 20 (9.52%); dentoalveolar abscess 7 (3.33%); bleeding gum 10 (4.76%); recurrent aphthous ulcers 10 (4.76%); halitosis 5 (2.38%); oral candidiasis 5 (2.38%) and hairy leukoplakia 3 (1.43%). 60 (28.57%); dental caries was the highest of the oral manifestation while 3(1.43%); Hairy leukoplakia the lowest.

Table 4: Oral Manifestation among Dental clinic attendees at the General Hospital Minna.

Oral Manifestation	Number of individuals with the lesion	(%) Occurrence
Dental Carries	60	28.57
Chronic marginal generalized gingivitis	33	15.71
Acute apical periodontitis	20	9.52
Chronic apical periodontitis	37	17.62
Angular stomatitis	20	9.52
Dentoalveolar abscess	7	3.33
Bleeding gum	10	4.76
Recurrent aphthous ulcers	10	4.76
Halitosis	5	2.38
Oral candidiasis	5	2.38
Hairy leukoplakia	3	1.43
Total	210	100

Table 5. shows the seroprevalence of HIV among dental clinic attendees at the General Hospital Minna in relation to age and sex. The age ranged 3 months to 70 years. From the two hundred (200) patients screened, ninety three (93) were males while one hundred and seven (107) were females. Seventy nine (39.5%) were HIV positive of which 50 (63.30%) were females and 29 (36.70%) were males. Individuals within the age group 20 – 29 years accounted for the highest prevalence of 40 (50.63%) while those aged 0 – 9 years were all seronegative.

Other age group has the following prevalence rates; 50 – 59 years 6 (46.15%), 30 – 39 years 20 (41.67%), 40 – 49 years 5 (41.67%), 10 – 19 years 7 (25.93%) and 60 years and above 1 (11.11%)

Table 5: HIV Seroprevalence among dental clinic attendees at the General Hospital Minna in relation to Age and Sex.

Age Group (Years)	Total No. Examined	Male		Female		Total (%) +Ve
		No. Examined	No (%) +Ve	No Ex-aminated	No (%) +Ve	
0-9						
10-19	12	9	0(0.00)	03	0(0.00)	0(0.00)
20-29	27	12	2(16.67)	15	5(33.33)	7(25.93)
30-39	79	33	14(42.42)	46	26(56.52)	40(50.63)
40-49	48	25	9(36.00)	23	11(47.83)	20(41.67)
50-59	12	07	2(28.57)	05	3(60.00)	5(41.67)
60	13	04	2(50.00)	09	4(44.44)	6(46.15)
ABOVE	09	03	0(0.00)	06	1(16.67)	1(11.11)
Total	200	93	29(31.18)	107	50(46.73)	79(39.50)

Table 6 shows the oral manifestations observed in relation to the HIV serostatus among dental clinic attendees at the General Hospital Minna, and their level of significance. Chronic apical periodontitis 30 (81.10%); angular stomatitis 15 (75.00%); recurrent aphthous ulcers 9 (90.00%); bleeding gum 7 (70.00%) and Halitosis 3 (60.00%) with their level of significance value less than 0.05 occurred more among HIV seropositive patients. The corresponding frequencies in HIV

seronegative subjects were: chronic apical periodontitis 7 (18.92%); angular stomatitis 5 (25.00%); recurrent aphthous ulcers 1 (10.00%); bleeding gum 3 (30.00%) and halitosis 2 (40.00%) with level of significance value greater than 0.05. On the other hand, dental caries 38 (63.33%); chronic marginal generalized gingivitis 21 (63.64%); acute apical periodontitis 17 (85.00%) and oral candidiasis 5 (100%) occurred more in HIV seronegative subjects. None of the individuals with oral candidiasis was HIV seropositive.

Table 6: Profile of oral manifestations in relation to HIV serostatus among dental clinic attendees in Minna.

Oral Manifestation	No of individuals with lesion	HIV Serostatus		Level of Significant
		Positive individuals (%)	Negative individuals (%)	
Dental caries	60	22(36.67)	38(63.33)	0.052
Chronic marginal generalized gingivitis	33	12(36.36)	21(63.64)	0.163
Acute apical periodontitis	20	3(15.00)	17(85.00)	0.003
Chronic apical periodontitis	37	30(81.10)	7(18.92)	0.000
Angular stomatitis	20	15(75.00)	5(25.00)	0.050
Dentoalveolar abscess	7	3(42.86)	4(57.14)	1.000
Bleeding gum	10	7(70.00)	3(30.00)	0.219
Recurrent aphthous ulcers	10	9(90.00)	1(10.00)	0.021
Halitosis	5	3(60.00)	2(40.00)	0.625
Oral candidiasis	5	0(0.00)	5(100.00)	-
Hairy leukoplakia	3	1(33.33)	2(66.67)	1.000

4. Discussion

A variety of bacteria were isolated from different oral diseases. The different species of bacteria isolated were *Bacillus licheniformis*, *Bacillus subtilis*, *Escherichia coli*, *Klebsiella pneumonia*, *Lactobacillus bulgaricus*, *Micrococcus luteus*, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Streptococcus faecalis*, *Streptococcus mutans* and *Streptococcus pyogenes*. The diseases diagnosed were dental caries, chronic marginal generalized gingivitis, acute apical periodontitis, chronic apical periodontitis, angular stomatitis, dentoalveolar abscess, bleeding gums, recurrent aphthous ulcers, halitosis, oral candidiasis and hairy leukoplakia

Dental caries has the highest percentage of occurrence with sixty individuals (28.57%), while only three cases (1.43%) of Hairy leukoplakia were seen. A few individuals presented with more than one oral manifestation. Twelve people with age zero to nine examined were all HIV negative, while those within the range of sixty and above were nine (three males and six females) and only a female was positive. Age 20 – 29 and 30 – 39 have the highest number of presentation of seventy nine and forty eight respectively. The highest percentage of occurrence of HIV positive individuals was also seen among these age groups, with females more affected.

Oral Manifestations like chronic apical periodontitis, angular stomatitis, bleeding gums and recurrent aphthous ulcers were significantly high with the positive subjects when compared with those without the virus. Isolates like the *Streptococcus mutans*, *Escherichia coli* and *Streptococcus pyogenes* were found in more than one oral manifestation. All the bacterial isolates were seen in dental caries.

The numbers of times an individuals brushes his/her teeth, and the frequency of intake of sugary diet explain the frequency of dental caries. Individuals that involve in multiple and unprotected sex came out positive with their clinical presentations, more of periodontitis, angular stomatitis and recurrent aphthous ulcers. People that keep to their dentist's advice of brushing their teeth two times daily and visiting the hospital twice a year for scaling and polishing presented with less oral pathology compared to those that ignore the advice.

This study has shown that oral manifestations are common features of HIV infection in Minna, Niger state. The clinical range of the oral manifestation of HIV infection seen is similar to that reported in other parts of Africa, Europe and

America (Arendorf *et al.*, 1997). The current data indicate that periodontal disease is more common in HIV infected male individuals compared to positive females. This is similar to findings by Arotiba *et al.*, (2005) and Mgbor and Okafor, (2002) but contrasted with Klein *et al.*, (1991) who showed that heterosexual women had higher prevalence of periodontal disease than heterosexual men. This disparity may be explained by differences in sample size and disease status. Klein sample consisted of patients with AIDS, while this study only looked at those who were HIV – positive.

A reduction on the prevalence of oral lesions has been reported in HIV patients using Highly Active Anti – Retroviral Therapy (HAART). In this study, the regular use of HAART, probably, reduced the prevalence of Oral lesions and especially, reduced hairy leukoplakia and oral thrush, which were significantly less frequent in these participants.

The reduction of oral lesions is related to the immunity recovery obtained by the use of HAART. Nicolatou-Galitis *et al.*, (2004) reported that regular use of HAART protected HIV patients of hairy leukoplakia.

The prevalence of HIV in dental clinic is significant substantiating that there is an appreciable risk of transmission of HIV in dental clinic if standard precaution is not strictly adhered to. It re-emphasized the need for proper instrument sterilization to prevent patient to patient transmission. Safe needle practice and proper sharp disposal is needed to prevent occupational exposure to blood among dentists. The meticulous handling of sharp instrument during scaling and also during instrument cleaning among dental auxiliaries need to be given urgent attention. This study shows that the risk of transmitting HIV to oral healthcare worker during treatment is also a potential hazard in this environment hence adequate preventive measure should be observed always. This study underscores the urgent need for strict observance of the universal precautionary measures while handling patients of unknown HIV status. The need for routine infection control training for dental professionals is hereby emphasized and recommended. Post exposure prophylaxis should be made readily accessible to all medical personnel. The significant prevalence of HIV among dental patients attending General Hospital Minna justifies the need to introduce provider initiated voluntary counselling and testing in dental clinic in Niger state to serve as additional opportunity for unscreened patients.

5. Conclusion

The oral cavity is one of the parts of the body where normal flora are found. Many bacteria resident in the mouth tend to cause oral diseases when the oral environment becomes favourable either through poor oral hygiene or decrease in body immune system. Some of these organisms that colonize the oral cavity came in through the food we eat, or through the fluids we consumed, so keeping the oral environment clean and avoiding risky behaviour will help to checkmate the proliferation of bacteria activities in the mouth.

In developing countries, Nigeria for example, evidence of apparent differences in the prevalence of some of the oral manifestations of HIV infection exists compared with prevalence seen in developed countries. These differences include HIV-associated periodontal disease, oral hairy leukoplakia and angular stomatitis.

Potentially, all HIV infected individuals are equally at risk of presenting with oral lesions at some time or the other during the disease process. This emphasizes the need for all health workers to be equipped with the necessary knowledge and expertise to manage and or refer those patients appropriately. Considerations also need to be given to relevant, available and affordable management of oral HIV infection in developing countries.

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