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Pacific Journal of Medical Sciences
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ADENOMATOID ODONTOGENIC TUMOR WITH RARE CLINICAL AND RADIOLOGICAL PRESENTATION- A CASE REPORT

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ABSTRACT:
The Adenomatoid odontogenic tumor (AOT) is a benign (hamartomatous) noninvasive lesion but progressive growth, constituting only 3% of all odontogenic tumors. Most common site of AOT is maxillary anterior region especially canine region. Most common variety of AOT is Follicular variety (73%) which is associated with impacted tooth (maxillary canine). Females are most commonly affected than males. We report on a rare case of follicular AOT in the mandibular anterior region seen in an 18 years old male patient. Diagnosis of adenomatoid odontogenic tumor should be considered when the clinician is presented with a corticated radiolucency in the anterior lower jaw, especially in teens and young adults.

Key words: Adenomatoid odontogenic tumor; Maxilla; Root resorption;

Received: May 2011: Accepted June 2011

INTRODUCTION:
The odontogenic tumors are a diverse group of lesions that represent the deviation from normal odontogenesis. The AOT is an epithelial tumor with an inductive effect on odontogenic ectomesenchyme. AOT can be clearly distinguishable from the classic intraosseous, infiltrative ameloblastoma. It was suggested to abandon the previously used term adenameloblastoma; Philipsen and Brin [1] introduced the above term (AOT), which was adopted by the WHO classification in 1971 [2]. The benign (hamartomatous) noninvasive AOT appears in 3 clinic topographic variants; 1) Follicular, 2) Extra follicular and 3) peripheral. Follicular and extra follicular variants are both intra-bony or central tumors and account for 97% of all AOTs of which 73% are of the follicular type [3]. The extra follicular variant is not associated with a unerupted tooth like the follicular variant, and the well defined, unilocular radiolucency is found between, above, or superimposed on the roots of erupted teeth. It is characteristic that the rare sub variant mimicking a periapical lesion is in fact located palatally (or lingually) to the tooth
involved [4]. Sixty – nine percent of AOTs are diagnosed in the second decade of life, and more than half of the cases (53%) occur during the teenage years (13 to 19 years of age). The females to male ratio for all age groups and AOT variants together is very close to 2:1 and predominantly seen in the maxilla (maxilla : mandible = 2.6:1) [5].

**CASE REPORT:**
An 18 year old male reported with a swelling of the right lower jaw region since 2 months. The swelling gradually progressed to attain its present size in two months duration. Extraorally (Figure 1) swelling measured 4x5cm and extended mesio-distally from left parasymphisis to right parasymphysis region. Supero-inferiorly extended from 1.0cm below the vermilion border of the lower lip to the sub mental region; it covered the whole chin region with diffuse margins. Intraorally (Figures 2 & 3) the swelling extended labially from distal aspect of region 32 to mesial aspect of region 44, with vestibular obliteration. Lingually a diffuse swelling was noted extended from distal aspect of region 41 to mesial aspect of region 44. The consistency was firm. Grade 3 mobility i.r.t over retained 83 (lower right deciduous canine). 31, 41, 42 showed grade 2 mobility. We came to the Provisional diagnosis of dentigerous cyst and differential diagnosis of calcifying epithelial odontogenic cyst, central giant cell granuloma, adenomatoid odontogenic tumor was considered.

**INVESTIGATIONS:**
Radiographically Intra oral periapical radiograph (IOPA) shows well defined unilocular radiolucency measuring about 4x3 cm extending mesiodistally from distal aspect of 45 region to other side of the radiolucency can’t be make out with an impacted dilacerated 43, radiolucency extending at the apex of the root. supero- inferiorly extending from alveolar crest region i.r.t 41,42, over retained deciduous right canine (83) to lower border of the mandible causing thinning of the lower border of the mandible. External root resorption i.r.t 83 (right lower deciduous canine) with displacement of teeth roots i.r.t 41, 42, 44 & 45 (Figure 4);
Occlusal radiograph shows well defined buccolingual cortical expansion (Hydraulic expansion), extending from distal aspect of 33 region to mesial aspect of 46 (Figure 5).
Orthopantomogram (OPG) shows well defined radiolucency measuring about 3x4cm extending mesio-distally from region 33 to 45, supero–inferiorly from alveolar crest region from 42, 44 region to lower border of the mandible causing thinning and expansion, which is surrounded by well defined corticated radiolucency. Dilacerated apically displaced impacted tooth is embedded within the radiolucency which is, extending till apex of the 43. Loss of lamina dura i.r.t apical 1/3rd of 31, 32, 41 to 45 regions (Figure 6); Pulpal vitality test was done, except 83 all the teeth showed
positive response. 
FNAC (Fine needle aspiration cytology) was performed showed straw – color aspiration, subjected for protein investigation (3.9 mg %), other microscopic examinations like cholesterol crystal examination, which was negative (Figure 7).

Surgical enucleation of the tumor for histopathological examination was performed under local anesthesia.

Microscopically tissue section of the specimen showed odontogenic epithelium proliferating in the form of whorls with rosset like pattern, showing globular calcifications, duct like areas are seen with hyperchromatic epithelial cells suggestive of adenomatoid odontogenic tumor (Figures 8 A & B)

DISCUSSION:
AOT is an uncommon tumor or benign, hamartomatous growth derived from odontogenic epithelium. These tumors tend to develop in younger people and are more common among women, but in our case it was found in adult male patient [3].

Three clinico - pathological variants are well recognized; follicular, extra follicular, and peripheral. The follicular and extra follicular variants are intra-osseous and account for about 96%. The maxilla, often together with an unerupted canine, is most commonly affected than the mandible. In our case it was found in mandible with an unerupted canine seen in only 35.7% of cases [3, 5].

Our case we found separate follicular AOT associated with a right mandibular canine, in a 18 year old boy with radiographic findings mimicking dentigerous cyst. Radiographically unilocular radiolucency with no internal calcification has been seen in only 27% of cases. To differentiate from dentigerous cyst, CEOC, Radicular cyst, and CGCG, mandibular premolar- molar region with an impacted tooth is the common site for dentigerous cyst; maxillary canine region is the most common site for AOT.

Dentigerous cyst radio graphically appears as the radiolucency attached to the cementoenamel junction; in case of AOT the radiolucency extends more apically beyond Cemento enamel junction as seen in our case.

CEOC (Calcifying epithelial odontogenic cyst) is most commonly seen in either maxilla or mandibular region anterior to first molar of young adults, not associated with an impacted tooth, radiographically unilocular radiolucency with internal calcification are seen. Radicular cyst also can be considered in the differential diagnosis because, pulpal vitality test shows no response i.r.t 83, and the periodontal ligament and lamina dura were not found to be intact around involved teeth as seen in our case. Radiographically radicular cyst presents as a well defined unilocular radiolucent area, thin rim of cortical bone, larger than 1.5cm, with displacement of adjacent teeth. In our case shows buccolingual cortical expansion with well defined unilocular radiolucency
about 4cm with displacement of adjacent teeth. Most common site for radicular cyst is maxillary anterior region but in our case it was found in mandibular anterior region and on aspiration it yields yellow color pus discharge, but in our case it yielded straw color fluid.

Central giant cell granuloma (CGCG) is an aggressive lesion commonly seen in females younger than 30 years; mandibular anterior region is the common site, crossing midline. Radiographically it shows unilocular or multilocular radiolucency with wispy septae, displacement of teeth and root resorption are evident [6]. AOT is usually well – encapsulated, so conservative enucleation and curettage is the most common treatment modality for this tumor, recurrence is extremely rare. Care full follow-up examinations should be conducted in the case [3, 8, 10].

**CONCLUSION:**

It should be emphasized that careful diagnostic procedures and adequate interpretation of clinical and radiographic findings and differential diagnosis can be listed out to arrive at a correct diagnosis as in our case the AOT is mimicking dentigerous cyst. The final diagnosis of an AOT was arrived by histologic examination.

Unusual findings seen in our case related to typical features of an adenomatoid odontogenic tumor (AOT).

<table>
<thead>
<tr>
<th>Typical features of most AOT</th>
<th>Unusual findings in our case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most commonly seen in females, maxillary canine being the most common site [5].</td>
<td>Seen in male patient with mandibular (35%) Canine region.</td>
</tr>
<tr>
<td>Cortical plate penetration rare size usually does not exceed 1-3 cm [3,7].</td>
<td>Cortical expansion is seen with AOT Size exceeded more than 4 cms.</td>
</tr>
<tr>
<td>Unilocular radiolucent area with radiopaque specks Associated with impacted teeth [4].</td>
<td>Unilocular radiolucent area without radiopaque specks (seen in only 27% of cases).</td>
</tr>
<tr>
<td>Root resorption extremely rare; only four cases Reported to date to our knowledge [7 – 10].</td>
<td>Root resorption of the over-retained deciduous canine, with displacement of adjacent teeth (premolars).</td>
</tr>
</tbody>
</table>
Figures and figure legends:

Figure 1:
Extra oral photograph of the patient

Figure 2:
Intra-oral photograph showing lingual swelling in the anterior region of the mandible

Figure 3:
Intra-oral photograph showing lower labial vestibular obliteration

Figure 4:
Patient Intra-oral Periapical radiograph showing well defined radiolucency with impacted dilacerated canine. Also notice displaced premolars
Figure 5: Mandibular occlusal radiograph showing buccal and lingual cortical expansion with no cortical perforation.

Figure 6: Orthopantomogram showing well defined radiolucency with impacted canine and displaced premolars, overretained deciduous canine.

Figure 7: Fine needle aspiration cytology showing straw coloured aspirate.
Figure 8: Pictomicrograph 40X magnification (A) and 100X magnification (B) (H & E). Showing odontogenic epithelium proliferating in the form of whorls with rosette like pattern, showing globular calcifications, duct like areas are seen with hyperchromatic epithelial cells suggestive of adenomatoid odontogenic tumor.

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5. Philipsen HP, Reichart PA, Nikai H. The adenomatoid odontogenic tumor (AOT); An update. Oral med pathol 1997;2;55-60.
6. Stuart C. White, Michael J. Pharoah; Oral radiology; 6th edition; Benign Tumors of the jaws; Chapter 22; 383-385.
SECOND TO FOURTH DIGIT RATIO (2D:4D) IN MEN ATTENDING INFERTILITY CLINICS IN AKURE METROPOLIS NIGERIA: A PREDICTIVE INDEX?

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Running title: Digit ratio a predictive index: case study of infertile men in Akure, Nigeria

ABSTRACT:
The ratio of index finger length to ring finger length is called the “2D:4D digit ratio,” or more simply, the “digit ratio”. This study was to investigate if there are significant differences in the digit ratio (2D:4D) of infertile men attending an infertility clinic and men drawn from the general population in Akure Nigeria; to generate data locally to serve as a source for future referencing in anthropometry as it relates to male fertility assessment. A total of 84 participants were involved in this study. They include men attending an infertility clinic (n=42), and those drawn randomly from the general population (n=42) with regards to their fertility. Information on 2D:4D and the seminal fluid data from two samples were obtained. Direct digit estimates was done using digital calipers and indirectly by taking measurements from a digital image of the hand. The digit ratios were obtained by dividing the lengths, of the index finger by the ring finger. Semen was collected from each participant by masturbation and examined for count and motility to ascertain their fertility status. There was a statistically significant ($p < 0.05$) increase in the length of the fourth digit compared to the second digit in fertile men. The 2D:4D ratio in fertile men was significantly lower ($p < 0.05$) compared to infertile men. This study demonstrates an association between 2D:4D ratio and the fertility status in adult men in Akure metropolis Nigeria.

Key words: Digit ratio, Infertility, Index finger, Ring finger, Seminal fluid

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INTRODUCTION:

The associations between the second and fourth digits of the hand (the 2D:4D ratio) and fertility-associated traits probably arise from early organizational effects of testosterone rather than from activational effects of current testosterone [1].

The ratio of the lengths of 2D:4D has received considerable attention as a possible marker of the prenatal effects of androgen on the developing fetus [2]. Men average lower on this measure than women. In studies done, it was reported that, for males, the index finger is generally of about 96% the length of the ring finger. This gives an average digit ratio of 0.96 for males [2]. The digit ratio is equal to 1.00 if length of 2D equal to 4D and greater than 1.00 if 2D were longer than 4D. Males generally have a digit ratio below 1.00 hence they have what is termed a "low digit ratio" that is 4D longer than 2D ring.

The digit ratio is a normal sexual dimorphic anatomic trait [3] determined at the 14th gestational week, and relatively stable throughout development [4 - 6]. The 2D:4D is assumed to be an ‘indicator’ of circulating prenatal gonadal hormones; smaller ratio reflects higher fetal testosterone and lower fetal estrogen. The suggestion that 2D:4D is a correlate of prenatal testosterone and estrogen was first made in 1998 by Manning, et al. [2]. In their study evidence was shown, that higher levels of testosterone during this critical developmental stage facilitates the growth of the ring finger, while higher levels of estrogen facilitates the growth of the index finger. It also appears that the right hand is affected more by these hormonal levels than the left hand such that length differences are more pronounced on the right hand. Averaged across samples from various populations, female values were found to be about 0.25 standard deviations higher than male values [7].

Several investigative methods are being routinely deployed in evaluating male patients with infertility. Notable amongst these are seminal fluid analysis, hormonal profile, and testicular biopsy [8]. These methods are usually met with diverse constraints. For example, the collecting seminal fluids samples require masturbating which has serious cultural/religious biases. The hormonal profile on the other hand is very expensive, testicular biopsy is an invasive procedure and requires expertise. If low digit ratios in men are associated with high sperm counts and testosterone levels and vice versa [2], it therefore follows that its use as a means of assessing infertility is invaluable.

Apart from the fact that the use of anthropometry offers a cheap, simple and easily repeatable means of evaluating fertility in men, there are scanty literature on this study and almost no data for males in the African continent. This present study was thus designed to determine the association of digit
ratio and infertility in Akure men as a possible predictive guide for male fertility.

SUBJECTS AND METHODS:
A total of 84 subjects were recruited for this study. They included 42 men attending infertility clinics in Akure metropolis in Nigeria. The sampling sites were randomly selected infertility clinics in Akure. They include the State Specialist Hospital, Hope Specialist Hospital and Owoyemi Specialist Hospital. All the participants attending these clinics did semen analysis to confirm their infertility. Patients were then diagnosed as either azoospermic (absence of sperm cells) or oligospermic (< 20 x10⁶ ml⁻¹) following two separate semen analyses [9]. The normative participants comprised 42 healthy fertile, married men that had no problems with ejaculation and sex life and has been able to father a child. They were contacted via their family doctor. The seminal fluid analysis was done in each of them to confirm the normospermic ranges (> 20-120 x10⁶ ml⁻¹) [9].

Informed consent was obtained from the authorities of the above named hospitals. The participants were duly informed of the purpose of the study and a signed consent was obtained from each of them. The protocol was approved by the local ethical committee.

We excluded inappropriate candidates through history taking and physical examination. The ‘disqualified entrants’ were those who had a history of cryptorchidisms, varicoceles, or testicular injury which can have an influence on semen analysis as well as those who had burns or trauma on hands that can have an influence on finger length [10]. We also excluded the following short comings: males with females co-twin [11].

Since 2D:4D ratios vary greatly between different ethnic groups [12], we excluded other tribes (concentrated on the Yoruba’s Western Nigeria where the hospitals were located).

After due counseling was done, informed permission was obtained. The participants were asked to sit comfortably and positioned the dorsum on a flat, smooth surface the right hand was used because relations with right-hand ratio are typically stronger than left hand [2]. The vernier caliper was the instrument used for direct measurement of digital lengths.

First we measured the digit lengths from the ventral crease proximal to the palm to the tip of the finger, using vernier calipers recording to 0.01 mm [13]. A second measurement was taken in order that repeatability of the 2D:4D ratio [12] could be calculated. All the measurements were made by one observer with right and left hands measured first and this procedure repeated after a period of at least 5 minutes blind to first measurements. The 2D:4D ratio was calculated by dividing the
length of the index finger by the length of the ring finger.

The length of the ring and the index finger was also alternatively estimated indirectly by taking measurements from a digital image of the hand [14] and data compared.

Results were expressed as mean ± standard deviation. Analysis was carried out using analysis of variance (ANOVA) with Scheffe’s post hoc test. The level of significance was considered at \( p < 0.05 \).

RESULTS:
The result in Table 1 shows that there was a statistically significant \( (p < 0.05) \) increase in the length of the fourth digit as compared to the second digit in fertile men in Akure.

The digit ratio is less than one, since it is expressed as the ratio of the value of the length of the index finger in centimeters to the value of the length of the ring finger in centimeters. This means that most fertile men randomly sampled in Akure had their fourth fingers longer than the second finger.

Table 2 shows a significant \( (p < 0.05) \) increase in the length of the ring finger (fourth digit) as compared to index finger (second digit) in infertile men in Akure. In both cases the digit ratio was less than one. The values of 2D, 4D and digit ratio in fertile men were slightly but significantly \( (p < 0.05) \) lower compared to those of infertile men.

Data in Table 2 also shows that 2D:4D ratio in fertile men was significantly lower compared to infertile men, (unpaired \( t \)-tests, 2D:4D for infertile men, \( x = 0.954 \), 2D:4D for fertile men, \( x = 0.946 \), \( t \)-test = 2.61, \( P > r t = 0.011 \)).

There was a significant difference for the digit ratio summary score, with greater digit ratio in infertile men compared to fertile men.

Table 3 shows the correlations between age, index finger, ring finger, and digit ratio of both the fertile and infertile men. The age of the participants were found to be positively correlated with 2D, 4D, and the digit ratio i.e. as the age increases, the values of 2D, 4D, and the relative digit ratio increases.
Table 1: Mean values for fertile (MF) and infertile (MIF) men in Akure

<table>
<thead>
<tr>
<th>Variables</th>
<th>MIF Minimum</th>
<th>MIF Maximum</th>
<th>MF Minimum</th>
<th>MF Maximum</th>
<th>MIF Mean ± SD</th>
<th>MF Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>25.00</td>
<td>53.00</td>
<td>42.00</td>
<td>33.14±0.99</td>
<td>30.83±0.56</td>
<td></td>
</tr>
<tr>
<td>2D</td>
<td>6.43</td>
<td>8.26</td>
<td>8.16</td>
<td>7.63±0.05</td>
<td>7.31±0.07</td>
<td></td>
</tr>
<tr>
<td>4D</td>
<td>6.70</td>
<td>8.79</td>
<td>8.68</td>
<td>8.01±0.06</td>
<td>7.73±0.08</td>
<td></td>
</tr>
<tr>
<td>Digit ratio</td>
<td>0.93</td>
<td>0.98</td>
<td>0.98</td>
<td>0.95±0.002</td>
<td>0.94±0.002</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Status of 2D, 4D, and digit-ratio in fertile and infertile men in Akure

<table>
<thead>
<tr>
<th>Status</th>
<th>2D</th>
<th>4D</th>
<th>Digit ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infertile</td>
<td>7.63</td>
<td>8.01</td>
<td>0.954</td>
</tr>
<tr>
<td>fertile</td>
<td>7.31</td>
<td>7.73</td>
<td>0.946</td>
</tr>
<tr>
<td>T-test</td>
<td>3.61</td>
<td>2.71</td>
<td>2.61</td>
</tr>
<tr>
<td>Pr &gt; t</td>
<td>0.0005</td>
<td>0.0082</td>
<td>0.011</td>
</tr>
<tr>
<td>p &lt; 0.01</td>
<td></td>
<td>p &lt; 0.01</td>
<td>p &lt; 0.05</td>
</tr>
</tbody>
</table>

Table 3: Status of 2D, 4D, and digit-ratio in fertile and infertile men using t-test

<table>
<thead>
<tr>
<th>Age</th>
<th>2D</th>
<th>4D</th>
<th>Digit ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>1.00</td>
<td>0.14</td>
<td>0.13</td>
</tr>
<tr>
<td></td>
<td>0.11</td>
<td>0.21</td>
<td>0.26</td>
</tr>
<tr>
<td>2D</td>
<td>0.18</td>
<td>0.97</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td></td>
<td>0.11</td>
<td>&lt; 0.0001</td>
<td>0.31</td>
</tr>
<tr>
<td>4D</td>
<td>0.14</td>
<td>0.97</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>0.21</td>
<td>&lt; 0.0001</td>
<td>0.0042</td>
</tr>
<tr>
<td>Digit ratio</td>
<td>0.13</td>
<td>0.31</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>0.26</td>
<td>0.0042</td>
<td></td>
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</tbody>
</table>
DISCUSSION:
The assessment of fertility in men using relative digit lengths (2D:4D) ratio is not popular in African settings with scanty documentations if any. The efficacy in terms of percentage reliability in evaluating male fertility has been verified to be statistical significant [15]. Findings from our initial unpublished pilot study (before commencement of this current research) were interesting and the data was worthwhile.

The digit ratio is arguably ubiquitous in appraising many anthropometric limits in relation to other clinical conditions. For instance some authors have reported significant correlations between 2D:4D and such diverse traits as psychological, fertility, sexual attitudes and orientation, status, and cognitive abilities [16, 17].

Our study provided further evidence that 2D:4D is a sexually dimorphic trait with the normative ‘control’ participants having a significantly lower digit ratio compared to their infertile counterparts.

The data were less than one as in the fertile men which were in tandem with those described previously in other studies [2, 15].

The overall sample data showed a weak but significant positive correlation between 2D:4D and age, although more data are required to clarify this situation. However, at present it appears that the relationships were either weak or non-existent. This finding provides some support to our prediction concerning a positive association between 2D:4D and male fertility.

However a study has shown an inverse relationship between digit ratio and semen quality [2]. This means that the lower the digit ratio, the higher the sperm count and motility and the more fertile the individual. Our study correctly identified with the variations in the finger ratio in fertile and infertile men and vertical association to their sexual status in the population. Manning et al. have presented the negative relationship between the 2D:4D ratio and sperm number, motility and testosterone concentrations [2, 12]. In their study, they had a subset of oligospermic males, which reduced the overall mean sperm numbers accounting for the significant relationship between sperm number and 2D:4D ratio [2]. In the same vein, our study showed meaningful findings where oligospermic males had higher digit ratio. Thus, the 2D:4D ratio is a likely predictive value for men’s semen quality in the Yoruba populace of Akure Nigeria.

This study shows that the influence of finger ratio is significant in the evaluation of fertility in men. This means that in addition to semen analysis, hormonal profile and environmental/sex life of an individual [8] a more influencing factor would be the digit ratio.
CONCLUSION:
This study demonstrates an association between 2D:4D ratio and the fertility status in adult men in Akure. Our data have provided a fertility predictive information/data on the relative digit lengths (2D:4D) ratio in men in Akure capital city of Ondo state Nigeria. This could serve as a future template for comparative studies on male fertility. However, there still exist controversies over this subject of relation between finger ratio and male fertility. Therefore the need for a larger scale study that requires a greater comparative study design is inevitable; and also to demonstrate further correlations between the finger ratio and male fertility.

ACKNOWLEDGEMENTS:
We wish to thank the medical directors of State specialist Hospital, Akure, Owoyemi Specialist Hospital Akure, and Hope Specialist Hospital Akure for availing us the opportunity to use their patients. Also for their direction, questions, and suggestions, which have helped to develop and shape this project.

REFERENCES:
PREVALENCE OF SELF-MEDICATION AMONG STUDENTS IN UNIVERSITY OF PAPUA NEW GUINEA

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ABSTRACT:

The inappropriate use of over-the-counter (OTC) and prescription medicines to self-medicate can cause significant medical problems. This cross-sectional descriptive study assesses prevalence and factors associated with self-medication among students in the University of Papua New Guinea during the 2005 academic year. Data from randomly selected consented students on the Taurama and Waigani campuses of the University of Papua New Guinea were obtained by self-administered, structured, pre-tested questionnaires. The sample size for the two campuses was calculated using the “proportionate to population size” (PPS) cluster sampling technique. A total of 583 questionnaires were distributed as follows, 124 (21.3%) among students on Taurama campus and 459 (78.7%) among students on Waigani campus. However, only 309 (53%) of the questionnaires received from all the students were suitable for analysis. Data for all the 309 students indicate that OTC and Prescription medicines were
used in 710 instances (63.8%) and 402 instances (36.2%) respectively. Paracetamol was the most frequently (59.6%) used OTC medicine. Antibiotics (54.5%) and Antimalarials (45.5%) were the prescription medicines used for self medication. For antibiotics, Amoxicillin (89.5%) was the most frequently used. For antimalarial medicines, Chloroquine (47.5%) and Artemether (38.3%) were the most frequently used for self medication. Headache and malaria were the most common symptoms for self-medication, whereas the most common reasons were previous experience of treatment in relation to symptoms and mild illness. Sources of medicines for self-medication were friends (53.8%), pharmacy (52.6%) and supermarkets (43.1%). There was no significant difference in the inappropriate use of medicines by students on Taurama campus compared to those on Waigani campus. Self-medication practices were similar among students on both campuses. There is a need for intensive education and comprehensive awareness campaign to advocate for reduction in the prevalence of self-medication practices among students on both campuses in the University of Papua New Guinea.

**Key words:** Self-medication, Students, Over-the-counter, Prescription, Medicines

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**INTRODUCTION:**

The use of medicines to treat self-diagnosed disorders or symptoms, or the intermittent or continued use of a prescribed medicines, without consultation with qualified medical practitioners, for chronic or recurrent disease or symptoms is considered as self-medication [1,2]. In most developed countries self-medication is a major component of the primary health care system. Rational use of over the counter (OTC) medicines can be achieved by appropriate labelling, information leaflets and also by ensuring that Pharmacists or Physicians give all necessary additional information or professional advice to consumers [1 – 3].

The use of prescription medicines for self-medication is common practice in some developing countries [2 – 6]. Some of the reasons for such common practice include non-licensed providers of medicines, availability of prescription medicines in open markets, actions of unregistered practitioners, use of leftovers, medicines obtained from family members or friends with previous similar symptoms [4 – 6]. There are also reports of increased and sometimes irrational use of OTC medicines in some developing countries [3 – 6]. This practice is on the increase among the poor socioeconomic status groups, because of several reasons which include lack of modern healthcare facilities in rural areas, difficulties of
accessing these facilities in urban areas, non-availability of doctors, high cost of private medical care and deviation from daily schedule caused by waiting in long queues [4 – 6].

In developing countries, such as Papua New Guinea (PNG), self-medication may pose a threat to public health unless the population is adequately educated on responsible self-medications, so as to avoid problems associated with irrational medicine use. PNG has a fair share of Heath Service problems, with reports indicating that anti-malarial medicine resistance and resistance to some antibiotics are on the increase [7]. This indicates the possibility of existing irrational use of these medicines, including their indiscriminate non-prescription use.

The Medicines and Cosmetic Act 1999 of PNG as amended in the Medicine and Cosmetics Regulations 2001; lists 1070 Prescription Only Medicines, 334 Pharmacy Only Medicines and 493 OTC medicines [8]. There are no published data indicating awareness of the OCT and Pharmacy only medicines that are available for self-medication in PNG. In addition, there are no data to indicate the prevalence and factors associated with self-medication among the various communities in PNG. More specifically, there are not data on the pattern of self-medication among students in the various universities in PNG. This calls for appropriate research to establish the extent of self-medication in communities in PNG, so as to develop appropriate strategy to address the problems.

The University of Papua New Guinea (UPNG) is the premier university in PNG. There are five Schools, offering various degree programs in UPNG. The School of Medicine and Health Sciences (SMHS), located in the Taurama campus of UPNG, offers degree programs in Medicine, Pharmacy, Dentistry and other related medical courses. The other four Schools are located in the Waigani campus of UPNG.

The aim of this study was to assess the prevalence and factors associated with self-medication among students in the UPNG. The objective was to ascertain the types of medicines used; the sources of medicines and medicine information, and also the common symptoms for which the medicines were used for self-medication.

**METHODS:**

Collection of data for this descriptive cross-sectional study was conducted during the 2006 academic session, in the UPNG, which is one of the four major universities in PNG. The study population included all the 2160 full time undergraduate students, excluding all foundation year students. The duration of the UPNG academic session is 30 weeks.
A calculated total sample size of 550 students was obtained based on a design effect of two, a relative precision of 10%, confidence level (CL) of 95% and predicted non-response rate of 20%. As there was no available information on likely prevalence rate of self-medication in PNG, an assumed prevalence rate of 25% was used. The sample size for the two campuses was calculated using the “proportionate to population size” (PPS) cluster sampling technique.

The identification number (ID) for each of the 2160 full time students registered in the Taurama and Waigani campuses of the UPNG were obtained from the Executive Officers in each of the five schools. These numbers were further confirmed in the academic office in Waigani. The computer-generated random numbers were obtained and each number was randomly allocated to individual student using the ID numbers. The computer generated random numbers were used for selection the students to participate in the study. This was carried out using the standard procedures (9) as follows; the sample interval (k) was calculated and used as the starting point in the random number table. Each number selected randomly was then allocated to a questionnaire which also contains the ID number of a student. The final list obtained was then separated according to the ID numbers of the students, Taurama and Waigani campuses. Thus, a total of 620 full-time students, 124 (20%) on Taurama campus and 496 (80%) on Waigani campus were selected. This amounted to about 10% over sampling of the students on both campuses. The questionnaires were given to those students whose ID numbers were selected using the sample interval. The purpose of the study was explained to each student before giving them a written consent form to read and sign. Questionnaire was given only to students that signed the consent form. To guarantee confidentiality, names were omitted from both the consent form and the questionnaire.

Self-administered, structured, pre-tested questionnaire was used to collect information on age, sex, type and reasons for medication, self-use of medication during the 2005 academic year, names and doses of self-prescribed medicines, duration of use, sources of the medicines, knowledge of OTC and prescription medicines, and reasons for not consulting a doctor. The questionnaire was pre-tested for content and designed using a different cohort of 50 students, selected randomly from both campuses.

Ethical clearance for the study was obtained from the School of Medicine and Health Sciences, UPNG Ethical and Research Grant Committee. Data analysis was by Statistical Package for Social Sciences (SPSS-PC Software, Version 11). Chi square test was used to assess significance amongst variables.
A p-value of < 0.05 was considered as significant. The data are presented for all the students as a group and for students on the Taurama campus and Waigani campus.

**RESULTS:**

A total of 620 students from UPNG were recruited for the study, of which 583 (94%) consented to participate by signing the consent form. The 37 (6%) students that did not sign were on the Waigani campus. Thus, a total of 583 questionnaires were distributed as follows, 124 (21.3%) among students on Taurama campus and 459 (78.7%) among students on Waigani campus. However, only 309 (53%) of the questionnaires received from all the students were suitable for analysis. Thus, the total consent rate, 309 of the 620 students recruited, was 49.8%. The age range of all the consented students was 19 – 49 years. Gender distribution of these students was 148 (47.9%) males with mean age 23.6 ± 4 years, and 161 (52.1%) females, mean age 21.9 ± 2.1 years.

Further analysis of questionnaires from the 309 students indicated that 85 (27.5%), mean age 22.4 ± 2.4, years were from Taurama campus and 224 (72.5%), mean age 22.8 ± 3.6 years, were from Waigani campus. Gender distribution of the students on Taurama campus was, 36 (42.4%) males with mean age 22.9 ± 3.2 years and 49 (57.6%) females with mean age 22.1 ± 1.5 years; on Waigani campus was 112 (50%) males, with mean age of 23.8 ± 4.2 years and 112 (50%) females, with mean age of 21.9 ± 2.3 years.

Of the 309 students, 253 (82%), mean age 22.7 ± 3.4 years, indicated that they had used self-medication during the 2005 academic year. Of these students, 90% (228) indicated regular use of self-medication, while 10% (25) occasionally self-medicated. Of the 253 students that self-medicated, the highest prevalence (84%) of self-medication was among the students in the 20 – 24 years age group, followed by students (9.5%) in the 25 – 29 years age group. Gender distribution of all the students that self-medicated was 117 (46%) males, mean age 23.6 ± 4.1 years, and 136 (54%) females, mean age 22.0 ± 2.2 years. This indicates that 79.1% of the male and 84.5% of the female students self-medicated. Thus, there was no statistically significant difference (p > 0.05) between the male and female students that self-medicated.

When the 253 students that self-medicated, were distributed according to campuses 30% (76) were on Taurama campus and 70% (177) on Waigani campus. This indicated that 89.4% and 79.0% of students on Taurama and Waigani campuses respectively self-medicated during the academic year. This difference was not statistically significant (p > 0.05).

The 253 students used various medicines for self-medication. Medicines were consumed in a
total of 1112 instances, which gives an average medicine consumption rate of 4.4 instances per student during the 30 weeks duration of the 2005 academic Session.

The OTC and Prescription medicines were used in 63.8% (710) and 36.2% (402) respectively of the 1112 instances (Table 1). Paracetamol used in 423 (59.6%) instances was the most frequently used OTC medicines, followed by other non-steroidal antiinflammatory medicines (NSAIDs) used in 122 (17.2%) instances. Cough and cold remedies were used in 96 (15.5%) instances. The use of other OTC medicines, such as, antacids, heat-rub, lozenges and worm tablets was relatively low (69 instances, 9.7%). Gender distribution (Table 1) of the frequency of OTC medicines consumption pattern indicates that the female students consumed more (402 instances, 56.6%) than the male students (308 instances, 43.4%). This difference was however, not statistically significant (p > 0.05).

Further distribution (Table 1) of the 710 instances indicated that the students on Taurama and Waigani campuses consumed OTC medicines in 193 (27.2%) and 517 (72.8%) instances respectively. This gives an average medicine consumption rate of 2.5 and 2.9 instances per student in Taurama and Waigani campuses respectively. This difference was not statistically significant (p > 0.05). Paracetamol was the most frequently used OTC medicine among students on both campuses.

Of the 402 (36.2%) instances that all the students used prescription medicines, antibiotics were the most frequently used, 219 instances (54.5%), followed by Antimalarials used in 183 instances (45.5%). In the antibiotic group, Amoxicillin (196 instances, 89.5%) was the most frequently used, followed by Septrin (17 instances, 7.8%), Chloramphenicol (four instances, 1.8%) and Penicillin (two instances, 0.9%). In the antimalarial group, Chloroquine (87 instances, 47.5%) was the most frequently used, followed by Artemether (70 instances, 38.3%), Fansidar (22 instances, 12.0%), Quinine (two instances, 1.1%) and Primaquine (two instances, 1.1%). There was not significant difference (p > 0.05) in the frequency of usage of prescription medicines among the female (204 instances, 50.7%) students, compared to male (198 instances, 49.3%) students.

Analysis of the data indicated that of the total 1112 instances, the medicines were used appropriately in 931 (83.7%) instances compared to their inappropriate use in 181 (16.3%) instances by all the students. Of the 181 inappropriate instances, the OTC medicines were used inappropriately in 21 instances (11.6%) compared to 160 inappropriate instances (88.4%) for prescription medicines. Antibiotics and antimalarial medicines were used in 121 (75.6%) and 33
(20.6%) instances respectively of the 160 inappropriate instances of medicines used by all the students. Amoxicillin (101 instances, 83.5%) was the most frequently abused antibiotic, while Chloroquine (33 instances, 51.5%) was the most frequently abused antimalarial medicine. Inappropriate use of the medicines was higher among the male students (53.6%) compared to the female students (46.4%). The difference was however, not significant statistically.

Further analysis of the distribution of the 402 instances that prescription medicines were used indicates usage of 36.2% (132 instances) by students on Taurama campus compared to 270 instances (67.2%) by the students on Waigani campus, (Table 1). This is equivalent to an average drug consumption rate of 1.7 instances per student on Taurama campus compared to 1.5 instances per student on Waigani campus. This difference was not statistically significant (p > 0.05). In both campuses, Amoxicillin was the most frequently used antibiotic, whereas Chloroquine was the most frequently used antimalarial medicines. There was not significant difference in the inappropriate use of medicines by students on Taurama campus compared to those on Waigani campus.

Table 1: Medicines / Medicine groups used by students for self-medication

<table>
<thead>
<tr>
<th>Medicines/Medicine groups</th>
<th>Instances (%) of usage in University of PNG</th>
<th>Instances (%) of usage in University PNG Campuses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total students</td>
<td>Females</td>
</tr>
<tr>
<td>Over the counter Medicines (OTC)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paracetamol</td>
<td>423 (59.6%)</td>
<td>249 (61.9%)</td>
</tr>
<tr>
<td>Other NSAIDs</td>
<td>122 (17.2%)</td>
<td>64 (15.9%)</td>
</tr>
<tr>
<td>Cough &amp; Cold remedies</td>
<td>96 (15.5%)</td>
<td>57 (14.2%)</td>
</tr>
<tr>
<td>Others</td>
<td>69 (9.7%)</td>
<td>32 (8.0%)</td>
</tr>
<tr>
<td>Total Instances</td>
<td>710.0</td>
<td>402.0</td>
</tr>
<tr>
<td>Prescription Medicines</td>
<td>Total</td>
<td>Females</td>
</tr>
<tr>
<td>Antibiotics</td>
<td>219 (54.5%)</td>
<td>117 (57.4%)</td>
</tr>
<tr>
<td>Antimalarials</td>
<td>183 (45.5%)</td>
<td>87 (42.6%)</td>
</tr>
<tr>
<td>Total Instances</td>
<td>402.0</td>
<td>204.0</td>
</tr>
</tbody>
</table>
Table 2 shows the prevailing conditions for which the students self-medicated. Headache and malaria were the two major reasons for self-medication among all the students in UPNG and on both campuses. In most cases, self-medication for headache was commenced as soon as the pain started. Dizziness was the prevailing symptom for the commencement of self-medication for malaria. Although, according to most of the students, malaria was usually associated with fever, the onset of fever associated with body ache or joint pain was not related to malaria. Self-medication for cough and skin infections was higher among students on Taurama campus, compared to those on Waigani campus.

Table 2: Conditions for which students self-medicated *

<table>
<thead>
<tr>
<th>Conditions</th>
<th>University of PNG</th>
<th>University of PNG Campuses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Males (n = 117)</td>
<td>Females (n = 136)</td>
</tr>
<tr>
<td>Headache</td>
<td>92.3% (108)</td>
<td>92% (125)</td>
</tr>
<tr>
<td>Malaria</td>
<td>71% (83)</td>
<td>76.5% (104)</td>
</tr>
<tr>
<td>Cough</td>
<td>41% (48)</td>
<td>49.3% (67)</td>
</tr>
<tr>
<td>Fever</td>
<td>43.6% (51)</td>
<td>36.8% (50)</td>
</tr>
<tr>
<td>Flu</td>
<td>34.2% (40)</td>
<td>39.7% (54)</td>
</tr>
<tr>
<td>Running nose</td>
<td>22.2% (26)</td>
<td>28.7% (39)</td>
</tr>
<tr>
<td>Back ache</td>
<td>31.6% (37)</td>
<td>19.1% (26)</td>
</tr>
<tr>
<td>Stomach ache</td>
<td>17.9% (21)</td>
<td>27.2% (37)</td>
</tr>
<tr>
<td>Sore throat</td>
<td>23.1% (27)</td>
<td>22.1% (30)</td>
</tr>
<tr>
<td>Ear ache</td>
<td>8.5% (10)</td>
<td>14.7% (20)</td>
</tr>
<tr>
<td>Skin infections</td>
<td>15.4% (18)</td>
<td>7.4% (10)</td>
</tr>
<tr>
<td>Diarrhoea</td>
<td>4.3% (5)</td>
<td>4.4% (6)</td>
</tr>
<tr>
<td>Vomiting</td>
<td>2.6% (3)</td>
<td>2.2% (3)</td>
</tr>
<tr>
<td>Others</td>
<td>24.8% (29)</td>
<td>25.7% (35)</td>
</tr>
</tbody>
</table>

* Figures indicate multiple responses; Total does not add up to 100%
The students were asked to indicate all the sources from which they obtained the various medicines they had used to self-medicate. Friends (53.8%), pharmacy shops (52.6%) and supermarkets (43.1%) were the major sources of medicines used for self-medication by all the students. The students indicted that they had visited pharmacy shops 133 times during the academic session.

Pharmacists were present during 47% of the times they visited pharmacy shops. Pharmacists were not present in any of the supermarkets during the time of their visits. Although this trend was similar for students on both campuses, the use of leftover medicines from previous visits to clinics was more prevalent among students (41.2%) on the Waigani campus, compared to 17.1% of students on the Taurama campus.

The students obtained information about the medicines used for self-medication from multiple sources. Most (65%) of the students indicated that the labels on packets and leaflets inside packets were the major sources of information about the medicines used to self-medicate. Previous prescriptions (54.5%), friends (37.2%), relatives (28.1%) and News media (13%) were the other sources of information. This trend was similar for students on both campuses.

When asked about the knowledge of side effects of some of the medicines that they used to self-medicate, 55.7% of the students had some knowledge of the side effects of some of the medicines, compared to 44.3% that had no knowledge of any side effects of any of the medicines. When distributed according to gender, 56.4% and 55.9% of male and female students respectively had some knowledge of the side effects of some of the medicines.

A total of 75% and 47.5% of students on Taurama and Waigani campuses respectively, indicated that they had some knowledge of the side effects of some of the medicines that they used to self-medicate. Thus, 25% of the students in Taurama campus were not aware of any side effects of the medicines used to self-medicate compared to 52.5% of the students on the Waigani campus.

The reasons for self-medication among all the students and students on each campus are presented in Table 3. Previous experience of treatment in relation to symptoms (73.5%) and mild illness (66.0%) were two of the major reasons for self-medication among all the students. The trend was similar among both male and female students.

Mild illness was the major prevailing reason for self-medication among 84.2% of students on Taurama campus, compared to 58.2% of
students on Waigani campus. On the Waigani campus 30.5% of students self-medicated because of long queues to doctors compared to 17.1% of students on the Taurama campus. It was more expensive for students on Waigani campus to see the doctors compared to students on Taurama campus.

Table 3: Reasons for self-medication among the students

<table>
<thead>
<tr>
<th>Reason</th>
<th>Males (n = 117)</th>
<th>Females (n = 136)</th>
<th>Total (n = 253)</th>
<th>Taurama (n = 76)</th>
<th>Waigani (n = 177)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Previous experience of treatment in relation to symptoms</td>
<td>79.5% (93)</td>
<td>68.4% (93)</td>
<td>73.5% (186)</td>
<td>81.6% (62)</td>
<td>70% (124)</td>
</tr>
<tr>
<td>Mild illness</td>
<td>67.5% (79)</td>
<td>64.7% (88)</td>
<td>66% (167)</td>
<td>84.2% (64)</td>
<td>58.2% (103)</td>
</tr>
<tr>
<td>Long queues to doctors</td>
<td>27.4% (32)</td>
<td>25.7% (35)</td>
<td>26.5% (67)</td>
<td>17.1% (13)</td>
<td>30.5% (54)</td>
</tr>
<tr>
<td>Expensive seeing the doctors</td>
<td>18.8% (22)</td>
<td>8.8% (12)</td>
<td>13.4% (34)</td>
<td>5.3% (4)</td>
<td>17% (30)</td>
</tr>
<tr>
<td>Number of visits to clinics because of lectures</td>
<td>18.8% (22)</td>
<td>14.7% (20)</td>
<td>16.6% (42)</td>
<td>15.8% (12)</td>
<td>17% (30)</td>
</tr>
</tbody>
</table>

* Figures indicate multiple responses; Total does not add up to 100%

**DISCUSSION:**

The high (50.2%) total non-response rate obtained in this study highlights the already reported common problems in conducting surveys by questionnaires [2,3,4]. The non-response rate of 54.8% (272 students) was higher on Waigani campus compared to 31.5% (39 students) on Taurama campus. Reasons for the high non-response rate include failure to complete and return the questionnaire despite several attempts made to contact some of the students, incomplete questionnaires and difficulty in remembering the names of medicines, dosage and duration of use. This supports the observation [2,3, 4] that problems in recalling retrospective information, such as
types of medicines used and understanding the meaning of self-medication are major contributing factors to the low response rate from some consented participants. Although the total number of female students was slightly higher than that of male students, the difference was not statistically significant. There was no significant difference in the mean age of students that self-medicated on both campuses.

The 82% prevalence of self-medication amongst the students in UPNG was lower than the 94% and 88% reported among university students in Hong Kong [3] and Croatia [11] respectively, but higher than the 45% and 76% reported amongst university students in Turkey [10] and Karachi [6] respectively.

No statistically significant differences were observed in the mean ages and self-medication practices among the male and female students in UPNG. This finding was similar to that reported by some authors [3,6,12], but different from that of others [3,4,5,13], who reported significant differences in self-medication practices between male and female respondents.

The relatively higher but non-significant prevalence of self-medication practice among the students (89.4%) on Taurama campus compared to students (79.0%) on Waigani campus was similar to the data reported for medical and non-medical students in Karachi [6] and Sudan [13]. Our data do not strongly favour the idea that students in the medical sciences tend to self-medicate more than other students [6]. However, the set up and location of the two campuses in UPNG makes it difficult to explain the reason for the high prevalence of self-medication practices among students in the Taurama campus. This is because there is only one clinic for staff and student on the Waigani campus, compared to the Taurama campus, which, apart from having a clinic for students, is located in close proximity to the PMGH. In addition, students on Taurama campus have easy access to their teachers; some of them are qualified medical doctors, pharmacists, dentists and nurses. Most of these staff members offer free consultations to students without prior appointment. Despite this easy access the prevalence of self-medication was 89.4% among the students on Taurama campus. It seems plausible that the students in Taurama and Waigani campuses may not be fully aware of some of the implications of indulging in self-medication. There is therefore an urgent need to carry out intensive education, information and awareness campaign to advocate for reduction in the prevalence of self-medication among students on both campuses in UPNG.

Paracetamol and other NSAIDs were the most frequently used OTC medicines for self-
medication among the students in UPNG and on both campuses. This corresponds to the findings that headache was the commonest prevailing illness for self-medication among the students. This is similar to reports on university students by other authors [2 – 6]. Panadol, the most frequently used OTC medicine for self-medication, is a Paracetamol-based analgesic that is known to provide fast, effective temporary relief of pain and discomfort associated with headache, tension headache, migraine headache, muscle pain, backache, toothache, period pain, cold and flu symptoms [9]. Panadol is a much safer medicine to use than Aspirin [9]. It is the analgesic of choice for individuals with a sensitive stomach, and stomach ulcers [9]. The various brands of Panadol available in Port Moresby are sold as OTC medicines [9]. There was no statistically significant difference between the frequency of usage of Panadol by students in Waigani and Taurama campuses.

The calculated frequency (545 instances by all the 253 students) of use of paracetamol and other NSAIDs is equivalent to 2.2 instances per student over the duration of the academic year. This frequency is higher than the values reported by other authors [3,4]. This should be of concern because the abuse of OTC medications may produce unwarranted medical complications or interact with prescription medications. Thus, the need to educate the students on the appropriate use of the OTC medications cannot be overemphasized. The lack of awareness of the “hidden” ingredients in some OTC medicines may exacerbate existing medical problems in susceptible individuals [9].

The high frequency with which antibiotics and anti-malarial medicines were used for self-medication is a controversial issue that must be addressed because of the possibility of developing drug resistance, if the medicines are not properly used. Inappropriate use of antibacterial and antimalarial medicines, such as inadequate dosing, incomplete courses and indiscriminate usage, are the major contributing factors to the development and spread of drug resistance, particularly in developing countries [2,6].

Port Moresby is not an endemic zone for malaria, thus the indiscriminate use of anti-malarial medicines must be discouraged. It is therefore necessary to conduct regular advocacy on the potential benefits and risks associated with the use of Artemether and Artesunate, which are the currently available anti-malarial medicines in PNG and other developing countries including.

Prevalence of self-medication for diarrhoea and vomiting was very low, because most of the students consider these to indicate serious illness, which calls for a visit to the doctor. Those that self-medicated indicated that they
use commercially available oral rehydration solution, coconut water or rice water.

Friends, relatives and medicine retail shops are responsible for promoting self-medication among the students. The high percentage of students from Waigani campus that used leftover medicines from previous visits to the clinic indicates that either they had not taken the prescribed dose of the medication or that too much medication had been prescribed. The presence of pharmacists in all medicine retail outlets can play a significant role in controlling some of the factors that promote self-medication. The non-availability of pharmacists in most medicine retail outlets to give professional advice on the use of OTC medicines and to restrict the sale of prescription only medicines is a major issue that requires immediate attention by the health authorities in Port Moresby. Consumers of OTC medicines require proper access to accurate and clear information on the uses of these medicines. It is therefore important to ensure that all medicine labels and leaflets inside packets are written in simple English and in the local Tok Pisin language commonly spoken by people in PNG.

Comprehensive information on the side effects of OTC medicines should be included on information leaflets in the packets of medicines. In addition, intervention, such as distribution of information about side effects of OTC medicines should be carried out via media, health education sessions, posters and education councillors on the UPNG campuses. The current UNPG foundation year course on Drug Abuse and Misuse should include the effective use of self-medication.

There was no significant difference in the prevailing reasons for self-medication among all the students in UPNG. However, self-medication in the treatment of mild illness was higher among students on Taurama campus compared to students in Waigani campus. This indicates that students on Taurama campus are more aware of the concept of self-medication, as visiting the doctor is unnecessary for mild illnesses. On the other hand, using self-medication because of previous symptoms indicates insufficient knowledge of the concept of self-medication. In order to correct and consolidate the prevailing self-medication practices among the students on Taurama campus, it is important that students get a clear understanding of the concept of mild illness and learns about the appropriate medicines that should be used in these cases. Experts in the field of drug education and self-care practices should conduct intensive advocacy and education of proper self-medication practices among the general student population in UPNG. Increasing the number of doctors in the student clinic on Waigani campus can shorten the
queues to doctors, thus encouraging more students to refrain from self-medication.

**CONCLUSION:**

The prevalence of self-medication is high (82%) among students in the University of Papua New Guinea, with no significant difference between male and female students. There was no significant difference observed in the self-medication practices among the students on the Taurama and Waigani campuses.

Paracetamol and other NSAIDs were the most frequently used OTC medicines for self-medication. Amoxicillin was the most frequently used antibiotic, while Chloroquine was the most frequently used antimalarial medicine. Inappropriate use of medicines was higher among the male students (53.6%) compared to the female students (46.4%) in UPNG. Headache and malaria were the two major reasons for self-medication. Friends, relatives and medicine retail shops were responsible for promoting self-medication among the students. The presence of pharmacists in all medicine retail outlets can play a significant role in controlling some of the factors that promote self-medication among the students.

There is need to carry out intensive education and comprehensive awareness campaign to advocate for reduction in the prevalence of self-medication among students on the Taurama and Waigani campuses in the University of Papua New Guinea.

**ACKNOWLEDGEMENT:**

We gratefully acknowledge all the students especially those on the Waigani campus in the University of Papua New Guinea that participated in this project. We thank Samson Grant, Roxanne Komeng, Henry Jeremiah, Dinah Tetaga and Christie Tande for their various contributions towards the success of this project.

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NEONATAL HYPOGLYCAEMIA, RELATIVE PLACENTAL WEIGHT AND MATERNAL PRE- ECLAMPSIA: ANY RELATIONSHIP?

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**Department of Obstetrics and Gynaecology, St Philomena Catholic Hospital, Benin City, Nigeria;

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ABSTRACT:

Pre-eclampsia is known to be associated with various placental morphologic changes as well as fetal growth restriction. Growth restricted neonates are at increased risk of hypoglycaemia in the first three days of life. The aim of the study was to examine the relationship between occurrence of neonatal hypoglycaemia and the relative placental weight in mothers with pre-eclampsia. The blood glucose concentrations of 69 neonates born to mothers with pre-eclampsia were determined three times daily during the first three days of life. The birthweight of each of the neonates as well as the corresponding
weight of the placenta were determined and recorded. The relative placental weight was calculated using the formula: Weight of placenta x 100/Birthweight of the infant. Overall prevalence of neonatal hypoglycaemia was 47.8%. Of the 69 neonates, severe neonatal hypoglycaemia (blood glucose < 1.6 mmol/L) was prevalent in 10 (14.5%) and 15(21.7%) had blood glucose level between 1.6 and 2.5 mmol/L. The relative placental weight did not differ with the severity of maternal pre-eclampsia. No statistically significant correlation was obtained between the relative placental weight and neonatal hypoglycaemia.

**Key Words:** Hypoglycaemia, neonates, placental weight, pre-eclampsia;

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**INTRODUCTION:**

Neonatal hypoglycaemia (blood glucose concentration below 2.6mmol/L) is one of the common clinical care problems encountered in some neonatal units [1]. The frequency is influenced by the cut-off point used for blood glucose concentration [1, 2]. In a study in Nepal, when the cut-off point for blood concentration was below 2.6mmol/L the incidence was 41.0%; the incidence dropped when a cut-off point below 2.0mmol/L was applied [2].

Pre-eclampsia is an established pregnancy-associated clinical condition that leads to fetal growth restriction [3-5]. It has been suggested that fetal growth restriction in pre-eclampsia might depend on abnormal placental development [3, 6]. For instance, shallow trophoblastic invasion of decidual arteries can precipitate pre-eclampsia with the attendant reduction in placental perfusion and insufficient transport of nutrients to the developing fetus which in turn leads to fetal growth restriction [4, 7-9]. Vascular spasm in the placental bed is believed to cause placental infarction, resulting in deterioration in the metabolism between the mother and her fetus with fetal growth restriction as a consequence [8, 10]. Some investigators [11, 12] have reported occurrence of placental growth retardation in pre-eclampsia. Some of the principal pathological changes of the placenta in pre-eclampsia include decidual arteriopathy, infarcts, abruptio placentae and Tenney-Parker changes [11, 13]. All these pathological features are not always present [13]. Khong et al [14] in their study of 39 patients with pre-eclampsia reported that the placental lesions were unrelated to maternal parity, degree of proteinuria, severity and duration of hypertension, or its therapy. Considering the various placental morphologic changes in pre-eclampsia and the resultant fetal growth restriction, it may be surmised that the relative
placental weight could predict the likelihood of neonatal hypoglycaemia among infants born to mothers with pre-eclampsia.

The present study, therefore, sought to examine the relationship between occurrence of neonatal hypoglycaemia and relative placental weight in maternal pre-eclampsia.

PATIENTS AND METHODS:
All neonates delivered at St Philomena Catholic Hospital (SPCH), Benin City between January and December 2010 to Nigerian women with pre-eclampsia were recruited into the study. Ethical clearance and permission for the study were approved by the hospital authority. The mothers were given a detailed verbal explanation of the study and their permission sought before enrolment. The criteria for diagnosis of pre-eclampsia and enrolment of the mother-infant pair into the study were:
An increase in either systolic or diastolic blood pressure greater than 30 mmHg or 15 mmHg respectively above the booking blood pressure (BP) plus proteinuria (using albustix) of one plus (1+) and above in the absence of urinary tract infection (UTI).
An intrapartum BP = 140/90 mmHg obtained on at least two occasions not less than 6 hours apart during delivery plus presence of proteinuria as indicated above was accepted as pre-eclampsia. The Korotkoff sound phase 5 (disappearance phase) which is more reproducible, correlated better with intra-arterial measurements of diastolic BP and is more closely related to outcome was used [10].
Nigerian women who did not smoke or drink alcohol and had not been diagnosed with diabetes mellitus or sickle cell anaemia and were not on medication, such as propanolol or drugs such as narcotics were recruited into the study.
Gestational diabetes mellitus was excluded by routine determination of blood glucose concentration in all pregnant women attending antenatal care clinic in our hospital. Pregnant women with random or fasting blood glucose concentrations below 8.0mmol/L or 6.0mmol/L respectively, were deemed to be free from gestational diabetes mellitus [15]. Those excluded from the study were mothers with eclampsia; Infants with rhesus isoimmunisation, polycythaemia and major congenital abnormalities; Infants of diabetic mothers and twins.

Pre-eclampsia was categorized into mild, moderate and severe according to the criteria suggested by Redman with some modifications [16]. In this Classification System, mild pre-eclampsia was defined as a diastolic BP increase of at least 30mmHg and proteinuria of 1+ (using albustix); moderate pre-eclampsia as
an increase in diastolic BP of at least 30mmHg and proteinuria of 2+; and severe pre-eclampsia as a diastolic BP increase of at least 30mmHg or a single diastolic BP equal or greater than 110mmHg and proteinuria of 3+.

In our hospital, the approved routine treatment of pre-eclampsia consisted of bed rest, anti-hypertensive drugs (Hydralazine, Methyl dopa) and sedatives (Diazepam) as determined by the patient’s clinical condition.

Following delivery of the neonate, the umbilical cord was clamped and this was followed by delivery of the placenta at the appropriate time. The placenta with all its membranes was weighed and recorded.

The corresponding birthweight of each baby was measured to the nearest 50g using a Waymaster Weighing Scale and the value obtained was recorded. From the weights obtained, the relative placental weight was calculated using the formula:

$$\text{Relative placental weight} = \frac{\text{Placental weight}}{\text{Birthweight of baby}} \times 100$$

The relative placental weight was categorized into two groups; those equal or less than 15% and those greater than 15%. Blood glucose measurement was performed for each neonate three times daily for the first three days of life, using a Glucometer (Acutrend meter product 128485 with glucose test strips) which display results in mmol/L. Neonates whose blood glucose concentration was less than 3.0mmol/L had their blood glucose concentration confirmed in the central laboratory of the hospital, using the standard glucose-oxidase-peroxidase method [17]. If there was a single blood glucose concentration with value less than 2.0mmol/L, the tests were continued for at least one day after the blood glucose concentration has returned to normal or after the therapy had been discontinued. At the time of this study, breast feeding in the neonatal unit/newborn nursery of the hospital was routinely started about 1-2 hours after birth. Some of the babies were given pre-lacteal 5% glucose orally. When the blood glucose concentration of a neonate was less than 1.6mmol/L or a neonate was symptomatic (irrespective of blood glucose concentration), intravenous administration of 10% dextrose in water was started immediately. To ensure reliability of the results, discoloured strips were not used and care was taken to avoid contamination with alcohol skin-cleansers. It was also ensured that the drop of blood covered the whole surface of the test-pad. The packed cell volume of each of the study
neonates was also determined. The Chi-square test and Z-score test were used in ascertaining the significance of differences in proportions with the p-value set at <0.05.

RESULTS:
Seventy one (5.2%) of the 1,360 pregnancies delivered in the hospital during the one-year study period were complicated by pre-eclampsia. Clinical data of the mothers with pre-eclampsia are shown in Table 1. The distribution of cases into subgroups of mild, moderate and severe did not differ in relation to maternal parity. Two (2.8%) of the 71 neonates delivered by pre-eclamptic mothers were stillborn, leaving 69 live-born babies whose data were further analysed. The frequency of delivery of neonates with birthweight less than the 10th percentile increased with the severity of maternal pre-eclampsia (Table 2); \(X^2=5.26\) p>0.05. As shown in Table 3, the relative placental weight was greater than 15% in majority of cases. The severity of maternal pre-eclampsia did not influence the relative placental weight (Table 3).

### Table 1: Clinical data of mothers according to severity of pre-eclampsia

<table>
<thead>
<tr>
<th>Severity of pre-eclampsia</th>
<th>Percent (n)</th>
<th>Mean age in Years</th>
<th>Maternal Parity in percent (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Para zero</td>
</tr>
<tr>
<td>Mild</td>
<td>42.3 (30)</td>
<td>24.7</td>
<td>44.7 (17)</td>
</tr>
<tr>
<td>Moderate</td>
<td>23.9 (17)</td>
<td>26.3</td>
<td>23.7 (9)</td>
</tr>
<tr>
<td>Severe</td>
<td>33.8 (24)</td>
<td>26.8</td>
<td>31.6 (12)</td>
</tr>
<tr>
<td>Total</td>
<td>100 (71)</td>
<td>25.4</td>
<td>100 (38)</td>
</tr>
</tbody>
</table>

### Table 2: Distribution of birthweight percentile of neonates according to severity of maternal pre-eclampsia.

<table>
<thead>
<tr>
<th>Severity of Pre-eclampsia</th>
<th>Number of neonates</th>
<th>Birthweight of infants by percentile (%) (n of neonates)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>&lt;10th</td>
<td>10 – 90th</td>
</tr>
<tr>
<td>Mild</td>
<td>29</td>
<td>13.8 (4)</td>
<td>75.9 (22)</td>
</tr>
<tr>
<td>Moderate</td>
<td>17</td>
<td>17.6 (3)</td>
<td>82.4 (14)</td>
</tr>
<tr>
<td>Severe</td>
<td>23</td>
<td>39.1 (9)</td>
<td>60.9 (14)</td>
</tr>
<tr>
<td>Total</td>
<td>69</td>
<td>23.2 (16)</td>
<td>72.5 (50)</td>
</tr>
</tbody>
</table>
Table 3: Distribution of relative placental weight according to severity of maternal pre-eclampsia.

<table>
<thead>
<tr>
<th>Severity of pre-eclampsia</th>
<th>Number (n) of mothers</th>
<th>Percent (n) of Relative placental weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>≤15%</td>
</tr>
<tr>
<td>Mild</td>
<td>30</td>
<td>13.3 (4)</td>
</tr>
<tr>
<td>Moderate</td>
<td>17</td>
<td>23.5 (4)</td>
</tr>
<tr>
<td>Severe</td>
<td>24</td>
<td>20.8 (5)</td>
</tr>
<tr>
<td>Total</td>
<td>71</td>
<td>18.3 (13)</td>
</tr>
</tbody>
</table>

Table 4: Frequency of neonatal hypoglycaemia according to relative placental weight.

<table>
<thead>
<tr>
<th>Relative placental weight</th>
<th>Blood glucose concentration (mmol/L)</th>
<th>% (n) of neonates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;1.6</td>
<td>1.6 – 2.5</td>
</tr>
<tr>
<td>≤15% (n = 13)</td>
<td>30.8 (4)a</td>
<td>38.4 (5)c</td>
</tr>
<tr>
<td>&gt;15% (n = 56)</td>
<td>10.7 (6)b</td>
<td>32.1 (18)d</td>
</tr>
<tr>
<td>Total (n = 69)</td>
<td>14.5 (10)</td>
<td>33.3 (23)</td>
</tr>
</tbody>
</table>

p-values: a vs b >0.05, c vs d >0.05

Table 5: Distribution of relative placental weigh among normoglycaemic and hypoglycaemic neonates of mothers with pre-eclampsia.

<table>
<thead>
<tr>
<th>Relative placental weight</th>
<th>Category of neonates</th>
<th>% (n) of neonates</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Normoglycemic</td>
<td>Hypoglycaemic</td>
<td></td>
</tr>
<tr>
<td>≤15% (n = 13)</td>
<td>30.8 (4)</td>
<td>69.2 (9)</td>
<td></td>
</tr>
<tr>
<td>&gt;15% (n = 56)</td>
<td>57.1 (32)</td>
<td>42.9 (24)</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>Total (n = 69)</td>
<td>52.2 (36)</td>
<td>47.8 (33)</td>
<td></td>
</tr>
</tbody>
</table>
The mean age of the neonates at the time of determination of the first blood glucose concentration was 2.3±0.6 hours (95% Confidence Interval, CI = 2.1-2.5). A total of 33 (47.8%) neonates born to mothers with pre eclampsia had at least one blood glucose concentration less than 2.6mmol/L (neonatal hypoglycaemia). Of the 69 neonates, 10 (14.5%) had at least one blood glucose concentration less than 1.6 mmol/L (severe neonatal hypoglycaemia). In addition, 8 (11.6%) neonates had 2 or more blood glucose concentration between 1.6 and 2.5 mmol/L and 15 (21.7%) had only one blood glucose concentration between 1.6 and 2.5 mmol/L.

Of the 33 hypoglycaemic neonates, 18(54.5%) were diagnosed in the first 12 hours of life and 25 (75.8%) were diagnosed during the first 24 hours of life. Although the prevalence of neonatal hypoglycaemia was higher among infants associated with relative placental weight equal or less than 15%, the difference was not statistically significant Z-statistic=1.83 p>0.05(Table 5). Similarly, the severity of hypoglycaemia did not correlate with relative placental weight Z-statistic: a versus b=1.49 p>0.05, c versus d= 0.22 p>0.05 (Table 4). The glucose values obtained using the Acutrend glucometer correlated well with values obtained from the central laboratory. Only 5(15.2%) of neonates with hypoglycaemia were symptomatic. The symptoms observed were poor feeding (3 cases), lethargy (3 cases), jitteriness (2 cases) and circumoral pallor (1 case).

DISCUSSION:
The overall prevalence (47.8%) of neonatal hypoglycaemia found in this study was lower than the 64.9% reported from Oulu, Finland [18], but higher than 38.0% reported from Nepal [2]. Although the same methodology and definition were used in the present study and in the Nepalese study, the study population in the later was not at risk of hypoglycaemia which may explain the lower prevalence reported in that study [2]. With regard to the higher prevalence rate reported in the Finnish study compared to the present study, one possible explanation might be the differences in feeding practices in the immediate postnatal period.

Breast feeding of the newborn infant routinely commenced within 1 to 2 hours after birth in our hospital compared to 24 hours after birth in the Finnish hospital [18]. The pattern of breast feeding practice has been variously shown to influence the prevalence of neonatal hypoglycaemia, (19, 20) a finding attributed to the ketogenesis-promoting property of breast milk [21]. In addition, skin-to-skin contact with the mother during breast feeding facilitates stable temperature and blood glucose for the neonate [22, 23].
Data from the present study showed that majority of mothers with pre-eclampsia, had relative placental weight greater than 15%, suggesting minimal placental growth retardation. The relative placental weight did not differ with the severity of the maternal pre-eclampsia. Similar finding was reported in the Finnish study [18].

In the present study, although the prevalence of neonatal hypoglycaemia was higher among neonates associated with relative placental weight equal or less than 15%, it was not statistically significant. Similar finding has been reported from Oulu, Finland [18]. Among the hypoglycaemic neonates born to mothers with pre-eclampsia, the severity of the hypoglycaemia did not differ with the relative placental weight. This may be explained, as documented by Benirchke et al [13] that the placental pathological features are not all invariably present. Although the number of neonates with symptomatic hypoglycaemia was small, the two leading symptoms of were poor feeding and lethargy. A study from India has reported a similar finding [24].

In conclusion, newborn infants of mothers with pre-eclampsia were at increased risk of hypoglycaemia, particularly in the first 24 hours of life but the prevalence of hypoglycaemia did not differ significantly with the relative placental weight.

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CASE REPORTS

A RARE CASE OF GINGIVAL CYST OF INFANT OCCURRING IN A BABY AGE FOUR MONTHS

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[Running title: Gingival cyst of infants]

ABSTRACT:
Gingival cyst of infant is an odontogenic cyst. It is developmental in nature. It arises from the epithelial remnant of dental lamina called cell rests of Serres. The Gingival cyst may appear within three months of age. Clinically it appears on the maxillary and mandibular ridges, and appears creamish white in color. The cyst usually does not need treatment because it tends to undergo involution and disappears. We present a case report of a solitary gingival cyst observed in a baby age four months.

Key words: Gingival cyst, dental lamina, alveolar cyst.
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INTRODUCTION:
Gingival cyst of an infant is derived from the remnant of the dental lamina. The cyst may be solitary or many in numbers. The Gingival cysts are seen in the anterior part of the alveolar ridge. The cysts are usually present during the time of birth and rarely seen after three months of age [1]. They regress spontaneously, so no treatment is usually required [2].

Case report:
A four months old male infant reported to the private clinic with a small nodule in the upper gum pad on the right lateral incisor region. Mother said she noticed it one day before when
The child was crying. It was asymptomatic and did not interfere with feeding. On examination, a solitary whitish papule measuring about 0.5 cm in diameter was present on the maxillary alveolar ridge on the right lateral incisor region. It was firm in consistency, non tender and mucosa over the lesion was smooth. Based on the history and clinical examination, a provisional diagnosis of gingival cyst of infant was made. Biopsy of the lesion could not be carried out as parents were not keen on it. The infant was kept under observation. The lesion regressed by itself after three months without any treatment.

The ethical clearance for the publication of the case report was obtained from the concerned authority.

**DISCUSSION:**

Gingival cysts of infant are small, superficial, keratin filled cysts that are found on the alveolar ridge. They originate from the dental lamina. The cyst is lined by thin epithelium and the lumen is filled with desquamated keratin, occasionally containing inflammatory cells [3]. Since they regress on their own by rupture, the lesion may go unnoticed or not sampled for biopsy. They are small, whitish papules on the alveolar ridges or on the palate. Based on the location they are classified either as ‘palatal’ or as ‘alveolar’ cysts [2]. Usually multiple cysts are present with each measuring not more than 3.0mm in diameter. Involvement of maxillary ridge is more common than mandibular ridge. Occasionally these cysts appear on the mandibular anterior ridge of newborn and misdiagnosed as natal teeth [2]. In the present case report the gingival cyst was a whitish papule measuring about 3.0mm on the maxillary ridge in the lateral incisor region. Majority of these type of cysts degenerate and involutes or rupture in to oral cavity within two weeks to five months of age [4,5]. But in our case the cyst was noticed only at four months of age and disappeared when the child was seven months old. Even though, the gingival cyst of infant is of little pathologic significance, it has to be diagnosed to avoid unnecessary therapeutic procedures and parents should be reassured.

**REFERANCES:**

LICHENOID REACTION ASSOCIATED TO AMALGAM RESTORATION: A CASE REPORT

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*Corresponding Author: Email: endopradeep@gmail.com.

ABSTRACT

Lichenoid amalgam restoration also known as amalgam associated oral lichenoid reaction, is an uncommon allergic reaction following long-term exposure to dental amalgam restorations. This is a case of oral lichenoid reaction associated to amalgam restorations in a 34 year-old male patient. He presented with a whitish discoloration on his left lower buccal mucosa seven months after a non-contributory medical and dental history. On examination, the presence of class I (buccal pit) silver amalgam restorations in relation to left Mandibular first and second molars was observed. Management included removing the amalgam restoration and using composite resin as a substitute. After 40 days, complete healing was observed. This case was reported from Yenepoya dental college, Mangalore, India.

Key words: Oral lichenoid reaction, Amalgam restorations, composite resins.

Received: June 2011; Accepted August 2011

INTRODUCTION:

Silver amalgam has been used as a dental restorative material for more than 150 years. Even today, with the advent of new synthetic non-metallic materials and novel time-saving procedures, silver amalgam is the most widely used and cost-effective dental material in restorative dentistry. Its superior compressive strength and minimal technique sensitivity makes it an ideal material for posterior restorations and core build ups [1]. In addition to corrosion and metallic colour, amalgam has got a major disadvantage [1]. Amalgam fillings are in direct contact with the oral mucosa and may directly alter the antigenicity of basal keratinocytes by the release of mercury and other metal salts as corrosion products [2,3,4]. In susceptible individuals, therefore, amalgam fillings may induce amalgam-contact hypersensitivity lesions (ACHL) with features similar to oral lichen planus (OLC). Such lesions are likely to occur on mucosal surfaces.

The ethical clearance for the publication of the case report was obtained from the Yenepoya University Ethics Committee.

**Case report:**
A 35 year-old male patient reported to the Department of Conservative Dentistry and Endodontics, Yenepoya Dental College and Hospital, Mangalore with a chief complaint of whitish discoloration on his left buccal mucosa since seven months with a non-contributory medical and dental history. On detailed hard tissue examination, the presence of class I (buccal pit) silver amalgam restorations in relation to left Mandibular first and second molars was observed. On further detailed soft tissue examination of the entire oral cavity, an unilateral whitish discoloration of the buccal mucosa was also observed in relation to the left mandibular teeth, extending from mandibular second molar to first premolar [Figure 1].

![Figure 1: Buccal pits of left lower mandibular first and second molar teeth and white keratotic patch seen on the buccal mucosa](image)

The Patient gave a dental history of undergoing silver amalgam restorations of his decayed teeth in relation left mandibular first and second molars a year back with no presence of any other decayed or restored teeth in the oral cavity.
The whitish discoloration was diagnosed as a reaction of the oral mucosa to silver amalgam restorations – Lichenoid reaction.

The management was for the replacement of silver amalgam restorations with composite resin. Amalgam restorations were removed using a high speed rotary handpiece with a round bur following the occupational and safety health administration (OSHA) regulations. After removal of the entire amalgam restorations, Glass ionomer cement (Fuji II) was placed as base on the pulpal floor and was temporarily restored with Zinc Oxide eugenol cement. The whole procedure was done in a dental clinic as outpatient procedure. On the following day the temporary restoration was removed leaving behind the Glass ionomer cement. The tooth was etched using 37.0% phosphoric acid for 15 sec followed by application of dentin bonding agent and curing. Composite restoration was done by incremental layer technique and curing for 30sec. Finishing and polishing (silicon carbide stone & alpine stone, sofelex disc) of the restoration was done after a week. The patient was recalled once in every 10 days for a period of one month. After a time period of 30 to 40 days there was a total disappearance of the lichenoid reaction and the patient was followed up for a period of six months with no recurrence seen [Figure 2].

Figure 2: After 40 days – Total disappearance of the Lichenoid reaction
DISCUSSION:
Oral mucosal lesions related to dental restorative materials may be caused by delayed cell-mediated hypersensitivity reactions [10]. In the present case histopathological examination was not done, because it is an invasive procedure; the intention was to use a more conservative approach for the management of the patient.

The most common contact lesions of the oral mucosa due to metal hypersensitivity are caused by nickel or chromium in orthodontic appliances or frame-work for partial dentures [11]. A review of cases reported as Mercurial hypersensitivity from mercury exposure in dentistry has been given by Bauer and First [12]. Accumulations of mercury have been found in lysosomes of macrophages and fibroblasts of submucous connective tissue of contact lesions, and also in normal mucosa [1]. There seems to be a great discrepancy in the manifestation of the incidence of hypersensitivity reactions inherent with the use of amalgam restorations as treatment of choice for the restoration of carious teeth [10].

Wong and Freeman [13] in their study confirm the mercury allergy is a factor in the pathogenesis of oral lichenoid reaction and healing of oral lichenoid reaction after replacement of amalgam restorations with Glass ionomer or composite resin.

It has been proposed that hypersensitivity to mercury from corroding amalgam fillings plays an important part in the etiology of oral lichen planus [14]. Some studies have demonstrated hypersensitivity to mercury among 16.0-62.0% of patients with oral lichen planus, whereas mercury hypersensitivity has been found in 1.0-4.0% in the general population of Sweden [14]. Only in 10.0% of the patients the mucosal affections disappeared after replacement of type II glass ionomer cements or composite resins [14]. Further, the presence of lichen planus on the oral mucosa may well render the patients more susceptible to mercury hypersensitivity because of the increased penetration of the affected oral mucosa by mercury [14].

A recent study demonstrated a different response of lichenoid mucosal lesions to replacement of amalgam fillings depending on the extensions of the lesions: those lesions, denoted contact lesions, which were confined to the area of contact with amalgam showed a total or almost disappearance without recurrence after replacement, whereas lesions exceeding the contact zone showed minor changes only [15].

In Conditions like lichenoid reactions secondary to silver amalgam restorations, using composite restoration having added advantages like good aesthetic and wear resistance properties compare to other restorative materials.
CONCLUSION:
Silver amalgam has been used as a dental restorative material for more than 150 years. Even today, with the advent of new synthetic tooth coloured materials, silver amalgam is the most widely used and cost-effective dental material in restorative dentistry. Local allergic reactions are rare, and when they occur, they can be eliminated by substitution with glass ionomer or composite resin. In the present case, the tissue becomes normal within 40 days after the buccal amalgam restorations were removed. The present article gives information about allergic reactions related to silver amalgam restorations and its managements.

REFERENCES

DIVERSE FORMS OF GINGIVAL ENLARGEMENT – REPORT OF TWO CASES

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*Corresponding Author: Email - dr.sabakhan23@gmail.com.

ABSTRACT:
Gingival hyperplasia (GH) is an increase in the gingival height or mass due to proliferation and thickening of gingiva. Gingival hyperplasia represents an over-exuberant response to certain inflammatory and genetic factors, drugs, systemic diseases, neoplasms. Hereditary gingival fibromatosis (HGF) is a rare oral disease, affecting only one in 750,000 people. It is characterized by a slow and progressive enlargement of both maxilla and mandibular gingiva. It usually develops as an isolated disorder, but can be one feature of a syndrome. Drug induced gingival enlargement is frequently observed as a side effect with the use of several medications in the susceptible patients. These reports address the diagnosis, treatment and follow up of two separate cases of gingival enlargement.

Keywords: gingival hyperplasia, hereditary gingival fibromatosis, drug induced gingival enlargement.

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INTRODUCTION:
Gingival hyperplasia is the increase in size of the gingiva resulting from proliferation of its cellular elements [1]. The clinical features of gingival enlargement depend on the etiologic factors and the pathological processes associated with it. Gingival enlargements are broadly classified into inflammatory, fibrotic and combination of these two. The main etiologic factors are inflammation, genetic factors, drugs, systemic diseases and neoplasms [2,3]. Inflammatory gingival enlargement can be caused by prolonged exposure to dental plaque, which may occur due to poor oral hygiene. In puberty and pregnancy, hyperplasia of the gingival tissues may be due to poor oral hygiene, inadequate nutrition, or systemic hormonal stimulation [4]. Fibrotic gingival enlargement is a non-inflammatory type of enlargement seen in hereditary and drug induced forms. It is neither hypertrophy nor hyperplasia. Increase in the intercellular matrix
is responsible for the enlargement. Hereditary gingival enlargement is rather rare but the drug induced enlargement is much more common [5].

Gingival enlargement is the preferred term for all medication-related gingival lesions previously termed “gingival hyperplasia” or “gingival hypertrophy” [6]. Drug induced gingival enlargement is frequently observed as a side effect with the use of several medications in the susceptible patients. Drugs associated with gingival enlargement can be broadly divided into three categories: anticonvulsants, calcium channel blockers, immuno-suppressants [6].

Hereditary gingival fibromatosis (HGF) is a rare condition characterized by a proliferative fibrous overgrowth of the gingival tissues. It usually develops as an isolated disorder but can be one of the features of several multisystem syndromes [7]. The syndromic characteristics most commonly seen in association with HGF are hypertrichosis, mental retardation, epilepsy [7]. HGF is an autosomal dominant disorder with a high degree of penetrance, although recessive forms are also described in literature [8]. Males & females are equally affected as a phenotype frequency of 1:175,000 and a gene frequency of 1:350,000 [8]. Here we are presenting two case reports of gingival enlargement, one with hereditary cause and another induced by the drug amlodipine.

**CASE REPORT 1**

A 21-year-old female presented with a complaint of excessive swelling of the gums and bleeding while brushing. The swelling caused difficulties in mastication and phonation and significant esthetic problem. Besides these, no other complains of pain, inflammation, discharge or halitosis were present. Patient remembered having the enlargement since childhood. She did not give a history of taking any drugs known to cause gingival enlargement. The patient gave a history of her brother (35 years) having a similar gingival enlargement, which was later confirmed on his examination. Intra oral examination of the patient revealed uniform, generalized and severe gingival overgrowth involving buccal and lingual tissues of both mandibular and maxillary arches with morphologically normal teeth. The tissue covered the crowns of the teeth till middle 1/3rd (Figure. 1). The gingival surface was pink, firm, granular and pebbled with abundant stippling. No acute inflammatory signs were present. Moderate local deposits were present. Routine blood investigations showed normal values. Panoramic radiograph revealed bone resorption, more severe in respect to the mandibular teeth’s indicating periodontitis (Figure. 2). A incisional biopsy was performed and it was confirmed as gingival fibromatosis. Thus a diagnosis of hereditary gingival
fibromatosis was made based on absence of drug history, positive familial history, clinical and histopathological features. Gingivectomy procedure with periodontal pack placement was done over duration of two weeks. Instructions were given to the patient to strictly maintain the oral hygiene. After the last gingivectomy procedure the patient returned for post surgical follow up after one month (Figure. 3). Patient was advised for routine scaling and oral prophylaxis procedure once in every six months. The ethical clearance for the publication of the case report was obtained from the concerned authority.

CASE REPORT 2:
A 40 year old female patient reported to our department with a chief complaint of enlarged gums in the upper and lower front and back teeth region noticed since 1 year. Initially there was small bead-like nodular enlargement of the gums that gradually progressed to the present size covering almost the entire front teeth. Enlargement was associated with intermittent pus discharge, bleeding and difficulty in chewing food. Her past medical history revealed that the patient was on Amlodipine 5 mg taking once daily since 2 years. On intraoral examination, marginal, attached and interdental gingival enlargement was well appreciated covering almost coronal one-third of maxillary and mandibular teeth and is extending to the lingual and palatal mucosa. Gingiva was pink in colour with erythematous area in relation to maxillary left lateral incisor and has lobulated surface. Margins of the gingiva were rolled out with normal gingival scalloping. On palpation, gingiva was firm and resilient in consistency. Hypertrophied areas were painless and did not bleed on touch. Poor oral hygiene status of the patient was assessed from the presence of local irritating factors contributing to the mild inflammatory component of the gingival enlargement (Figure. 4). Patient was subjected to complete hemogram and all the parameters were found to be within normal range. Orthopantomograph revealed complete set of dentition with generalized horizontal bone loss (Figure. 5). On the basis of the patient's history and clinical features, a clinical diagnosis of amlodipine induced gingival overgrowth (AIGO) was made. Patient was subjected to gingivectomy procedure and was recalled for follow up after a month (Figure. 6). Patient's physician was consulted regarding drug substitution or withdrawal of the drug. Patient was instructed to maintain good oral hygiene with the use of chlorhexidine oral rinses.
Figure 1: Hereditary gingival enlargement in relation to maxillary and mandibular gingiva.

Figure 2: Orthopantomogram showing generalized horizontal bone loss in hereditary gingival enlargement.

Figure 3: Post operative - after gingivectomy procedure in hereditary gingival enlargement

Figure 4: Amlodipine induced gingival enlargement of marginal, attached gingival, interdental papilla.

Figure 5: Orthopantomogram showing generalised horizontal bone loss in Amlodipine induced gingival enlargement.

Figure 6: Post operative - after gingivectomy procedure in Amlodipine induced gingival enlargement.
DISCUSSION:
This report documents two cases of gingival enlargements due to two different etiologies. Gingival enlargements have hereditary and acquired forms, causes of which are inflammation, leukemia, use of medication such as phenytoin, cyclosporine & calcium channel blockers [9].

HGF can be inherited as an autosomal dominant or recessive condition. Autosomal dominance in a four-generation pedigree with 50 of 105 at risk of developing gingival fibromatosis was reported by Bozzo et al [10]. According to Bitten court et al [11], this anomaly is classified in two types according to its form. The nodular form is localized and characterized by presence of multiple enlargements of gingival. The symmetric form is most common type and results in uniform gingival enlargement as was seen in the present case. The enlargement usually begins at time of eruption of permanent dentition and rarely develops with eruption of deciduous dentition. Fletcher reported that the enlargement progresses rapidly during “active” eruption and decreases with end of this stage [12]. He also stated that presence of teeth appears to be necessary for HGF to occur as the condition is not seen before eruption of teeth and disappears with loss of teeth. It is accepted that HGF is a disease of genetic origin. Some authors report increase in proliferation of fibroblasts, collagen synthesis and elevated matrix metalloproteinase’s while others suggest a decrease in collagenase activity [13]. A gene locus for hereditary gingival fibromatosis has been localized to the 37CM genetic interval on chromosome 2p 21-p22 flanked by D2 S1788 and D2S441 [13].

Calcium channel blockers are considered potential etiologic agents for drug-induced gingival hyperplasia. Although the incidence of nifedipine-induced gingival hyperplasia is about 10%, very few reports of amlodipine-related gingival hyperplasia have been reported in the literature [6]. The prevalence rate of gingival enlargement in patients taking amlodipine is found to be 3.3% [14]. Because only a subset of patients treated with this medication will develop gingival overgrowth, it has been hypothesized that these individuals have subsets of fibroblasts with an abnormal susceptibility to the drug. It has been showed that fibroblast from overgrown gingiva in these patients are characterized by elevated levels of protein synthesis, most of which is collagen [15]. Most types of pharmacological agents implicated in gingival enlargement have negative effects on calcium ion influx across cell membranes, thus it has been postulated that such agents may interfere with the synthesis and function of collagenases, thereby inhibiting collagen degradation [16]. Several factors such as age, genetic predisposition, pharmacokinetic variables, and alteration in gingival connective tissue homeostasis, histopathology, ultrastructural factors, and inflammatory changes may influence the
relationship between the drugs and gingival tissues.

CONCLUSION:
The above case reports outline the two forms of gingival enlargements, their identification and diagnosis. Gingival hyperplasias have potential cosmetic implications and also provide new niches for the growth of microorganisms, which is a serious concern for both the patients and oral diagnostician

REFERENCES:
TOBACCO INDUCED LICHENOID REACTION

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ABSTRACT:

The oral mucosa may present clinical features of a certain conditions similar to those observed in lichen planus called lichenoid reaction. The pathological feature resembles that of lichen planus. The pathologist requires the indication of a cause – effect relationship by the clinician in order to provide a diagnosis of lichenoid reaction. This condition is treated by removal of the causal factor. Here we report a case of lichenoid reaction due to tobacco chewing habit in an 30 year old male patient. This case was reported from Yenepoya dental college, Yenepoya University, Mangalore, India.

Key Words: Lichenoid reaction, tobacco, habits.

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INTRODUCTION:

The oral mucosa may present different types of clinical and microscopic alterations similar to Lichen planus. One such condition is called as lichenoid reaction. These conditions are triggered by various systemic or topical causative agents. The etiology of Lichenoid reaction is related to the contact with specific agents, such as restorative materials, drugs, and tobacco habits [1]. One such sensitivity reaction is known as lichenoid reaction. The first microscopic features are discussed in 1973 and term lichenoid reaction was introduced in 1986 [2,3]. He described the features as destruction of basal cell layer due to hydropic degeneration causing consequent interruption in the basal membrane Pathologists use the terms “lichenoid mucositis” or “chronic mucositis with lichenoid features”. The reason for this is because there are not enough distinctive features that make the lichenoid reaction a definitive diagnosis for true lichen planus. Therefore, the diagnosis may be lichen planus or a lichenoid reaction depending upon how clearly consistent the features may be in a tissue sample [4].
The ethical clearance for the publication of the case report was obtained from the Yenepoya University Ethics Committee.

**Case report:**
A 30-year-old male patient presents with a complaint of burning sensation of left buccal mucosa of 1 month duration. Personal history indicates that he has habit of chewing areca nut since last two years. Frequency of the chewing habit was four to five quids per day. He usually keeps the betel quid in the left buccal sulcus approximately two to three hours after chewing.

On examination an erythematous area interspersed with white striac and blackish pigmentation was observed on the left buccal mucosa [Figure 1]. The lesion was non scrapable and tested negative for Candida. A provisional diagnosis of Tobacco induced Oral Lichenoid Reaction was made. Habit counselling was done and the patient was advised to stop the quid chewing habit. The patient was asked to report back two weeks later. He reported with a relief of symptoms. Another review conducted after 3 months showed complete clinical healing of the lesion.

![Figure 1](image1.png)

**Figure 1** – White striations and pigmentation with eroded areas on the left buccal mucosa

**DISCUSSION:**
Few lichenoid reaction cases are reported due to the contact of cobalt, nickel, gold, palladium, due to corrosion of the amalgam restorations and after placement of orthodontic arch-wires [5,6]. Few studies also suggested lichenoid reactions with a characteristic microscopic aspect associated with the habit of chewing gum or eating candies with cinnamon flavor, with disappearance of symptoms when the habit was discontinued [1]. Tobacco induced lichenoid lesions are mostly involving buccal mucosa or the tongue and they are unilateral in nature because these are the
sites of betel quid retention. These lesions usually resolve after cessation of the habits. Lichenoid reaction is a mucocutaneous condition with multiple etiologies ranging from silver amalgam contact to quid chewing habit. Accurate identification of the etiologic agent helps in arriving at the appropriate diagnosis and hence is considered to be most important factor in treatment planning.

REFERENCES:

Letter to the Editor:

ORAL FINDINGS IN ISOLATED GLOSSOPHARYNGEAL PALSY

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Dear Editor, Glossopharyngeal nerve is the IX cranial nerve, which helps in palatal movement, as it innervates the stylopharyngeus muscles (has role in elevation of the pharynx), whose damage can result in a complication knows as glossopharyngeal nerve palsy [1].

Here we report a case of isolated glossopharyngeal nerve palsy, following tonsillectomy.

A 24-year-old man reported to the out patient department of a dental college in Mangalore, with the chief complaint of difficulty in swallowing. He denied any history of trauma but gave us the history of tonsillectomy three years back. Clinical examination showed incomplete elevation of the soft palate on the right side. There was absence of gag reflex and uvular deviation was seen to the right [Figure 1].

Figure 1: Uvular deviation seen towards the right side
No facial palsy, diplopia, nor any evidence of motor weakness or sensory deficit. Deep tendon reflex of jaw, limbs was normoflexive and symmetric.

We present a case report and proposing an anatomic explanation for a rare complication of dysphagia following tonsillectomy, caused by paralysis of glossopharyngeal nerve.

The mean distance between postero-superior tonsillar fossa and the main trunk of glossopharyngeal nerve is 10.7mm and the mean distance from the postero-inferior tonsillar fossa and the closest lingual branch of the nerve is 6.5mm [2].

Direct nerve injury seems to be the most plausible explanation for this rare complication. The proximity of the nerve to the tonsillar fossa emphasizes the importance of maintaining the correct surgical plane during surgery [2].

Occipital condyle fracture, bulbar palsy, traumatic dissection of internal maxillary artery and compression of the nerve by rheumatoid pannus can be associated with isolated glossopharyngeal palsy [3, 4, 5].

Due to widespread practice of tonsillectomy, students of health sciences and practitioners should be taught on this entity and should be trained to maintain a proper surgical plane during tonsillectomy so as to prevent any damage to glossopharyngeal nerve.

Patient consent and the ethical clearance from the concerned institution were obtained for the above report.

REFERENCES

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