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Antibiotics usage among Patients attending Dental Clinic at Kampala International University Teaching Hospital, Uganda.

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ABSTRACT

Antibiotics are the most used medicines in dental practice and are used regularly for the management of oral and dental infection that originates from odontogenic infections, however there is inappropriate use of antibiotics that result into gastrointestinal disturbances to fatal anaphylactic shock and development of resistance. The sampling was done at Kampala International University Teaching Hospital (KIU-TH) employing simple random sampling; informed consent was sought from the patient and health workers at the dental clinic. Signs and symptoms obtained in dental cases tooth ache at 43.16% was the most common symptom followed by painful chewing at 30.55% and others at 13.88%. The most used antibiotics were amoxicillin at 45.83%, metronidazole at 26.4%, clindamycin at 12.5% and others. The indications of antibiotics was majorly for odontogenic infections at 41.67% followed by prophylaxis of local infection like tumor surgery, tooth extraction at 33.33% and prophylaxis of infective endocarditis. Some indications found in the study include odontogenic infections, non odontogenic infections, prophylaxis of infective endocarditis, prophylaxis of local infections where it also identifies common antibiotics used such as amoxicillin, metronidazole, clindamycin, macrolides, among them and also the symptoms such as painful chewing, fever, toothache and swollen gums which are tender. Appropriate antibiotic and prescription of antibiotics by dentists is urgently needed in view of the antibiotic resistance strains and occurrence of a biofilm of organisms in the oral cavity while combination therapy also works. Dental Infections, should first receive the appropriate local therapy with prevention which can sometimes be complemented with a systemic treatment with antibiotics. There is no literature to provide information about the antibiotic use at all levels.

Keywords: Odontogenic infections, Antibiotics, Dental infections, Amoxicillin, Metronidazole**.**

INTRODUCTION

Dental conditions presenting with most patients require surgery or invasive interventions such as extraction, scaling, pulpectomy or filling with subsequent administration of antibiotics. Whereas most dental conditions are not life threatening, there is a tendency to bombard with antibiotics. Prior to modern dental services, local procedures such as extraction were going on without serious complication. It is surprising that these procedures were done without administration of antibiotics or even proper postoperative instructions. It is believed that with modern knowledge in clinical managements of dental conditions, situations may exist to do away with away with antibiotics as long as the patient is proven not to be at risk of certain conditions such as rheumatic heart disease. Post-operative instructions such as warm saline water mouth wash, cotton pack in the socket for at least 30 minutes, not putting any thing in the socket, good oral hygiene and oral analgesics are sufficient. Antibiotic treatment is an aspect of pharmacotherapy with the particularity of affording both preventive and curative action. It was introduced in the mid-twentieth century in the form of sulfa drugs. Since then, people have focused much at clinical and pharmacological research, in response to the progressive challenges posed by bacterial infections: identification of new pathogens, the consolidation of new

diseases, and novel clinical situations (increase in chronic processes, survival of patients with disorders considered to be fatal.) [1].

Antibiotics are generally prescribed for acute episodes and for brief periods of time, while the most heavily consumed medicines are those prescribed for chronic processes (antihypertensive agents like beta brokers, hypolipidemic drugs like statins, antacids like magnesium hydroxide, anti-inflammatory drugs like steroids, bronchodilators.).Bacterial infections are common in dental and oral clinical practice; as a result, antibiotics use prescribed for their treatment is also frequent. In Spain, it has been estimated that odontogenic infections are the cause of 10% of all antibiotics prescriptions [2] by pharmaceutical specialties or drug products, amoxicillin and the associated amoxicillin-clavulanic acid accounted for 67.8% of all prescriptions and 59.4% of the global cost. The associated amoxicillin-clavulanic acid was the most frequently prescribed treatment, representing 38.7% of the prescriptions and 45.7% of the net cost. Spiramycin and the combination of spiramycin and metronidazole in turn accounted for 13.34% of the prescriptions and 10.2% of the global expenditure. Lastly, clindamycin represented 4% of the prescriptions and 4.2% of the costs. In total, three drug substances and two drug associations or combinations of the same three drug substances account for 95% of all antibiotic prescriptions made by dentists in the context of the public health care system, and 75% of the total antibiotic cost. The present study reviews antibiotics, used in dental practice, and contributes elements to favor the rational use of such medicines [3]. Dentistry is a comprehensive speciality devoted to resolving dental infections or restoring and rehabilitating tooth structure lost to such bacterial processes. The use of antibiotics is an integral part of dentistry and prescribing antibiotics is a privilege that must not be abused. Irrational use of antibiotics will lead to an increased burden on the patient and the society by increasing treatment costs, and adverse events. Abuse of Antibiotics has already been considered as a pandemic community issue by World Health Organization [4] whilst the abuse of antibiotics by dentists is a worldwide problem [5]. These oral infections can show themselves in an acute form (acute onset, quick evolution and evident signs and symptoms), or in a chronic form (slow onset and evolution showing less obvious signs and symptoms).They are classified as odontogenic and nonodontogenic. Odontogenic infections are the most frequent and begin affecting periodontal and dental structures. Non- odontogenic infections start in extra dental structures, such as mucous membrane, glands, tongue, [6]. About 10% of prescribed antibiotics are used for treating oral infections. Antibiotics prescribing may be associated with unfavorable side effects ranging from gastrointestinal disturbances to fatal anaphylactic shock [7].

Statement of Problem

Antibiotics are the most used medicines in dental practice [8] and are used regularly for the management of oral and dental infection that originates from odontogenic infections [10], however there is inappropriate use of antibiotics that result into gastrointestinal disturbances to fatal anaphylactic shock and development of resistance. The irrational use of antibiotics creates favorable conditions for resistant organism to appear and persist causing infections that do not respond to standard treatment [9]. The use of antibiotics in this way too, makes treatment expensive to the government and the patients especially the poverty stricken developing African countries [9]. A study at Sumba Mwanga government hospital dental department Tanzania showed that out of 4670 cases of dental conditions, 90% were for tooth extraction and discharged on antibiotics and analgesics [11]. Therefore this study will help to guide the stakeholders and policy makers in the formulation of prescribing guidelines in Uganda and Bushenyi Ishaka municipality thus at dental clinic in Kampala International University Teaching Hospital.

Justification of the Study

There is need to minimize the frequent use of antibiotics in situations where it is avoidable in order to protect them from resistance of microbes. Prescribing guidelines in the propers use of antibiotics should be advocated for to reduce government's expenditure of limited resources in poor African countries like Uganda. Thus at Kampala International University Teaching Hospital and is Further intended to provide data to other researchers who may pick interest in assessing antibiotics use in dental clinic. This prompted the researcher to carry out the study about the use of antibiotics in dentistry to provide adequate information about the subject.

Aim

Evaluation of the use of antibiotics among patients attending dental clinic at Kampala international university teaching Hospital.

Specific objectives

- To identify the clinical symptoms and signs commonly presented by the patients attending dental clinic at Kampala international university teaching hospital.
- To assess the commonly used antibiotics in dental clinic at Kampala international university teaching hospital.
- To determine the reasons as to why these antibiotics are used in dental clinic at Kampala international teaching hospital.

Research questions

- What are some of the presenting symptoms and signs for patients attending to dental clinic at Kampala International University Teaching Hospital?
- What antibiotics are commonly used in dental cases in dental clinic at Kampala
- Hospital?
- What are the reasons for the use of these antibiotics in dental clinic at Kampala International University Teaching

METHODOLOGY

Area of Study

The study was carried out in the dental clinic of KIU-Teaching hospital found in Ishaka- Bushenyi district. The clinic comprised of staff including dentists, dental intern doctors, and nurse. Ishaka is the largest town in Bushenyi district and it is located 75km by road, northwest of Mbarara, the largest city in the sub region. Ishaka Bushenyi municipality. The dominant tribe being Banyankole and others like Bakonjo, Batooro and Bakiga.

Study design

A cross sectional descriptive study was conducted, with involvement of quantitative methods of data analysis.

Study Population

The study population were all patients and health workers at dental clinic in KIUTH. The target population were the dental health workers and some patients who attend at dental clinic or admitted due to dental related conditions.

Sample size determination

A sample size of the study was determined by the formula cited by fisher *et al*.

n= desired sample size

$n = z^2pq/d2$

z = standard normal deviation usually set at 1.96

p = the proportion of study population that receive health services at KIUTH (95%) [12]

q = 1 – p

d = amount of error (0.05 level)

p=0.95, q=0.05, d=0.05

$n= (1.96)^2(0.95)\ (0.05)/\ (0.05)^2$

Selection criteria for the study.

Inclusion Criteria

Dental staffs on duty by that time were asked.

Patients who were attending for dental services and were initiated on antibiotic therapy.
Post-operative files were considered.

Exclusion criteria

Patients who were not initiated on antibiotic therapy

Quality control

The study instruments were pre-code and pre-test questionnaires, Interview tool guide and observational tool guide. Research Assistant was employed and trained by the researcher to collect data. The researcher code, all the participants and no names was needed during the study, Data that was collected from the study unit was recorded on the document by the researcher.

The questionnaires consisted of a close ended (Yes or No) and open ended questions. The researcher collected data by observation, interview of the selected participants and recording responses in the questionnaires, and the researcher checked for completeness of the questionnaires.

Sampling method for the study

The sampling was done at KIU-TH, employing simple random sampling; informed consent was sought from the patient and health workers at the dental clinic. Thereafter two lots containing yes and no for prospective participants to choose was made in order to determine who was to participate in the study; those patients that choose yes in the lot were subsequently recruited into the study.

Data analysis

The data was collected, sorted, tallied and presented inform of tables and figure to describe the magnitude of the assessment. The results were discussed in consistence with research questions and literature review.

Reliability and validity

Data collectors were trained.

Used language/terms that were easily understood by participants. The principal investigator supervised other researchers/data collectors. Only participants who were interested and able to give necessary information were allowed to participate in the study.

RESULTS

Social demographic characteristics of study population

From the study conducted, the following results were obtained from a sample of 72 patients who were attending at dental clinic with dental cases at KIU-TH Ishaka Bushenyi. A total of 72 patients who attended dental clinic at KIU-TH participated in the study in the month of April 2017. A greater proportion 32 (44.44%) of the patients who participated in the study were young adults in the interquartile range of 21-30. More females 50(69.44%) participated in the study and a high proportion 30(41.67%) attained education up to primary level.

Table 1: Social demographic characteristics of study population

VARIABLE	FREQUENCY	PERCENTAGE
Age n (%)		
Below 10	5	6.94
11-20	10	13.89
21-30	32	44.44
31-40	15	20.83
41 and above	10	13.89
Total	**72**	**100**
Sex n (%)		
Male	22	30.56
Female	50	69.44
Total	72	100
Educational level n (%)		
Primary	30	41.67
Secondary	24	33.33
Others	18	25.00
Total	**72**	**100**

Some of the signs and symptoms of dental cases

The study findings of some symptoms and signs that respondents shown with at the dental clinic due to infections with toothache at 31(43.05%), painful chewing at 22(30.55%), fever 3(4.16%), tender swollen gums 6(8.33%) and others at 10(13.88%) all out of 72 respondents.

Table 2: The symptoms and signs presented by patients who come with dental cases.

VARIABLE	FREQUENCY	PERCENTAGE
Symptoms		
Toothache	31	43.05
Painful chewing	22	30.55
Fever	3	4.16
Swollen gums	6	8.33
Others	10	13.88
Total	72	100

Some of the antibiotics used in dental cases.

Out of the 72 respondents, the study shows amoxicillin at 33(45.0%), metronidazole at 19(26.4%), clindamycin 9(12.5%) and others 11(15.27%) in dental clinic.

Table 3: Some of the antibiotics used and prescribed to patients in dental clinic

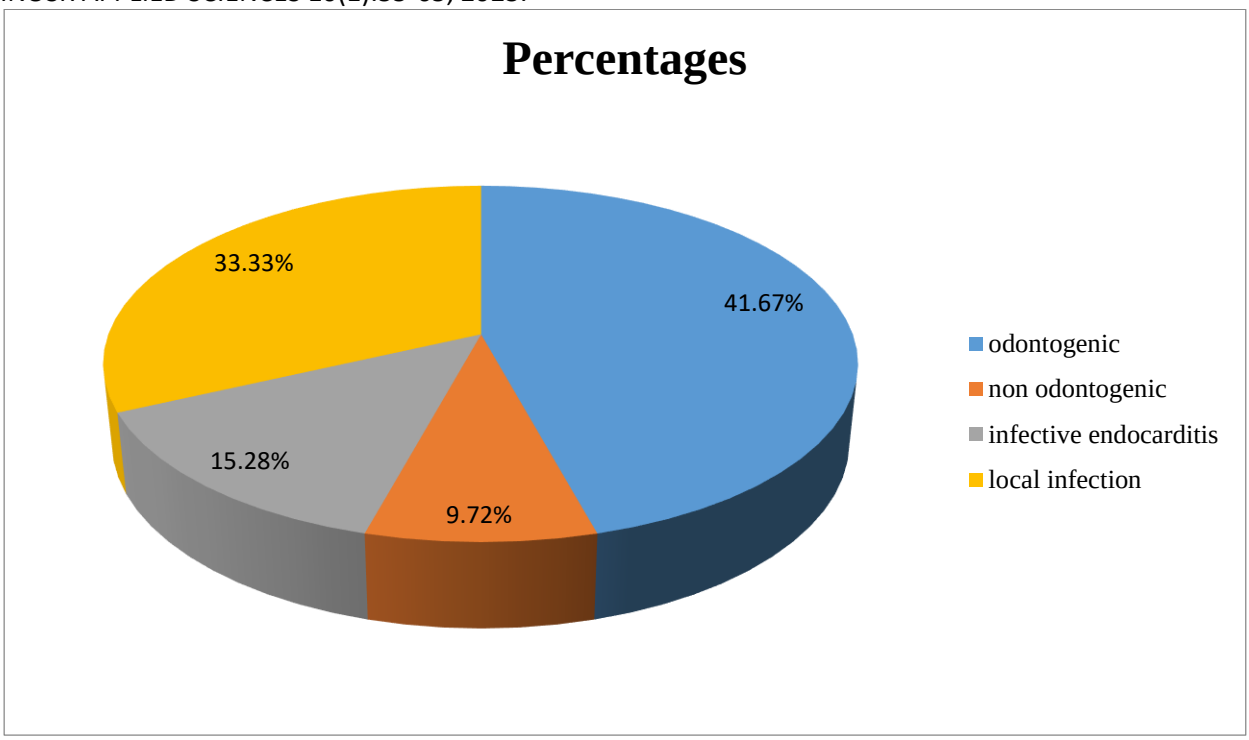
VARIABLE	FREQUENCY	PERCENTAGE
Antibiotics n (%)		
Clindamycin	9	12.5
Amoxicillin	33	45.83
Metronidazole	19	26.4
Others	11	15.27
Total	**72**	**100**

Indications of Antibiotics in Dental Clinic

Table 4; the table below shows some of the indications of the antibiotics in dental clinic at KIU-TH. The results got on the indications of some antibiotics in dental clinic with odontogenic infections at 30(41.67%), non odontogenic infections at 7(9.72%), prophylaxis of infective endocarditis at 11(15.28%), prophylaxis of local infections at 24(33.33%) out of the 72 respondents of the study each.

Indications		**Drugs**	**Frequency**	**Percentages**
Odontogenic infections	Periodontal abscess, Dental caries, NUG	Amoxicillin, Clindamycin	30	41.67%
Non odontogenic	Tuberculosis, bone marrow infections, Syphilis	Rifampicin, ciproflaxin, Clindamycin.	7	9.72%
Prophylaxis for infective endocarditis		clindamycin, amoxicillin. vancomycin	11	15.28%
Prophylaxis of local infections	Immunosuppression, Surgeries, begnin tumors surgery, tooth extractions	Amoxicillin Clindamycin	24	33.33%
Total			72	100

Figure 1; the pie chart below shows the various indications of antibiotic use in dental clinic at KIU-TH.



The pie chart above represents the study findings of the indications of antibiotics in dental cases in dental clinic at KIU-TH. They show odontogenic infections at 41.67%, non odontogenic infections at 9.72%, prophylaxis of infective endocarditis 15.28%, and prophylaxis of local infections at 33.33%.

DISCUSSION

Symptoms Presented by Dental Patients

According to the results obtained, the different symptoms associated with dental cases according to the respondents where most presented with toothache at 43.05% where sensations are generally sharp, lasting as long as the stimulus and a spectrum from physiologic sensation to pain in disease [13]. In a toothache, nerves are stimulated by either exogenous sources or endogenous factors [14]. Also according to the result above in the table 2, fever at 4.16% is mostly brought up due to the inflammatory mediatory ("Medical Subject Headings"2013). The study also views painful chewing at 30.55% where an unpleasant sensation caused by intense or damaging events in experienced when chewing food which can also be accompanied by dysphagia also as cited above in the literature [14]. The study also identifies tender swollen gums at 8.33% with other symptoms at 13.88% which are associated with the above symptoms which include tender, swollen lymph nodes under your jaw or in your neck, sudden rush of foul-smelling and foul-tasting, salty fluid in your mouth and pain relief if the abscess ruptures, bad breath that won't go away, red or swollen gums, tender or bleeding gums [15].

Common Antibiotics Used in Dental Clinic

According to the of use of antibiotics, the study findings on common antibiotics found being mostly prescribed in the treatment of dental cases are amoxicillin at 45.83%followed by metronidazole at 26.4%, clindamycin at 12.5% and others at 15.27% which further more describes the overuse of antibiotics in treatment of most dental infections as described in the literature that most infections of dental origin still respond to penicillin group of antibiotics [16]. Amoxicillin (45.83%) is the most used because of the cidal effect and being a broad spectrum antibiotic given

that antibiotic which cidal effects do more activity than the static drugs in treatment of dental infections as cited that bacteriricidal antibiotics are preferred when the host is immune compromised as bacteriostatic drugs require the host's immune system to completely eradicate the infection [17]. It's also shown by the study that clindamycin (12.5%) is useful in penicillin allergic patients and has a wide spectrum of activity including anaerobes and also given that it being a second choice drug from penicillin's in the treatment of some dental infections [18].Metronidazole at 26.4% is also involved in the study where it's more preferred in the combination therapy treatment with penicillin especially in treatment of odontogenic infections and more useful in abscess formation like periodontal abscesses [19]. Other at 15.27%, antibiotics such as Vancomycin, streptomyc in, gentamycin, ampicillin are also useful but prescribed in prophylactic incidences like infective endocarditis, macrolides such as azithromycin which are used in treatment of patients allergic to penicillin's from the second choice of clindamycin in penicillin allergy [20].

Indications of Antibiotics in Dental Clinic

According to the results in the table and pie chart obtained showing some indications of antibiotics in treatment of dental cases with 72 respondents, the study identifies odontogenic infections at 41.67% which involves infections such as periodontal abscess, dental caries, alveolar abscess and necrotizing ulcerative gingivitis which infections can be managed by antibiotics and here it penicillin's as the drugs of choice [20]. Prophylaxis of local infections at 33.33% is said to be another indication of antibiotics in dental where they are used in after surgeries like tumor surgeries, tooth extractions to prevent sepsis on surgical sites especially as also cited when Abu-Taa et al compared the benefits of pre- and post-operative antibiotics in patients undergoing periodontal surgery. Pertaining to the post-operative antibiotics, remarkable reduction in the post-operative discomfort was noticed [21]. The results also show that prophylaxis of infective endocarditis at 15.28% which is an uncommon infection but antibiotic prophylaxis not only acts by destroying bacteria, but also by inhibiting bacterial adherence. It is indicated in high risk dental procedures in patients with pre-existing high rate cardiac disorders [22]. And also the results show non odontogenic infections at 9.72% as an indication out of the 72 respondents as cited that the non-odontogenic infections require a prolonged treatment. They include infections such as tuberculosis, syphilis and non-specific infections of bone new synthetic antibiotics such as fluoroquinolones are the drug of choice for management of non- odontogenic infections. Fluoroquinones are indicated for bone and joint infections, genitourinary tract infections, and respiratory tract infections [23].

CONCLUSION

The definitive assessment of antibiotics use, common antibiotics and symptoms presented by patients in dental clinic are limited and specific though they bring out the utilization of antibiotics with dental cases in dental clinic at KIU-TH. Some indications found in the study include odontogenic infections, non odontogenic infections, prophylaxis of infective endocarditis, prophylaxis of local infections where it also identifies common antibiotics used such as amoxicillin, metronidazole, clindamycin, macrolides, among them and also the symptoms such as painful chewing, fever, toothache and swollen gums which are tender. Appropriate antibiotic and prescription of antibiotics by dentists is urgently needed in view of the antibiotic resistance strains and occurrence of a biofilm of organisms in the oral cavity while combination therapy also works. Dental Infections, should first receive the appropriate local therapy with prevention which can sometimes be complemented with a systemic treatment with antibiotics. There

are no literature to provide information on antibiotic use in dental origin infections at all levels.

RECOMMENDATIONS

Therefore under the treatment regime with use of antibiotics in dental clinic at KIU-TH, I would recommend that; there should be more sensitization about antibiotic resistance in some indicated infections ministry of health. The dentists should follow the proper prescription table to avoid resistance hence encouraging proper use of antibiotics. Sensitization of patients about oral care to prevent occurrence of infection should be advised to patients also doing sampling severe conditions like dental abscess before prescription of antibiotics and also proper identification of symptoms clinically before antibiotic use. Further studies to assess the antibiotic use should be done over a wide geographical area.

REFERENCES

1. Morcillo E, Cortijo J, V. V. (2008). Bases farmacológicas de la antibio¬ticoterapia en infeccionesodontogénicas. *Med Oral*, 1:15-23.
2. Machuca M, Espejo, Gutierrez L, H. J. (2000). Análisis de la prescripciónantibiótica en unafarmaciacomunitaria. *Pharm Care Esp*, 18:300-7.
3. Miloro M, L. P. (2013). Peterson's Principles of Oral and Maxillofacial Surgery.
4. WHO. (2014). WHO's first global report on antibiotic resistance reveals serious, worldwide threat to public healtth. Retrieved from www.who.int/mediacentre/news/releases/2014/amr-report/en/.
5. Goud SR, Nagesh L, F. S. (2012). Are we eliminating cures with antibiotic abuse? *A Study among Dentists. Niger. J ClinPract*, 15:151–5.
6. Rodriguez-Alonso E, R.-M. (2009). Tratamientoantibiótico de la infección.
7. NajlaSaeed Dar-Odeh, Osama Abdalla Abu-Hammad, Mahmoud Khaled Al-Omiri, Ameen SamehKhraisat, A. (2010). Antibiotic prescribing practicesby dentists: a review. *TherClin Risk Manag*, 6:301-306.
8. Lewis. (2008). Why we must reduce dental prescription of antibiotics. *European Union Antibiotic Awareness Day*, 205(10):537–538.
9. Dar-Odeh NS, Abu-Hammad OA, Al-Omiri MK, Khraisat AS, S. A. (2010). Antibiotic prescribing practices by dentists: a review. *TherClin Risk Manag*, 6:301–6. 5.
10. Christine K Tashobya, Dominique Dubourg, Freddie Ssengooba, Niko Speybroeck, Jean Macq, Bart Criel, A comparison of hierarchical cluster analysis and league table rankings as methods for analysis and presentation of district health system performance data in Uganda , *Health Policy and Planning*, Volume 31, Issue 2, March 2016, Pages 217–228
11. Iruka N. Okeke, Adebayo Lamikanra, Export of Antimicrobial Drugs by West African Travelers, *Journal of Travel Medicine*, Volume 10, Issue 2, 1 March 2003, Pages 133–135,
12. Napeñas. (2013). Intraoral pain disorders. *Dental Clinics of North America*, 57 (3): 429–47.
13. Hargreaves KM, Cohen S, B. L. (2011). *Cohen's pathways of the pulp* (10th ed.).
14. Figini L, Lodi G, Gorni F, G. M. (2007). Single versus multiple visits for endodontic treatment of permanent teeth. *The Cochrane Database of Systematic Reviews (4): CD005296).*
15. Brescó-Salinas M, Costa-Riu N,

Berini-Aytés L, G.-E. C. (2006). Antibiotic susceptibility of the bacteria causing odontogenic infections. *Med Oral Patol Oral Cir Bucal*, 11:E70–75.

16. Mani N, Gross CH, Parsons JD, Hanzelka B, Müh U, Mullin S, et al. (2006). In Vitro Characterization of the Antibacterial Spectrum of Novel Bacterial Type II Topoisomerase Inhibitors of the Aminobenzimidazole Class. *Antimicrob Agents Chemother*, 50:1228–37.
17. Nuñez, V.A., Sarrazin, A.F., Cubedo, N., Allende, M.L., Dambly-Chaudière, C., and Ghysen, A. (2009) Postembryonic development of the posterior lateral line in the zebrafish. Evolution & development. 11(4):391-404.
18. Daramola OO, Flanagan CE, Maisel RH, O. R. (2009). Diagnosis and treatment of deep neck space abscesses. *Head Neck Surg*, 141:123–30.
19. Sequra-Eqea JJ, Velasco-Ortega E, Torres-Logares D, *et al.* [2010] Pattern of antibiotic prescription in the management of endodontic infections amongst Spanish oral surgeons. *Int Endod J*;43:342–350.
20. Abu-Ta'aM, Quirynen M, Teughles W, V. S. D. J. C. (2008). Periodontal, 35; 1: 58-63.
21. Vera. (2007). Vera JRM, Gomez-Lus Centelles ML. Antimicrobial prophylaxis in oral surgery and dental procedures. Med Oral Patol Circ Buccal 2007; 12: 44-52.
22. Bysted H, Dahlback A, Dornbusch K, N. C. (1978). Concentration of azidocillin, erythromycin, doxycycline and clindamycin in human mandibular bone. . *Int J Oral Surg*, 7: 442-44.