THE EFFECT OF ANTIBIOTICS ON DENTOALVEOLAR INFECTION IN NEPALESE DENTAL PATIENTS

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ABSTRACT

This paper investigates the effectiveness of 7 types of antibiotics commonly used in the treatment of oral infections in Kathmandu, Nepal. Pus samples were collected from the deeper part of dentoalveolar infections in 100 adult patients using a sterile swab stick, which was cultured for aerobic bacteria. Antibiotic sensitivity testing was performed using two different media, Mueller Hinton Agar (pH 7.3 ± 0.2) and Blood Agarâ (HIMEDIA Laboratory Ltd., India) using the Kirby-Bauer Technique. 73 of the cultures yielded non-pathogenic bacteria and 27 yielded pathogenic bacteria. Of the 7 antibiotics tested, Chloramphenicol produced the best result with positive sensitivity for 100% of the samples, Co-trimoxazole was tested as the least effective in the treatment of dentoalveolar infections.

Key Words: Dentoalveolar infections, Antibiotics

INTRODUCTION

Dental caries, the most prevalent oral disease, is a multifactorial diasease that is not amenable to antibiotics. However, if untreated, in the context of absolute poverty, due to poor nutrition, chronic disease and the lack of availability of oral health care, there is a greatly increased risk of the development of life threatening sequelae to dental infections.

The proper use of antimicrobial drugs can be beneficial in the management of oro-facial infections. The type of antibiotics used, the duration of therapy and the optimum dosage are important parameters, which need to be considered if antimicrobial therapy is to be utilised effectively. Injudicious prescription of drugs, mainly from patient demand has resulted in the increase of antibiotic resistant pathogenic organisms world-wide, which has caused great concern[1,2]. Incorrect drug selection for treatment of infections, and the incorrect duration and dosage are some of the factors leading to the rise of antimicrobial resistance[3,4,5,6,7].

A recent study in the United Kingdom revealed that for patients with acute dento-alveolar infections, a short course of antibiotic therapy (2-3 days duration) was effective in helping to resolve their symptoms, provided drainage of the infection had been established[8]. Before this type of information can be used effectively in Nepal, preliminary information on the effectiveness of various types of antibiotics in the treatment of oral infections is necessary.

AIM

The aim of the study is to determine the effectiveness of 7 antibiotics in the treatment of dentoalveolar infections of patients in the Kathmandu valley of Nepal.

METHOD

Pus samples were collected from 100 adult patients (48 males and 52 females) with dentoalveolar infections presenting to the Patan Hospital, Dental Clinic, Kathmandu, Nepal. Selection for the study was gained through written consent from the patients. Pus was collected from

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the deeper part of the infected site using a sterile swab stick, which was sent to Patan Hospital Laboratory and cultured for aerobic bacteria on Blood and MacConkey Agarâ (HIMEDIA Laboratory Ltd., India) at 37 degrees centigrade for 48 hours in an incubator. Antibiotic sensitivity testing was performed using two different media, Mueller Hinton Agar (pH 7.3 ± 0.2) and Blood Agarâ (HIMEDIA Laboratory Ltd., India) using the Kirby-Bauer Technique. Antibacterial sensitivity was tested against the following antibiotics using sensitivity discs: Penicillin (10 Units), Amoxycillin (10 mcg), Cloxacillin (5mcg), Erythromycin (15 mcg), Chloramphenical (30 mcg), Tetracycline (30 mcg), and Co-trimoxazole (25 mcg). The laboratory followed the antimicrobial susceptibility testing procedure provided by the manufacturer of the microbial sensitivity discs (Span Diagnostics Ltd., India).

RESULTS

Of the 100 pus samples collected and cultured, 73 of the cultures yielded non-pathogenic bacteria (Klebsiella, E.Coli, a haemolytic Streptococci, coagulative negative Staphyloccoci) and 27 yielded pathogenic bacteria (b haemolytic Streptococci). The results of the antimicrobial testing are provided in Table 1.

Table 1.

Results of antimicrobial sensitivity testing of b haemolytic Streptococci isolated from dentoalveolar infected patients.

Antibiotic	Sensitive		Moderately Sensitive		Resistant		Total Sample Tested
	N	%	N	%	N	%	N
Chloramphenicol	22	100	0	0	0	0	22
Penicillin	22	95.6	1	4.4	0	0	23
Amoxycillin	22	95.6	0	0	1	4.4	23
Erythromycin	20	90.9	0	0	2	9.1	22
Cloxacillin	17	89.5	0	0	2	10.5	19
Tetracycline	18	81.8	2	9.0	2	9.2	22
Co-trimoxazole	7	33.3	1	4.8	13	61.9	21

DISCUSSION

From the 27 samples yielding β haemolytic Streptococci, sensitivity testing was performed only on 23 of the samples.–due to the contamination of 4 samples during the testing procedure. Complete testing was only performed using Penicillin and Amoxycillin sensitivity discs because the laboratory technicians failed to test for susceptibility using discs impregnated with some of the other antibiotics. Due to the lack of facility in our laboratory, culture of anaerobic bacteria and sub-group of β haemolytic streptococci could not be performed.

Of the 7 antibiotics tested, Chloramphenicol produced the best result with positive sensitivity for 100% of the samples, with no samples demonstrating any resistance to the antibiotic. Except for Chloramphenicol and Penicillin G, the remaining 5 antibiotics demonstrated some degree of resistance with 13 of 21 samples of β haemolytic Streptococci showing resistance to Co-trimoxazole.

In Nepal, the most commonly used antibiotics are Penicillin and Amoxycillin, the latter being more readily available in many local pharmacies. These drugs are recommended for dentoalveolar infections and are less likely to disturb the commensal flora. For patients who are sensitive to penicillin, Erythromycin is often recommended but has been known to have an

unreliable absorption profile and is associated with gastrointestinal disturbances. The use of broad-spectrum antibiotics, such as Tetracycline and Chloramphenicol may result in the destruction of the commensal flora and encourage the overgrowth of endogenous pathogens and lead to opportunistic infections such as candidiasis. Chloramphenicol has demonstrated effectiveness, but due to its potential toxic side effects, it is reserved for the treatment of life-threatening infections[9]. The side effects of the medication must, therefore, be considered when prescribing the antibiotics.

Another factor to be considered in the prescription of antibiotics is the cost of the medication. An antibiotic may be efficacious but suffer from the disadvantage of being more costly compared to other antibiotics, which may be just as effective. Table 2 presents the average cost of the 7 antibiotics found in some pharmacies in Kathmandu. Co-trimoxazole may be relatively inexpensive in comparison to the other antibiotics tested, but the results of this study demonstrate that it is the least effective in the treatment of dentoalveolar infections.

Table 2.
Unit cost of 7 antibiotics found in pharmacies in Kathmandu.

Antibiotic	Average Cost *(Nepali Rupees)*
Co-trimoxazole 960mg	2.84
Tetracycline 500mg	3.37
Penicillin 500mg	4.00
Chloramphenical 500mg	4.33
Cloxacillin 500mg	8.00
Amoxycillin 500mg	9.24
Erythromycin 500mg	10.18

Pharmacists should not over-dispense especially more expensive broad-spectrum agents when narrower spectrum antibiotics are just as effective, just for their personal financial gain. When efficacy, side effects and cost are assessed for the above antibiotics, Penicillin is the first choice in the treatment of dentoalveolar infections.

Self-medication is often cited as a major factor to drug resistance[10]. It has been seen that in both non-established market economies and established market economies, patients commonly expect to receive a prescription for their problem from a physician or dentist even though a prescription may not be warranted[11,12]. Similar to other non-established market economies in Africa[13], in Nepal too, drugs are sold to self-prescribing customers who do not think it necessary to consult a dentist or a physician. What is more alarming is that the dispensers of drugs themselves may not be formally trained as dispensers or pharmacists. These behaviours may adversely affect the immunological and financial status of the patient. Therefore, patients, prescribers and dispensers need to be made aware of the fact that not all infections require the use of antibiotics.

It is often forgotten that the appropriate treatment for acute apical abscesses is the removal of the irritants from within the tooth, extraction of the tooth or establishment of drainage through surgical intervention and that antibiotics are only an adjunct and not the primary form of therapy for such problems. A controlled clinical trial demonstrated that Penicillin was of no benefit as a supplement to appropriate local treatment[14]. In fact, antibiotics are only warranted in situations where there is systemic involvement, evidenced usually by signs of cellulitis or elevated temperature by 1.5°C[8].

Inadequate diagnosis could be another factor for the overuse of antibiocs to "cover any possible infection"[12]. This trend appears to be more common in developing countries, where diagnostic facilities are inadequate[15,16]. Additional problems common to the developing world like malnutrition, poor underlying health and poor infection control measures can all increase susceptibility to infection and therefore contribute to the greater use of antibiotics.

Simple, yet effective infection control measures like thorough hand washing and/changing gloves before and after contact with patients can reduce spread of resistant bacterial strains in health care facilities.

RECOMMENDATIONS

Antibiotic resistance is a global problem. Therefore, strategies should be developed that are relevant to both developing and developed world. A national strategy should emphasise on factors specific to the national situation and once formed should be implemented with strict adherence. Modifications should be made as necessary to make them relevant even at the local level.

For the protection of the public from injudicious use of antibiotics further work is needed to:

- Determine the duration and dosage of effective antibiotics in the treatment of dentoalveolar infections in Nepal
- Develop policies and guidelines in the use of antibiotics in the treatment of dentoalveolar infections and other oral conditions
- Develop policies and guidelines for infection control in treating dental patients in all settings so as to reduce unnecessary use of antibiotics
- Educate health care workers, pharmacists, medicine dispensers and the public concerning the rational use of antibiotics for oral conditions
- Initiate problem-based pharmacotherapy training for medical, dental para-medical and pharmacy students for a positive impact on long term good prescribing habits.

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