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ANTIBIOTIC MISUSE IN THE DENTAL PROFESSION IN INDIA: A SILENT HEALTH EMERGENCY

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ABSTRACT

The use of antibiotics by health care professionals has benefitted mankind to a great extent in achieving adequate control of infections. However, there has been a tremendous rise in the use of antibiotics among medical and dental professionals during the last 10-15 years which has given rise to a serious global problem of antibiotic resistance (AMR). There is a significant problem of antibiotic misuse by dental professionals in India, with antibiotics being prescribed inappropriately for clinical and non-clinical reasons. There are no dedicated antibiotic prescribing guidelines for dental practitioners in key Indian policy documents. Despite, many studies reporting inappropriate use of antibiotics by dentists, the full extent of this problem is still unknown and reasons for such prescription patterns are unclear and need further investigation. The present paper attempts to provide the most recent information regarding antibiotic misuse by dentists in India and recommends appropriate measures to combat this public health threat.

Keywords: *antibiotic, dental practice, misuse, prescription, India*

INTRODUCTION

Antibiotic resistance (AMR) is emerging as one of the deadliest public health crisis across the world. Resistant microbes ('super bugs') tend to spread easily, turning once-curable infections or illnesses into deadly conditions and making surgeries, cancer treatment, delivery of complex medical procedures and routine care far more riskier (1). Approximately 5 million deaths are reported annually across the globe due to AMR. In South Asia alone, deaths directly linked to AMR are projected to reach 11.8 million between 2025 and 2050 (2). More than 2.5 lakh deaths were reported in 2021 only in India that were directly linked to AMR (3). Moreover, about 10 lakh deaths were associated with drug-resistant infections.

Studies have suggested a clear link between the levels of antimicrobial use and development of AMR (4,5). Between 2000 and 2010, global antibiotic consumption rose by 40% and BRICS countries (Brazil, Russia, India, China and South Africa) accounted for about three-fourths of this consumption. The overall prescription rate of antibiotic for any ailment in India was estimated to be 412 prescriptions per 1000 persons per year and prescription rate for dental problems was approximated to be 89.21 prescriptions per 1000 persons per year (6).

There is widespread use of antibiotics in dental practices across India. Several studies conducted across different parts of India among dental practitioners, indicated inappropriate prescription of antibiotics (5,7,8). Prescription rate of dental practitioners in the Indian urban population varied between 27% and 77% (5). Dentists who were postgraduates (MDS) prescribed significantly fewer antibiotics to their patients compared to dentists who were graduates (BDS).

There is no need for systemic antibiotics in oral conditions such as toothache caused by pulpal or periapical inflammation as they are localised conditions and are best treated by dental interventions such as tooth extraction or removal of the pulpal tissue (8). Additionally, prophylactic use is no longer recommended for routine dental procedures (9). The data on antibiotic use in dentistry is still lacking in middle and low income counties like India. The objective of the present study was to provide the most recent information regarding antibiotic misuse by dental professionals in India so that appropriate measures can be taken to combat this global public health threat.

METHODS

A narrative review of literature was done which engaged most of the recent articles published in different journals in the last 10 years relating to the subject of antibiotic misuse among dentists in India. The review itself began with the search of relevant key words – like

antibiotic misuse, dentists, private dental practitioners, India, in various search engines including Google, Pubmed, Medline. The search examined both the original studies and reviews having any significant information relating to the study. Pubmed and Medline search provided 18 articles from which relevant information was extracted. Conference proceedings were also explored in order to find any relevant literature on antibiotic misuse. The authors also searched World Health Organization (WHO) website to obtain additional information on the topic. In addition, other website like 'Indian Dental Association' and 'The Ministry of Health and Family Welfare, Govt. of India' were also consulted to extract any important information on the subject.

TYPE OF ANTIBIOTIC PRESCRIBED

A recent study was carried out to study the relevance of the prescriptions by analysing the antibiotic types associated with different dental diagnoses, using a large-scale nationally representative data set (10). The results of this survey indicated that beta-lactam, penicillin and cephalosporins were the most commonly prescribed antibiotics by Indian dentists to treat dental diseases like toothache, dental abscess, gingivitis, periodontitis, pulpitis etc. followed by macrolides and quinolones. Almost one-third of the subjects primarily prescribed beta-lactams and cephalosporins for 'diseases of pulp and periapical tissues'. Other antibiotics like tetracyclines were also found to be prescribed for 'disorders of tooth development or eruption', 'discoloration of teeth' and 'abrasion'(10).

ROLE OF INFORMAL SECTOR IN PRESCRIBING ANTIBIOTICS

India, being a highly populous country, has a low dentist to population ration (11). This problem is compounded by the fact that there is unequal distribution of qualified dental workforce and delivery of oral health care is often provided by non-dental practitioners also called as informal health care providers (IHCP) and general medical practitioners especially in the rural areas. In developing countries like India, the informal sector accounts for 51-96% of all health care providers. These providers lack good knowledge, adequate training and skills to perform dental procedures, and often prescribe antibiotics to their patients especially for acute dental problems. Patients are forced to consume medicine over and over again until they are able to visit a qualified dentist. According to a study conducted on prescriptions by these IHCP, more than 85% of prescriptions for dental problems contained antibiotics, a rate that surpasses any other health problem (12).

ROLE OF PHARMACISTS (OVER THE COUNTER)

Over the counter drugs (OTC) are sold without the prescription of a registered medical/dental practitioner. In a developing country like India, pharmacists are often approached by patients for seeking heath advice, including dental advice. Reports of a study revealed that about 67% of private sector pharmacies/chemists in India dispensed antibiotics without prescriptions (13). Main reasons cited by patients were easy access and convenience, cheaper cost (generic medicines), availability of credit facility and difficulty in getting an appointment with a dental practitioner or physician. This could be due to the fact that in India and other middle and low income countries, a vast majority of population may not be able to afford visiting a qualified dental practitioner in addition to pay for the cost of medication. Findings of another study indicated that 22.4% of pharmacists were dispensing antibiotics for toothache without a dentist's prescription (14).

SELF-MEDICATION FOR DENTAL PROBLEMS

Although it legally not permitted to purchase antibiotics over the counter, self-medication with antibiotics is widely prevalent for dental problems in India (5). A systematic review conducted on the misuse of antibiotics in dental profession in India highlighted various reasons cited by dental patients for resorting to self-medication for their dental/oral problems, irrespective of whether they take antibiotics or other drugs or home/traditional remedies (5). Considering their oral/dental complaints to be a minor problem was cited as one of the important reasons for self-medication. The other reasons mentioned in the study were: having fear of dental treatment, past experiences with same medication and previous prescriptions, long queues/waiting time in the dental practice, time constraints, distance of the dental clinic from their residence/work place and non-availability of dental practitioner (Figure 1) (5).

INDIAN POLICY AND PRACTICE FOR DENTAL ANTIBIOTIC PRESCRIBING AND GLOBAL STANDARDS

Although overuse of antibiotics in dental profession has been well documented by India Council of Medical Research (ICMR), there is a lack of guidelines and tool kits for appropriate antibiotic prescribing by dental practitioners in India. Four key elements were taken into consideration for comparison of Indian policy with the global policy standards and best practice (15).

1. **Therapeutic dental antibiotic prescribing.** Global guidance suggests that antibiotics are not recommended for treating conditions like toothache and localized dental infections. Rather, therapeutic antibiotics are only recommended in case of severe dental

infections having systemic involvement such as fever and lymph node enlargement (15). However, managing the source of dental infection (draining an abscess, extraction or root canal treatment) is paramount in addition to antibiotic prescription.

According to a recent study reports, the authors found no comprehensive document that includes details on therapeutic antibiotic prescribing in dentistry in India; however the dental emergencies section of the Indian Dental association (IDA) website does provides description of various dental conditions and management of dental pain. The antibiotic regime/type is not mentioned for therapeutic use in conditions like systemic cellulitis (16). No justification is provided in any of the policy documents for or against the antibiotic use contrary to global guidance. It is also not clearly mentioned in any of the documents that antibiotics should not be used for localized dental pain.

2. **Prophylactic dental antibiotic prescribing.** Pre-operative prophylactic antibiotics are advised by global researchers for high-risk dental procedures that involve manipulation of gingival tissue or periapical region, in patients with certain high-risk cardiac conditions such as prosthetic cardiac valve or its repair, history of endocarditis, unrepaired cyanotic or completely repaired congenital heart disease (CHD) within 6 months of procedure, repaired CHD with residual defects, and in cardiac transplant patients having heart valve problems (15,17). Routine prophylaxis is not advised for patients wearing any type of prosthetic joints and for routine dental/oral procedures including minor surgical treatments (18).

Very few Indian policy documents contain information on high-risk dental procedures and list of high-risk cardiac conditions (15). Prophylactic antibiotics are indicated for simple dental extractions, contrary to the global guidance which advice against the use prophylactic antibiotics in cases of simple/uncomplicated dental extractions. The IDA website does not contain any information regarding prophylaxis against some medical conditions and minor surgical procedures, through it contains a section on prophylactic use of antibiotics against infective endocarditis and for dental treatment of patients with joint replacement (16).

3. **Antibiotic prescribing resources for dental professionals.** Several toolkits are recognized globally that enable practicing dentists adhere to guidelines (19). However, antibiotic prescribing resources or toolkits for dentists in India are very limited. The Antimicrobial Stewardship Programme Guidelines framed by Indian Council of Medical Research (ICMR) does not provide any recommendations for Indian settings, though it only gives reference to UK's openly available tool kits (15). The IDA's resource centre

provides a limited range of antibiotics required for management of dental infections especially in primary dental care (16).

4. **Stewardship advice for practising dentists.** Antibiotic stewardship refers to the systematic approach aimed towards optimizing the use of antibiotics to achieve the best treatment outcomes while minimizing the unintended consequences of antibiotic use, including toxicity, the emergence of resistance, and other adverse effects (20). The ultimate goal is to ensure that infections are treated effectively while preserving the efficacy of antibiotics for future generations. Stewardship in dentistry is not just about reducing the use of antibiotics but using it judiciously and effectively when clinically appropriate and ensuring that right drug, dose and duration are selected. This practice supports the fight against AMR and ensures that these vital medications remain a viable option in providing dental and medical health care.

Globally recognized documents also provide advice to dentists on various stewardship components like: self-evaluation of prescribing behaviour; antibiotic good prescribing; infection prevention and control in dental settings and practices; culture and sensitivity testing where required; appropriate referral to oral specialists and proper communication with patients (21).

The operational guidelines for dental health care providers advise Indian dental professionals to ensure good record keeping (15). Some general documents recommended good record keeping, electronic record keeping but provide no information on the current status of implementation of these guidelines, especially with respect to general dentists who are mostly working or employed in private sector in India.

WORLD HEALTH ORGANIZATION (WHO) STRATEGY ON AMR

In its Global Action Plan on AMR, 2015, the World Health Organization (WHO) stressed the importance of collecting data on antibiotic use and provides framework for countries to develop a National Action Plan (NAP) to tackle AMR (22). This plan has the objective to ensure the prevention and treatment of infectious diseases with save and effective medicines. The key strategies are:

1. To improve awareness of antimicrobial resistance
2. To strengthen surveillance
3. To reduce the incidence of infections
4. To optimise the use of antibiotics
5. To guarantee investment in countering antimicrobial resistance

Therefore, dental practitioners in their routine dental practice should prescribe antibiotics that are safe and only in cases indicated and recommended by contemporary guidelines.

CONCLUSION AND RECOMMENDATIONS

Antibiotic misuse in dental profession is a serious global health threat, with inappropriate use by both medical and dental health care professionals in India. There is a lack of dedicated antibiotic prescribing guidelines for dentists in India which can negatively influence practitioner attitude and awareness. Unlike in developed nations, prophylactic use of antibiotics for routine dental procedures like extractions and root canal treatments (RCT) are common in India. Therefore, there is an urgent need to develop appropriate guidelines for dental professionals in India and include them in key documents such as NAP and Standard Treatment Guidelines. These guidelines should also clarify when not to prescribe antibiotics (for therapeutic and prophylactic use), in line with the global guidance.

Stewardship measures like good record keeping are essential as it is a major problem in primary health care in India. Information regarding AMR and appropriate antibiotic prescribing should be included both in the undergraduate and postgraduate dental curriculum since it is not provided in the current education modules. The National Dental Commission (NDC), which will soon replace Dental Council of India (DCI) as the topmost body concerned with dental education and practice in India, should take this into consideration. India's Oral Health Policy should also include AMR along with other programs to address India's common dental disorders like dental caries, periodontal disease and oral cancer. Another area of concern is lack patient awareness resources regarding antibiotic use for common dental problems. OTC antibiotic use and selling should be discouraged by Indian Policy makers, as dental problems require dental intervention for management rather than resorting to self-medication.

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Figure 1. Various reasons cited by subjects for self-medication (5)