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## Incidence of Allergy to Antibiotics During the Period Of 2019-2020- A Retrospective Study

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**Abstract:** The prescribing of antibiotics by dental practitioners has become an important aspect of dental practice. For this reason, antibiotics account for the vast majority of medicines prescribed by dentists. Allergy to antibiotics is a rare phenomenon which can occur from any group of drugs, such drugs should be avoided as possible and alternative drugs should be prescribed. The aim of the study is to analyse the incidence of antibiotic allergy during 2019-2020. Evaluation of 126 reports of patients reported to saveetha dental college and hospitals were analysed and the results were statistically analysed and tabulated using chi square test. Intraoperative photographs were checked for cross verification. Out of 126 subjects, in the age group of 1-30 years, 15 patients(11.90%) were allergic to antibiotics and 21 patients(16.67%) were clinically healthy and in the age group of 31-60 years, 39 patients(30.95%) were allergic to antibiotics and 36 patients (28.57%) were clinically healthy. and in the age group of 61-80 years, 7 patients(5.56%) were allergic to antibiotics and 8 patients (6.35%) were clinically healthy. Among the 126 patients, 64 patients were males in which 33 patients were allergic to antibiotics(26.19%) and 31 patients were healthy(24.60%). 62 patients were females in which 28 patients were allergic to antibiotics(22.22%) and 34 patients were healthy(26.98%) and the results obtained were statistically insignificant ( $P>0.05$ ). Within the limits of this study of antibiotic allergy, incidence in males were higher and majority of the patients of the age group of 31- 60 years were allergic to antibiotics.

**Keywords:** Antibiotics, Amoxicillin, Allergy, Hypersensitivity, Pain.

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### INTRODUCTION

Dentists prescribe medications for the management of a number of oral conditions, mainly orofacial infections (Dar-Odeh *et al.*, 2008). There are various dental procedures such as extraction, scaling, prosthesis, braces, teeth whitening, root canal treatment, gum surgery, bridges and implants and tooth filling. These procedures are done to treat patients with decayed, chipped, broken and discoloured teeth (Patturaja and Pradeep, 2016). Dentists are highly knowledgeable regarding oral and facial anatomy, which seems reasonable for them to be at the forefront in providing these services, understanding limitations of treatment and having the ability to recognize and manage complications (Mp, 2017b). Since most human orofacial infections originate from odontogenic infections (Bali *et al.*, 2015), the prescribing of antibiotics by dental practitioners has become an important aspect of dental practice. Patients with diseases such as HIV should be treated with better care and also the clinician must protect himself from unnecessary exposure to the pathogen (Kumar, 2017). Dental extractions are the commonly performed procedures in dental clinics. An ideal tooth extraction is defined as painless removal of the whole tooth or tooth root with minimal trauma to the investing tissues so that the wound heals uneventfully and no postoperative prosthetic problem is created (Mp, 2017a). It is often associated with swelling, pain, trismus and sometimes postoperative infections which are treated by prophylactic analgesics and antibiotics (Rao and Kumar, 2018). Patients who sustain major trauma are more prone for developing infection on the affected site (Abhinav *et al.*, 2019).

For this reason, antibiotics account for the vast majority of medicines prescribed by dentists. (Lewis, 2008) Dentists prescribe all common antibiotics such as beta lactams, macrolides, tetracyclines, clindamycin, metronidazole (Cleveland and Kohn, 1998). Dental professionals are at a greater risk for acquiring cross-infection while treating patients (Mp and Rahman, 2017). Antibiotics are used as a means for prevention of

infective endocarditis in patients with heart diseases and uncontrolled diabetes mellitus(Kumar and Sneha, 2016).

Antibiotic prescribing may be associated with unfavorable side effects ranging from gastrointestinal disturbances to fatal anaphylactic shock and development of resistance. The increasing resistance of antibiotics were probably related to over or misuse of broad-spectrum agents such as cephalosporins and fluoro-quinolones (Wise *et al.*, 1998). Patient's expectation of an antibiotic prescription, convenience, and demand necessitated by the social background of the patients are considered unscientific reasons for antibiotic prescription. Penicillin is still the gold standard in treating dental infections(Palmer *et al.*, 2001). Among the group of penicillins, penicillin V, amoxicillin, and amoxicillin and clavulanate have been advocated for the treatment of odontogenic infections (Ellison, 2009). Antibiotics should be prescribed at the correct frequency, dose, and duration so that the minimal inhibitory concentration when exceeded can prevent the occurrence of side effects. Patients who are allergic to one group of antibiotics can choose another drug from the same group such as Patients who are allergic to penicillin should benefit from clindamycin; it is active against some oral anaerobes and facultative bacteria, and has the advantage of good bone penetration (Palmer *et al.*, 2000). Patient pain and anxiety are undesirable side effects of dental procedures which affect the willingness of the patient to undergo treatment(Abhinav, Sweta and Ramesh, 2019). Our team has rich experience in research and we have collaborated with numerous authors over various topics in the past decade (Deogade, Gupta and Ariga, 2018; Ezhilarasan, 2018; Ezhilarasan, Sokal and Najimi, 2018; Jeevanandan and Govindaraju, 2018; J *et al.*, 2018; Menon *et al.*, 2018; Prabakar *et al.*, 2018; Rajeshkumar *et al.*, 2018, 2019; Vishnu Prasad *et al.*, 2018; Wahab *et al.*, 2018; Dua *et al.*, 2019; Duraisamy *et al.*, 2019; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Gheena and Ezhilarasan, 2019; Malli Sureshbabu *et al.*, 2019; Mehta *et al.*, 2019; Panchal, Jeevanandan and Subramanian, 2019; Rajendran *et al.*, 2019; Ramakrishnan, Dhanalakshmi and Subramanian, 2019; Sharma *et al.*, 2019; Varghese, Ramesh and Veeraiyan, 2019; Gomathi *et al.*, 2020; Samuel, Acharya and Rao, 2020) Thus the aim of the study is to analyse the incidence of antibiotics from the period of 2019-2020.

## **MATERIALS AND METHODS**

### **Sample collection**

The details of the patients were reviewed from the records that are formulated by saveetha university for the purpose of preservation and efficient analysis of patients details that contains data including pictures of oral cavity and treatments being done which is maintained in a secured manner and data of 126 patients were analysed between June 2019 and March 2020. This serves as proofs and records for the conduction of retrospective studies.

### **Inclusion criteria**

All patients who had a history of antibiotic allergy were included in the study.

### **Exclusion criteria**

Patients' records that were incomplete were removed from the study. Repetitive entries were also removed. Patients who had systemic illness, Malignancy, immunocompromised patients, patients allergic to other substances were also excluded from the study.

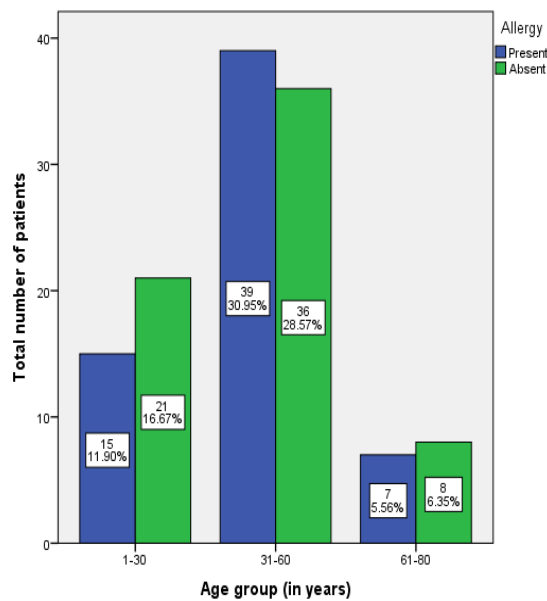
### **Ethical approval**

The study was commenced after approval from the scientific review board, and the ethical clearance was obtained from the ethical committee of the University with the following ethical approval number-SDC/SIHEC/2020/DIASDATA/0619-0320."

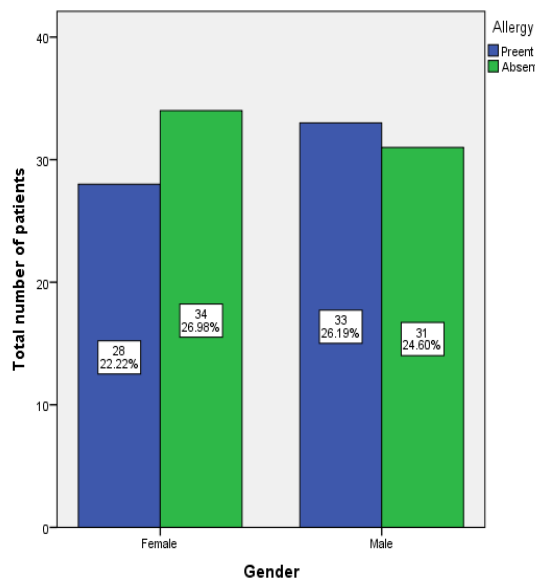
### **Statistical analysis**

Data was downloaded and imported to excel sheet. All the necessary data required for the study were included and excel tabulation was done. The excel sheet was imported to spss software version 23 and Data analysis was done using descriptive statistics and the results were obtained in the form of graphs and tables using the chi square test and the significant p value set as <0.05.

**RESULTS AND DISCUSSION**



**Fig.1: Bar graph showing association between age distribution and presence / absence of Allergy to antibiotics. X-axis - Age of patient (in years) and Y-axis- Total number of patients. Majority of patients of all age groups were clinically healthy (green) whereas the age group of 31-60 years had more incidence of antibiotic allergy(blue) than the other age groups.However, the difference was not significant statistically.(Chisquare test, p- 0.588, >0.05, insignificant)**



**Fig.2: Bar graph showing association between gender distribution and presence / allergy to antibiotics. X-axis represents the Gender of the patient and Y-axis represents the Total number of patients. Majority of patients in males were allergic to antibiotics(blue) whereas the majority of females were clinically healthy(green) than females. however , the difference was not significant statistically. (Chisquare test, p -0.472, >0.05, insignificant)**

Antibiotics are the commonest cause of life-threatening immune-mediated drug reactions that are considered off-target, including anaphylaxis, and organ-specific and severe cutaneous adverse reactions. However, many antibiotic reactions documented as allergies were unknown or not remembered by the patient, cutaneous reactions unrelated to drug hypersensitivity, drug-infection interactions, or drug intolerances. Although such reactions pose negligible risk to patients, they currently represent a global threat to public health. Antibiotic allergy labels result in displacement of first-line therapies for antibiotic prophylaxis and treatment.

From the above study we can observe that there were totally 126 subjects and they belong to the age group from 1-80 years. However in the age group of 1-30 years, 15 patients(11.90%) were allergic to antibiotics and 21 patients(16.67%) were clinically healthy and in the age group of 31-60 years, 39 patients(30.95%) were allergic to antibiotics and 36 patients (28.57%) were clinically healthy. and in the age group of 61-80 years, 7 patients(5.56%) were allergic to antibiotics and 8 patients (6.35%) were clinically healthy. Majority of patients of all age groups were clinically healthy whereas the age group of 31-60 years had more incidence of antibiotic allergy(Figure 1).

Among the 126 patients, 64 patients were males in which 33 patients were allergic to antibiotics(26.19%) and 31 patients were healthy(24.60%). 62 patients were females in which 28 patients were allergic to antibiotics(22.22%) and 34 patients were healthy(26.98%) and the results obtained were statistically insignificant ( $P>0.05$ ). Majority of patients in males were allergic to antibiotics(blue) whereas the majority of females were clinically healthy(Figure 2).

A study done by Macy et al says that antibiotic allergy incidence rates are sex dependent, higher in females than in males (Macy, Romano and Khan, 2017). In our study males were more commonly affected. Another study done by Chovel et al proves that 32.9% subjects treated with antibiotics had a rash during their illness compared to 23.1% untreated patients independent of age, gender, ethnicity and their results were not significant ( $p>0.05$ ) (Chovel-Sella *et al.*, 2013). whereas In our study, males were more affected and elderly people were commonly affected. Minhas et al says in his study that of 201 articles, 84 were screened and 57 fully assessed; these 57 articles contained 71 vancomycin HSR cases that were included in analysis. Vancomycin HSRs were immediate (anaphylaxis,  $n = 7$ ) and nonimmediate ( $n = 64$ )(Minhas *et al.*, 2016).

Medications can cause both allergic and non-allergic reactions, ranging from mild to severe skin or systemic changes. Diagnosis of allergy to drugs is quite complicated and requires a very proper medical history with detailed conversation to the patients. Diagnostic procedures include skin hypersensitivity tests, blood tests to detect IgE levels against specific active substances of drugs and basophil activation tests for the diagnosis of anaphylaxis. Basophil activation test is done to observe immediate reaction of the drug by activating markers CD63 and CD203 and the reaction is identified using flow cytometry whereas IgE dependant reactions are done in order to analyse the delayed hypersensitivity reaction to drugs such as amoxicillin, vancomycin, erythromycin, fluoroquinolones etc. Allergy treatment is usually based on the immediate cessation of the drug, and in some cases desensitization. Antibiotic allergy can be prevented by doing various testing procedures such as intradermal injection of small quantities of drug can show signs of hypersensitivity in case the patient has an allergy. Desensitization can be used when acute onset immunologically mediated hypersensitivity is confirmed to safely administer the needed antibiotic dose. Health care workers should be careful before administering the patient with antibiotics and encourage the patient to undergo sensitivity tests before taking the drug in order to prevent life threatening conditions such as respiratory arrest. Skin reactions can be reversed with immunomodulatory treatment to inhibit the skin lesions. Previously our team had conducted numerous clinical trials(Jesudasan, Wahab and Sekhar, 2015; Christabel *et al.*, 2016; Packiri, Gurunathan and Selvarasu, 2017; Patil *et al.*, 2017; Marimuthu *et al.*, 2018; Jain, Muthusekhar and Baig, 2019), over the past years. Now we are focussing on epidemiological studies. The idea for this study stemmed from the current interest in our community. Further studies can be done on a large population with proper testing to analyse the specific group of antibiotics causing allergic reaction. Some of the limitations were the predominance of the south indian population and this study is a unicentered study which is a major limitation and sample size is very less. It is important to accurately diagnose patients with suspected allergy to drugs to prevent exacerbation and relapse of severe allergic reactions and damage to health or even death in the case of anaphylaxis. Our institution is passionate about high quality evidence based research and has excelled in various fields ( (Pc, Marimuthu and Devadoss, 2018; Ramesh *et al.*, 2018; Vijayashree Priyadharsini, Smiline Girija and Paramasivam, 2018; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Ramadurai *et al.*, 2019; Sridharan *et al.*, 2019; Vijayashree Priyadharsini, 2019; Chandrasekar *et al.*, 2020; Mathew *et al.*, 2020; R *et al.*, 2020; Samuel, 2021)

## CONCLUSION

Within the limits of this study of antibiotic allergy, incidence of males is higher than females and the age group of 31- 60 years had a higher chance of developing allergy to antibiotics than other age groups. Therefore it is very important to take necessary precautions before prescribing an antibiotic to the patients and patients should be made aware about developing an anaphylactic reaction to antibiotics in case they are prone to develop an allergy and also doctors should convince the patient to not self prescribe antibiotics by taking over-the-counter drugs which could be fatal.

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### CONFLICT OF INTEREST

The authors would like to declare that there is no conflict of interests.

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