

THE PREVALENCE OF TETRACYCLINE — STAINED TEETH IN MALAYSIANS — A PRELIMINARY SURVEY

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SUMMARY

Eighty-eight (1.96%) out of 4,500 patients had teeth stained by tetracycline. The majority had yellowish-brown stains (59.1%), whilst 37.5% had greyish-brown and 3.4% had black stains. A large number of teeth (79.6%) were stained up to two-thirds of their crowns. The deciduous teeth, permanent incisors and first molars were most commonly affected (73.9%). Teeth are only stained by tetracycline if this drug is administered during their calcification periods. For aesthetic reason, the drug should not be prescribed from the fourth month of pregnancy till the seventh year of life. The social embarrassment due to such discolouration may be overcome by tooth bleaching and construction of tooth facings and crowns.

INTRODUCTION

Tetracycline and its homologues are widely used to combat infection. The side effects associated with these drugs are few and include nausea,

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vomiting, diarrhoea, superinfection with resistant organisms and staining of developing teeth. Depending on the dosage, administration period and the homologue, teeth may be stained from yellow, brown to black. The psychological impact and emotional trauma faced by patients with seriously discoloured teeth is a serious one which may lead to grave embarrassment and social handicap. These problems should never arise if practitioners are knowledgeable about the hazards of prescribing the drugs. This paper preliminarily reports the prevalence of tetracycline staining of teeth of patients and discusses its significance.

MATERIAL AND METHODS

A total of 4,500 patients between the ages of 4-30 years who attended the Dental Faculty, University of Malaya for routine dental treatment were examined for tetracycline — stained teeth. This was accomplished through examination of the teeth. The colour, extent of staining and the types of teeth involved were noted. As an aid to diagnosis, all patients or their parents were asked about previous histories of serious illnesses and drug prescriptions from the time of conception till the age of seven years.

RESULTS

A total of 88 patients (1.96%) out of 4,500 showed evidence of tetracycline staining. Fifty-two (59.1%) of the 88 patients had yellowish-brown stains, 33 (37.5%) had greyish-brown stains and 3 (3.4%) had black stains on their teeth.

Thirty (34.1%) patients had their teeth stained up to the coronal third of their teeth, 40 (45.5%) had up to two-thirds and 19 (20.4%) had total

TABLE I
TYPES OF TEETH INVOLVED WITH STAIN

Types of teeth	No. of Patients
Deciduous teeth	31 (35.3%)
Permanent incisors and first molars	34 (38.6%)
Permanent canines	11 (12.6%)
Permanent premolars	8 (9.0%)
Permanent second and third molars	4 (4.5%)
Total	88 (100%)

involvement of the crowns of their teeth.

The first-erupted groups of teeth were most commonly affected as shown in Table I: deciduous teeth 31 patients (35.3%), permanent incisors and first molars 34 patients (38.6%).

DISCUSSION

Shwachman and Shuster ¹ were amongst the first to write about discoloured teeth due to tetracycline. Since then, there has been a steady addition of papers to the literature on the subject. ^{2,3,4,5} The teeth of children suffering from cystic fibrosis receiving therapeutic tetracycline are known to be severely stained. ⁶

Tooth discolouration can only occur during tooth development. Tetracycline forms a complex with calcium in the crystal surface of bones and teeth resulting in the discolouration. Once deposited, tetracycline leaves a permanent mark in the involved tooth in the form of bands of discolouration of variable thickness and shades which fluoresce under ultraviolet light microscopy. In bone, tetracycline is also likewise deposited, but permanency is not a feature because of the ability of bone to continually undergo remodelling throughout life. Unlike bone, once formed, enamel and dentine do not remodel themselves. Teeth and bones with tetracycline deposits in them do not render themselves superior or inferior to their normal counterparts in terms of strength and ability to resist infection.

If tetracycline-stained teeth are to be avoided, the practitioner needs to know the chronology of tooth development. Tetracycline can only be incorporated into dentine or enamel when it is calcifying. Once the tooth crown is completely

TABLE II
CHRONOLOGY OF TOOTH DEVELOPMENT

Tooth	Dentine and enamel formation begin	Crown formation complete
Deciduous teeth	4th - 6th month pregnancy	2 - 12 months
Permanent teeth:		
Incisors	3 - 4 months	4 - 5 years
Canines	4 - 5 months	6 - 7 years
Premolars	1½ - 2½ years	5 - 7 years
1st molar	Before birth	2½ - 3 years
2nd molar	2½ - 3 years	7 - 8 years
3rd molar	7 - 10 years	12 - 16 years

formed and the calcification process stops, no tetracycline will be taken up. Table II above modified from Schour and Massler ⁷ and Kraus ⁸ gives the approximate times at which the crown of each tooth starts and finishes forming. Hence it can be seen that to avoid staining of all teeth, tetracycline must not be prescribed to the pregnant mother from the fourth month of pregnancy till the child is sixteen years of age. Other common drugs available in the market should hence be employed.

All the deciduous teeth of the child will be stained should tetracycline be given after the fourth month of pregnancy. When given after the child is three months old, the permanent set of teeth will then be affected. Staining due to tetracycline is only important in its aesthetic consideration, and as only the visible teeth (incisors, canines and premolars) of the permanent set are the most vital, the authors recommend abstinence from tetracycline intake only from the fourth month of pregnancy till the seventh year of life. Stained molars do not have any aesthetic significance. Table I shows a high prevalence of staining on the anterior teeth, the first molars and the canines (51.2%). These teeth are affected together because their crowns are formed at almost the same time. The deciduous teeth, though temporary, must not be allowed to be affected as the emotional and psychological effect that it will have on the child would be tremendous.

The prevalence of tetracycline staining of teeth greatly depends on the awareness of dental and medical practitioners regarding the staining properties of tetracycline when prescribing it to their patients. In the present study, the prevalence

is at 1.96% (88 patients out of 4,500). This is a relatively high figure and certainly the incidence may be further reduced in future as more practitioners are aware of this problem. Many (59.1%) suffered from yellowish-brown type of stain, with a much lesser number suffering from the more prominent darker colours. Lighter coloured stain indicates a low dose of tetracycline intake. With increase in the dosage the stain tends to appear darker and even black. The stain is deposited in bands, the thickness of which depends on the duration of intake of the drug. A prolonged and continuous intake that lasts for as long as the calcification period of the tooth crown results in the whole of the said crown to be stained. An intermittent intake results in multiple bands of stain alternating with normal tooth colour. Table II shows that 79.6% of the cases had stains up to two-thirds of their tooth crown area: an indication of prolonged intake of the drug.

The management of tetracycline-stained teeth is entirely in the hands of the dental surgeon. Whilst it is not intended to discuss the treatment in detail, the authors feel that it would be sufficient to mention briefly the methods available to remedy the situation. Anterior teeth which are lightly stained may be bleached with encouraging end-results. Tooth facings of dental materials may also be placed onto the discoloured surface to mask it. The heavily stained or hypoplastic tooth can only be treated with the use of an artificial crown

inserted as a cap over it. Stained posterior teeth, unless otherwise weakened by hypoplasia, are best left alone.

In conclusion, the authors wish to stress that the embarrassment due to tetracycline-stained teeth may be easily eradicated through proper knowledge and understanding of this drug. Abstinence from the use of it during the calcification period of the tooth crown ensures safety from discolouration.

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