

BASICS OF TOOTH STAINING – DIAGNOSIS & MANAGEMENT

1. Dr. R. JAYASRIKRUPAA, MDS

READER, DEPARTMENT OF ORAL PATHOLOGY AND MICROBIOLOGY,
SREE BALAJI DENTAL COLLEGE AND HOSPITAL, CHENNAI
BHARATH INSTITUTE OF HIGHER EDUCATION AND RESEARCH.

2. Dr. LOYOLA WILLIAM

CRR, DEPARTMENT OF ORAL PATHOLOGY AND MICROBIOLOGY,
SREE BALAJI DENTAL COLLEGE AND HOSPITAL, CHENNAI
BHARATH INSTITUTE OF HIGHER EDUCATION AND RESEARCH

3. Dr. N.ARAVINDHA BABU, MDS

PROFESSOR, DEPARTMENT OF ORAL PATHOLOGY AND MICROBIOLOGY,
SREE BALAJI DENTAL COLLEGE AND HOSPITAL, CHENNAI
BHARATH INSTITUTE OF HIGHER EDUCATION AND RESEARCH

4. Dr. KMK MASTHAN, MDS

PROFESSOR & HEAD,
DEPARTMENT OF ORAL PATHOLOGY AND MICROBIOLOGY,
SREE BALAJI DENTAL COLLEGE AND HOSPITAL, CHENNAI. BHARATH
INSTITUTE OF HIGHER EDUCATION AND RESEARCH

CORRESPONDING AUTHOR:

Dr. R. JAYASRIKRUPAA, MDS

READER, DEPARTMENT OF ORAL PATHOLOGY AND MICROBIOLOGY,
SREE BALAJI DENTAL COLLEGE AND HOSPITAL, CHENNAI
BHARATH INSTITUTE OF HIGHER EDUCATION AND RESEARCH.

jayasri.krupaa@gmail.com

Abstract: Dental Stains are pigmented deposits on the tooth surface which are either extrinsic or intrinsic in nature. A dental stain compromises the aesthetics of an individual. Their prevalence may vary through geographic location, age, sex, habit and diet of an individual. Since there are a lot of variation between different types of stains there is a need to classify them for easy diagnosis and management. As dentists, we should be able to diagnose the type of stains and help those patients by providing them with choices to choose the most conservative treatment plan with an aesthetic outcome. This article aims to give an insight into the prevalence, aetiology and classifications of dental stains.

1. Introduction:

Dental stains, the pigmented deposits on the tooth surface are the first dental variations seen which causes aesthetic problems for the patient. They differ in aetiology, appearance, composition, location, severity and degree of adherence to the tooth.¹

The number of people seeking treatment for dental stains has substantially increased. Hence the dentist must be prepared to manage these problems. He should be able to identify the type of stains and its aetiology because it dictates how to manage the condition².

2. Classification:

The causes for dental stains can be classified according to the location of the stains, as extrinsic or intrinsic. Extrinsic stains, as the name suggests, are found on the outer surface of the tooth while intrinsic stain is found within the tooth structure.³

Extrinsic Stains.

Extrinsic discolouration is defined as discolouration located on the outer aspect of the tooth. This staining occurs on the outer aspect of the tooth by penetrating the enamel or when dentin is exposed.⁴

Prevalence:

It has been observed that the prevalence of extrinsic stains increases with age and is found to be higher among men when compared to women.⁵

Predisposing factor:

There are various factors that can modify the occurrence of extrinsic stains like enamel defects, salivary dysfunction, poor oral hygiene, microscopic pits and fissures on the enamel that make the subject susceptible to the accumulation of stain producing beverages, tobacco, and other topical agents.⁴

Aetiology and Classification

Major reasons for the formation of extrinsic stains are:

- a) **Chromogenic bacteria:** These bacteria that are present in plaque, deposits coloured substances onto the tooth surface. Colour of the stains vary from one strain of bacteria to other like green, yellow, blue, black, orange etc. They tend to reoccur after removal.⁴
- b) **Direct staining by food:** It occurs by food substance having a strong colouring characteristic like tea, coffee, berries etc.⁴
- c) **Chemical transformation of pellicle:** The pellicle may be exposed to a variety of denaturing agents under normal conditions like tannic acid that is a natural constituent of various fruit, wines, tea and coffee. Undisturbed adsorption and apposition of glycoproteins forming an extraordinary thick "consolidated" pellicle may also increase the possibilities for extrinsic discoloration.⁴

The causes of extrinsic staining can be further divided into two categories

Direct stains: It has multi-factorial aetiology with chromogen derived from dietary sources or those that are habitually placed in the mouth⁴

Indirect stains: These are caused by chemical interaction at the tooth surface by cationic antiseptics and metal salts. These agents are colourless or of a different colour from the stain they produce on the tooth surface⁴

Depending on elements of origin causing extrinsic staining of the tooth, it is divided into

Non-metallic stain: The non-metallic extrinsic stains are absorbed onto the tooth surface deposits such as plaque or the acquired pellicle. The aetiological agents include.^{2,6}

- i. **Diet:** Tea, coffee, other beverage causing brown to black staining.
- ii. **Habit:** Tobacco and paan causing reddish to brown staining
- iii. **Poor Oral hygiene:** Plaque and calculus causes yellow to brown stain

Metallic stains: It is mainly associated with industrial workers or people consuming drugs based on metal salts. Some metals like copper, iron, fluoride, manganese, silicon, silver, and tin produce characteristic tooth staining.

Various metals and the characteristic colour of stains they produce on the tooth surface.⁷

Copper, Nickel, Mercury, Lead- Green and Blue Stain

Manganese - Violet, Black stain

Tin- Golden brown stain

Silver- Grey stain

Iron- Black stain

INTRINSIC STAINS

These are stains that occur inside the tooth structure that may occur due to incorporation of chromogenic materials into enamel and dentin either before eruption i.e. during odontogenesis (pre-eruptive) or after the eruption (post-eruptive). There are several causes of intrinsic tooth staining which have either an endogenous or exogenous origin. ⁴

Aetiology and Classification

The intrinsic dental stain has been broadly classified into pre-eruptive causes and post-eruptive causes.

Pre-eruptive causes

The teeth may become discoloured from the changes in the quality or quantity of enamel or dentin, or due to deposition of the discolouring agent into the hard tissues during development of the tooth.⁸

- ***Disturbance in tooth germ formation*** It can either affect a single tooth (localised) or can be generalised. Example of localised stain is **Turner's tooth** that is caused by trauma to the tooth during development. ² Developmental stains are seen in case of infections like Cytomegalovirus, Morbillivirus (measles), Varicella-zoster (chickenpox), Streptococcal infections etc. The nutritional deficiency like Vitamins C and D, calcium, and phosphate that are required for healthy tooth formation, lead to enamel hypoplasia. ⁸
- ***Genetic disorder*** It consists of hereditary diseases like Amelogenesis imperfecta (affecting the formation of enamel), Dentinogenesis imperfecta (defect in dentin formation) and Dentin dysplasia. Amelogenesis imperfecta appears bluish brown in colour while Dentinogenesis imperfecta, dentin dysplasia and Epidermolysis bullosa leave a yellowish tinge on the tooth⁹
- ***Metabolic disorders*** It signifies any abnormal chemical reactions in the body that alters the normal metabolic process. In the case of neonatal jaundice, there is an increased level of bilirubin in the body leading to deposition of bilirubin in the developing tooth enamel and dentin. This gives a yellowish discolouration to the tooth.¹⁰ In Congenital Erythropoietic Porphyria, there is increased formation and excretion of porphyrins. Porphyrin pigments have an affinity for calcium phosphate and are incorporated into teeth during tooth formation that causes a characteristic reddish-brown discolouration of the teeth, called ERYTHRODONTIA.
- ***Medication:*** Drugs from the Tetracycline family have been associated with intrinsic tooth discolouration. Tetracycline chelates with the calcium ions on the surface of the hydroxylapatite crystals forming a stable orthophosphate complex. Teeth appear yellowish to brown and also fluoresce under ultraviolet light, giving off a bright yellow colour.
- ***Dental fluorosis*** It is the environmental cause for staining characterized by enamel discolouration resulting from subsurface hypomineralisation due to the excessive

intake of fluoride during the early maturation stage of enamel formation. Clinically mild fluorosis can be identified as faint white lines or streaks on the enamel.

- **Post eruptive cause:** It is a type of intrinsic staining that occurs after the eruption of the tooth
- **Dental condition** The carious lesions can be identified by changes in colour as the disease progresses. The initial carious lesion appears as an opaque, white spot that differs in colour from the adjacent enamel due to increased porosity. It can be identified by air drying the lesion.⁹
- **Pulpal condition** Damage of pulp due to bacterial, mechanical or chemical irritant causes its necrosis which leads to release of disintegration products that penetrate the dentinal tubules that cause staining. Trauma to the tooth may also lead to internal resorption presents as a pink lesion in an otherwise healthy tooth, known as the 'PINK TOOTH OF MUMMERY'.¹¹
- **Dental material** Various restorative materials used in dentistry also lead to staining of the tooth. Eugenol, phenolic and polyantibiotic based materials used during endodontics therapy contain pigments which may stain dentin.⁷ The most common restorative stains which a dentist comes across in his life is amalgam stains that appear as a bluish tinge around the restoration.¹²

MANAGEMENT OF STAINS:

The treatment of tooth discoloration consists of identifying the aetiology and implementing the required therapy. Scaling and polishing of the teeth using prophylactic paste applied with a rotating rubber cup may remove many extrinsic stains. For more stubborn extrinsic and intrinsic stain, various bleaching techniques may be attempted. Bleaching can be performed externally, termed night guard bleaching or vital tooth bleaching or intracoronally in root-filled teeth, called non-vital tooth bleaching.¹³

Teeth discoloured by dental caries or dental materials require the removal of the caries or restorative materials, followed by proper restoration of the tooth. Partial (e.g. laminate veneers) or full-coverage dental restorations may be used to treat generalized intrinsic tooth discoloration in which bleaching is not indicated or in which the aesthetic results of bleaching fail to meet the patient's expectations.¹⁴

3. Conclusion :

The understanding of the pathological process involved in stain formation can help the dentist to explain the cause to the concerned patients. The dentist should analyse the expectation of every patient and treat them for discolouration accordingly. The knowledge shall help the clinician to decide if he will be able to manage the stains or he should refer it to the specialist for rehabilitation of the tooth structure.

4. References:

1. Hattab FN, Qudeimat MA, al-Rimawi HS. Dental discolouration: an overview. *J Esthet Dent* 1999;11(6):291-310.
2. Manuel ST, Abhishek P, Kundabala M. Etiology of tooth discolouration-a review. *Nigerian Dent J* 2010;18(2):56-63.
3. Sulieman M. An overview of tooth discolouration: extrinsic, intrinsic and internalized stains. *Dent Update*. 2005; 32:463-471
4. Eriksen HM, Nordbø H. Extrinsic discolouration of teeth. *J Clin Periodontol* 1978; 5: 229-236.
5. Erickson HM, Nordbo H. Extrinsic discolouration of teeth. *J Clin Periodontol* 1978;5(4):229-236.
6. Prathap S, Rajesh H, Bloor VA, Rao AS. Extrinsic stains and management: A new insight. *J Acad Indus Res* 2013;1(8):435
7. Isaac S, Brudevold F. Discoloration of teeth by metallic ions. *J Dent Res* 1957;36(5):753-8.
8. Amaral TH, Guerra Cde S, Bombonato-Prado KF, Garcia de Paula E Silva FW, de Queiroz AM. Tooth pigmentation caused by bilirubin: a case report and histological evaluation. *Spec Care Dentist* 2008;28(6):254-257.
9. Patel DN. Tooth discolouration. *Medscape*.
10. Siekert RG, Gibilisco JA. Discolor
11. Watts A, Addy M. Tooth discolouration and staining: a review of the literature. *Br Dent J* 2001;190(6):309-16.
12. Wei SH, Ingram MI. Analysis of the amalgam tooth interface using the electron microprobe. *J Dent Res* 1969;48(2):317.
13. Sulieman MA. An overview of tooth-bleaching techniques: chemistry, safety and efficacy. *Periodontol* 2000 2008; 48:148-169.
14. Cutbirth ST. Indirect porcelain veneer technique for restoring intrinsically stained teeth. *J Esthet Dent* 1992; 4:190-196.