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Black's Classification: Isn't It a Time to Switch over to a Comprehensive Caries Classification?

Asaad Javaid Mirza[*] *BDS, MCPS, MDS, FICD*[1], Mohsin Nazir *BDS, MDSc*[2], Maaz Asad Javaid *BDS, MDSc*[3], Shama Asghar *BDS, FCPS*[4], Asghar Shigri *BDS, MPH*[5]
[1]Professor, Dept of Operative Dentistry, College of Dentistry, Baqai Medical University, Pakistan
[2]Sr. Registrar, Dept of Periodontology, College of Dentistry, Baqai Medical University, Pakistan
[3]Assistant Prof. Dept of Periodontology, College of Dentistry, Baqai Medical University, Pakistan
[4]Associate Prof. Dept of Operative Dentistry, College of Dentistry, Bahria University, Pakistan
[5]Professor, Dept of Community Dentistry, College of Dentistry, Baqai Medical University, Pakistan

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***Corresponding author**
Asaad Javaid Mirza

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Abstract: GV Black proposed a classification for recording caries which served the purpose efficiently for almost 100 years. Owing to its inbuilt shortcomings and current knowledge on cariology and induction of modern technology and restorative materials, Black's philosophy has been rendered despondently ineffective. Though various more comprehensive classifications and caries management systems have been evolved but Black's classification remains popular tool for recording of caries worldwide. The similar situation is found among dental professionals in Pakistan. This study was planned with the objective to know the reason for not using other classification systems and awareness about the existence of newer systems among Operative Dentistry / cariology specialists or teachers. A content validated close-ended questionnaire was used as a tool for this survey based study. The questionnaire based on two-point Likert scale with options of "Yes "and 'No" comprising of ten simple queries regarding Black's caries classification was sent personally to all those who showed willingness to participate in the study and was recollected within 15 days. 85% of the participant agreed that Black's classification focuses on treating dental cavities and not the carious process itself and 95% were aware of existence of more conservative modes of caries classification. Majority confirmed that Black's classification isn't compatible with minimal interventional approach to dental treatment. Even then, this is the chief classification that is followed in dental schools in Pakistan. Black's classification isn't well-suited for existing philosophy for caries management and dental profession should switch over to already existing more compatible classification.
Keywords: Black's caries classification, Global caries initiative, Global oral health.

INTRODUCTION

In early 20th century, a legendary American dentist - Greene Vardiman Black proposed a caries classification based on the tooth type and the tooth surface involved [1]. It was the time when caries was considered as an irreversible process and its treatment used to focus on surgical removal of the carious lesion followed by repairing the hole produced as a result of digging the lesion for removal. This classification was warmly welcomed by the dental profession for detecting and recording the carious lesions and was included in the curricula of dental schools for teaching to undergraduate students. It served the purpose efficiently for almost a century as during that period, restorative materials neither had adhesive properties nor had any known therapeutic anticariogenic role [2-4].

Based on fresh understanding of cariology and development of preventive management strategies, Black's philosophy has been rendered miserably ineffective because of the following shortcomings;

- It doesn't remove the cause of the disease [5].
- It identifies carious sites through the existence of cavities but incipient caries remains undisclosed [6].
- It's purely surgical approach for caries control limits the capacity to assess the effectiveness of preventive protocols for the early treatment of caries [7].
- It involves inessential sacrificing of sound tooth tissue to gain access and visibility, to remove all traces of caries, to make space for restorative material, to provide a mechanical retention to the restoration and to extend the cavity to 'self cleansing' areas to avoid secondary caries [8].
- It advocates cavity designs in which reproduction of original tooth morphology is not only very difficult but depends entirely upon the dentists' creative ability [9].

- It merely locates the site of the cavity present but doesn't mention the extent of the lesion.
- It doesn't recognize root caries which has become more prevalent nowadays as compared to Black's era due to increase in average human age [10].
- It leads to a repeated cycle of restoration replacement that result in the restoration increasing in size each time it is changed, leading to eventual loss of the tooth [11].

Dental professionals are consistently in search of a comprehensive classification system which could categorize the site and extent of carious lesions and their activity level that is essential to decide the form of treatment suitable to control and treat caries present in an individual's mouth. It may be therapeutic treatment or operative intervention as per assessment of caries risk in that patient. Several caries classification and management systems have been proposed in this regard.

International Caries Detection and Assessment System (ICADS)

Introduced first in 2004, it is a peer-reviewed, evidence-based and internationally recognized clinical scoring system used to classify dental caries [12] and has been updated as fresh innovations in caries preventive management have shown effectiveness. The process is simply followed as:

- Tooth surfaces are cleaned and visually inspected.
- A blunt probe is used to examine the tooth surface.
- Lesions are scored from 0 to 6.
- Treatment is based on the score.

American Dental Association Caries Classification System (CCS)

In 2008, the American Dental Association convened a group of experts to develop a new caries classification system [13]. Under a good light source, a tooth is air dried and a visual inspection of all of its surfaces is performed, noting any lesion that appear white (chalky) or discolored. A blunt probe is used to evaluate surface texture. For approximal caries, radiographs are recommended. Elastomeric tooth separation is also recommended to help in accurate discovery of interproximal caries.

Mount-Hume Classification System

This Simple to use and aligned to clinical practice classification was proposed by Graham J. Mount; W. Rory Hume in 1998 [14]. It allows the dentist to define the extent and complexity of a cavity and encourages a conservative approach to preserve healthy tooth tissues.

Caries Assessment Spectrum and Treatment (CAST) Index

This straightforward and easy to use caries assessment system covers complete range of stages of caries progression in nine codes from no lesion, sealants and restorations to lesions in enamel and dentine, advanced stages in pulpal and tooth-surrounding tissues and carious tooth loss [15].

Site-Stage (SI/STA) Classification System

It is similar to the Mount-Hume system; it designates the site ("SI") component and stage ("STA") component of the carious lesion. It adds one more stage (Stage zero) for incipient lesions making total 5 stages of caries progression. Mount-Hume system has four stages; from stage 1-4 [16].

International Caries Classification and Management System (ICCMS):

This comprehensive classification has four constituents [17].

Classification - Caries Staging and Assessment of lesion activity
Management - Caries Prevention, Control and Tooth Preserving Operative Care
Caries Risk Assessment
Decision Making

Despite all the demerits Black's classification exhibits and existence of contemporarily evolved above mentioned more appropriate classification systems, majority of the dental practitioners across the globe still uses Black's caries classification and disease management system [18]. Pakistan is no exception. Black's philosophy is not only widely used by clinicians but also utilized in dental institutions for teaching purposes [19]. To the best of our knowledge, no study exists which could reveal the cause of not switching over to currently proposed classification systems and awareness about the existence of such systems by dental clinicians in the country. This study was designed to investigate the awareness about the new caries classification systems among dental fraternity involved in operative dentistry training, practice or teaching. The other objective of the study was to know the reason for continuing use of Black's philosophy.

MATERIALS AND METHODS

Seeking approval from the ethical committee of the institution, a content validated close-ended questionnaire was meticulously designed by the research team keeping simplicity, viability and precision in its words. Respondents did not have to mention the names on the questionnaire (survey form) to maintain their anonymity. The anonymity of the respondents was necessary to for having unbiased responses free from fear of shamefulness in case of wrong answer.

Minimum two-year experience in teaching, post graduate qualification or training in operative dentistry was mandatory to have for an individual to fill

out the survey form. The objective behind this restriction was to have feedback on the issue from those who have considerable insight into the subject as compared to general dentists.

The study sample included N=60 respondents from various teaching institutions using non-probability convenient sampling technique.

The questionnaire based on two-point Likert scale with options of "Yes "and 'No" comprised of ten simple queries regarding Black's caries classification. First five questions were directed towards inbuilt shortcomings present in the classification. Next three queries were about use of Black's philosophy in recording and management of caries in dental schools. The last two questions were concerned about awareness of existence of more comprehensive caries classification and management system and opinion of the respondents to discard Black's principles and adopt currently recommended minimal intervention dentistry in teaching and clinical practices. A pilot study was conducted on 30 post graduate trainees and teachers of operative dentistry prior to the main study to evaluate the feasibility of the study. Twenty five completed survey forms were assessed; the reliability of the questionnaire was assessed through Cronbach's alpha coefficient which showed a high reliability value of 0.966.

The questionnaire was sent personally to all those who showed willingness to participate in the study and was recollected within 15 days.

RESULTS

Of the N=60 participants that took part in the study, the highest qualification for n=43 of them was Bachelor of Dental Surgery, n=10 were FCPS holders, n=5 had an MSc degree and only n=2 carried a postgraduate Diploma. Most of the subjects (83.3%) had more than 2 years of teaching experience in the field of Operative Dentistry. *Figure 1* depicts a percentile pie chart of the frequency distribution of the participants according to their highest dental qualification. For most of the samples, the highest qualification was Bachelor of Dental Surgery with more than two years teaching experience in Operative Dentistry (72%).

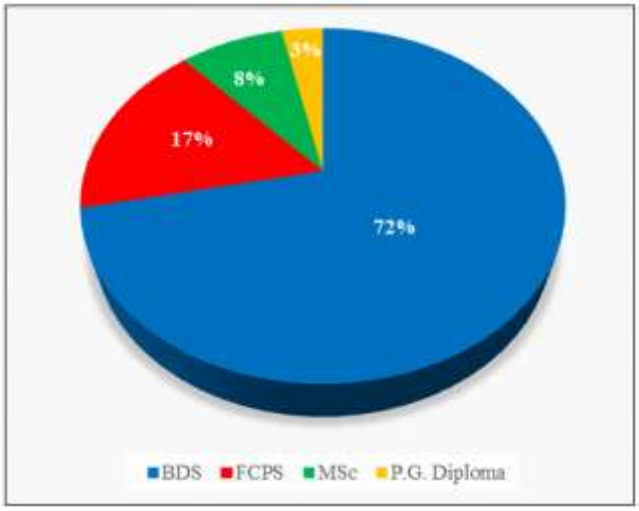

Fig-1: Frequency distribution of participants according to highest dental qualification

When inquired about the invention of G.V. Black's classification and its historical relevance to amalgam fillings only, majority of the subjects showed affirmative responses. All the participants who had a Fellowship in Operative Dentistry answered 'yes' to this query. G.V. Black's classification relies on the cliché 'extension for prevention' which is inadequate for modern dentistry. Of the N=60 dentists, only n=3 supported this ideology. Similarly, n=58 Operative dentists agreed that the size and extent of the carious lesion is not taken into account in the classification either. Analysis through a Chi Square test revealed that X^2 (3, N = 60) = 14.17, p =0.003.

85% of the participants in this study agreed that G.V. Black's classification focuses on treating dental cavities and not the carious process itself. Even a greater number (95%) indicated that there were better and more conservative modes of caries classification available for teaching and clinical recording of caries. Thus leading the majority of the subjects to confirm that G.V. Black's classification is at odds with present day minimally interventional approach to dental treatment. Even then, the results of this study proved that this is the chief classification that is followed in every dental school in Pakistan.

At the undergraduate level, dental students are actually examined on the basis of G.V. Black's classification. Most graduate and postgraduate candidates affirmed this fact through the questionnaire. N=59 of the subjects said that emphasis on minimally

invasive approaches to dental therapy should be practiced and taught in dental schools. A general disagreement to the usage of the G.V. Black's classification in the curriculum and clinical practices was observed.

Statistical Analysis

All data in this study was statistically analyzed using the Statistical Package for the Social Sciences (SPSS) software version 20 (IBM Corporation, Armonk, New York, USA). The Chi Square test was used and the results were expressed in means and percentages. Also, p-value ≤0.05 was considered significant.

DISCUSSION

The presently recommended preventive philosophy of caries management depends on diagnosis of disease risk and early detection of caries which should focus on less invasive strategies including fluoride application, use of antimicrobials, sealant placement and restoration with minimal invasion where necessary [20]. As Black's classification shows inability to record incipient caries, early diagnosis can't be made which makes it desirable to accept a new approach for identification and recording of the lesions caused by caries [21].

All the respondents of this study who were either qualified in specialty of Operative Dentistry or were involved in teaching of the subject definitely have better understanding of the subject than the general dental practitioner. They have superior perception of limitations of Black's cavity designs and caries classification. They all believe that Black's philosophy was good enough for the period of time when silver amalgam was the solitary material for cavity restorations and it doesn't fulfill the need of modern day conception of minimal intervention dentistry. Finding of another such study are similar where the author concludes that "Black's classification was considered to be insufficient in the light of the new technologies and current concepts about minimally invasive therapies" [22, 23]**.**

Regarding awareness about existence of comprehensive caries classification and management system, majority of the respondents was found aware of other classifications suitable for implementation for the purpose. In a 2015 survey of dentists that the National Dental Practice-Based Research Network discovered that more than 70% of respondents were unaware of the ADA CCS [24]. These findings surprisingly contradict the finding of present study. The logical reason behind this ignorance might be the level of dentists' education working for the network. The majority of the participants might either have basic dental qualification and no specialty training in Operative Dentistry or not involved in teaching of the subject. Those who have basic degree and post graduate qualification but are involved in teaching have to go through all currently available material relevant to their field to stay updated.

All the respondents confirmed that during undergraduate dental education, students are bound to follow Black's classification for recording of caries and Black's principles of cavity designs as their curricula demands it. They have to make Black's cavity design as they are clinically examined on that basis and in case of noncompliance or bad performance, chances of examiner's annoyance increases and scoring good marks decreases. This might be the main reason for continuous use of 100-year old classification and cavity preparation principles because the same students become future clinicians. They continue doing what they learnt in their dental school.

Almost all of the respondents opined to switchover to contemporary principle of minimal intervention dentistry as it would persuade the clinicians to decrease the amount of healthy tooth tissue that is often unnecessarily cut in search of the cavity designs recommended by Black.

There is a general need in dental teaching institutions in the country to adopt the concept of the early caries detection resulting in minimal intervention and more prevention. It will develop the ability of undergraduate students to manage the complexity of the caries lesion and apply the frequently changing evidence regarding the management of such lesions in Operative Dentistry. It will also help the dentists in Pakistan to meet the agenda of

International Dental Association's Global Caries Initiative (GCI)

It was launched in 2009 and gave a 10-year plan for implementing a new paradigm for caries management, disease prevention and health promotion with the vision to "improve oral health through execution of a new paradigm for managing dental caries and its consequences; one that is based on uptodate knowledge of the disease and its prevention, so as to deliver optimal oral and thus general health and well-being to ailing humanity [18].

World Health Organization's Global Oral Health Program

It has acknowledged the significance of promoting "a new paradigm among dentists, shifting from a restorative to preventive model [25, 26].

The small sample size is the limitation of the present study. A more representative data can be achieved by incorporating responses from all the general dental practitioners involved in practices, interns working at various dental institutions and final year undergraduate students.

CONCLUSION

Though Black's classification is incompatible with current caries preventive and minimal intervention philosophy but is still used in most of the dental institutions in Pakistan. There is dire need of implementing more comprehensive system through education in dental schools.

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