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Original article

Dental Notation System Used in Dental Teaching in Different Dental Collages

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ABSTRACT

The aim of this study was to find the most commonly used Tooth Numbering System to teach and learn in dental collages in various universities (Benghazi University, Omar Mukhtar University and Libyan International Medical University) by both academic staff and fourth year dental students, to identify the most commonly taught TNS in different dental colleges, to understand the reason why dental staff prefer to use a specific TNS, and the consequences of using more than one TNS. This cross-sectional study was conducted within the dental collages of various Medical Universities. The questionnaire containing 11 questions was randomly distributed to 120 individuals (60 deans of academic staff and 50 fourth year dental students). The palmer notation system was the most commonly used to teach and learn by academic staff and dental students in teaching and practiced in dental collages, while the universal notation system was the least used to teach and learn by academic staff and dental students. As well as the most TNS preferred to use by academic staff and dental students in operative, oral surgery departments and orthodontic department in academic teaching was the palmer notation system while the least TNS use was universal notation system. The Palmer TNS proved to be the most taught TNS in dental colleges in different University. It is advised that the Palmer TNS be implemented as a unified system in my country, due to the advantages of this particular TNS and the benefits of using one single TNS.

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INTRODUCTION

All humans pass through two stages of dentitions. The primary dentition consists of 20 teeth, while the permanent dentition consists of 32 teeth. The age-related variations in tooth presence and location will necessarily need numbering and encoding method for each tooth [1]. Tooth numbering system (TNS) serves as a means for identification, recording and management of dental patients [2]. It specifically identifies the teeth by numbers or alphabets which are used for charting [2]. Incisors, canine, premolars and molars are the dental expressions used for all human teeth [3]. Miscommunication may occur during referral cases between the dentists & between the dentists & clinician in specifying the tooth number, this can cause serious misinterpretation [3]. To avoid these, it is necessary for the dentist to use tooth numbering system that allows accurate teeth identification [4]. The most commonly tooth numbering systems are, Universal numbering system, Federation Dentaire Internationale (FDI) and Palmer notation system, which are frequently used by dental practioner [5].

In 1861, a tooth numbering system was initially proposed by Austrian Dentist Adolf Zsigmondy and was named Zsigmondy Method using a Zsigmondy cross to record quadrants of tooth position [6]. Then American dentist Palmer

described the same method of recording teeth in 1870[6]. Palmer not aware of Zsigmondy's earlier publication and Palmer claimed the authorship of this tooth-numbering system [7]. Therefore, it is generally known as Palmer's notation [7]. This method entered the American Dental culture in 1870, and due to its applicability and effectiveness, it was accepted currently [7]. Though many other systems were introduced after it, it's still widely used worldwide [8].

In this system, Zsigmondy using Roman's numerals I, II, III, IV, V for each tooth from the midline going distally while Palmer changed and substituted this by upper case letters A, B, C, D, E for primary teeth and numbered from 1-8 for permanent teeth [8]. The Maxilla and Mandible are divided into four quadrants, right and left, and upper and lower (for maxillary arch & for mandibular arch) [9].

The advantages of this system are easy to use and understand, easy to record in patient records and radiographic evidence and the main disadvantages are difficult to pronounce and interpret into computer input requires a special software, a private processing editor and takes more space in the patients' files [10]. Federation Dentaire Internationale (FDI) The two-digit system, originally described by Dr. Jochen Viohl of Berlin in 1966, identifies each tooth with two digits [11]. The first digit indicates the quadrant and the second digit refers to the tooth [12]. it is similar to the Palmer system with the difference that here mouth is divided into four quadrants [12]. For permanent teeth, quadrants are numbered 1, 2, 3, 4, starting from the right upper quadrant and ending in the lower right quadrant [13]. Permanent teeth are numbered 1 to 8, the same as the Palmer system [13]. For primary teeth, the quadrants are numbered 5, 6, 7, 8, starting from the right maxillary quadrant and ending at the right mandibular quadrant [14]. Primary teeth are number 1to 5 starting from central incisors [14]. At the 5th annual meeting of the Fe´de´ration Dentaire Internationale (FDI) in 1970 it was proposed that the 2-digit system be used worldwide [15], due to its easy to remember and learn, easy to record and describe, easy to register and print in records, accessible to type in the computer and easily adapted to standard charts, these made it used in general practice, the FDI believed that the 2-digit system met all the requirements for the ideal TNS [15]. This system is now called the FDI tooth numbering system [16].

The FDI tooth numbering system still have disadvantages, the main disadvantages are difficulty in understanding if the number written in FDI or Universal system, e.g., 12 sometimes between two doctors, it can be misunderstood if its tooth number twelve of Universal system or 2 for tooth number and 1 for the quadrant in FDI [16]. Since the primary and permanent teeth are differentiated with the number of quadrants, it can be confusing for new learners to understand if it's a primary tooth or permanent and can mislead the records [17]. Some general practitioners reported they were confused by this system [17]. In the case of deciduous teeth, there can be confusion, which is difficult to memorize [17]. Common mistake in typing was transposition. As far as the FDI numbering system is concerned, there is a world of difference between tooth number 32 and tooth number 23 [16]. Universal/ADA System This method of tooth numbering was proposed by the American Dental Association in 1968 [16]. Although it is called the universal system, it is widely only used in the USA and parts of Canada. In this method, Permanent teeth are numbered as 1 to 32[17]. Counting starts from the third molar of right maxilla and ends in the third molar of right mandible [17]. In Primary teeth, the numbering is done using the English alphabet's capital letter A to T. 'A' is the letter indicates to the second molar of right maxilla, and 'T' is the letter indicates to the second molar of right mandible [17]. The advantages of this system are convenient to write, convenient to record in the patients' records and every tooth has a separate number [17]. The main disadvantages are the necessary for memorizing 32 digits and 20 characters and associating these 52 unrelated symbols with individual teeth, difficult to count tooth without a picture present mainly in the absence of third molar, need skill and training to build a habit of correct counting, in Primary Dentition, especially during Mixed Dentition, counting is difficult, and there is no midline differentiation [18,20].

Different notation systems are preferred in the different parts of the world, FDI system most commonly used within European region [19,20]. Whereas Universal numbering system is more common in the Canada and US [19,21]. Additionally, Palmer notation is popular in Great Britain and Asian countries [19,23].

None of the studies conducted have focused on analyzing the most commonly tooth numbering system teach in various dental colleges in my country. The main purpose of the current research was to detect the most preferred tooth numbering system used in teaching by final year students and Academic Stuff to identify a particular tooth while working in the dental departments at Benghazi university, Libyan International Medical University and Omar Al-Mukhtar University.

METHODS

This is a cross sectional study was conducted over the dental staff and the students of 4th year B.D.S in various University of Dental Colleges, over a period of 6 months from during summer 2023. The students of 1st and 2nd year BDS were excluded as they did not visit the Dental OPD, while 3rd year visited the OPD partly and did not visit all the clinical departments hence were excluded as well.

The survey questions were written by the authors and based on prior literature and some questionnaire utilized for this study was modified from the previous reported study but the setting was performed according to our dental collages.
The ethical approval of the study was obtained by the ethical review committee of Benghazi University of Dental College (0185). The survey required 5 minutes for completion. There were two final versions of the questionnaire: one for academic staff and one for fourth year dental students.
The questionnaire was compromised of 11 questions for academic staff and dental students. The questions focused on five areas: (1) information about age, gender and the name of university (2) the specific TNS used in teaching or learning and the reasons for its use, (3) opinions regarding what TNS easiest to teach and understanding in dental collage (4) the suggested TNS to be used for academic teaching, (5) is it important to teach or learn all three TNS in dental collages?

RESULTS

A total of 120 questionnaires were gathered from both academic staff and fourth year dental students from different university in my country with a response rate of 50% for academic staff and 40% for dental students
The response rate from Benghazi university (70.8% from dental students 90% from academic staff), while the Omar Mukhtar university the participated were (22.9% from dental student, 7% from academic staff), and (8% from dental students, 3% from academic staff) were participated from Libyan International Medical University (table 1).

Table 1. Distribution of staff & students in different university

Variable	Benghazi university	Omar Mukhtar university	Libyan International Medical University
Distribution of students	70%	22%	8%
Distribution of academic staff	90%	3%	7%

In academic staff survey the female participant were 80% and the male participants were 20% (figure 1), while in fourth year dental students survey were 53% male and 46%femal (figure 2).

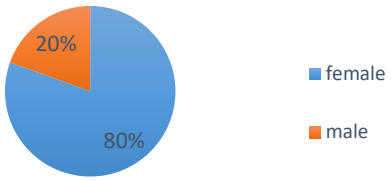

Figure1: Gender Distribution In Academic Staff

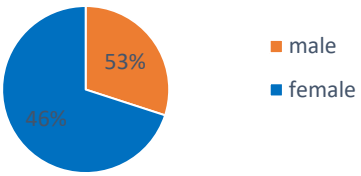

Figure2: Gender Disturbution Of Dental Students

The academic and the dental students who participates in this study responded to the survey questions as follows: in academic staff survey the palmer notation system was the easiest to teach & understand in academic teaching for both permanent and primary dentition (81%)**,** while the Universal TNS was the least easy to teach & understand in academic teaching (5%).
In fourth year, dental students survey, the palmer notation system was the easiest to learn & understand in academic teaching for both permanent and primary dentition (83%), while the Universal TNS was the least easy to learn & understand in academic teaching (8%) (table 2).

Table 2. the easiest TNS used by students &staff

Volume	Palmer notation system	Universal notation system	Two-digit system (FDI)
The most TNS easiest to learn by students	83%	9%	**8%**
The most TNS easiest to teach by academic staff	80%	5%	**15%**

The most commonly TNS used by academic staff and dental students in teaching and practiced in dental collages was the palmer notation system, 57% for academic staff and 79% for dental students while the least TNS used by academic staff and dental students was the universal notation system (11.5%, 9%).
The most TNS preferred to use by academic staff and dental students in operative and oral surgery departments in academic teaching was the palmer notation system (86%,66%), while the least TNS use was universal notation system (6%,14%). The most TNS preferred to use by academic staff and dental students in orthodontic department in academic teaching was the palmer notation system (82%,72%), while the least TNS used by academic staff was universal notation system (3%) and FDI was the least TNS used by dental student (8%).
All academic staff said that's important to teach all three TNS to the dental students in dental collages but only one TNS is used for patient records.
Most of the academic staff (76%) and dental students (72%) reported a specific reason for choosing only one TNS use in teaching in dental collages because of ease of use in communication in dental collages (Figure 3,4). The dental staff (70%) and dental students (14%) agreed that the use of different TNS within one dental collage leads to dental confusion in teaching in dental school.

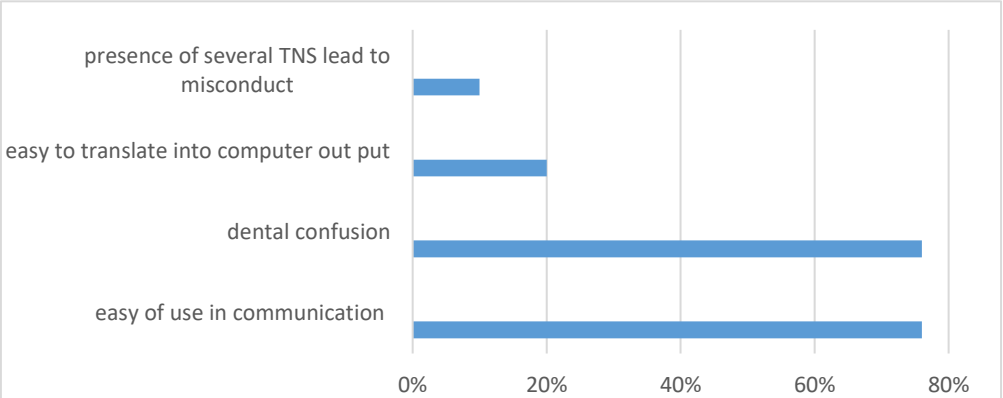

Figure 3. Reasones For Using One TNS By Academic Staff

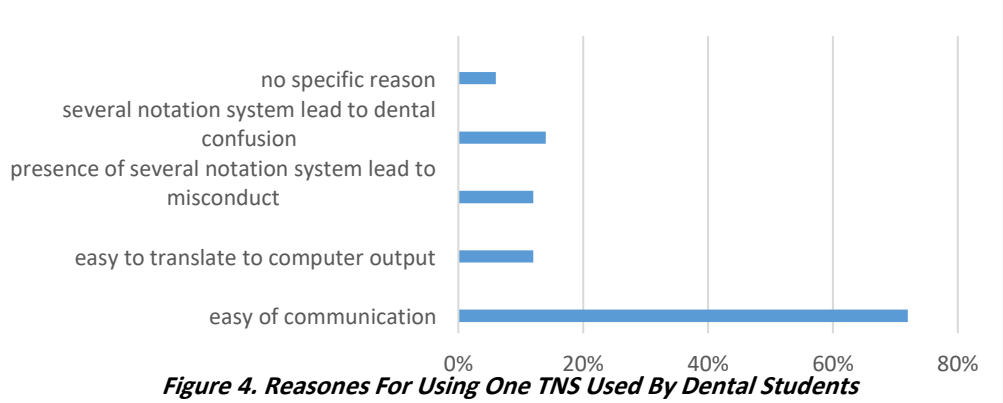

Figure 4. Reasones For Using One TNS Used By Dental Students

Most of the academic staff and dental student said there is no need to introduce a new tooth notation system other than these ones already use in dental teaching and practices in dental collages.

DISCUSSION

In our paper, the focus of attention was on detect the most preferred tooth numbering system used in teaching by final year students and Academic Staff to identify a particular tooth.

After a thorough assessment of the literature, researchers developed their own questionnaire. We distributed and gathered questionnaires from Benghazi University, Libyan International Medical University, and Omar Al-Mukhtar University in order to ensure that our findings accurately reflected participants' opinions about all these systems.

The results of questionnaire done in this paper show that the palmer notation system was the most commonly used by academic staff and dental students in teaching and practiced in dental collages, with 57% for academic staff and 79% for dental students, while the universal notation system was the least used by academic staff and dental students (11.5%, 9%). As well as the most TNS preferred to use by academic staff and dental students in operative, oral surgery departments and orthodontic department in academic teaching was the palmer notation system while the least TNS use was universal notation system. Similar findings were reported in a previous study by Khan 2020 who reported that Palmer Notation system (85%; n = 175) was the most often used tooth numbering method. It was followed by the FDI system (10%; n = 20) and the Universal Numbering system (5%; n = 10) [23].

According to a survey of academic staff, the Palmer Notation System was found to be the easiest for teaching both permanent and primary dentition (81%). As well, in a survey of fourth-year dental students, the palmer notation system was the easiest to acquire and understand in academic teaching for both permanent and primary dentition (83%). This is consistent with other research, which found that Palmer Notation System is easy to apply, easy to record, and easy to understand [24,25] According to divergent findings from a UK study, the Palmer method is mostly utilized by dentistry colleges for clinical diagnosis and treatment planning since it facilitates the rapid coding of many teeth [26].

The Palmer Tooth Numbering System is recommended by the WHO and other major health organizations. Nearly 99% of the participants agreed that the department of Health and the dental colleges should share the duty of unifying and standardizing the Tooth Numbering System throughout the country [27].

Also, all academic staff agreed that it is critical to teach all three TNS to dental students at dental colleges, but only one TNS is utilized for patient records. These results are consistent with Al-Johany 2016 who found that the majority of the study's participants preferred that dentist be aware of and informed about all three TNS while using a single TNS for patient records.

While the most of academic staff (76%) and dental students (72%) stated that they choose just one TNS for teaching in dental collages because to its ease of use in communication. The usage of several TNS within a single dental collage could be cause dental confusion in teaching at dental school, according to survey of academic staff (70%) and students (14%). These results agree with Al-Johany 2016 [28] study who represented that, about 95% of survey participants agreed that employing several TNS produces communication challenges and misunderstandings, particularly amongst practitioners at different dental clinics. Miscommunication may result in the extraction of an incorrect tooth.

The majority of the academic staff and dental students in our study stated that there is no need to create a new tooth notation system other than those presently used in dental teaching and practices in dental colleges. On the other hand, our findings contradicted with Erfan, et al. 2022 [29] who found that globally, there is a demand for simple and up-to-date recordkeeping systems that save time and are efficient in both electronic and print formats.

Finally, maintaining uniformity in dental record keeping is one of the most important requirements. In Libya, there is also limited data available. Further study with large sample size covering most dental colleges is required in this area.

CONCLUSION

The Palmer tooth numbering system is widely used for both primary and permanent teeth in academic and non-academic settings. The majority of participants felt that the Palmer tooth numbering system should be used as the standard tooth numbering system, and there was no need to establish a new teeth notation system.

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إستخدام أنظمة تدوين الاسنان في تدريس طب الاسنان في مختلف الكليات الطبية

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المستخلص

هدفت هذه الدراسة الي العثور علي نظام ترقيم الاسنان الأكثر تعاملا في تدريس في مختلف كليات الاسنان في جامعة بنغازي وجامعة عمر المختار و جامعة الدولية للعلوم الطبية من قبل أعضاء هيئة التدريس و طلاب الاسنان في السنة الرابعة ولفهم السبب الذي يجعل أعضاء هيئة التدريس يقضل استخدام نظام ترقيم واحد و عواقب استخدام اكثر من نظام ترقيم واحد . المواد و الطريقة: أجريت هذه الدراسة المقطعية داخل كليات الاسنان في مختلف الجامعات الطبية و تم توزيع الاستبيان الذي يحتوي علي 11 سؤالا بشكل عشوائى علي 120 فرد (60 أعضاء هيئة التدريس و 50 طالبا في السنة الرابعة)ز النتائج: كان نظام التدوين بالمر هو الأكثر استخداما لتدريس و التعلم من قبل أعضاء هيئة التدريس و طلاب طب الاسنان , في حين كان نظام التدوين العالمي هو الأقل استخداماللتدريس و التعلم من قبل أعضاء هيئة التدريس و طلبة السنة الرابعة.و كان النظام الأكثر استعمالا في قسم جراحة الفم و التقويم و الحشو هو نظام بالمر بينما الأقل استخداما هو نظام التدوين العالميز الاستنتاج: اثبت نظام بالمر انه النظام الأكثر شيوعا في التدريس في مختلف كليات الاسنان في الجامعات الطبية و ينصح بتنفيذ نظام بالمر كنظام موحد في مختلف كليات نظرا لمزايا هذا النظام و فوائد استخدامه.

الكلمات الدالة. التدوين، نظام ترقيم الأسنان (TNS)، FDI، بالمر، النظام العالمي.