Comparison of two systems of tooth numbering among undergraduate dental students

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ABSTRACT

Background: Dental charting is the basis of treatment in dentistry. It should be recorded to know the presence of healthy or diseased, for communication purpose with the colleagues and also used for reference purpose. The three commonly used systems are universal system, Federae Dentale Internationale numbering system (FDI) system, and Palmer/Zsigmondy system. Although these systems are in practice there are lot of confusions in referring a tooth which leads to mismanagement which eventually terminates the clinician-patient relationship. Hence, a growing need of a new system to make dental charting simple, easy, and to avoid confusions is always present. Molar, incisor, canine, Akram, premolar (MICAP) a tooth numbering system that was introduced by Akram et al. in the year 2011.

Aim: To assess the attitude of undergraduate students toward the MICAP system and their preference to use in identification of teeth.

Materials and Methods: The undergraduate students who were involved in the study were briefed about the ICPM system through a lecture and demonstration. All the 155 undergraduate dental students were asked to number the teeth of given patients using both FDI and the ICAP system. The attitude of the students towards the new system was assessed using a validated questionnaire. Forty-one percentage of students agreed for the uniqueness of the system, and thirty-six percentage agreed that the system was easy to understand. Forty-six percent of students were unsure about the easiness of usage of MICAP system and 42% of students about the clinical applicability of MICAP system.

Conclusion: MICAP system of tooth identification can be followed by the students if the system is included in the curriculum and repeatedly used for routine teeth identification.

Key words: Federae dentale internationale numbering system, molar, incisor, canine, Akram, premolar, tooth numbering system, Undergraduates

Tooth notation is used as a guide in dental and periodontal charting. Most commonly used systems are Federae Dentale Internationale (FDI) system and universal system. Poor communication between the dentist in referring the tooth leads to error. All the existing systems of tooth notation have its own advantages and disadvantages, but there is a need to establish a new system which is simple, user-friendly for students and practitioners. Although FDI system is very simple and accurate but in case of deciduous teeth, there can be confusion, and it is difficult to memorize. Similarly, in the universal system of tooth numbering, it is difficult to memorize the tooth numbers and there is no midline differentiation. Hence, new systems such as molar, incisor, canine, Akram, premolar (MICAP) and Havale’s alphanumeric dental notation for primary teeth have been introduced recently.

FDI is a two-digit numbering system which is widely used in many countries. In this system, among the two digits the first number represents the quadrant (1-4) starting from upper right, upper left, lower left, and lower
right and the second number represents the tooth (1-8). MICAP is a new system to record and communicate dental and periodontal problem. The abbreviation of MICAP is derived from where M=molar, I=incisor, C=canine, A-Akram (family name of the dentist) and P-premolar.

Molar, incisor, canine, Akram, premolar tooth notation for permanent teeth
Permanent teeth are designated by the first letter of their names I-incisor, C-canine, P-premolar, and M-molar. These are called ANAASEA letters which stand for the continents Asia, North America, South America, Europe, and Africa as people in these continents have same tooth type. Then, the digits allotted for each teeth as are incisor 1, 2, canine 1, premolar 1, 2, molar 1, 2, 3. These digits are named as TOTT which stands for two incisors, one canine, two premolars, and three molars. Each ANAASEA letter is divided into four quadrants, and TOTT digits are written in superscript in case of maxillary teeth and subscript in case of mandibular teeth.

\[21\ 12\ 1\ 1\ \ 21\ 12\ 321\ \ 123\]

\[
\#\ I\ \ #\ C\ \ #\ P\ \ #\ M
\]

\[21\ 12\ 1\ 1\ \ 21\ 12\ 321\ \ 123\]

If a referral note contains information as 45 - extraction, 21 - composite filling, and 35 - RCT, it can be written in MICAP notation as \(2\ P\ -\ extraction, \ I^1\ -\ composite\ filling,\ and\ P_2\ -\ RCT.\)

Molar, incisor, canine, Akram, premolar tooth notation for deciduous teeth
The digits are for incisor 1, 2, canine 1, molar 1, 2 respectively. These TOT digits stand for two incisors, one canine, and two molars. In deciduous teeth, additional letter “d” is always written in the left side of the sign # to denote primary dentition.

\[21\ 12\ 1\ 1\ \ 21\ 12\]

\[\#d\ I\ \ #d\ C\ \ #d\ M\]

\[21\ 12\ 1\ 1\ \ 21\ 12\]

If a referral note contains information, 53 - GIC restoration and 75 - extraction it can be written \#d'C - GIC restoration and \#dM_2 - extraction.

Mixed dentition is written in molar, incisor, canine, Akram, premolar as

\[21\ 12\ 1\ 1\ \ 1\ \ 21\ 12\]

\[
\#\ I\ \ #d\ C\ \ #d\ P\ \ #\ M
\]

\[21\ 12\ 1\ 1\ \ 1\ \ 1\ \ 21\ 12\]

In recent times, it is seen that that dental practices, institutions, and organizations are digitalizing patient records. However, the MICAP system has not been used or evaluated in India. Hence, this study was conducted to assess the attitude of undergraduate students toward the MICAP system and their preference to use in identification of teeth.

Null hypothesis
Students will not prefer the new tooth numbering system.

MATERIALS AND METHODS
Clearance from Ethical Committee was obtained from Saveetha University (SRB/STUG15/76). The present study was conducted between January 2015 and May 2015 at Saveetha Dental College. A pilot study was conducted which involved 20 undergraduate students to assess the ability of the examiner to educate the participants regarding both FDI and MICAP system as well to see if the pro forma and questionnaire was understandable to the participants. This questionnaire was obtained from a similar study done in Malaysia. It has closed-ended questions based on 5-point Likert scale (5 = strongly disagree, 4 = disagree, 3 = not sure, 2 = agree, 1 = strongly agree). It was observed that the students were able to utilize the pro forma and able to understand the questions without difficulty. A trained single examiner carried out the study, and an intraexaminer reliability was carried out in the pilot study. Intraexaminer reliability was checked with repetition of tooth numbering in twenty patients. Intraexaminer reliability data demonstrated a mean percentage agreement of 100% and a kappa coefficient of 1.00 indicating good reliability. It was estimated that 145 participants would be needed to assess the usage of MICAP system (\(\alpha\) error = 0.05, power = 90%). All undergraduates students including the 3rd year, final year, and internship students were included in this study. To avoid a possibility of rejection of response from the participants, a total of 155 students were involved in the study. The students were informed about the purpose of the study, and an informed written consent was obtained from the participants. The patients who participated in the study were also informed about the study and consent was obtained from them. The study consisted of two parts. In the first part, the students were given a lecture and demonstration about FDI and MICAP system and a demonstration was done by the trained calibrated examiner. The students were asked to record the teeth of their patients both in FDI and MICAP system. The patients were either completely dentulous or partially edentulous. One of the authors assessed the accuracy of teeth identification in both the systems. The obtained data were entered in SPSS version 18 (SPSS Inc. Released 2009. PASW Statistics for Windows, Version 18.0. SPSS Inc., Chicago)
and was subjected to statistical analysis. A Chi-square analysis was done to compare between the responses given by students studying in different years ($P < 0.05$ considered statistically significant).

RESULTS

A total of 155 students participated in the research with 64 3rd year students, 42 final year and 49 interns. It was seen that all the students had correctly identified and depicted the dentition in both the tooth numbering systems.

A descriptive analysis [Table 1] showed that of the 155 students that 30% of students agreed, and 6% strongly agreed that MICAP system was easy to understand. However, (41%) of them were unsure about the uniqueness of the system and 46% of the students were unsure whether the MICAP charting was easy or not. However, it was observed that all the students identified and translated the teeth in MICAP system with accuracy. Forty-two percent of the students were doubtful about the clinical usage of MICAP system.

A comparison of responses of students between the years [Table 2] was evaluated using Chi-square test. A statistically significant difference was seen in response to the question whether the content of MICAP system was unique. 32.8% of 3rd years had disagreed that content of MICAP is unique. Similarly, a statistically significant difference was seen in usage of MICAP in clinical practice. More number of interns (55.1%) were not sure whether the new tooth numbering system (TNS) could be used in clinical practice.

DISCUSSION

Dentists are mainly sued because of improper communication on tooth notation with their colleagues. Three notations are used all over the world-FDI, Palmer, and universal system. In the UK, most of the dentist prefer Palmer notation, but many others suggest FDI system. Studies state that errors made in making and replying to the referral notes are due to different tooth notation system that are being practiced which leads to confusion and malpractice. For instance, different numbers for the same tooth may complicate the clinical scenario. For example, #14 is maxillary right first premolar (FDI system), and the same digit is maxillary left first molar (universal system). Maxillary right first premolar in the universal system is #5, and same tooth is #4 in the Palmer notation. In addition, the universal system does not have a demarcation of midline and both universal and FDI system are confusing to use in primary dentition. MICAP is simple and provides a unique identification and differentiates clearly from other existing systems.

Table 1: Students opinion on MICAP system

| Statement                        | Strongly disagree | Disagree | Not sure | Agree | Strongly agree |
|----------------------------------|-------------------|----------|----------|-------|---------------|
| MICAP is easy to understand      | 15 (10%)           | 30 (19%) | 54 (35%) | 46 (30%) | 10 (6%)        |
| MICAP is unique in its content   | 4 (3%)             | 38 (24%) | 64 (41%) | 45 (29%) | 4 (3%)         |
| Dental charting is easy by MICAP | 6 (4%)             | 48 (31%) | 72 (46%) | 28 (18%) | 1 (1%)         |
| M (MICAP is applicable in clinical practice) | 16 (10%)           | 44 (29%) | 65 (42%) | 28 (18%) | 2 (1%)         |

Table 2: Comparison of responses between third year, final year and interns regarding MICAP system

| S.NO | Question                        | Type of consent | Third year | Final Year | Intern | % N<sub>P</sub> |
|------|--------------------------------|-----------------|------------|------------|--------|----------------|
| 1    | MICAP is easy to understand     | Strongly disagree | 6          | 9.3        | 4      | 9.5           | 5 | 10.2 | 0.819 |
|      |                                | Disagree         | 14         | 21.9       | 8      | 19.0          | 8 | 16.3 | 0.301 |
|      |                                | Not sure         | 21         | 32.8       | 15     | 35.7          | 18 | 36.7 | 0.607 |
|      |                                | Agree            | 19         | 29.7       | 12     | 28.5          | 15 | 30.6 | 0.447 |
|      |                                | Strongly agree   | 4          | 6.3        | 3      | 7.3           | 3 | 6.2  | 0.905 |
| 2    | MICAP is unique in its content  | Strongly disagree | 3          | 4.7        | 1      | 2.3           | 0 | 0    | 0.317 |
|      |                                | Disagree         | 21         | 32.8       | 7      | 16.6          | 10 | 20.4 | 0.014 |
|      |                                | Not sure         | 20         | 31.3       | 21     | 50.0          | 23 | 46.9 | 0.896 |
|      |                                | Agree            | 19         | 29.7       | 11     | 26.1          | 15 | 30.6 | 0.344 |
|      |                                | Strongly agree   | 1          | 1.5        | 2      | 5.0           | 1 | 2.1  | 0.779 |
| 3    | Dental charting is easy in MICAP| Strongly disagree | 3          | 4.7        | 3      | 7.1           | 0 | 0    | 1.000 |
|      |                                | Disagree         | 20         | 31.3       | 13     | 31.0          | 15 | 30.6 | 0.444 |
|      |                                | Not sure         | 32         | 50.0       | 16     | 38.1          | 24 | 49.0 | 0.069 |
|      |                                | Agree            | 9          | 14.0       | 9      | 21.5          | 10 | 20.4 | 0.965 |
| 4    | MICAP is applicable in clinical practice | Strongly agree | 0           | 0          | 1      | 2.3           | 0 | 0    | N/A   |
|      |                                | Disagree         | 18         | 28.1       | 16     | 38.1          | 10 | 20.4 | 0.307 |
|      |                                | Not sure         | 25         | 39.0       | 13     | 31.0          | 27 | 55.1 | 0.051 |
|      |                                | Agree            | 11         | 17.4       | 8      | 19.1          | 9  | 18.3 | 0.779 |
|      |                                | Strongly agree   | 9          | 1.5        | 2      | 2.3           | 0 | 0    | 1.000 |

* P<0.05 considered statistically significant
The learning and assessment of usage of new TNS among undergraduate students was undertaken as they can learn and practice both currently used tooth notation and new TNS as part of their clinical skill training. Both the FDI and the MICAP system of tooth numbering was taught through lecture and demonstration to a maximum of ten students in one session. Microteaching allows learning each skill to the maximum extent as there is a chance of listening, observing, and practicing.[9]

The MICAP system is a self-explanatory tooth numbering system. Numbers 1, 2, 3 printed along with letters I, C, P, and M as superscript and subscript represent upper and lower teeth, respectively. Writing digits as superscript and subscript is a simple procedure and can be understood easily by all.[10] The alphabets used indicate the teeth class which is universally used standard terminologies to name the teeth, and the numbers indicate the first, second, or third tooth of that tooth class.[11] Hence, it is not essential to memorize the alphabets or numbers individually for the system. This was also observed in this study as all students made no mistakes in identifying the teeth in MICAP system. In the MICAP system, since superscripts and subscripts are written on either side of the alphabet, the direction of writing will not be a concern as in the case of FDI system where we write from left to right for right quadrant and vice versa for the left quadrant. There are pros and cons of each system, but each country or region have adopted a particular system. As a new knowledge, MICAP fulfills the identification of teeth. However, it is essential to assess the acceptability of this tooth numbering system across various countries of the world.

Although in this study, all the students had written the tooth numbering in the MICAP system accurately, most of them were neutral to the fact that the MICAP system is easily understandable, its applicability in clinical practice and its uniqueness in its content unlike in previous research.[9] This difference could be attributed to the fact the undergraduate students were used to the FDI system of tooth numbering, and they were not able to comprehend the new method.

More number of 3rd year students felt the MICAP system was unique unlike a final year and intern students as 3rd year students have just entered the clinics when compared to final years and interns who have been using the FDI system for 2 years. As well, interns were more unsure of the MICAP system usage in clinical practice than the 3rd and the final years. Hence, if MICAP was introduced in the curriculum in the beginning of their dental education, the students could have felt the MICAP is a possible way of dental charting and can be used in clinical practice. Similarly, it was seen in a study done in Selengor[11] that younger generation was able to adapt to the system.

A direct comparison could not be made to previous studies as the method to assess the perception of students was different apart from the questionnaire used. In the previous study,[3] the tooth numbering was done using only the MICAP system. In this study, both FDI and MICAP system was used for teeth identification. In both the studies, it can be seen that more number of students have agreed to the MICAP system being easier to understand, its uniqueness in content and its applicability in clinical practice when compared to those who have not agreed. It can be observed that in this study the percentage of students who agree to the new TNS when compared to previous studies[3,11] is lesser. This could be attributed to the difference in the sample size in the two studies, or the participants of this study were more likely not interested in exploring the new system as it is not included in the curriculum.

However, it can also be seen from the present research that though the MICAP system is new, it is well adopted by the students with a one-time training. A skill that is learnt becomes an habit when it is adopted to regular practice.[12] In addition, it is also observed in the present study that the new TNS was not completely rejected by the students. Therefore, the null hypothesis is disproved. Hence, the present study is a step toward learning of the new format by prospective users which could be an alternate dental charting method.

**CONCLUSION**

MICAP system is a new tooth numbering system that can be learnt by the undergraduate students and can be used in future dental practice. As well-experienced dentists can use the system if they are interested to adapt the system into their practice.

**Limitation of the study**

A larger number of participants should have been involved in the study. To assess the opinion regarding MICAP system among the students and to test the reliability of the system.

Primary teeth identification by MICAP system was not done. It should be done in future research.

Experienced graduates can be involved in future studies to assess the applicability of MICAP system in clinical practice.

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**Conflicts of interest**

There are no conflicts of interest.

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