Introducing CALP (Computer assisted learning program) in Oral Medicine

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**Abstract**

**Purpose**
Theoretical concepts are taught to the students in classroom teaching but diagnosing and managing patients in clinical practice requires application of that knowledge as well as critical thinking ability. Final year dental students are often confused by the variation in the clinical presentation and co-relation of theoretical descriptions of white lesions of oral mucosa. Additionally some white lesions described in the text book may not be seen in short clinical postings. Considering the need, case based Computer Assisted Learning Program (CALP) was developed for better Knowledge, diagnosis and treatment planning of White Keratotic Lesions (WKL).

**Materials and method**
Fifty final year dental students were introduced to CALP. The evaluation of CALP was planned after completion of tutorial on WKL of oral mucosa. Tutorials were followed by two days of self reading of the topic covered in class. Students had to appear for multiple choice questions test (recall and application type) with forty five items, based on WKL before CALP session. The CALP session was immediately conducted and fifty students included in the study were allowed to operate CALP separately in Digital library. CALP was designed to show a clinical picture of WKL which is supplemented with all details required of case to arrive at a diagnosis. Post test incorporated into CALP had the same MCQs that were asked in the pre test. Score of post test were displayed on the screen only after attempting all questions. CALP was designed to give correct answers with explanations along with appropriate treatment plan of given case, after the MCQ test.

Feedback of students was noted through discussion which was a combination of their reflection about self reading and experience of CALP. The questionnaire about CALP experience was a combination of open and closed ended questions about CALP. The scores of pre and post CALP
tests were compared.

Result
Computerized case based diagnosis and management program was well perceived by the students. There was significant improvement in student's knowledge in decision making skills after using the program. Program was experienced as, informative, innovative, enjoyable, and useful. Students also shared that they valued the opportunity to interact with the teachers and realized the importance of self directed learning. They felt benefitted in terms of better memory, recall, more efficient studying practice and better organization of thoughts due to case based learning. However, the students expressed that few more topics should have been taught through CALP. During this project we learn that students do accept innovative ideas by teachers. Adjunct teaching tools so can be used to enhance student's interest in the learning.

Conclusion
Computerized case based diagnosis and management program was well perceived by the students. There was significant improvement in student's knowledge in decision making skills after using the program. It can thus be envisaged as an adjunct to conventional teaching methods to improve students' confidence and performance in clinical practice.

Keywords: CALP, Oral Medicine

Introduction

The first use of computers as an instruction tool in the dental profession was reported when computer assisted learning was developed as a part of dental curriculum at the university of Kentucky. CAL provides an effective way of learning or simply it can be defined as the learning procedures and environments facilitated through computers. Learning programs designed usually evaluates the students' diagnosis depending on what facts have been accessed. Several studies have shown that group of students who are using CAL have better results than group using only traditional learning. It has got few major advantages over conventional methods of learning. It is time saving, motivating, interesting, and requires much less time to achieve the same performance. There are wide variety of CAL programs available in subjects, orthodontics, prosthodontics, periodontology, and endodontics.

Beginners are often confused by the variation in the clinical presentation and theoretical descriptions of white lesions of oral mucosa. Theoretical concepts are taught to the students in classroom teaching but managing patients in clinical practice requires application of that knowledge as well as critical thinking ability.

The need of CALP in Oral Medicine for improvement in overall performance of students was felt necessary. This study is directed towards introduction of case based computer assisted learning in Oral Medicine with the objective to enhance student's positive attitude and interest towards learning in the subject.

Hypothesis

Only theoretical teaching is not sufficient to learn oral mucosal lesions. During clinical practice final year BDS students may not get exposed to each and every type of WKL. Few rare and sometimes common WKL lesions become difficult for them to diagnose and treat as well. The case based CALP can be used as an adjunct to conventional classroom and clinical teaching to improve students’ knowledge, diagnostic and management skills of WKL. Introducing computer assisted learning in Oral medicine would be a good Teaching-Learning method for
BDS students.

**Aim and Objectives**

**Aim:**

To introduce and evaluate CALP in oral medicine to guide dental students to diagnose and treat WKL.

**Specific Objectives:**

1. To assess students knowledge, diagnostic and management skills of White lesions.
2. To motivate students for self directed learning and to develop interest in the subject.
3. To assess CALP with the help of student’s feedback.

**Methodology**

The project was carried out with fifty final year BDS students from V.S.P.M's Dental College and Research Centre, Nagpur, India. All 50 students who attended the tutorials on WKL were included for CALP session. The informed consent was obtained from students. Two days of self reading of the topic (already covered in tutorials) was advised for better application of theoretical knowledge while using CALP. Pre-CALP test with validated MCQ paper including fifty questions was carried out. The functioning of software was explained briefly before session. Students were directed to use case based computer assisted learning program separately at the same given time. After using the program, the data of post-CALP MCQ test was collected. CALP was evaluated by using validated and pilot tested questionnaire given to the students. The questionnaire was combination of open and closed ended questions. The group discussion carried out with the students after CALP session. The experience about classroom teaching supplemented CALP was shared by the students and the feedback of facts was noted.

The program designed was a unit of nine cases of white keratotic lesions. Followed by pictorial and necessary case details, multiple choice questions were asked after each case. After selecting answers, program gives the final score to operator at the end of each case. Last part of it is showing expert answers with possible explanations and best treatment plan for the pathology.

**Implementation**

**Planning:**

- Permission was obtained from the Dean of the Institute and Head of Department to conduct this Project.
- Case based computer assisted learning program was developed.
- Permission to carry out the project and ethical approval was sort by the Institutional Research Approval Committee.
- Student informed consent forms were prepared.
- Adequate copies of validated questionnaire (CALP) and MCQ test sheets were made.
- Before getting consent from students, they were explained about the study and were counseled for self reading of the topic required before appearing for CALP session.
Discussion with faculty:

- The faculty (Head and peer group) from department of Oral Medicine and Radiology were introduced to the concept of CALP.
- The proposed study plan was also discussed with the faculty.
- The MCQ test paper was designed and validated with the help of faculty.
- Post CALP session discussion was held with student as well as teachers, which gave insight to faculty to try new methods of learning.

Collection of feedback:

- Students’ feedback:

An informal feedback was obtained from students about CALP experience. The validated questionnaire includes five closed ended questions with three point likert scale and four open ended questions about the CALP functioning. The opinions of students were also collected in the group discussion about project as a whole separately.

- Faculty feedback:

After being exposed to newer teaching modality and students response, faculty feedback was obtained through interviews.

Results

The results of the study are as under:

A) Feedback of CALP questionnaire:

A CALP session included fifty final year BDS students. All fifty students answered the question asked in questionnaire. For closed ended questions the answers obtained were on three points likert scale. About 96% of students have used computers more than 100 times, so it was very easy for them to operate CALP. 89% of students were very comfortable while using the program. The program increased lot of confidence among 92% of students in planning diagnosis and treatment. While 86% of students felt that CALP has increased their comprehension of the subject. The qualitative data received through open ended questions about CALP was of the experience while using program in terms of best and worst part of program including the key points learned. Majority (96%) of the students felt the program was a informative, innovative, useful and enjoyable. The best part about the program was its explanation and guidance through case presentation to arrive at a diagnosis. The other factors mentioned were, classification of lesions and treatment charts explained at the end. The program was a good blend of clinical and theoretical part learned so far according to few of them. Whereas few students felt that it has made them realize the importance of logical sequencing and thinking of already read text about WKL. The program was designed such that one can’t go to previous slide once read /attempted (MCQ section), which was written felt as a worst part of program.

The key point learned was method to co-relate history with diagnosis and planning appropriate treatment. Students also commented that they would like to have similar learning programs for few more difficult topics of the subject.
B) Comparison of pre and post CALP test:

Students appeared for pre and post MCQ test. Total 44 MCQ (same) were asked in both the tests. To compare pre and post test scores Student’s Paired ‘t’ test was applied, which gave significant results whereas T value was 17.76. (Table) Pre test score was 31.72 and post test score was 40.44 which suggest significant improvement in knowledge and diagnostic skills for white keratotic lesions among students.

Salient points that emerged during the Group Discussion with students:

Students found the computer assisted learning as a good learning modality.
Few major and difficult topics should be covered with the help of case based learning.
As the content given in the program was collected from multiple books, students found it interesting and were happy to share it. While discussion it was found that they usually read from one or two text books only whereas program gave additional data about WKL.

Feedback from the faculty was obtained through personal interviews.

Comments of faculty from department of oral medicine and radiology:

The program is innovative and informative in the field of Oral Medicine.
It can surely help students to perform better as a clinician and at assessment level too.
This type of case based learning program can be included routinely in dentistry for the benefit of students.

Discussion

Computer assisted simulation is an important teaching modality in the preclinical training of students in dentistry but was never tried in Oral Medicine. Computer can also simulate real patients and can be used as interactive media. Some studies showed that CAL is an acceptable method of education and comparable with tutorial method. CAL may provide the student with enhanced everyday decision making tool in clinical treatment situations. Several studies have shown that groups of students who are using CAL have better results than groups using only traditional learning.

The pre and post CALP MCQ test results were used to observe the change in knowledge and diagnostic skills of students in the present study. The same pre and post-test should be used for testing students, as this is the only way that the evaluator can be certain that the tests are equivalent. Any improvement in the number of questions answered correctly in the post test can be definitely attributed to the students having increased their knowledge as a result of using the program.

Overall response of students towards CALP was positive which is in accordance with the study by Lechner et al. The findings of this study showed that CAL was found to be easy and useful. It has increased confidence of students in diagnosis and treatment planning as reported in other studies.

All responses shared in the study favors Martin et al comments, that, software developed by the faculty contains structured, actual and concrete information. This motivates students to be attentive and concentrate which provides conditions for good learning and stimulates deeper thinking. It also direct students towards self study. Self study or performance component requires that students should practice/read themselves for better results.
Other advantages of CALP are; the computer is very patient and has time. CAL can be repeated frequently without the computer getting tired or impatient\textsuperscript{1,9}.

Literature provides only inconclusive evidence for the merits of educational software\textsuperscript{10} which may be due to limitation of CALP related to lack of necessary communication skills and attendance recording like in lecture\textsuperscript{1}. Multimedia training would not be the option used in place of conventional training method but this new technology can sure be used for self directed learning with few more advantages \textsuperscript{1}. It can be said that educational software may simply become part of the fabric of education instead of replacing a whole swath of it \textsuperscript{10}.

A main policy of each dental institute is to create a positive attitude in undergraduate and postgraduate students to undertake self director learning throughout their professional life, which can be provided by using multimedia training methods. Conclusively CAL should be used in academic learning to supplement traditional education\textsuperscript{2}.

This study definitely added newer dimension to Oral Medicine. Case based computer assisted learning was never tried in Oral Medicine before this and positive results obtained through the study would encourage the teachers as well, and may help to figure out newer ideas in this field. For the first time I have interacted with the students about their difficulties in subject learning. This project helped me to get closer to students’ mind and understand the dilemma they face while co-relating the actual theory read and its clinical implications.

Although CALP doesn't need to replace traditional teaching methods but it can serve as better supplemental teaching tool in this advancing edge of medicine.

**Limitations**

- Students have to be familiar with the medium/computer.
- Students’ motivation for self reading is quite difficult.
- Large sample size can give more accurate figures to evaluate CALP.

**Conclusion**

Computerized case based diagnosis and management program was well perceived by the students. There was significant improvement in student's knowledge in decision making skills after using the program. It can thus be envisaged as an adjunct to conventional teaching methods to improve students' confidence and performance in clinical practice.

**Take Home Messages**

Theoretical studies aided with Computer assisted learning in Oral Medicine would definitely help students, worldwide, in diagnosis and treatment planning of oral mucosal lesions which may be difficult for them during undergraduate years. Creating similar CALP in other topics of Oral Medicine would help in self directed learning.
Notes On Contributors

Dr Tapasya Karemore - First author - Contributed towards making of CALP, conducted the project and manuscript writing.

Dr Usha Radke - Dean of the institute, contributed towards logistics arrangements and content validation of the CALP

Dr Mukta Motwani - Contributed for content validation of the CALP and manuscript editing.

Dr Vaibhav Karemore - Contributed for development of CALP and manuscript writing.

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Appendices

Table

**Paired Samples Statistics**

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<th>Mean</th>
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<th>Std. Error Mean</th>
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**ANNEXURE I: Student Feedback questionnaire (CALP)**

Questionnaire

1. How many times have you used computers?
   a. Never
   b. 1-10 times
   c. 51-100 times
   d. More than 100 times

2. How comfortable did you feel using the program?
   a. Very
   b. Quite comfortable
   c. Not very
   d. Very comfortable

3. The program increased my confidence in planning diagnosis and treatment of white lesions of oral mucosa:
   a. Yes, a lot
   b. Yes a little
   c. Not at all
4. Finding my way through the program was easy:
   a. Agree
   b. Neither agree nor disagree
   c. Disagree

5. I felt that the program increased my comprehension of the subject matter:
   a. Agree
   b. Neither agree nor disagree
   c. Disagree

6. Tick as many of the words listed below as describe your experience of this computer program in your first session:
   a. Fun
   b. Informative
   c. Frustrating
   d. Boring
   e. Irritating
   f. Enjoyable
   g. Innovative
   h. Useless
   i. Useful
   j. Difficult

7. What was the worst thing about the program?

8. What was the best thing about the program?

9. What was the main thing you learned?
Declarations

The author has declared that there are no conflicts of interest.

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