



An expert system for the diagnosis and management of oral ulcers

Sh.A. Ali, H.I. Saudi*

Periodontology, Oral Diagnosis and Radiology, Tanta University, Egypt

Received 14 December 2013; revised 5 March 2014; accepted 8 March 2014

Available online 11 May 2014

Abstract

The present research was conducted to introduce a Visual Basic expert system to help the postgraduate students in the diagnosis and treatment of the most common and rare oral ulcers. A total of sixty postgraduate students shared in the study. They received the system on a CD-ROM and asked to evaluate it using a printed questionnaire. The oral ulcerative conditions merged in the database included, aphthous ulcers, chancre, traumatic ulcers, histoplasmosis ulcers, acute herpetic ulcers, burns, herpangina, tuberculosis, syphilis, gonorrhea, acute necrotizing ulcerative gingivitis, herpes labialis, herpes zoster, erythema multiform, Steven Johnson's syndrome. The conditions also included, allergy, Behcet's syndrome, neutropenia, necrotizing sialometaplasia, pemphigus, ulcerative lichen planus, vitamin deficiency, anemia, lupus erythematosus, epidermolysis bullosa, pemphigoid, squamous cell carcinoma, desquamative gingivitis and others. Results showed that the mean overall scoring quality of the program was 3.0 ± 0.7 with 75% success rate. It can be concluded that the introduced expert system was helpful to the postgraduate students in the diagnosis and treatment of the most common oral ulcers.

© 2014, Production and Hosting by Elsevier B.V. on behalf of the Faculty of Dentistry, Tanta University.

Open access under [CC BY-NC-ND license](https://creativecommons.org/licenses/by-nc-nd/4.0/).

Keywords: Expert system; Diagnosis and treatment of oral ulcers

1. Introduction

Oral ulcerations is a common mucosal disorder. It may be caused by physical or chemical trauma, viral, fungal or bacterial infections, allergy, malignancy or a manifestation of systemic diseases [1]. The process of oral ulceration causes a breach in the oral epithelium,

which typically exposes nerve endings in the underlying lamina propria, resulting in pain or soreness, especially when eating spicy foods or citrus fruits [2]. As the majority of the ulcers require treatment of the underlying cause, proper diagnosis will lead to successful treatment and prevention of the lesions [1].

The arrival of the twenty-first century has suddenly forced on dentistry a new paradigm regarding expected standards for state-of-the art patient care. Traditional methods and procedures that have served the profession well are being questioned within the context of evidence based rationales and emerging information technologies [3].

In the area of dental informatics, the application of computer and information sciences to improve dental research, education, and practice has been particularly

* Corresponding author. +20 1005218804 (mobile).

E-mail address: Hussein_saudi@hotmail.com (H.I. Saudi).

Peer review under the responsibility of the Faculty of Dentistry, Tanta University



Production and hosting by Elsevier

noteworthy and the use of electronic teaching tools and learning environments as CD-ROM or web-based has increased dramatically [4,5].

Expert system is an intelligent computer program that uses knowledge and inference procedures to solve problems at the level of a human expert. It emulates the decision making ability of a human expert in a particular field. The knowledge in expert system may be either expertise or knowledge that is available from books, journals, conferences, magazines, knowledge persons and internet [6].

So, the aim of the present research is to introduce an expert system for the diagnosis and treatment of the most common oral ulcers based on the algorithm of Morris (2004) [7].

2. Materials and methods

The knowledge database was collected from Burket's Oral Medicine (2008) [8], strategies in dental diagnosis and treatment planning of Morris (2004) [7] and many health care websites as Mayo Clinic. The data was classified, stratified, organized then transferred to the expert system database.

The expert system was developed using Visual Basic Ver. 5 language. The system contained many forms that welcome the user and start step by step to introduce the major descriptive categories of the oral ulcers whether occurring for the first time, recurrent or chronic in nature. Then starts to branch according to the user selections to reach the most descriptive condition that meets his or her patient. When the user selects the final condition, the corresponding form is located by the search engine and loaded to the screen displaying the diagnosis, the picture of the ulcer and the suggested treatment options (Figs. 1–3).

To facilitate the user in decision making, a backward button was added in all selection forms to revise or change the selection. Also to make the decisions without confusions the introduced selection options were programmed so that the user was not allowed to select more than one option.

The oral ulcerative conditions merged in the database included, aphthous ulcers, chancre, traumatic ulcers, histoplasmosis ulcers, acute herpetic ulcers, burns, herpangina, tuberculosis, syphilis, gonorrhea, acute necrotizing ulcerative gingivitis, herpes labialis, herpes zoster, erythema multiform, Steven Johnson's syndrome. In addition to allergy, Behcet's syndrome, neutropenia, necrotizing sialometaplasia, pemphigus, ulcerative lichen planus, vitamin deficiency, anemia, lupus erythematosus, epidermolysis bullosa,

pemphigoid, squamous cell carcinoma, desquamative gingivitis and others.

The compiled software was copied to CD-ROMs and distributed to 60 postgraduate dental students and house officers of Tanta University Faculty of Dentistry. The users were trained on using the software, asked to use it in their clinics and to fill a questionnaire about the size of the program, the loading time, the clarity of the introduced selection options, the number of correctly diagnosed ulcers and to score the quality of the overall program from 1 (inadequate) to 5 (excellent) [9].

3. Results

The questionnaire papers were collected from the postgraduate students and data were tabulated and analyzed. So as to facilitate data scoring for statistical purposes the selection options were converted into numerical scores, the item "Not clear" = 0, "Confused" = 1 and "Clear" = 2. Also the overall scoring quality of the program were coded as "Inadequate" = 0, "Adequate" = 1, "Good" = 2, "Very good" = 3 and "excellent" = 4.

The mean scores for the included ulcers were represented in Table 1. The overall scoring quality of the program was 3.0 ± 0.7 with 75% success rate.

4. Discussion

Early detection of diseases enables their prevention and appropriate treatment. Computer based methods are increasingly used to improve that medical service [10].

The present research was conducted to introduce a newly developed concise expert system as an aid in the proper diagnosis and treatment of the most common oral ulcers for the postgraduate students. The oral ulcers were selected as they represent a common complaint of the outpatient clinics [11].

The percentage of diagnosis for the recurrent, first time ulcers and ulcers with well circumscribed borders was 90%, 85% and 85% respectively. Such results may be attributed to the increased prevalence of such ulcers. Also the percentage of the ulcers with ill defined borders, ulcers without systemic manifestations and multiple ulcers was 80%, 80% and 75% respectively. Results may be attributed to prevalence of such type of ulcers, the introduced data from the expert system and the back knowledge of the postgraduate students.

The percentage of diagnosis for the chronic ulcers, ulcers with purulent material, single ulcers and ulcers with systemic manifestations was 70%, 70%, 65% and 65% respectively. Such scores may be attributed to low

Download English Version:

<https://daneshyari.com/en/article/3179645>

Download Persian Version:

<https://daneshyari.com/article/3179645>

[Daneshyari.com](https://daneshyari.com)