Stress management in dental students: a systematic review

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Abstract: This study compared the effectiveness of stress management programs in dental education by systematic review of the literature. The number of studies concerning stress management programs for dental students is limited compared with studies discussing sources of stress. Several types of programs for stress management have been reported, and differ in their duration, content, and outcomes. Two main strategies have been used to help stressed students, ie, decreasing the number of stressors and increasing the ability to cope with stress. The first strategy includes several components, such as reducing fear of failure and workload pressure due to examinations and requirements. The second strategy includes coping techniques, such as deep breathing exercises. Although positive effects have been reported for most of the programs, these have mainly been evaluated using subjective self-report measures. There is a need for more research to identify the most effective stress management program.

Keywords: students, dentistry, education, management, stress

Introduction

Dental students have a 100% prevalence of stress.1 Perception of stress is due to the tendency of dental students toward perfectionism based on their history of high achievement and excellence in previous schooling and the fact that excellence is the norm in dental school.2 The effect of year of study on stress levels has been found to be significant, with the third year of the 5-year curriculum considered the most stressful.3 Increasing stress may result in decreased student performance.4 Stress can be a significant threat and have a detrimental effect on the physical and/or mental health of students.5 Stress may also harm the trainee’s professional effectiveness by decreasing attention, reducing concentration, impinging on decision-making skills, and reducing the ability to forge good clinician-patient relationships.6

In relation to the serious side effects of stress among students in the health professions, more than two decades ago Tisdelle et al reported the deficiency in stress management research and programs available for dental students.7 This observation has not been adequately addressed, despite numerous reports of the negative consequences of stress and recommendations to develop stress management programs for intervention and prevention. Although there is a large body of literature on stress management, its specific application to dental education has been largely unexplored. Compared with studies reporting the sources of stress, the number of studies discussing the prevention or management of stress in dental education is limited. However, a few researchers have studied the specific effects of stress management programs in dental education and some have provided empirical data.
Thirty-eight sources of stress in five groupings have been identified, being stressors related to living accommodation, stressors related to personal factors, stressors related to educational environment, stressors related to academic work, and stressors related to clinical factors. Prevention and intervention procedures have been classified in six categories. Apart from these, one study done in India recommends that parents should be advised not to force their children to study something against their will, because they found that fear of facing parents after failure is a major source of stress, particularly in that part of the world.

Summarizing the literature, stressed students can help by either decreasing the number of stressors or by increasing their coping skills with regard to stress. Decreasing the number of stressors can be achieved in several ways, such as reducing fear of failure and workload pressure due to examinations and course requirements. In addition, the content of the dental curriculum could be reduced or its design changed. Clinical requirements can be reduced or deleted to decrease the number of stressors. Dodge et al found lower levels of stress among students in a clinical program based on patient needs than in students in a clinical program based on requirements. Further, students in programs without requirements have higher productivity and academic performance. Increasing the length of the curriculum in order to lower students’ workload can help, and may also reduce their fear of failure. Stress caused by uncertainty during transition periods can be reduced by scheduling sessions for exchange of information between students and their classmates from one year ahead, which can be a good source of information for their juniors.

Increasing students’ ability to cope with stress is also important, and may help them in their future professional activities. Kay and Lowe suggest implementing stress management and wellness courses for students. Topics such as coping with stress, time management, and choosing realistic goals could be addressed. Moreover, overall wellness should be emphasized by discussing the importance of sleep, diet, exercise, and other stress relievers like yoga and meditation. Positive outcomes have been observed among dental and medical students in previous studies.

The purpose of the present study was to systematically review the literature to identify stress management programs in dental education and to determine their effectiveness. We focused on programs that provided students with coping techniques, such as meditation, hypnosis, imagery, and muscle relaxation, education regarding the psychological and physiological effects of stress, affiliation with peers, opportunities for emotional expression (support groups), and intensified relationships with faculty. After review of the literature, we discuss the implications of integration of stress management into dental education, provide practical suggestions for decreasing and alleviating stress, and make suggestions for future research.

**Methods**

This systematic review was conducted after approval of the protocol by the institutional review board at the King Abdullah International Medical Research Center. Two reviewers (AMA, AHA) evaluated studies on stress management in dental students for inclusion. The aim of the evaluation was to assess the quality of the studies as objectively as possible. Assessment of quality included the study design, sampling (size and technique), the outcomes measured, and the reliability and accuracy of the data. The authors assessed the rigor of the selected studies according to the availability and quality of the study design, study sampling, response rate, measurement tool, and stress management program.

**Selection of studies**

The literature search primarily involved a search of PubMed (NLM), Library of Congress, LISTA (EBESCO), and Web of Science (TS). The key words used in our literature search were “dental”, “dentistry”, “education”, “management”, “stress”, and “students”. To narrow our search, the key words were combined by using AND as follows: “dental students stress management”, dental AND students AND stress management, dental AND undergraduates AND stress AND management, dental AND students AND stress, dental AND undergraduates AND stress, dental AND education AND stress, dental AND education AND stress AND management, dentistry AND stress AND management. The reference lists of retrieved articles were also checked. Further, experts in stress management and behavioral psychology were contacted and asked about stress management programs for students. The citations identified in the electronic search were downloaded into EndNote X2, while those retrieved from other sources were entered manually (eg, hand searching, reference lists). Duplicates were deleted and a unique identification was assigned to each citation (author name and year of publication) on the review form.

A review form was designed (see Figure S1) to help determine which papers should be included in the study. A paper was included if it was published in the English language between January 1966 and November 2013, included undergraduate dental students, and investigated or discussed...
any stress management program. When the information pro-
vided by the title and abstracts was found to be relevant to the
present research, or when this information was insufficient
to decide on inclusion, the full text article was retrieved and
evaluated. All remaining articles were read in their entirety
and a final selection was made.

Data were extracted from the selected studies using a data
extraction form (see Figure S2). The data extraction form
included questions organized in three categories: general
information (primary author, year of publication, country,
journal); specific information (study design, study sample,
stress management program); and analysis of outcomes
(prevention, intervention). The review and data extraction
forms were tested in a pilot study of a small number of papers.
Based on the findings of the pilot, the forms were revised
prior to use for identification of the articles included in the
present study.

Procedure
The two reviewers (AMA, AHA) reviewed all the articles;
the primary investigator was a consultant in dental services,
program director, and a PhD student in a medical education
program, and the other was a dental consultant interested in
stress among dental professionals and students. The reviewers
used the review and data extraction forms, and in case of a
difference of opinion between the two reviewers, an expert
was consulted to resolve the matter.

Data analysis
The results of the selected studies were combined and the find-
ings reported most frequently were identified and summarized
in tables. Aspects of stress management were categorized
according to whether they were prevention or intervention
programs. The results of all the papers included were reviewed
to identify duplicate data, and a table was developed that
included all aspects of stress management.

Results
Most of the literature addressing stress in dental students
focused on the sources of stress and factors influencing
the level of stress, such as gender and other demographic
variables. Despite the call for stress management among
dental students, only a small number of articles were found
that discussed programs for managing these stressors in
undergraduate dental students.

The initial electronic search by key words revealed 89
papers; after excluding duplicates and irrelevant papers by
review of titles, this number was reduced to 22 (Figure 1).

The reviewers went through these 22 papers by reading
the abstract, and after checking if the papers measured the
effects of stress management programs in dental students, the
number of papers was reduced further to 14. After reading
the full text of these 14 papers, more papers were excluded
according to the selection criteria, finally leaving seven papers
for analysis (see Table S1).

Four of the studies selected were controlled trials,18–20
the fifth was a cross-sectional survey, the sixth was a case
report, and the seventh was a systematic review addressing
stress in dental students.1,5,21 The selected studies discussed
different stress management programs, ranging from a short
program to (one 60-minute session) a rather intensive
program (60–90-minute sessions). Five of the selected stud-
ies reported intervention programs for stress management
and the other two reported prevention programs.1,5,18–21 For
six of the seven programs, the authors reported significant
effects on stress reduction; however, no significant effect
was found in one study.18

The stress management programs used varied in type, in that there were programs that trained students
in specific relaxation strategies or techniques (ie, deep
breathing, progressive muscle relaxation, Synchro-Energizer,
yoga),1,18,19,20 other programs that introduced an interpersonal
approach to dentistry (ie, faculty advising system, counseling

Figure 1 Articles screened for review.
system, study and test-taking skills program, stress management workshop),\textsuperscript{21} and another program using multiple stress management seminars.\textsuperscript{7}

Outcomes of the stress management programs were measured using multiple measurement tools including the Visual Analog Scale,\textsuperscript{18,19} Spielberger State-Trait Anxiety Inventory,\textsuperscript{16–20} COPE questionnaire,\textsuperscript{1} Expectancy,\textsuperscript{7} Stress Knowledge Inventory,\textsuperscript{7} Profile of Mood States,\textsuperscript{20} Observer Rating Inventory,\textsuperscript{20} and Thurstone Temperament Schedule and Stanford Stress questionnaire.\textsuperscript{20}

The variety of the stress management programs (Table 1) indicated that there are as yet no gold standards for the duration of such programs or the tools that can be used to assess their outcome. There are no stress management programs that deal with all sources of stress known from the literature.

Discussion

The aim of this study was to identify stress management programs in dental education, and to determine their effectiveness. To this end, we undertook a systematic review of the literature. Seven articles were selected and reviewed, but only four showed significant stress reduction using the suggested stress management programs. In almost all programs, the participants found them useful.

The number of studies discussing the content and effectiveness of stress management programs for dental students is limited, compared with studies discussing the sources of stress among dental students. The stress management programs reported in the literature for medical students were also limited, and included self-hypnosis, meditation, mindfulness-based stress reduction, changes in the “pass/fail” grading system, feedback on various health habits, educational discussion, and changes in the length and type of curriculum provided.\textsuperscript{21} There were other studies discussing stress management programs, but these do not focus on dental students specifically. Online stress management programs are effective if participants enjoy these, and have been shown to be more easily accessible and more cost-effective than traditional programs.\textsuperscript{23–25} Cognitive-behavioral stress management programs have been shown to be effective in reducing dysfunctional thought and decreasing stress.\textsuperscript{26,27}

These general observations regarding stress management programs could be used to design programs specifically for dental students.

Different types of programs addressing stress management in dental students have been reported, but differ in their duration, content, and effect. These programs are either single or multiple sessions and contain relaxation techniques or information about stress. The shortest stress management program was a one-hour session, while the longest consisted of six 60–90-minute sessions. The stress management programs reported either helped to reduce the number of stressors or enhance stress coping skills, using relaxation techniques such as deep breathing and yoga. Stress management programs focused on stress prevention attempted to decrease the impact of stressors through stress awareness lectures.

The reported stress management programs did not follow one concept, and used either one measure or a combination of measures. For instance, some studies suggested improvement of the inter-professional relationship skills to reduce stress among dental students or used yoga; and the other studies used the Synchro-Energizer and Progressive Muscle Relaxation techniques, or combination of awareness and stress reduction exercise in multiple sessions. Most of these programs were liked by the students, helped them to manage their stress, and do not follow a gold standard. Hence, we recommend a program with easy application for students and dental schools, where students can achieve high outcomes with the least expenditure of time and effort.

Table 1 Summary of selected studies

<table>
<thead>
<tr>
<th>Reference</th>
<th>Year</th>
<th>Study sample</th>
<th>Study design</th>
<th>Outcomes measurement</th>
<th>Effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shankarapillai et al\textsuperscript{7}</td>
<td>2012</td>
<td>100 students</td>
<td>Controlled trial</td>
<td>VAS, STAI</td>
<td>Significant stress reduction</td>
</tr>
<tr>
<td>Alzahem et al\textsuperscript{3}</td>
<td>2011</td>
<td>49 articles</td>
<td>Systematic review</td>
<td>Data collection form</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Ahmad et al\textsuperscript{1}</td>
<td>2011</td>
<td>291 students</td>
<td>Cross-sectional</td>
<td>DES questionnaire</td>
<td>90.3% stress reduction</td>
</tr>
<tr>
<td>Piazza-Waggoner et al\textsuperscript{8}</td>
<td>2003</td>
<td>26 students</td>
<td>Controlled trial</td>
<td>VAS, STAI, COPE questionnaire</td>
<td>No significant effect</td>
</tr>
<tr>
<td>Howard et al\textsuperscript{20}</td>
<td>1986</td>
<td>23 students</td>
<td>Controlled trial</td>
<td>PMS, STAI, ORI, symptoms</td>
<td>Stressed students benefited the most</td>
</tr>
<tr>
<td>Schwartz et al\textsuperscript{21}</td>
<td>1984</td>
<td>Dental students</td>
<td>Case report</td>
<td>Stress Knowledge Inventory, STAI, Symptom Checklist, physiological assessment</td>
<td>Not available</td>
</tr>
<tr>
<td>Tisdelle et al\textsuperscript{1}</td>
<td>1984</td>
<td>17 students</td>
<td>Controlled trial</td>
<td></td>
<td>Effective in reducing dental students’ physiological and self-reported stress levels</td>
</tr>
</tbody>
</table>

Abbreviations: DES, Dental Environment Stress; VAS, visual analog scale; STAI, Spielberger State-Trait Anxiety Inventory; COPE, Coping Orientation for Problem Experiences; PMS, Profile of Mood States; ORI, Observer Rating Inventory.
The huge impact of stress on dental students indicates a need for stress management programs in dental education. Such programs could be introduced in dental curricula; for example, by recruiting a clinical psychologist for dental students in dental schools. Based on our review, the following considerations should be incorporated into future research: rigorous study design, including randomized controlled trials; more detailed study of varying durations and frequencies of interventions (e.g., single-session versus multiple-session programs); more objective outcome measures than self-reports; and the effects seen on long-term follow-up.

A limitation of this research might be the small number of studies selected for review. Therefore, future studies are needed to study the effectiveness of stress management programs for dental students.

This review highlights the importance of stress management programs, the promising start made by those already implemented and investigated, and the unexplored territory that must be charted if these interventions are to efficiently and effectively succeed in the twin goals of benefiting future dentists and their patients and establishing a sound scientific base for future research.

Disclosure

The authors report no conflicts of interest in this work.

References

Supplementary material

Study ID: …………………………………

Study review

I. Screening questions
a. Does the study include data on stress management? Yes No
b. Has the study been done on undergraduate dental students? Yes No
c. Has the study has been written in English? Yes No

Note: If any answer is “no”, that study will be excluded.

II. Assessment
a. Excluded following initial screening (Abstract). Yes No
b. Excluded following full text screening. Yes No

If excluded why

……………………………………………………………………………………………

Figure S1 Study review form.

I. General information
a. Primary author…………………………………………………………………………
b. Year of publication ………………………………… …………………………………
c. Journal ………………………………………………………………………………..
d. Country………………………..……… ……………………………………………

II. Specific information
a. Study design …………………………………………………………………………
b. Study sample ……………………. …………………………………………………
c. Stress management program ……………………………………………………

III. Outcomes
a. Prevention ……………………………………………………………………………
b. Intervention ………………………………………………………………………
c. Duration ……………………………………………………………………………
d. Outcomes measurement ………………………………………………………
e. Effectiveness ………………………………………………………………………

Reviewer signature: ………………………………  Date: ………………………………

Figure S2 Data extraction form.
### Table S1 Reference checklist

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<tr>
<th>Title</th>
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<th>Exclusion reason</th>
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<th>Abstract</th>
<th>Full-text</th>
<th>Exclusion reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>44. Lopez Rendon JM, Ochoa Garcia JD, Velez Betancur JC. [Diagnosis and proposed solutions to causes of stress in students in the clinic of the CES Health Science Institute Dental School]. <em>CES Odontol.</em> 1990;3(2):83–94. Spanish.</td>
<td>X</td>
<td>NA</td>
<td>No management program</td>
</tr>
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</table>
Table S1 (Continued)

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