10.21608/ADJC.2023.200377.1351 Advanced Dental Journal
Volume 6 (2024) | Issue 1| Pages 149-154

Original Article

PREVALENCE OF WORKPLACE STRESS AND ITS EFFECT ON SOME PHYSIOLOGICAL PARAMETERS AMONG PEDIATRIC DENTISTS: A CROSS-SECTIONAL STUDY

Maha Sayed Emam[1], Randa Youssef Abd Al Gawad[1], Walaa Amin Fakher[2], Shaimaa Mohamed Sabry[1]

[1]Pediatric Dentistry and Dental Public Health Department, Faculty of Dentistry, Cairo University.
[2]Psychiatry Department, Faculty of Medicine, Cairo University.
E-mail: Maha.Sayed@dentistry.cu.edu.eg

Submitted: 21-6-2023
Accepted: 06-12-2023
Publish Date : 01-01-2024

Abstract

Aim: This study aimed to evaluate the prevalence of workplace stress among pediatric dentists.
Subjects and methods: This cross-sectional study included 185 pediatric dentists aged 24 to 36 years old. The physiologic assessment was done by measuring blood pressure and heart rate before and after work. Statistical analysis regarding the values of blood pressure and heart rate before and after work was performed using paired t-tests. Comparisons between non-parametric data (percent change of blood pressure and heart rate) were performed by Kruskall-Wallis test.
Results: The median percent change in systolic pressure after work was zero, While the median percent change in diastolic pressure was 1.18. The median percent change in heart rate after work was -2.35.
Conclusion: The prevalence of workplace stress among pediatric dentists was high but surprisingly, the work environment among pediatric dentists had a slight change in blood pressure and heart rate.

Keywords: Work stress, Workplace stress, Workplace burnout

Introduction

Work related stress is a pattern of physiological, emotional, cognitive and behavioral reactions to extremely taxing aspects of work content, organization and environment, stress occurs when demands of the job exceeds the worker's abilities, resources and needs or when the culture of an organization's expectations are not met by a particular worker's knowledge or abilities.[1]

Dentistry is commonly known as a stressful profession among various occupations. Frequent dealing with different types of patients, working in a very small area for long periods of time, and exposure to toxic substances, all these factors put the dentist under stress. Adding to the previous factors, working with uncooperative children with annoying parents will put pediatric dentistry at the top of the most stressful branches of dentistry.[2,3]

Previous research has found that members of medical professions have higher levels of occupational stress than members of other professions. This stress is primarily caused by workload, work-related judgments, and patient–professional relationships.[4]

In most nations, the dental profession is affected by changes in patient supply and ensuing competitiveness among colleagues, governmental involvement, dental service costs, and economic trends. These factors may have an impact on the amount of work that dentists have to do. The introduction of new and complex technologies, techniques, and therapeutic strategies is considered a source of occupational stress together with treating many anxious patients. Workplace stress can affect a dentist's well-being as well as the quality of his or her work.[5]

Both short-term and long-term stress can have a severe impact on a practitioner's physical, mental, and emotional health. Dental professionals should be aware of these risk factors, they should also be adequately motivated to learn about the drawbacks and hazards associated with their work.[6]

Subjects and Methods

A total of 185 Participants were enrolled in this study. The participants were included in the study according to certain criteria in which they must be medically free, as well as submit for master's or Ph.D. programs in pediatric dentistry. Pediatric dentists who are pregnant, fasting, or taking medications affecting the nervous system were excluded from the study.

A power analysis was designed to have adequate power to apply a statistical test of the research question regarding stress development in the work environment and its physiological and psychological effect on pediatric dentists. The predicted sample size (n) was a total of (246) cases. Sample size calculation was performed using Epi info for Windows version 7.2.[7]

The study was conducted from October 2020 till May 2022, during this period there was an emerging worldwide pandemic crisis which was Covid 19. This lockdown represented an obstacle in our study as a smaller number of participants were available. The participants were not stressed enough during this small period which was less than 3 hours.

Because Covid-19 was a factor of stress in our study, the study didn't continue after May 2022 as Covid-19 was no longer a stress factor where herd immunity was acquired. An open discussion was held between the authors, and it was agreed to limit the study to the number of available participants fulfilling the inclusion criteria during this period of work, which was 185 participants

The study was conducted in Pediatric Dentistry and Dental Public Health Department at Cairo University and Ain Shams University. Both universities had most of the students from different universities applying for the master's and Ph.D. programs. Pediatric dentistry postgraduate training seems to be a challenging experience that requires residents to complete clinical training, research projects, and teaching programs.

The principal investigator informed the participants about the objectives and steps of the study clearly, and an informed consent was signed by the participants. The principal investigator was responsible for the distribution of the recording chart to the participants on the day of work before starting their work.

The recording chart was a specially designed chart that was formulated to collect the data from the participants. The recording chart wa

composed of two sections; the first section included the demographic data (age, gender, and nationality), and workplace data (university, year of graduation, years of experience, and type of postgraduate pediatric program).

The second section included the physiological assessment in which before and after measurements of blood pressure and heart rate were recorded.

The Physiological assessment was done in which blood pressure and heart rate were measured before work and after 3 hours of continuous work. The digital sphygmomanometer was used on each participant's right arm in a seated position at a steady room temperature in the Pediatric dental clinic to collect blood pressure and heart rate values. The measurements were done by the principal investigator. Two readings were recorded, the first reading was before starting the first case and the second one was after 3 hours of continuous work.

Results

I. Descriptive data:

I.1. Demographic data:

The study included 18 (9.8%) male pediatric dentists and 167 (90.2%) female pediatric dentists. The Participants were aged from 24 to 36 years old. Most of the participants were Egyptian 161 (87%), in addition to 24 (13%) other nationalities (11 Sudanese, 3 Saudi, 3 Yemeni, 2 Syrian, 2 Bahrain, 1 Jordan, 1 Palestine, and 1 Eritrean).

I.2. Workplace data:

According to the university of graduation, 52% of the participants graduated from Egyptian governmental universities (76 Cairo, 14 Ain Shams, 3 Tanta, 1 Assiut, 1 South Valley, and 1 Fayoum University). 42.6% of participants graduated from Egyptian private universities (25 MIU, 15 MSA, 12 MUST, 9 Future, 6 from 6th October, 3 British, 3 MTI, 2 ACU, 2 Nahda, 1 Sinai, and 1 Delta University). 5.4% of participants graduated from universities outside Egypt (3 Science and Technology (Sudan), 2 National Ribat, 2 Qassim, 1 Khartoum, 1 Sharjah, and 1 Riyadh Elm).

According to the type of postgraduate pediatric program, 102 (55.1%) were master's students, 74 (40%) were visitor residents and 9 (4.9%) were Ph.D. Students. The mean years after graduation was 5.03±2.88 and the mean years of experience were 4.98±2.84 (ranging from 1 to 15 years).

I.3. Physiological assessment:

I.3.1. Blood pressure and percent change in blood pressure:

The mean systolic and diastolic blood pressure in percent change before and after work are illustrated in Table (1).

I.3.2. Heart rate and percent change in heart rate:

The mean heart rate in percent change before and after work is illustrated in Table(2).

Table (1): The mean systolic and diastolic blood pressure in percent change before and after work.

		n=185		
		Mean ±SD	**Min**	**Max**
Blood Pressure (before)	**Systolic**	123.72 ±13.14	94	198
	Diastolic	74.26 ±9.33	48	108
Blood pressure (after)	**Systolic**	123.44 ±11.32	94	156
	Diastolic	73.83 ± 10.73	51	108

Table (2): The mean heart rate in percent change before and after work.

		n=185		
		Mean ±SD	**Min**	**Max**
Heart rate	**Before**	92 ±11.1	60	128
	After	90.04 ±11.33	60	121

Discussion

Workplace stress is a global issue nowadays, **Pouradeli et al. (2016)** found that dentists experience significant levels of stress, and several researchers have categorized dentistry as a stressful profession. Dentists are at high risk of developing occupational health issues. Pediatric dental care is affected by the pedodontic triangle which consists of the parents, the child, and the dentist. When it comes to managing a child on the dental chair, the pediatric dentist's anxiety and stress levels are elevated **Aishwarya and Gurunathan (2017).**[8,9]

Our study is a descriptive cross-sectional study. The cross-sectional design is utilized to study the prevalence of certain conditions, treatments, services, or other outcomes, as well as the factors that influence them. Cross-sectional studies are useful in identifying the number of people affected by a certain condition. A wide range of outcomes and risk factors can be evaluated from this type of studies **Hemed (2015).**[10]

In this study, a digital sphygmomanometer was used to measure both blood pressure and heart rate. Two readings were recorded, the first reading before starting the case and the second reading after 3 hours of continuous work. The same parameters were adopted by **Mohsen and Hakim (2019)** and **Rengganis et al. (2020).** Mercury sphygmomanometer and stethoscope would not give an accurate reading as the loud noise and screaming of the children would hinder the proper listening of the stethoscope sounds. A digital sphygmomanometer provided the reading of blood pressure and heart rate simultaneously, saving the dentists time. The same method was used by **Lin et al. (2018)** in measuring heart rate and by **Myers et al. (2008)** and **Buchanan (2009)** in measuring blood pressure.[11,12,13,14,15]

Regarding blood pressure and heart rate, there was no significant difference between before and after values of blood pressure and heart rate. In the light of our study, we included only young pediatric dentists aged from 24 to 36 at baseline; thus, it was not representative of the general population. Those pediatric dentists are physiologically fit and healthy so nearly no change happened to blood pressure. But in the long term, if stress coping mechanisms were not practiced, those pediatric dentists may be exposed to hypertension and other chronic diseases. This was not in accordance with **Al-sandook et al. (2007)**, **Mohsen and Hakim (2019)** and **Vrijkotte et al. (2000)** who concluded that high work stress caused elevation of systolic blood pressure. This may be due to the older age of the participants in such studies.[16,11,17]

A previous study **Lindquist et al. (1997)** reported that chronic work stress was not related to casual office blood pressure, but it's related more to ambulatory blood pressure (monitoring a person's blood pressure during their routine, daily activities, and during sleep). On the other hand, **Tanna & Khatri (2021)** found a strong relationship between high stress levels and hypertension among adults.[18,19]

Some participants showed a statistically significant decrease in heart rate after work. The reason for the increased heart rate preoperatively may be due to several factors. The physical effort exerted by these students to arrive on time, especially when they were late. Also, Caffeine consumption in the morning causes an increase in heart rate and blood pressure, especially in habitual caffeine

drinkers **Geethavani et al. (2014).** This finding was not in parallel with **Vrijkotte et al. (2000)** and **Lucas et al. (2020)** who found an increase in heart rate after work.[20,21,22]

Conclusion :

The prevalence of workplace stress among pediatric dentists was high but surprisingly, the work environment among pediatric dentists had a slight change in blood pressure and heart rate.

Conflict of Interest:
No conflict of interest.

Funding:
This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors

Ethics:
This study protocol was approved by the ethical committee of the faculty of dentistry-Cairo university on 27 October 2020 concerning the scientific content and compliance with research and human subjects' regulations

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