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Occupational stressors experienced by pediatric residents during COVID-19 pandemic: A mixed-methods sequential explanatory study

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Abstract:

BACKGROUND: Pediatric residents deal with children who are critically ill. This study was conducted to discover the stressors experienced by pediatric residents during the outbreak of coronavirus disease 2019 (COVID-19).

MATERIALS AND METHODS: This study included two quantitative and qualitative phases and was conducted using a mixed-methods sequential explanatory design. Using a quantitative-cross-sectional approach, the first phase of the study was conducted on 70 pediatric residents of hospitals affiliated with the Iran University in Tehran, Iran. The participants were selected through the convenience sampling method. The data collection tool used in the quantitative phase of this study was the Osipow occupational stress inventory. After collecting and analyzing data and according to the results, the second phase of the study, qualitative phase, was initiated. Sampling was done purposefully. Ten percent of the highest average, lowest, and middle average were interviewed. Data were collected using semi-structured interviews. All interviews were recorded and typed in the MAXQDA software and then analyzed.

RESULTS: The pediatric residents' occupational stress level in this study was $187/40 \pm 20.37$ and the resident's occupational stress had a significant relation with marital status, sleep duration, year of residency, and the number of monthly shifts. The qualitative phase revealed that the residents attributed their occupation stress to theoretical education problems, clinical problems, the outbreak of the COVID-19 pandemic, a lack of balance between work-life responsibilities, and inappropriate physical environment as well as insufficient welfare facilities.

CONCLUSION: Given the prominent role of residents in the healthcare system, paying attention to their occupational stress is essential. Therefore, all health policymakers are recommended to alleviate medical residents' occupational stress by making appropriate decisions and adopting efficient measures.

Keywords:

COVID-19, occupational stress, pediatric residents

Introduction

So far, many epidemics have occurred throughout human history bringing about a large number of cases causing widespread morbidity and mortality, such as Middle East respiratory syndrome

(MERS), severe acute respiratory syndrome (SARS), and HIV. All of these epidemics impose a great economic, social, and psychological burden on human life.^[1] Since December 2019, the coronavirus disease (COVID) induced by SARS has spread rapidly around the world.^[2] At present, this

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disease has turned into one of the major crises in human mental and physical health.^[3] This pandemic caused quarantine, the closure of schools and universities, and social isolation,^[4] and imposed unprecedented changes and many challenges on the health systems of all countries.^[5] The healthcare team was more exposed to the physical and psychological negative effects of this epidemic than other occupational groups.^[6] For instance, in a study conducted jointly in several European countries in 2020, it was found that 31.4% of healthcare team members suffered from anxiety, 12.2% from depression, and 30% from severe stress following the outbreak of the COVID-19 pandemic. In addition, radical changes in their workload and extreme pressure were reported. During the outbreak of Ebola in 2018 in the Democratic Republic of the Congo, anxiety levels among medical staff who deliver direct care to infected patients were extremely high.^[7] In another study that was conducted during the MERS epidemic, it was found that 77% of university students experienced low levels of stress and 18.4% experienced a moderate level of anxiety.^[8] In his study, Meo showed that 23.5% of medical residents felt hopeless, 44.1% felt separated from their family and friends due to quarantine, and about 56.2% of them reduced their study hours. Especially in boys, this rate was higher, and finally, he concluded that long-term quarantine during the outbreak of COVID-19 increased psychological problems and had negative effects on medical students' learning.^[9,10] Another research investigated problems experienced by pediatric residents in Italy during the outbreak of COVID-19. It was found that this epidemic had a significant impact on the participants' teaching and learning processes and severely affected their daily performance. It was also reported that the quality of educational programs was reduced due to the outbreak of COVID-19, and the participants did not have the necessary independence to provide care services to patients. Since face-to-face learning was replaced by webinars and online seminars, the participants felt that they did not acquire the necessary clinical skills.^[11] The results of another study in France also revealed that pediatric residents faced different problems, such as heavy workload, stress related to close contact with COVID-19 patients, and increased workload due to providing frequent medical consultations in pediatric emergency departments, which severely caused fatigue and job burnout among them.^[12] In another study, it was found that medical residents experienced more job burnout compared to specialists.^[4] They are responsible for providing comprehensive care to patients; however, they must deal with their educational affairs and lessons. Due to job burnout, medical residents may experience irreparable medical errors as well as severe and negative changes in their personal lives.^[13] In Iran, COVID-19 disease spread in 31 provinces in a short period of time,

and medical centers were quickly filled with patients suffering from this disease.^[14] The results of a study conducted to compare mental health status during the COVID-19 pandemic in four demographic groups of non-patients, patients with COVID-19, medical staff, and medical students in Iran showed a very high level of anxiety, stress, and depression among the studied groups, especially in medical students.^[15] During the COVID-19 pandemic, academic centers underwent many changes. The high volume of patients, a radical increase in healthcare team workload, high mortality in patients, and futility of the healthcare team's efforts in treating COVID-19 patients, lack of equipment and medicines, and transition from face-to-face to online education psychologically affected the healthcare team, including medical students, more than other groups. In other words, the levels of depression, fear, anxiety, and despair were higher in medical students than in other occupational groups. Under the conditions of quarantine, virtual education was not feasible and many educational centers were closed, so a large number of medical students were unable to complete their clinical and theoretical training courses. Although distance education was very helpful, it demotivated many of the students.^[1] Among the few studies conducted in this regard on pediatric residents in Iran, we can refer to a study done by Ansari *et al.*^[16] They found that the residents found themselves directly exposed to the deadly virus, which increased occupational stress among them. In their study, the residents complained about the lack of facilities and were tired and exhausted from the recurrent epidemic waves in Iran. In similar studies done outside of Iran, this finding was not mentioned and this can be one of the reasons for conducting this research. In addition, Ebrahimi *et al.*^[17] showed that most of the pediatric residents were worried about the transmission of COVID-19 to the people around them, especially their family, and their resilience decreased during the outbreak of COVID-19. In short, regarding the importance of this research, it can be said that the clinical training of residents is an essential and important part of training in the medical course, without which the training of efficient and competent physicians will be very difficult or impossible. In the clinical setting, learning is focused on real issues in the context of professional work, and residents are motivated by this congruency as well as active participation. This setting is the only context where the skills of history taking, physical examination, clinical reasoning, decision-making, empathy, and professional commitment are learned in an integrated manner.^[18] However, pediatric residents are faced with children who are critically ill and unable to express their pain. In addition, facing these children's parents, who are very worried, doubles the stress compared to adult patients.^[19] This study was conducted to discover the stressors experienced by the

pediatric residents during the outbreak of COVID-19 while caring for their little patients.

Materials and Methods

Study design and setting

This study was conducted during the COVID-19 pandemic from April 1 to the end of August 2022 and aimed at identifying the factors affecting pediatric residents' occupational stress. The participants were selected from five university hospitals affiliated with the Iran University of Medical Sciences in Tehran, Iran. This study included two quantitative and qualitative phases and was conducted using a mixed-methods sequential explanatory design. The inclusion criterion was stating the residency period at least five months prior to the study.^[17] Incomplete questionnaires were excluded from the analysis. In this study, the convenience sampling method was used. Since the total number of the research community was known ($n = 77$), the target sample size was calculated using the following formula ($n = 64$). Having considered 10% participant dropout, 70 individuals were included in the quantitative phase of the study.

$$n = \frac{Nz^2pq}{Nd^2 + z^2pq}$$

N = population size (70), $z = 1.96$, $p = q = 0.5$, $d = 0.05$ (5% chance of error occurring), sample size including 10% dropout = 70.

Data collection

The data collection tool used in the quantitative phase of this study was the Osipow occupational stress inventory, which was designed in 1987. This tool measures the occupational stress of professionals performing their duties from their own point of view. It is comprised of six dimensions and 60 questions.

These six dimensions are role overload (i.e., examination of the person's status and his/her response to the demands of the professional work environment), role insufficiency (i.e., examination of the congruency between the level of skill, education, and educational and experimental characteristics of the person and the needs of work environment), role ambiguity (i.e., examination of a person's level of awareness of the priorities, expectations of the work environment, and evaluation criteria in the work environment), role boundary (i.e., examination of the conflicts that a person has in terms of work conscience and the role that is expected of him/her in the work environment), responsibility (i.e., examination of a person's sense of responsibility in terms of providing the efficiency and well-being

of others in the work environment), and physical environment (i.e., examination of the unfavorable physical conditions of the work environment to which the person is exposed).^[20] The Osipow occupational stress inventory is rated based on a 5-point Likert scale (1 = never, 2 = sometimes, 3 = often, 4 = usually, and 5 = most of the time). The total score ranges between 56 and 266. The total score between 56 and 88 mean low stress, 766 and 748 mean low to moderate stress, 756 and 788 means moderate to severe stress, and between 266 and 256 means severe stress. In addition to the research conducted in the world, the research done in Iran also examined and confirmed the validity of this questionnaire. For instance, Sharfiyan *et al.*^[21] reported that the content validity of this questionnaire was very favorable. They also calculated its reliability using the test-retest method and reported a satisfactory result (Cronbach's alpha coefficient = 98%). Cronbach's alpha correlation coefficient for the tool in the quantitative section was calculated and the number was 0.81. The questionnaire was filled out in person or online by the participants. Collected data were analyzed using Statistical Package for Social Sciences (SPSS) (version 21). It should be noted that in the quantitative phase, no participants were excluded from the study and the data of all the participants were analyzed.

The qualitative phase of the study was initiated after the completion of the quantitative phase and analysis of the collected data (from September 1 to the end of October 2022). By using the purposeful sampling method, 15 pediatric residents (eight in their third year of residency, four in their second year of residency, and three in their first year of residency) were selected. At least five months had passed since the beginning of the participants' residency period. The first author of the study conducted all the interviews. Individuals who were willing to participate in the study and were able to express their experiences were selected. The participant's unwillingness to continue the study was the only criterion for their exclusion from the study. It should be noted that none of the participants were excluded in the qualitative phase of the study.

In this study, data were collected using semi-structured interviews. The interviews were initiated by questions such as "Do you have any experience of stress-causing factors during residency period?", "Would you please explain more," and "Why do you think these stressors arise?" To elicit more details, questions such as "Can you elaborate on that?" and "Why do you think so?" were also asked. According to the wishes of the participants, the interview was conducted in a quiet room in the hospital. All the interviews were recorded using a tape recorder after obtaining verbal and written permission from the participants. Each interview lasted between 45 and 60 minutes. The interviews

were continued until data saturation was achieved. To confirm the trustworthiness of the data in the qualitative phase, Guba and Lincoln's criteria, including credibility, dependability, transferability, and conformability were used (Streubert, 2013 #31). To increase credibility, the researcher had long-term engagement with the research subject, data were collected through close clinical collaboration with residents in the hospital environment, the collected data were reviewed by the participants at the end of each interview session and coding, and data triangulating was done through conducting interviews with diverse participants. To ensure the conformability of the study, all the authors contributed to analyzing the data and reporting the findings. All the stages of the study and research process were recorded and reported in detail so that it would be possible for researchers to follow the research. It also tried to present the participants' quotes exactly. In addition, the participants' demographic characteristics and the field of research were explained in detail so that the reader of the research can decide on the use of the research transferability of findings to other populations.

Data analysis

International Business Machines Corporation (IBM) SPSS Statistics for Windows, version 21, software was used to analyze the quantitative data of this study. During descriptive analysis, the mean and standard deviation were measured. To examine the relationship between the variables and the level of occupational stress, T-test and analysis of variance (ANOVA) were run. To examine the relationship between occupational stress and variables more precisely and remove confounding variables, logistic regression analysis was used. The significance level in all statistical tests was considered to be less than 0.05. To analyze the interviews in the qualitative phase, the qualitative content analysis proposed by Graneheim and Lundman^[22] was used since it helps extract and identify the main codes from the interviews and provides a deeper understanding of the problems and stressors. After the end of each interview, it was transcribed and coded. The transcriptions were read by the first, second, and sixth authors, and related categories and subcategories were identified. Analyzes, codes, and categories were approved by all authors.

Ethical consideration

This study was approved by the ethics committee of the Iran University of Medical Sciences and Health Services (code of ethics: IR.IUMS.REC.1400.1254). After explaining the objectives of the study, written informed consent was obtained from all the participants in both quantitative and qualitative phases. The participants were assured of confidentiality and anonymity. It was explained that they were allowed to leave the study at any stage of the research, and their withdrawal at

any stage of the study would not change their working conditions, and they would not incur any costs. The results of the study were provided to the participants at the end of the study.

Results

Quantitative results

A total of 70 pediatric residents were included in the quantitative phase. The mean score for occupational stress among the residents was 187.40 ± 20.37 [Table 1]. The participants' mean age and standard deviation was 31.67 ± 3.77 years. In terms of gender, 59 participants (84.3%) were female and 11 (15.7%) were male, and in terms of marital status, 26 participants (37.1%) were single and 44 (62.8%) were married [Tables 2 and 3]. Pearson's statistical test results indicated an inverse relationship between the participants' sleep duration and their occupational stress [Table 2, $P = 0.002$]. In other words, shorter durations of sleep and resting were associated with higher occupational stress. The results of the independent t-test revealed a significant relationship between the residents' marital status and their occupational stress [Table 3, $P = 0.009$]. ANOVA test results also indicated a significant relationship between the year of residency, the number of monthly shifts, and occupational stress [Table 3, $P < 0.001$].

Qualitative results

In the qualitative phase, 15 participants were interviewed, all of whom were pediatric residents (eight were in their third year of residency, four in their second year of residency, and three in their first year of residency) [Table 4]. After reviewing 245 primary codes, five main categories and 33 subcategories were extracted. The main categories were problems related to theoretical education, clinical problems, problems related to the outbreak of the COVID-19 pandemic, a lack of balance between work-life responsibilities, stressful physical environment, and insufficient welfare facilities [Table 5].

Table 1: Mean scores of occupational stress

Characteristics	M	SD	Maximum	Minimum
Occupational stress	187.40	20.37	236	156

M: mean, SD: standard deviation

Table 2: Relationship between the mean score occupational stress and the participants' demographic characteristics

Characteristics	M	SD	Pearson correlation	P
Stress				
Age	31.67	3.77	-0.146	0.382 ^a
Number of children	0.37	0.66	-0.042	0.728 ^a
Sleep duration	3.02	0.83	-0.359	0.002 ^a
Resting duration	1.97	0.77	-0.095	0.434 ^a

M: mean, SD: standard deviation, ^aPearson

Table 3: Relationship between the mean score occupational stress and the participants' demographic characteristics

Characteristics	n	Mean	Std. deviation	P
Stress				
Sex				
Man	11 (84.3)	185.18	24.99	0.226*
Woman	59 (15.7)	194.27	16.14	
Marital status				
Married	26 (37.1)	179.19	15.97	0.009 ^a
Unmarried	44 (62.9)	192.25	21.29	
Smoking status				
Yes	7 (10)	181.57	17.89	0.429 ^a
No	63 (90)	188.04	20.66	
Clinical work experience				
Yes	27 (38.6)	182.44	17.07	0.107 ^a
No	43 (61.4)	190.51	21.81	
Residency year				
First	21 (30)	211.09	14.07	<0.001 ^b
Second	25 (35.7)	179.52	13.82	
Third	24 (34.3)	174.87	11.42	
Number of shifts in a month				
<10	48 (68.6)	177.54	12.75	<0.001 ^b
10–15	20 (28.6)	209.65	17.82	
>15	2 (2.9)	201.50	3.53	

M: Mean, SD: Standard deviation, *independent t-test, ^bANOVA**Table 4: The participants' demographic characteristics in the qualitative phase**

Participant's code	Age (year)	Sex	Pediatric assistant year	Marital status	Number of children
1.	29	Female	2	Single	-
2.	30	Female	3	Single	-
3.	28	Female	2	Single	-
4.	37	Female	3	Married	2
5.	32	Male	3	Married	1
6.	29	Female	1	Single	-
7.	31	Female	3	Single	-
8.	29	Female	2	Single	-
9.	28	Female	1	Single	-
10.	33	Male	3	Married	1
11.	36	Male	3	Married	1
12.	27	Female	2	Single	-
13.	29	Female	1	Single	-
14.	30	Female	3	Single	-
15.	34	Female	3	Married	2

In the following, some of the participants' responses are elaborated.

Problems related to theoretical education

This category included five subcategories: lack of up-to-date knowledge, lack of a coherent educational curriculum, insufficient use of modern educational methods, educational injustice, and professors' excessive expectations from medical residents.

- Lack of up-to-date knowledge

"As a physician, I should always learn and keep myself up to date. But I think it is not so. In many cases, I didn't know what to do to manage the child's disease. There are too many new cases that I just come across, and this causes a lot of stress" (Participant No: 8, a second-year resident student)

"One of the frequent issues we encounter in our education is that the professors are not up to date. They are so busy taking care of the patients and managing the crowded wards that they hardly find any time to update their knowledge. It also affects the education given to us." (Participant No: 13, a first-year resident student)

- Lack of a coherent educational curriculum

"Our education isn't coherent. We don't implement an appropriate educational curriculum. Our educational curriculum is very old and not coherent. Its purpose is not clear. The professors don't know how to implement it." (Participant No: a second-year resident student)

"Education in many cases is spontaneous and unplanned. Suddenly, the professor decides to talk about a certain topic, while it was not in the lesson plan and there was no need to teach it at that time." (Participant No: 7, a third-year resident student)

- Insufficient use of modern educational methods

"In the theoretical courses, we have a lot of credits on how to use new teaching methods to achieve better teaching and learning. However, it is not used in practice." (Participant No: 9, a first-year resident student)

- Educational injustice

"Sometimes, the professor says specific educational tips to some students who are more active and dynamic, while this is far from justice. We all have to be equal in the education system." (Participant No: 12, a second-year resident student)

- Professors' excessive expectations from medical residents

Almost all of the participants emphasized that the professors' expectations of them were more than they could handle.

"The professors expect us to be fully prepared in the morning program. I mean, we should study the patient in advance and be completely familiar with the patient's medical conditions, while we were on shift and awake until the morning, how can we be ready? Did we have time to examine the patient? In addition, we should manage the patients during the shifts. Don't you think that the professors' expectations are too unrealistic?" (Participant No: 15, a third-year resident student)

"The professors expect me to admit the patient, teach his family and ease their worries, take the patient to the para-clinic

Table 5: Categories and subcategories extracted from data analysis

Categories	Sub categories
Problems related to the theoretical education	Lack of up-to-date knowledge Lack of a coherent educational curriculum Insufficient use of modern educational methods Educational injustice Professors' excessive expectations from medical residents
Clinical problems	Shift problems Dealing with critically ill patients Lack of self-confidence Dealing with concerned parents Incomplete and incorrect delivery of patients Inappropriate interprofessional relationships High accountability and responsibility of the medical profession
Problems related to the outbreak of the COVID-19 pandemic	COVID-19 unknownness Death of infected children Worries about their own and family's infection Concerns about the unknown complications of the disease in young children
Lack of balance between work-life responsibilities	Maternal guilt Patriarchal attitudes in traditional Iranian society Distance from family and children
Stressful physical environment and insufficient welfare facilities	Lack of amenities and comfort Boring physical environment of the hospital

department, be active in the morning program and ward round, teach junior residents and interns, prepare educational slides and pamphlets, etc. You say, how can I do all these things? (Participant No: 12, a second-year resident student)

Clinical problems

This category included seven subcategories: shift problems, dealing with critically ill patients, lack of self-confidence, dealing with concerned parents, incomplete and incorrect delivery of patients, inappropriate interprofessional relationships, high accountability, and responsibility of the medical profession.

• Shift problems

"We have many and heavy shifts. Apart from our own learning hours which are in the mornings, we also have night shifts where we have to study our courses and our patients at the same time." (Participant No: 9, a first-year resident student).

"Us upper years have fewer shifts, but because we have more responsibility, heavy shifts are assigned to us. Managing very critical patients, having many patients, long shifts and monitoring the lower years in all shifts is the minimum we do." (Participant No: 2, a third-year resident student)

"Our shifts are crowded most of the time. Our patients are very sick. We have admissions from all over Tehran and sometimes from other cities as well. We had shifts where we couldn't even

rest for 10 minutes. I think this is the main problem for me and my colleagues. Lack of time to make decisions and less accuracy in our work." (Participant No: 11, a third-year resident student)

• Dealing with critically ill patients

"I always think that I wish my patients were better. My patients are small and most of them are sick. All this puts a lot of stress on me." (Participant No: 8, a second-year resident student)

• Lack of self-confidence

"I feel that my self-confidence is low. I have several reasons, the professors reduce this feeling in me because they are constantly teaching us, but they do not give good feedback. The science of treating children is very broad. Everything I learn, again, I feel that it is not enough. I have to treat a child who does not speak, and this is a lot of tension." (Participant No: 1, a second-year resident student)

• Dealing with concerned parents

"Our patients are small. The families are very worried. Sometimes it happened that the parents said bad things to us, of course, later they apologized. The smallest change in the condition of the children worries them too much and their worry, It also stresses us out." (Participant No: 13, a first-year resident student)

• Incomplete and incorrect delivery of patients

"It has happened many times that colleagues do not hand over patients to us completely at the end of their shift due to reasons such as fatigue or being in a hurry to get to the next job. It takes a lot of my time to examine the patient, read the file and Many other tasks to take care of the patient. Now you can imagine how much time is taken by us with so many different tasks in the shift." (Participant No: 6, a first-year resident student)

• Inappropriate interprofessional relationships

"There have been many times when the senior resident insulted the junior resident, or the professor came to see our work and reprimanded us in front of the nurses. For example, I saw many times that the professor accepted the words of the nurses but not ours." (Participant No: 4, a third-year resident student)

• High accountability and responsibility of the medical profession

"Look, the medical profession has a lot of responsibility. I am responsible for my patient. It causes me a lot of stress to do the correct treatment, to take care of my parents' situations and to be able to be a reliable and correct answer in my profession." (Participant No: 7, a third-year resident student)

Problems related to the outbreak of COVID-19 pandemic

This category included four subcategories of COVID-19 unknownness, the death of infected children, worries

about their own and family's infection, and concerns about the unknown complications of the disease in young children.

- COVID-19 unknownness

"This disease had just spread. We didn't know much about it ourselves. Every day there was a new news about it. It was really scary. I was fighting a disease that I didn't know anything about." (Participant No: 13, a first-year resident student)

- Death of infected children

"I am a paediatrician. I was in a situation where my little patients were dying of covid-19. It was a disaster for me. I was under a lot of stress." (Participant No: 2, a third-year resident student)

- Worries about their own and family's infection

"One of the worries that my colleagues and I endured and experienced a lot was that this disease would be transmitted to us or our family. I have two children and an elderly father, and I was worried about him contracting Covid-19." (Participant No: 15, a third-year resident student)

- Concerns about the unknown complications of the disease in young children

"I really didn't know what effects the covid-19 disease could have on my patients. In the hospital or at home and with the family, they always asked this question and I couldn't exactly answer what the complications of this disease would be in the future.?" (Participant No: 4, a third-year resident student)

Lack of balance between work-life responsibilities

This category included three subcategories: maternal guilt, patriarchal attitudes in traditional Iranian society, and distance from family and children.

- Maternal guilt

"Our shifts are too many and long. When I go home I am tired and exhausted, I feel very sad because I can't care my child properly and be a real mother. I'm not doing enough for my child and I feel I'm failing her. It really hurts me." (Participant No: 15, a third-year resident student)

- Patriarchal attitudes in traditional Iranian society

"We, as women, have many problems in this society. Our husbands do not understand that our work is hard and associated with long hours. They expect us to fulfill the roles of wife and mother when we go home, while it is beyond our control. We are very tired." (Participant No: 5, a third-year resident student)

"Fortunately, we don't have any problems in our work environment. The biggest stressor for married residents is our husbands' behavior and expectations. It's like we are housewives and they expect us to behave like a housewife." (Participant No: 4, a third-year resident student)

- Distance from family and children

"We have a lot of problems with our families. Long and many shifts keep us away from our families and children. I want to be with my child more. I feel like she doesn't know me." (Participant No: 15, a third-year resident student)

Stressful physical environment and insufficient welfare facilities

This category included two subcategories: lack of amenities and comfort and boring physical environment of the hospital.

- Lack of amenities and comfort

"We don't have many amenities in our shifts. The rest pavilion is not well equipped for us, we don't have enough sleep, and our salaries are also very low." (Participant No: 10, a third-year resident student)

"I'm always thinking about where to put my kids when I'm at work? We don't have a kindergarten. My mind is always busy and I'm worried about them." (Participant No: 4, a third-year resident student)

- Boring physical environment of the hospital

"Our medical centers are not well designed. The environment is depressing. It is boring. We live here and the inappropriate environment and the boring atmosphere here make the working conditions much worse." (Participant No: 1, a second-year resident student)

Discussion

This study was conducted with the aim of investigating the pediatric residents' occupational stress during the COVID-19 pandemic in Iran. The results revealed that the residents who participated in this study experienced a lot of occupational stress. The analysis of the conducted interviews showed that occupational stress had a multidimensional etiology depending on cultural, social, and economic factors. It was determined that problems related to theoretical education were one of the extracted categories in this study. Its subcategories included the lack of up-to-date knowledge, the lack of a coherent educational curriculum, the insufficient use of modern educational methods, educational injustice, and professors' excessive expectations from medical residents. Pediatricians play an important role as supporters of child and family health. Accurate and up-to-date education as well as improvement of clinical knowledge and skills should be among the priorities of residents' curriculum because proper and practical use of medical topics is the basis of clinical learning and correct medical diagnoses, especially in pediatric wards. In another study, Nadia K acknowledged that residents did not have significant knowledge and skills related to the management of patients with low health

literacy because this skill was taught in less than 50% of the educational curriculum.^[23] However, the residents who participated in this study admitted that the use of senior residents with little experience, instead of faculty members, to teach some topics had a negative effect on the education quality of the internship courses. Similarly, Vahidshahi *et al.*,^[24] during a study in Iran, found that only one-third of medical residents and interns had a positive attitude toward the educational role of senior residents, and the residents were not able to fill the existing educational gap. Howel *et al.*^[25] also stated that although most medical professors valued teaching medical interns and residents, reasons such as lack of funds and salaries, high workload, shortage of staff, and a large number of patients, made them feel disappointed. Consequently, they tended to work in the private sectors, and this may be in direct conflict with the motivations of teaching. Since the crisis in the clinical education of pediatric residents creates serious concerns about the quality of care services provided to children and the education of experts in this field, attention should be paid to the professors' satisfaction with teaching in educational centers as well as the promotion of the quality of teaching by using novel methods to reduce the problems related to medical education and improve the level of education.

Also, clinical problems were among the other subcategories obtained in this study. The pediatric residents participating in this research admitted that shift problems, dealing with critically ill patients, lack of self-confidence, dealing with concerned parents, incomplete and incorrect delivery of patients, inappropriate interprofessional relationships, and high accountability and responsibility of the medical profession were some of their problems during the residency period. Similarly, in Denmark, Christensen *et al.*,^[26] reported that the residents could not fulfill their role in the treatment of the disease and could not perform well in stressful situations due to low self-confidence created because of insufficient knowledge, lack of proper education, lack of motivation, and professors' improper behavior. McKinley also concluded that the large volume of patients, long working hours, long shifts, and difficulties in communicating with children were among the problems of pediatric residents, which caused job burnout and professional dissatisfaction among them. In his study, it was also reported that 50% of pediatric residents suffered from job burnout.^[27] In this regard, in a study conducted on pediatric residents in Japan, it was found that reducing the shift hours of residents and also using the overnight call shift (OCS) system increased the quality of treatment and care provided to the children.^[28] In a study conducted on 44 pediatric residents, Aran stated that workload, fatigue, and lack of sufficient sleep during 24-hour residency shifts increased

the risk of medical errors so that residents who slept less than one hour during a 24-hour shift made risky medical decisions in 50% of cases.^[29] Hua *et al.*^[30] also found that reducing workload and increasing rest hours during residents' stays in medical centers improved residents' public relations with staff, patients, and their families.

Another main category discovered in this research was the problems related to the outbreak of the COVID-19 pandemic. The pediatric residents referred to COVID-19 unknownness, death of infected children, worries about their own and family's infection, and concerns about the unknown complications of the disease in young children, as problems induced by the COVID-19 pandemic. The COVID-19 pandemic has significantly impacted pediatric resident education and changed the educational and daily performance of residents. Votto and Filippo also acknowledged that the COVID-19 pandemic was an unknown and new infectious disease and the interpretation of its common symptoms in children was very different, which caused a delay in the correct diagnosis of the disease and a decrease in immediate admission of COVID-19-infected children. Although children may have mild or no symptoms of the disease, this is only the tip of the iceberg. Unfortunately, in some cases, children with mild or no symptoms of COVID-19 had a very difficult course of the disease.^[31] In this regard, Crisci *et al.*^[32] reported that pediatric residents were affected by the disease of COVID-19 differently than other medical staff caring for infected adults because children generally had milder symptoms than adults. Despite the lower incidence of severe disease symptoms, children with COVID-19 had large amounts of SARS-CoV-2 viral RNA in their nasopharynx compared to infected adults. However, the side effects after recovery from COVID-19 in children are not well defined and most of the side effects after recovery are manifested in forms of low mood, lack of appetite, and fatigue.^[33] The non-tangibility of the signs, symptoms, and complications of COVID-19 disease in children increases the pediatric residents' concern about contracting the disease, and in some cases, causes the residents to be negligent in observing health protocols, hence increasing the incidence of COVID-19 in pediatric residents and their families.^[34]

Another main category discovered in this research was the lack of balance between work-life responsibilities. The subcategories included maternal guilt, patriarchal attitudes in traditional Iranian society, and distance from family and children. It seems that being a parent has a different gender effect on the career development of physicians. Since women are biologically responsible for pregnancy, childbirth, and breastfeeding, they are more exposed to occupational stress, especially in medical fields, than men. In this regard, Collie *et al.*'s^[35] study

showed that sometimes being a “mother” and a “doctor” was too tiring and stressful for female physicians because the problems and issues related to the medical profession, such as shift work, long working hours, and severe occupational stress, along with motherhood responsibilities led to difficulties in managing work shifts and caring for a child as well as long periods of separation from children. Previous studies have also revealed that many women physicians postpone starting a family and having children to progress in their careers because they believe that starting a family and having children can have a negative effect on family relationships and increase tensions in their lives.^[36] However, the evidence indicates that patriarchal attitudes in the healthcare system, especially in developing countries like Iran, cause continuous gender discrimination against female physicians.^[37] These discriminations include sexual harassment, constant disagreements and misbehavior, a lack of trust in female physicians to entrust work responsibilities, and a lack of support during pregnancy and postpartum.^[38] In this regard, during a survey conducted on more than 2400 National Health Service (NHS) physicians, it was found that 91% of female participants experienced sexual harassment at work within the previous two years, and nearly 61% of women were discouraged from working in a particular specialty because of their gender, and 70% of women believed that their clinical ability was questioned or undervalued because of their gender. More than half of women also said they received undesirable verbal comments about their gender, and 31% said they experienced unwanted physical behavior at work. In addition, among 393 male participants who responded to this survey, 28% believed that they had more opportunities during education because of their gender.^[39]

The other main category in relation to occupational stress discovered in this study was insufficient welfare facilities. The residents named the lack of amenities and comfort and boring physical environment of the hospital. In Iran, medical residents do not receive anything called a salary and they do not benefit from other welfare services such as insurance and pensions. Iran’s Ministry of Health and Medical Education only pays them a small allowance due to economic issues and severe inflation. Therefore, it is clear that such an allowance, considering residents’ working hours and workload in hospitals, is very small and unfair. These groups, who have spent seven years to complete the Doctor of Medicine, are deprived of the right to work as general physicians, based on the laws enacted by Iran’s Ministry of Health, to manage the financial affairs of their lives. This meager allowance cannot fulfill the needs of a general practitioner during their residency period. Nevertheless, even if residents are allowed to work as general practitioners, a large number of residents cannot work in other medical centers because

Iranian residents are required to work between 360 and 540 hours a month in university hospitals. Apart from legal issues and unfair working hours, residents do not have proper pavilions in most Iranian hospitals, which reduces the residents’ resting hours. Chellaiyan also acknowledged that the lack of medical residents and interns’ satisfaction with the welfare facilities of medical centers reduced the quality of patients’ treatment.^[40] Since the hospital environment per se is full of stress and boring, some measures should be taken to overcome these problems. In this regard, Grover found that the physical environment of the hospital could cause job burnout, increase the conflict between the physician and the patient, and raise the risk of mental and spiritual problems in the residents.^[41] Similarly, Asgarian found that an increase in residents and physicians’ satisfaction enhanced the quality of treatment and reduced the incidence of medical errors.^[42]

Limitations and recommendations

The first limitation of this research was the use of self-reported data in the quantitative and qualitative phases, which may cause careless responding and intentionally exaggerated responses by the residents. In addition, qualitative data may be biased or falsely positive as a result of peer pressure and fear of possible consequences. The second limitation of the study was that only 70 pediatric residents participated in the quantitative data of the study, so the findings cannot be generalized to all pediatric residents. Furthermore, the small sample size in this study reduced the power of statistical analysis and made detecting possible relationships between variables difficult.

In this study, we gave sufficient explanations to the participants about the objectives and importance of this study for the research team, and then the subjects entered the study. In this way, it was tried to increase the participation of the samples and to answer the questions with great accuracy.

Conclusions

With the sum of the findings of the quantitative and qualitative phases, it was found that Iranian pediatric assistants suffered from high occupational stress, which was mostly caused by the old regulations of the clinical environment and the non-observance of basic occupational rights. For this reason, managers and policymakers of health systems in Iran are expected to adopt new and up-to-date decisions and regulations, such as changes in educational laws, reducing residents’ working hours, teaching new mentoring methods to professors and seniors, and increasing residents’ salaries and income. Providing more welfare facilities such as leave and overtime and holding courses to deal with the

tension and work stress created during the internship period. In the quantitative part, the research team used the full count method on 70 residents. It is suggested to conduct another study with a larger sample size. It is also suggested to conduct a separate study on the effects of society's culture on the working conditions of female residents.

Author contributions

Fatemeh Kalroozi: conceptualization; project administration; resources; supervision; validation. Mohhsen Moradi: methodology; writing—original draft; formal analysis; and writing—review and editing. Ali Manafi Anari: data curation; formal analysis; and writing—review and editing. Behzad Haghighi Aski: data curation; methodology; and writing—original draft. Nahid Mehrabi: conceptualization; supervision; and validation.

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Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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Conflicts of interest

There are no conflicts of interest.

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