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Prevalence and predictors of fibromyalgia among Egyptian physicians: a cross-sectional study

Dina O. Abdulazim^{1*} , Yasmim Lacerda², Amanda Mendes³, Bianca Souza⁴, Amany A. Salem^{5,6}, Arwa Al-Shaarawy¹ and Basma M. Eissa¹

Abstract

Background Fibromyalgia is a chronic, disabling disorder of widespread musculoskeletal pain. It is generally considered a stress-related syndrome. Healthcare workers are prone to mental and physical stress due to excessive work burdens, long working hours, and a lack of balance between work and social life.

Objective The aim of this study was to examine the prevalence of fibromyalgia and its predictors among Egyptian physicians.

Methods Six hundred and ninety-one Egyptian physicians completed an online survey which included a self-reported fibromyalgia rapid screening tool (FIRST) as well as demographic (sex and age), health-related (chronic illnesses if any), and employment data (workday length, specialty, and employer). Logistic regression was performed to explore possible predictors of fibromyalgia.

Results Fibromyalgia was observed in 13.2% of participants, with a female to male ratio of 3.8:1. Predictors of FM in this cohort included the following: female sex (odds ratio (OR) 2.2, 95% confidence interval (CI) 1.2–3.9, $p=0.014$), age 41–50 years (OR 3.8, 95% CI 1.5–9.6, $p=0.005$), concomitant chronic illness: endocrinopathies (other than diabetes mellitus) (OR 2.69, 95% CI 1.09–6.64, $p=0.035$), musculoskeletal disorders (OR 5.60, 95% CI 2.96–10.6, $p<0.001$), autoimmune disorders (OR 3.61, 95% CI 1.69–7.73, $p=0.002$), employment at a Ministry of Health Healthcare Facility (OR 1.8, 95% CI 1.1–3.1, $p=0.013$), and a workday length of ≥ 13 h (OR 2.4, 95% CI 1.1–5.3, $p=0.038$). Physicians in surgical specialties were less likely to suffer from FM (OR 0.47, 95% CI 0.24–0.94, $p=0.033$).

Conclusion Egyptian physicians have higher fibromyalgia prevalence than the general population. Demographic, health-related, and professional predictors of FM were identified in this cohort.

Keywords Fibromyalgia, Egypt, Predictors, Physicians

*Correspondence:

Dina O. Abdulazim
drdinaossama@cu.edu.eg

Full list of author information is available at the end of the article



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Background

Fibromyalgia (FM) is a chronic disabling disorder with complex etiopathogenesis. Dysfunction in central and peripheral pain processing in FM results in diffuse bodily pain among other features, including fibro-fog, non-restorative sleep, and fatigue [1, 2]. FM can either be idiopathic (primary) or coexist with a wide variety of chronic illnesses (secondary) [3, 4]. FM is a stress-related syndrome [5], and practicing medicine is a highly stressful occupation. Factors like excessive work burden, long working hours, lack of balance between work and social life, clerical duties, and individual susceptibility to stress contribute to the exaggerated mental and physical stress physicians (PH) encounter [6].

Stress in the medical profession stems from the emotional burden of being responsible for the wellbeing of patients, time pressure, uncertainty, and workflow difficulties due to colleagues and other professional groups as well as the physically demanding nature of some specialties [7]. Shift work is a fundamental aspect of the medical practice, characterized by irregular and unusual work schedules, additionally contributing to occupational stress [6, 7], and has been associated with negative long-term health consequences, such as an increased risk of cardiovascular disease, diabetes, and autoimmune disorders [8].

The health care system in Egypt is highly heterogeneous. It can grossly be subdivided into public sector (governmental) and private sector. However, the public sector includes university hospitals (UH) (i.e., teaching hospitals), Ministry of Health Healthcare Facilities (MOHF), and others [9]. Physicians are highly burdened in MOHF, with little career development opportunities and a deficient incentive system [10].

The prevalence of FM in the general population ranges between 0.2 and 8% [11–13]. The pooled regional prevalence of FM in the Eastern Mediterranean region is 4.43% [13]. Published literature on the prevalence of FM in Egyptians has included school children [14], special groups such as adults with autoimmune rheumatic diseases [15, 16], chronic hepatitis C infection [17], and chronic depression [18].

Detecting FM among PH is critical because the physical disability and associated fatigue negatively impact PH mental health, their ability to work, the quality of health care service provided, and patients' safety, even increasing the risk of legal liabilities [12, 19, 20]. While, in Egypt, the prevalence of FM in medical students was estimated at 12.5% [21], data on the prevalence of FM among PH is scarce. Thus, the aim of this study is to examine the prevalence of fibromyalgia and its predictors among Egyptian physicians.

Patients and methods

In this cross-sectional study, Egyptian PH were invited to complete an online survey, through social media platforms. The inclusion criterion was being an Egyptian PH who has received a Medical Practice License from the Egyptian Medical Syndicate. Exclusion criteria included being an undergraduate medical student, being an intern (i.e., a pre-licensing trainee), being a non-PH healthcare worker, e.g., a nurse, or being a non-Egyptian national. This study has been performed in accordance with the principles laid down by the 1964 Declaration of Helsinki and its later amendments. All participants gave informed consent prior to their inclusion.

The survey collected data including sex, age group, and typical workday length in hours (hours/day). Workdays were subdivided into 3 categories according to their typical length: standard hours (≤ 8 h/day), extended hours (9–12 h/day), and long hours (≥ 13 h/day). PH subspecialties were collected and categorized into one of 3 broad specialties: medical (which also included general practitioners), surgical, and non-clinical (which included basic sciences e.g., anatomy and paraclinical specialties e.g., radiology). Participants were questioned about whether they were professionally affiliated with a UH, a MOHF (clinic and/or hospital), and whether they had a private practice.

Participants were questioned about whether they had any chronic health condition(s) (CHC), defined as chronic illness(es) requiring pharmacologic or non-pharmacologic treatment for at least 3 months. Participants were questioned about whether their CHC(s) have been controlled with or without treatment over the 3 months prior to recruitment.

FM rapid screening tool (FiRST) was employed to screen participants for FM. It is a self-report questionnaire which comprises 6 questions, each assigned one point, to assess the characteristics of pain, its location, character, associated symptoms, and the impact on the quality of life. Any participant with a score of $\geq 5/6$ points was considered to have fibromyalgia [22].

The statistical analysis is as follows: assuming a 95% confidence interval, a 5% margin of error, a 50% population proportion, and a 20% drop out rate, the final sample size was estimated to be at least 462 responses. After application of the exclusion criteria, out of the 717 responses collected, 691 were eligible for inclusion in the final data analysis. Frequencies (numbers and percentages) were used to describe qualitative data. Bivariate relationships were displayed in cross tabulations and comparison of proportions was performed using the chi-square test or Fisher's exact test whenever appropriate (with post hoc Bonferroni-Holm p value corrections). Logistic regression analysis was used to examine possible

predictors of FM. The level of significance was set at p value ≤ 0.05 .

Results

A total of 691 PH were recruited into this study. The sex and age distribution of participants is outlined in Table 1. FM was recorded in 91(13.2%) participants. FM was significantly more prevalent in female compared to male PH with a female to male ratio of FM occurrence was 3.8:1 (odds ratio (OR) 1.9, 95% confidence interval (CI) 1.2–3.4, $p=0.011$). The prevalence of FM was significantly different between age groups, being the highest among PH in the 41–50 years age group (30.23%, $p=0.001$).

Proportions of participants with different professional affiliations, workday lengths, and specialties are displayed in Table 1. UH affiliation was more frequent among females than males (71.1% vs. 28.9%, OR 1.4, 95% CI 1.0–1.9, $p=0.036$), and having a private practice was more common among males than females (24.9% vs 13.7%, OR 2.1, 95% CI 1.4–3.1, $p<0.001$). There was no significant difference between females and males regarding MOHF affiliation (28.5% vs. 32.4%, $p=0.293$).

The prevalence of FM was higher in PH affiliated with a MOHF compared to those not affiliated with one (OR 1.7, 95% CI 1.1–2.6, $p=0.029$). Although FM prevalence was numerically the highest among the long workday group, the difference from other workday lengths was not statistically significant. There was no significant difference in

the prevalence of FM according to PH specialty either. The sex distribution among different subspecialties was as follows; in medical specialties, 72.1% were females, and 27.9% were males; in surgical specialties, 36.2% were females, and 63.8% were males; and in non-clinical specialties, 87.2% were females, and 12.8% were males. A comparison of the demographic and professional characteristics of female and male PH with FM is outlined in Table 2. Among PH with FM, having a private practice was more frequent among males than females (OR 5.8,95% CI 1.8–18.6, $p=0.004$).

Examining the frequency of CHC in the entire cohort of PH, males were more likely than females to have systemic hypertension (HTN) (12.4% vs 3.6%, OR 3.8, 95% CI 2.0–7.0, $p<0.001$), and female PH were more likely than males to have endocrine disorders (4.7% vs 1.3%, OR 3.7, 95% CI 1.1–12.4, $p=0.025$) and autoimmune disorders (AID) (6.2% vs 1.8%, OR 3.7, 95% CI 1.3–10.6, $p=0.010$). There were no significant differences between the sexes regarding the frequency of all other CHC.

A comparison between PH with and without FM regarding the frequency of different CHCs is displayed in Table 3. Examining only PH with FM, HTN was more frequent in males than in females (26.3% vs 6.9%, OR 4.8, 95% CI 1.28–18.8, $p=0.030$). Subgroup analysis revealed that a higher frequency of HTN was observed among males with FM compared to females among subjects ≤ 40 years of age (13.3% vs 0.0% $p=0.040$) but not

Table 1 Demographic and professional characteristics of physicians with and without fibromyalgia

Parameters		Total		No FM		FM		p value
		n	(%)	n	(%)	n	(%)	
Sex	Male	225	(32.6)	206	(91.6)	19	(8.4)	0.011
	Female	466	(67.4)	394	(84.5)	72	(15.5)	
Age group (years)	20–30	241	(39.4)	216	(89.6)	25	(10.4)	0.023
	31–40	359	(52.0)	311	(86.6)	48	(13.4)	
	41–50	43	(6.2)	30	(69.8)	13	(30.2)	
	51–60	23	(3.3)	21	(91.3)	2	(8.7)	
	> 60	25	(3.6)	22	(88.0)	3	(12.0)	
Professional affiliation	UH	356	(51.5)	314	(88.2)	42	(11.8)	0.272
	MOHF	206	(29.8)	170	82.5	36	(17.5)	0.029
	Other	67	(9.7)	62	(92.5)	5	(7.5)	0.146
	Private practice	120	(17.4)	104	(86.7)	16	(13.3)	0.953
Workday length (hours/day)	0–8	448	(64.8)	388	(86.6)	60	(13.4)	0.199
	9–12	181	(26.2)	162	(89.5)	19	(10.5)	
	≥ 13	62	(9.0)	50	(80.6)	12	(19.4)	
Specialty	Non-clinical	109	15.8	93	(85.3)	16	(14.7)	0.092
	Medical	427	61.8	367	(85.9)	60	(14.1)	
	Surgical	138	19.9	128	(92.8)	10	(7.2)	
	Declined to state	17	2.5	12	(70.6)	5	(29.4)	

Bold values are statistically significant ($p \leq 0.05$). FM, fibromyalgia; MOHF, Ministry of Health Healthcare Facility; UH, university hospital

Table 2 Demographic and professional characteristics of female and male physicians with fibromyalgia

Parameters		FM females (n = 72)		FM males (n = 19)		p value	
		N	(%)	n	(%)		
Age group (years)	20–30	21	(29.2)	4	(21.1)	0.571	
	31–40	37	(51.4)	11	(57.9)		
	41–50	11	(15.3)	2	(10.5)		
	51–60	1	(1.4)	1	(5.3)		
	> 60	2	(2.8)	1	(5.3)		
Professional affiliation	UH	35	(48.6)	7	(36.8)	0.360	
	MOHF	30	(41.7)	6	(31.6)		0.424
	Other	3	(4.2)	2	(10.5)		0.279
	Private practice	8	(11.1)	8	(42.1)		0.004
Workday length (hours)	0–8 h	51	(70.8)	9	(47.4)	0.136	
	9–12 h	13	(18.1)	6	(31.6)		
	≥ 13 h	8	(11.1)	4	(21.1)		
Specialty	Non-clinical	12	(16.7)	4	(21.1)	0.325	
	Medical	49	(68.1)	11	(57.8)		
	Surgical	6	(8.3)	4	(21.1)		
	Declined to state	5	(6.9)	0	(0.0)		-

Bold values are statistically significant ($p \leq 0.05$). FM fibromyalgia, MOHF Ministry of Health Healthcare Facility, UH university hospital

Table 3 Frequencies of different chronic health conditions among physicians with and without fibromyalgia

CHC	No FM (N = 600)		FM (N = 91)		p value	Females + FM (n = 72)		Males + FM (n = 19)		p value
	n	%	n	%		n	%	n	%	
Systemic hypertension	35	(5.8)	10	(11.0)	0.063	5	(6.9)	5	(26.3)	0.030
Diabetes mellitus	15	(2.5)	6	(6.6)	0.046	4	(5.6)	2	(10.5)	0.601
Endocrine disorders	18	(3.0)	7	(7.7)	0.035	6	(8.3)	1	(5.3)	1.000
Cardiovascular disease	6	(1.0)	3	(3.3)	0.103	2	(2.8)	1	(5.3)	0.509
Neurological disorders	7	(1.2)	3	(3.3)	0.133	3	(4.2)	0	(0.0)	1.000
Psychiatric disorders	29	(4.8)	8	(8.8)	0.131	5	(6.9)	3	(15.8)	0.356
Gastrointestinal disorders	14	(2.3)	5	(5.5)	0.092	5	(6.9)	0	(0.0)	0.580
Genitourinary disorders	4	(0.7)	3	(3.3)	0.052	3	(4.2)	0	(0.0)	1.000
Renal disease	1	(0.2)	1	(1.1)	0.246	1	(1.4)	0	(0.0)	1.000
Dermatologic disorders	12	(2.0)	7	(7.7)	0.007	6	(8.3)	1	(5.3)	1.000
Musculoskeletal disorders	27	(4.5)	19	(20.9)	< 0.001	16	(22.2)	3	(15.8)	0.753
Autoimmune disorders	22	(3.7)	11	(12.1)	0.002	10	(13.9)	1	(5.3)	0.447
Any CHC	163	(27.2)	53	(58.2)	< 0.001	40	(55.6)	13	(68.4)	0.312
CHC controlled over past 3 months	105	(64.4)	29	(54.7)	0.206	21	(52.5)	8	(61.5)	0.570

Bold values are statistically significant ($p \leq 0.05$). CHC chronic health condition(s), FM fibromyalgia

among those > 40 years (75.0% vs. 35.7%, $p = 0.275$). Apart from HTN, there were no significant differences between the sexes regarding the frequencies of CHC among PH with FM (Table 3).

FM was significantly more frequent in PH with the following CHCs compared to PH without: diabetes mellitus (28.6% vs. 12.7%, OR 2.75, 95% CI 1.04–7.29, $p = 0.046$), endocrinopathies (28.0% vs. 12.6%, OR 2.69, 95% CI

1.09–6.64, $p = 0.035$), musculoskeletal disorders (41.3% vs. 11.2%, OR 5.60, 95% CI 2.96–10.6, $p < 0.001$), autoimmune disorders (33.3% vs. 12.2%, OR 3.61, 95% CI 1.69–7.73, $p = 0.002$). FM was significantly less frequent among healthy PH compared to those with ≥ 1 CHC (8.0% vs. 24.5%, OR 0.27, 95% CI 0.17–0.42, $p < 0.001$). Univariate and multivariate logistic regression analyses were conducted to explore possible demographic, health-related,

and professional predictors of FM among PH, as displayed in Table 4.

Discussion

In subjects with FM, the presence of diffuse bodily pain as well as other core features such as fatigue, non-restorative sleep, and cognitive dysfunction has a profoundly negative impact on work performance [19]. The concomitant occurrence of FM with other somatic and mental health disorders compounds its impact on the physical and psychological well-being of affected individuals [2]. A stress-related disorder such as FM is particularly relevant to a population such as PH because of their highly stressful profession, its potentially deleterious effects the provision of the healthcare service, and the risk of suboptimal patient outcomes [5, 6]. The aim of this study is to examine the prevalence of fibromyalgia and its predictors among Egyptian physicians.

In our cohort of Egyptian PH, the prevalence FM was 13.2%. This estimate is higher than that recorded in the regional Middle Eastern general adult population (4.4%) and in the global general population (1.78%) [13]. This higher prevalence in the Egyptian PH population was not surprising, as it is probably an extension of the high prevalence of FM observed among Egyptian medical students, which was estimated at 12.5% [21]. Compared to studies on PH worldwide, the prevalence of FM in this work was higher than the 6.0% prevalence documented in a relatively younger predominantly male cohort of PH in training in Saudi Arabia [23]. In another Saudi study examining the burden of FM among healthcare workers, the prevalence of FM in a more homogenous cohort of PH was 11.6%, which is more in line with our findings [24]. On the other hand, a Pakistani study on PH in a tertiary care hospital (of whom 69% had rheumatoid arthritis) documented FM in 28.4% of participants [25].

In our study, FM was significantly more prevalent in female compared to male PH, with a 3.8:1 female to male ratio of FM occurrence. Similarly, a recent study on 352 Egyptian FM patients also observed a female to male ratio of 3.9:1, and the intensity of FM features was greater in females [26]. The findings in this study are also congruent with the large body of literature demonstrating female sex predominance among subjects with FM [2, 11, 26, 27]. There is compelling epidemiologic evidence that females are at a significantly higher risk for various clinical pain conditions, including more intense postoperative and procedural pain compared to males [28]. This may be explained by the action of sex steroids, which alter levels of spinal nociceptive neurotransmitters and augment cortical neuronal excitatory synaptic function [29].

This current study reported the prevalence of FM to be significantly different between age groups, with the

Table 4 Logistic regression analysis for possible predictors of fibromyalgia among physicians

Predictor	B	p value	OR	95% CI	
				Lower	Upper
Univariate analysis					
Demographics					
Female sex	0.68	0.012	1.9	1.1	3.4
Age 41–50 years ^a	1.32	< 0.001	3.7	1.7	8.1
Health status					
Presence of ≥ 1 CHC	0.87	< 0.001	3.7	2.4	5.9
Number of CHC	0.54	< 0.001	2.2	1.7	2.8
Endocrinopathies	0.99	0.031	2.7	1.1	6.6
Diabetes mellitus	1.01	0.059	-	-	-
Musculoskeletal disorders	1.72	< 0.001	5.6	2.9	10.6
Autoimmune disorders	1.28	< 0.001	3.6	1.7	7.7
Professional factors					
MOHF employment	0.50	0.030	1.6	1.0	2.6
Specialty					
Medical	0.33	0.188	-	-	-
Surgical	-0.75	0.033	0.47	0.24	0.94
Non-clinical	0.19	0.512	-	-	-
Workday length					
≤ 8 h/day	0.06	0.813	-	-	-
9–12 h/day	-0.34	0.218	-	-	-
≥ 13 h/day	0.51	0.135	-	-	-
Multivariate analysis					
Demographics					
Female sex	0.78	0.014	2.2	1.2	3.9
Age 4–50 years ^a	1.34	0.005	3.8	1.5	9.6
Presence of ≥ 1 CHC	1.28	< 0.001	3.6	2.2	5.9
Professional factors					
MOHF employment	0.63	0.013	1.8	1.1	3.1
Specialty ^b					
Medical	0.69	0.074	-	-	-
Non-clinical	0.60	0.199	-	-	-
Workday length ^c					
9–12 h/day	0.09	0.752	-	-	-
≥ 13 h/day	0.85	0.038	2.4	1.05	5.3

Bold values are statistically significant ($p \leq 0.05$)

^a Age 20–30 years was used as the reference class

^b Surgical specialty was used as the reference class

^c ≤ 8 h was used as the reference class

CHC chronic health condition(s), CI confidence interval, MOHF Ministry of Health Healthcare Facility, OR odds ratio

highest prevalence among PH in the 41–50 years age group. This is in line with previous studies which have demonstrated an increase in FM prevalence with age [2, 3, 11]. On the contrary, in the study on FM among Pakistani PH, its prevalence was highest among the youngest (20–35 years) age group with a decreasing trend with

advancing age. This discrepant finding might have been due to the predominance of the younger age group in the Pakistani cohort of PH, of whom only 2.9% were older than 45 years of age [25].

Another independent predictor for the presence of FM in this work was employment at a MOHF, even when adjusting for age, sex, the presence of chronic illness, specialty, and workday length. Based on the World Health Organization health system profile of Egypt [10], MOHFs lack human resource plans. No specific job descriptions are defined, and performance does not relate to promotion. Additionally, MOHFs suffer a geographically skewed distribution of specialists which hinders the traditional transfer of experience between generations of PH, raising a unique challenge to career enhancement. Further comparative studies are needed to explore occupational stress and job satisfaction as possible explanatory factors for the increased prevalence of FM among PH at MOHFs.

In this study, FM was most prevalent among PH with long workdays, and a workday length of ≥ 13 h was an independent predictor of FM adjusted for age, sex, chronic illness and specialty. Longer working hours may contribute to the development of FM by two mechanisms. On one hand, longer working hours lead to increased workloads and ultimately greater occupational stress [30]. On the other hand, longer working hours have been previously linked to the development of depression among healthcare workers in general and PH in particular [31–34]. The bidirectional relationship between FM and depression (where one condition predisposes to and worsens the other) [35] may explain the impact of working hours on the development of FM in PH.

Being a surgeon was a protective factor against the presence of FM among the studied PH in the present work. Since almost two thirds of surgeons included in this study were males, this effect of specialty on FM disappeared when adjusting for demographic and other professional factors.

In the present work, the presence of ≥ 1 chronic illness was an independent predictor of the presence of FM, adjusted for demographic and professional parameters. FM was significantly more frequent among PH with diabetes mellitus, endocrinopathies, musculoskeletal disorders, and autoimmune disorders in this study. These findings are consistent with data from the general population about the comorbidities of FM. Indeed, a significant association between diabetes and FM was documented [3, 36]. Endocrinopathies such as thyroid and adrenal diseases have also been linked to the development of FM [37–39]. Arif et al. demonstrated that over 70% of FM patients had been previously diagnosed with a painful musculoskeletal

disorder, with 66% of them being on long-term non-steroidal anti-inflammatory drug therapy [3]. Autoimmunity has been proposed as a predisposing factor to the development of FM [40], frequently accompanying many autoimmune disorders, which also typically occur more commonly in women [4, 36].

This study has certain limitations, including the study design being cross-sectional, leading to the inability to define causal association among the analyzed aspects. The duration of the clinical practice in years and the city of employment were not considered as potential confounders. Moreover, occupational stress and job satisfaction were not measured, and mental health factors could not be captured in depth.

In conclusion, demographic predictors of FM in this cohort included female sex and being in the 41–50 age group. Health-related predictors included suffering from chronic illness(es), particularly diabetes mellitus, endocrinopathies, and musculoskeletal and autoimmune disorders. Professional predictors included MOHF affiliation and longer working hours. PH are a vulnerable population to developing FM. To mitigate its potential effects on their job performance and quality of life, PH do require not only greater awareness of this disabling condition but also timely access to psychological and social support, so that stress coping strategies may be effectively deployed. The importance of health promotion strategies and interventions in the PH population cannot be overemphasized.

Abbreviations

AID	Autoimmune disease
CHC	Chronic health condition
CI	Confidence interval
FM	Fibromyalgia
HTN	Hypertension
MOHF	Ministry of Health Healthcare Facility
OR	Odds ratio
PH	Physicians
UH	University hospital

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Authors' contributions

SF and DA conceptualized the research project. AE, BE, and MA oversaw the participant recruitment and data collection. BE and AH performed the data handling and analysis. DA wrote the first draft of the manuscript. DA and SF revised the draft for publication. All authors have read and approved the final manuscript.

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Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

This study was approved by Cairo University Faculty of Medicine Research Ethical Committee (N-241–2023) and has thus been conducted in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments. All participants have provided informed consent prior to their inclusion.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

Author details

¹Department of Rheumatology and Rehabilitation, Faculty of Medicine, Cairo University, Cairo, Egypt. ²International Federation of Medical Students Associations, Brazil (IFMSA), Faculdade Ciencias Medicas De Minas Gerais (FCMMG), Belo Horizonte, Brazil. ³International Federation of Medical Students Associations, Brazil (IFMSA), Universidade de Uberaba (UNIUBE) – Medical School, Uberaba, Brazil. ⁴International Federation of Medical Students Associations, Brazil (IFMSA), Universidade Federal da Paraíba (UFPB), Joao Pessoa, Brazil. ⁵University of Manchester, Manchester, UK. ⁶Department of Public Health, Faculty of Medicine, Cairo University, Cairo, Egypt.

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