High prevalence of fibromyalgia syndrome among Israeli nurses

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ABSTRACT

Objective. *Stress has extensively been shown to trigger fibromyalgia syndrome (FM). Nursing is associated with high levels of stress. Our hypothesis was that nurses suffer from an increased prevalence of FM symptoms, and that these symptoms correlate with the levels of stress to which they are exposed in the course of their occupation.*

Methods. *The study was conducted as a targeted survey distributed to nursing staff in Soroka University Medical Centre, Beer-Sheva, Israel. Participants were asked to answer a questionnaire evaluating symptoms of FM, based on the current diagnostic criteria, which include the widespread pain index (WPI) and the symptom severity scale (SSS). Participants were further questioned regarding stressful experiences during their work and about post-traumatic symptoms as well as regarding work performance and motivation.*

Results. *206 participants completed the study questionnaire (84.5% females and 15.5% males). Twenty (9.7%) participants of the sample fulfilled criteria for diagnosis of FM reaching rates among females and males of 10.9% and 3.1% respectively. The prevalence of FM in our study was related to age with the highest prevalence in the older age groups (p=0.012). FM symptoms were strongly correlated with work related stress and were strongly correlated with Post Traumatic Stress Disorder (PTSD)-related symptoms. Work-performance parameters did not show a significant correlation with FM parameters.*

Conclusion. *FM is highly prevalent among nursing staff. Our findings point towards the possibility that work-related stress and traumatic events may play a major role in the development of FM symptoms among nurses. With aging this association is more significant.*

Introduction

The fibromyalgia syndrome (FM) is one of the most common "rheumatic" disorders. FM is thought to be a centralised chronic pain state beginning in adolescence or young adulthood manifested by pain experienced in different body regions at different times (1, 2-4). The prevalence rate of FM ranges from 2% to 5% in various population-based survey studies worldwide, and it is similar in different countries, cultures, ethnic groups and socio-economic classes (1, 5-7). The prevalence of the FM in the Israeli population is 2.6% and is similar to that observed in other Western populations (6). FM has a female:male ratio of 2-3:1 (5). Patients with FM are likely to have a history of headaches, dysmenorrhea, temporomandibular joint disorder, chronic fatigue, irritable bowel syndrome and other functional gastrointestinal disorders, interstitial cystitis/painful bladder syndrome, endometriosis, and other regional pain syndromes (especially back and neck pain) (1, 5, 8).

The aetiology and pathophysiology of FM remain incompletely understood. But in recent years significant progress towards elucidating the mechanisms and the genetic background behind FM and other chronic pain conditions has been extensively studied (9-12).

Stress has been shown to trigger FM, ranging from early life events such as preterm birth (13), through childhood adversities including sexual abuse (14-16), to the acute stress related to catastrophic events such as war, terrorism, accidents and natural disasters (17-20). More specifically, workplace-related stress such as bullying has previously been tied to the development of FM (21). Nursing staff represents a specific and somewhat unique occupational population. In the specific case of nursing, employees have developed patholo-

gies including "burnout syndrome", "workplace stress", conflicts related to violence within healthcare institutions (directed at both clients and the nursing staff), indices of poor workplace satisfaction, and depression (22). The issues could also be related to hospital work, which involves a mental workload that directly impacts the quality of care, quality of life at the workplace, and overall quality of life (22).

Nursing is associated with high levels of stress, a low degree of quality of life and high levels of exhaustion (23), due mainly to the long hours and professional dissatisfaction (24). Moreover, symptoms of anxiety, depression, psychological suffering, sleep disorders, fatigue and other somatic complaints are reported to be associated with nursing and exert a negative impact on the mental health of these healthcare workers (25).

In the current study we have attempted to evaluate the prevalence of FM among a sample of nursing staff. Our hypothesis was that in the view of the above outlined association between FM and stress, nursing staff may suffer from an increased rate of FM associated symptoms that may be correlated with the degree of stressful events exposed in the course of their occupation. Such occurrences may end in significant deleterious consequences for both the healthcare workers and the treated individuals alike.

Materials and methods

The study was conducted as a targeted survey distributed to nursing staff at the Soroka University Medical Centre, Beer-Sheva, Israel, a teaching hospital with 1150 beds that serves as the only tertiary referral centre for Southern Israel, with an estimated catchment population of 1,000,000. The questionnaire was distributed to nurses working at Soroka University Medical Centre, who completed the survey anonymously and included basic demographic data, including age, marital status, education, religion and medical history. In addition, details were collected regarding work-related role, place of work (department), years on the job, and academic degree. Nurses were further questioned as to

which of their workplace conditions are perceived of as causing most work-related stress, *e.g.* interactions with peers, with hospital directors, with professional supervisors, patients and their families, as well as workload at work, working conditions, demand to additional and overtime work.

*Assessment of trauma
and post-traumatic symptoms*

The presence of post-traumatic symptoms was screened by using the post-traumatic diagnostic scale (26), a version of which we had previously been used for assessing post-traumatic symptoms (17).

Assessment of pain

Participants were screened for the presence of widespread pain, fatigue, sleep disorders, joint stiffness, paresthesia, irritable bowel symptoms, anxiety, depression, headache, back pain and difficulties with concentration. Duration of pain was recorded, as well as medical treatments utilised and specialist referrals performed. In addition, the FM diagnostic criteria questionnaires, *i.e.* the Widespread Pain Index (WPI) and the Symptoms Severity Scale (SSS) were included. Fibromyalgia score (FS) was calculated based on WPI and SSS scores.

Lastly, nurses were questioned about the relation between their health conditions and their work performance, including questions about work motivation, work absenteeism, work quality and relationship with the patients, patients' families, management, physicians and with other nurses.

In order to evaluate the possible relationship between work-related stress conditions and the occurrence of physical symptoms characteristic of FM participating nurses were asked to indicate in a series of questions, which of the following factors they considered to be a source of stress in their workplace, on a scale of 2-10: management, supervisor nurse, professional supervisors, colleagues, patient's family, administrators, patients, work burden, physical conditions, extra shifts.

The symptoms evaluated included the following: sleep disturbances, fatigue,

joint stiffness, paresthesia, feeling of swelling, irritable bowel symptoms, anxiety, depression, difficulty with concentration and memory, headache, backache and widespread pain. We further compared the WPI and the SSS across these workplace-condition-related categories, as well as the total FS.

In order to evaluate in the current study the possible relationship between FM symptoms and traumatic events among nurses, we collected data regarding the occurrence of PTSD-like symptoms among participants.

The study was approved by the institutional Review Board.

Statistical analysis

Descriptive statistics was provided. The statistics for continuous variables included mean, standard deviation, variables with non-parametric distribution were described with median and interquartile range and categorical variables were described with numbers and percentages. Based on the responses of participants to the questions comprising the WPI and the SSS, it was possible to identify participants fulfilling diagnostic survey criteria of fibromyalgia syndrome and to compare these individuals with participants not fulfilling these criteria. Differences between the FM group *versus* non-FM group were assessed by Student *t*-test for continuous variables, Mann Whitney test for variables with non-parametric distribution and chi-square test (χ^2) for categorical variables. Pearson and spearman's correlations were calculated for the relationship between FM symptoms and traumatic events and for the relationship between work conditions and FM symptoms. All statistical tests and/or confidence intervals, as appropriate, was performed at $\alpha=0.05$ (2-sided) except for those specified otherwise. All *p*-values reported were rounded to three decimal places. All statistical analyses were conducted using SPSS 25.0 statistical software (IBM Corp Armonk, NY, USA).

Results

Two-hundred and six participants completed the study questionnaire, including 174 females (84.5%) and 32 males

Table I. Baseline characteristics of study population according to fibromyalgia syndrome (FM) status (n=206).

Variable		FM (n=20)		Non-FM (n=186)		p-value
Age group, years, n (%)	24-29	2	(10.0)	38	(20.4)	0.012
	30-39	5	(25.0)	53	(28.5)	
	40-49	4	(20.0)	69	(37.1)	
	50-59	5	(25.0)	14	(7.5)	
	≥ 60	4	(20.0)	12	(6.5)	
Gender, n (%)	Female	19	(95.0)	155	(83.3)	0.171
Religion, n (%)	Jewish	18	(90.0)	148	(83.1)	0.625
	Muslim	2	(10.0)	24	(13.5)	
	Christian	0		6	(3.4)	
Jewish origin (n=158), n (%)	Ashkenazi	11	(68.8)	49	(34.5)	0.007
	Sephardi	5	(31.2)	93	(65.5)	
			(n=16)		(n=142)	
Jewish religious status, n (%)	Ultra-orthodox	1	(5.9)	0		<0.001
	Religious	0		27	(18.2)	
	Conservative	9	(52.9)	28	(18.9)	
	Saccular	7	(41.2)	93	(62.8)	
			(n=17)		(n=148)	
Birth country, n (%)	Israel	12	(63.2)	97	(53.9)	0.716
	Abroad	7	(36.8)	82	(45.6)	
	New immigrant (5 years)	0		1	(0.6)	
			(n=19)		(n=180)	
Family status, n (%)	Married	14	(70.0)	139	(74.7)	0.125
	Single	2	(10.0)	29	(15.6)	
	Divorced	2	(10.0)	15	(8.1)	
	Widower	2	(10.0)	3	(1.6)	
Parenthood, n (%)		15	(75.0)	148	(79.6)	0.575
Education status, n (%)	Bachelor of arts (BA)	5	(25.0)	118	(63.4)	0.304
	Master of arts (MA)	15	(75.0)	68	(36.6)	
Education years (mean ±SD)		15 ± 2.8		15 ± 4.9		0.962
Work setting, n (%)	hospital	20	(100)	183	(98.9)	1.00
	ambulatory	0		2	(1.1)	
Work extent, n (%)	Full time job	14	(70.0)	116	(62.7)	0.520
	Partial	6	(30.0)	69	(37.3)	
Work status, n (%)	head clinic/ward	2	(10.0)	13	(7.0)	0.949
	Deputy head clinic/ward	1	(5.0)	9	(4.9)	
	Head shift	8	(40.0)	84	(45.4)	
	Nurse	9	(45.0)	79	(42.7)	
Seniority (median, IQR)		23, 7-38		13, 4-20		0.036

(15.5%). Twenty participants (9.7%) of the sample, including 19 females and one male, fulfilled the criteria for diagnosis of FM with current rate among females and males 10.9% and 3.1% respectively. The baseline characteristics and demographics of the study population are presented in Table I.

The prevalence of FM in our study was age related. In the younger groups of age 24-29, 30-39, 40-49 the proportion of FM was particularly low, while in the more elderly participants ages, 50-59, and older than 60 the proportion was higher (p=0.012).

166 participants (80.6%) were Jewish, while 26 (12.6%) were Muslim and 6 were Christian (2.9%). No significant differences were found regarding the proportion of FM by religion. We further analysed Jewish individuals based on their an self-reported level of religiosity (classified as "secular", "conservative", "religious" and "ultra-orthodox"); 9 (52.9%) individuals in the "conservative" group fulfilled FM criteria compared to 28 (18.9%) without FM criteria and in the "secular" group 7 (41.2%) participants fulfilled FM criteria compared to 93 (62.8%) partici-

pants without FM criteria (p<0.001). No significant difference was found according to place of birth (country), family status, parenthood, educational status or educational years, work extent (full time job vs. partial), work setting (hospital vs. outpatient) or work status. Total working years were associated to number of working years of 23 years compared to 13 years of the nurses without FM (p=0.036).

The correlation between work conditions (stress) and symptoms of FM is present in Table II. Statistically significant correlations were observed between many signature FM features and the major causes of work related stress surveyed. Thus, the total FS was strongly correlated with stress related to management, supervisor nurse, professional supervisors, colleagues, patient's family, administrators, patients, work burden, physical conditions, extra shifts. As shown in the table, widespread pain was also strongly correlated with many of these stressful factors.

Table III presents the correlations between FM symptoms and PTSD-related symptoms. As shown, strong correlations were found between central FM features such as the FS, as well as the WPI and widespread pain, and between classical PTSD related symptoms such as avoidant thoughts, difficulty in recalling parts of a traumatic events, loss of interest in participation, hypervigilance, etc. These correlations demonstrate a close linkage between FM and PTSD symptoms in the population studied.

Table IV presents comparisons between FM and non-FM nurses regarding work related performance. In order to evaluate what impact FM symptoms had on nurses' professional performance, participants were questioned about a range of work performance related parameters.

This questionnaire included questions regarding motivation to come to work, punctuality of arrival, absence from work, leaving work early, work concentration, empathy to patients and their families, to colleagues, motivation to improve the quality of work, conduct with the management, physicians and with other nurses. The results of these

Table II. Correlation between work conditions (stress) and symptoms (n=206).

	management	Supervisor nurse	Professional supervisor	Colleagues	Patient's family	Administra-tors	patients	Work burden	Physical conditions	Extra shifts
FS	0.136	0.096	0.093	0.130	0.114	0.047	0.089	0.336**	0.261**	0.157*
WPI	0.106	0.016	0.064	0.086	0.098	0.095	0.087	0.247**	0.174*	0.075
SSS	0.162*	0.152*	0.115	0.142*	0.110	0.018	0.098	0.323**	0.257**	0.203**
Sleep disorders	0.206**	0.233**	0.177*	0.234**	0.259**	0.134	0.169*	0.371**	0.330**	0.202**
Fatigue	0.200**	0.227**	0.221**	0.172*	0.182**	0.227**	0.206**	0.458**	0.369**	0.221**
Joint stiffness	0.110	0.065	0.065	0.053	0.089	0.125	0.093	0.214**	0.194**	0.136
Paresthesia	0.110	0.108	0.128	0.095	0.088	0.084	0.139*	0.135	0.089	0.153*
Feeling of swelling	0.125	0.089	0.117	0.166*	0.146*	0.146*	0.112	0.203*	0.125	0.145*
IBS	0.177*	0.133	0.160*	0.150*	0.047	0.052	0.055	0.245**	0.175*	0.151*
Anxiety	0.241**	0.256**	0.232**	0.290**	0.193**	0.212**	0.216**	0.315**	0.174*	0.299**
Depression	0.295**	0.225**	0.204**	0.292**	0.221**	0.253**	0.208**	0.272**	0.230**	0.289**
Concentration	0.177*	0.237**	0.218*	0.239**	0.232**	0.254**	0.182**	0.283**	0.342**	0.315**
Memory	0.211**	0.275**	0.279**	0.246**	0.273**	0.143*	0.226**	0.324**	0.344**	0.374**
Headache	0.165*	0.214**	0.199**	0.182**	0.229**	0.073	0.205**	0.340**	0.325**	0.240**
Back pain	0.252**	0.221**	0.214**	0.219**	0.222**	0.147*	0.155*	0.280**	0.388**	0.211**
Widespread pain	0.190**	0.154*	0.125	0.193**	0.234**	0.185**	0.221**	0.287**	0.273**	0.236**

FS: fibromyalgia score, WPI: widespread pain index; SSS: symptom severity scale.
*$p<0.05$. **$p<0.01$.

Table III. Correlations between FM symptoms and PTSD-related symptoms (n=206).

	FS	WPI	SSS	Sleep disorders	Fatigue	Joint stiffness	Paresthesia	swelling	IBS	Anxiety	Depression	Concen-tration	Memory	Headache	Back pain	Wide-spread pain
Sad thoughts	0.342**	0.180**	0.375**	0.255**	0.137*	0.145*	0.12	0.214**	0.104	0.253**	0.266**	0.258**	0.225**	0.153*	0.184**	0.195**
Nightmares	0.339**	0.236**	0.314**	0.314**	0.184**	0.212**	0.211**	0.172*	0.211**	0.240**	0.309**	0.249**	0.226**	0.217**	0.245**	0.190**
Re-experiencing traumatic event	0.342**	0.232**	0.327**	0.248**	0.175*	0.189**	0.151*	0.224**	0.142*	0.193**	0.317**	0.276**	0.230**	0.197**	0.251**	0.202**
Feeling down	0.302**	0.161*	0.347**	0.199**	0.180**	0.161*	0.123	0.239**	0.119	0.192**	0.270**	0.166*	0.114	0.212**	0.224**	0.141*
Physiological sensations	0.326**	0.246**	0.296**	0.160*	0.161*	0.165*	0.217**	0.222**	0.209**	0.203**	0.271**	0.223**	0.167*	0.245**	0.206**	0.187**
Avoiding thoughts	0.305**	0.166*	0.339**	0.182**	0.162*	0.135	0.127	0.191**	0.143*	0.192**	0.309**	0.226**	0.139*	0.236**	0.167*	0.198**
Avoiding activities	0.315**	0.220**	0.307**	0.229**	0.117	0.221**	0.158*	0.189**	0.109	0.229**	0.297**	0.216**	0.181*	0.201**	0.208**	0.200**
Unable to recall part of events	0.263**	0.221**	0.241**	0.233**	0.137	0.208**	0.172*	0.299**	0.187**	0.149*	0.343**	0.162*	0.201**	0.166*	0.163*	0.224**
Less interest in activities	0.280**	0.217**	0.281**	0.253**	0.133	0.183**	0.196**	0.294**	0.236**	0.208**	0.341**	0.251**	0.239**	0.154*	0.174*	0.205**
Less activities participation	0.344**	0.186**	0.387**	0.324**	0.223**	0.179*	0.147*	0.284**	0.164*	0.295**	0.355**	0.269**	0.287**	0.226**	0.197**	0.200**
Feeling isolated	0.319**	0.183**	0.361**	0.196**	0.234**	0.139*	0.103*	0.250**	0.184**	0.315**	0.388**	0.203**	0.214**	0.244**	0.274**	0.217**
Feeling emotional dullness	0.329**	0.205**	0.335**	0.294**	0.210**	0.164*	0.148*	0.303**	0.156*	0.292**	0.335**	0.266**	0.234**	0.213**	0.199**	0.238**
Feeling one's plans won't be fulfilled	0.253**	0.136	0.281**	0.191**	0.088	0.076	0.105	0.239**	0.154*	0.227**	0.248**	0.154*	0.142*	0.216**	0.125	0.143*
Restlessness	0.390**	0.241**	0.403**	0.251**	0.259**	0.185*	0.248**	0.389**	0.214**	0.251**	0.388**	0.299**	0.259**	0.327**	0.261**	0.306**
Hypervigilance	0.343**	0.257**	0.322**	0.166*	0.170*	0.096	0.159*	0.297**	0.209**	0.239**	0.191**	0.177*	0.217**	0.195**	0.203**	0.124

FS: fibromyalgia score; WPI: widespread pain index; SSS= symptom severity scale.
*$p<0.05$. **$p<0.01$.

parameters were correlated with FM symptoms in the entire sample and a dichotomous comparison was also performed between participants fulfilling and not fulfilling FM criteria. Work-performance parameters did not show a significant correlation with FM parameters, including the WPI, SSS, sleep disturbances, concentration and memory difficulties, headaches, back pain and depression.

Discussion

In the current study we have demonstrated a high prevalence of FM symptoms among nursing staff, roughly twice the proportion of the general population. It is the most important finding in our study, which is consistent with a previous investigating high prevalence of FM among Israeli school teachers (27), and to the best of our knowledge, has not been previously reported in nursing staffs. The study's results are a major indication of the role of that work-related conditions and load play in the pathogenesis of centralised pain. Our findings underline the possibility that work-related stress and traumatic events may play a major role in the development of FM symptoms among individuals working as nurses. Moreover, our data confirmed that with aging there is a cumulative effect of this stressful

Table IV. Comparison between FM and non-FM nurses regarding work-related performance (T test, df=204).

T test comparing FM *vs.* non-FM

	FM status	n	Mean	Std. Deviation	t
Current health status (range 1-10)	Non-FM	183	7.79	1.690	-4.057**
	FM	19	6.16	1.463	
Motivation to come to work (range 1-10)	Non-FM	183	8.11	2.91	-1.361
	FM	20	7.20	2.913	
Punctuality of arrival (range 1-10)	Non-FM	184	8.88	1.726	-0.890
	FM	20	8.50	2.524	
Absence from work (range 1-10)	Non-FM	177	6.88	3.756	1.607
	FM	18	7.94	2.555	
Leaving work early (range 1-10)	Non-FM	177	6.86	3.612	0.465
	FM	18	7.28	3.409	
Work concentration (range 1-10)	Non-FM	185	8.59	1.831	-0.535
	FM	20	8.35	2.455	
Empathy to patients (range 1-10)	Non-FM	186	8.75	1.906	-0.581
	FM	20	8.50	1.906	
Empathy to colleagues (range 1-10)	Non-FM	186	8.82	1.659	-0.058
	FM	20	8.80	1.542	
Empathy to patient's families (range 1-10)	Non-FM	186	8.64	1.946	-0.416
	FM	20	8.45	1.849	
Motivation to quality work (range 1-10)	Non-FM	186	8.83	1.721	-0.081
	FM	20	8.80	2.067	
Relationship with the management (range 1-10)	Non-FM	186	8.68	1.984	0.038
	FM	20	8.70	1.455	
Relationship with physicians (range 1-10)	Non-FM	186	8.85	1.779	-0.483
	FM	20	8.65	1.496	
Relationship with other nurses (range 1-10)	Non-FM	186	9.01	1.575	0.396
	FM	20	9.15	1.309	

*p<0.05. **p<0.01.

environment leading to more prevalent FM. Thus, our findings link FM symptoms with trauma on one hand and with stressful work conditions on the other among nurses making stress a plausible link in this association.

In addition, the results of this study are consistent with previous investigations which have demonstrated that nursing work is associated with high levels of stress as well as symptoms of anxiety, depression, psychological suffering, sleep disorders, fatigue and other somatic complaints (23, 25). In FM, similar to other complex and polygenic conditions, an intricate matrix of interactions plays out between genetic susceptibility and a lifelong of more-or-less subtle exposures, which may include elements as diverse as viral infection, physical trauma, hormonal changes and stress (27, 28).

Workplace-related stress has previously been related to the development of FM and extensive literature attests to the relationship between workplace mistreatment and occupational outcomes such as absenteeism from work (27, 29). It is interesting that our results did not show an increase in absenteeism or a decrease in other work-performance parameters (at least so far as can be evaluated through the self-report of participants) including motivation to come to work, that was described previously in a similar study about Israel school teachers (27).

We observed correlations between FM symptoms and PTSD related symptoms demonstrating a close association between these symptoms in the population studied, although causality cannot be inferred.

Our study is limited by the fact that we only collected data at one institution and in one country and further studies are needed to ascertain whether these results can be duplicated in other countries and in other healthcare environments.

As we did not collect data regarding the actual performance of nursing work, it is hard to determine the real impact FM symptoms may have on the performance and productivity of nursing staff. Nonetheless, the results of our study like the results of previous ones call for attention to the necessity of carefully scrutinising the workplace in which nurses (as well as other critical professionals) carry out their vocation (27).

A societal perspective should be combined with an epidemiological, occupational and medical point of view in reassessing this milieu and doing what is possible in order to assure that nurses continue to perform their vital functions without jeopardising their own health.

References
1. CLAUW DJ: Fibromyalgia: a clinical review. *JAMA* 2014; 311: 1547-55.
2. WILLIAMS DA, CLAUW DJ: Understanding fibromyalgia: lessons from the broader pain research community. *J Pain* 2009; 10: 777-91.
3. TRACEY I, BUSHNELL MC: How neuroimaging studies have challenged us to rethink: is chronic pain a disease? *J Pain* 2009; 10: 1113-20.
4. WOOLF CJ: Central sensitization: implications for the diagnosis and treatment of pain. *Pain* 2011; 152 (suppl.): S2-S15.
5. CROFFORD LJ: Fibromyalgia. *In*: Harrison's principles of internal medicine. 19th edition New York, McGraw Hill Education 2015, 2238-40.
6. ABLIN JN, OREN A, COHEN S *et al*.: Prevalence of fibromyalgia in the Israeli population: a population-based study to estimate the prevalence of fibromyalgia in the Israeli population using the London Fibromyalgia Epidemiology Study Screening Questionnaire (LFESSQ). *Clin Exp Rheumatol* 2012; 30 (Suppl. 74): S39-43.
7. HAUSER W, SARZI-PUTTINI P, FITZCHARLES MA: Fibromyalgia syndrome: under-, over- and misdiagnosis. *Clin Exp Rheumatol* 2019; 37 (Suppl. 116): S90-7.
8. AARON LA, BUCHWALD D: A review of the evidence for overlap among unexplained clinical conditions. *Ann Intern Med* 2001; 134: 868-81.
9. ABLIN JN, BUSKILA D: Update on the genetics of the fibromyalgia syndrome. *Best Pract Res Clin Rheumatol* 2015; 29: 20-8.
10. PARK DJ, LEE SS: New insights into the genetics of fibromyalgia. *Korean J Intern Med* 2017; 32: 984.

11. ESCARAMIS G, GRATACOS M *et al.*: Genome-wide analysis of single nucleotide polymorphisms and copy number variants in fibromyalgia suggest a role for the central nervous system. *Pain* 2014; 155: 1102-9.

12. ATZENI F, TALOTTA R, MALASA IF *et al.*: One year in review 2019: fibromyalgia. *Clin Exp Rheumatol* 2019; 37 (Suppl. 116): S3-10.

13. BUSKILA D, NEUMANN L, ZMORA E, FELD-MAN M, BOLOTIN A, PRESS J: Pain sensitivity in prematurely born adolescents. *Arch Pediatr Adolesc Med* 2003; 157: 1079-82.

14. HELLOU R, HAUSER W, BRENNER I *et al.*: Self-reported childhood maltreatment and traumatic events among Israeli patients suffering from fibromyalgia and rheumatoid arthritis. *Pain Res Manag* 2017; 2017: 3865249.

15. VAN DEN HOUTE M, SWENNEN L, BOGAERTS K, VAN OUDENHOVE L, VAN DIEST I, VAN DEN BERGH O: Childhood trauma, perfectionism, and pain severity in fibromyalgia patients. *J Psychosom Res* 2017; 98: 47-54.

16. VARINEN A, KOSUNEN E, MATTILA K, KO-SKELA T, SUMANEN M: The relationship between childhood adversities and fibromyalgia in the general population. *J Psychosom Res* 2017; 99: 137-42.

17. ABLIN JN, COHEN H, CLAUW DJ *et al.*: A tale of two cities - the effect of low intensity conflict on prevalence and characteristics of musculoskeletal pain and somatic symptoms associated with chronic stress. *Clin Exp Rheumatol* 2010; 28 (Suppl. 63): S15-21.

18. ABLIN JN, COHEN H, EISINGER M, BUSKILA D: Holocaust survivors: the pain behind the agony. Increased prevalence of fibromyalgia among Holocaust survivors. *Clin Exp Rheumatol* 2010; 28 (Suppl. 63): S51-6.

19. USUI C, HATTA K, ARATANI S *et al.*: Vulnerability to traumatic stress in fibromyalgia patients: 19 month follow-up after the great East Japan disaster. *Arthritis Res Ther* 2013; 15: R130.

20. CONVERSANO C, CAMASSI C, BERTELLONI C *et al.*: Potentially traumatic events, PTSD and post-traumatic stress spectrum in patients with fibromyalgia. *Clin Exp Rheumatol* 2019; 37 (Suppl. 116): S39-43.

21. KIVIMAKI M, LEINO-ARJAS P, VIRTANEN M *et al.*: Work stress and incidence of newly diagnosed fibromyalgia: prospective cohort study. *J Psychosom Res* 2004; 57: 417-22.

22. ZAVALA MOQ, KLINJ TP, CARRILLO KLS: Quality of life in the workplace for nursing staff at public healthcare institutions. *Rev Lat Am Enfermagem* 2016; 24: e 2713.

23. LEE JS, AKHTAR S: Effects of the workplace social context and job content on nurse burnout. *Hum Resour Manage* 2011; 50: 227-45.

24. GARTNER FR, NIEUWENHUIJSEN K, KET-ELAAR SM, VAN DIJK FJ, SLUITER JK: The mental vitality @ work study: effectiveness of a mental module for workers health surveillance for nurses and allied health care professionals on their help-seeking behavior. *J Occup Environ Med* 2013; 55: 1219-29.

25. GARCIA-IZQUIEDRO M, RIOS-RISQUEZ MI: The relationship between psychosocial job stress and burnout in emergency departments: an exploratory study. *Nurs Outlook* 2012; 60: 322-9.

26. FOA EB, CASHMAN L, JAYCOX L, PERRY K: The validation of a self-report measure of posttraumatic stress disorder: the Posttraumatic Diagnostic Scale. *Psychol Assess* 1997; 9: 445.

27. BUSKILA Y, BUSKILA D, JACOB G, ABLIN JN: High prevalence of fibromyalgia among Israeli school teachers. *Clin Exp Rheumatol* 2019; 37 (Suppl. 116): S21-6.

28. BRUMMETT C, CLAUW DJ: Fibromyalgia and Centralized Pain States. *In*: Essentials of Pain Medicine (Fourth Edition). Elsevier 2018, 213-22. e212.

29. ASFAW AG, CHANG CC, RAY TK: Workplace mistreatment and sickness absenteeism from work: results from the 2010 National Health Interview survey. *Am J Ind Med* 2014; 57: 202-13.