A painful train of events: increased prevalence of fibromyalgia in survivors of a major train crash

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ABSTRACT

Objectives. *To evaluate the prevalence of fibromyalgia in survivors of a major train crash in southern Israel, three years after the event.*

Methods. *Survivors were contacted by mail and telephone. Individuals consenting to participate in the study underwent physical examination, including a tender point count and dolorimetry, as well as extensive evaluation of parameters relating to quality of life, presence of widespread pain, fatigue, physical and social function, posttraumatic symptoms and symptoms related to anxiety, dissociation, depression, somatisation, etc.*

Results. *Fifteen percent of survivors participating in the study met ACR criteria for the classification of fibromyalgia. Significantly lower rates of physical and emotional functioning were found among survivors with fibromyalgia compared with those not meeting the classification criteria. Survivors with fibromyalgia rated significantly higher on scales of somatisation, obsessive – compulsive ideation, interpersonal sensitivity, depression, anger and hostility, phobic and general anxiety, paranoid ideation and psychoticism. Survivors with fibromyalgia also rated significantly higher on scales of posttraumatic symptoms including intrusion, avoidance and arousal. These individuals also rated significantly higher on the Peritraumatic Dissociative Experiences Questionnaire (PDE-Q) and the Dissociative Experiences Scale (Hebrew version) (DES-H).*

Conclusion. *Fibromyalgia was found to be highly prevalent, three years after a major train crash, among individuals exposed to the combination of physical injury and extreme stress. This finding is in accordance with previous data regarding the association of fibromyalgia with both physical and emotional trauma and calls attention to studying the underlying susceptibility factors which may partake in this association.*

Introduction

Fibromyalgia syndrome (FMS) is the prototypical central nervous system sensitisation syndrome (1, 2) and causes significant impairment in functioning and quality of life, as recently described (3). As demonstrated by advanced central nervous system functional imaging modalities, FMS is characterised by increased pain processing, clinically leading to manifestations such as alodynia and hyperalgesia (4, 5). While a strong familial aggregation clearly points towards a genetic basis for FMS (6), various triggers have been implicated as contributing to symptom - development in FMS, when genetically susceptible individuals are adequately challenged. It is within this context that both physical trauma and emotional stress (or distresses) have been previously investigated regarding their role in the instigation of chronic pain and FMS. A substantial amount of data points towards the association between trauma and FMS (7-10). Although subgroups of FMS patients have been described who appear to be highly psychologically resilient and to demonstrate surprisingly low levels of distress despite the presence of exquisite tenderness (11), in many others anxiety levels are high; In addition, various forms of external stress have been implicated as triggers leading towards the development of pain, ranging from the acute stress caused by a terrorist attack (12) to the more mundane stressors definable as "daily hassles" (13-15).

A specific area of interest is centred on the association between FMS and physical trauma. Injury to the cervical spine, *e.g.* whiplash injury, has been clearly associated with the development of

FMS in previous studies (7, 16). Physical and emotional trauma obviously coexists in many traumatic events and may interact in the pathogenesis of FMS. In the current study we have attempted to widen our data on this issue by investigating the occurrence of FMS among survivors of a major train crash, occurring in southern Israel in 2005.

On June 21st 2005, an Israeli passenger train, travelling from Haifa to Beer-Sheva, collided with a truck, causing derailment of three carriages. Eight people lost their lives in the collision, including the drivers of the train and the truck. 198 injuries were reported.

Three years later, we have attempted to evaluate the prevalence and severity of FMS among survivors of this event.

Methods

Data collection and sample

In order to locate survivors of the Revadim disaster, information was collected from medical centres and facilities which had received casualties of the event. We were thus able to achieve a list of 153 individuals who had been evacuated from the site of the crash on June 21st, 2005.

Inclusion criteria included all individuals, male and female, who had received medical attention directly after the Revadim train crash and who provided written informed consent. Exclusion criteria included individuals with known psychiatric disorders, known prior diagnosis of chronic pain, and individuals under the age of 18 at the time of the study.

The study protocol was approved by the institutional review board of the Ben-Gurion University in accordance with the principles of the declaration of Helsinki and all participants gave written informed consent.

Recruitment was performed between during October 2008 and April 2009, about three years after the Revadim disaster. The overall sample consisted of 53 participants.

Study instruments

After signing an informed consent, patients were evaluated by one observer (D.M.). A generalised pain history was recorded. Tenderness was assessed by digital palpation and the diagnosis of FMS was made according to the 1990 American College of Rheumatology classification criteria, namely: widespread pain for more than 3 months, as well as tenderness to palpation in at least 11 of 18 sites (17). In all subjects, a count of 18 tender points at nine symmetrical sites was performed by thumb palpation. Definite tenderness at any point was considered present if some involuntary verbal or facial expression of pain occurred or withdrawal was observed. In addition, a manual dolorimeter was used, and points reported to be painful on less than 4 kg of pressure were recorded as tender.

Study design

Starting in October 2008, invitations (letters followed by telephone) were sent by mail to 153 train passengers, which were answered by 115 subjects. After receiving a full explanation of the procedure, sixty-two subjects refused to participate in the study (53.9%) and 53 subjects signed a written informed consent. The questionnaires were filled out in the presence of an interviewer and subjects were assisted in answering the questions, as needed. Each interviewer ensured that all subjects clearly understood the content of each item and the different aspects of the various component questions. All subjects were interviewed regarding relevant background data, degree of personal injury, experience of a sensation of a threat to life, symptoms and problems immediately after the accident, somatic symptoms, pain (both localised and widespread), manifestations of anxiety, posttraumatic symptoms and dissociation.

All subjects completed the following questionnaires:

1) *Demographics and background questionnaire*: Socio-demographic data such as age, gender, marital status, place of birth, education, place of residence and types of trauma in the past.

2) *Quality of life assessment*: Quality of life (QoL) was assessed by SF-36 (18; 19). This is a health-related profile of QoL that contains 36 items and measures health status across three domains: functional status, well-being and overall evaluation of health. The Hebrew translation of the SF-36 was validated in an adult general population (20), and our group has used it on patients with widespread pain, with and without FMS (21). The SF-36 contains eight scales: physical functioning, social functioning, and role limitations attributable to physical and emotional problems, mental health, vitality, bodily pain and general health. Each scale generates a score from 0 to 100, with a high score indicating better health and less body pain.

3) *The Symptom Check List (SCL-90)*: This questionnaire (22) consists of 90 items measuring 9 clinical subscales. It was developed as a measure of general psychiatric symptom severity and as a descriptive measure of psychopathology and has been found to be useful in the assessment of neurotic symptoms (23). The clinical subscales are: somatisation (12 items), obsession-compulsion (10 items), interpersonal sensitivity (9 items), depression (13 items), anxiety (10 items), hostility (6 items), phobic anxiety (7 items), paranoid ideation (6 items) and psychoticism (10 items). The scale has been extensively used and validated in Hebrew (24). Subjects are required to rate how much they are bothered by specific complaints on a 5-point Likert scale from 0 = "never" to 4 ="frequently". A higher score indicates more distress.

4) *Post Traumatic Stress Disorder Symptom Scale (PSS-I):* The PSS-I is a 20-item interview assessing the severity of every DSM-IV PTS symptom during the preceding two weeks (25). Each symptom is rated on a 4-point scale from 0 (not at all) to 3 (very much). Sub-scales scores are calculated by summing items in each of the PTS symptom clusters: re-experiencing, avoidance and arousal.

5) *The Peritraumatic Dissociative Experiences Questionnaire (PDEQ)*: The PDEQ was developed in order to examine dissociation at the time of trauma (26, 27). PDEQ ratings were found to be predictive of posttraumatic stress symptoms beyond the contributions of level of stress exposure and general dissociative tendencies (28). It also positively associated with level of stress exposure and general dissociative tendencies,

measured by the Dissociative Experiences Scale. A PDEQ score (range is 0 to 10) was calculated from the 10 items. If a subject neglected the respective peritraumatic dissociative experience, the item was scored with zero. If a subject reported the full respective Peritraumatic dissociative experience, the question was scored as threshold (1 point). If the answer implied a less-intense peritraumatic dissociative experience than the one implied by the item, or if the patient's description contained some degree of uncertainty, the question was scored as sub threshold (0.5 points).

6) *Dissociative Experiences Scale - Hebrew version (H-DES):* The Dissociative Experiences Scale developed by Bernstein and Putnam (29), and Carlson and Putnam (30), is used to measure the frequency of 28 dissociative experiences that are considered important aspects of the dissociation construct (31). The Hebrew translation of the DES (H-DES) has demonstrated high reliability and validity (32).

7) *The Traumatic Events Questionnaire (TEQ):* The TEQ assesses experiences with twenty four specific types of traumatic events (*e.g.* accidents, crime, adult abusive experiences) reported in the empirical literature as having the potential to elicit PTSD symptoms (33). To assess trauma intensity, respondents provide information for each event that was experienced including severity of injuries, threat to life, and their assessment of how traumatic the event was at the time and how they currently assess it. Each item is measured on a 7-point Likert scale anchored by "not at all" and "severely/extremely". These four items are summed for the worst event experienced, to produce a trauma intensity score ranging from 4 to 28. To obtain a trauma exposure score, the number of events reported by the individual is summed (34).

8) *Physical Function Assessment:* Physical function and health status were assessed using the Fibromyalgia Impact Questionnaire (FIQ) (35). The first part of the FIQ focuses on the patient's ability to perform daily tasks (*i.e.* driving, cleaning, walking, gardening, etc.) and contains 10 items with responses ranked 0 to 3, where 0 = "always able", and 3 = "never able". The item scores were normalised to range from 0 to 10 for uniformity, with 10 representing worst physical function. The mean of the items yields a single physical function score. A validated Hebrew translation of the FIQ was used (36).

9) *The Sense of Coherence (SOC) Scale* was developed by Antonovsky (37) and measures overall coping capacity. SOC consists of three components: comprehensibility, manageability and meaningfulness; the stronger these components are the stronger the SOC. The short version (13 items) was used in this study. Each item has two anchoring responses ranging from one to seven possible scores. The added score range is 13–91 points; the higher the score, the stronger the SOC.

The questionnaires were filled out by an interviewer and subjects were assisted in answering the questions, as needed. The interviewer made sure that all subjects clearly understood the content of each item and the different aspects of various components.

Statistical methods

Means, standard deviations, and frequencies were computed to summarise the distribution of values for each variable. Age, years of education, family status, number of years of marriage, immigrant/veteran status and number of years in Israel were analyzed as continuous data and compared by one-way analysis of variance (ANOVA). Chi-square tests were used for categorical data such as gender, place of birth and religion.

Results

The subjects were between the ages of 22 and 66, with a mean age of 39.8±1.9 (S.E.M) years. The mean level of education was 15.4±0.49 years; the percentage of employment was 83%; 58.5% were married.

39.6% of the participating passengers underwent hospitalisation after the accident, with an average of 8.9±4.5 days of hospital stay. 20.7% suffered fractures and 5.7% underwent surgery. 40% of the injuries were defined as mild, 40% as moderate and 20% were judged to be severe. The mean self-reported estimation of the injury severity, on a scale of 0-10, was 3.92 (SEM=0.4).

Eight (15.0%) of the subjects met the American College of Rheumatology criteria for classification of FMS. All eight were females. Another 4 individuals not suffering from widespread pain met the tenderness criterion, have a minimum of 11 tender points. We thus were able to compare survivors with and without FMS.

The demographic data of the subjects are summarised in Table I. The two groups, survivors with and without FMS, did not differ significantly on any of the demographic measures, such as age, marital status, reported level of education, and employment status.

Quality of life: Survivors with FMS reported an impaired quality of life in comparison with survivors without FMS, in almost all the domains of the SF-36 (Table II). Physical function, physical role function, emotional role, bodily pain and the total scores were

Table I. Socio-demographic characteristics of survivors with and without FMS.

Variable	Survivors With FMS n=8	Survivors Without FMS n=45	ANOVA
Age (years) Range, (years)	39.7 ± 2.1 22–57	40.4 ± 4.3 23–62	NS
% Married	65%	75%	NS
Number of children	1.4 ± 0.2 0–8	2.3 ± 0.6 0–4	NS
% Employed	82.2%	87.5%	NS
Education, (years) Range, (years)	15.1 ± 0.5 5–23	17.1 ± 1.3 12–22	NS

Results are expressed as mean and SEM or percentage.
One-way ANOVA; NS: not significant.

Table II. Quality of life of survivors with and without FMS.

Variable	Survivors with FMS n=8	Survivors without FMS n=45	ANOVA
Physical function	20.8 ± 01.9	26.0 ± 0.8	F(1,51)=6.7, p<0.0015
Physical role function	4.8 ± 0.5	6.5 ± 0.2	F(1,51)=7.9, p<0.007
General health perception	16.6 ± 0.5	15.2 ± 0.4	NS
Emotional functioning	3.5 ± 0.4	5.1 ± 0.2	F(1,51)=11.1, p<0.002
Social functioning	5.6 ± 0.4	6.1 ± 0.2	NS
Bodily pain	4.8 ± 0.3	8.0 ± 0.5	F(1,51)=14.7, p<0.0004
Mental health	20.1 ± 0.8	21.5 ± 0.6	NS
Vitality	13.9 ± 0.9	15.5 ± 0.4	NS
Total score	11.7 ± 0.4	12.6 ± 0.2	F(1,51)=4.6, p<0.04

Results are expressed as mean and SEM.
One-way ANOVA; NS: not significant.

Table III. Symptom check-list in survivors with and without FMS.

Variable	Survivors with FMS n=8	Survivors without FMS n=45	ANOVA
Somatisation	2.33 ± 0.3	0.9 ± 0.1	F(1,51)=20.0, p<0.0005
Obsessive compulsive	2.15 ± 0.4	1.2 ± 0.1	F(1,51)=6.75, p 0.0015
Interpersonal sensitivity	1.56 ± 0.4	0.8 ± 0.1	F(1,51)=4.9, p<0.035
Depression	1.9 ± 0.4	0.8 ± 0.1	F(1,51)=9.7, p<0.003
Anger & hostility	1.33 ± 0.3	0.6 ± 0.1	F(1,51)=6.9, p<0.015
Phobic anxiety	1.5 ± 0.4	0.6 ± 0.1	F(1,51)=7.7, p<0.008
Anxiety	1.6 ± 0.4	0.8 ± 0.1	F(1,51)=4.2, p<0.045
Paranoid ideation	1.2 ± 0.3	0.6 ± 0.1	F(1,51)=8.6, p<0.006
Psychoticism	0.2 ± 0.04	0.06 ± 0.01	F(1,51)=8.6, p<0.015

Results are expressed as mean and SEM.
One-way ANOVA.

Table IV. Posttraumatic symptoms in survivors with and without FMS.

Variable	Survivors with FMS n=8	Survivors without FMS n=45	ANOVA
Intrusion	12.75 ± 1.0	8.6 ± 0.4	F(1,51)=15.9, p<0.0003
Avoidance	16.6 ± 2.3	10.9 ± 0.4	F(1,51)=11.8, p<0.0015
Arousal	11.25 ± 1.3	7.2 ± 0.4	F(1,51)=13.4, p<0.0007
Total score	40.6 ± 4.3	26.8 ± 1.1	F(1,51)=18.3, p<0.0001

Results are expressed as mean and SEM. One-way ANOVA.

significantly lower for survivors with FMS, as compared to survivors without FMS (F(1, 51)=6.7, p<0.0015; F(1, 51)=7.9, p<0.007; F(1, 51)=11.1, p<0.002; F(1, 51)=14.7, p<0.0004; (F(1, 51)=4.6, p<0.04-respectively).

SCL-90 Symptomatic profile: Psychiatric symptoms, including hostility, interpersonal sensitivity, somatisation, depression, anxiety, phobia, obsession, paranoia and psychoticism, are presented in Table III. The subscales of somatisation, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobia anxiety, paranoid ideation and psychoticism were significantly higher for survivors with FMS, as compared to survivors without FMS ((F(1, 51)=20.0, p<0.0005; (F(1, 51)=6.75, p<0.0015; F(1, 51)=4.9, p<0.035; F(1, 51)=9.7, p<0.003; (F(1, 51)=6.9, p<0.015; F(1, 51)=7.7, p<0.008; (F(1, 51)=4.2, p<0.045; (F(1, 51)=8.6, p<0.006; F(1, 51)=8.6, p<0.015-respectively).

Posttraumatic symptoms: Stress-related and post-traumatic symptoms are summarised in Table IV. The symptom clusters related to intrusive, avoidance and arousal symptoms were more severe for the survivors with FMS than the survivors without FMS (F(1, 51)=15.9, p<0.0003; (F(1, 51)=11.8, p<0.0015; F(1, 51)=13.4, p<0.0007-respectively). The overall score of PTSD symptoms was more severe for the survivors with FMS than the survivors without FMS (F(1, 51)=18.3, p<0.0001).

Peritraumatic dissociative experiences: The PDE-Q was significantly higher for survivors with FMS, as compared to survivors without FMS (F(1, 51)=8.9, p<0.005) Table V).

Dissociative Experiences Scale: The results are summarised in Table V. The DES-H was significantly higher for survivors with FMS, as compared to survivors without FMS (F(1, 51)=6.4, p<0.015). Abnormal DES-H (*i.e.* DES-H<30) was observed in 3 survivors with FMS (37.5%) and only in 1 (2.22%) survivors without FMS.

The Traumatic Events Questionnaire: There were no statistically significant differences between the survivors with or without FMS in this score (Table V).

Dolorimeter threshold and tender points count: Table V demonstrates that survivors with FMS had more tenderness (high point count and lower dolorimetry thresholds) than survivors without FMS (F(1, 51)=54.0, p<0.0001 and F(1, 51)=25.6, p<0.0001-respectively).

Physical function assessment: Table V demonstrates that the physical functioning scores were significantly more impaired in survivors with FMS as compared to survivors without FMS (F(1, 51)=15.0, p<0.0004).

Sense of coherence: Survivors with FMS had less SOC score than survivors without FMS (F(1, 51)=8.0, p<0.007), demonstrated symptoms in terms of

Table V. Dissociative symptoms, physical functioning and pain in survivors with and without FMS.

Variable	Survivors FMS diagnosis n=8	Survivors without FMS n=45	ANOVA
PDE-Q	8.8 ± 5.5	2.1 ± 0.2	F(1,51)=8.9, p<0.005
DES-H	20.0 ± 7.7	9.0 ± 1.3	F(1,51)=6.4, p<0.015
TEQ	1.6 ± 0.2	1.4 ± 0.05	NS
Dolorimeter threshold, 9 sites (kg)	1.85 ± 0.3	4.38 ± 0.2	F(1,51)=25.6, p<0.0001
Tender points count, 18 sites	14.5 ± 0.8	4.3 ± 0.6	F(1,51)=54.0, p<0.0001
FIQ	43.0 ± 5.4	21.0 ± 2.2	F(1,51)=15.0, p<0.0004
SOC	52.9 ± 2.6	60.9 ± 1.1	F(1,51)=8.0, p<0.007

Results are expressed as mean and SEM.
PDE-Q: Peritraumatic dissociative experiences questionnaire; DES-H: Dissociative experiences scale, Hebrew version; TEQ: Traumatic events questionnaire; FIQ: Fibromyalgia impact questionnaire; SOC: Sense of coherence; One-way ANOVA. NS: not significant.

psychological distress and increased health care utilisation because of poor coping skills.

Discussion

In the current study we have demonstrated a high prevalence of FMS among survivors of a major train crash. Fifteen percent of survivors responding to our survey fulfilled ACR criteria for the classification of FMS (17), when contacted three years after the event. This figure is considerably higher than the prevalence of FMS in the general population, which is estimated to be around 3.4% (38) and is similar to our previous results obtained in the post- whiplash population (7). This figure is also high in comparison with the prevalence of widespread pain in the adult Israeli population, which has been estimated to range around 10.3% (39).

A major train crash, such as occurred in the Revadim disaster, constitutes a classic constellation in which severe physical trauma may interact with extreme stress, all within an acute, onetime episode. Survivors of the crash suffered major physical trauma, including fractures and contusions, and were simultaneously exposed to extreme emotional stress. Even survivors who did not suffer physical trauma would inevitably witness the injuries and suffering of those in their surroundings. The experience of trauma in a set of circumstances in which one experiences little or no control over one's fate is expected to result in an increase in the development of symptoms such as chronic pain and FMS. Thus, passengers in a large train (or similar large transportation vehicle, such as a passenger ship or airplane) might be expected to be particularly vulnerable to the results of an accident causing massive trauma, as well as fatalities.

The relationship between stress and FMS is a complex one and has been the subject of much interest recently. Epidemiological studies have consistently shown that individuals with high baseline levels of psychological distress are more likely to develop chronic regional or widespread pain (OR 1.5–2) (40-43) compared with individuals with low levels of distress. In addition, traumatizing experiences have been shown to be frequent among FMS patients and to be correlated with dissociative symptoms (44).

The function of the hypothalamic-pituitary-adrenal system, responsible for the human stress response, is a possible link between stress and pain, and baseline function of the HPA stress response is a predictor of chronic widespread pain, independent of distress and other psychological factors (45).

The terrorist attacks of 9/11 in the United States have been used as an opportunity for studying the effect of an acute stressful event on the perception of pain among individuals in proximity to these calamities. No increase was found in somatic symptoms amongst individuals in the general population of New York city (46) and no increase in pain or fatigue levels were found in FMS patients followed from before to the attacks to one month afterwards in Washington DC (47). In contrast, daily inter-personal hassles, do tend to increase pain and other somatic symptoms in some settings (48). In interpreting these results it could be assumed that direct exposure to the stressful event, as in the case of individuals physically injured in a disaster, is necessary, rather than indirect exposure through the media, through hearsay or even through visually witnessing an event from afar.

The issue of exposure to stress is further complicated by the simultaneous exposure to physical trauma. As mentioned above, direct injury to the cervical spine can act as a trigger for the development of FMS (7; 8). Individuals developing PTSD, a condition which bares clinical overlap with FMS (*e.g.* the presence of insomnia, cognitive impairment and anxiety)(49, 50) may contract this condition in response to a combination of stressful as well as physically injurious events. As previously demonstrated, a genetic predisposition may underlie the tendency of some individuals to develop PTSD under conditions which do not cause this outcome in others (51). Fifteen percent of individuals in the current study reported the occurrence of post-traumatic symptoms; notably, survivors fulfilling FMS criteria had significantly higher levels of somatisation, depression, anxiety and other stress-related symptoms compared with survivors not suffering from FMS. Classical post-traumatic symptoms such as intrusion, avoidance and arousal were also significantly more common among survivors with FMS compared with those without FMS. Physical activity may have a protective effect in patients with post-traumatic stress disorder regarding the development of fibromyalgia (52). These findings emphasise the combined and interacting outcomes of chronic pain and classical posttraumatic symptoms among the train crash survivors.

As FMS is a condition with familial as well as genetic underpinnings (53), it is clearly possible that in a similar fashion a genetic susceptibility may underlie the determination of which individuals

develop FMS in response to a stressful and traumatic event, such as the one described in the current study. In this context it is worthy to mention the extensive line of evidence linking FMS and chronic pain to COMT (catecholamine o-methyl transferase), the enzyme that degrades catecholamines, in pain transmission (54). Thus, it has been demonstrated that the val158met polymorphism is responsible for differential pain sensitivity in humans, working in part by modulating opioidergic activity (55). This val158met polymorphism is more weakly associated with psychiatric disorders (56). There thus are indications of a genetic link between the human stress response and the susceptibility to chronic pain, and an intriguing future line of research could focus on examining whether survivors of events such as the Revadim accident, who developed FMS, are genetically distinct from those who did not.

Vlaeyen has described a model of chronic pain pathogenesis as a cyclical process, whereby pain produces fear, which leads to behavioural avoidance, inactivity, disability, and increased focus on pain avoidance (57). This model would appear to give another possible conceptual framework for understanding the above-mentioned associations.

It is intriguing to note, that all 8 individuals who met the ACR criteria for FMS in the current study were females. While the female to male preponderance of fibromyalgia is well known, this finding draws attention to a possible sex-related difference in the way in which stress may bare an effect on the development of pain.

An obvious limitation of our results is related to the fact that only 53 of the 115 (46.1%) individuals contacted agreed to participate in the study. It is difficult to make assumptions about the extent to which those examined may differ from those who refused to take part in the study, since those refusing may have been more severely traumatised on the one hand (6 individuals stated they were too traumatised to participate); on the other hand a large proportion of these individuals appeared unwilling to participate because of being asymptomatic. Similar rates of participation have been previously reported (58).

Although this limitation is inherent when attempting to study survivors of an unexpected disaster, we still believe that the information collected from the participants adds valuable insight into the outcome of such events.

In conclusion, in the current study we have demonstrated a high prevalence of FMS, as well as posttraumatic symptoms, among survivors of a major train crash, when examined three years after the disaster. This finding adds to the existing evidence regarding the relationship between both physical trauma and acute stress in the pathogenesis of fibromyalgia and chronic pain and highlights the need for further research into understanding the susceptibility and risk factors for the development of these serious and debilitating complications. It also calls attention to the need for clinical follow up and resource-allocation directed at the survivors of such events.

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