Alamrawy *et al.*
Egypt J Neurol Psychiatry Neurosurg (2023) 59:96
https://doi.org/10.1186/s41983-023-00697-5

The Egyptian Journal of Neurology, Psychiatry and Neurosurgery

RESEARCH

Open Access

Unveiling the enigma: physicians' perceptions of functional neurological disorders in Egypt—a cross-sectional study

Roa Gamal Alamrawy[1*], Alshymaa Mohamed Abdel Tawab[2], Hoda Aly Mohamed Omran[3], Ahmed K. Awad[4], Marwa Abdelazim Rizk[5], Esraa Ahmed Abdelrasoul[6], Amira Etman[7], Dina B. Ahmed[6], Essam G. Ali[8] and Manar Ahmed Kamal[9]

Abstract

Background In medical practice, it is common to see patients who present with physical symptoms for which no disease pathology can be found. The presence of neurological symptoms that are shown to be incompatible with neurological pathophysiology is classically known as "conversion disorder" or "Functional Neurological Symptom Disorder" (FND). While FND is common in Egypt as in the rest of the world, few scientific studies systematically evaluate the degree of knowledge, attitude, and care provided by health care professionals to FND patients. We aimed to assess Egyptian physicians' perspectives on FND.

Results A cross-sectional study has been conducted on 152 physicians dealing with FND practicing in Egypt from specialties of psychiatry, neurology, and other specialties. We found that for 45% of the participants, disordered functioning of the nervous system plus psychogenesis was the accepted etiology behind FND. Most participants were significantly not satisfied with their education about FND (*p*-value 0.01). Psychiatrists and neurologists significantly preferred to use the term "conversion disorder" while other specialties mainly used "psychic" and "Somatization/Somatoform Disorder" (*p*-value 0.001). Forty-four percent of the participants think they have a good knowledge of functional neurological disorders (FND), while the majority (86.8%) were worried about missing an organic disorder. Psychiatrists were the most confident in diagnosing FND and the most comfortable discussing it with patients (*p*-values 0.055 and 0.007, respectively).

Conclusion Here we highlight the common theme of worry about FND patients prevailing among healthcare professionals who are mostly perplexed about the mechanisms behind FND, and how to communicate these symptoms to other professionals and patients themselves. Future directions need to be devoted to minimizing the gap between the research finding and the currently applied care. Better education and teaching about FND may improve patient care.

Keywords Functional neurological disorders, FND, Conversion disorder, Conversion reaction, Hysteria, Somatization, Somatoform disorder, Psychogenic non-epileptic seizures, PNES, Functional movement disorder

*Correspondence:
Roa Gamal Alamrawy
roa.alamrawy@gmail.com
Full list of author information is available at the end of the article

Springer Open

© The Author(s) 2023. **Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit http://creativecommons.org/licenses/by/4.0/.

Background

In medical practice, it is common to see patients who present with physical symptoms for which no disease pathology can be found [1]. Of these symptoms, motor or sensory symptoms might present with disproportionate physical signs that are consistent with well-known neurological diseases [2]. A plethora of names are used to describe these symptoms, including "somatoform disorders", "psychic symptoms", "hysteria", or "medically unexplained" [3].

The classically known "conversion disorder" with a hallmark of neurological symptoms that are shown to be incompatible with neurological pathophysiology, refers to the transformation of intrapsychic tensions into physical manifestations. Although, in the 5th edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), a new term has been conceptualized to integrate these symptoms into a diagnosis. The term "*Functional Neurological Symptom Disorder"* (FND) was added in parentheses after the DSM-IV term *"Conversion Disorder".* However, DSM-5 in 2013 imposes diagnostic criteria that are unrelated to etiology and remove the centrality around the medically unexplained symptoms [2].

Functional neurological disease (FND) is a frequent and incapacitating syndrome at the interface of neurology and psychiatry that, until recently, has received little attention from the clinical neuroscience community [4]. While there is a lot of information available about the physical characteristics, psychological makeup, and neuropsychological performance of patients with functional neurological disorders (FNDs), the supposed biopsycho-social mechanisms underlying FND are complex. Genetics, temperament, and early childhood experiences are implicated, along with the neurophysiologic markers (such as cortical network, autonomic, and psychophysiological). Functional neuroimaging studies suggest activation alterations in regions mediating emotional processing, regulation, and awareness (peri-genual anterior cingulate cortex/VMPFC, insula, amygdala), cognitive control (DLPFC, dorsal anterior cingulate cortex [dACC], inferior frontal gyrus), self-referential processing (TPJ/posterior cingulate cortex/precuneus), and motor planning (SMA) [5]. FND appears as the result of a combination of higher-order influences (such as attention to self or expectation) and bottom-up limbic influences (such as trauma and arousal) interacting with and influencing basic motor function (such as intention, inhibition), involving complex associative regions and processing upstream of primary motor and sensory cortices [6]. On one hand, neural networks and neurophysiologic mechanisms may mediate "functional" symptoms, reflecting neurobiological and intrapsychic processes, while on the other hand, these represent much more complexity for achieving a diagnosis of FND and hence communicating it.

The complexity within nomenclature may add more to physicians' lack of understanding of FND and appears to be a worldwide problem [7, 8]. As a result of poor training, inexperience, and misconception about FND, most physicians do not welcome dealing with patients with FND [3]. Even the act of communicating the diagnosis and discussing treatment choices can be challenging [9]. The relationship between patients with FND and physicians has been incapacitated by the lack of communication, lack of explanations, and lack of empathy sometimes [10].

Payers, physicians, and affected patients experience difficulties with complex brain–body differential diagnoses [11]. A patient with FND takes seven years on average to be diagnosed, which significantly worsens the prognosis [12]. And along that period, the possibility of receiving a wrong diagnosis, unnecessary investigation, and inappropriate treatment is high [4]. Many physicians still regard people with FND as malingerers [10]. Patients' presentations of FND and clinicians' perceptions of it are heavily influenced by culture, which can exacerbate the situation when a cultural issue such as gender discrimination exists [13].

FND is common in Egypt, with patients seen by doctors of many disciplines and in a variety of settings, including emergency rooms, outpatient clinics, and inpatient wards. However, few scientific studies systematically evaluate the degree of knowledge, attitude, and care health care professionals provide to FND patients. As a result, we presented this study to gain a better understanding of physicians' views on FND patients. Collectively, this will give access to physicians' professional development. In turn, aiding in the development of culture-sensitive care for FND patients.

This study aimed to assess Egyptian physicians' perspectives on functional neurological disorders (conversion disorder). The study explored physicians' perspectives in the context of functional neurological disorders. Additionally, it revealed the possible associations between the physicians' characteristics including gender, and the affection of physicians' perspectives toward FND.

Methods

Study design and study population

This cross-sectional study was conducted on 152 physicians. An online anonymous survey was utilized in this study. The data were collected during the third coronavirus wave peak in Egypt [14], using the Google Forms Platform because of the restrictions on physical contact that ensued during the pandemic. Snowball convenient sampling was used to recruit health professionals

practicing in Egypt. No official contact methods were available to use in terms of contacting physicians and that is why determining a sample size was challenging as inherited in similar studies [3]. Participants: physicians were recruited through an online survey link disseminated through social network sites such as Facebook and WhatsApp on the major unofficial specialties' clusters over 8 weeks. Those who provided consent to participate were recruited according to inclusion criteria. Inclusion criteria: Egyptian physicians from both genders, between the age of 24 and 60. Physicians who were practicing currently in Egypt and dealing with patients with functional neurological complaints; from the fields of psychiatry, neurology, internal medicine, general practice and family medicine, emergency medicine, physical medicine, and physiotherapy.

Measurement

Sociodemographic and professional data profile (Additional file 1: Appendix 1): The form was designed by the research team based on a focused literature review [9, 15–17]. Questions include information about the participants such as age, gender, residence, specialty, years of practice, and the number of FND patients encountered during the practice.

Views about functional neurological disorders survey [3] (Additional file 1: Appendix 2): This questionnaire was developed in Australia by Lehn et al. in 2019 [3], to explore the perceptions of health practitioners of the FND patients they may have treated or diagnosed in the past, as well as their understanding of options for treatment and management. The survey includes five subscales presented as follows: general/education, diagnosis and communication of diagnosis, patients' characteristics, functional symptoms, their validity, and referral pathways and management. As items overlap between subscales, the survey in total has assessed perceptions towards FND. Practice assessment covered items on clinical interest, communication confidence, peer referral, and support, negative experiences with FND patients, and symptom validity. The original questionnaire underwent expert review to assure face and content validity. The original scoring system was a 5-point Likert-type scale from 1 = "Strongly agree" to 5 = "Strongly disagree". Of note, in the current study, the scoring system has been modified to a 3-point Likert-type scale from 1 = "agree" to 3 = "disagree". This adaptation was made based on cross-cultural differences, as Egypt is sharing the characteristics inherited from other collectivist communities such as India, China, Japan, and many others. One is the dimension of "*uncertainty avoidance*" [18]. Contrary to other individualistic cultures such as Australia [19], response styles people from collectivist communities tend to prefer the middle response on a 5-point Likert scale and to avoid extreme responses, which might lead to erroneous conclusions in research [20, 21]. However, this adaptation was in line with expert opinion in designing knowledge, attitude, and practice (KAP) surveys in psychiatry: *"When offering options for answers, care must be taken to avoid offering too extensive a range of options to avoid offering a false sense of detail especially there is no gold standard against which less granular and more granular can be validated"* [22].

Statistical analysis

The collected data were summarized and presented in suitable tables. In further analyses, participants were grouped under three groups: psychiatrists, neurologists, and the other specialties group (OSG). Categorical variables are presented as numbers and percentages. Statistical significance was evaluated using the Chi-square test for categorical variables. For the association between the variables, we used Spearman correlation analysis. Multinomial logistic regression models were conducted to determine the association between the predictor and dependent variables. Therefore, the multinomial logistic regression model had two main categories: (psychiatry and neurology), while the reference category was: the other specialties group (OSG). The multinomial logistic regression model has been interpreted using odds ratio (OR) and 95% confidence interval (CI). We conducted statistical analyses using the Statistical Package for the Social Sciences (SPSS) software (version 26.0) [23].

Ethics approval and consent to participate

All procedures performed in this study were by the standards of the ethics committee and research review board at Alexandria University Faculty of Medicine (IRB No. 00012098, expires June. 2022; FWA No. 00018699, expires Jan. 2026), Approval No. 0305100. Informed consent was obtained from all individual participants included in the study for participation and publishing.

Results

Baseline demographic characteristics of the participants

We conducted a cross-sectional study with a total of 152 participants. According to Table 1, most participants were females (75.7%). Most of the participants belonged to the (30 to < 40) age category (50.7%), living in cities (94.1%). The highest percentage in specialty was related to psychiatrists (52.6%), followed by general practice/family medicine physicians (15.8%). Most participants have not spent any postgraduate training in psychiatry or neurology (28.9% and 55.3%, respectively). Such findings were underscored by respondents' free responses too. Forty-five percent of the sample were beyond their first

Table 1 Baseline demographic characteristics of the participants ($n=152$)

Variables	*n*	%
Age		
24–< 30	59	38.8
30–< 40	77	50.7
40–< 50	14	9.2
50–60	2	1.3
Gender		
Female	115	75.7
Male	37	24.3
Main place of practice		
City	143	94.1
Countryside	9	5.9
Specialty		
Psychiatry	80	52.6
Neurology	19	12.5
Internal medicine	14	9.2
General practice/family medicine physician	24	15.8
Emergency medicine	4	2.6
Physical medicine	9	5.9
Physiotherapy	2	1.3
Years of practice		
< 1	17	11.2
1–5	69	45.4
6–10	37	24.3
11–20	26	17.1
21–30	1	7
> 30	2	1.3
Months spent in postgraduate "Psychiatry" training?		
0	44	28.9
1–3	29	19.1
4–6	25	16.4
7–12	10	6.6
13–24	15	9.9
25–48	7	4.6
> 48	22	14.5
Months spent in postgraduate "Neurology" training?		
0	84	55.3
1–3	35	23
4–6	8	5.3
7–12	8	5.3
13–24	4	2.6
25–48	5	3.3
> 48	8	5.3
Number of patients that you encountered with functional neurological disorders during the last year?		
0	23	15.1
1–5	51	33.6
6–10	25	16.4
11–20	20	13.2
21–50	15	9.9
> 50	18	11.8
Did you have exposure to functional neurological disorders (FND)/conversion disorder, or a condition which you consider similar, prior to studying medicine?		
No	79	52
In myself	6	3.9
A family member	26	17.1
A friend	18	11.8
In myself and others	23	15.1
What is your preferred term for use with colleagues in referring to functional neurological disorders (FND)?		
Conversion disorder	57	37.5
Dissociative disorder	5	3.3
Functional neurological disorder	16	10.5
Medically unexplained symptoms	6	3.9
Psychogenic "psychic"	26	17.1
Somatization/somatoform disorder	26	17.1
Hysteria	4	2.6
Depression	4	2.6
Stress-related disorder	7	4.6
Unspecific anxiety syndrome	1	0.7
Do you see the etiology of functional neurological disorders (FND)/conversion disorder as involving?		
Disordered functioning of the nervous system	17	11.2
Psychogenesis	51	33.6
Disordered functioning of the nervous system plus psychogenesis	69	45.4
Malingering/feigning	5	3.3
Unknown or other	10	6.6
Ahmed, a 26-year-old man woke up on the morning with inability to move his right leg. The patient mentioned his mother's death recently after being ill for several years. How likely is a diagnosis of functional neurological disorder?		
Impossible (never)	7	4.6
Possible (maybe)	95	62.5
Probable (mostly)	50	32.9
Mona, a 60-year-old woman, has been brought to the emergency room with an attack of loss of consciousness. She has been brought by her sons who accompanied her to her retirement party. How likely is a diagnosis of functional neurological disorder?		
Impossible (never)	17	11.2
Possible (maybe)	124	81.6
Probable (mostly)	11	7.2
Ezzat, a 62-year-old man presented to clinic with tingling in his arm after reported current stresses at work. How likely is a diagnosis of functional neurological disorder?		
Impossible (never)	12	7.9
Possible (maybe)	120	78.9
Probable (mostly)	20	13.2
Maha, a 24-year-old woman has been brought to emergency room with sudden onset of inability to move her both legs. She has been brought by her husband and he reported preceding verbal conflict. How likely is a diagnosis of functional neurological disorder?		

Table 1 (continued)

Variables	*n*	%
Impossible (never)	7	4.6
Possible (maybe)	70	46.1
Probable (mostly)	75	49.3
If you disagree with the statement: "It is appropriate for me to be involved in the treatment of patients with functional neurological disorders", who (in your opinion) would be the most appropriate specialist to refer to?		
Neurologist	11	7.2
Psychiatrist/ psychotherapist	81	53.3
Physical medicine/ physiotherapist	2	1.3
General practitioner	3	2
I agree with the statement/I neither agree nor disagree	55	36.2

Data are presented as number (*n*) and percentage (%)

FND: functional neurological disorders

year of training, and nearly half of the participants hold a license of specialist $_{\pm}$ consultant.

Functional neurological disorders

According to Table 1, less than half of the participants encountered five or fewer FND patients in the last year, in comparison with a minority of physicians (11.8%) who dealt with more than 50 patients during the last year. Before studying medicine, around half of the participants were exposed to FND in their environment, and nearly 40% of them had FND themselves. Interestingly, on one hand, 45% found disordered functioning of the nervous system and psychogenesis were behind the etiology of FND, while 33% believed it was only psychogenesis. On the other hand, 3% believed that FND patients might be malingering/feigning. Around one-third of the participants recommend that referral to a psychiatrist/psychotherapist would be the most appropriate specialist to refer to. "Conversion Disorder" was the preferred term for the majority when referring to the diagnosis of FND, followed equally by "Somatization/Somatoform Disorder" and "Psychogenic (psychic)".

Four case scenarios have been constructed by the team. Those cases were suggestive of FND as preceded by stress and are genuine to the Egyptian culture and represented common situations. Each has presented a different gender with a different age group. When it is the case of "Ahmed; a young male", ≈33% agreed that is mostly an FND compared with the case of "Maha; a young female" nearly half agreed it was mostly FND rather than a structural lesion.

According to Table 2, we found that 44.1% of the participants think they have a good knowledge of functional neurological disorders (FND), and 36.2% believe they received adequate education about it. About half of the participants (49.3%) are willing to spend time caring for these patients. Only 29.6% were confident in diagnosing the FND, while the majority (86.8%) were worried about missing an organic disorder, considering nearly 25% of the sample are not confident about their neurological examination and knowledge about neuroanatomy.

Half of the participants were comfortable discussing the diagnosis with the patient. About 57.9% of the participants disagreed that these patients are responsible for their symptoms, and the minority (12.5%) think these patients do not want to get better. Most participants (71.1%) believed these symptoms were real, although 38.8% agreed that these symptoms are in patients' minds. While 49.3% neither agreed nor disagreed about disability pensions, 40.1% neither agreed nor disagreed about the right for FND patients to compete in the Paralympics. Specialist multidisciplinary support is needed by 67.1% of the sample, although 30.3% of the participants found it hard to help FND patients, while 25.7% would prefer not to deal with them (Table 2).

Association between different factors and specialty

According to Table 3, we found that psychiatrists and neurologists significantly preferred to use the term "conversion disorder" while other specialties mainly used "psychic" and "Somatization/Somatoform Disorder" (p-value 0.001). Around half of the psychiatrists (62.7%) agreed that they have good knowledge about FND compared to (19.4%) of neurologists and (17.9%) of other specialties. Most participants were significantly not satisfied with their education about FND (p-value 0.01). Psychiatrists were significantly willing to spend more time with FND patients (p-value = 0.038). However, psychiatrists were the least confident about their neurological examination skills and knowledge about neuroanatomy, compared to neurologists and OSG (p-value 0.001). Our data suggest that psychiatrists were the most confident in diagnosing FND and the most comfortable discussing it with patients (p-values 0.055 and 0.007, respectively). On the other side, OSG was the least sure about diagnosing FND and the most struggling when discussing the association of psychiatric problems with patients (p-values 0.001). Most of our participants significantly disagreed that patients are responsible for their symptoms or control them (p-value 0.003 and 0.007, respectively). However, the percentage of OSG who think that FND patients are manipulative was twice as much as psychiatrists who think the same (64.3% and 32.1, respectively). Interestingly, most of our participants from psychiatry, neurology, and OSG were not sure if symptoms of FND were real or not (52.6%, 12.5%, and 34.9%, respectively). About 46.2% of OSG preferred not to see FND patients compared to 35.9% and 17.9% in psychiatrists and

Table 2 Grouped responses about functional neurological disorders ($n = 152$)

Variables	Agree		Disagree		Neither agree nor disagree	
	n	%	*n*	%	*n*	%
General/education						
I have a good knowledge of functional neurological disorders (pathogenesis, underlying mechanisms, treatment strategies…)	67	44.1	31	20.4	54	35.5
I received adequate education about functional neurological disorders as part of my training	55	36.2	45	29.6	52	34.2
People with functional neurological disorders are interesting to work with	57	37.5	27	17.8	68	44.7
I am willing to spend time caring for people with functional neurological symptoms	75	49.3	22	14.5	55	36.2
I enjoy working with patients who have functional neurological symptoms	39	25.7	38	25	75	49.3
I am confident about my neurological examination skills/knowledge of neuroanatomy	52	34.2	37	24.3	63	41.4
Diagnosis and Communication of Diagnosis						
Generally, I am confident diagnosing a functional neurological disorder	45	29.6	35	23	72	47.4
I am confident discussing the possibility of a functional neurological disorder with a patient	49	61.8	18	11.8	40	26.3
I am not sure how to diagnose a functional neurological disorder	44	28.9	57	37.5	51	33.6
One thing I worry about is missing an organic disorder	132	86.8	5	3.3	15	9.9
Generally, I am comfortable explaining the diagnosis of a functional neurological disorder to patients	76	50	29	19.1	47	30.9
I often struggle with the discussion of associated psychiatric/ psychological problems	46	30.3	50	32.9	56	36.8
I do not have enough time to deal with these patients appropriately in my clinic/office	43	28.3	62	40.8	47	30.9
One worry with the explanation I have is that the patient does not believe me/gets angry at me and then I will lose the patient's trust	60	39.5	37	42.3	55	36.2
Patients characteristics						
I am often worried that these patients are actually malingering/faking/feigning	52	34.2	41	27.0	59	38.8
These patients are responsible for their symptoms	12	7.9	88	57.9	52	34.2
People with functional neurological disorders are in control of their symptoms	9	5.9	95	62.5	48	31.6
Functional patients' symptoms are in their mind	59	38.8	41	27.0	52	34.2
In my experience these patients often do not want to get better	19	12.5	67	44.1	66	43.4
I find these patients often demanding and difficult to deal with	49	32.2	31	20.4	72	47.4
People with functional neurological disorders are manipulative	28	18.4	62	40.8	62	40.8
I have often had bad experiences in the past with patients with functional neurological disorders (for example patients complaining or being shouted at...)	47	30.9	46	30.3	59	38.8
Functional symptoms and their validity						
These patients' symptoms are real	108	71.1	10	6.6	34	22.4
Patients with non-epileptic seizures should be allowed to drive	37	24.3	59	38.8	56	36.8
Patients with Functional Movement Disorders should be able to compete in Paralympic wheelchair sports	35	23	56	36.8	61	40.1
Disability pensions should not be awarded to these patients because it will prevent them from getting better	61	40.1	16	10.5	75	49.3

Table 2 (continued)

Variables	Agree		Disagree		Neither agree nor disagree	
	n	%	*n*	%	*n*	%
Referral pathways and management						
I find it difficult to help patients with functional neurological disorders	46	30.3	36	23.7	70	46.1
I do not think I can help these patients much without specialist support from psychologist/psychiatrist/neurologist/physiotherapist	102	67.1	18	11.8	32	21.1
When I see patients with functional neurological disorders, I often find that the referring doctor was not honest/open with the patient	44	28.9	40	26.3	68	44.7
Many patients with functional neurological disorders who are referred to me are just dumped on me	35	23	39	25.7	78	51.3
It is appropriate for me to be involved in the diagnosis of functional neurological disorders	103	67.8	9	5.9	40	26.3
It is appropriate for me to be involved in the treatment of patients with functional neurological disorders	98	64.5	14	9.2	40	26.3
I am uncertain of how to set goals of achievement for patients with functional movement disorders	64	42.1	28	18.4	60	39.5
I generally feel well supported by other health professionals who refer patients with functional neurological disorders to me	52	34.2	39	25.7	61	40.1
If I had a choice, I would rather not see patients with functional neurological disorders	39	25.7	58	38.2	55	36.2

Data are presented as number (*n*) and percentage (%)

Table 3 Association between different factors and specialty ($n = 152$)

Variables	Psychiatry [80 (52.6%)]		Neurology [19 (12.5%)]		Other specialties (OSG) [53 (34.9%)]		Overall *p*-value
	n	%	*n*	%	*n*	%	
1. Baseline demographic characteristics							
Age							
24–< 30	31	52.5	5	8.5	23	39	0.431
30–< 40	43	55.8	11	14.3	23	29.9	
40–< 50	6	42.9	2	14.3	6	42.9	
50–60	0	0	1	50	1	50	
Gender							
Female	62	53.9	11	9.6	42	36.5	0.152
Male	18	48.6	8	21.6	11	29.7	
Main place of practice							
City	77	53.8	19	13.3	47	32.9	0.098
Countryside	3	33.3	0	0	6	66.7	
Years of practice							
< 1	8	47.1	1	5.9	8	47.1	0.098
1–5	42	60.9	6	8.7	21	30.4	
6–10	21	56.8	7	18.9	9	24.3	
11–20	8	30.8	4	15.4	14	53.8	
21–30	0	0	0	0	1	100	
> 30	1	50	1	50	0	0	
Months spent in postgraduate "Psychiatry" training?							
0	1	2.3	3	6.8	40	90.9	0.001
1–3	17	58.6	4	13.8	8	27.6	
4–6	18	72	3	12	4	16	
7–12	8	80	2	20	0	0	
13–24	12	80	3	20	0	0	
25–48	5	71.4	2	28.6	0	0	
> 48	19	86.4	2	9.1	1	4.5	

Table 3 (continued)

Variables	Psychiatry [80 (52.6%)]		Neurology [19 (12.5%)]		Other specialties (OSG) [53 (34.9%)]		Overall *p*-value
	n	%	*n*	%	*n*	%	
Months spent in postgraduate "Neurology" training?							
0	42	50	0	0	42	50	0.001
1–3	23	65.7	4	11.4	8	22.9	
4–6	7	87.5	0	0	1	12.5	
7–12	2	25	5	62.5	1	12.5	
13–24	2	50	2	50	0	0	
25–48	3	60	1	20	1	20	
>48	1	12.5	7	87.5	0	0	
Number of patients that you encountered with functional neurological disorders during the last year?							
0	7	30.4	0	0	16	69.6	0.004
1–5	32	62.7	4	7.8	15	29.4	
6–10	11	44	3	12	11	44	
11–20	12	60	4	20	4	20	
21–50	7	46.7	3	20	5	33.3	
>50	11	61.1	5	27.8	2	11.1	
Did you have exposure to functional neurological disorders (FND)/conversion disorder, or a condition you consider similar, before studying medicine?							
No	32	40.5	10	12.7	37	46.8	0.060
In myself	4	66.7	1	16.7	1	16.7	
A family member	16	61.5	4	15.4	6	23.1	
A friend	15	83.8	1	5.6	2	11.1	
In myself and others	13	56.5	3	13	7	30.4	
What is your preferred term for use with colleagues in referring to functional neurological disorders (FND)?							
Conversion disorder	45	78.9	7	12.3	5	8.8	0.001
Dissociative disorder	3	60	1	20	1	20	
Functional neurological disorder	4	25	4	25	8	50	
Medically unexplained symptoms	2	33.3	0	0	4	66.7	
Psychogenic "psychic"	8	30.8	4	15.4	14	53.8	
Somatization/somatoform disorder	12	46.2	3	11.5	11	42.3	
Hysteria	3	75	0	0	1	25	
Depression	0	0	0	0	4	100	
Stress-related disorder	3	42.9	0	0	4	57.1	
Unspecific anxiety syndrome	0	0	0	0	1	100	

Table 3 (continued)

Variables		Psychiatry [80 (52.6%)]		Neurology [19 (12.5%)]		Other specialties (OSG) [53 (34.9%)]		Overall *p*-value
		n	%	*n*	%	*n*	%	
Do you see the etiology of functional neurological disorders (FND)/conversion disorder as involving?								
Disordered functioning of the nervous system		5	29.4	3	17.6	9	52.9	0.133
Psychogenesis		30	58.8	9	17.6	12	23.5	
Disordered functioning of the nervous system plus psychogenesis		38	55.1	6	8.7	25	36.2	
Malingering/feigning		4	80	0	0	1	20	
Unknown or other		3	30	1	10	6	60	
2. Grouped responses about functional neurological disorders								
General/Education								
I have a good knowledge of functional neurological disorders (pathogenesis, underlying mechanisms, treatment strategies…)	Agree	42	62.7	13	19.4	12	17.9	0.001
	Disagree	16	51.6	1	3.2	14	45.2	
	Neither Agree nor Disagree	22	40.7	5	9.3	27	50	
I received adequate education about functional neurological disorders as part of my training	Agree	34	61.8	10	18.2	11	20	0.010
	Disagree	22	48.9	1	2.2	22	48.9	
	Neither Agree nor Disagree	24	46.2	8	15.4	20	38.5	
People with functional neurological disorders are interesting to work with	Agree	37	64.9	6	10.5	14	24.6	0.069
	Disagree	16	59.3	3	11.1	8	29.6	
	Neither Agree nor Disagree	27	39.7	10	14.7	31	45.6	
I am willing to spend time caring for people with functional neurological symptoms	Agree	47	62.7	5	6.7	23	30.7	0.038
	Disagree	9	40.9	6	27.3	7	31.8	
	Neither Agree nor Disagree	24	43.6	8	14.5	23	41.8	
I enjoy working with patients who have functional neurological symptoms	Agree	23	59	4	10.3	12	30.8	0.655
	Disagree	19	50	7	18.4	12	31.6	
	Neither Agree nor Disagree	38	50.7	8	10.7	29	38.7	
I am confident about my neurological examination skills/knowledge of neuroanatomy	Agree	19	36.5	16	30.8	17	32.7	0.001
	Disagree	25	67.6	0	0	12	32.4	
	Neither Agree nor Disagree	36	57.1	3	4.8	24	38.1	
Diagnosis and Communication of Diagnosis								
Generally, I am confident diagnosing a functional neurological disorder	Agree	28	62.2	8	17.8	9	20	0.055
	Disagree	19	54.3	1	2.9	15	42.9	
	Neither Agree nor Disagree	33	45.8	10	13.9	29	40.3	
I am confident discussing the possibility of a functional neurological disorder with a patient	Agree	56	59.6	15	16.0	23	24.5	0.007
	Disagree	7	38.9	0	0.0	11	61.1	
	Neither Agree nor Disagree	17	42.5	4	10.0	53	34.9	

Table 3 (continued)

Variables		Psychiatry [80 (52.6%)]		Neurology [19 (12.5%)]		Other specialties (OSG) [53 (34.9%)]		Overall *p*-value
		n	%	*n*	%	*n*	%	
I am not sure how to diagnose a functional neurological disorder	Agree	20	45.5	0	0	24	54.5	0.001
	Disagree	28	49.1	15	26.3	14	24.6	
	Neither Agree nor Disagree	32	62.7	4	7.8	15	29.4	
One thing I worry about is missing an organic disorder	Agree	70	53.0	18	13.6	44	33.3	0.656
	Disagree	2	40	0	0	3	60	
	Neither Agree nor Disagree	8	53.3	1	6.7	6	40	
Generally, I am comfortable explaining the diagnosis of a functional neurological disorder to patients	Agree	44	57.9	10	13.2	22	28.9	0.216
	Disagree	14	48.3	1	3.4	14	48.3	
	Neither Agree nor Disagree	22	46.8	8	17	17	36.2	
I often struggle with the discussion of associated psychiatric/ psychological problems	Agree	18	39.1	5	10.9	23	50	0.001
	Disagree	38	76	5	10	7	14	
	Neither Agree nor Disagree	24	42.9	9	16.1	23	41.1	
I do not have enough time to deal with these patients appropriately in my clinic/office	Agree0	18	41.9	6	14	19	44.2	0.186
	Disagree	36	58.1	10	16.1	16	25.8	
	Neither Agree nor Disagree	26	55.3	3	6.4	18	38.3	
One worry with the explanation I have is that the patient does not believe me/gets angry at me, and then I will lose the patient's trust	Agree	27	45.0	7	11.7	26	43.3	0.132
	Disagree	23	62.2	7	18.9	7	18.9	
	Neither Agree nor Disagree	30	54.5	5	9.1	20	36.4	
Patients characteristics								
I am often worried that these patients are actually malingering/faking/feigning	Agree	31	59.6	3	5.8	18	34.6	0.285
	Disagree	23	56.1	6	14.6	12	29.3	
	Neither Agree nor Disagree	26	44.1	10	16.9	23	39	
These patients are responsible for their symptoms	Agree	5	41.7	1	8.3	6	50	0.003
	Disagree	52	59.1	16	18.2	20	22.7	
	Neither Agree nor Disagree	23	44.2	2	3.8	27	51.9	
People with functional neurological disorders are in control of their symptoms	Agree	2	22.2	0	0	7	77.8	0.007
	Disagree	56	58.9	15	15.8	24	25.3	
	Neither Agree nor Disagree	22	45.8	4	8.3	22	45.8	
Functional patients' symptoms are in their mind	Agree	32	54.2	10	16.9	17	28.8	0.112
	Disagree	26	63.4	4	9.8	11	26.8	
	Neither Agree nor Disagree	22	42.3	5	9.6	25	48.1	

Table 3 (continued)

Variables		Psychiatry [80 (52.6%)]		Neurology [19 (12.5%)]		Other specialties (OSG) [53 (34.9%)]		Overall *p*-value
		n	%	*n*	%	*n*	%	
In my experience these patients often do not want to get better	Agree	6	31.6	2	10.5	11	57.9	0.053
	Disagree	40	59.7	11	16.4	16	23.9	
	Neither Agree nor Disagree	34	51.5	6	9.1	26	39.4	
I find these patients often demanding and difficult to deal with	Agree	25	51	5	10.2	19	38.8	0.762
	Disagree	19	61.3	4	12.9	8	25.8	
	Neither Agree nor Disagree	36	50.0	10	13.9	26	36.1	
People with functional neurological disorders are manipulative	Agree	9	32.1	1	3.6	18	64.3	0.004
	Disagree	39	62.9	9	14.5	14	22.6	
	Neither Agree nor Disagree	32	51.6	9	14.5	21	33.9	
I have often had bad experiences in the past with patients with functional neurological disorders (e.g., patients complaining or being shouted at...)	Agree	24	51.1	3	6.4	20	42.6	0.080
	Disagree	26	56.5	10	21.7	10	21.7	
	Neither Agree nor Disagree	30	50.8	6	10.2	23	39	
Functional symptoms and their validity								
These patients' symptoms are real	Agree	64	59.3	11	10.2	33	30.6	0.089
	Disagree	5	50	2	20	3	30	
	Neither Agree nor Disagree	80	52.6	19	12.5	53	34.9	
Patients with non-epileptic seizures should be allowed to drive	Agree	19	51.4	5	13.5	13	35.1	0.432
	Disagree	35	59.3	4	6.8	20	33.9	
	Neither Agree nor Disagree	26	46.4	10	17.9	20	35.7	
Patients with functional movement disorders should be able to compete in Paralympic wheelchair sports	Agree	17	48.6	1	2.9	17	48.6	0.007
	Disagree	31	55.4	13	23.2	12	21.4	
	Neither Agree nor Disagree	32	52.5	5	8.2	24	34.9	
Disability pensions should not be awarded to these patients because it will prevent them from getting better	Agree	36	59	12	19.7	13	21.3	0.013
	Disagree	5	31.3	2	12.5	9	56.3	
	Neither Agree nor Disagree	39	52	5	6.7	31	41.3	
Referral pathways and management								
I find it difficult to help patients with functional neurological disorders	Agree	23	50	2	4.3	21	45.7	0.080
	Disagree	23	63.9	4	11.1	9	25	
	Neither Agree nor Disagree	34	48.6	13	18.6	23	32.9	
I do not think I can help these patients much without specialist support from psychologist/psychiatrist/neurologist/physiotherapist	Agree	47	46.1	15	14.7	40	39.2	0.218
	Disagree	12	66.7	2	11.1	4	22.2	
	Neither Agree nor Disagree	21	65.6	2	6.3	9	28.1	

Table 3 (continued)

Variables		Psychiatry [80 (52.6%)]		Neurology [19 (12.5%)]		Other specialties (OSG) [53 (34.9%)]		Overall *p*-value
		n	%	*n*	%	*n*	%	
When I see patients with functional neurological disorders, I often find that the referring doctor was not honest/open with the patient	Agree	18	40.9	5	11.4	21	47.7	0.258
	Disagree	24	60	6	15	10	25	
	Neither Agree nor Disagree	38	55.9	8	11.8	22	32.4	
Many patients with functional neurological disorders who are referred to me are just dumped on me	Agree	16	45.7	5	14.3	14	40	0.624
	Disagree	23	59	6	15.4	10	25.6	
	Neither Agree nor Disagree	41	52.6	8	10.3	29	37.2	
It is appropriate for me to be involved in the diagnosis of functional neurological disorders	Agree	66	64.1	10	9.7	27	26.2	0.001
	Disagree	3	33.3	0	0	6	66.7	
	Neither Agree nor Disagree	11	27.5	9	22.5	20	50	
It is appropriate for me to be involved in the treatment of patients with functional neurological disorders	Agree	63	64.3	9	9.2	26	26.5	0.002
	Disagree	2	14.3	3	21.4	9	64.3	
	Neither Agree nor Disagree	15	37.5	7	17.5	18	45	
I am uncertain of how to set goals of achievement for patients with functional movement disorders	Agree	28	43.8	5	7.8	31	48.4	0.042
	Disagree	18	64.3	4	14.3	6	21.4	
	Neither Agree nor Disagree	34	56.7	10	16.7	16	26.7	
I generally feel well supported by other health professionals who refer patients with functional neurological disorders to me	Agree	30	57.7	5	9.6	17	32.7	0.470
	Disagree	22	56.4	3	7.7	14	35.9	
	Neither Agree nor Disagree	28	45.9	11	18.0	22	36.1	
If I had a choice, I would rather not see patients with functional neurological disorders	Agree	14	35.9	7	17.9	18	46.2	0.002
	Disagree	42	72.4	6	10.3	10	17.2	
	Neither Agree nor Disagree	24	43.6	6	10.9	25	45.5	
If you disagree with the statement: "It is appropriate for me to be involved in the treatment of patients with functional neurological disorders", who (in your opinion) would be the most appropriate specialist to refer to?								
Neurologist		4	36.4	1	9.1	6	45.5	0.081
Psychiatrist/ psychotherapist		38	46.9	13	16	30	37	
Physical medicine/ physiotherapist		1	50	0	0	1	50	
General practitioner		0	0	0	0	3	100	
I agree with the statement/I neither agree nor disagree		37	67.3	5	9.1	13	26.6	

Data are presented as number (*n*) and percentage (%). *p*-values ≤ of 0.05 are considered statistically significant

FND: functional neurological disorders

neurologists, respectively (p-value 0.002). However, when the preferred term for FND was subclassified according to specialty, "Conversion Disorder" represented the most used label by psychiatrists and neurologists, versus "Psychogenic/psychic" for the other specialties group (OSG) (Table 3).

Association between sex differences and decision-making from different specialties: regarding the association between gender differences and decision-making, Table 4 shows no statistically significant relationship between females from different specialties and their decision to diagnose FND. However, there was a weak statistically significant relationship (young male; Ahmed's case) between males and their likelihood of diagnosing FND (overall p-value = 0.048). In Ahmed's case, the male neurologists never diagnosed this case as FND (100%), while (64.3%) of the male psychiatrists diagnosed this case as FND.

The results collectively uncovered insufficiencies in physicians' clinical knowledge and training about FND. Furthermore, results highlighted negative experiences with FND patients, and attitudes towards them; likewise, explored physicians' clinical interest, their communication confidence, and peer support.

Discussion

Ancient Egyptian physicians were the first to describe female cases with FND. In 1900 BC, they ascribed such symptoms to the displacement of the uterus [24]. Functional neurological disorders have contributed to patients' disabilities and significant costs on the level of the health care system and the patients themselves [25]. According to Egypt's national survey of mental health in 2017, somatoform disorders have a prevalence of 5% [26]. This is considered a leap from the rate of 0.67% in 2009 [27]. This study was conducted on 152 Egyptian physicians from different specialties to capture their perspectives on functional neurological disorders. Eighty psychiatrists have participated in this study which represents more than 10% of the number of psychiatrists in Egypt [28].

Although FND constitutes an overlap between psychiatry and neurology, around the third and half of the sample did not receive any postgraduate training in psychiatry or neurology, respectively. Most primary healthcare doctors and nurses in Egypt have not received official in-service training on mental health within the last five years [28].

Nearly one-fifth of the studied sample has reported experience of FND themselves before they studied medicine, such complaints might be labeled later as "Medical Student Syndrome" during studying medicine. This observation sheds light on the need for careful assessment of physical symptoms in medical personnel before jumping to the conclusion of catastrophic misinterpretation of bodily symptoms. Studying medicine is not a risk factor for the presence of illness anxiety and accompanied attitudes [29].

Disordered functioning of the nervous system plus psychogenesis was the accepted etiology behind FND for 45% of the participants. This is in concordance with a study in the Netherlands, when most neurologists and psychiatrists, regarded FND as disordered functioning of the nervous system, combined with psychogenic factors [30]. Aside from that, most Italian neurologists preferred explaining FND symptoms to their patients, because of abnormal functioning of the nervous system [31]. Nevertheless, a large-scale international study revealed that FND patients from 16 countries preferred to conceptualize the disorder as one at the interface of mind and brain [32]. Besides, patients with functional motor disorders were generally dissatisfied with psychological explanations for their symptoms and commonly felt misunderstood and abandoned by health care professionals. A lack of understanding of functional motor disorders left patients feeling unable to help themselves [10].

"Conversion Disorder" represented the most used label by psychiatrists and neurologists in this study. In a cohort of Italian neurologists, when referring to FND, the terms: "functional neurological disorders" and "somatization disorder" were the two most frequently used [31]. But in an international survey, the preferred term for communication favored 'functional' over 'psychogenic' terminology [33]. "Psychogenic/psychic" represented the most common name for the other specialties group (OSG). From a study that included over 700 physiotherapists, (68%) preferred to use the word 'functional', when discussing patients with functional symptoms with colleagues, but (52%) used the term 'medically unexplained symptoms in communication with patients [34]. However, psychology-related terms such as "Somatization disorder", "Psychogenic disorder", and "Conversion disorder" were selected more often by Italian general practitioners, indicating that a psychological view of FND is still widely held [17]. Worth noting that in the hot-off-the-press Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, Text Revision (DSM-5-TR), the term "Functional Neurological Disorder" has been prioritized so "*Conversion Disorder"* is now in parentheses. The rationale behind this was that *Conversion disorder* is

Table 4 Association between sex difference and decision-making from different specialties ($n = 152$)

Variables	Psychiatry [80 (52.6%)]		Neurology [19 (12.5%)]		Other specialties [53 (34.9%)]		Overall *p*-value
	n	%	*n*	%	*n*	%	
1. Female doctor decision							
Ahmed, a 26-year old man woke up on the morning with inability to move his right leg. The patient mentioned his mother death recently after being ill for several years. How likely is a diagnosis of functional neurological disorder?							
Impossible (never)	3	60	0	0	2	40	0.190
Possible (maybe)	34	45.9	8	10.8	32	43.2	
Probable (mostly)	25	69.4	3	8.3	8	22.2	
Mona, a 60-year old woman has been brought to emergency room with an attack of loss of consciousness. She has been brought by her sons who accompanied her to her retirement party. How likely is a diagnosis of functional neurological disorder?							
Impossible (never)	8	57.1	1	7.1	5	35.7	0.719
Possible (maybe)	48	51.6	10	10.8	35	37.6	
Probable (mostly)	6	75	0	0	2	25	
Ezzat, a 62-year old man presented to clinic with tingling in his arm after reported current stresses at work. How likely is a diagnosis of functional neurological disorder?							
Impossible (never)	6	60	0	0	4	40	0.858
Possible (maybe)	49	52.7	10	10.8	34	36.6	
Probable (mostly)	7	58.3	1	8.3	4	33.3	
Maha, a 24-year old woman has been brought to emergency room with sudden onset of inability to move her both legs. She has been brought by her husband and he reported preceding verbal conflict. How likely is a diagnosis of functional neurological disorder?							
Impossible (never)	2	40	0	0	3	60	0.431
Possible (maybe)	29	48.3	6	10	25	41.7	
Probable (mostly)	31	62	5	10	14	41.7	
2. Male doctor decision							
Ahmed, a 26-year old man woke up on the morning with inability to move his right leg. The patient mentioned his mother death recently after being ill for several years. How likely is a diagnosis of functional neurological disorder?							
Impossible (never)	0	0	2	100	0	0	0.048
Possible (maybe)	9	42.9	5	23.8	7	33.3	
Probable (mostly)	9	64.3	1	7.1	4	28.6	
Mona, a 60-year old woman has been brought to emergency room with an attack of loss of consciousness. She has been brought by her sons who accompanied her to her retirement party. How likely is a diagnosis of functional neurological disorder?							
Impossible (never)	2	66.7	1	33.3	0	0	0.482
Possible (maybe)	15	48.4	7	22.6	9	29.0	
Probable (mostly)	1	33.3	0	0	2	66.7	

Table 4 (continued)

Variables	Psychiatry [80 (52.6%)]		Neurology [19 (12.5%)]		Other specialties [53 (34.9%)]		Overall *p*-value
	n	%	*n*	%	*n*	%	
Ezzat, a 62-year old man presented to clinic with tingling in his arm after reported current stresses at work. How likely is a diagnosis of functional neurological disorder?							
Impossible (never)	2	100	0	0	0	0	0.640
Possible (maybe)	13	48.1	6	22.2	8	29.6	
Probable (mostly)	3	37.5	2	25	3	37.5	
Maha, a 24-year old woman has been brought to emergency room with sudden onset of inability to move her both legs. She has been brought by her husband and he reported preceding verbal conflict. How likely is a diagnosis of functional neurological disorder?							
Impossible (never)	1	50	1	50	0	0	0.228
Possible (maybe)	5	50	0	0	5	50	
Probable (mostly)	12	48	7	28	6	24	

Data are presented as number (*n*) and percentage (%). *p*-values ≤ of 0.05 are considered statistically significant

not an etiologically neutral term and falls from the use by researchers and clinicians in the field [35].

Culture-sensitive vignettes were presented and revealed more bias toward judging a young female as having FND. In a similar experiment, Swedish general practitioners were gender-biased too in their diagnostic assessment of FND syndromes; a female patient with back pain was more likely to be diagnosed as FND in comparison to an identical male counterpart [36]. In vignettes about pain patients, gender stereotypes influenced medical students' judgment of patients' future work ability [37]. Results from a study on 290 psychiatrists in the United States indicated that even when diagnostic criteria are clear, the gender and race of both of patient and physician affected the diagnosis [38]. However, in our study, there was no relation between the gender of the physician and assigning a diagnosis of FND. Females are more often given false psychosomatic diagnoses, which may reflect the scarcity of research and deficient understanding of how the female body responds to biological illness [39]. It seemed that stereotyped preoccupations with men and women were identified as the main triggers of gender bias [40].

Most participants were significantly not satisfied with their education about FND. Nonetheless, more psychiatrists agreed that they have good knowledge about FND. Psychiatrists were more welcoming in treating FND patients. Also, psychiatrists were the most confident in diagnosing FND and the most comfortable discussing it with patients. Interestingly, psychiatrists were the least confident about their neurological examination skills and knowledge about neuroanatomy. This seems familiar to "the Dunning–Kruger effect" which is a cognitive bias in which people with little competence in a certain domain (here is neuroanatomy) significantly overestimate their ability in that domain in comparison to peer or general performance (diagnosis of FND) [41]. Such a finding is worth noting and sheds light on the degree of suitability of the FND management process as a one-man show. Patient-centered care requires a multidisciplinary team to fill the gaps and bring in holistic care. OSG was the least sure about diagnosing FND and the most struggling when discussing the association of psychiatric problems with patients and compared to psychiatry and neurology physicians, OSG had the most physicians who preferred not to see FND patients.

Most of the studied sample was worrying about missing an organic disorder. A study by the European Academy of Neurology was conducted to catch opinions and clinical practices related to diagnosing and managing functional movement disorders (FMD), the responses from 92 countries have revealed that most survey respondents were very concerned about missing a separate organic entity in patients with FMD [33]. In comparing FND patients with multiple sclerosis (MS) as long-term neurological conditions (LTNCs), FND patients reported considerably more problems in their diagnosis and treatment [42]. Many people suffering from difficult-to-diagnose chronic, invisible illnesses such as chronic fatigue syndrome, fibromyalgia, Lyme disease, and postural orthostatic tachycardia syndrome (POTS) are frequently misdiagnosed. As a result of this, they often describe feelings of abandonment from physicians and the healthcare system, which results in increased risks for psychiatric co-morbidity and consequently misdiagnosis [43]. The perspectives of 2769 healthcare personnel had an overriding theme of uncertainty: about how to diagnose FND, about professional roles, and about how to manage it optimally. Fear of saying the incorrect thing, offending patients, or breaking the therapeutic relationship was also a common concern [44]. A large systematic review capturing the views of more than 3900 professionals concluded uncertainty about the diagnosis and treatment of psychogenic non-epileptic seizures (PNES). As a result, they see patients with PNES as challenging and frustrating [45]. From a broader perspective, in a study of 349 neurologists from the United Kingdom, the majority were unsure about making the diagnosis of conversion disorder [9]. Physicians reported little or no formal training in how to manage such presentations and described learning from their own experience and senior role models [46, 47]. Physiotherapists rated functional symptoms among the least conditions they felt most knowledgeable about [34]. And this was no better than the knowledge of respondents from nursing staff [48] and medical students [49]. Given that, diagnostic errors are common in FND patients, these errors receive considerable attention in both the media and in the medical literature [11]. All in all, these events point fingers at physicians and intimidate the healthcare system.

Although most of our participants disagreed that patients are responsible for their symptoms or control them, most of the sample was not sure if symptoms of FND were real or not. Respondents from specialties other than psychiatry and neurology (OSG) were more towards that FND patients are manipulative. In a study of attitudes toward functional seizures, over 50% of GPs were not sure or did not think that functional seizures were involuntary [50]. Perspectives of nursing staff towards FND are somehow similar, in the Edinburgh Department of Clinical Neurosciences, nearly half thought the patients were "manipulative"; and around the third found it inappropriate for FND patients to be admitted to the neurology ward [48]. In agreement with this, a study conducted in a university hospital in Turkey found physicians from internal medicine and

emergency medicine tended to consider symptoms of FND as "malingering" [48]. Another sample of emergency medicine physicians was more towards those functional seizures that are voluntarily controlled [51].

In concordance with our sample, most healthcare providers agreed to restrict patients with functional seizures from driving [52]. In terms of disability benefits, in a sample of Iranian physicians, 75% agreed that PNES patients with specific jobs are qualified for disability benefits [53]. On the contrary, nearly half of the sample was indecisive about the eligibility of FND patients for disability pensions. Whereas in Egypt, Law No. (10) of 2018 on the rights of persons with disabilities defined a person with a disability in (Article 2) as: "Every person has a complete or partial deficiency or defect, whether it is physical, mental, mental or sensory if the defect or deficiency is stable, which prevents him from dealing with various obstacles from participating fully and effectively with society and on an equal basis with others" [54]. The Ministry of Social Solidarity operates the "Takaful and Karama program", which offers some financial assistance to persons with disabilities [55]. Such regulations would qualify FND patients in Egypt for disability benefits. Agreeing on the right for FMD patients to compete in Paralympics was challenging to our sample. Stating facts, The International Paralympic Committee (IPC) has specified that: "certain health conditions are ineligible, including pain functional syndromes and fibromyalgia. As no objective method of measuring the pain and therefore no way of accurately assessing the minimum level of impairment required for inclusion" [56].

Referring to a psychiatrist or a psychotherapist was the predominant management option across the studied sample. However, this has no different from the Dutch experience, when 60% of the neurologists and 95% of the psychiatrists, agreed that a psychiatrist should be part of the treating team [30]. Similarly, Italian neurologists [31] together with emergency specialists [48] preferred "psychotherapy and psychiatric consultation" as the most crucial step [17]. In cases of functional seizures, most GPs felt that neurology and psychiatry should be responsible for their diagnosis and management [50], while most physiotherapists felt physiotherapy to be an appropriate treatment [34]. Given that anxiety and depression are prevalent in Egyptian FND patients, psychiatric consultation might be of benefit [57]. However, literature demonstrated that multidisciplinary inpatient rehabilitation for functional movement disorders, improved patient function, somatic symptoms, depression, and anxiety [58], and this was supported by a considerable portion of our sample.

To our knowledge, this study is the first to address such matters in Egypt and the Middle East. However, there is no study without limitations. Because participants were recruited online, this method may have responder bias, with health professionals interested in FND more likely to respond than those with little understanding or interest. Despite this, more than 10% of psychiatrists in the country seem genuinely reflect Egypt's psychiatric current practice towards FND. Although the cross-sectional design of the current study limits the possibility of establishing causality between background and perspectives, it uncovered many factors that are worth future investigations. Future directions need to be devoted to minimizing the gap between the research finding and the currently applied care. Better education and teaching about FND may improve patient care. Namely, teaching about underlying mechanisms leading to FND and evidence-based treatment approaches should be included in undergraduate curricula at medical schools and the specialty training of health professionals, and by applying a unifying algorithm in how to manage FND patients in a culture-sensitive model. Furthermore, the implementation of a multidisciplinary approach to FND management, as well as the development of patient materials, resources, and support groups.

Conclusions

This study highlighted Egyptian physicians' perspectives on functional neurological disorders and conversion disorders. In Egypt, health practitioners have a low level of self-perceived knowledge regarding FND, while a considerable proportion did not receive any postgraduate training in psychiatry or neurology, as a result, they have fears of missing a serious organic disease. Disordered functioning of the nervous system plus psychogenesis was the prevailing accepted etiology behind FND, although communicating the disorder to patients was still uncomfortable for many physicians, except psychiatrists who were the most confident in diagnosing FND and the most comfortable discussing it with patients. Terms to communicate FND diagnosis were also challenging, "conversion Disorder" was the preferred term for the majority when referring to the diagnosis of FND, followed equally by "somatization, somatoform disorder, and psychogenic (psychic)", which stands still in the practice of psychiatrists and neurologists. The common theme of worry of FND patients was deeply rooted. Those fears were mainly underpinned by a lack of knowledge, a shortage in training, and previous beliefs about FND patients.

Abbreviations

FMD	Functional movement disorders
FND	Functional neurological disorders
DSM	Diagnostic and Statistical Manual of Mental Disorders
IPC	The International Paralympic Committee
LTNCs	Long-term neurological conditions
MS	Multiple sclerosis
OSG	Other specialties group
PNES	Psychogenic non-epileptic seizures
POTS	Postural orthostatic tachycardia syndrome
WHO	World Health Organization

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s41983-023-00697-5.

Additional file 1. Appendix 1: Sociodemographic and Professional Data Profile. **Appendix 2:** Views about Functional Neurological Disorders Survey.

Acknowledgements
We would like to show our gratitude to the Mental Health Research Network of Egypt (MHRNE) and Dr. Hesham Abuhegazy for their help. This study would never have been possible without their support. We are indebted to all the participants for their cooperation.

Author contributions
All authors contributed to conceiving the presented idea, reviewing the literature, developing the methodology and data collection; drafting the article, and helping shape the manuscript. RGA is the corresponding author, obtained the ethical approval, designed the online survey, extracted the data, and has a major contribution in writing the manuscript, critical revision, and preparing the final version of the article after meeting the journal's standards. MAK led the statistical analysis and data curation, MAK, AKA, and MAR performed computations and verified the analytical methods, data tabulation, and presentation. AMT, HAO, EAA, AE, DBA, and EGA interpreted the results and helped with data presentation. RGA, MAR, and EAA performed an extensive literature search. RGA, AMT, HAO oversight and leadership responsibility for the research activity planning and execution. All authors have read and approved the manuscript.

Funding
Not applicable.

Availability of data and materials
The data used to support the findings of this study can be found in the manuscript.

Declarations

Ethics approval and consent to participate
All procedures performed in this study were in accordance with the standards of the ethics committee and research review board at Alexandria University Faculty of Medicine (IRB No. 00012098, expires June. 2022; FWA No. 00018699, expires Jan. 2026), Approval No. 0305100. Informed consent was obtained from all individual participants included in the study for participation and publishing.

Consent for publication
Not applicable.

Competing interests
The authors declare no conflicts of interest.

Author details
[1]Mamoura Psychiatric Hospital, General Secretariat of Mental Health and Addiction Treatment, Ministry of Health and Population, Alexandria, Egypt. [2]Faculty of Nursing, Cairo University, Cairo , Egypt. [3]Faculty of Medicine, Alexandria University, Alexandria, Egypt. [4]Faculty of Medicine, Ain-Shams University, Cairo, Egypt. [5]Faculty of Medicine, Zagazig University, Zagazig, Egypt. [6]Abbassia Psychiatric Hospital, General Secretariat of Mental Health and Addiction Treatment, Ministry of Health and Population, Cairo, Egypt. [7]Shebin Elkom Hospital for Mental Health and Addiction Treatment, General Secretariat of Mental Health and Addiction Treatment, Menoufia, Egypt. [8]Ministry of Health and Population, Ismailia, Egypt. [9]Faculty of Medicine, Benha University, Benha, Egypt.

Received: 14 December 2022 Accepted: 22 June 2023
Published online: 10 July 2023

References

1. Stone J, Carson A, Duncan R, Coleman R, Roberts R, Warlow C, et al. Symptoms 'unexplained by organic disease' in 1144 new neurology out-patients: how often does the diagnosis change at follow-up? Brain. 2009;132(10):2878–88.
2. American Psychiatric Association. Diagnostic and statistical manual of mental disorders: DSM-5. 5th ed. Washington: American Psychiatric Association; 2013.
3. Lehn A, Bullock-Saxton J, Newcombe P, Carson A, Stone J. Survey of the perceptions of health practitioners regarding Functional Neurological Disorders in Australia. J Clin Neurosci. 2019;67:114–23.
4. Espay AJ, Aybek S, Carson A, Edwards MJ, Goldstein LH, Hallett M, et al. Current concepts in diagnosis and treatment of functional neurological disorders. JAMA Neurol. 2018;75(9):1132.
5. Perez DL, Dworetzky BA, Dickerson BC, Leung L, Cohn R, Baslet G, et al. An integrative neurocircuit perspective on psychogenic nonepileptic seizures and functional movement disorders. Clin EEG Neurosci. 2015;46(1):4–15.
6. Voon V, Cavanna AE, Coburn K, Sampson S, Reeve A, LaFrance WC. Functional neuroanatomy and neurophysiology of functional neurological disorders (conversion disorder). J Neuropsychiatry Clin Neurosci. 2016;28(3):168–90.
7. Hingray C, El-Hage W, Duncan R, Gigineishvili D, Kanemoto K, LaFrance WC, et al. Access to diagnostic and therapeutic facilities for psychogenic nonepileptic seizures: an international survey by the ILAE PNES Task Force. Epilepsia. 2018;59(1):203–14.
8. Kanemoto K, LaFrance WC, Duncan R, Gigineishvili D, Park SP, Tadokoro Y, et al. PNES around the world: where we are now and how we can close the diagnosis and treatment gaps-an ILAE PNES Task Force report. Epilepsia Open. 2017;2(3):307–16.
9. Kanaan RA, Armstrong D, Wessely SC. Neurologists' understanding and management of conversion disorder. J Neurol Neurosurg Psychiatry. 2011;82(9):961–6.
10. Nielsen G, Buszewicz M, Edwards MJ, Stevenson F. A qualitative study of the experiences and perceptions of patients with the functional motor disorder. Disabil Rehabil. 2020;42(14):2043–8.
11. Weintraub P. Cure unknown: Inside the Lyme epidemic. New York: St Martin's Griffin; 2013.
12. Reuber M. The etiology of psychogenic non-epileptic seizures: toward a biopsychosocial model. Neurol Clin. 2009;27(4):909–24.
13. Barnow S, Balkir N. Cultural variations in psychopathology: From research to practice. Göttingen: Hogrefe Publishing; 2012.
14. State Information Center in Egypt. Tag el-Deen: Egypt overcomes third wave of corona peak. 2021. https://www.sis.gov.eg/Story/155697/Tag-el-Deen-Egypt-overcomes-third-wave-of-corona-peak?lang=en-us. Accessed 20 Mar 2022.
15. Ahern L, Stone J, Sharpe MC. Attitudes of neuroscience nurses toward patients with conversion symptoms. Psychosomatics. 2009;50(4):336–9.
16. Dent B, Stanton BR, Kanaan RA. Psychiatrists' understanding and management of conversion disorder: a Bi-national survey and comparison with neurologists. Neuropsychiatr Dis Treat. 2020;16:1965.
17. Marotta A, Fiorio M, Fracasso I, Franchini CA, Defazio G, Tinazzi M. Functional neurological disorders as seen by a cohort of general practitioners in northern Italy: evidence from an online survey. Front Neurol. 2021;2:583672.
18. Hofstede Insights. Egypt: Hofstede Insights. https://www.hofstede-insights.com/country/egypt/. Accessed 21 Mar 2022.

19. Difference between teams. Difference between collectivist and individualistic culture. http://www.differencebetween.net/miscellaneous/difference-between-collectivist-and-individualistic-culture/. Accessed 21 Mar 2022.
20. Chen C, Lee S, Stevenson HW. Response style and cross-cultural comparisons of rating scales among East Asian and North American students. Psychol Sci. 1995;6(3):170–5.
21. Grandy J. Differences in the survey responses of Asian American and White science and engineering students. ETS Res Rep Ser. 1996;1996(2):i–23.
22. Andrade C, Menon V, Ameen S, Kumar PS. Designing and conducting knowledge, attitude, and practice surveys in psychiatry: practical guidance. Indian J Psychol Med. 2020;42(5):478–81.
23. IBM Corp. IBM Corp. Released 2019. IBM SPSS Statistics for Windows, Version 26.0. Armonk, NY: IBM Corp.
24. Allin M, Streeruwitz A, Curtis V. Progress in understanding conversion disorder. Neuropsychiatr Dis Treat. 2005;1(3):205.
25. Carson A, Stone J, Hibberd C, Murray G, Duncan R, Coleman R, et al. Disability, distress, and unemployment in neurology outpatients with symptoms "unexplained by organic disease." J Neurol Neurosurg Psychiatry. 2011;82(7):810–3.
26. Rabie M, Sabry N, Shaker N, Ali M, Noby S. National Survey for Mental Health in Egypt "One Year Prevalence of Common Mental Disorders : WHO- EMRO. 2017.
27. Ghanem M, Gadallah M, Meky FA, Mourad S. National survey of prevalence of mental disorders in Egypt: preliminary survey. East Mediterr Health J. 2009;15(1):65–75.
28. Saeed SIN. Aims of Egypt : Assessment of Governmental Mental Health System Egypt (2016–2017) [Internet]. New University of Lisbon, Faculty of Medical Sciences; 2018. https://run.unl.pt/handle/10362/40174. Accessed 22 May 2022.
29. Szczurek K, Furgał N, Szczepanek D, Zaman R, Krysta K, Krzystanek M. "Medical Student Syndrome"—a myth or a real disease entity? Cross-sectional study of medical students of the Medical University of Silesia in Katowice, Poland. Int J Environ Res Public Health. 2021;18(18):9884.
30. de Schipper LJ, Vermeulen M, Eeckhout AM, Foncke EMJ. Diagnosis and management of functional neurological symptoms: the Dutch experience. Clin Neurol Neurosurg. 2014;122:106–12.
31. Tinazzi M, Fiorio M, Berardelli A, Bonetti B, Bonifati DM, Burlina A, et al. Opinion, knowledge, and clinical experience with functional neurological disorders among Italian neurologists: results from an online survey. J Neurol. 2022;269(5):2549–59.
32. Butler M, Shipston-Sharman O, Seynaeve M, Bao J, Pick S, Bradley-Westguard A, et al. International online survey of 1048 individuals with functional neurological disorder. Eur J Neurol. 2021;28(11):3591–602.
33. LaFaver K, Lang AE, Stone J, Morgante F, Edwards M, Lidstone S, et al. Opinions and clinical practices related to diagnosing and managing functional (psychogenic) movement disorders: changes in the last decade. Eur J Neurol. 2020;27(6):975–84.
34. Edwards MJ, Stone J, Nielsen G. Physiotherapists and patients with functional (psychogenic) motor symptoms: a survey of attitudes and interest: Figure 1. J Neurol Neurosurg Psychiatry. 2012;83(6):655–8.
35. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders, Text Revision DSM-5-TR. 5th ed. Washington: American Psychiatric Association; 2022.
36. Claréus B, Renström EA. Physicians' gender bias in the diagnostic assessment of medically unexplained symptoms and its effect on patient–physician relations. Scand J Psychol. 2019;60(4):338–47.
37. Gustafsson Sendén M, Renström EA. Gender bias in assessment of future work ability among pain patients—an experimental vignette study of medical students' assessment. Scand J Pain. 2019;19(2):407–14.
38. Loring M, Powell B. Gender, race, and DSM-III: a study of the objectivity of psychiatric diagnostic behavior. J Health Soc Behav. 1988;29(1):1.
39. Dusenbery M. Doing harm: The truth about how bad medicine and lazy science leave women dismissed, misdiagnosed, and sick. New York: HarperCollins; 2018.
40. Hamberg K. Gender bias in medicine. Women's Health. 2008;4(3):237–43.
41. Kruger J, Dunning D. Unskilled and unaware of it: How difficulties in recognizing one's own incompetence lead to inflated self-assessments. J Pers Soc Psychol. 1999;77(6):1121–34.
42. O'Keeffe S, Chowdhury I, Sinanaj A, Ewang I, Blain C, Teodoro T, et al. A service evaluation of the experiences of patients with functional neurological disorders within the NHS. Front Neurol. 2021;31:12.
43. Pederson CL, Brookings JB. Suicide risk linked with perceived burdensomeness in postural tachycardia syndrome. J Health Sci Educ. 2018;2(1):1–8.
44. Barnett C, Davis R, Mitchell C, Tyson S. The vicious cycle of functional neurological disorders: a synthesis of healthcare professionals' views on working with patients with functional neurological disorder. Disabil Rehabil. 2020;24:1–10.
45. Rawlings GH, Reuber M. Health care practitioners' perceptions of psychogenic nonepileptic seizures: a systematic review of qualitative and quantitative studies. Epilepsia. 2018;59(6):1109–23.
46. Warner A, Walters K, Lamahewa K, Buszewicz M. How do hospital doctors manage patients with medically unexplained symptoms: a qualitative study of physicians. J R Soc Med. 2017;110(2):65–72.
47. Xie XY, Lin G, Huang Q, Li CB, Hallett M, Voon V, et al. Opinions and clinical practice of functional movement disorders: a nationwide survey of clinicians in China. BMC Neurol. 2021;21(1):435.
48. Kilic O, Yapici-Eser H, Necef I, Altunoz U, Oztop-Cakmak O, Aktas C. How do physicians manage functional neurological and somatic symptom disorders in the emergency department? A vignette methodology. Noro Psikiyatr Ars. 2021;58(4):261.
49. Hutchinson G, Linden SC. The challenge of functional neurological disorder—views of patients, doctors and medical students. J Ment Health Train Educ Pract. 2021;16(2):123–38.
50. Yogarajah M, Child R, Agrawal N, Cope S, Edwards M, Mula M. Functional seizures: an evaluation of the attitudes of general practitioners local to a tertiary neuroscience service in London. Epilepsia Open. 2019;4(1):54–62.
51. Shneker BF, Elliott JO. Primary care and emergency physician attitudes and beliefs related to patients with psychogenic nonepileptic spells. Epilepsy Behav. 2008;13(1):243–7.
52. Sahaya K, Dholakia SA, Lardizabal D, Sahota PK. Opinion survey of health care providers towards psychogenic non epileptic seizures. Clin Neurol Neurosurg. 2012;114(10):1304–7.
53. Asadi-Pooya AA, Dastgheib SA, Nazeri M. Disability benefits in patients with psychogenic nonepileptic seizures: a survey of physicians' opinions. Epilepsy Behav. 2020;103: 106877.
54. State Information Service. Persons with Disabilities Law and its Implementing Regulations. 2018. https://www.sis.gov.eg/Story/142989/Persons-with-Disabilities-Law-and-its-implementing-regulations. Accessed 24 May 2022.
55. Ministry of Social Solidarity. Takaful and Karama Program. https://www.moss.gov.eg/ar-eg/Pages/program-details.aspx?pid=10. Accessed 24 May 2022
56. International Paralympic Committee. International Standard for Eligible Impairments. 2016. http://www.paralympic.org. Accessed 24 May 2022
57. Rady A, Alamrawy R, Ramadan I, Abd El Raouf M. Does alexithymia, independent of depressive and anxiety disorders, correlate with the severity of somatic manifestations among patients with medically unexplained physical symptoms? J Exp Psychopathol. 2021;12(4):204380872110437.
58. Hebert C, Behel JM, Pal G, Kasi R, Kompoliti K. Multidisciplinary inpatient rehabilitation for Functional Movement Disorders: a prospective study with long term follow up. Parkinsonism Relat Disord. 2021;82:50–5.

Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.