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Opinions and experience of neurologists and neurology trainees in Saudi Arabia on functional neurological disorders: a survey based study

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Abstract

Background Functional Neurological Disorder (FND) is commonly encountered in clinical practice, causing functional impairment and poor quality of life. As there is limited data from Saudi Arabia, our study aims to explore the experience and opinions of Saudi neurologists and neurology trainees regarding FND.

Methods In our cross-sectional observational study, we included 100 neurology consultants and trainees. Data was collected using an online questionnaire from March to August 2023.

Results A total of one hundred neurologists participated in the survey. Although 41% of physicians encountered FND patients on a weekly basis or more frequently, only 41.7% of trainees reported receiving dedicated lectures on FND. Furthermore, only 46% of respondents felt comfortable providing a clear explanation of the FND diagnosis to their patients. While the majority (64%) used the term “Functional Neurological Disorder” in medical documentation, only 43% used this term when communicating the diagnosis to patients, with the terminology varying widely. Clinicians emphasized that inconsistent and variable neurological examinations were key indicators raising diagnostic suspicion, which aligns with the recommended reliance on detailed clinical history and neurological examination. Lastly, 61% of physicians stated that their approach to patients with FND lacked a structured management plan.

Conclusion Our study findings emphasize that FND is commonly encountered in clinical practice and reveal a significant lack of targeted education on FND for neurology trainees. Enhancing educational programs for both trainees and practicing neurologists on this prevalent neurological condition is essential for improving patient care and outcomes.

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Background

Functional neurological disorder (FND) is defined as impaired motor or sensory symptoms that are inconsistent with the range of manifestations of other non-functional neurological disorders [1], and cannot be explained by a recognized neurological or medical condition [3]. Symptoms may include weakness, abnormal movement or gait, seizures, numbness, impaired vision or hearing, dizziness, difficulty swallowing, slurred speech, and cognitive symptoms [1]. These symptoms are real and lead to significant distress and disability [1, 2]. FND is now seen as a “rule-in” and possibly treatable condition, rather than being considered a “diagnosis of exclusion”, as the practice was previously. The diagnosis thus requires a physical exam to illustrate positive signs and symptoms (e.g., Hoover’s sign, entrainable tremor) [3, 4].

Patients with FND are commonly encountered in clinical practice [5–7]. In a study of neurology outpatient clinics conducted in the UK, FND symptoms were found to be the second most common presentation after headaches [8] and are frequently encountered by neurology trainees in the inpatient service as well [9]. Estimates of incidence are conservatively 12 per 100,000 per year [10]. The overall median annual prevalence rate of FND was 37.2 per 100,000 persons, and around 8,000 new diagnoses of FND are made per year in the US and UK, respectively [10, 11], while local data from Saudi Arabia is lacking. FND consumes a significant portion of physicians’ time and results in both direct and indirect healthcare expenses [12]. For example, in the United States, the total annual costs of FND care was \$1.2 billion [14]. Total costs and costs per admission for FND increased from 2008 to 2017 at a higher rate than that of other neurological disorders [14]. Data for healthcare costs of FND patients in Saudi Arabia are lacking. If not managed adequately, FND can result in significant disability and poor quality of life [2].

Alongside communication of the diagnosis, psychoeducation and psychotherapy [3], other treatment options include specialist-physiotherapy [15], multidisciplinary and integrated rehabilitation [16, 17]. It is important to consider that in-depth psychosocial evaluation may benefit patients with FND [18]. The pathophysiology of the disorder is believed to result from the interplay of biological, psychological, and social factors, commonly referred to as the “biopsychosocial model” [19]. This model helps in understanding the complex interactions that contribute to FND and guides a more holistic approach to treatment, addressing not only the symptoms but also the underlying causes and contributing factors.

Moreover, numerous studies have consistently revealed a lack of education and knowledge about FND among neurologists and other healthcare professionals [5, 9, 20]. Furthermore, stigmatizing attitudes towards FND

patients are prevalent and can potentially hinder effective patient care [5, 20]. One study analysed neuroscience nurses’ attitudes toward FND patients and found that 16% refused to consider the symptoms real and 46% felt that patients were manipulative [20]. Another study revealed that emergency medicine and internal medicine practitioners tend to consider potential FND patients as malingering [18]. Patients with FND often express concerns about not being taken seriously and their needs not being adequately understood [21], which can lead to frustration and treatment non-compliance. This emphasizes the necessity for improved communication and training in this area.

Our study aims to explore the experience and attitude toward FND in Saudi Arabia, the level of comfort in diagnosing and disclosing the diagnosis, along with commonly used approaches to management and follow-up. The findings of our study could be utilized to develop future projects in FND education for both trainees and practicing neurologists. This study represents a distinctive and comprehensive investigation conducted in Saudi Arabia, exploring the perceptions and experiences of neurologists specifically regarding FND.

Methods

This cross-sectional, observational study was conducted utilizing an online questionnaire composed of 24 questions within 6 sections. The study population consisted of neurology consultants and trainees practicing in Saudi Arabia. In Saudi Arabia, neurology consultants are board-certified neurologists with at least three years of clinical experience, registrars are board-certified neurologists who have yet to fulfil the criteria to become a consultant (referred to here as consultant equivalent), fellows are board-certified neurologists completing a subspecialty training, and trainees (residents) are physicians enrolled in a 5-year postgraduate training program. This anonymous survey was distributed using the Saudi Neurology Society emailing system, neurologist and trainees WhatsApp groups (around 410 trainees and 232 neurologists), online distribution to neurologists through social platforms (LinkedIn), and direct contact with neurologists both in person and online. Data collection spanned from March to August 2023, using Google Forms. The data collected from responses were then exported to a Microsoft Excel sheet for analysis. Ensuring the privacy and confidentiality of participants, all questionnaires were anonymous and devoid of any identifying data.

An initial literature review was conducted to evaluate previous studies on FND. Following this, a preliminary questionnaire was created with the aim of collecting data answering our research question. The questionnaire was first tested by our primary investigator (SA), then sent to five additional neurology consultants and training

physicians for validation. Revision and changes were made based on feedback received. The purpose of the questionnaire was to ascertain the opinions, experiences, and attitudes towards FND of the neurology physicians practicing in Saudi Arabia as well as their understanding of FND management approaches. Clinician demographic factors such as gender, age, time spent in practice and profession, were addressed in the survey to assess if they correlated with the responses to subsequent questions. The questionnaire (see Additional file 2) explored the following sub-categories:

- Clinical experience.
- Typical characteristics of FND patients.
- Opinions, knowledge, and patient outcomes.
- Case vignette.

The second section of the survey was exclusive to neurology trainees (residents and fellows). Two questions were posed to assess whether these trainees had received previous teaching on FND, either in lecture format or a bedside/clinical setting. This study was approved by the Ethics Committee of the Health Sciences Colleges Research on Human Subjects at King Saud University in Riyadh (E-23-7545). All authors had full access to all data in the study, including statistical reports and tables.

Statistical analysis

The mean and standard deviation were used to describe the continuous variables, and the frequencies and percentages were used to describe the categorical variables. The multiple response dichotomies analysis was applied to describe categorical variables measured with more than one option. The Kolmogorov-Smirnov statistical normality test and the histograms were used to assess the statistical normality assumptions for metric variables. The Multivariable Binary Logistic Regression Analysis (MBLR) was applied to assess the predictors of physicians' odds of having clear FND care plan and guidelines against their sociodemographic factors and work related and professional factors. The associations between predictor variables with the analysed outcomes in the Logistic Regression analysis were expressed as Multivariable adjusted Odds Ratios (OR) with their associated 95% confidence intervals. The multivariable Linear Regression was also applied to assess the predictors for the physicians perceived comfort level disclosing the FND diagnosis to their patients, the associations between the tested predictor variables with the physicians' comfort level disclosing the FND diagnosis mean score was expressed as unstandardized beta coefficient with its associated 95% confidence limits. The SPSS IBM statistical computing program version 28 was used for the statistical data

analysis and the alpha significance value was considered at 0.050 level.

Results

One hundred neurology physicians (40 consultants or equivalent, 10 fellows, 50 trainees (residents) completed and returned the study questionnaire.

Demographics and years of practice

Table S1 (in additional file 1) displays the physicians' sociodemographic and career related characteristics. Among the participants, 56% were male physicians while the remaining 44% were females. Regarding age groups, 46% of the physicians were aged between 24 and 30 years, 41% were aged between 31 and 40, and the remaining 13% were aged 41 and older. When asked about their neurology clinical experience, 49% had less than five years of experience, 31% had between 5 and 10 years, 14% had between 11 and 20 years and only 6% had 21 or more years of experience. As for their clinical roles, the findings revealed that 50% of the physicians were neurology trainees, 10% were neurology fellows, 40% were neurology consultants or equivalent.

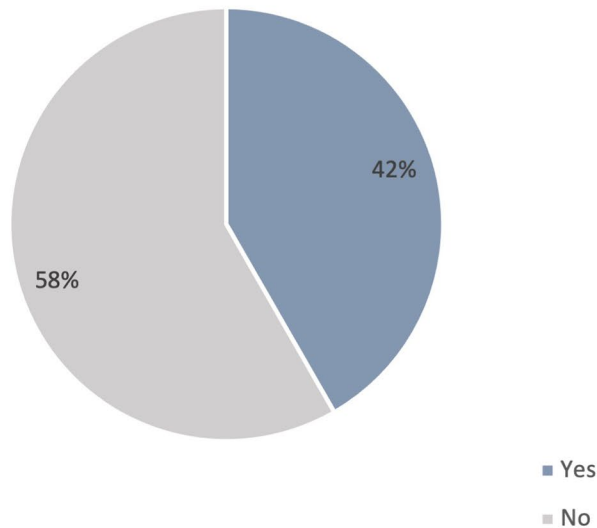
Trainees FND educational experience

The trainee physicians were exclusively asked to indicate with Yes/No questions whether they received prior dedicated FND education as part of their medical training. Results showed that 58% did not receive teaching about FND in a lecture, and 47% stated that they never had previous bedside or clinical teaching on the disorder (Fig. 1: Trainees FND Educational Experience).

Practical experience with FND patients

The physicians were requested to choose from a list that best describes their work or training environment. Findings revealed that the majority were practicing at tertiary referral hospitals and academic teaching hospitals (56% and 55% respectively). On the other hand, 13% were practicing at primary care centres and 13% at private hospitals. Table S2 (in additional file 1) presents the descriptive analysis of the physicians' experiences and perceptions regarding patients with FND. The survey explored the physicians' frequency of encountering patients with neurological symptoms without clear structural causes in their practice. The majority (44%) stated that they encountered such cases at least once a month or more frequently, while 18% and 23% reported encountering such patients once a week and more than once a week, respectively. Only 2% reported seeing patients with neurological symptoms without clear structural causes less than once every six months or not at all in their daily practice. When asked to indicate the predominant gender of their encountered FND patients, the majority

If you're a trainee, have you previously received teaching about functional neurological disorders (FND) in a lecture?



If you're a trainee, have you previously received bedside or clinical teaching about functional neurological disorders (FND)?

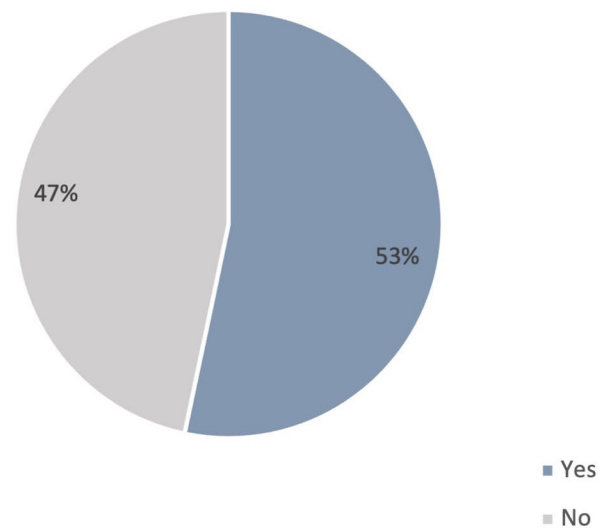


Fig. 1 Trainees FND Educational Experience

of physicians (70%) indicated the encountered patients were predominantly women, while the remaining 30% of the physicians had cared for equal number of male and female patients. None reported predominantly encountering FND in male patients.

The survey also investigated the most common clinical presentations of FND patients as per the physician's experience. The majority of encountered FND patients (79%) presented with functional seizures, followed by functional limb weakness or paralysis (58%), functional abnormal movements (42%), functional sensory loss (33%), functional gait impairment (18%), and functional speech or language impairment (17%). Additionally, less common presentations included: functional vision loss (7%), and around 4% of encountered patients complained of disability secondary to pain and sensory changes.

Evaluation setting and referral

Based on the findings of the survey, the physicians reported the usual setting for assessment of patients with FND, with 57% reporting an emergency room setting, 31% in the outpatient clinics, and 10% in hospital inpatient wards. The majority of FND patients were referred by: emergency physicians (78%), family medicine physicians (34%), internal medicine physicians (24%), or from other general neurologists to subspecialty clinics (25%).

Moreover, 36% of the encountered FND patients were self-referred patients.

Perceived predictors of FND diagnosis

Factors that were perceived to predict the diagnosis of FND were as follows: 88% of the physicians agreed that having an inconsistent and variable neurological examination would highly raise their suspicion of FND, 79% believed another predictive factor was the presence of current psychological stressors or trauma, 50% thought psychological trauma in adulthood (physical, psychological, or sexual abuse) was another element, 57% suggested the presence of secondary gain like having a paid leave from work or a compensation, 52% suggested extensive or inconclusive investigations, and 43% of the physicians believed that the patients having early childhood psychological trauma (physical, psychological, or sexual abuse) is another factor predicting FND diagnosis. Other predicting factors included: the presence of an associated mental illness (39%), working in the medical field (21%), low socioeconomic and poor education background (20%). Interestingly, only 8% of responding physicians reported the presence of an associated non-functional neurological disease as a predictor of FND.

Explanations of FND symptoms

The study participants shared the prevailing misunderstandings that patients might hold regarding their symptoms. According to the findings, 75% of the patients believed that their complaints stemmed from an underlying non-functional neurological disorder. Additionally, 42% attributed their symptoms to the influence of the evil eye and black magic. Around 29% of patients associated their symptoms with serious other non-neurological body systems disorders. Another 26% of physicians reported that their patients believed their symptoms were caused by vaccines they had received. Furthermore, 13% of physicians stated that some of their patients attributed their symptoms to medications they were taking. Interestingly, 25% of physicians believed that their patients perceived their symptoms as having psychological origins (See Table S2 in additional file 1).

Terminology used to Document and disclose FND diagnosis

The participants were asked to select their commonly used terminology when documenting FND diagnoses. The majority (64%) used “functional neurological disorder” as the term of diagnosis, 13% of the physicians used the term “psychogenic disorder”, 10% used “conversion disorder”, and 6% used “medically unexplained disorder”. Additionally, 2% used “somatoform disorder”, while 5% used “stress-related syndrome” to describe their patients’ conditions.

On the other hand, the terminology used by physicians to explain the FND diagnosis to the patients varied. Many (43%) preferred to use the term “functional neurological disorder”, followed by “stress-related syndrome” (20%), “medically unexplained disorder” (15%), conversion disorder (10%), psychogenic disorder (7%), somatoform disorder (2%). Lastly, 1% used malingering syndrome and 2% used “non-organic disorder” to describe the FND to their patients (Fig. 2).

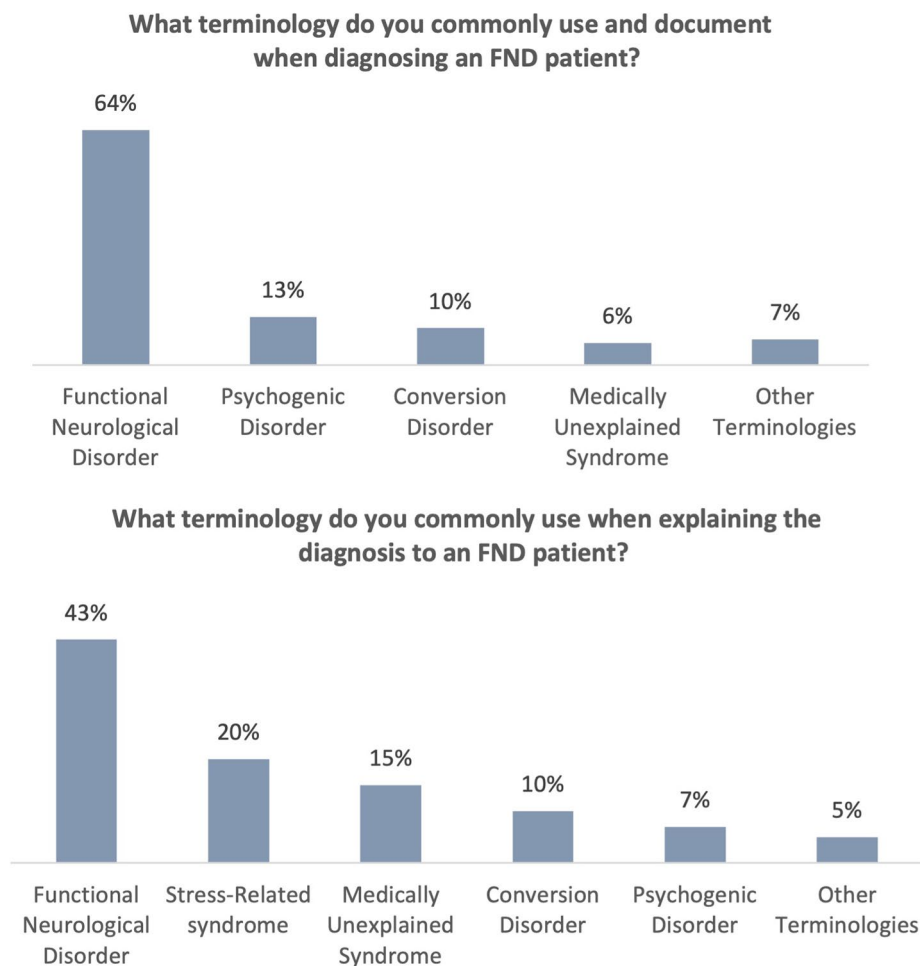


Fig. 2 Terminology used to document and disclose FND diagnosis

Table 1 Multivariable Linear Regression Analysis of physicians self-rated comfort score disclosing FND diagnosis to their patients. *N* = 100

Unstandardized Beta Coefficients		95.0% C.I for Beta coefficient		
		Lower Bound	Upper Bound	<i>p</i> -value
(Constant)	2.465	1.975	2.956	<0.001
Sex = Male	-0.043	-0.272	0.186	0.710
Duration of neurology experience >= 10 years (Yes Vs No)	0.365	0.232	0.499	<0.001
Do you have a clear structured FND management plan? (Yes Vs No)	0.435	0.193	0.677	0.001
Patients with FND should be investigated with MRI, EEGs or electrophysiological studies (Yes Vs No)	-0.149	-0.264	-0.034	0.012

Dependent outcome Variable = Mean Self-Rated comfort level disclosing FND diagnosis to patients. Model *R*squared = 0.434, adjusted *R*-squared = 0.409.

Diagnosing FND and communicating the diagnosis

The findings from the analysis of physicians' approach to FND diagnosis disclosure and management are presented in (Table S3 in additional file 1). The results indicate that 46% of physicians reported feeling comfortable providing a clear disclosure of FND diagnosis to their patients, while 14% felt very comfortable. In contrast, 38% expressed some level of discomfort and 2% felt very uncomfortable disclosing the diagnosis.

To further understand the factors influencing physicians' comfort in disclosing FND diagnosis, a multivariable linear regression analysis was conducted using their self-rated mean comfort scores. Table 1 presents the results of this analysis. The gender of the physicians did not have a significant correlation with their self-rated comfort level in disclosing the FND diagnosis to patients ($p=0.710$). Physicians with 10 or more years of experience in neurology were significantly more comfortable discussing the FND diagnosis with their patients compared to those with less than ten years of experience, on average (beta coefficient=0.365, $p<0.001$). Additionally, it was evident from the analysis that physicians who had a clear and structured management care plan for FND patients were significantly more comfortable disclosing the diagnosis to their patients compared to those who lacked such plans (beta coefficient=0.435, $p=0.001$). Conversely, physicians who believed that FND patients should undergo investigations such as MRI, EEGs, or electrophysiological studies were found to be significantly less comfortable disclosing the diagnosis to their patients compared to those who did not prefer proceeding with further investigations, on average (beta coefficient=-0.149, $p=0.012$). The physicians other measured demographic and professional as well as practice related

Table 2 Multivariable Logistic Binary Regression Analysis of having an in-place clear and structured FND management plan

Multivariate adjusted Odds Ratio	95% C.I. for OR		<i>p</i> -value	
	Lower	Upper		
Sex = male	1.204	0.395	3.667	0.744
Healthcare provider's age	0.355	0.088	1.441	0.147
Consultant or equivalent	1.700	0.996	2.901	0.050
Trained at Tertiary referral hospital	3.342	1.095	10.203	0.034
Comfort level in disclosing FND diagnosis to patients	3.741	1.494	9.368	0.005
Mean agreement level that patients should be told clearly about the diagnosis of FND diagnosis.	2.612	1.142	5.974	0.023
Mean agreement Level that FND symptoms are voluntary	1.647	0.987	2.747	0.056
Patients level of satisfaction with care = satisfied	2.665	1.118	6.351	0.027
Constant	0.001			<0.001

DV = Do you have a clear structured FND management plan? No/Yes.

factors did not converge significantly on their comfort level disclosing the FND diagnosis to their patients as such were dismissed from the analysis model.

FND management strategies

According to the responses provided by physicians, 61% of them stated that their approach to patients diagnosed with FND lacked a clear structured management plan, compared to 39% of physicians who reported otherwise. In terms of investigations, the findings indicated that most physicians (96%) took a comprehensive medical history from the patients upon their initial presentation and performed a detailed neuro-examination (92%). Moreover, 48% of physicians requested blood tests and 75% arranged for neuroimaging studies as part of their evaluation. When asked about their typical approach and interventions for newly presenting FND patients, many of the physicians (43%) referred their patients for psychology and behavioural therapy, and 21% of the physicians referred their FND patients for physical therapy. Furthermore, 11% initiated psychiatric medications as part of the treatment plan, and 14% of physicians referred their patients to another specialized neurologist for a second opinion (See Table S3 in additional file 1).

The multivariable Logistic Regression Analysis was employed to assess the factors that predict the physicians' likelihood of having a clear structured management care plan when dealing with FND patients. The findings (Table 2), indicate that the physician's gender and age did not have a significant correlation with their odds of with having a clear FND management care plan. However, consultants and registrars were found to be more likely (OR 1.7, 95% CI 0.996–2.901, $p=0.050$) to have a

structured management care plan for FND patients compared to fellows and trainees. Furthermore, the analysis revealed that physicians who practiced at tertiary referral hospitals were significantly more inclined (OR 3.34, 95% CI 1.095–10.203, $p=0.034$) to have a structured FND patients management care plan compared to physicians who did not practice in such centres, on average. Additionally, the analysis showed a positive association between physicians' comfort level in disclosing the FND diagnosis to their patients and their likelihood of having a structured management care plan for FND (OR 3.74, 95% CI 1.49–9.36, $p=0.005$). Similarly, physicians who had a positive attitude towards clearly disclosing the FND diagnosis to patients were significantly more likely (OR 2.612, 95% CI 1.142–5.974, $P=0.023$) to have a clear structured management care plan for FND compared to those with a different attitude (OR 2.612, $p=0.023$).

The perceived level of satisfaction of patients had a significant positive correlation with the physicians odds of having a clear structured care plan, as physicians who rated their patients as satisfied with the care provided were found to be significantly more inclined (OR 2.665, 95% CI 1.118–6.351, $p=0.027$) to have a clear care plan in place for the FND patients compared to physician who cared for frustrated patients or those who were neither satisfied or dissatisfied.

Follow-up and patients' satisfaction

The participants were asked to describe their perception of patients' satisfaction at the end of their care process. The findings (See Table S3 in additional file 1) revealed that 55% of the patients are neither satisfied nor frustrated, 28% of them are often frustrated and only 17% of the patients get satisfied with their care plans.

The findings also showed that 35% rarely scheduled follow up appointments for their patients, and 5% of the physicians never offer follow up appointments. Alternatively, 40% usually offer follow up and 20% always offer follow up appointments for their FND patients. When the physicians were asked to describe their patients' outcome after their follow up appointments, many of the physicians (42%) reported that their patients improve or recover, 27% of the physicians reported that their patients have persistence of the same symptoms and/or develop new symptoms, 14% suggested that the patients don't show up again to the clinic for follow (despite it being arranged), and finally, 11% of the physicians suggested that the patients request referrals to other practitioners for a second opinion. Only 1% of the physicians believed their patients came back with the same symptoms but were a bit relieved. Lastly, 2% of the physicians do not have clinics in which to provide follow-up.

FND case agreeability

As part of our assessment, we provided our surveyed population with two real-life cases, one with functional dizziness and one with non-functional vertigo secondary to a peripheral aetiology. The results showed that most physicians (83%) correctly identified the case consistent with FND (See Figure S3 in Additional file 1).

Discussion

FND is commonly encountered in the clinical setting

This analysis of physicians' experiences and perspectives regarding patients with FND revealed intriguing insights, most importantly demonstrating the high frequency with which FND is encountered by physician's practicing in Saudi Arabia. Notably, 44% of neurologists in our study reported encountering patients with FND at least once a month or more frequently, while 18% and 23% reported encountering such patients once a week and more than once a week, respectively. This finding is consistent with a study conducted in Scotland, UK, over a period of 15 months, which recruited more than 3,000 patients. The study demonstrated that functional symptoms were the second most common presentation, following headaches, for patients referred to neurology clinics [22]. A significant proportion of participants in our study with less than 5 years of experience reported frequent encounters with FND patients. This finding contrasts with a prior study conducted in Egypt in 2023²³, a country with a somewhat similar cultural background. The Egyptian study, which primarily involved psychiatrists and a few neurologists, revealed that among participants with 1 to 5 years of clinical experience, the majority reported encountering only 1 to 5 FND patients annually.

Several factors may have contributed to the high frequency of cases encountered in our study population. These include a growing recognition and awareness of FND, a more refined diagnostic process, and increased access to healthcare resources. Additionally, the specialized nature of the healthcare settings in our study likely contributed to this high frequency. Most of our participants practice in tertiary referral hospitals and academic university teaching hospitals, which often attract complex cases. This may result in a higher volume of referrals and, consequently, an increased frequency of encountering FND patients compared to general practice settings.

Interestingly, only 8% of responding physicians reported the presence of an associated non-functional neurological disease in the patients they encountered as a predictor of FND. This finding is somewhat unexpected given the well-documented overlap between FND and other non-functional conditions, such as Parkinson's disease and Multiple Sclerosis [24, 25]. This highlights the necessity for thorough follow-up of these patient and to

remain open to the possibility of a secondary diagnosis to ensure comprehensive patient care.

The veiled truth

Our study findings indicate that although the majority of surveyed physician used the term FND in clinical documents (64%), there was a greater variation in the terminology used by physicians to explain the diagnosis of FND to their patients. While many physicians (43%) stated they used the term “functional neurological disorder” with patients, others preferred using “stress related symptoms” (20%), and “medically unexplained symptoms” (15%). This finding contrasts with the previously mentioned study from Egypt [23], where 37.5% of the surveyed physicians preferred using the term “conversion disorder” when discussing FND cases with their colleagues. In contrast, only a minority of our sample referred to it as such, with 10% using the term in their documentation and 10% when discussing the diagnosis with patients. The variability in terminology used to explain the diagnosis to patients may indicate a discomfort in disclosing the diagnosis. This discomfort can arise from several factors, including uncertainty about the condition, difficulty in explaining the diagnosis in Arabic (as medicine is taught and practiced in English in the country), challenges in conveying the complex nature of FND to patients, or a lack of confidence in their understanding of these disorders. Furthermore, heterogeneity in labelling and framing, reflecting varied conceptualizations of FND, was observed in a study where international experts had less than 50% agreement on the terminology used for diagnosing patients with Functional Cognitive Disorders [26].

Various terminology and explanatory models have been used by physicians to convey FND diagnosis to patients. A recent study [27] discussed the multiple explanatory models utilized. Examples of these include, the ‘Multi-system Stress’ approach which interprets FND through physiological stress responses within the previously mentioned biopsychosocial paradigm [19]. Others include the ‘Sensitized Alarm’ and ‘Malfunctioning Software’ approaches which are based on a neuroscience perspective. These approaches can aid in effectively communicating the diagnosis of FND to patients, helping them to comprehend this complex condition.

Traditionally, physicians have faced challenges in confirming the diagnosis with confidence and certainty, and in effectively communicating the diagnosis of FND – and yet this is vitally important to patient care. Inadequate communication, delays in diagnosis, and discomfort in explaining the diagnosis significantly contribute to poor patient prognosis [28]. These factors hinder the patient’s ability to comprehend, accept, and actively participate in their treatment. Moreover, fuelling diagnostic

uncertainty contributes to lack of trust, prompts patients to seek further diagnostic tests and second opinions, with the risk of exposing the patient to iatrogenic harm and also adding to the burden of the disorder. Research indicates that providing a clear diagnosis can significantly enhance patient engagement. Moreover, it has been emphasized that discussing FND as the diagnosis at an early stage leads to better patient acceptance [28].

Considering that FND is now a “rule-in” diagnosis, positive diagnostic criteria should be utilized [13], which in turn would minimise diagnostic delays and enhance the overall management. FND is relatively unfamiliar to patients and their families and is still perceived by many healthcare workers as a purely “psychosomatic” illness [5, 7]. Many FND patients report negative experiences with their healthcare providers and describe feeling stigmatized, being made to think that they are imagining the symptoms, or that it is “all in their head” [29]. Furthermore, experts have shown that explaining to the patient that their weakness stems from “stress” lacks understandable reasoning [28]. Moreover, stigmatization by healthcare professionals can create significant barriers and exacerbate the suffering experienced by FND patients, ultimately leading to poor treatment adherence and sub-optimal patient outcomes [28, 29].

To combat this, it is crucial to have comprehensive understanding of how to effectively communicate the diagnosis of FND and educate patients, family members, and healthcare professionals about this condition. It is vital for trainees and healthcare providers to be prepared to actively listen to and empathize with patients’ past experiences. Direct and stigma-countering communication techniques must be used when delivering the diagnosis, such as explicitly affirming the reality of the patients’ symptoms [30]. In addition, our results demonstrated that physicians who had a clear and structured management care plan for FND patients were significantly more comfortable disclosing the diagnosis to their patients compared to those who lacked such plans. This may indicate that these physicians had a higher exposure, hence more experience in managing FND patients, or have access to the required resources to manage these patients.

Dispelling the myths

In our study, we explored cultural and supernatural beliefs and misconceptions associated with FND. A considerable number (42%) of our surveyed physicians indicated that their patients with FND attributed their symptoms to the impact of the evil eye or black magic. Notably, cultural beliefs such as supernatural powers, involving concepts like black magic and the evil eye, continue to influence patients. In a study conducted in Saudi Arabia [31], investigating beliefs concerning epilepsy,

a considerable number of participants maintained the belief that the disorder was caused by possession of “jinn”, irrespective of their educational background and understanding of the condition. The study noted that the majority of participants acquired information about epilepsy from informal sources rather than healthcare professionals. This emphasizes the crucial role of medical education in correcting misconceptions.

Furthermore 26% of physicians in our study reported that their patients believed their FND symptoms were caused by vaccines they had received. Multiple reports describing FND occurring after vaccination have emerged amidst the rise of COVID-19 [32–34]. It is worth noting that FND following vaccinations have been documented in the pre-COVID era as well [35–37], highlighting that this is not a new phenomenon. The “biopsychosocial model” proposes that FND arises from a complex interaction of biological, psychological, and social factors [19]. This framework helps explain how factors such as biological predispositions, psychological distress, physical triggers and social influences may contribute to the observed increase in FND cases following COVID-19 vaccination.

Additionally, while FND can affect both men and women, there is a general observation that FND is more commonly encountered among women [38]. The reported female-to-male ratio ranges from 2:1 to 10:1 [10]. In our study, most physicians reported that the majority of the FND patients they encountered were females. The higher prevalence of FND among women has been attributed to a complex interplay of factors, including potential biological influences, as well as social and cultural determinants [40]. Societal and gender-specific risk factors, such as the increased likelihood of women seeking medical attention and experiencing trauma or abuse, which is frequently associated with FND, must be considered [41]. Additionally, it is unclear whether this disparity is partially due to gender bias within the medical field. There may be a tendency to hesitate in diagnosing FND in men, while sometimes dismissing women’s complaints as medically unexplained [42]. This historical discrepancy can be traced back to the dominance of Freudian theories, where “hysteria” was perceived as exclusive to women [43]. Moreover, a cohort study exploring the trajectories of patients with somatic symptoms found that women were less likely to receive both diagnostic investigations and a diagnosis [39]. Furthermore, research has shown that physicians were more inclined to perceive women, compared to men, as having a medically unexplained condition when presented with identical clinical vignettes [42]. These findings emphasize the importance of basing clinical judgments on objective grounds rather than relying on gender as a diagnostic criterion.

Lastly, healthcare providers indeed play a crucial role in addressing these attitudes, correcting misconceptions, and offering patients and their family’s evidence-based information, all while maintaining a non-judgmental approach. Healthcare providers can help patients navigate the complicated interplay between cultural beliefs and scientific understanding by encouraging open communication, thereby improving access to appropriate medical care and support. This can be achieved, all while recognizing and addressing any potential biases in the diagnosis and treatment of FND, to ensure equitable healthcare for all individuals, irrespective of their gender.

The missing piece

Patients with FND experience disability and impaired quality of life more than those with other neurological conditions [2, 44]. The high burden of FND also translates into substantial economic costs. It has been reported that the annual total cost for FND was similar to other demanding neurological disorders, and that annual cost has been increasing at a higher rate than for any other neurological disorder [14, 45]. Despite the disabling nature and significant economic burden of FND, several international studies have demonstrated suboptimal knowledge among healthcare workers, particularly regarding disease understanding and advanced management strategies [46, 47]. Furthermore, a study conducted across three different centres in Scotland revealed that FND was, on average, the most commonly diagnosed condition seen by a neurology trainee as an inpatient consultation, accounting for 18% of cases, surpassing epilepsy (14%), primary headache disorders (9%), and neuroinflammatory conditions (6%) [9]. Moreover, a study surveying French junior neurologists, revealed that 45.5% never received any dedicated teaching on FND [48]. Similarly, our findings demonstrated that 58% of the trainees have never received dedicated teaching on FND, and 47% have never undergone bedside or clinical teaching on the disorder. In the absence of dedicated training, physicians may feel inadequately prepared to offer the essential support and guidance required by their patients, leading to persistent barriers for patients seeking diagnosis and treatment. To deliver optimal patient care, further teaching and education of health professionals about FND is required to improve the management of FND and to enhance diagnosis [5, 7]. It is crucial to improve awareness, understanding, and provide comprehensive educational programs to enhance the management and outcomes of individuals with FND. Furthermore, there is a need for further development of specific curricular resources targeting neurology trainees to address the identified gaps and promote more effective care for patients with FND [49–51].

Moreover, our findings indicate a correlation between the professional and training backgrounds of consultants and trainees and the existence of a well-defined, organized care plan for patients with FND. Physicians who practiced or received training at tertiary referral hospitals were notably more likely to have such a management plan compared to those who did not practice or undergo training in these centres. The observed disparity in the presence of structured care plans suggests that the training environment plays a crucial role in equipping physicians with the necessary knowledge and skills to effectively diagnose and manage FND cases. According to previously published literature, dedicated FND training significantly enhances knowledge and confidence in the assessment and management of FND patients, both immediately after the course and at a 6-month follow-up. One of the most effective techniques proposed was simulation-based multidisciplinary teaching courses [51].

To illustrate further, a survey conducted on neurology trainees and recent neurology residency graduates in the US, aimed to assess their level of education on functional seizures, and a subtype of FND, this study showed that although 82% of the trainees had some information on the topic, 77% reported lack of training in the aspect of treatment and 54% reported no instruction on the of interdisciplinary management of patients [49]. Furthermore, in the absence of dedicated training, physicians may feel inadequately prepared to offer the essential support and guidance required by their patients.

Incorporating education about the underlying mechanisms of FND and evidence-based treatment methods into medical schools and the training of other healthcare professionals is likely to enhance patient outcomes and increase satisfaction among healthcare providers [51]. Historically, FND was a “diagnosis of exclusion”, however, there has been a shift towards a positive evidence diagnosis, with the availability of various bedside tests demonstrating positive signs of FND, and some may hold a therapeutic value to patients when disclosed appropriately [52, 53]. Growing evidence supports that an integrated multidisciplinary management plan [17, 54, 55] that includes approaches such as cognitive-behavioural therapy [56], physical [57, 58], occupational [59], and speech therapy [60], along with psychological support, and medication management is the most effective approach.

Study limitations

Our study has some limitations. The reliance on self-reported data obtained through an online questionnaire, introduces the potential for response bias, as participants may have provided inaccurate or incomplete information. The survey distribution methods, such as using email systems, WhatsApp groups, and online platforms, may also

introduce sampling bias, as not all neurologists may have been reached or chosen to participate. It's important to note that most of the physicians who participated in our study were affiliated with academic and tertiary centres. As a result, the experiences may not be universally applicable or generalizable to physicians working in different settings. Lastly, a limitation of our study involves the case vignettes included in the survey, particularly Case 1. This case should emphasize positive clinical signs of FND rather than just the normal imaging. The two-week duration of dizziness symptoms does not meet Persistent postural-perceptual dizziness (PPPD) criteria and could be consistent with Benign paroxysmal positional vertigo (BPPV), potentially influencing our results. However, these were two real cases encountered on our inpatient service and were added for illustration purposes, exactly as they presented clinically. In summary, while this study provides valuable insights into the perceptions and experiences of neurology consultants and trainees in Saudi Arabia, its findings should be interpreted within the context of these limitations.

Conclusion

FND is a condition commonly encountered in the daily practice of neurologists and neurology trainees in Saudi Arabia. FND imposes a substantial burden, impacting quality of life and adding to the economic expenses. This emphasizes the significance of FND as a clinical entity that requires attention and understanding within the medical community – starting with dedicated education for trainees. Our study reveals significant variability in the terminology used by neurology physicians for the diagnosis. The prevalent use of the term “Functional Neurological Disorder” in Saudi Arabia suggests recognition, but the persistent perception of FND as conversion or psychogenic disorder may indicate a lack of uniform understanding of the condition. Moreover, the discrepancy between the percentage of physicians that document FND as the final diagnosis and those who explicitly disclose the diagnosis as FND to their patients could indicate ongoing discomfort with the diagnosis warranting further investigation and intervention. It is noted in our study that neurology trainees in Saudi Arabia may not be receiving dedicated clinical and theoretical education specifically focused on the disorder. This, combined with the finding that physicians without a structured management plan for FND may experience discomfort in disclosing the diagnosis, emphasizes the need for FND-centred education for healthcare providers. In conclusion, FND education, a standardized approach to FND diagnosis and management, as well as FND campaigns to the public are crucial for equitable healthcare and improved well-being for individuals affected by this disorder.

Abbreviations

FND	Functional Neurological Disorder
DSM-5	Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition
OR	Odds Ratio
CI	Confidence interval

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12883-024-03810-0>.

Supplementary Material 1. Additional file 1: Table S1: Demographics and Years of Practice. Table S2: Descriptive Analysis of the Physicians' Experiences and Perceptions Regarding Patients With FND. Table S3: Disclosing the Diagnosis of FND and Management Plan. Figure S3: Case vignettes.

Supplementary Material 2. Additional file 2. Study questionnaire.

Author contributions

SA generated the study idea and contributed to the writing and editing of the manuscript and supervised the entire process of writing this study. FA prepared the initial literature review. SA and FA prepared the questionnaire which was then circulated around with the assistance of HE, GA, and RB. A systematic review of previous studies was conducted by FA, RB, HE and GA. SA and HE wrote the abstract. The background was written by FA and GA. Methods and results were written by FA. The discussion was written by RB, HE, FA and edited by SA, GG. Referencing, tables and graphs were prepared by FA. SA and GG proofread and edited the entire manuscript. GG generated ideas, reviewed and edited the manuscript.

Funding

This work was supported by the College of Medicine Research Center, Deanship of Scientific Research, King Saud University, Riyadh, Saudi Arabia.

Data availability

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

Declarations

Ethics approval

This project has received ethical approval by the King Saud University Institutional Review Board (Ethics Committee of the Health Sciences Colleges Research on Human Subjects) (#E-23-7545).

Consent to participate

On the first page of the survey, participants were informed that to ensure the privacy and confidentiality of participants, the questionnaire was anonymous and devoid of any identifying data. The participants were informed that by clicking "next" they consent to participate in the study.

Consent for publication

Not Applicable (does not contain identifiable data from any individual person).

Competing interests

The authors declare no competing interests.

Received: 7 May 2024 / Accepted: 20 August 2024

Published online: 29 August 2024

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