J Mol Neurosci
DOI 10.1007/s12031-011-9556-9

How Much Do Physicians in Latin America Know About Behavioral Variant Frontotemporal Dementia?

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Received: 31 December 2010 / Accepted: 16 May 2011
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Abstract Diagnosis of behavioral variant frontotemporal dementia (bvFTD) can be especially challenging during the early stages for several reasons, including the fact that (a) behavioral disturbances in bvFTD can mimic the symptomatic profile of psychiatric disorders; (b) neuropsychological performance may be relatively spared; and (c) changes in structural neuroimaging may go undetected. Most frequently, bvFTD is not included as part of medical or residency training outside the field of cognitive neurology. The present study aimed at examining bvFTD-related practices concerning academic and professional training, diagnosis, and treatment across Latin America. We surveyed the academic and professional aspects of clinical practice related to bvFTD of 596 physicians from different fields throughout the continent. We discuss several aspects concerning Latin American physicians' training on dementia and bvFTD, the way in which they approach the differential diagnosis of bvFTD, and their most frequent strategies for the treatment of this condition. We conclude that information about bvFTD deserves more attention in both undergraduate and postgraduate medical education in Latin America, and that understanding clinical practices related to FTD can help design more efficient training programs for physicians in this and other world regions.

Keywords Frontotemporal dementia · Diagnosis · Treatment · Academic training · Latin America

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Objective

Frontotemporal dementia (FTD) is an umbrella term used to encompass several clinical degenerative syndromes, some of which are thought to be more frequent in younger populations than other dementias such as Alzheimer's disease. Indeed, FTD is considered, by many, a frequent cause of presenile dementia (Ratnavalli et al. 2002), and its prevalence is remarkably higher than Alzheimer's disease in people younger than 60 years old (Knopman et al. 2004), when patients are still active in life. Because of the prominent behavioral changes affecting this patient population, FTD is often misdiagnosed for other neurodegenerative or psychiatric conditions (Mendez et al. 2007). While efforts to further our understanding about clinical, pathological, and neuropsychological aspects of FTD have increased remarkably during the past decade, little is known regarding the awareness among physicians about this condition and the way it is diagnosed and treated in everyday clinical practice.

Interest in FTD has increased considerably with advancements in the field of behavioral neurology, neuropathology, biochemistry, and genetics, which has allowed for the correlation between different molecular profiles and clinical phenotypes (Piguet et al. 2011). Thanks to these genetic and clinical in-depth descriptions of FTD, at least three major clinical syndromes are now distinguished: (1)

Published online: 25 May 2011

the behavioral variant (bvFTD); (2) progressive nonfluent aphasia and semantic dementia; and (3) the motor branch of FTD, which includes corticobasal degeneration, progressive supranuclear palsy, and motor neuron disease (especially lateral amyotrophic sclerosis), which are associated with FTD features and pathology (Kertesz et al. 2005; Piguet et al. 2011).

The bvFTD is characterized by a decline in cognitive functions, especially executive skills, and severe changes in behavior including loss of insight, lack of empathy, apathy, disinhibition, loss of manners and decorum, compulsive and ritualistic behavior (Bozeat et al. 2000; Hodges and Miller 2001; McKhann et al. 2001; Neary et al. 1998). For this reason, diagnosis of bvFTD is usually challenging, as the patient's behavioral profile may overlap with many of the symptoms typical of psychiatric conditions. Diagnosis is further challenged by the fact that marked disturbances tend to occur before evidence of any abnormalities on neuroimaging (Davies et al. 2006; Kipps et al. 2007; Mendez et al. 2007; Rascovsky et al. 2007). Moreover, a recent study showed that radiologists very infrequently propose bvFTD or Pick's disease as the diagnosis of a patient based on his/her MRI (Suarez et al. 2009).

Exploring bvFTD-related clinical practice across Latin America is important in order to understand the way health professionals in the region approach bvFTD, its diagnosis, and its treatment. The present study was aimed at investigating doctors' knowledge of clinical practice related to bvFTD using an online questionnaire. Physicians from different fields throughout Latin America responded to questions about their experience with the disease during academic training and everyday clinical practice. As far as we know, no previous study has yet reported a thorough assessment of the knowledge of Latin American doctors about bvFTD.

Methods

Potential Participants

Potential participants are physicians who are members of the "Health Professionals" who are part of the online section of the Institute of Cognitive Neurology's website (www.ineco.org.ar) and users of Intramed (www.intramed.net), an online portal for health professionals. In both cases, a banner was placed inviting visitors to voluntarily access an online questionnaire. All participants gave their informed consent by pressing on an "I agree" button placed beneath an explanatory letter. Potential respondents were informed of the anonymity of their responses, which was achieved by deleting their names and email addresses from the database. The banner was visible for a period of 54 days.

Questionnaire

The questionnaire used in this study was divided into two main sections: demographic/professional profile and FTD practice-related information. In the first section, participants provided information about themselves, including (in order of appearance on the questionnaire): (a) age, (b) field/specialty, (c) country where they got their degree, (d) country where they currently work, (e) whether they obtained a postgraduate degree, (f) time devoted in the last 5 years to postgraduate courses, (g) whether they had studied "bvFTD" as part of their medical and/or postgraduate education, (h) number of conferences relevant to their field they attended in the last 5 years both locally and internationally.

In the second part of the questionnaire, respondents answered a series of questions about their professional experience with bvFTD, which included (in order of appearance): (a) whether they diagnose "dementia," (b) whether they diagnose "Frontotemporal Dementia," (c) whether they make the differential diagnosis for the "behavioral variant Frontotemporal Dementia," (d) number of patients with bvFTD diagnosed every year, (e) which tests (from a given list, see Table 1) they usually order to be able to diagnose dementia (all types), (f) of these, which top five tests (ranked 1 to 5) they consider the most relevant/useful for the differential diagnosis of bvFTD, (g) which tests they consider are necessary and indispensible for the diagnosis of bvFTD. As part of the second section of the questionnaire, respondents were asked to classify a series of test results/findings (from a given list, see Table 2) according to whether each item (a) does not support the diagnosis for dementia, (b) supports dementia diagnosis, but *not* bvFTD, (c) suggests dementia diagnosis, but *not* bvFTD, (d) suggests bvFTD diagnosis, or (e) supports diagnosis for bvFTD. Each item was accompanied with a series of "orienting" examples in order to increase specificity. For example, one item read "Reports of behavioral disinhibition *(eg. inappropriate behavior, lack of decorum or loss of manners, impulsive reactions)* by relatives or caregivers." Participants were then asked to choose five disorders/pathologies (from within a given list, see Table 3) and rank them 1 (top) to 5 according to their relevance for differential diagnosis of bvFTD. Finally, respondents were instructed to check all treatment options they *usually* recommend to bvFTD patients. The survey took 21.4 min (SD=11.4) to complete on average.

Data Analysis

All statistical analyses were conducted employing the PASW (formerly, SPSS) 18.0 package. When inferential hypotheses were tested on categorical data, Pearson chi-square tests were calculated in order to evaluate differences

Table 1 Clinical procedures and tests employed to diagnose dementia

	Neurologists	Psychiatrists	Geriatricians	General practitioner
Standard neurological assessment	100%	76.7%	92.8%	92.2%
Cognitive assessment by neuropsychologist	73.5%	58.1%	45.2%	40.1%
Cognitive screening tools (e.g., MMSE)	83.6%	73.3%	76.2%	52.1%
Blood labs/analyses	69.4%	60.0%	78.6%	51.5%
Urine labs/analyses	46.9%	69.8%	76.2%	67.2%
Electrocardiogram	40.8%	60.5%	47.6%	39.1%
Electroencephalography	57.1%	47.7%	59.5%	54.7%
Computed tomography scan	40.1%	36.0%	47.6%	10.4%
Magnetic resonance imaging	71.4%	46.5%	54.7%	35.4%
Single photon emission CT	38.8%	8.14%	16.7%	5.21%

Values show the percentage of respondents who request these tests or procedures in their clinical practice

MMSE mini-mental state examination

across groups. Comparisons between groups (e.g., across different fields of medicine) on ordinal or scale measurements (e.g., number of patients diagnosed with dementia) was conducted using independent Student's *t* test or one-way ANOVAs depending on the number of groups. When relevant, Bonferroni post hoc comparisons were carried out.

Table 2 Percent of respondents (all specialties) whose symptom (A) does not support diagnosis for dementia (B) supports dementia diagnosis but *not* bvFTD (C) suggests dementia diagnosis but *not* bvFTD (D) suggests bvFTD diagnosis or (E) supports diagnosis for bvFTD

Symptom	A	B	C	D	E
Reports of behavioral disinhibition by relatives or caregivers	7.9	8.7	5.2	45.4	32.8
Evidence of behavioral disinhibition during clinical interview	4.4	7.4	7.1	30.4	50.7
Reports of apathy by relatives or caregivers	12.9	14.8	21.6	37.5	13.2
Evidence of apathy during clinical interview	12.3	18.3	15.6	28.4	25.4
Reports of lack of empathy by relatives or caregivers	13.0	9.7	14.1	44.2	19.1
Evidence of lack of empathy during clinical interview	11.7	10.8	13.3	30.8	33.3
Reports of perseverative stereotyped compulsive or ritualistic behaviors by relatives or caregivers	11.7	14.5	22.8	34.5	16.4
Evidence of perseverative stereotyped compulsive or ritualistic behaviors during clinical interview	10.3	18.9	19.2	22.0	29.5
Reports of changes in eating habits or hyperorality	14.6	13.5	16.3	38.8	16.8
Evidence of hyperorality during clinical interview	14.7	13.6	16.6	29.1	26.0
Normal results on standard cognitive screening tests	39.8	12.0	14.8	24.0	9.5
Episodic memory deficits detected on a comprehensive neuropsychological battery	12.2	27.1	26.6	23.3	10.8
Language deficits on a comprehensive neuropsychological battery	8.8	20.6	24.5	28.3	17.9
Visuospatial deficits on a comprehensive neuropsychological batter	8.6	25.8	24.7	27.4	13.6
Attentional fluctuations	10.6	20.9	26.3	29.3	12.8
Executive dysfunction on a comprehensive neuropsychological battery	9.4	19.4	18.6	30.5	22.2
Constant dizziness or vertigo	51.0	19.9	17.4	8.7	3.1
Frequent falls	41.7	21.8	19.6	12.3	4.5
Mood changes sustained throughout time (e.g., manic periods in between depressive periods)	34.8	17.4	21.3	18.5	8.0
Frontal atrophy on CAT or MRI	1.7	10.5	8.0	34.8	45.0
Hippocampal atrophy on CAT or MRI	6.4	23.9	26.4	22.8	20.6
Evident vascular lesions on CAT or MRI	8.9	27.7	27.1	21.9	14.4
Frontal hypometabolism on SPECT	6.1	7.2	10.3	28.4	47.9
Sudden onset of symptoms	32.8	19.3	17.9	18.5	11.5
Symptoms appear before age of 65	14.1	14.9	18.8	36.7	15.5
Motor deficits including extrapyramidal signs	26.1	24.7	24.4	15.8	8.9
Motor deficits preceding cognitive deficits	23.4	26.2	22.6	18.2	9.6

Table 3 Percent of respondents (all specialties) who ranked each disorders/pathology according to their relevance for the differential diagnosis of bvFTD (top priority is "#1")

	#1	#2	#3	#4	#5
Alzheimer disease	56.3	13.1	6.2	7.8	14.4
Mild cognitive Impairment	6.6	12.7	12.8	4.9	10.9
Vascular dementia	12.8	36.6	18.7	16.3	8.3
Parkinson's disease	2.2	6.1	13.5	12.2	10.5
Lewy body dementia	5.0	6.7	10.4	18.8	14.8
Progressive primary aphasia	3.4	6.4	4.2	4.1	3.1
Semantic dementia	3.4	3.5	10.4	5.7	11.8
Corticobasal syndrome	1.9	1.3	3.5	6.5	7.4
Progressive supranuclear paralysis	–	1.3	1.7	3.3	4.4
Adult attention deficit/hyperactivity disorder	2.5	5.1	6.6	9.4	3.5
Bipolar disorder	2.8	1.9	1.7	2.9	1.3
Obsessive–compulsive disorder	0.6	1.3	2.4	1.6	0.9
Major depression	0.6	1.3	2.8	2.0	3.5
Late onset schizophrenia	0.3	1.9	1.4	2.9	1.7
Other	1.6	1.0	3.8	1.6	3.5

Because of its nonspecific nature, the "Other specialties" group was excluded from the group comparison analyses of bvFTD-related practices unless otherwise specified.

Results

Respondents' Demographic and Professional/Academic Profile

A total of 596 respondents successfully completed the survey. The sample consisted of 8.2% neurologists, 14.4% psychiatrists, 7.0% geriatricians, 32.2% general practitioners, and 38.1% other specialties (e.g., dermatologists, cardiologists, etc.) currently working in Latin America. Argentina (59.6%), Bolivia (0.5%), Brazil (0.5%), Chile (2.2%), Colombia (3.7%), Cuba (2.0%), Guatemala (0.3%), Honduras (0.3%), Mexico (15.6%), Panama (0.5%), Peru (3.2%), Paraguay (1.2%), Uruguay (2.2%), Venezuela (2.9%), and others (2.5%).

The mean age of the respondents was 46.0 years (SD=11.3) for neurologists, 47.4 years (SD=12.7) for psychiatrists, 45.8 years (SD=11.2) for geriatricians, 41.3 years (SD=12.2) for general practitioners, and 43.8 years (SD=11.1) for other fields. A total of 38 (6.4%) respondents obtained their medical degree in a country different to where they currently work as physicians, although the proportion was similar (χ^2=2.73, df=4, p=0.60) across fields (neurology, 6.1%; psychiatry, 3.49%; geriatrics, 9.52%; general practitioner, 7.81%; others, 5.72%).

As shown in Table 4, the time devoted to postgraduate education during the last 5 years was comparable between respondents of different medical fields ($F_{4,592}$=1.28, p=0.28). Likewise, physicians of different specialties attended, on

Table 4 Academic profile across medical fields

		Neurologists, n=49	Psychiatrists, n=86	Geriatricians, n=42	General practitioner, n=192	Other, n=227
Time devoted to postgraduate education during the last 5 years (hours)		439.30±640.4	703.63±1,227.4	789.08±1,047.5	625.28±1,209.1	1,048.48±3,223.1
Heard of bvFTD during medical school	Y	26.5%	36.1%	21.4%	40.6%	31.3%
	N	73.5%	64.0%	78.6%	59.4%	68.7%
Heard of bvFTD during postgraduate	Y	85.7%	86.0%	78.6%	29.2%	22.0%
	N	14.3%	14.0%	21.4%	70.8%	78.0%
No. of relevant conferences attended during the last 5 years		26.52±31.8	27.04±43.9	25.93±61.5	34.23±146.0	26.94±63.6
No. of conferences that were international		8.51±9.1	7.47±21.9	5.62±16.0	3.10±16.1	4.20±7.7

Values are shown as mean±SD or percent total for each column

average, a similar number of conferences during the last 5 years ($F_{4,592}$=0.19, p=0.95). Overall, only 33.9% of the respondents had covered or studied bvFTD as part of their undergraduate medical degree curricula. No significant differences were found between participants of different medical fields in this respect (χ^2=11.9, df=8, p=0.15). During postgraduate training, however, the majority of neurologists, psychiatrists, and geriatricians received training in bvFTD, which occurred significantly less (χ^2=182.9, df=8, p<0.001) for general practitioners and doctors of other specialties.

bvFTD-Related Practices

Diagnosing Dementia, FTD, and bvFTD

As expected, significant differences were found between the specialties in the ratio of doctors diagnosing dementia (χ^2=53.8, df=3, p<0.001), FTD (χ^2=114.3, df=3, p<0.001), or bvFTD (χ^2=67.9, df=3, p<0.001) in particular (Table 5). Neurologists reported the highest ratios in all cases. Besides these group differences, a similar pattern was observed within each specialty: respondents were less likely to diagnose more specific forms of dementia. No significant differences were found between countries on the proportion of respondents who diagnose dementia (χ^2=17.1, df=3, p=0.52), who make diagnosis of FTD (χ^2=19.9, df=3, p=0.33), or even differential diagnosis of bvFTD (χ^2=29.3, df=3, p=0.12). Comparing the number of patients diagnosed with bvFTD every year revealed a significant difference between specialties ($F_{3,325}$=9.62, p<0.001), with general practitioners diagnosing a significantly lower number of patients than neurologists (p<0.001) but not psychiatrists (p=.99) or geriatricians (p=0.34). Indeed, neurologists diagnose significantly more bvFTD than both psychiatrists and general practitioners (p<0.001, for both), but not geriatricians (p=0.10). Only the answers from practitioners who diagnose bvFTD were taken into account for the bvFTD practice-related questions analyzed below.

When asked which clinical procedures or tests they usually indicated in the diagnostic process of dementia (Table 1), neurological assessment was unanimously the most frequently requested procedure. On the contrary, single photon emission computed tomography (SPECT) was the least popular in all specialties, although neurologists indicated it significantly more frequently than respondents from other medical fields (χ^2=44.8, df=3, p<0.001). Also, neurologists requested MRI studies more frequently than the rest of the specialties (χ^2=44.8, df=3, p<0.001). Overall, a significant difference was found in the number of tests typically requested by doctors in each specialty ($F_{3,325}$=13.8, p<0.001), with general practitioners requesting 4.5 (SD=1.9) tests on average, compared to the 5.3 (SD=2.2), 5.9 (SD=1.6), and 6.2 (SD=1.9) usually indicated by psychiatrists, geriatricians, and neurologists in this study, respectively.

Making the Differential Diagnosis of bvFTD

As explained above, respondents were asked to pick five of the procedures discussed above that they would take into account for the differential diagnosis of bvFTD and rank them from 1 (max) to 5 (min) according to their relevance in considering a patient's diagnosis (Table 6). Neurological assessment was ranked first for more than half of the participants in this study. A cognitive assessment by a neuropsychologist and the use of cognitive screening tools were the top ranked, respectively, for the second and third places. Standard lab procedures (blood and urine) and EEG were the least relevant procedures for bvFTD differential diagnosis, although 15.8% of the respondents considered blood analyses important for the process of diagnosis, but in the least relevant position (no. 5). While imaging techniques, especially MRI, were selected more frequently ranked no. 4 and no. 5, they were still considered to provide relevant and valuable information for the diagnosis of bvFTD.

Of these lab tests, respondents were instructed to choose which they considered necessary and indispensible for the differential diagnosis of bvFTD (Table 6). The most frequently selected item by participants from all fields was

Table 5 Clinical experience with bvFTD

		Neurologists	Psychiatrists	Geriatricians	General practitioner
Makes diagnosis of dementia	Y	98.0%	85.7%	95.2%	58.9%
	N	2.00%	14.3%	4.76%	41.1%
Makes diagnosis of FTD complex	Y	87.8%	60.7%	61.9%	16.1%
	N	12.2%	39.3%	38.1%	83.9%
Makes differential diagnosis of bvFTD	Y	73.5%	59.8%	55.0%	21.1%
	N	26.5%	40.2%	45.0%	78.9%
No. of patients diagnosed with bvFTD/year (mean±SD)		10.6±16.2	3.26±2.9	6.05±10.7	3.20±6.5

Table 6 Percent of respondents (all specialties) who ranked clinical procedures according to their relevance for the differential diagnosis of bvFTD (top priority is "#1")

	#1	#2	#3	#4	#5	Neurologists	Psychiatrists	Geriatricians	General practitioner
Standard neurological assessment	51.0	16.1	12.1	7.4	7.5	79.6%	66.3%	64.3%	69.8%
Cognitive assessment by neuropsychologist	17.2	32.5	15.3	8.0	8.0	57.1%	30.2%	26.2%	19.8%
Cognitive screening tools (e.g., MMSE)	14.4	21.6	21.4	11.3	7.2	55.1%	59.3%	64.3%	55.2%
Blood labs/analyses	1.9	2.2	5.5	9.6	15.8	28.6%	33.7%	40.5%	29.7%
Urine labs/analyses	–	0.3	0.3	1.4	2.2	24.5%	27.9%	42.9%	53.6%
Electrocardiogram	–	0.3	0.5	1.6	2.2	18.4%	41.9%	16.7%	31.8%
Electroencephalography	3.0	2.5	7.1	13.5	11.4	16.3%	9.30%	21.4%	9.38%
Computed tomography scan	1.9	9.3	12.3	14.3	14.7	16.3%	34.9%	31.0%	21.4%
Magnetic resonance imaging	5.2	12.3	17.3	20.9	13.6	49.0%	17.4%	19.0%	4.17%
Single photon emission CT	5.4	3.0	8.2	12.1	17.5	12.2%	6.98%	9.52%	1.56%

The four rightmost columns indicate the percent of respondents from each specialty who thought the procedure/test was necessary and indispensible for the differential diagnosis of bvFTD

MMSE mini-mental state examination

neurological assessment. For neurologists, cognitive assessment conducted by a psychologist and the use of cognitive screening tools were each chosen by more than half of the respondents. Similarly, almost half considered that MRI was a necessary procedure for bvFTD diagnosis. General practitioners, on the other hand, tend to rely more strongly on a neurological assessment and the use of cognitive screening tools (55.2%), but only 19.8% thought that a comprehensive cognitive assessment by a neuropsychologist was indispensible for a differential diagnosis of bvFTD. Also, CT scans appear to be the choice over MRI for them (21.4% vs. 4.17%, respectively). A considerable proportion of both psychiatrists (41.9%) and general practitioners (31.8%) believe that an EKG is necessary and indispensible for a bvFTD diagnosis, and more professionals in those fields consider CT scans over MRI.

Respondents were presented with several signs and symptoms that a patient may exhibit or that may be reported by a relative or caregiver. For instance, behavioral disinhibition reported by a person close to the patient was suggestive of bvFTD for 45.4% of the participants, but when evidenced during clinical interview, it became supportive of bvFTD diagnosis for half of the respondents. A considerable number of participants indicated that apathy, lack of empathy, perseverative behaviors, and hyperorality suggested bvFTD, but when these same symptoms were reported by a relative or a caregiver, participants did not believe they provided support for a diagnosis of bvFTD. The lack of empathy, when evidenced during a clinical interview, however, was slightly more frequently chosen as a supporting diagnosis than merely suggesting it. Episodic memory was more clearly associated with suggestion or support of a dementia other than bvFTD. Other cognitive domains, including language, visuospatial abilities, and attention were similarly thought to indicate bvFTD and a non-bvFTD dementia. For executive functions, however, the trend was clearer in showing that almost half of the participants thought it was suggesting (30.5%) or supporting (22.2%) diagnosis of bvFTD. Some symptoms were more clearly rejected as indicators of any dementia, including dizziness or vertigo and frequent falls. Mood changes sustained throughout time suggest no dementia for 34.8% of the participants, but it suggested or supported either a non-bvFTD dementia (17.4% and 21.3%) or bvFTD (18.5% and 8%). For a vast majority, both frontal atrophy on CT or MRI and hypometabolism on SPECT suggested or supported bvFTD. Hippocampal atrophy and vascular lesions were suggestive or supportive of other non-bvFTD dementias for a large portion of the respondents, although 20.6% and 14.4%, respectively, thought they supported a diagnosis of bvFTD. Motor signs were thought to similarly indicate non-bvFTD dementia, bvFTD, or even no dementia at all.

Table 3 reveals the top-ranked disorders that are most relevant when considering the differential diagnosis of bvFTD. The vast majority of participants (all specialties except for "Other") indicated that Alzheimer's disease is most relevant when diagnosing bvFTD. Vascular dementia and Lewy Body dementia follow. Although ranked as less relevant in comparison to the aforementioned disorders, Parkinson's disease and Semantic dementia were important to a substantial number of respondents. Although overall similar patterns were observed when analyzing ranked disorders by specialty, a complete list of responses is available upon request from the corresponding author.

Treating bvFTD

The respondents checked all treatment options they usually recommend for patients with bvFTD diagnosis. Acetylcholinesterase inhibitors are indicated by 41.5% of participants who diagnose and treat bvFTD. Selective serotonin reuptake inhibitors (31.7%), monoamino oxidase inhibitors (27.4%), as well as typical (50.9%) and atypical (19.8%) antipsychotics were also reported. Memantine was recommended by 50.1% while vitamin E and gingko biloba by 25.2% and 19.0%, respectively. Nonpharmacological treatment options that are usually indicated by respondents of this study included cognitive rehabilitation (39.0%), occupational therapy (37.9%), music therapy (45.5%), and group rehabilitation/stimulation activities (45.8%). Remarkably, 18.7% of physicians in this study recommend psychotherapy for the patients, and 73.2% do so for their relatives (psychotherapy included counseling and psychoeducation).

Discussion

The present study sought to investigate various aspects of bvFTD-related practices of Latin American physicians. An online questionnaire was made available for doctors of different fields and specialties to answer questions about their academic and professional profile as it relates to bvFTD and their clinical experience with this disorder. The respondents came mainly from the fields of neurology, psychiatry, geriatrics, and general practice. Although doctors are commonly faced with bvFTD, our findings indicate that the knowledge base of this condition is deficient. The most important results of this study are discussed below.

Academic Training in bvFTD

About 40% of all respondents received training in bvFTD during their time in medical school. The proportion of participants who had and had not encountered this disease as part of their medical education was similar across their current fields of practice. This was not the case, however, when looking at training in bvFTD during postgraduate education. While neurologists, psychiatrists, and geriatricians covered the disease as part of their programs, less than 30% of general practitioners and doctors from other fields heard of bvFTD during residency and postgraduate training programs. These findings reveal the urgent need to include bvFTD as part of both medical school and residency program curricula for general practitioners in Latin America. If more general practitioners are aware of the existence of a neurodegenerative disease with the features of bvFTD, they will refer potential bvFTD patients sooner and more frequently to neurologists, psychiatrists, and geriatricians, who are more likely to be able to make the appropriate differential diagnosis.

Diagnosis and Treatment of bvFTD

The majority of Latin American neurologists and geriatricians diagnose dementia. Making the differential diagnosis specifically for bvFTD appear to be somewhat challenging, as evidenced by the fact that across specialties, the number of physicians who diagnose this disease is remarkably smaller than those who are able to detect that the patient has some form of dementia (i.e., in the sense that the patient has a neurodegenerative progressive disease affecting cognitive functioning and disturbed activities of daily living). In fact, the proportion of neurologists who answered affirmatively to whether they diagnose dementia went from (yes to no ratio) 49:1 to 2.7:1 when asked if they make the differential diagnosis of bvFTD. Similarly, from 6:1 to 1.49:1 for psychiatrists, 20:1 to 1.22:1 for geriatricians, and 1.43:1 to 0.26:1 for general practitioners. The pattern appeared to be consistent across different countries. This highlights the importance of training doctors throughout Latin America, especially those in bvFTD-relevant fields, in the key features of bvFTD, providing practical strategies for differential diagnosis of the disease.

For those physicians making the diagnosis of bvFTD, neurological assessment seems to be, unanimously, the most important source of information in the diagnostic process. Interestingly, most neurologists will refer the patient to a neuropsychological service for a comprehensive assessment of his/her cognitive abilities. Psychiatrists and geriatricians, on the other hand, seem to more often depend on brief cognitive screening tools rather than complete assessment batteries, and around half of general practitioners will not request neuropsychological information for diagnosis. In fact, less than 20% of general practitioners believed that the cognitive assessment by a neuropsychologist was indispensable. This last finding is especially important because while screening tools may provide information in some cases, Graham and Hodges (Graham and Hodges 2008) have recently demonstrated that both brief bedside screening neuropsychological tests and brain imaging may be normal in many bvFTD patients, stressing the need for a comprehensive multidisciplinary assessment including a comprehensive neuropsychological evaluation.

The present results also revealed a relatively low preference for requesting MRI scans in all fields. Indeed, neurologists were the group that most frequently relied on neuroimaging for bvFTD diagnosis. While normal brain imaging has been detected in as many as 50% of bvFTD patients (Kipps et al. 2007), new criteria will demand the presence of frontal atrophy on MRI/CT or hypoperfusion in

SPECT to distinguish between probable and possible bvFTD (Rascovsky et al. 2007). Therefore, whenever possible, physicians of different fields suspecting FTD should request neuroimaging.

Similarly, when asked to rate a series of patient signs and symptoms on how supportive they are of bvFTD, behavioral disinhibition was perceived by the majority as a supporting diagnosis for the disease. Such a trend was not as clear for other core features of bvFTD. This may be the result of one of the limitations of the consensus criteria to date, which is the lack of operational definitions for specific instances of apathy, lack of empathy, repetitive behaviors, etc. (Rascovsky et al. 2007). In this sense, Latin American physicians would benefit from training courses that help orient them as to how each of the symptomatic domains of bvFTD may manifest. As well, much controversy was observed for the neuropsychological findings, which were equally indicative of bvFTD or a dementia other than bvFTD. While the diagnosis of this disease does, in no way, rely solely on neuropsychological results, educating physicians about the cognitive profiles of bvFTD patients can provide helpful information for early differential diagnosis.

Neuroimaging, neurological assessment, and family reports can supply valuable information to distinguish these diseases, and cognitive examination may support differential diagnosis for each one of them. Interestingly, though, psychiatric disorders typically presenting with frontal features that mimic bvFTD symptoms were not as relevant for Latin American physicians when considering differential diagnoses. It is known that patients diagnosed with bvFTD present with behavioral disturbances and neuropsychiatric symptoms that may be mistakenly diagnosed as occurring due to an underlying psychiatric disorder (Bozeat et al. 2000; Mendez et al. 2006). However, the reverse holds true that psychiatric disorders may be mistakenly diagnosed as bvFTD. For example, late onset bipolar disorder, late onset schizophrenia, and atypical depression can all mimic the bvFTD syndrome. In this sense, physicians should not minimize the symptomatic overlap between psychiatric disorders and bvFTD, and should consider a more holistic approach to the differential diagnosis of these disorders by working in an interdisciplinary fashion grouping neurologists, psychiatrists, neuropsychologists, occupational therapists, etc.

Pharmacological treatment for bvFTD in Latin America seems to be dominated by AChE inhibitors and typical antipsychotics. Memantine is usually prescribed for bvFTD patients by half of the physicians surveyed in this study. Some recent preliminary studies have argued for the benefits of this uncompetitive antagonist of the *N*-methyl-D-aspartate glutamate receptor on the behavioral disturbances of bvFTD patients (Boxer et al. 2009; Diehl-Schmid et al. 2008; Kavirajan 2009; Swanberg 2007; Vossel and Miller 2008). Nonpharmacological treatment was usually indicated by almost half of the participants in this study, who also very frequently suggested psychotherapy for relatives of bvFTD patients. Neuropsychological rehabilitation, cognitive stimulation, and other functional/occupational therapies are effective in attenuating behavioral and cognitive disturbances of patients with this disease (Mendez 2009) while psychotherapy and educational programs for their relatives and caregivers can alleviate the burden and increase the sense of competence (Grinberg et al. 2007; Riedijk et al. 2009). Therefore, these approaches should be encouraged and made available for as many patients and their families as possible.

Shortcomings of This Study

In interpreting the results of this study, one must take into account the bias that arises from the sample in itself, physicians browsing through two health-related websites that feature medical information. It could be the case that doctors who spend time looking for information online are more knowledgeable about recent publications in the field of dementia than physicians who do not have access to the Internet, which occurs in a substantial portion of doctors in Latin America, especially those working in rural or more isolated areas. Naturally, the results of this questionnaire must be interpreted with this limitation in mind, and they are in no way representative of all physicians in Latin America. In this sense, another potential weakness regarding the actual generalizability of these results involves the overrepresentation of doctors from particular countries (especially Argentina and Mexico), which can bias the results toward the practices that are common in their medical communities. Nonetheless, it must be noted that no significant differences were found on the proportion of physicians diagnosing dementia, FTD, and in particular, bvFTD across countries. This finding allows for more certainty in thinking about regional strategies to improve bvFTD-related practices. Evidently, future studies should confirm these findings and interpret them in the context of each country's own prevalence of bvFTD. Unfortunately, no epidemiologic studies are available about the prevalence of bvFTD in Latin American countries, and preliminary studies like the present one will slowly contribute to raising awareness of the importance of detecting and treating bvFTD from its early stages. In fact, because of the lack of official figures, it is hard to determine whether the average of bvFTD patients diagnosed by each professional group is in accordance with the prevalence of the disease. Future studies should also consider offering comparator diseases, i.e., other neurological conditions that are more (e.g., Alzheimer's disease) and less (e.g., motor neuron disease) prevalent in order to determine whether bvFTD is uniquely underrepresented.

Conclusion and Implications of Our Findings

The findings of this study represent the first attempt to characterize bvFTD-related practices of physicians throughout Latin America. We have found that most medical students in the region do not study this disease as part of their academic curriculum, and more strikingly, that many doctors—especially general practitioners—do not cover bvFTD as part of their residency and postgraduate training. We have also demonstrated that, even within neurologists, a substantial number of doctors will diagnose "dementia" but will not make the differential diagnosis of bvFTD. If they do, many will ignore the need for neuropsychological assessment or neuroimaging. Also, a large number of physicians will not consider psychiatric disorders typical of adult populations of relevance for differential diagnosis of bvFTD. All of these findings stress the need for bvFTD to be approached from an interdisciplinary perspective, combining the knowledge of different fields and specialties. It also highlights the importance of creating top-notch academic training programs that can provide physicians with the latest trends in diagnostic criteria and treatment of the disease. Information about bvFTD deserves more attention in both undergraduate and postgraduate medical education programs in Latin America.

Acknowledgments This study was funded by a FINECO grant.

Conflicts of Interest The authors report no conflicts of interest.

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