Severity of Neuropsychiatric Symptoms and Distress in Dementia among Older People in Central Africa (EPIDEMCA Study)

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OBJECTIVES: Neuropsychiatric symptoms are common in dementia. Limited data are available concerning their association with dementia in developing countries. Our aim was to describe the severity of neuropsychiatric symptoms among older people, evaluate the distress experienced by caregivers, and assess which neuropsychiatric symptoms were specifically associated with dementia among older adults in Central Africa.

DESIGN: This study is part of the EPIDEMCA program, a cross-sectional multicenter population-based study.

SETTING: The EPIDEMCA program was conducted from November 2011 to December 2012 in urban and rural areas of the Central African Republic and the Republic of the Congo.

PARTICIPANTS: Participants were older people (≥65 y) included in the EPIDEMCA program who underwent a neuropsychiatric evaluation. The sample included overall 532 participants, of whom 130 participants had dementia.

MEASUREMENTS: Neuropsychiatric symptoms were assessed with the brief version of the Neuropsychiatric Inventory including the evaluation of severity and associated distress. *Diagnostic and Statistical Manual of Mental Disorders*, 4th ed., Text Revision, criteria were followed to diagnose dementia. A logistic regression model was used to identify associated neuropsychiatric symptoms.

RESULTS: The prevalence of neuropsychiatric symptoms was 89.9% (95% confidence interval = 84.6-95.1) among people living with dementia. The overall median severity score for neuropsychiatric symptoms was 9 [interquartile range [IQR] = 6-12], and the overall median distress score was 7 [IQR = 4-10]. Overall median scores of both severity and distress were significantly increased with the number of neuropsychiatric symptoms, the presence of dementia, and dementia severity. Depression, delusions, apathy, disinhibition, and aberrant motor behavior were associated with dementia after multivariate analysis.

CONCLUSION: This report is one of the few population-based studies on neuropsychiatric symptoms among older people with dementia in Sub-Saharan Africa and the first one evaluating the severity of those symptoms and distress experienced by caregivers. Individual neuropsychiatric symptoms were strongly associated with dementia in older people and require great attention considering their burden on populations. **J Am Geriatr Soc 68:180-185, 2020.**

Key words: neuropsychiatric symptoms; behavioral and psychological symptoms of dementia; older adults; cognitive disorders; dementia

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Psychiatric symptoms are commonly associated with dementia and can occur at any stage of the disease process.[1] Studies on neuropsychiatric symptoms (NPS) are uncommon in low- and middle-income countries (LMICs),

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particularly in Sub-Saharan Africa (SSA).[2] Recent data from this region were reported in Nigeria, Tanzania, Central African Republic (CAR), and Republic of the Congo (ROC), mainly focusing on the prevalence of NPS.[3-5]

In our previous study conducted in CAR and ROC,[5] the prevalence of at least one NPS was 63.7% (95% confidence interval [CI] = 59.5-67.8) among older people, and NPS appeared to be strongly associated with dementia (odds ratio [OR] = 7.7; 95% CI = 3.4-17.5).[5] However, severity of the symptoms and distress were not reported. In a study conducted in rural Tanzania, the severity scores and distress scores appeared to be higher in people with dementia (PWD) than in people with mild cognitive impairment (MCI).[3]

More attention must be paid to identifying those symptoms among PWD and understanding their impact because knowledge of the specific symptoms associated with dementia could lead to more targeted strategies for disease management, especially in the context of LMICs where resources are limited. Our study therefore intended to evaluate the severity of NPS in Central Africa, describe the resulting distress among caregivers, and assess which NPS are specifically associated with dementia.

METHODS

Study Design and Participants

The Epidemiology of Dementia in Central Africa (EPIDEMCA) study was a multicenter population-based survey carried out in rural and urban areas of CAR and ROC between 2011 and 2012 including people aged 65 years and older. The detailed methodology was fully described elsewhere.[5,6]

Assessment

Briefly, a two-phase design was used. The first phase included a cognitive screening using the Community Screening Interview for Dementia (CSI-D).[7] The Geriatric Mental State[8] was used to assess mental state alongside a structured questionnaire investigating sociodemographics, lifestyle, and medical history. In the second phase, participants with a CSI-D cognitive score of 24.5 or lower underwent a neurological assessment including psychometric tests and evaluation of NPS.[5,6]

All the assessments were conducted in local languages. Translation of the questionnaires was performed following World Health Organization guidelines.[5,6]

Neuropsychiatric Symptoms

Twelve NPS, along with the severity and distress of each of their NPS over the last 30 days, were assessed in the second phase through the brief version of the Neuropsychiatric Inventory (NPI-Q),[9] based on interviews with an informant. Overall severity (from 0 to 36) and distress (from 0 to 60) scores were calculated by adding scores from each individual item/domain.

Table 1. Characteristics of Study Participants (EPIDEMCA, 2011-2012)

	Participants with dementia (n = 130)		Participants without dementia (n = 402)				
Characteristics	**n or median**	**% or IQR**	***n* or median**	**% or IQR**	***P* value**	**Test statistic**	***df***
Site, n (%)					.008	11.75	3
Nola (rural CAR)	37	28.5	76	18.9			
Bangui (urban CAR)	31	23.8	81	20.1			
Gamboma (rural ROC)	29	22.3	152	37.8			
Brazzaville (urban ROC)	33	25.4	93	23.1			
Age, years, median (IQR)	80	(69.0-91.0)	74	(64.0-84.0)	<.001	39.42	1
Sex, females, n (%)	101	77.7	319	79.3	.598	.27	1
No formal education, n (%)	112	86.8	359	89.5	.374	.79	1
Married/living as a couple, n (%)	102	79.1	305	76.1	.511	.43	1
History of stroke (present), n (%)	8	6.1	20	5.0	.613	.25	1
Hypertension (present), n (%)	78	61.4	251	62.9	.837	.04	1
Diabetes (present), n (%)	9	7.1	34	8.7	.628	.23	1
No alcohol consumption, n (%)	110	90.2	322	80.5	.025	6.64	2
Current smoker, n (%)	29	22.3	95	23.6	.408	1.79	2
Dementia subtypes, n (%)							
Alzheimer's disease	98	75.4					
Vascular dementia	15	11.5					
Mixed dementia	9	6.9					
Other types of dementia[a]	5	3.9					
Unclassifiable dementia	3	2.3					
Severity of dementia, n (%)							
Very mild to mild	75	57.7					
Moderate	28	21.5					
Severe	27	20.8					

Abbreviations: CAR, Central African Republic; IQR, interquartile range; ROC, Republic of the Congo.
[a]Other types of dementia included Parkinson's dementia and frontotemporal dementia.

Cognitive Assessment

Diagnosis of dementia was established following the *Diagnostic and Statistical Manual of Mental Disorders*, 4th ed., Text Revision, criteria.[10] Medical history and clinical features were used to diagnose dementia subtypes. Alzheimer's disease (AD) was diagnosed according to the clinical criteria proposed by the National Institute of Neurological and Communicative Disorders and Stroke and the Alzheimer's Disease and Related Disorders Association.[11] Severity of dementia was evaluated by the Clinical Dementia Rating scale.[12]

Other Assessment

Sociodemographic data such as age, sex, marital status ("married/living as a couple" and "not married"), education ("no formal education" and "some formal education"), site (Nola, Bangui, Gamboma, or Brazzaville) were collected. Lifestyle and vascular risk factors collected were hypertension (yes/no), diabetes (yes/no), frequency of alcohol consumption (any, sometimes, regularly), smoking status (current smokers and nonsmoker), and history of stroke (yes/no).

Ethics

Ethical approval was obtained in ROC, CAR, and France, and each participant and/or their informant gave an informed consent to participate in the study.[6]

Statistical Analysis

EpiData, v.3.1, and Stata software, v.12 for Windows (StataCorp LP, College Station, TX), were used for data management. Categorical variables were reported with frequencies and percentages and compared using the χ^2 or Fisher exact tests. Quantitative variables were summarized using the median with their interquartile range. Analyses of variance and Kruskal-Wallis tests were also used for comparisons. Variation of the overall distress score of NPS according to their overall severity score was evaluated through the Spearman correlation test, and the Spearman rank correlation coefficient (Spearman ρ) was calculated.

A backward stepwise procedure was performed to identify NPS associated with our dependent variable (dementia) in a multivariate logistic regression adjusted on site, age, sex, marital status, and education level. The level of significance

Table 2. Overall Median Severity and Distress Scores by Site, Cognitive Status, and Severity of Dementia in Dementia Subtypes and According to Type of Informants (EPIDEMCA, 2011-2012)

	Severity		Distress	
	Median (IQR)	*P* value	Median (IQR)	*P* value
Site				
Nola	7.5 (4-10)	.002	6 (4-7)	.001
Bangui	9 (6-11)		6.5 (5-10)	
Gamboma	15 (12-27)		21.5 (13-40)	
Brazzaville	19.5 (9-30)		11 (5-31)	
Country				
Central African Republic	9 (5.5-10.5)	<.001	6 (4-8.5)	<.001
Republic of the Congo	15 (9-29)		13 (7-31)	
No. of neuropsychiatric symptoms				
1 or 2	4 (2-4)	<.001	3 (2-4)	
3 or more	10 (7-12)		7 (5-10)	
Cognitive status				
No dementia	8 (6-10)	.042	6 (4-7)	.014
Dementia	10 (6-13)		7.5 (5-12)	
Severity of dementia				
Very mild to mild	8 (6-11)	.042	6 (4-8)	.020
Moderate	10 (9-12)		7 (6-10)	
Severe	18.5 (9-28)		12 (10-30)	
Dementia subtypes				
Alzheimer's disease	10 (6-15)	.989	7.5 (5-13)	.891
Vascular dementia	10.5 (8-13)		9.5 (6-13)	
Mixed dementia	10 (9-14)		6 (4-11)	
Other types of dementia	MD		MD	
Unclassifiable dementia	11 (6-12)		9 (6-12)	
Type of informant				
Spouse	27 (6-32)	.285	31 (5-50)	.172
Children	10 (7.5-12)		7 (6-9.5)	
Siblings	12 (12-12)		12 (12-12)	
Other informants	8.5 (5-12)		5.5 (4-9)	

Note: Other informants included mainly grandsons, granddaughters, sons-in-laws, and daughters-in-law.
Abbreviations: IQR, interquartile range; MD, missing data.

was defined as $P < .05$. The ORs and their 95% CIs were calculated.

RESULTS

Characteristics of the Study Sample

Among the 532 participants included in the second phase of the EPIDEMCA study who were assessed by the NPI-Q, a total of 130 subjects were diagnosed with dementia (Supplementary Figure S1). Table 1 presents the characteristics of the participants, according to the presence or absence of dementia. Overall, 383 informants provided information for the NPI-Q including 31 spouses, 186 children, 10 siblings, and 156 other relatives (including 98 sons- and daughters-in-law).

Median age of PWD was 75.0 years (range = 70.0-81.0 y), and most of them (98 older people [75.4%]) had AD. There were 15 participants with vascular dementia, 9 with mixed dementia, 5 with other types of dementia (Parkinson's or frontotemporal dementia), and 3 participants had unclassifiable dementia. PWD were predominantly female (77.7%) and with no formal education (86.8%).

The prevalence of NPS was significantly higher among the PWD (89.9%; 95% CI = 84.6-95.1) than the people without dementia (55.8; 95% CI = 47.1-64.5%; $P < .001$). This prevalence among PWD was significantly higher in CAR (95.6%) than in ROC (83.6%) ($P = .02$).

Prevalence of Neuropsychiatric Symptoms

The most common NPS reported were depression (60.7%), anxiety (41.5%), irritability (37.6%), apathy (33.8%), delusions (30.7%), and hallucinations (26.1%) among PWD. The overall prevalence of each NPS among PWD and their prevalence by dementia severity are presented in Supplementary Table S1.

Severity of Neuropsychiatric Symptoms and Distress

The overall median severity score was 9 (range = 6-12), and the overall median distress score for NPS was 7 (range = 4-10). The distribution of the overall severity score was strongly correlated with that of the overall distress score ($\rho = .82$; $P < .001$). The severity score and the distress score were significantly higher among the dementia group compared with the no dementia group, as presented in Table 2. These scores were significantly increasing with increasing dementia severity and with the number of NPS (Table 2).

Regarding dementia subtypes, no statistical differences were found in severity and distress scores (Table 2).

The median severity score was significantly higher in ROC sites than in CAR areas (Table 2). The highest median severity score was found in Brazzaville (urban ROC); the highest median distress score was reported in Gamboma (rural ROC). Overall, spouses reported higher severity and distress scores compared with other informants, but the difference was not significant (Table 2).

Neuropsychiatric Symptoms Associated with Dementia

Five symptoms were independently associated with dementia: depression, delusions, apathy, disinhibition, and aberrant motor behavior (Table 3).

DISCUSSION

This study contributes to extending the knowledge on NPS in PWD in Central Africa. Overall median scores of severity and distress were high in the study, and their distributions were strongly correlated. Severity and distress scores significantly increased with the number of NPS, the presence of dementia, and with dementia severity.

Findings are comparable with those reported in a cross-sectional study performed in Tanzania in 2015.[3] Indeed, among 296 participants including 78 PWD, median scores of severity or distress of symptoms appeared to be increasing with cognitive impairment. These scores were greater in PWD than in those with MCI or controls. Overall symptom severity score and the overall distress score were also significantly associated with dementia.[3]

The increase in median scores of severity and distress might reflect the increase of the number of NPS according to the cognitive impairment and the severity of dementia as reported in our previous study.[5] We can therefore confirm

Table 3. Neuropsychiatric Symptoms Associated with Dementia Among Participants (EPIDEMCA, 2011-2012)

	Univariate analysis			Multivariate analysis		
Variables	**OR**	**95% CI**	***P* value**	**aOR**	**95% CI**	***P* value**
Delusions (Yes/No)	5.4	3.2-9.1	<.001	2.4	1.1-5.0	.02
Hallucination (Yes/No)	4.6	2.7-7.9	<.001			
Agitation (Yes/No)	3.9	2.2-6.8	<.001			
Depression (Yes/No)	2.6	1.7-3.9	<.001	1.9	1.0-3.4	.04
Anxiety (Yes/No)	2.4	1.6-3.7	<.001			
Euphoria (Yes/No)	4.5	1.8-10.8	.001			
Apathy (Yes/No)	7.6	4.4-13.0	<.001	4.2	2.0-8.7	<.001
Disinhibition (Yes/No)	25.4	9.6-67.2	<.001	8.7	2.7-28.0	<.001
Irritability (Yes/No)	2.6	1.7-4.1	<.001			
Aberrant motor behavior (Yes/No)	43.4	10.1-187.3	<.001	78.2	8.6-709.8	<.001
Sleep and nighttime behavior disorders (Yes/No)	2.1	1.3-3.5	.003			
Appetite and eating disorders (Yes/No)	1.2	.6-2.2	.572			

Abbreviations: aOR, odds ratio adjusted for age, sex, marital status, and education level; CI, confidence interval; OR, odds ratio.

that the increase in the number of NPS among older PWD can increase the severity or distress score as previously reported in Nigeria and in Tanzania.[3,4]

Overall scores of severity and distress were strongly correlated in this study. This suggests that the severity of the symptoms reported in our study was most probably clinically relevant. Indeed, Teipel et al, using the full version of the NPI, found that high scores of NPS (clinically relevant) were significantly associated with the distress of caregivers.[13]

Overall scores of severity and distress were higher in ROC than in CAR. These results are different from what might be expected. The prevalence of NPS among PWD was significantly higher in CAR than in ROC. We would therefore expect higher severity and distress scores in CAR because we found that the number of NPS increased distress and severity scores and that these scores were correlated with each other. However, these results might be explained by the distribution of NPS in our study. The most common symptoms identified in this study had been reported to be associated with a higher distress score among PWD[14] even if many studies reported that agitation would be the symptom with the highest distress score.[15-17] This might also reflect the cultural differences between the countries. These symptoms could be considered more burdensome in ROC than in CAR. Nevertheless, our results must be interpreted with caution. Due to the use of NPI-Q, this research was unable to assess whether severity of NPS was clinically significant for the older people.

Although not significant, spouses of older people appeared to report higher scores of severity and distress than other informants. Living with the older people, spouses could be more likely to experience the symptoms daily than others. Thus we can assume that spouses are more likely to be more emotionally affected by the burden of NPS considering their close and long relationship with the older person. However, we were not able to confirm these hypotheses in this study.

Depression, delusions, apathy, disinhibition, and aberrant motor behavior were associated with dementia after adjustment. Previous studies on NPS did not assess the strength of the association between individual NPS and dementia in SSA; comparisons with other studies are therefore limited. Nevertheless, each of these five symptoms had already been identified as common in PWD in other SSA countries.[3,4] A very strong association between aberrant motor behavior and dementia was shown, certainly arising from the fact that aberrant motor behavior was strongly considered during neurologic examination leading to a dementia diagnosis. A similar pattern of most frequent symptoms was also identified in the United States and Canada[18] as well as the presence of motor aberrant behavior in severely demented patients.[19]

This study has many strengths. It is one of the few population-based studies on NPS in SSA evaluating the severity of those symptoms and the distress experienced by caregivers, and the first one in Central Africa. Moreover, this study relied on a high-quality dementia diagnosis including a neurologic examination, and NPS were evaluated using the NPI-Q, the most common instrument in population-based studies.[20]

However, some limitations also must be acknowledged. This study was carried out on a subgroup of the overall EPIDEMCA population that was selected based on low scores during cognitive screening, thus limiting statistical power and the generalizability of our results to any older population. In addition, the number of PWD in our study may be considered small (n = 130), although it remained higher than in the two previous studies conducted in SSA (38 in Nigeria and 78 in Tanzania).[3,4] Also, the key role and position of older people in African societies could lead to a cultural bias and affect the outcomes regarding the severity and distress of NPS in our study with caregivers who may not have reported their true burden or minimized it. We also must acknowledge that the use of the NPI-Q with caregivers to assess the burden of NPS limits our interpretation. Specific instruments are needed to better characterize the burden of NPS such as the Zarit burden Interview.[21] Finally, the cross-sectional study design did not allow us to demonstrate any causal relationship between NPS and dementia.

In conclusion, this is one of the few population-based studies on NPS and dementia in SSA. Knowledge remains limited in this region where these symptoms require great attention considering their burden on populations. Urgent actions should be implemented for the management of NPS in older PWD living in SSA.

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SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article.

Supplementary Figure S1: Flowchart of the EPIDEMCA study including selection of the study sample.

Supplementary Table S1: Prevalence of each neuropsychiatric symptom among participants with dementia and their prevalence according to level of dementia severity, EPIDEMCA, 2011-2012.