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Daily activities and suspected dementia among community-dwelling older adults: a cross-sectional study

Shuhan Yan^{1,2†}, Zihan Geng^{3†}, Jie Zhang³, Huahua Liu⁴, Zhifang Chen⁴, Yaqin Shi^{1*} and Feng Zhang^{1*}

Abstract

Background Dementia is undiagnosed among many older adults, and more than half the people in local communities live with symptoms of dementia are not properly treated.

Objective The study aims to explore the relationship between decline of daily activities and the incidence of suspected dementia.

Methods A two-stage sampling method was used to conduct a multicenter cross-sectional survey. Older adults who have not been diagnosed as dementia were recruited from the local community. The Revised Hasegawa Dementia Scale (HDS-R) was used to evaluate the cognitive function. We evaluated daily activities from several aspects (bathing, dressing, toileting, grooming, feeding, transportation, walking, telephone, housekeeping, and taking medications). Logistic regression was adopted to assess the influence of daily activities on the risk of suspected dementia after controlling for the covariates.

Results The analysis included 2458 individuals. Daily activities included toileting (OR = 1.830, 95%Cl 1.581 ~ 2.119), grooming (OR = 1.938, 95%Cl 1.659 ~ 2.265), dressing (OR = 1.771, 95%Cl 1.542 ~ 2.033), bathing (OR = 1.793, 95%Cl 1.591 ~ 2.022), feeding (OR = 1.821, 95%Cl 1.565 ~ 2.118), transportation (OR = 1.996, 95%Cl 1.743 ~ 2.285), walking (OR = 2.069, 95%Cl 1.685 ~ 2.542), telephone (OR = 3.640, 95%Cl 2.738 ~ 4.838), housekeeping (OR = 1.415, 95%Cl 1.213 ~ 1.649), and taking medications (OR = 1.633, 95%Cl 1.451 ~ 1.839) were still related to the incidence of suspected dementia after controlling for age, education, post-retirement work, social activity, drinking, smoking, living with spouses, and diabetes.

Conclusions Daily activities were related to the incidence of suspected dementia. Daily activities were affected even if the older adults were not diagnosed as dementia. Timely and accurate diagnosis of dementia should be encouraged among community-dwelling older adults.

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Keywords Community, Dementia, Daily activities

Introduction

Dementia is a complex syndrome resulting from different neurodegenerative processes that lead to cognitive decline, affecting memory, language, perception, and executive functions [1]. However, many people with dementia never receive a diagnosis, and most cases in lower income countries are likely to be undiagnosed [2]. Dementia is undiagnosed among many Chinese older adults, and more than half the people in local communities live with symptoms of dementia are not properly treated [3]. As dementia is an irreversible disease [4], early diagnosis and detection of dementia are critical for its prevention and treatment.

Dementia often, but not invariably, begins with memory impairment and eventually progresses to a stage where the individual is unable to independently manage daily activities [5]. Daily activities include instrumental activities of daily living (IADLs), such as transportation or taking medications, and basic activities of daily living (BADLs), such as feeding or grooming [6]. The BADLs and IADLs are two different categories used to assess an older adults' functional ability, when evaluating their capacity to live independently. The severity of dementia interfered with the older adult's performance in daily activities [7]. Cognitive decline, motor impairments, behavioral and psychological symptoms of dementia influence daily activities performance in individuals with dementia. Previous studies have highlighted the complex interplay between these factors and their impact on daily activities [8].

Diagnosis of dementia in older adults with cognitive impairment was quite tricky, which made it impossible to identify underlying dementia and to perform therapy at the early stage [9]. Identification of the characteristics



of people who have undiagnosed dementia is challenging [10] and this is our study to explore whether daily activities of undiagnosed dementia is normal [11]. Comparable to complex diagnosis methods, the Hasegawa Dementia Scale-Revised (HDS-R) is a valuable initial screening tool for identifying individuals who may need further evaluation of possible dementia [12]. Previous research suggested that daily activities may be an essential variable, when determining the severity of dementia [13, 14]. Moreover, the fundamental tasks of BADLs are essential for personal survival and independent living, and difficulty with BADLs often signifies the need for direct care assistance. In patients with dementia, impairment in IADLs occur soon after onset [15]. Therefore, it is particularly important to explore the relationships between of daily activities impairment and incidence of suspected dementia among community-dwelling older adults.

Methods

Study design

The present study employed a multi-center, cross-sectional design utilizing a two-stage sampling methodology. In the first stage, a random selection process was employed to choose 21 communities located in Nantong, an eastern city situated in China. According to the data from Nantong Civil Affairs Bureau in 2018, Nantong city is divided into Chongchuan District, Gangzha District, and Kaifa district. In 2018, each community had a total population of 1,219,700, with individuals over the 60 comprising 19.73% (240,600) of the population. Secondly, we numbered the selected communities and selected 1000 people randomly. They were then assessed according to inclusion criteria and home visit permits by telephone appointment.

The research was performed in accordance with the Declaration of Helsinki protocol obtained ethical approval from the Ethics Committee of the Affiliated Hospital of Nantong University (2018-K042) and was duly registered on the Clinical Trial Registry (ChiCTR1900020923) on 2019/01/22. Oral and written information on objectives, procedures, potential risks, and benefits was presented to all participants. They were told that they could withdraw from our study unconditionally. Before the protocol, each participant received written informed consent.

Participants

Participants included in this study were individuals aged 60 and above using auditory-verbal communication. In cases where multiple older adults were present within a family unit, only one participant was selected for investigation. Exclusion criteria encompassed the following conditions: 1) previously diagnosed dementia based on the DSM-IV criteria; 2) blindness; 3) aphasia; or 4)

deafness. Data collection starts in January and continues until June 2019. Five full-time investigators surveyed from February to June 2019 (Fig. 1).

Data collection

Demographic data and clinical information

The demographic information was initially obtained through the Community Health Service Center's registration data. A face-to-face evaluation obtains the HDS-R score to the older adults by our professional investigators. The older adults' self-reports obtained the older adults' personal history, as medical history and family history. The data on basic activities of daily living were collected from older individuals and their family members, typically their children or partners, which may lead to potential recall bias. To review the information of older individuals living alone, telephone interviews with their children or relatives should be conducted.

Social activities refer to any event, action, or gathering where individuals come together to interact, communicate, and engage with people besides family members.

Dementia

The Revised Hasegawa Dementia Scale is designed to assess cognitive functions [16], with a sensitivity of 0.90 and a specificity of 0.82. It helps in the early detection of dementia by identifying cognitive impairment that may indicate the onset of the condition. The HDS-R is composed of questions and tasks that assess multiple cognitive functions, such as orientation, attention, memory, language, and visuospatial abilities. The test usually has a total score of 30 points. A lower score indicates greater cognitive impairment. The HDS-R score is 20 / 21, which is used to distinguish normal cognition from dementia. Therefore, people who scored less than 21 are defined as suspected dementia, referring to an early stage when signs and symptoms suggest a person may have dementia, but not yet definitively diagnosed [17].

Daily activities

We selected seven questions to examine the degree of limitation of people's daily activities. Basic activities of daily living included 5 items, such as bathing, dressing, toileting, grooming, and feeding. The 5 items had four answer options: cares for self, with minor assistance, needs moderate assistance, completely unable [18]. Instrumental activities of daily living included 5 items, such as transportation, walking, telephone, housekeeping, and taking medications [19]. We assessed older adult's ability of walking using three options (walk freely, use of assistive devices, barely walk) and transportation using four options (using transportation for a long distance, for a short distance, unable to get outside of the house, barely move or move in the chamber). We assessed the ability of telephone using three options (operates telephone on own initiative, with minor assistance, does not use telephone all), housekeeping using four questions (cares for self, with minor assistance, needs moderate assistance, completely unable), and taking medications using four questions (cares for self, with minor assistance, needs moderate assistance, completely unable).

Statistical analysis

Statistical analysis was achieved with the SPSS 25.0. Two persons were engaged in data entry separately. Epidata 3.1 checked the input errors. In the case of a low proportion of missing data ($0 \sim 5.28\%$), the case-wise deletion method was used to deal with missing data. Minimum sample size calculation was performed according to Lee et al. [20]. A single population proportion formula was used to estimate the sample size. The sample proportion was assumed to be 0.405. To produce a confidence interval with a width of no more than 0.05, 837 subjects were needed. Anticipating a 20% dropout rate, 1047 older adults were enrolled. In the bivariate logistics regression analysis, age, education, post-retirement work, social activity, drinking, smoking, living with spouses, and diabetes were taken as controlled variables.

Results

A subset of 2964 elderly individuals met the eligibility criteria out of the evaluated sample size of 3913. A total of 369 (12.45%) individuals declined participation in the present study. Out of the sample size of 2595 participants, 137 (5.28%) had missing data, leaving 2458 participants' data for the analysis. 559 (22.7%) older individuals were evaluated using the HDS-R to assess suspected dementia. (Fig. 1)

(OR=2.000, 95%CI 1.780~2.248), education Age (OR=0.782, 95%CI 0.682~0.896), post-retirement work (OR=0.531, 95%CI 0.397~0.709), housework allocation (OR=0.458, 95%CI 0.375~0.558), types of housework (OR=0.530, 95%CI 0.452~0.622), social activity (OR=0.595, 95%CI 0.461~0.767), drinking (OR=0.716, 95%CI 0.559~0.917), smoking (OR=0.726, 95%CI 0.541~0.976), living with spouses (OR=0.599, 95%CI $0.487 \sim 0.738$), and diabetes (OR=1.419, 95%CI $1.126 \sim 1.787$) were related to the incidence of suspected dementia (Table 1).

Similarly, daily activities included toileting (OR=1.830, 95%CI 1.581~2.119), grooming (OR=1.938, 95%CI 1.659~2.265), dressing (OR=1.771, 95%CI 1.542~2.033), bathing (OR=1.793, 95%CI 1.591~2.022), feeding (OR=1.821, 95%CI 1.565 ~ 2.118), transportation (OR=1.996, 95%CI 1.743 ~ 2.285), walking (OR=2.069, 95%CI 1.685 ~ 2.542), telephone (OR=3.640, 95%CI 2.738 ~ 4.838), housekeeping (OR=1.415, 95%CI 1.213 ~ 1.649), and taking medications (OR=1.633, 95%CI 1.451 ~ 1.839) were still related to the incidence of suspected dementia after controlling for age, education, post-retirement work, social activity, drinking, smoking, living with spouses, and diabetes (Table 2).

Discussion

A significant finding for this research was that daily activities were related to the incidence of suspected dementia. 22.7% older adults in communities were considered suspected dementia using the HDS-R.

Older adults exhibiting preclinical symptoms such as toileting disability, grooming disability, bathing disability, dressing disability, bathing disability, and feeding disability were related to incidence of dementia. Among community-dwelling older adults, the decline of BADLs was usually the more noticeable symptom compared to IADLs, and to which early medical attention should be attached [21]. The most easily accomplished behavioral independence was eating, and the hardest was transfer to grooming and bathing [22]. Muscle weakness of the lower extremities [23], blurring of vision, and insensitivity to temperature [24] in the older adults have been implicated with difficulties in bathing. Among the older adults, the prevalence of toileting disability is relatively high and requires prevention and management [25]. The loss of the inhibitory influence on micturition reflex and involuntary bladder contraction can cause toileting disability because they failed to realize that they need to empty the bladder. Previous studies have proved that feeding was associated with significant differences in the measure of dementia [26]. Some articles [27, 28] found that nutritional status measured by the Mini Nutritional Assessment was associated with dementia, and the nutritional status of dementia residents was low. Swallowing dysfunction or dysphagia emerges in 13-57% of people with dementia [29]. Moreover, periodontitis is common in older people, associated with an elevated serum pro-inflammatory status and neuro inflammation [30]. Mounting evidence suggests that neuro inflammation is involved in the progression of dementia [31, 32]. Besides, the study found that dressing is an important activity of daily living, but many older adults have difficulty due to physical injury [33]. Common dressing problems include difficulties in sequencing, forgetting to change clothes and fastenings [34].

	Total number N (%)	Suspected dementia (%)	OR for suspected dementia (95% CI)	
Gender				
Male	1110 (45.16)	258 (23.24)	0.949 (0.786~1.147)	
Female	1348 (54.84)	301 (22.33)		
Age, years				
60~70	811 (32.99)	119 (14.67)	2.000 (1.780~2.248)	
71~80	989 (40.24)	186 (18.81)		
81~90	575 (23,39)	196 (34.09)		
>90	83 (3.38)	58 (69.88)		
Education level				
Illiteracy	444 (18.06)	129 (29 05)	0 782 (0 682~0 896)	
Primary school	1246 (50.69)	278 (22 31)		
Middle school and above	768 (31 25)	152 (19 79)		
Career	/00(51.25)	152 (15.75)		
Public institution	//7 (18 10)	91 (20 36)	1 020 (0 945~1 101)	
Entorpriso	317 (12.00)	70 (24.02)	1.020 (0.943/01.101)	
Worker	311 (12.50)	73 (23.47)		
Farmer	1775 (51 97)	204 (22.06)		
Nepe	1273 (31.67)	294 (23.00)		
None	108 (4.39)	22 (20.37)		
Numbers of career experience	100 (4 20)	22 (20 27)	1 1 (5 (0 0 (7 1 4 0 2)	
0	108 (4.39)	22 (20.37)	1.165 (0.967~1.403)	
	2022 (82.26)	458 (22.65)		
2	264 (10.74)	55 (20.83)		
>2	64 (2.60)	24 (37.50)		
Post-retirement work				
Yes	417 (16.97)	61 (14.63)	0.531 (0.397~0.709)	
No	2041 (83.03)	498 (24.40)		
Social activity				
Yes	525 (21.36)	85 (16.19)	0.595 (0.461~0.767)	
No	1933 (78.64)	474 (24.52)		
Living Partner				
Live Alone	306 (12.45)	80 (26.14)	0.991 (0.865~1.134)	
Live with couple only	905 (36.82)	187 (20.66)		
Live with younger generation	1247 (50.73)	292 (23.42)		
Total family Members, No.				
1	72 (2.93)	15 (20.83)	1.177 (0.981~1.412)	
2~5	1592 (64.77)	346 (21.73)		
>5	794 (32.30)	198 (24.94)		
Living with spouse				
Yes	1861 (75.71)	380 (20.42)	0.599 (0.487~0.738)	
No	597 (24.29)	179 (29.98)		
Smoking				
Yes	335 (13.63)	61 (18.21)	0.726 (0.541~0.976)	
No	2123 (86.37)	498 (23.46)		
Drinking				
Yes	507 (20.63)	93 (18.34)	0.716 (0.559~0.917)	
No	1951 (79.37)	466 (23.89)		
Diabetes				
Yes	453 (18.43)	127 (28.04)	1.419 (1.126~1.787)	
No	2005 (81.57)	432 (21.55)		
Hyperlipidemia	/			
Yes	279 (11 35)	74 (13 24)	1 261 (0 949~1 675)	
No	2179 (88.65)	485 (86 76)		
	2172 (00.03)	100 (00.7 0)		

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	Total number N (%)	Suspected dementia (%)	OR for suspected dementia (95% CI)
Hypertension			
Yes	1218 (49.6)	282 (50.4)	1.047 (0.867~1.265)
No	1240 (50.4)	277 (49.6)	

Table 1 (continued)

Although function of IADLs declines over time [35], there were significant differences between older adults with suspected dementia and normal older adults. Unusual behavior and mobility patterns [36], such as the absence of ability of transportation, housekeeping, telephone, walking and taking medications may be early symptoms of dementia. Clinic staff can differentiate older adults' performance of those abilities, as the basis for measuring competence. It has been previously demonstrated that evaluating IADLs is a crucial part of dementia diagnostic procedure [15]. Dementia stigma is a key concern of dementia advocacy.

Timely and accurate diagnosis of dementia is the key to the prevention and treatment of dementia. Numerous studies identify dementia stigma as a major concern in dementia advocacy [37, 38]. Stigma has been viewed as a key barrier to community engagement, thereby leading to social isolation, reduced quality of life among people with dementia [39]. Many young couples in China have to deal with dual pressures from their careers and from their responsibilities as caregivers for older relatives. Early intervention is a major goal of dementia prevention. Both family caregivers and community nurses play an important role in the care of the disabled elderly at home. Our goal is to prevent dementia as soon as possible by early detection of the decline of daily living function. To help people with dementia and their caregivers individually, research exploring which individual activities affect dementia is needed. We expected to provide useful information for determining patients with dementia as early as possible and contributing to social, health, and economic policies for people with dementia and their caregivers. Findings are beneficial to effective care management and the design of non-pharmaceutical interventions. The physical activity program improves cognitive function and BADLs in individuals with mild dementia [40]. Engaging in daily activity potentially exerts protective effects on cognitive function, including continuous cerebral blood flow, enhanced aerobic capacity, brain nutrient supply, and growth factors. Notably, one such growth factor is the brain-based neurotrophic factor, which facilitates neuronal survival, improves learning abilities, and mitigates cognitive decline [41]. Nursing strategies, such as verbal clues, gesticulates, or physical exercise guidance, can effectively maintain the functional ability of older adults with cognitive impairment if these strategies are used continuously in activities of daily living.

One of the strengths of this study was the large sample size of participants. At the same time, conducting surveys in the community is also our advantage. The data was based on community records and the older adults' self-report, which may cause recall bias.

Limitation

Our study has some limitations. We used a scale to screen suspected dementia. Diagnosing suspected dementia involves a comprehensive assessment to distinguish it from other conditions that can cause similar symptoms. We selected ten questions to examine the degree of limitation of people's daily activities. Further follow-up studies could use a standardized and validated scale. Finally, cross-sectional studies cannot identify the causal relationship between dementia and these variables, such as daily activities, age, education level, social activities and housework types. Further clinical randomized controlled studies are needed to clarify the causal relationship.

Table 2 Binary logistics regression analysis of daily activities and suspected dementia

	Total number N (%)	Suspected dementia (20/21)		
		n (%)	OR (95% CI)	Adjusted OR (95% CI)#
BADLs				
Toileting				
1=Cares for self	2219 (90.28)	430 (19.38)		
2=With minor assistance	74 (3.01)	33 (44.59)	2.201 (1.917~2.526)	1.830 (1.581~2.119)
3=Needs moderate assistance	105 (4.27)	52 (49.52)		
4=Completely unable	60 (2.44)	44 (73.33)		
Grooming				
1=Cares for self	2251 (91.58)	441 (19.59)		
2=With minor assistance	69 (2.81)	32 (46.38)	2.296 (1.981~2.663)	1.938 (1.659~2.265)
3=Needs moderate assistance	77 (3.13)	41 (53.25)		
4=Completely unable	61 (2.48)	45 (73.77)		
Dressing				
1=Cares for self	2177 (88.57)	418 (19.20)		
2=With minor assistance	98 (3.99)	38 (38.78)	2.114 (1.857~2.407)	1.771 (1.542~2.033)
3=Needs moderate assistance	116 (4.72)	55 (47.41)		
4=Completely unable	67 (2.72)	48 (71.64)		
Bathing				
1=Cares for self	2035 (82.79)	354 (17.40)		
2=With minor assistance	158 (6.43)	67 (42.41)	2.100 (1.879~2.347)	1.793 (1.591~2.022)
3=Needs moderate assistance	169 (6.88)	74 (43.79)		
4=Completely unable	96 (3.91)	64 (66.67)		
Feeding				
1=Cares for self	2218 (90.24)	433 (19.52)		
2=With minor assistance	83 (3.38)	37 (44.58)	2.183 (1.895~2.516)	1.821 (1.565~2.118)
3=Needs moderate assistance	106 (4.31)	51 (48.11)		
4=Completely unable	51 (2.07)	38 (74.51)		
IADLs				
Transportation				
1=Using transportation for a long distance	1348 (54.8)	190 (34.0)		
2=For a short distance	858 (34.9)	225 (40.3)	2.403 (2.122~2.721)	1.996 (1.743~2.285)
3=Unable to get out of the house	179 (7.3)	97 (17.4)		
4=Barely move or move in the chamber	73 (3.0)	47 (8.4)		
Walking				
1=Walk freely	2056 (83.6)	381 (68.2)		
2=Use of assistive devices	346 (14.1)	145 (25.9)	2.871 (2.371~3.477)	2.069 (1.685~2.542)
3=Barely walk	56 (2.3)	33 (5.9)		
Telephone				
1=Operates telephone on own initiative	2383 (91.8)	443 (77.5)	5.128 (3.889~6.761)	3.640 (2.738~4.838)
2=With minor assistance	173 (6.7)	103 (18.4)		
3=Does not use telephone all	39 (1.5)	23 (4.1)		
Housekeeping				
1=Cares for self	99 (3.8)	11 (2.0)		
2=With minor assistance	164 (6.3)	18 (3.2)	1.752 (1.510~2.033)	1.415 (1.213~1.649)
3=Needs moderate assistance	915 (35.3)	151 (27.0)		
4=Completely unable	1417 (54.6)	379 (67.8)		
Taking medications				
1=Cares for self	563 (21.7)	65 (11.6)		
2=With minor assistance	1079 (41.6)	206 (36.9)	1.837 (1.640~2.057)	1.633 (1.451~1.839)
3=Needs moderate assistance	766 (29.5)	192 (34.3)		
4=Completely unable	187 (7.2)	96 (17.2)		

[#]Binary logistics regression analysis controlled for age, education, post-retirement work, social activity, drinking, smoking, living with spouses, and diabetes

Conclusion

The data in this study suggest that through daily activities maintenance or promotion, it is possible to prevent or improve dementia with a highly structured behavioral nursing intervention and systematic approaches. Nursing research regarding behavioral gerontology in China has recently been carried out to describe and identify these concepts relevant to nursing practice. Thus, the need for further study is critical. Monitoring changes in daily activities over time can help healthcare professionals assess disease progression, tailor interventions, and provide appropriate support to enhance the individual's quality of life.

Abbreviations

ADLs	activities of daily living
BADLs	Basic Activities of Daily Living
HDS-R	The Revised Hasegawa Dementia Scale
IADLs	Instrumental Activities of Daily Living
OR	Odds Ratio

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Author contributions

FZ and YQS conceptualized the research questions, conducted data collection and statistical analyses, coordinated and supervised data collection, critically revised manuscript and approved the final manuscript as submitted.SHY and ZHG helped conceptualize the research questions, helped design the data collection methods, drafted the initial and revised manuscripts, and approved the final manuscript as submitted. JZ, HHL, and ZFC helped the research design, collected and inputted the data, conducted statistical analyses, helped draft the initial manuscript, and approved the final manuscript as submitted.

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Data availability

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

Declarations

Ethics approval and consent to participate

The research was performed in accordance with the Declaration of Helsinki and the protocol obtained ethical approval from the Ethics Committee of the Affiliated Hospital of Nantong University (2018-K042) and was duly registered on the Clinical Trial Registry (ChiCTR1900020923). Oral and written information on objectives, procedures, potential risks, and benefits was presented to all participants. They were told that they could withdraw from our study unconditionally. Before the protocol, each participant received written informed consent.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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