

Original Research

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Prevalence Of Cognitive Impairment in Famagusta-North Cyprus Residents Over 65 Years

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ABSTRACT

Objectives: Dementia is one of the major causes of disability and dependency among elderly and the fifth cause of death worldwide. With screening and identifying disease at early stages, new treatment plans and specific care in patients' lives overall benefit society in financial and social aspects. The main aim of this study is to detect prevalence of cognitive impairment (CI) among Famagusta residents in North Cyprus aged 65 and above, and also to identify its associated risk factors.

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Patients and Methods: This study is a population based, cross-sectional study. Simple random sampling was applied to the population. Sample size was calculated as 143. Along with demographics involving risk factors of dementia, CI was assessed by the Mini-Mental State Examination and Mini Cog Test scores. Daily life activity impairment was evaluated with Functional Activities Questionnaire and depression with Short Geriatric Depression Scale. SPSS was used for analysis and chi-square was used for hypothesis test ($p < 0.05$).

Results: In total, 135 participants were included in analysis from 4 age groups (65-69/70-74/75-79/80+). The mean age of the participants was 73.17 ± 6.421 and females comprised 70.4%. Overall, 40% of the whole population had CI and 20.7% had depression. It was observed to be more frequent among older age groups ($p < 0.001$) and females ($p = 0.007$). Lower education was found to be associated with CI and 60.8% of individuals with 6 or less years of education had CI ($p = 0.011$).

Conclusion: This study has shown that prevalence of CI, including MCI and possible dementia cases are quite high. Considering the growing elderly population, cognitive screening tests and preventive measures of modifiable risk factors are required as public health measures.

Dementia is a chronic condition, identified as a progressive decline in memory and other cognitive abilities, which are orientation, comprehension, calculation, language, and judgement [1].

Dementia is one of the major causes of disability and dependency among elderly worldwide [2]. It is associated with increased risk of death and decreased quality of life [3].

There are various disorders and factors that lead to dementia which result in irreversible neuronal loss and reduction of cognitive functioning. The most common type is Alzheimer's Disease (AD). However, frontotemporal, lewy body dementia and vascular dementia are also common types [4].

Before dementia develops, there is a critical period which is known as 'Mild Cognitive Impairment' (MCI). MCI is described as "intermediate stage of cognitive impairment that is often, but not always, a transitional phase to dementia" [5]. The main difference between dementia and MCI is that former interferes with daily activities [6]. It is reported that 15% of all MCI cases turn into dementia [7-9] It is important to detect MCI in order to slow down its progression to dementia.

Risk factors can be divided into two groups as non-modifiable and modifiable. Older age is the major risk factor and being female is also among the non-modifiable risk factors for dementia. There are many reasons behind the higher likelihood of dementia in females. Most identifiable cause as the tendency of women to live longer than men and consequently the risk of dementia increasing with age [10]. Concerning modifiable risk factors, vascular risk factors are hypertension, hyperlipidemia, diabetes mellitus, stroke history and coronary heart disease. Presence of multiple vascular risk factors, which is more than three, increases the probability of developing any type of dementia [10]. In addition, the education span of individuals is considered to be one of the main risk factors for

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dementia development. A systematic review states that lower education levels are associated with an increased in the development of dementia [11] and meta-analysis points out that risk can be reduced by 7 % for per year increase in education [12].

High income countries (HIC) and low income countries (LIC) show different behaviours in terms of dementia prevalence. Even though prevalence of dementia in LIC doubled the prevalence in HIC in 2015, it was projected that LIC will experience a massive growth in dementia prevalence and it will reach a value of approximately 4 times higher than that of HIC prevalence till 2050 [13].

Everyday there is an increase in number of people diagnosed with dementia all around the world. According to studies, it was seen that the incidence of dementia doubled with every 5.9 year increase in age, from 3.1/1000 person years at age 60-64, to 175.0/1000 person years at age 95+. Initially, researchers arrived at the conclusion that dementia was more common in HIC based on the sole data for 'diagnosed cases'. However, it was not until later that they realised there seems to be an underestimation in figures for middle income countries (MIC) and LIC due to the vast majority of population with dementia being undiagnosed. 7.7 million new cases of dementia is anticipated each year worldwide, implying one new case within every 4.1 seconds which shows the scale of the issue/disease [14].

According to World Health Organization (WHO), there are 50 million dementia sufferers and 60-70% of them are subclassified as AD. Overall dementia is the fifth cause of death in the world and it is projected to be a further increase in prevalence of dementia from 82 million to 152 million between years 2030-2050. Raising awareness and early diagnostic criteria are seen to be effective for fighting the prevalence of the disease.

The importance of our study is that, currently, there are no official data about the situation in Cyprus. Alzheimer Europe estimated a total of 11,250 dementia patients in Cyprus in 2012 which represents 1.07% of the total population (1,047,311) [15]. Our study is necessary to understand the trends in Cyprus regarding dementia and MCI. Further development on our research would make for better understanding of the problem around the country and could inform the structuring of government health policies aimed at the aged population. Additionally, early detection of cognitive impairment (CI) with screening tests could mitigate the condition and help slow progression and reduce mortality. Reversible causes of CI, which are potentially treatable can be identified and treated as well [16]. With screening and identifying disease at early stages, new treatment plans and specific care in patients' lives overall benefit society in financial and social aspects. Also, the significance of periodic check-ups and follow-ups for cognitive health of elderly population must be emphasized as well as the importance of public health policies that can be shaped accordingly.

By the light of this literature the main aim of this study is to define prevalence of CI, MCI and depression of Famagusta residents over 65, and also to identified the severity of CI and its associate

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risk factors. In addition, goal is to offer follow-up and/or referring individuals with scores lower than threshold levels.

Material and Methods

A population based, cross sectional study was carried out among residents of Famagusta who are aged ≥ 65 years between September 2019 and June 2020. This study approved by Health Subcommittee of Eastern Mediterranean University Research and Publication Ethics Board.

According to Turkish Republic of Northern Cyprus State Planning Organization from 2011 population census, there were 3170 people aged ≥ 65 years living in Famagusta and distribution of population according to age groups of 65-69, 70-74, 75-79, 80+ were 36%(1139), 25%(785), 19%(614) and 20%(632), respectively. The sample size of study was calculated as 143 with 99% confidence level. Delphi consensus was a study showing that prevalence of dementia changes with different age ranges and regions of the world. Famagusta was found to be in the Euro A region. Age standardized prevalence was calculated and applied as 6% by using the information from the study [17].

The residents aged ≥ 65 years were divided into 4 different age groups as 65-69, 70-74, 75-79, 80+ and number of surveys required to collect from each age group was calculated depends of the distribution of population. By simple random sampling, participants of study were selected randomly from population registries of Municipality of Famagusta. If selected participants refused to participate in the study, they were replaced by randomly selected substitute participants. Participants with mental retardation, communication problems (ie, aphasia) and perceptual problems (i.e., blindness or deafness) were excluded from the study.

The research team consisted of a neurologist as a supervisor, and seven third year medical students. A door to door survey was conducted. Informed voluntary consent form were filled by all the participants.

Demographic questionnaire prepared by the team to identified the age, sex, years of education, vascular risk factors, regular drugs and self declaration of forgetfulness of participants.

CI assessed by validated Turkish versions of the standardized Mini-Mental State Examination (sMMSE) [18], Clock drawing [19], daily life activities with Functional Activities Questionnaire (FAQ) [20] and depression with Short Geriatric Depression Scale [21]. In addition to this, a modified version of sMMSE (sMMSE-il) was used for illiterate participants [22].

MMSE cut off score for CI accepted as lower and equal score of 24 out of 30. Scores were further classified; between 20 to 24 as mild, 13 to 19 as moderate and lower than 12 as severe CI.

In Clock drawing the participants were got either 0 if they could not able to draw or 2 if they could able to draw. Also, Clock drawing was a component of MiniCog score which is accepted as an other cognitive screening score with three word recall score. Total score is out of 5 calculated by adding the

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scores from clock drawing test score and the number of words recalled from three words recall test ranging from 0 to 3.

FAQ was used to assess daily life activities of participants. For the people aged 50-69 having equal or more than 5 and aged above 70 having equal or more than 9 scores respectively indicating functional activities impairment.

Short Geriatric Depression Scale was used to assess the occurrence and the severity of depression in elderly. Severity categorization was done according to scores between 0 to 4 as no depression, 5 to 8 as mild, 9 to 11 as medium level, 12 to 15 as heavy depression.

IBM SPSS version 22.0 was used for data entry and analysis. The chi square test was used as a hypothesis test for data analysis which determines whether an association between two categorical variables and $p < 0.05$ was considered significant.

Results

After exclusion criterias checked in all collected data, our research ended up with having the total number of analyzed data as $n=135$ which corresponds to 94.4% response rate.

70.4% ($n=95$) of participants are female and 29.6% ($n=40$) of participants are male. The mean age is 73 with the standard deviation 6. The minimum age was 65 years and maximum age was 97 years in our study population. Age groups are divided into 4 different groups as 65-69, 70-74, 75-79, 80+ and participants in each age groups are 37.1% ($n=50$), 24.4% ($n=33$), 24.4% ($n=33$) and 14.1% ($n=19$), respectively.

8.4% ($n=11$) of participants are illiterate, 44.3% ($n=58$) are educated for 1-6 years which is the highest percentage, 35.6% ($n=48$) are educated for 7-12 years and 10.7% ($n=14$) are educated for more than 12 years. Most of the population over 65 were living with their spouse with 51.9% ($n=69$) in Famagusta. People living with his/her children or grandchildren, spouse and children, spouse and caregiver were 15.8% ($n=21$), 15% ($n=20$), 0.8% ($n=1$) respectively.

In diseases of vascular risk factor; study population mostly had only one risk factor 33.8% ($n=44$). This followed by three or more risk factors 29.2% ($n=38$), two risk factors with 26.2% ($n=34$), none with 10.8% ($n=14$).

In this study, 40% ($n=54$) of participants have CI. Analysis revealed that cognitive impairment is associated with gender ($p=0.007$), age ($p=0.000028$) and education level ($p=0.011$). CI is more common among females than males as 47.4% ($n=45$) of female participants have CI whereas 22.5% ($n=9$) of male participants have CI. As education years increase, CI decreases as least percentage of CI is seen in 12+ education groups with 5.9% ($n=3$). For association between age groups and CI, it is found that as age increases CI becomes more common. It is found that there is no association between number of vascular risk factors and CI.

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In the group with CI, the influence on daily life activities determined by FAQ coincides exactly with their own declaration. Furthermore, of the 54 people with CI, 34 out of them had no impairment in their daily life activities determined by FAQ. This group is the possible MCI group and constitutes 25.2% of the total population.

Characteristics of subjects and association with CI summarized in Table 1.

In age groups, both CI and depression ratios compared with each other's (Figure 1). In first age group which is ages between 65-69 CI ratio is 34.0% and depression ratio is 14.0%. Between ages 70-74, founded CI ratio and depression ratio is 42.4% and 24.2% respectively. In third group which is consisting population between 75-79 has 33.3% CI ratio and 21.2% depression ratio. Lastly in 80 and older age group, both CI proportion and depression proportion are highest amongst in contrast to other three groups. Orderly they are 63.2% and 31.6%.

In our population in respect to scores found in MMSE, CI severity levels were found and proportionally manifested (Figure 2). Respectively 60.0% of population has not CI, 31.9% has mild, 7.4% has moderate and 0.7% has severe CI.

Discussion

Dementia is a worldwide problem. Many people especially more than 65 years old people dementia prevalence increases dramatically. In 2014 it was estimated that 5 million people live with dementia and expected to be nearly 14 million by 2060 [23].

Dementia presents both in LIC and MIC and also in HIC. However, the prevalence of dementia is variable. It is lower in HIC compared to dementia prevalence in LIC and MIC. In addition to this, in 2015 the dementia prevalence is only 2 times higher in LIC compared to HIC. However, in 2050 it is projected that dementia prevalence will be four times higher in LIC and MIC [13]. Cyprus is an island in [Mediterranean Sea](#), divided into two parts as North and South Cyprus. North Cyprus is a MIC [24]. Therefore North Cyprus is a high risky country for dementia.

Although dementia is a huge public health concern, there was no any previous study was carried out in Cyprus, including both North and South Cyprus. Due to this huge absence, this study was designed. This study only involved Famagusta city in North Cyprus, however, this will be conducted in other cities as well and a country-wide data about dementia prevalence will be collected. Our study showed that nearly half of Famagusta population who are over than 65 years old have CI.

In this study, one of the data collection tools was MMSE. MMSE is the most commonly used screening test for detection of CI in elderly population, this test has both higher specificity and sensitivity compared to other tests. The cut point for mini MMSE was decided as 24. Below and equal levels of 24 CI was grouped in mild, moderate and severe. These cut points were decided according to many researches in which it was reported that cut-points were 23/24 and 24/25. According to 14 studies, it was seen that MMSE's cut values 23/24 or 24/25 has 88.3% sensitivity and 86.2%

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specificity [25]. It is evident that MMSE test is a commonly used reliable test for population surveys for CI. In addition to MMSE, Mini-Cog Test also done to participants and similarly results of mini cog test supported our MMSE results.

Depression can overlap and interfere with the results of cognitive tests. However, since prevalence of depression was found to be overall lower, this supports that the impact of depression can be ignored and results of cognitive tests can be more objectively evaluated as CI.

The only study about epidemiology of dementia in Turkey was carried out in İstanbul, sharing a population with similar socioeconomic characteristics with our study and validated Turkish MMSE was used as a screening tool. It was found that the prevalence of CI is 50% above 70 years old in population survey. With further diagnostic methods in clinics, it indicates that the prevalence of dementia is 20.0% [26]. Our population's educational status and our country's economic status are similar with this research's. Also, our population's cognitive impairment prevalence was found as 40% above 65 years old, which is quite similar with this research. Highly variable prevalence rates have been reported for dementia, ranging from 8.5% to 59.4% around the world [27]. This high variability may be observed because of different risk factor characteristics of participants and different socioeconomic status of countries. Our prevalence is also within this ranges.

Concerning the association between age groups and CI, it was revealed that as age increases CI becomes more common. Besides that, CI was found to be more common among females than males. Furthermore, CI was seen more commonly in lower education groups, and a significant association between low levels of education was observed similarly with previous epidemiological studies [10,28].

Data on the presence of vascular risk factors were dependent on patients' own declaration. This might explain detecting no association between disease vascular risk factors and CI as some participants were not aware of vascular risk factors or were underdiagnosed. Previous studies point out that vascular risk factors disrupts cognitive functions [29].

Dementia estimates in North Cyprus was calculated and is around 2700 based on worldwide prevalence [17]. To the best of our knowledge, this is the first study ever not only in North part but also in Cyprus to determine prevalence of CI and MCI

Overall, this study indicates that 40% of the study population has CI and 25.2% possible MCI. It is of great importance to follow up this patients with possible MCI annually.

Interestingly 63% of the individuals with CI determined by valid tests did not have a declaration of forgetfulness by themselves and /or their relatives. Therefore, it is important to screen this age group periodically. Most recently, American Academy of Neurology (AAN) is recommending physicians annual cognitive function assessments for memory problems of individuals aged 65 and older, because increasing age is the major risk factor for cognitive decline [30]. Patients may not

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realise the developing cognitive deficits or think this as a part of normal aging, thus routine checking is necessary.

The limitations of this study can be mentioned as different external factors may affect cognitive tests at that time such as hours of day, previous night sleep, vitamin deficiencies and metabolic status. Additionally participants of study were selected randomly from Municipality of Famagusta population registries for the residents aged ≥ 65 years. These registries include majority of the residents aged ≥ 65 years in Famagusta but not all. Data collection between genders were favored as females because of two reasons: Municipality of Famagusta population registries were mostly comprised of females and also as participation to our study depends on willingness, females were volunteered more to become participants in our study. Furthermore, some data was based on patients own declaration.

To conclude, dementia is one of the global major health problem. This neuropsychiatric progressive disease becomes more prevalent with age, consequently, it has become a global concern. Dementia impacts not just the individual but also the families and societies at large as it interferes with their daily activities and a reduction in productivity.

40% of the participants surveyed in our research suffer from CI. Additionally 25.2% of the study population have possible MCI and 20.7% suffer from depression.

Our study showed CI is more common in women, elderly and those who received little or no education.

Future studies can be conducted in other cities to find out the general cognitive impairment prevalence in North Cyprus.

Highlights

- Nearly half of the study population have cognitive impairment
- Cognitive impairment have association with older age, female gender and lower education
- Considering the growing elderly population, cognitive screening tests are required as public health measures.

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Table 1. Demographics of participants in relevance to cognitive impairment

Characteristic of Subjects	Total (n=135)	Cognitive impairment (n=54, 40%)	No cognitive impairment (n=81, %60)	p value
Gender n (%)				0.007
Female	95(70.4)	45(83.3)	50(61.7)	
Male	40(29.6)	9(16.7)	31(38.3)	
Age groups n (%)				0.000028
65-69	50(37.1%)	17(34.0)	33(66.0)	
70-74	33(24.4%)	14(42.4)	19(57.6)	
75-79	33(24.4%)	11(33.3)	22(66.7)	
80+	19(14.1%)	12(63.2)	7(36.8)	
Education groups n (%)				0.011
Illiterate	11(8.4)	5(9.8)	6(7.5)	
1-6 years	58(44.3)	31(60.8)	27(33.8)	
7-12 years	48(35.6)	12(23.5)	36(45.0)	
12+ years	14(10.7)	3(5.9)	11(13.8)	
Total	131(100.0)	51(100.0)	80(100.0)	
People living with n (%)				
Alone	22(16.5)	10(18.9)	12(15.0)	
Spouse	69(51.9)	23(43.4)	46 (57.5)	
His/her children or grandchildren	21(15.8)	10(18.9)	11 (13.8)	
Spouse and children	20(15.0)	9(17.0)	11 (13.8)	

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Spouse and caregiver	1(0.8)	1(1.9)	0(0.0)
Total	133(100.0)	53(100.0)	80(100.0)
Diseases of vascular risk factors n (%)			0.930
None	14(10.8)	6(11.5)	8(10.3)
One risk factor	44(33.8)	18(34.6)	26(33.3)
Two risk factor	34(26.2)	12(23.1)	22(28.2)
Three or more risk factor	38(29.2)	16(30.8)	22(28.2)
Total	130(100.0)	52(100.0)	78(100.0)
Declared forgetfulness			
by themselves or relatives n (%)			
Yes	48(35,6)	20(37,0)	28(34,6)
No	87(64,4)	34(63,0)	53(65,4)
Total	135(100.0)	54(100.0)	81(100.0)
Functional daily life impairment n (%)			
Yes	28(20,7)	20(37,0)	8(9,9)
No	107(79,3)	34(63,0)	73(90,1)
Total	135(100.0)	54(100.0)	81(100.0)

Figure Legends

Figure 1. Cognitive impairment and depression frequency in age groups

Figure 2. Cognitive impairment presence and severities in the study population

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