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Demanslı Hastalarda Teknoloji Kullanımının Zorlukları: Telefon Kullanımı Üzerine Bir Araştırma ve Literatürün Gözden Geçirilmesi

Challenges of Technology Use in Patients with Dementia: A Study on Telephone Use and Review of the Literature

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ÖZ

Giriş: Bu çalışma, demans hastaları arasında telefon kullanma yetisini koruyanlar ile kaybedenler arasındaki bilişsel ve nöropsikiyatrik farklılıkları araştırmayı amaçlamaktadır. Demans hastalarının iletişim ve bilgiye erişim açısından telefon kullanımı kritik öneme sahiptir ve bu konuda sınırlı sayıda çalışma bulunması, mevcut araştırmayı daha da anlamlı hale getirmektedir.

Yöntem: Araştırma, Alzheimer (AD), Lewy Cisimcikli Demans (LBD), Frontotemporal Demans (FTD) ve Vasküler Demans (VD) tanısı almış, en az bir yıl boyunca takip edilen hastalar üzerinde yapılmıştır. Günlük yaşam aktiviteleri Barthel İndeksi ile değerlendirilmiş ve telefon kullanımı doğrudan sorgulanmıştır. Demans evreleri Klinik Demans Derecelendirme (CDR) ölçeği, bilişsel durum ise Mini-Mental Durum Değerlendirmesi (MMSE) ile ölçülmüştür. Telefon kullanma yetisini kaybeden ve koruyan grupların bulguları karşılaştırılmıştır.

Bulgular: 204 hasta (124 AD, 21 FTD, 35 VD, 24 LBD) arasında, telefon kullanma yetisini kaybedenlerin Barthel İndeksi puanları daha düşüktü. AD hastalarında, telefon kullanma yetisinin kaybı daha düşük MMSE puanlarıyla ilişkilendirildi. Telefon kullanımı için olumlu faktörler genç yaş, erkek cinsiyet, uzun eğitim süresi ve daha kısa hastalık süresi olarak belirlendi.

Sonuç: Erken evre demans hastaları için erişilebilir programlar geliştirilmesi ve ileri evredeki hastalara yönelik uygun müdahalelerin planlanması faydalı olabilir. Bu bulguları desteklemek için daha kapsamlı çalışmalara ihtiyaç duyulmaktadır.

Anahtar Kelimeler: demans, enstrümental günlük yaşam aktiviteleri, telefon kullanımı, bilişsel bozukluk

ABSTRACT

Objective: This study aims to examine cognitive and neuropsychiatric differences between dementia patients who retain versus those who lose the ability to use the telephone. Given the limited research available on this topic, the findings hold particular importance, as telephone use is crucial for dementia patients' access to information and communication.

Method: The retrospective study included patients with Alzheimer's (AD), Lewy Body (LBD), Frontotemporal (FTD), and Vascular Dementia (VD) who had been followed for at least one year. Activities of daily living were assessed using the Barthel Index, and telephone use was directly questioned. Dementia stages were evaluated with the Clinical Dementia Rating (CDR) scale, and cognitive status with the Mini-Mental State Examination (MMSE). Findings were compared between groups with and without telephone-use ability.

Results: 204 patients were included (124 AD, 21 FTD, 35 VD, 24 LBD). Those who lost the ability to use the phone had lower Barthel Index scores. Except for LBD, patients who lost phone use ability had higher MMSE scores. In AD patients, the loss of phone ability corresponded with lower MMSE scores. Positive factors for phone use included younger age, male gender, longer education, and shorter disease duration.

Conclusion: Developing accessible programs for early-stage dementia patients and planning appropriate interventions for advanced cases could be beneficial. Larger-scale studies are needed to confirm these findings and further explore influencing factors.

Keywords: dementia, instrumental activities of daily living, telephone use, cognitive impairment

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INTRODUCTION

Dementia is the general name of neurodegenerative diseases characterised by progressive deterioration of multiple cognitive functions leading to loss of function beyond biological ageing (1). With the increase in the elderly population, dementia is becoming an important public health problem.

One of the major consequences of dementia is the impairment in instrumental activities of daily living (IADLs), including the use of electronic devices such as telephones. People with dementia and their relatives are at high risk of social isolation. Telephone is one of the most common technological tools for social communication. However, patients with dementia have difficulty in using the telephone with the progression of the disease. These difficulties are often related to memory problems, executive dysfunction, and visuospatial impairments, depending on the type and severity of dementia (2–6).

It is very important to obtain information about the skills of using electronic devices in order to prevent social isolation of individuals with dementia and to ensure the continuation of their treatment. In the literature, studies on telephone use ability in dementia are limited, and the relationship between this functional loss and demographic or clinical variables such as cognitive level, disease duration, and dementia type has not been sufficiently investigated (2–6).

This study aims to examine the clinical, cognitive, and functional characteristics of dementia patients who retain versus those who lose the ability to use the telephone. The secondary aim is to evaluate whether there is a difference between the types of dementia in terms of loss of ability and to provide suggestions about the arrangements that can be made for electronic devices according to the diseases.

MATERIALS AND METHODS

Participants

In this study, 204 patients who were followed up at xxx Hospital Dementia Outpatient Clinic were included. National Institute on Aging and the Alzheimer's Association (NIA-AA) criteria were used for the diagnosis of Alzheimer's disease (AD) (7), International Behavioural Variant FTD Criteria Consortium criteria for Frontotemporal Dementia (FTD) (8), International Society of Vascular Behavioural and Cognitive Disorders criteria for vascular dementia (9), and criteria revised by McKeith et al. in 2017 for Dementia with Lewy Bodies (LBD) (10).

Patients were included in the study regardless of dementia stage. All patients were informed about the study and consent was obtained from them or their legal guardians. Demographic data of the patients were recorded. Patients who had previously used a mobile phone but had lost this ability or were still able to use a mobile phone were included in the study. Patients who had never used a mobile phone and patients who had a disease that would impair physical functionality in the last 6 months were excluded from the study.

Mini Mental State Examination Scale (MMSE) was used to assess cognitive functions, Barthel Index was used to measure activities of daily living and Clinical Dementia Rating (CDR) scale was used to determine disease stages.

Data Collection Tools

Turkish reliability studies of all tests used are available.

Barthel Activities of Daily Living Index: It was prepared to evaluate basic life activities and consists of 10 questions including feeding, washing, self-care, dressing, defecation control, bladder control, going to the toilet, getting into a wheelchair, walking and climbing stairs (11). It is evaluated over 100 points. In scoring; 0-20 indicates complete dependence, 21-61 indicates severe dependence, 62-90 indicates moderate dependence, 91-99 indicates mild dependence and 100 points indicates independence.

Mini Mental State Examination (MMSE): It was developed in 1975 by Folstein and colleagues at the Centre for Psychoanalytic Studies (12). It consists of five sections including orientation, recording, attention-calculation, language and recall. The highest score is 30. Score ranges; 0-9 indicate severe cognitive impairment, 10-19 moderate cognitive impairment, 20-23 mild cognitive impairment, while the score range of 24-30 is considered as "normal cognitive function level".

Clinical Dementia Rating Scale (CDR): This scale developed by Morris et al. is completed by the clinician performing the examination (13). It is evaluated using a 5-point scale (0, 0.5, 1, 2, 3) on a total of 6 axes (memory, orientation, judgement-problem solving, functioning outside the home, home life-hobbies, personal care). Stage 0 is classified as normal old age, stage 0.5 as suspected dementia, stage 1 as mild dementia, stage 2 as moderate dementia and stage 3 as severe dementia.

Statistical Analysis

The statistical analysis was performed using [SPSS v25]. The Shapiro–Wilk test was used to evaluate the normality of distribution for continuous variables. Descriptive statistics of numerical variables are given as mean ± standard deviation (SD), median, minimum (min), and maximum (max) values.

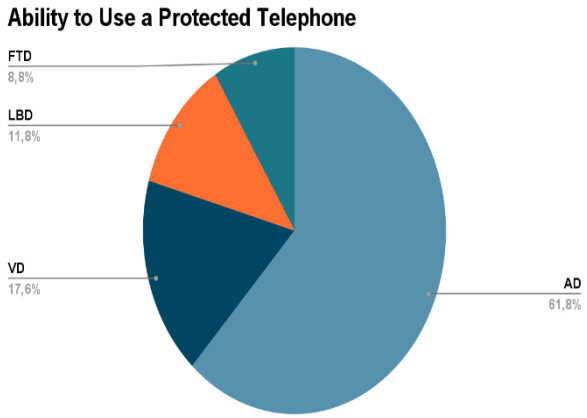
For group comparisons:

- In the Alzheimer's disease (AD) group, where sample sizes were adequate, independent samples t-tests were applied.
- In the Frontotemporal Dementia (FTD), Vascular Dementia (VD), and Lewy Body Dementia (LBD) subgroups, due to smaller sample sizes and non-normal distributions, the Mann–Whitney U test was used.

A p-value less than 0.05 was considered statistically significant in all analyses.

RESULTS

Of the 204 patients who participated in the study, 102 were able to use the telephone, while 102 had lost this ability. For the Alzheimer's disease (AD) group, independent samples t-tests were performed to compare cognitive and functional scores between patients who retained and lost the ability to use the telephone. For the other dementia subtypes (FTD, VD, LBD), Mann–Whitney U tests were used due to smaller sample sizes and non-normal distributions (Table 1). The distribution of dementia types according to the group with and without loss of phone use is given in Table 2 (Figure 1).



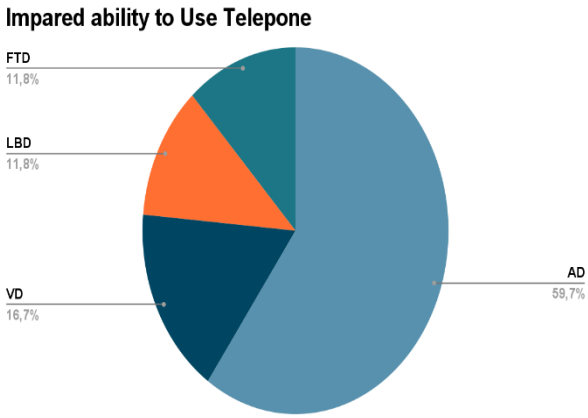


Figure 1. Distribution of dementia types according to phone usage.
(Abbreviations: AD: Alzheimer's Disease; FTD: Frontotemporal Dementia; VD: Vascular Dementia; LBD: Lewy Body Dementia)

Table 1. Demographic and Clinical Characteristics of Patients with Intact and Impaired Telephone Use

Variable	Preservation of the Ability to Use the Telephone (n=102)	Impaired Ability to Use Telephone (n=102)
Age (Mean ± SD)	72.3 ± 8.2	75.8 ±7.3
Gender (% female)	62%	67%
Education (years)	11.1 ± 3.5	7.9 ± 4.1
Duration of dementia (years)	2.8 ± 1.3	4.1 ± 1.9
MMSE Score (Mean ± SD)	24.7 ± 2.5	17.3 ± 3.2
Barthel Index Score (Mean ± SD)	88.5 ± 12.0	62.7 ± 14.5
CDR Score (Mean ± SD)	1.0 ± 0.4	2.1 ±0.6

Table 2. Distribution of Dementia Types with Intact and Impaired Telephone Use

Dementia Type	Ability to Use a Protected Telephone (n)	Impaired ability to use the telephone (n)
AD	63	61
FTD	9	12
VD	18	17
LBD	12	12
Total	102	102

The mean age of patients who maintained the ability to use the telephone (72.3 ± 8.2) was significantly lower than that of patients with disability (75.8 ± 7.3), $t(202) = -3.2$, $p < 0.01$. The proportion of female patients was slightly higher in the group with disability (67%) than in the intact group (62%).

Years of education were significantly higher in the group that maintained the ability to use the telephone (11.1 ± 3.5) compared to the group with disability (7.9 ± 4.1), $t(202) = 6.1$, $p < 0.001$. The duration of dementia was also shorter in the intact group (2.8 ± 1.3 years) compared to the disability group (4.1 ± 1.9 years), $t(202) = -5.5$, $p < 0.001$.

MMSE scores were significantly higher in the group that retained the ability to use the telephone (24.7 ± 2.5) compared to the group that lost this ability (17.3 ± 3.2), $t(202) = 20.0$, $p < 0.001$.

Functional skills, as measured by the Barthel Index, were significantly higher in the intact group (88.5 ± 12.0) compared to the group with disability (62.7 ± 14.5), $t(202) = 14.7$, $p < 0.001$. CDR scores were lower in the intact group (1.0 ± 0.4) compared to the disability group (2.1 ± 0.6), indicating that dementia was milder in the intact group, $t(202) = -14.3$, $p < 0.001$.

Depression scores measured by the Geriatric Depression Scale (GDS) did not show a significant difference between the dementia groups who lost the ability to use the telephone ($p > 0.05$).

In this study, an independent sample t-test was performed to compare Barthel, MMSE and CDR scores between Alzheimer's disease patients (AD) with and without telephone use (Figure 2). A significant difference was found between the two groups in terms of Barthel scores: 96.97 ± 10.05 for phone users and 57.38 ± 39.63 for non-phone users; $t(122) = -7.568$, $p < 0.001$, Cohen's $d = -1.359$. This indicates a large effect size and suggests a significant difference in Barthel scores between the groups.

Similarly, in terms of MMSE scores, the mean score of phone users (19.31 ± 6.17) was significantly higher than non-users (15.06 ± 5.03); $t(100) = -3.767$, $p < 0.001$, Cohen's $d = -0.743$.

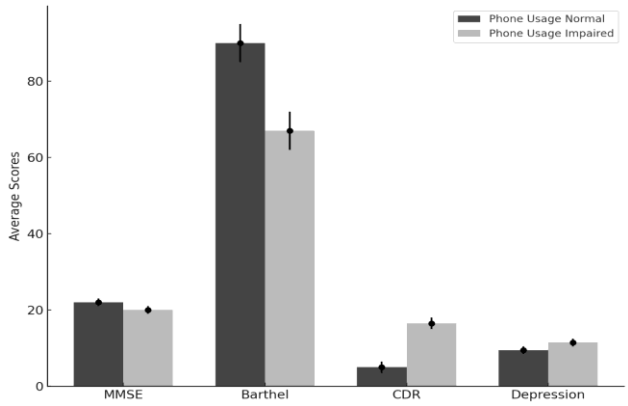


Figure 2. Comparison of cognitive, functional and depression scores of patients with ıntact and ımpaired telephone use in alzheimer's disease group.

There was also a significant difference in CDR scores between phone users (2.03 ± 3.21) and non-users (10.73 ± 5.56); t(87) = 8.295, p < 0.001, Cohen's d = 1.810.

In FTD patients, there was a significant difference in Barthel scores between those who could use the telephone and those who could not (100.00 ± 0.00 vs. 68.33 ± 35.09); Mann–Whitney U, p = 0.005, Cohen's d = -1.391. In terms of CDR scores, the scores of patients who could use the telephone (2.00 ± 1.41) were significantly lower than those who could not use the telephone (8.67 ± 7.12); Mann–Whitney U, p = 0.030, Cohen's d = 1.220. No significant difference was found for MMSE scores (20.50 ± 7.23 vs. 20.90 ± 5.53); Mann–Whitney U, p = 0.912, Cohen's d = -0.067. Similarly, no significant difference was found between the groups for depression scores (p > 0.05) (Figure 3).

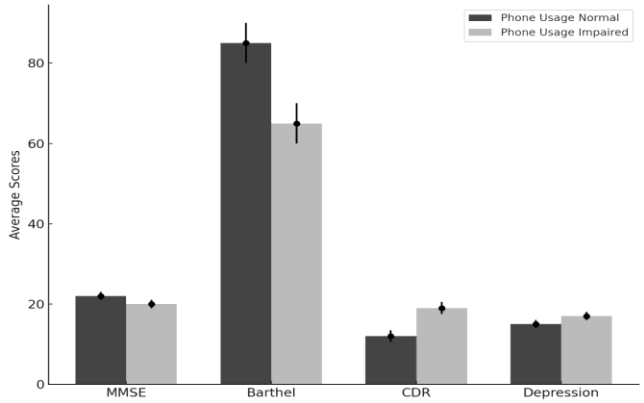


Figure 3. Comparison of cognitive, functional and depression scores of patients with ıntact and ımpaired telephone use in frontotemporal dementia group.

In VD patients, there was a significant difference in Barthel scores between those who could use the telephone and those who could not (92.94 ± 21.58 vs. 50.56 ± 42.63); Mann–Whitney U, p < 0.001, Cohen's d = -1.243. CDR scores also showed a significant difference; patients who could use a telephone had significantly lower scores (1.56 ± 0.73) than those who could not use a telephone (12.13 ± 6.06); Mann–Whitney U, p < 0.001, Cohen's d = 2.180. There was no significant difference in MMSE scores (17.62 ± 7.88 vs. 14.92 ± 4.59); Mann–Whitney U, p = 0.298, Cohen's d = -0.418. Similarly, there was no significant difference in depression scores (p > 0.05) (Figure 4).

In LBD patients, there was a significant difference in Barthel scores between those who could use a telephone and those who could not (90.83 ± 25.66 vs. 37.92 ± 41.15); Mann–Whitney U, p = 0.001, Cohen's d = -1.543. No significant difference was found for MMSE scores (20.00 ± 5.92 vs. 16.00 ± 6.53); Mann–Whitney U, p = 0.157, Cohen's d = -0.644. Similarly, no significant difference was observed for CDR scores (3.86 ± 5.46 vs. 8.90 ± 5.67); Mann–Whitney U, p = 0.087, Cohen's d = 0.903. Depression scores did not differ significantly between groups (p > 0.05) (Figure 5).

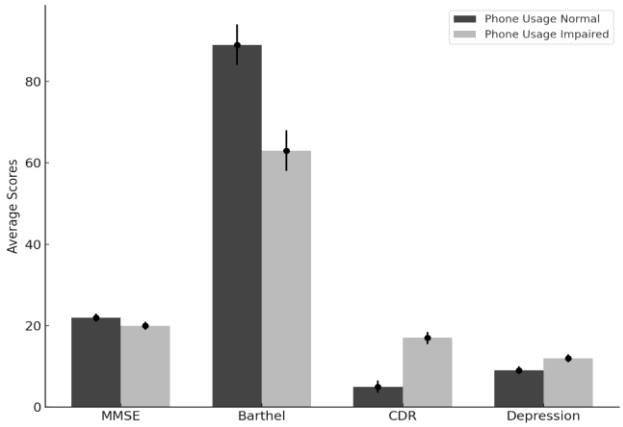


Figure 4. Comparison of cognitive, functional and depression scores of patients with ıntact and ımpaired telephone use in vascular dementia group.

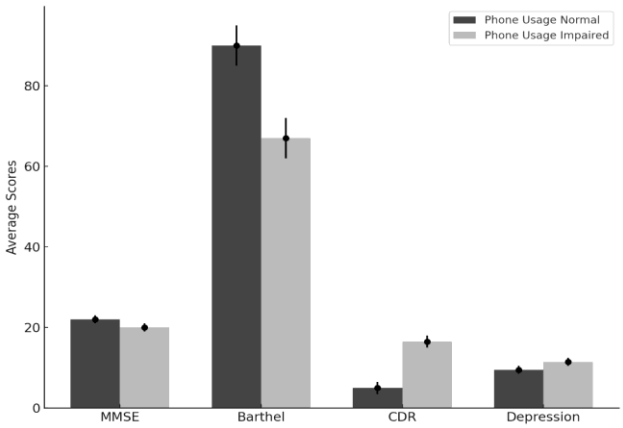


Figure 5. Comparison of cognitive, functional and depression scores of patients with ıntact and ımpaired telephone use in dementia with lewy bodies group.

DISCUSSION

In this study, it was found that patients who lost the ability to use the telephone had more severe cognitive and functional impairments, longer duration of dementia and lower educational level than patients who retained the ability to use the telephone. In addition, it was determined that disability loss was more common in older age and female gender.

In all dementia subtypes, patients who lost the ability to use the telephone had lower Barthel Index values than patients who retained the ability to use the telephone. CDR scores were also significantly higher in all groups with impaired telephone use, except for LBD where the difference did not reach statistical significance.

While MMSE scores were significantly lower in AD patients with impaired telephone use, this difference was not statistically significant in FTD, VD, and LBD subgroups. This suggests that MMSE, while useful in Alzheimer's disease, may be less sensitive in capturing functional decline related to telephone use in other dementia types. These findings are in line with previous literature reporting that MMSE has limited capacity to detect executive or visuospatial impairments common in non-AD dementias (2–4, 16).

It is frequently observed that individuals with dementia have significant difficulties in using technological devices and have difficulty in using familiar objects (2–6). This study revealed that loss of the ability to use the telephone in patients with dementia is closely related to cognitive and functional impairments. When demographic data were analysed, younger age, male gender, longer education period and shorter disease duration were found to be protective factors for the ability to use the telephone.

In the literature, losses in the ability to use the telephone are questioned, researches are conducted to increase basic telephone skills and new device design studies are ongoing (14, 15). It is observed that impairments in visual-spatial skills further complicate this process (16). It is known that patients with mild cognitive impairment and early stage dementia can maintain mobile phone use; however, information on whether there is a distinction between types of dementia, how this is affected by other neuropsychiatric evaluations and how patients cope with this process is limited (4). Our findings support that among all evaluated scales, the Barthel Index and CDR score were the most consistently associated with telephone use across dementia subtypes.

The results of this study emphasise the need for further research to improve the quality of life of patients with dementia.

Patients and their relatives use technological devices to maintain their productivity, socialise, access health professionals and participate in cognitive or physical therapies from their own homes (4, 17). It is important to explore and facilitate the use of technology to support ageing in place, create a safer and freer living space, and help them maintain their independence (18, 19). Sense of self and sociability are also among the important goals to be pursued (20).

The pandemic process, which is particularly effective globally, has revealed that the geriatric population and people with chronic diseases are more prone to social isolation. Social isolation may lead to apathy, introversion, increased depression and progressive loss of the ability to perform activities of daily living in patients with dementia (21). Spatial orientation disorders may also develop with social isolation (22, 23). The use of technological devices not only enables older adults to participate in the community, but may also fulfil functions such as reminding, warning, relaxation, compensatory behaviour management and safety surveillance in patients with dementia (24).

Preventing withdrawal from rehabilitation programmes may prevent the progression of orientation problems (23). Patients living in nursing homes or away from their relatives are kept in contact with family members (25). Continuous social support reduces depression, improves quality of life and slows the progression of the disease (26, 27). The use of technology by patients and the development of technological devices strengthen social presence (28). While continuous remote contact is socially and emotionally beneficial for the patient, it also saves the caregiver from the feeling of abandonment.

Adaptation to new devices is difficult in people with dementia. They have difficulty in learning updates on existing devices and may show reluctance to share these difficulties. Even if awareness is provided in the early period, disease-related embarrassment, depression and frustration may cause them to miss the opportunity to observe and evaluate the learning difficulty (29). Approaching the patient by considering their individual characteristics may increase their compliance. Providing technical support for devices may prevent the patient from avoiding use with a sense of failure (4).

Many everyday technologies are not designed to meet the access needs of people with dementia. Efforts are being made to produce technological devices that are simpler to use in order to enable patients to use these devices (30). However, the lack of skills should be taken into account when designing new devices and the difficulty and slowness of learning processes should be taken into consideration (2). Therefore, many devices are being tested prospectively, even if a small number of patients are included in the study (31). In order to facilitate the design of studies and to ensure that they reach a wide audience, determining the factors affecting the ability to use the devices will help the efficient use of resources.

It is thought that the devices having very simple functions, including visual support if possible and these visuals having features similar to familiar objects facilitate learning (30). The fact that the device has video features helps patients to better hear, understand and interpret what their relatives say (32). Increased interpretation ability increases the self-confidence of the patients and contributes to them feeling safe (33).

It is thought that designing devices that focus on individual needs will facilitate the use of these devices. However, it should be kept in mind that the inclusion of patients in the design process may cause the patient to withdraw from using the device and not want to use it again in case of a problem (32, 34).

Studies have examined the usability of technologies such as video telephones and have shown that although individuals with dementia find them useful and enjoyable, they may initially have difficulty understanding some functions (31). However, it has been observed that videophones can also be used to learn about the patient's environment and

to increase awareness and confidence through non-verbal visual cues (28).

In our study, it was learnt that patients who retained the ability to use the phone used the devices with simple functions they used in the past more easily than multifunctional smart devices. Devices designed for personalised needs can also convey the message that the personality is not lost and is cared for, thanks to the patient's participation in the process (35). This contributes to the continuation of self-esteem and sense of self, which are at the top of the hierarchy of needs (36). Although the acceptance of the device is individualised, it may vary according to the character of the person and the support they receive from their environment (36).

In the use of video devices, the requests of the patient's relatives to follow the patient over the image were found to be ethically inappropriate; even if it was considered for security purposes, this was considered as a violation of individual rights (32, 37).

Limitations of the Study: This study has several limitations. Firstly, the cross-sectional design prevents assessment of causal relationships or longitudinal change in telephone use ability. Secondly, the data were collected from a single centre, which may limit generalisability. In addition, the sample sizes for FTD, VD, and LBD groups were relatively small, which may affect the statistical power for subgroup analyses. Future studies with larger and multicentre cohorts are needed to confirm and expand these findings.

Suggestions for further studies: Future research should examine in more detail the effects on phone use at various stages of dementia. Also, more data should be collected on which cognitive functions are affected in different types of dementia and how they reduce the ability to use the telephone.

Further studies with a larger sample and a prospective design will provide a better understanding of the relationship between changes in the cognitive skills of patients with dementia and their ability to use the telephone.

CONCLUSION

In conclusion, this study shows that the ability to use the telephone in dementia patients is associated with cognitive and functional status, especially reflected through Barthel Index and CDR scores. While MMSE differences were only significant in Alzheimer's disease, Barthel and CDR scores differentiated groups across all dementia types. These findings may guide clinicians in assessing functional capacities and tailoring supportive technologies for dementia patients.

Ethics Committee Approval: This study was approved by the Scientific Research Ethics Committee of Sancaktepe Şehit Professor İlhan Varank Training and Research Hospital (Approval No: 2024/309, Date: October 23, 2024), in accordance with the Declaration of Helsinki.

Authors' contributions: OT contributed to the conceptualization and writing of the manuscript. MT performed the data analysis. SS supervised the study and critically revised the manuscript for important intellectual content. Data collection was conducted with the support of FY. All authors read and approved the final manuscript.

Conflict of Interest: The authors declare no conflicts of interest.

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Informed Consent: nformed consent was obtained from all individual participants included in the study.

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