

Tele-health occupational therapy program in Greek patients with dementia during Covid-19

Vlotinou Pinelopi

Department of Neurology, University Hospital of Alexandroupolis,
Greece
pvlotino@phyed.duth.gr

Tsiakiri Anna

Department of Neurology, University Hospital of Alexandroupolis,
Greece
anniw_3@hotmail.com

Vadikolias Konstantinos

Department of Neurology, University Hospital of Alexandroupolis,
Greece vadikosm@yahoo.com

Terzoudi Aikaterini

Department of Neurology, University Hospital of Alexandroupolis,
Greece katerzoudi@hotmail.com

Katsouri Ioanna-Giannoula

Occupational Therapy Department, University of West Attica, Athens
Greece
School of Medicine, Aristotle University of Thessaloniki, Greece
ykatsouri@uniwa.gr

Athanasopolou Christina

Occupational therapy Department, University of West Attica, Athens
Greece
chatha@uniwa.gr

Tzonichaki Ioanna

Occupational therapy Department, University of West Attica, Athens
Greece
itzonichaki@uniwa.gr

Serdari Aspasia

Department of Psychiatry, University Hospital of Alexandroupolis,
Greece
aserdari@yahoo.com

Heliopoulos Ioannis

Department of Neurology, University Hospital of Alexandroupolis,
Greece Alexandroupolis, Greece
iiliop@hotmail.com

Abstract

Importance: During the Covid-19 pandemic in-person rehabilitation approach in dementia is not feasible, thus, intervention through tele health could be a solution.

Objective: To determine whether tele-occupational therapy program can maintain a stable cognitive level of demented patients and their performance in functionality and mobility, for a short time period.

Design: A pilot Interventional comparison study

Participants: 18 patients with dementia (8 in the experimental group, 10 in the control group) with a score of MMSE 16-20, who had the ability to use an electronic device.

Intervention: Weekly individual tele-occupational therapy sessions and a pre-test- post-test neuropsychological, functionality and mobility evaluation over two months period for both intervention and control group

Outcomes and Measures: The measured outcomes included the changes of the cognitive, functional and mobility status of the patients before and after the tele-health program. The outcomes were correlated with the results of the control group. MMSE, Barthel scale and TUG test were performed.

Results: Significant differences were found in Functionality in the whole sample ($p < .05$ / $p < .10$) and also in Mobility ($p < .05$ / $p < .10$) between the first and the second evaluation. Control group showed statistically significant deterioration after these two months in cognitive level, functionality and mobility, (MMSE $p = .005$, Barthel total $p = .005$, TUG $p = .007$). The experimental group remained stable.

Conclusion: An Individual-Tele-health occupational-therapy program appears to maintain the cognitive and performance status for short time period. It would be meaningful to explore the long-term implementation of similar tele- programs in demented patients.

What this Article Adds: Practitioners working over dementia patients could apply tele-health programs as a supplementary treatment plan, not only during a pandemic.

Keywords: Tele-health, Covid 19, Dementia, cognition, functionality

JEL classifications: I Health, Education, and Welfare H51, H52, H53, H75

Introduction

Coronavirus 2019 disease (Covid-19) revealed the adaptation difficulty to the new circumstances, the lack of flexibility and maneuvering but also, in the other hand it revealed the power of the whole medical system in Greece. Rehabilitation departments in public hospitals and support structures for patients with Dementia (PwD) were directly affected, reducing by 70% the people served while gradually with the pandemic escalation, these numbers decreased even more. The increased risk for COVID 19 due to age of PwD, in addition to the restrictions of group gathering and transportation were the main reasons explaining the limitation of rehabilitation programs in dementia. On the other hand, practices and strategies in occupational therapy addressing to such pandemic conditions had not been discussed or organized before in Greece.

As dementia is a neurodegenerative disease, causing a progressive decline in all functional levels of a person, occupational therapy intervention is an important key-factor both for the patient who gains part of his functionality and for the patient's environment that needs to be supported (AOTA, 2012; Bujnowska-Fedak & Grata-Borkowsky 2015). Providing occupational therapy services in PwD till now and with a traditional way of performance we could list a host of advantages. The provision of support in the field of cognition and the motor sector, also in areas related to the maintenance of social skills, the strengthening of communication skills and the motivation for engaging PwD in deliberate activities, are a few paradigms (Pozzi et al. 2019; Graff et al. 2006; Smallfield, Heckenlaible, 2017; Tzonichaki, 2013). When Covid-19 did not exist, PwD could benefit from

occupational therapy services provided in their home, in daily dementia care units but also less frequently through telehealth, targeting in maintaining functional performance, safety with or without modifications, being able to communicate with peers and be supported (Nissen, Hersch, Tietze, Chang, 2018).

On the other hand, under covid-19 circumstances, occupational therapy had to be transformed through tele-health following the requirements of the present situation in Greece and all over the world.

Regarding virtual reality technology in neuroscience, many different ecologically valid virtual environments have already been created (Nef et al, 2013) that can be used to safely expose populations at risk in critical tasks (Katz et al, 2005; Katsouri, 2018).

This article highlights the impact of a pilot Tele-occupational therapy approach in 18 Greek- PwD during Covid-19, aiming to maintain patient cognitive skills, functionality and mobility to their previous health status.

Methods

This was a pilot study of a convenient sample of 18 people diagnosed with moderate dementia enrolled. The PwD were members of a daily - care unit specialised in dementia which was established in 2007 in Alexandroupolis, in Evros faculty, in northern Greece. All the patients had been diagnosed by a certified neurologist from University Department of General University Hospital of Alexandroupolis.

Inclusive criteria

All the participants were previous following the activities of a Daily care-center in Alexandroupolis, called "Memory School" that provided public services under the scientific supervision of the University Neurological department. Participants should be diagnosed with dementia for at least one year and followed-up systematically by the team of outpatient clinic, of the University Hospital of Evros. Their access to internet services as well as having a device compatible to internet access (tablet, computer, mobile phone) was basically pre-requisite. The basic level of cognitive skills was defined as 16-20 score in the MMSE scale and the age of the participants should be between 65-85 years old. Participants had to be able to move independently (even if they had to use a cane) and caregiver had to be eligible to assist the individual whenever needed. The participants had to be pharmaceutical stable with no psychiatric disorder.

Procedure

PwD were informed by phone by a neuropsychologist, about the 2month participation in a tele-health program. The patients that fulfilled the criteria and agreed to participate were assessed at home by an occupational therapist. Participants or their caregivers completed a written consent and they were informed that they could withdraw whenever they decided. Pre and post evaluation took place at participant's home, performing all means of personal protection. The participants in both groups had access to internet connection and devices but not all of them were willing to take part in this project. Participants were divided in two groups, the intervention and control group. MMSE scale was performed (Molloy & Standish, 1997)

and cognitive status was identified. Barthel index scale (Mahoney & Barthel, 1965) for functionality and TUG test for mobility status assessment was used (Podsiadlo & Richardson, 1991).

Patients and their caregivers were trained at home, on the platform use (Skype) with the occupational therapist's assistance. Participants of the experimental group had a one-by-one session with a trained occupational therapist, twice every week using the skype platform. The cognitive exercises had been prepared prior to each session in a "pptx" presentation form and the therapist could share his screen with every participant so that [s]he would be able to participate. Every participant was given a notebook the first day of evaluation to take notes or answers to questions asked by the therapist.

The participants were informed about the way they would be trained and at every session they performed each exercise after the therapist's demonstration. The exercise program was divided in three levels: warming up for 4minutes, 12-14 min of gradually increasing difficulty effort and in the end 2-4 minutes of relaxation. If exercise was difficult to be performed or could probably cause a fall, the presence of the caregiver was necessary during the 20minutes of exercise.

The session also included the involvement in basic daily activities. The participants were directed to move in their house trying to get the appropriate objects to work with (for example dishes, toothbrushes, glasses). After the object collection, they had to perform the occupation they had been asked to. The therapist could watch the participant and provide guidance. If patient needed more help, the therapist could demonstrate the expected action.

Regard to the control group, the patients did not participate in any tele-occupational therapy - activity but they participated in the initial and final neuropsychological examination.

Data sets were collected pre and post the tele-health intervention and PSPPV1.4.1 program was used for the statistical analysis.

Interventional program

Before Covid-19, PwD could participate in "Memory school's" activities through physical presence. Through the application of tele-occupational therapy program, an attempt was made to transfer this program to which patients were accustomed to respond via Skype communication. Cognitive abilities such as memory, attention, spatial or temporal navigation, distinction, identification, writing, reading, critical thinking formed the program basis (Cheng 2016; Day 2019; Small & Cochrane, 2020; Kao, Lin, Wu, Lin & Liu, 2016; Yorozuya, Kubo, Tomiyama, Yamane & Hanaoka, 2019). Different activities were included in every week's program even if the cognitive functions that were targeted to work with were the same.

The tele-health program for mobility included exercises using the body weight in a sitting or a standing position paying attention to gait muscles and balance exercises, sensory and memory stimulation (Mileski et al. 2018; Ismail et al. 2018; Gholamnezhad, Boskabady & Jahangiri, 2020; Lamb, Mistry et al. 2018; Kouloutbani, Karteroliotis & Politis, 2019; Lamb, Sheehan et al. 2018; Bajwa et al. 2019). Reminiscence and nostalgia techniques were also used while program related to the maintenance of communication was carefully developed

(van Dulmen, Smits & Eide, 2017) as well as combined exercises and cognitive training programs (Okamura, Otani, Shimoyama & Fujii, 2018; Cui, Lin, Sheng, Zhang & Cui, 2018; Katsouri 2018) accordingly to proposed protocols and guidelines (Table 1).

Table 1.A summary report of basic exercises-activities-skills trained

1.Basic program of Exercises for every session, 20 min			
Exercises with model imitation: Exercises in a sitting position / upright posture with bipod support and wall support	Exercises after demonstration: exercises with rubber bands for the upper extremities	Exercises in a sitting and standing position with a bar	Isometric exercises in upright and semi-sitting position
Balance exercises (one-legged supports / ball use)	bilateral exercises	Coordination exercises- use of ball and bar	Dual: gait & cognitive exercises
2.Basic cognitive skills of each session, 20 min			
Map navigation spatial and temporal orientation, sequence,	concentration exercises	constructive skills exercises, logical writing exercises,	logical-mathematical exercises, acoustic and visual memory
3.Basic remodeling of activities of daily living, 20 min			
-Lunch: description of preparation instructions and execution	-Organize of a weekly program -room make up	-Personal hygiene: teeth brushing/shaving -Coffee making	-Shopping list -Financial calculations -Communication verbal/non verbal

Results

Two groups were created: the intervention group (n=8) and the control group (n=10). Eight were males while 10 were females. The mean age of control group was 75.1years / intervention group 75.25y). Both groups had similar pre-cognitive, functionality and mobility status.

A Kruskal-Wallis test was performed between the two groups due to the small sample and the non-parametrical data settings to identify differences between groups (**p<.05. No differences were identified between the two groups and the parameters: patient cognitive level (MMSE), mobility (TUG) and functionality (Barthel) (p>.10)at baseline. This underscores the homogeneity in the sample taken with respect to the characteristics of the level of dementia (intervention group: MMSE, av.score 19,75/Barthel 78.125/TUG 11,626 vs control group: MMSE av.score 18,4/ Barthel 82,5/TUG 12,6) (Table 2).

Table 2. Kruskal -Wallis test between pre-intervention groups.

Kruskal Wallis test (df=1)			
		X2	p
Pre Condition	MMSE	.40	.529
	BARTHEL	1.92	.166
	TUG	.72	.395

The interventional tele-occupational therapy program was applied to 8 PwD while in the control group no intervention was performed. Wilcoxon test was performed

Cognitive status

There was no significant change in cognition in the experimental group (Z=-1.34, p=.180). However, there was a significant deterioration of the cognition in control group (Z=-2.83, p=.005). Between the post cognitive status, of intervention-experimental and control group, a significant difference was found, allowing us to support the possible degradation of the cognitive level as soon as the cognitive support stops in PwD (Z=-3.24, p=-.001. (Table 3, Table 4).

Functionality

The results revealed that there was not significant difference between pre-post conditions for interventional group, for functionality (expressed through Barthel)(Z=-1.00, p=-0.68). On the contrary, there was statistically significant difference(deterioration) between pre-post condition for control group (Z=-2.68, p=-.007). Between the post condition for both group a statistical significant difference was found (Z=-2.34, p=-.020). Functionality in intervention group remained stable while in the control group, mobility was impaired.

Mobility

There was not significant difference for mobility between pre-post conditions for interventional group (z=-1.28, p=-0.68) but there was significant difference for the same condition for control group, showing the worsening of mobility for participants that did not take part in the experimental study (Z=-2.68, p=-.007)(Table 4).

Table 3: Pre-Post differences between groups in MMSE, Barthel and TUG scores after the tele-occupational therapy program

	Pre -N=8/10				Post- N=8/10			
	Intervention Group		Control group		Intervention Group		Control group	
	Av.	St.Dev	Aver.	St.D ev	Aver .	St.Dev.	Aver.	St.Dev
MMSE	20	3.8	18	2.5	19	3.7	16	2.6
TOTAL BARTHEL	78	8.4	83	7.9	76	7.8	66	1.3
TUG	12	2.4	13	2.9	10.75	1.98	20.20	2.35

Table 4. Post- Differences between the two groups in cognitive status, functionality and mobility.

	Intervention Group		Control group		Total	
	Z	P	Z	P	Z	P
MMSE	-1.34	.180	-2.83	.005*	-3.24	.001**
Transfers	-1.41	.157	-2.89	.004*	-3.21	.001**
Personal care	NaN	NaN	-1.41	.157	-1.41	.157
wc	NaN	NaN	NaN	NaN	NaN	NaN
bath	-.45	.655	-2.83	.005*	-2.50	.013**
Walking on level	NaN	NaN	-1.41	.157	-1.41	.157
stairs	-1.00	.317	-2.45	.014*	-2.65	.008

Dressing	NaN	NaN	- 2.24	.025* *	- 2.24	.025**
Bowel control	NaN	NaN	NaN	NaN	NaN	NaN
Feeding	NaN	NaN	NaN	NaN	NaN	NaN
Bladder control	NaN	NaN	NaN	NaN	NaN	NaN
TOTAL_BARTHEL	-1.00	.317	- 2.82	.005* *	- 3.14	.002**
TUG	-1.82	.068*	- 2.68	.007* *	- 2.34	.020**

Discussion

The pandemic has resulted in patients with dementia being confined to their home. Thus, it impacted the rehabilitation plan of those patients diagnosed with dementia. Furthermore, the pandemic affected all functional levels of PwD (Fasilis et al.2018). Our research give some evidence not only focusing on the gradually worsening of functionality between PwD that did not participate in rehabilitation programs but also focuses on the possibility of maintaining cognition, mobility and functionality through participation in tele-health program.

In particular, a decline on mobility in control group may prove a lack or a limited involvement in motor activities. On the other hand the stability and even the improvement on mobility in experimental group following a tele program - the occupational therapy program that used to participate in before Covid-19 - could be a first sign that having to follow a participation program, could organize the PwD, remind them to stay active and motivate them.

To date, there are limited data on the implementation of telehealth programs in occupational therapy in PwD in the presence of Covid-19. The suggestion of remaining physical active with cognitive involvement to purposeful activities could be a manner for maintaining the previous health status during COVID-19 or even similar negative circumstances of contact avoidance. Goodman-Casanova et al. (2020) revealed as well that home and self-remaining, could affect negatively physical and mental health. Moreover they underlined that participants living alone reported negative feelings, sleeping problems and less involvement with cognitive activity training. Keeping patients informed about the situation, staying healthy with a daily routine with maintained physical, mentally and leisure activities was proposed as a management way (Goodman-Casanova,2020; Tzonichaki, 2019). In the same line, Panerai, Raggi, Tasca et al (2021), found that during Covid-19 period, tele-occupational therapy with telephone based sessions combined with emotional support, appears to be an effective intervention for the management of neuropsychiatric symptoms, mood and can improve cognition among patients with major neurocognitive disorders.

Occupational therapy's challenge in nowadays according to Dirette, (2020) is the establishment of healthy habits, the provision of strategies for increasing activity level, the emotional wellbeing and the socialization for people with dementia as well (Dirette, 2020). Ricci Dimov, da Silva & Dellbrugger (2020), created peer support groups and virtual meetings as a mental health intervention strategy. Participants had the opportunity to report every day's news, thoughts and routine, and occupational therapists provided guidelines on organising physical wellbeing tips, meditation techniques and healthy daily routines during Covid 19 period. Sterrenberg (2021), also used virtual group program in elderly with other neurological diagnosis,

with Parkinson's disease, as a response to Covid-19 pandemic. Sterrenberg (2021), explored the benefits and effectiveness of a biopsychosocial programme using virtual technology in a 10-week group programme suggesting that telehealth- virtual programmes can improve the quality of life of people with Parkinson's. In Singapore, Priyadharsini(2020), used telehealth in occupational therapy supporting children with special needs and families, reframing parent's perspectives in managing their child's behaviour, directing and supporting them on activities to engage children development. Findings- even if they come from other areas of occupational therapy practice- support the view that persons can benefit on many different levels from the services provided from tele-health occupational therapy and can retain part of their functionality in covid-19 pandemic. In fact, it is a common finding between the above researchers and the present study, that occupational therapy can be applied through tele-health practice while on the other hand, can have positive results and strengthen skills in patients.

Barriers, limitations and solutions/ future recommendations

Though the use of telehealth in Greece is a promising field and could offer solutions due to restrictions caused in remote areas of the country, it can also be associated with a difficulty in handling and solving problems. Older Greek people can hardly use advanced technology and even fewer can have access to the appropriate equipment. On the other hand more training is needed, for both therapist and caregivers/patients as well as further future studies and research with a larger sample have to be conducted, before incorporating telehealth programs into the daily practice of the dementia recovery approach.

Conclusions

Tele-health occupational therapy programs that focuses on maintaining cognitive abilities, mobility and basic daily activities, may be promising and useful for patients with moderate dementia. As long as covid-19 or others restrictive factors will inhibit the normal flow of Greek demented patient lives, tele-health will rightly gains ground in recovery in dementia.

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