

Kognitivní rehabilitace jako nástroj v boji proti Alzheimerově chorobě z pohledu pomáhajících profesí

Cognitive rehabilitation as a tool in the fight against Alzheimer's disease from the point of view of assisting professions

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Abstract

Tento příspěvek se zaměřuje na osoby trpící demencí (v tomto případě mírnému stadiu Alzheimerovy choroby) se zaměřením na kognitivní rehabilitaci. Toto onemocnění obvykle postihuje osoby starší 65 let. V roce 2006 činil počet osob s Alzheimerovou chorobou v České republice 6 545 osob trpících touto chorobou. V roce 2010 se toto číslo zvýšilo na 7 981 osob s Alzheimerovou chorobou a tento trend se dále zvyšuje. Výzkum zahrnuje testování 10 probandů (100% žen ve věku 65 až 70 let), které byly rozděleny záměrným výběrem do dvou skupin: experimentální (aktivní účast na další speciální pedagogické a pracovní terapii, také známá jako intervence na pracovní terapii) a kontrolní skupina (pasivní účast v průběhu intervence). Testování bylo zahájeno přijímacími zkouškami s použitím standardizovaného kognitivního testu Montreal. Stejný test byl pak použit po intervenci v rámci výstupního testování a shromážděné údaje byly poté porovnány. Následující výsledky ukazují na skutečnost, že pravidelné intervence seniorů trpících Alzheimerovou chorobou s využitím moderních technologií (v tomto případě herních konzolí spojených s pohybovým senzorem Kinect[®]) a klasických testů "papíru a tužky" množství vlivu na výsledky experimentální skupiny, které dosáhly mírně lepších výsledků než pasivní kontrolní skupina, která stagnovala nebo se zhoršila ve srovnání s výsledky na začátku.

Klíčové slova: Alzheimerova choroba, edukace pomocí ICT, edukace seniorů, trénování kognitivních funkcí, socializace.

Abstrakt

This paper focuses on people with dementia (in this case a mild stage of Alzheimer's disease) with a focus on cognitive rehabilitation. The disease usually affects persons over 65 years of age. In year 2006, the number of people with Alzheimer's disease in the Czech Republic was 6,545 people. In year 2010, this number increased to 7 981 people with Alzheimer's disease and this trend is further increasing. The research includes testing of 10 probands (100 % of women aged 65 to 70 years) which were divided by an intentional selection into two groups: experimental (active participation on further special-pedagogical and occupational therapy, also known as work therapy intervention) and control group (passive participation during intervention). The testing

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was initiated by entrance examinations with the use of standardized Montreal cognitive test. The same test was then used after the intervention within a framework of output testing and the collected data were then compared with each other. The following results then pointed to the fact, that regular intervention for seniors suffering from Alzheimer's with the use of modern technologies (in this particular case game consoles connected with the Kinect© system sensors) and classic "paper and pencil" tests had certain amount of influence on the results of the experimental group, which achieved slightly better results than passive control group which stagnated, or got worse compared with the results at the beginning.

Keywords: Alzheimer's disease, education using ICT, education of the elderly, cognitive training, socialization,

Introduction

Alzheimer's disease can be defined as a neurodegenerative condition which is followed by atrophy of the brain tissues, which causes the brain to lose its weight (the overall weight of brain is then reduced under 900g to its normal state which is circa 1500g). Senile plaques (also known as neuritic plaques) can then be found on the surface of the cortex, which are caused by a protein composed of amyloid beta peptides (Bradbury 2007). The more such plaques an individual has on their brain, the worse the cognitive deficit is, symptoms of which are loss of orientation in space and time, disruption of short-term, and subsequently long-term memory (Kumar et al. 2007). The contemporary discussion of the issues tries to slow down the progression of the disease. Even early symptoms should be a warning and force is to choose a suitable activity for cognitive and motor function development (Bennett, 2008). Such individuals then seem less forgetful and are not as much disoriented, as others thus making the condition less severe, however even these slight symptoms should be examined in case of further development of Alzheimer's disease (Topinková 2005). The more the condition progresses, the more the state of the patient worsens and the intervention itself is then, of course, more difficult (Bennet et al. 2011). If we want to have the best results possible, it is necessary to start with the intervention as soon as possible, meaning from the point of first symptoms of early stages of dementia (Vostrý and Dončevová 2016). Following the previous theme we can then add the knowledge to the education of senior members of the society, which is today done at universities of the Third Age (U3A). These institutions help develop their technological literacy etc. In many cases the elderly learn how to operate with a computer and what are the pros and cons of using technology. A group of people with Alzheimer's is quite often being neglected, but it is the early stages of this condition which needs to be attended and help clients to activate and support their already disrupted cognitive functions. To have

this educative option can then be used as dementia prevention (Tomczyk 2015). We can also mention one key study which pointed out the use of modern technology (in this particular case a game console and movement sensor) and video games to help people with disputed cognitive functions. One case study included a female senior (103 years), who was able to support her cognitive functions by the use of a bowling video game. The results and discussion of this study included a conclusion where author states that if cognitive functions are not stimulated enough, the overall health of clients and patients will inevitably deteriorate (Iorfino 2013). To all of which Vostrý and Dončevová (2016) follow in their study. Their presented results of education intervention with the use of ICT showed that experimental group showed signs of improvement after 6-month intervention. The output result then being recommendations for general practice and for supporting professions which directs professionals to engage patients in regular activation activities using the ICT and similar technologies.

Research

For the purpose of this particular research the causal research problem was contemplated (Gavora, 2010): What is the influence of the use of gaming consoles on the changes of cognitive function levels among people with dementia (moderate stage of Alzheimer's disease). The goal is then to find out, whether the use of gaming consoles in occupational therapy intervention has any influence on the change of cognitive function levels. The testing itself was then done using a standardized test: Montreal cognitive test which is widely used in occupational therapy for senior members of the society and thus was applied for input and outputs testing. This test includes eight areas (focus and orientation, memory, word production, language, visual and spatial skills, abstraction, etc.) from which we focused on the testing of focus and orientation skills. The results collected in the data sets from input and output testing were provided by a comparison between experimental and control group. The group of probands was divided into experimental (E – which actively participated on our intervention) and control (C – which only used services provided by the institution where they lived) by a loss toss. For the intervention method we decided to use the console X-Box 360[®] with Kinect[®] system and freeware commercial application Dr. Kawashima's body and brain[®]. This gaming application is divided into various areas, all of which client is able to control with her body movement. ICT is then regarded as an addition to already existing standard Occupational Therapy procedures, which are usually done in a "paper and pencil" fashion. The research itself took approximately 6months, once a week, each session around 25 mins. In case of this particular study we used a comparison of data with the use of nonparametric statistical method which doesn't require normal (Gauss) data distribution which was due to low

number of individual's mere impossible. The statistical analysis contained the difference between input and output results. The difference values were then compared with each other by Mann-Whitney which calculated the effect size to be $\alpha = 0,05$.

The results

The results of the comparative data are shown in the data density distribution graph, where the X-axis is the difference between the measured parameter between the input and the output, and the Y-axis is the density distribution of the data related to the corresponding difference value on the X axis (Vostry, 2016). When presenting the overall results, the value of the Test Criterion of the Mann-Whitney test valid for the given analysis (W) and the value of the observed significance level of the given test criterion (P) is always given. As an example, we present the difference between the entry and exit examinations in the light type Alzheimer's group using the standardized Barthel Index. Table 1 describes the assessment at the entry, where the rating itself ranged between 65 and 85 points, which corresponds to a slight degree of dependence on the tested Barthel Index parameters. The degree of dependence did not change at the output, but we observed a point increase of up to 20 points for the active group. Most improvements were in mobility, while the passive group worsened by up to 10 points, but the state of dependence was also unchanged. The comparison of the calculated differences between the results of the output and the input diagnosis results in a statistically significant difference, in favor of the active group ($W = 1,0 P = 9,62.10^{-3}$). The difference distribution density is shown in graph 1. The results here are shown as a priority when changing the score. Conclusion as such has not changed, but with the overall difference we can see that the active group that participated in our June improved its score against the passive group.

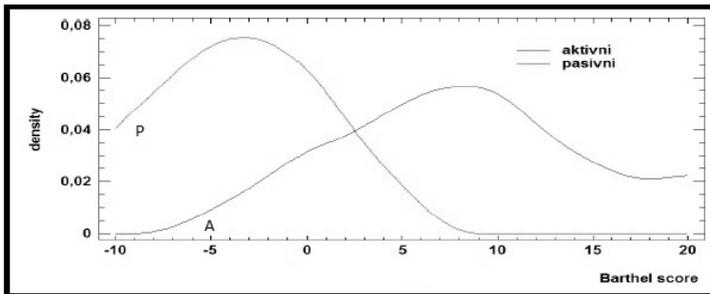
Table 1: Results of the Barthel index score - light ones, A = active participation in the intervention, P = passive attendance at the conference

VSTUPNÍ TESTOVÁNÍ			VÝSTUPNÍ TESTOVÁNÍ			VST UP-VÝSTU P
Sku pina	P očet bod ů	Závi slost	Sku pina	P očet bod ů	Závi slost	Difer ence
A	6 5	Lehk á	A	8 5	Lehk á	20

A	0	8	á	Lehk	A	0	9	á	Lehk	10
A	5	7	á	Lehk	A	0	8	á	Lehk	5
A	5	8	á	Lehk	A	5	8	á	Lehk	0
A	0	8	á	Lehk	A	0	9	á	Lehk	10
P	0	8	á	Lehk	P	0	8	á	Lehk	0
P	0	8	á	Lehk	P	5	7	á	Lehk	-5
P	0	7	á	Lehk	P	0	6	á	Lehk	-10
P	5	7	á	Lehk	P	0	7	á	Lehk	-5
P	0	7	á	Lehk	P	0	7	á	Lehk	0

Source: Vostrý (2016)

Graf 1: difference between input and output - Barthel index, light type (A = active group, P = passive group)



Source: (Vostrý 2016)

Conclusion

There is not yet any accessible commercial product on the market which could fulfil the nature of cognitive function rehabilitation (Vostrý a Dončevová, 2016). The used product which was at our disposal can be

evaluated as very useful. The tool fulfilled all criteria which were set at the beginning of the study. The only problem to which we have pointed to previously (articles, diploma thesis etc.), being the childish layout of the applications used and the set time limit, which then limits the full use of the application itself. It was the time which played a key role in completing all the tasks, which could not be done in time due to the limit set by the app. That is why only some parts of the app were used. The full potential then could not have been exploited e.g.: create and save a file of game statistics even when the game goals were not fulfilled. The contemporary world is fully open to modern technologies and that is why a question needs to be raised: if in this area should some products be created which could help seniors, individuals suffering from dementia and all other patients for increasing their life quality in general. Not only that such individuals strive to become a part of the general *populis* (which creates the majority within a society), which uses technologies regularly and actively, but also they could further develop their cognitive skills (Hill 2000). The study itself was quite complicated at first, when it comes to the negotiated time duration of the intervention, however over time organisational problems vanished completely. Probands (if we don't count in short term illnesses, exhaustion etc.) were with only little trouble participation and with little help were more than able to perform given tasks (McGrath et al., 2014). As Laver et al., (2017) stated in the management of the behavioral and psychological symptoms of dementia, and emphasize that symptoms should be prevented where possible and that, in the first place, non-pharmacological strategies should be used to manage the symptoms. One of the most effective interventions in the care of dementia is to provide staff with in-depth training on signs of dementia, personal care and the most effective communication with dementia and their carer's.

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