Education of people with dementia as part of cognitive rehabilitation

Vzdělávání osob s demencí jako součást kognitivní rehabilitace

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Abstract: This contribution paper focuses on individuals suffering from dementia (especially in this case, moderate stage of Alzheimer's disease). The research includes testing of 20 probands which were divided by an intentional selection into two groups: experimental (active participation on further special-pedagogical and ergotherapeutic, also known as work therapy intervention) and control group (passive participation during intervention). The testing 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 than 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.

Key words: Dementia. Education. Elderly education. Ergotherapy. Montreal cognitive test. Special education – intervention. Comprehensive rehabilitation.

Abstrakt:

Příspěvek je zaměřen na osoby trpící demencí (v tomto případě Alzheimerovou

chorobou – střední typ). K výzkumu jsme využili 20 probandů (z toho 100 % žen), kteří se nacházeli v jedné instituci poskytující sociální služby. Těchto 20 probandů jsme rozdělili záměrným výběrem do skupiny experimentální (aktivní účast na naší speciálně-pedagogicko-ergoterapeutické intervenci) a do skupiny kontrolní (pasivní účast na naší intervenci), vždy po deseti probandech. Samotná intervence trvala půl roku (1 x týdně, 25min.) a zahájena byla vstupním vyšetřením pomocí standardizovaného Montreálského kognitivního testu. Stejný test pak byl využit po intervenci v rámci výstupního testování a data mezi sebou byla komparována. Ze zde prezentovaných výsledků můžeme poukázat na fakt, že pravidelná intervence seniorů trpících demencí za využití moderních technologií (v tomto případě herní konzole s kinektem – pohybový senzor) a klasických testů „tužka-papír“, měla vliv na výsledky experimentální skupiny, která dosahovala mírně lepších výsledků, oproti skupině pasivní, která stagnovala, popř. se mírně zhoršila.

Klíčová slova: Demence. Edukace, edukace senior. Ergoterapie. Montreálský kognitivní test. Specialní pedagogika – intervence. Ucelená rehabilitace.

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. 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 a 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.

Methodology

For the purpose of this particular research the causational 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 ergotherapy 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 ergotherapy 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 (A – which actively participated on our intervention) and control (P – 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 his/her body movement. ICT is then regarded as an addition to already existing standard ergotherapy (work 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 $\alpha = 0, 05$.

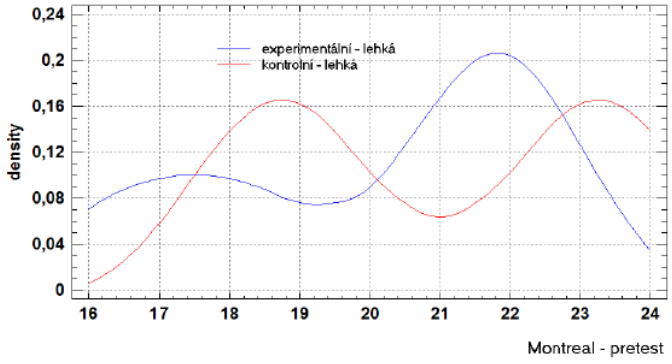
Results

During the entrance testing the results were sort of equal, the result values varied in score between 17 to 24 from the overall point count, which related to the normal distribution of data, specifically slight or deep depression. Visible changes were manifested after the output result comparison, where the experimental group (active participants of intervention program) reached higher scores than the control group (passive participation during intervention). The overall point count was slightly better among the first group, which had in average 2 points better results from the beginning, whereas the control group stagnated or had worse scores in some cases even 9 points worse from the initial testing. Based on these results it is possible to say, that experimental groups has improved in their results and therefore reached better results than the control group. The results are shown in the table n. 1 and graph n. 1, 2 a 3, which show the difference between the pretest and the posttest testing in the experimental and

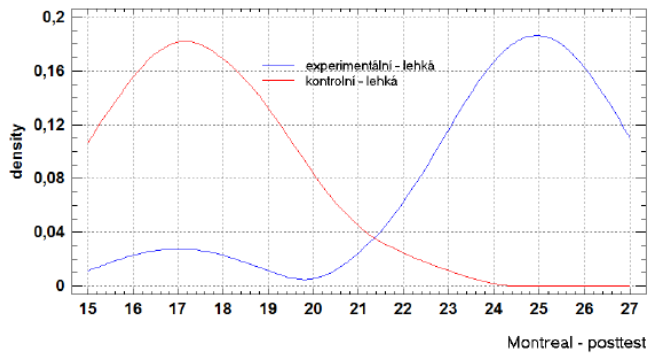
control groups. On the basis of the data obtained, we can prove that after the experiment, the experimental group achieved better results, compared to the control group, which stagnated, slightly worsened.

Coming-in		Coming-out		difference
group	Number of points	group	Number of points	
E	18	E	27	-9
E	17	E	23	-6
E	22	E	24	-2
E	23	E	25	-2
E	22	E	26	-4
E	19	E	25	-6
E	21	E	26	-5
E	21	E	25	-4
E	22	E	23	-1
E	16	E	17	-1
K	18	K	15	3
K	18	K	17	1
K	24	K	21	3
K	22	K	18	4
K	19	K	17	2
K	19	K	15	4
K	24	K	19	5
K	23	K	18	5
K	20	K	16	4
K	23	K	18	5

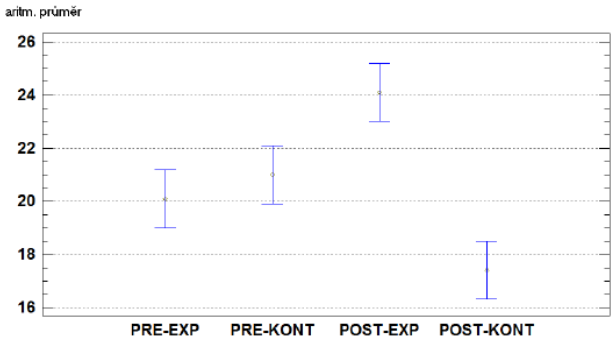
Tab. n. 1 *– Montreal cognitive test - difference between in and out testing. E = experimental group, K – controlling group (Source: own).*



Graph n. 1 *– distribution of difference between input and output testing - Montreal cognitive test: light type - experimental group - pretest (W = 62,5 P-value = 0,359974), (source:own)*



Graph n. 2 *– distribution of difference between input and output testing - Montreal cognitive test: light type - experimental group - posttest (W = 6.0 P-value = 0.000943149), (source: own)*



Graph n. 3 *– Arithmetic averages and confidence intervals of the Montreal Light Cognitive Overall Results (source: own)*

Discussion

Hátlová (2010) focused her work on psychomotor therapy for people suffering from dementia. Her approach includes exercise units, which are to stimulate an individual properly. The main idea of stimulation was also one of the goals in our study as well. In this particular intervention the stimulation included not only the movement apparatus, but also cognitive functions as well. Thanks to the body movement, probands we able to control a fictional character inside the video game connecting cognitive functions during which they also had to think about their move and use their memory, not to mention the cognitive training itself. Kolářová et al., (2012) in her article describes the work with elderly using the idea and observation of movement during cognitive and movement rehabilitation and states that the observation itself and imagination of movement has a positive influence on the optimal movement performance not only to be used for sportsmen, but also for people after trauma, or other neurological diagnosis. The resulted movement is then described by the individual quality of cognitive functions. These include: orientation in space (using visual and spatial area, which was a part of the rehabilitation process). The results of the study point to the fact, that the use of ICT has a positive effect on improving cognitive functions, based on the results of the experimental group

(scored more point at the end using Addenbrooks cognitive test).

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 safe 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.

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