

Combined Therapy for Patients after Ischemic Stroke as a Support of Social Adaptability

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Abstract

THE OBJECTIVE: The main objective of the research was to find out the effectivity of the combined therapy suitable for patients after ischemic stroke (promoting social adaptability). The therapy itself is then focused on robotic, psychomotor and cognitive therapy. The research indicators were divided into three categories of psychological, social and cognitive indicators.

PROBAND SAMPLE: We have a 58 probands diagnosed with a stroke participated on the research (ischemic type I60-I69; ICD-10; the 10th revision of the International Statistical Classification of Diseases and Related Health Problem), out of which 49 were male patients ages between 48–55 and women between the age of 45–51. The data collection was then done during 2018. Indicators were evaluated and tested firstly after the initiation of the combined therapy, then after 10 weeks of intensive therapy, which took place 3 times a week 45 minutes for each patient participating in the research.

RESULTS: The results of the research point to the fact, that combined therapy of robotic, psychomotor and cognitive can have positive effect on, and be suitable as a treatment for patients after ischemic stroke, regarding their productive age. Positive results have been therefore overt among all tested areas.

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INTRODUCTION

Ischemic stroke is an overtly pervasive global and world-wide discussed clinical phenomenon, as well as a socioeconomic issue, despite the current development in treatment, care and prevention. In Czech Republic alone, in 2016, more than

19 000 patients with this diagnosis were hospitalized and treated in specialized cerebrovascular medical centers (Tomek *et al.* 2017). This is the most frequent acute disease/illness among neurology patients. Third group patients succumb to their state every year and more than a half of all cases, who survive, have severe limitations of cog-

nitive and motor functions. This makes them lastingly dependent on care of others (Adamovičová, 2003; Yue *et al.* 2019). A very important key measure for patients after ischemic stroke is mainly secondary type of prevention, which needs to be taken into consideration as a complex approach including not only pharmacological therapy, but also nonpharmacological approach. These among other measures has the goal to minimize the danger of relapse, or further deterioration of the current state of the patient. When it comes to resocialization of patients after ischemic stroke, substitution or resuscitation of damaged functions plays a key role in the treatment process. The greatest challenges and deficiencies can be then detected while performing daily tasks, as hygiene, eating instead, mobility, verticalization, etc. Speech impairments and disorders such as aphasia or dysarthria are then diagnosed in among over 60 percent of the population after suffering from an ischemic stroke (Šaňák, 2018; Solgajová *et al.* 2017). One of the serious deficiencies is apart from locomotion issues, also cognitive issues. These can be detected in over 92 % of all diagnosed cases.

In the current state after ischemic stroke, cognitive function may also fluctuate, thus the minimum duration for any cognitive function testing is set to a 3-month threshold after a stroke episode (Konečný *et al.* 2017). Modern approach in rehab process suitable for patients with ischemic stroke is mainly relying on robotic therapy. The robotic walking motion rehabilitation represents an advanced rehabilitation technology which has become center of attention of the academic and professional society. This approach originated as a modification of treadmill rehab processes to improve walking motion in tow or relaxed movement.

Taken from physiotherapy practice, the rehabilitation of overall walking motion among patients after ischemic stroke takes usually around six months. Demonstrable changes can be observed in first three months after the stroke episode (Škoulodík *et al.* 2017). When it comes to traditional rehabilitation concepts, the main focus is to put towards improvement of motor and cognitive skills of a particular patient (Dietz, 2009). Purposefully we then help patients to improve their life quality and in cases of patients in productive age, the rehab process aims also towards other various possibilities of work placement. Historical overview of the treatment taught the medical professional community only to reduce pain and suffering of the patient. The modern trend on the other hand engages mainly in supporting independence for life quality improvement of the patients (Chua *et al.* 1999).

MATERIAL AND METHODS

The main objective of the research was to find out, how effective is the combined therapy for patients diagnosed with ischemic stroke (both embolic and thrombotic

type) according to the classification of disorders, listed as I60-I69; ICD-10; the 10th revision of the International Statistical Classification of Diseases and Related Health Problem. The Therapy focused mainly on robotic, psychomotor and cognitive therapy and skill development. Somatic, psychological, social and cognitive indicators were tested and observed among 58 selected patients, out of which 49 were male, ages 48-51 and women, ages 45-57, who have not been diagnosed with any speech impairment. Data collection was realized from 2018/January.

The initial examination was initiated before initiation of therapy and the final examination following completion of the therapy. The indicators were evaluated and assessed after the combined therapy was initiated, then again after 10 weeks of intensive therapy. The therapy itself then took place 3 times a week, mainly by individual appointments with patients, each about 45 minutes per patient, based on individual needs and possibilities of each patient. The main methodology used for assessment was the international classification of illnesses and disorders (ICD-10), Functional Independence Measure questionnaire (FIM; test evaluating the management of everyday activities with the subsequent calculation of the overall envy or independence from the surroundings; modified from older version of Barthel Test) and Mini Mental State Exam (MMSE; test evaluating individual components of cognitive functions with an overall calculation of cognitive deficit), (Siverová *et al.* 2016; WHO 2014 and 2017) Based on the previously mentioned criteria, the following indicators were selected for analysis:

- *Cognitive and psychological indicators:* state, mood changes, willpower, focus, orientation and memory;
- *Somatic indicators:* endurance, movement coordination, stability range of movement;
- *Daily routine task indicators:* dressing-up, hygiene;
- *Social indicators:* adaptability, collaboration;
- *Research sample:* 58 patients (100%), out of which 49 men (ages 48-55; 84,5% of total) and 9 women (ages 25-51; 15,5% of total);
- *Therapy:* robotic therapy using the Amadeo® and MOTomed Reck Viva 2 Pro; cognitive rehabilitation and psychomotor therapy;
- *Diagnosis:* iCMP (Czech) (I60.0-I60.9; MKN – 10);
- *Assessment scales:* (modified ICF and FIM, MMSE); 95,0% Tukey HSD test $\alpha = 0,05$;

The assessment has been done according to the previously mentioned methodology. In our case, this can be considered as a longitudinal and qualitative form of research.

RESULTS

Patients moved at the initial examination very similar to the point level in the monitored indicator FIM - Daily Activities it was ± 45 points, in the monitored indicator FIM - Mobility at ± 25 points, in the monitored area

Contrast	Diferrence	Values +/-
FIM – Daily Activities – input/output	-3,95	4,0951
FIM – Mobility – input/output	-8,98	4,0752
FIM – Social – input/output	-2,48	4,0842
MMSE – input/output	-2,21	3,5419

FIM - Social ± 25 points and in MMSE on ± 19 points. Based on the presented results, it is evident that the monitored groups experienced a point improvement of 5 points in the monitored indicators on average. The given questionnaire research resulted in the following findings: In case of somatic, psychological, social and cognitive indicators, we have found significant differences in all groups of indicators ($p < 0,05$; also, among other tested indicators), meaning the tested group with the iCMP diagnosis has shown significant improvement over the initial testing. The presented results point to the fact, that improvement has been proven among all tested indicators. In the case of daily living, mobility and social skills, the tested patient group improved mainly in areas of communication skills, verticalization, hygiene and mobility. The MMSE testing then showed significant improvement of short term memory, language and orientation skills. Overall, the combined therapy has scored to have a positive impact on patients, due to the fact, that all observed and tested indicators

improved after 10 day therapy intervention. Detailed statistical results are shown in Figure 1.

DISCUSSION

Based on the results presented, we present the following. Combination of somatic, psychological and cognitive deficiency creates an assumption that we have to initiate with somatic or psychological therapy, thus cognitive deficiencies are not prioritized and can be often neglected. If our goal is to have patients to be socially adaptable, it is not possible to only build intervention on motor skill stimulation, but also cognitive training.

The intervention process focal point was mainly support of active movement in collaboration with elements of cognitive rehabilitation. Movement was stimulated via psychomotor therapy procedures, which are always undergone by active participation and movement, which requires also certain amount of willpower to perform. This is a support method which parallel to pharmacotherapy and surgery, can have beneficial effects (Valenta *et al.* 2010). Robot therapy that was chosen for this particular study has become more popular over the recent years. Studies verify the positive effect on various research samples, and also predict that due to such intervention processes, testing and assessment methods should improve in the future as well (Flemer *et al.* 2014). On the contrary, some studies view these outcomes not in such high esteem and are more skeptical towards

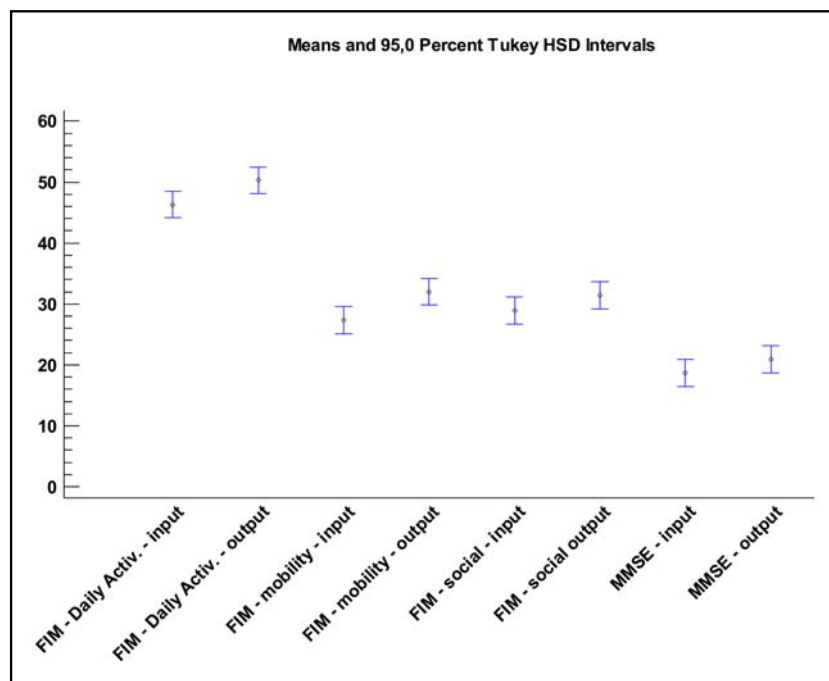


Fig. 1. Influence of Combined Therapy on Monitored Indicators (tested by FIM – Functional Independence Measure and MMSE – Mini Mental State Examination)

FIM - Daily Activities; comparison of input and output testing (after 10 weeks; $p = 0.0008$);
 FIM - Mobility; comparison of input and output testing (after 10 weeks; $p = 0.0001$); FIM
 - Social Indicator; comparison of input and output testing (after 10 weeks; $p = 0.0025$);
 MMSE; comparison of input and output testing (after 10 weeks; $p = 0.0055$).

the use of such intervention. In such studies the reasoning behind this is that robot therapy may improve patient motor skills, however the direct causation of the improvement hasn't been yet fully verified and further testing is required (Bayon *et al.* 2016). Cognitive function deficiencies of various etiology is frequently neglected in practice, which is mainly proven among population of patients after ischemic stroke, who show signs of cognitive and motor issues even after rehabilitation. The therapy is then devoted mainly to motor skill development more than to cognitive skills. This idleness and inactivity can negatively influence the deficiency of such however. Our main recommendation is therefore a regular and effective movement in compliance with cognitive training focused on specific areas of cognitive function (Vostrý *et al.* 2019).

CONCLUSION

The global goal of the society is currently the issues of overcoming the aging population problems, which will require a gradual adaptation to a new demographic. Objectives of such adaptation lay mainly in social exclusion and discrimination prevention of this age group with a particular handicap. All measures of prevention then engage in active life style during lifetime and old age (Amman-Reiffer *et al.* 2017). The presented study results, focusing on patients with cognitive issues show that combined efforts in psychomotor and robot therapy can have positive effect on the observed area (cognitive functions, independence, social adaptability and somatic changes). Among all tested groups of patients proved significant point improvement opposite the initial testing. It has to be also mentioned however, that there are also limitations to the study results as well. Main issue, of course is that the verification of the therapy efficiency is not a clear process. We may observe countless other variables, which may also influence the output results of the testing. This considers mainly intrinsic and extrinsic conditions. That is why we label this type of intervention as a support type for patients with cognitive deficiencies (Hátlová *et al.* 2017). Intervention is then initially supporting social adaptability of the research sample. The environment in which the intervention takes place also plays a key role in the social adaptability. This pointer, which is also defined in the ICD -10, has not been however taken into account for the assessment, due to the fact, that the research sample contained only short-term hospitalized patients (Fischer *et al.* 2017).

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