ORIGINAL ARTICLE

The Effect of Combined Therapy on the Support and Development of Social Skills of people with Multiple Sclerosis in Senior Age

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Abstract

OBJECTIVE: The article contains results of longitudinal research. The aim of the research was to find out how psychomotor therapy with the use of elements of ergotherapy (with the support of cognitive functions; with the support of robotic assisted therapy) on the support and development skills of people with sclerosis multiplex (SM; *sclerosis multiplex*) in facilities providing social services members of the probands.

PROBAND SAMPLE: The research was carried out in 46 probands, with 43.5% of men and 56.5% of women aged 65-67 years. The main relevant feature for the selection of probands was the established diagnosis Multiple Sclerosis (*according to ICD-10; G35*). Another relevant feature for the selection of probands was the length of stay in the facility, which was at least 1 year from the actual start of the facility. The assembled research sample was divided according to other criteria by deliberate selection into the experimental group and the control group. The experimental group participated actively in our intervention and consisted of 23 probands of which 10 were men and 13 were women. The control group only participated in the therapies performed at the facility and did not participate in our intervention. The control group also included 10 men and 13 women. The intervention itself lasted 5 months, three times a week for 40 to 55 minutes. We provided input and output data using a standardized test (*FIM test; FIM test; Functional Independence Measure*). Subsequent comparison of obtained data between input and output testing was performed by *Tuckey HSD test at significance level α = 0.05.*

RESULTS: The achieved results (at the significance level α = 0.05) show that the experimental group underwent better results in comparison with the initial testing and in comparison with the control group, which rather stagnated in the results, respectively. slightly worsened compared to initial testing.
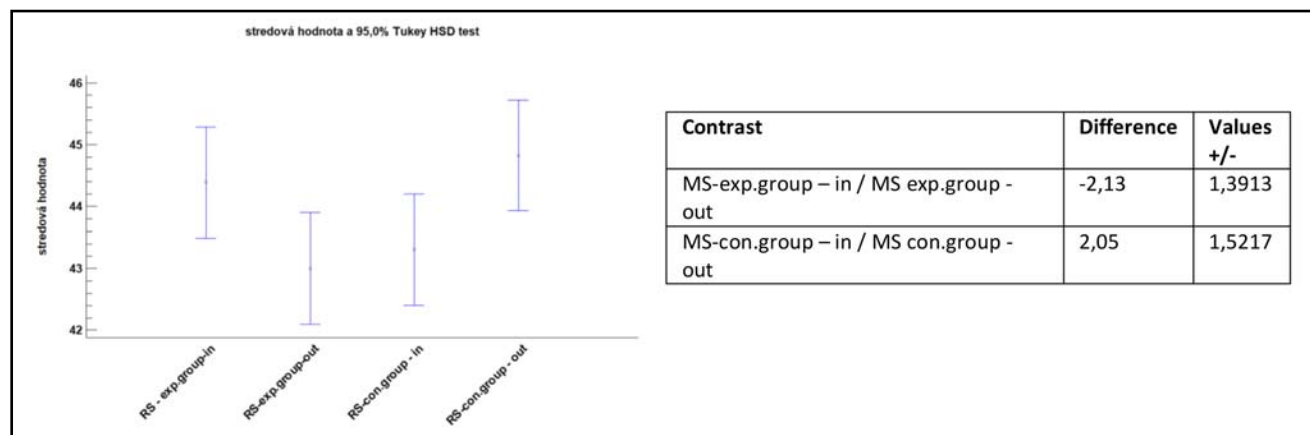
CONCLUSION: The presented results show an improvement in the experimental group that participated in our chosen combination therapy. We therefore recommend this therapy as a suitable therapeutic activity associated with the given diagnosis with regard to the age of the patients.

INTRODUCTION

The number of multiple sclerosis diagnoses in the last years is on the rise and it affects predominantly young women aged 20-40 (Vališ *et al.* 2017). The disease presents a multi-focus inflammation disease of the central nervous system (CNS) of young adults. Part of the cause is an auto-immune and neurodegenerative (immunopathological) projection in the pathological phase, when the immune system attacks the antigens of (above all) white matter of the CNS (the grey matter, however, gets damaged as well), (Havrdová, 2008; Filippi *et al.* 2020). The cause of the disease is not known, but today, genetic predisposition combined with external factors. Multiple sclerosis is a polygenetically hereditary disease, where only a part of the causing genes is known. From a genetic standpoint, however, the disease is not considered hereditary. The mechanism triggering the autoimmune process can be a viral or bacterial infection. MS can also be caused by environmental agents (above all highly polluted environment), where the immunity of an organism is compromised (Meluzínová, 2008; Lassmann, 2020). The majority of MS cases (up to 85%) starts with a series of relapses and remissions, which go into the secondary, progressive phase within the space of 10 to 20 years. This does not happen always, however, and a certain percentage of patients the relapse portion is not present and there is a steady rise of neurological disability. The prevalence of MS in the Czech republic is estimated to be 170 to 200 per 100,000 people, i.e. 17-20 thousand affected (Horáková, 2011). Patients with multiple sclerosis experience various symptoms, motoric function impairment, however, seems to be present in a majority of cases. Significant changes can be observed specifically in the way people diagnosed with MS walk. This start off with the walk becoming slower, and the postural stability is impaired, together with a different movement pattern of the ankle, especially during dorsal flexion in the stance phase. The walking differences get more noticeable as the neurological deficiency grows. This process coincides with the weakening of muscles with the localization in the flexors of the knee joint (Kellheher *et al.* 2010). Apart from motor deficiency, cognitive deficiency can be observed in up to 65% of patients. A significant breakthrough was also the fact that cognitive deficiencies are not directly bound to the physical state of the patient. The most often observed deficiency is an impairment of working memory, which impacts the ability to learn and cognitive performance (Mezerová *et al.* 2014; Thompson *et al.* 2017). These symptoms, which are present in patients with MS can be summarized to sphincter issues (urinary incontinence); Depressions, which are the most prevalent psychological syndrome (occuring in up to 75% of patients with experience at least one depressive episode while diagnosed); Furthermore, physical and mental fatigue are reported (this symptom is described by the patients as the most disabling). Other symptoms include spasticity (spastic paresis), which contributes to the image of central motoneurons and is regarded as a prevalent mobility-limiting symptom. Balance is also impacted, which is caused by impaired proprioception, weakening of motor strength, impairment of muscle coordination or sight impairment (Novotná, 2013). The degree of impairment in the rehabilitation practice is expressed by using the EDSS (Expanded Disability Status Scale), which measures neurological disabilities (*Expanded disability status scale: Kurtzke; 1983*). In the case of this scale, the disability is quantified based on the evaluation of seven functional systems: sight, motor skills, cerebellum functions, brain stem functions, sphincters, fatigue evaluation and cognitive deficiency. Furthermore, tests such as the Timed 25 foot walk test (T25FW) are used, which is measured over the distance of 25 feet (7.62 metres). Above all, the speed and regularity of the walk are evaluated. Furthermore, tests such as 10 metre walk speed are used, where maximum speed and safety of walking are measured. Other tests include the Timed up and go test (TUG). The test involves rising from a chair, walking 3 metres and back again. The last extensive test is also a walking test for 6/2 minutes, where the walking endurance is measured (Novotná *et al.* 2013).

Rehabilitation plays an important part of the treatment of patients. The goal of complex rehabilitation is to ease and master basic daily activites, which enables the patient to learn new skills, which aid in the patient's mobility control, self-sufficiency, communication and it also supports social adaptability (social and work integration). The first phase of the rehabilitation is called diagnostic. This is where the patient is diagnosed with multiple sclerosis and this diagnosis is presented to them. Patients often experience shock and thus the ability to accept new information is impaired (Barnes, 2003). In this case, psychological intervention and help from family members. This phase is followed by early rehabilitation phase, which focuses on motoric treatment. Physiotherapy and ergotherapy play an important role; these are based on the neurophysiological basis of brain plasticity, and supports adaptational changes in the nerve structures. In the late phases of rehabilitation, patients usually lose individual phases and their functional endurance and ability lowers. Rehabilitation is therefore targeted to treat issues connected to the motor impairment, walking and stability, or the treatment of spasticity (Hoskovcová *et al.* 2008). In the case of postural instability, patients often use various forms of balance exercise focusing on the oculomotoric system. In general, we can say that rehabilitation shows little evidence of positive impact of stability

Contrast	Difference	Values +/-
MS-exp.group – in / MS exp.group - out	-2,13	1,3913
MS-con.group – in / MS con.group - out	2,05	1,5217

Fig. 1. Influence of intervention on the improvement on managing everyday tasks compared to input and output testing of the test and control groups of patients diagnosed with Multiple sclerosis.
Note: The comparison between the input and output test of MS diagnosed patients; MS - exp.group - in (Multiple sclerosis; test group; input test) / MS - exp.group - out (Multiple sclerosis; test group; output test) - P = 0.3426 and MS - con.group - in (Multiple sclerosis; control group; input test) / MS - con.group - out (Multiple sclerosis; control group; output test) - P = 0.4314. Source: own research

training on postural instability. In practice, stimulation is provided by the so-called robot-assisted therapy, Flowin®, Posturomed, SMART Balance Master®, BalanceTutor(tm), etc. (Řasová, 2017).
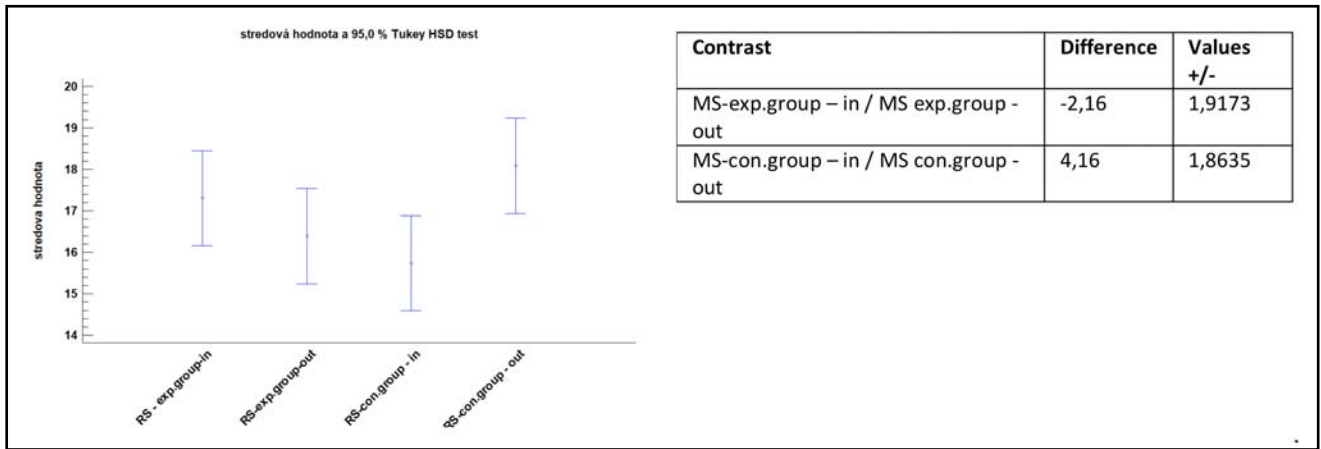
MATERIAL AND METHODS

The goal of the presented research was: To determine how combined therapy (*psychomotoric therapy; physiostherapy; ergotherapy; robot-assisted therapy; cognitive therapy) influences the social adaptability of patients diagnosed with multiple sclerosis (according to the ICD-10; G35). Social adaptability is understood as improvement in the observed criteria, i.e. mobility and self-sufficiency. The research was performed in social service centres in 46 patients, 43.5% male and 56.5% female, aged 65-67. This is the main relevant criterion for the performed research. Another relevant attribute of the selected subjects was the length of stay in the social service centres, which was to be at least 1 year since their admission to the centre. The subject pool was divided based on other criteria by deliberate selection into 2 groups, a test group and a control group. The test group actively attended our interventions and consisted of 23 subjects, 10 male (43.5%) and 13 female (56.5%). The control group attended only the therapy sessions organized by the given centre and did not attend our interventions. This group consisted of 23 subjects as well, 10 male (43.5%) and 13 female (56.5%). The intervention lasted for 5 months, with 4 weekly meetings with a duration of approx. 45 minutes each, performed above all as individual therapy. As mentioned above in the theoretical data, we chose a standardized test aimed at the evaluation of functional independence (*FIM test; Functional Independence Measure*). Compared to the above mentioned tests which observe the patient in real time and measure mobility in particular, FIM test enables us to get a comprehensive view of the patient's

state and compare any improvement or deterioration in the results with previously obtained data. The comparison of input and output data was performed by the Tuckey HCD test with a significance level of α = 0.05. For the interventions, we chose psychomotoric therapy, elements of ergo- and physiotherapy, balance exercises and robot-assisted therapy, repeated periodically on an individual basis. During the interventions with the test group, the patients' individual needs were regarded.

RESULTS

In the case of support and development of social skills in multiple sclerosis patients, these results were observed and presented. In case of the first monitored indicator (see graph 1), which monitors the ability to perform routine daily activities, we can see that the test group performed better at the end of the research compared to the start of the research and the control group. The level decreased by 2.13 points, which means the individual was less dependent on the assistance of caretakers. The control group's level increased by 2.05 points after attending regular therapy, which (according to the FIM test results) means more dependency on caretakers. A similar result can be observed in the second indicator (see graph 2) which targets mobility development. In the case of more frequent interventions, the test group's level dropped by 2.16 points, which points to the subjects' better gross motor skills. The difference was most noticeable in walking, which became more stable. However, the walks still had to be accompanied by assisting instruments, e.g. walking canes or crutches. The control group's level, on the other hand, rose by 4.16 points, which was the biggest rise in the monitored indicators. The last monitored indicator (see graph 3) targeted the development and support in social adaptation. In this case, similarly to the previous results, the test group achieved better

Contrast	Difference	Values +/-
MS-exp.group – in / MS exp.group - out	-2,16	1,9173
MS-con.group – in / MS con.group - out	4,16	1,8635

Fig. 2. Influence of intervention on mobility development compared to input and output testing of the test and control groups of patients diagnosed with Multiple sclerosis.
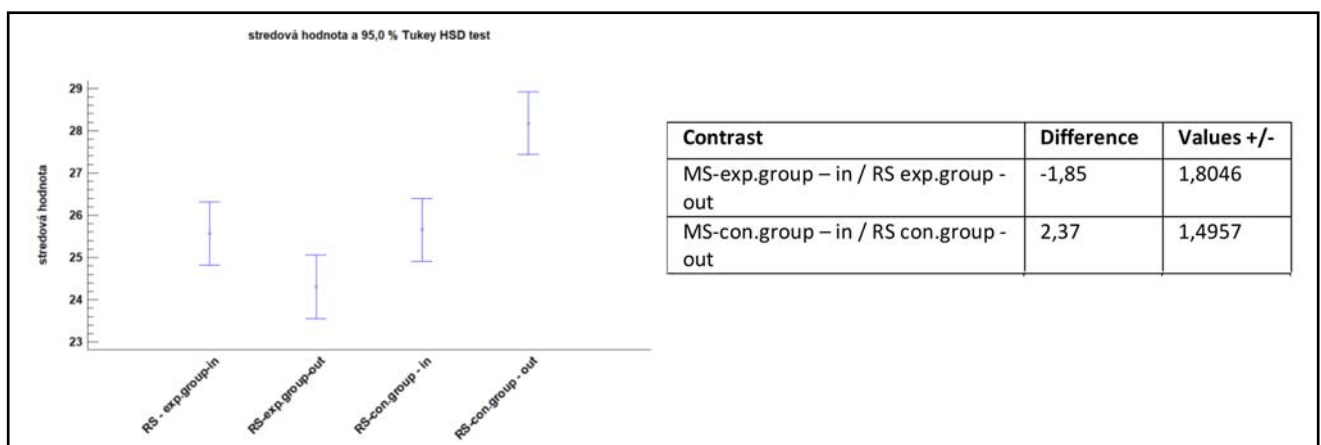*Note: The comparison between the input and output test of MS diagnosed patients; MS - exp.group - in (Multiple sclerosis; test group; input test) / MS - exp.group - out (Multiple sclerosis; test group; output test) - P = 0.5681 and MS - con.group - in (Multiple sclerosis; control group; input test) / MS - con.group - out (Multiple sclerosis; control group; output test) - P = 0.1484. Source: own research*

results compared to input testing and the control group. The test group's point level lowered by 1.85 points and the test group grew by 2.37 points, which meant increased dependency on the help of caretakers. The presented results point to the fact that if the frequency and duration of our interventions are increased, there may be better results for such a group of subjects. In our case, this was a test group which apart from standard rehabilitation approaches also engaged in our interventions. It is, at this time, important to also point out the possible limits of this study, which may to affect the end results to a significant degree. Among the limits of the study for this research, we may mention, from our standpoint, above all low motivation of patients and their opinion on their diagnosis. The duration and intensity of the chosen therapy may affect the end results. Higher or lower intensity of the treatment may influence our output. We cannot disregard the

ongoing attacks of the illness, which were, however, not observed in either group over the course of the therapy. Lastly, we must mention the engagement of the therapeutical team. To mitigate the above mentioned limits as much as possible, each group of subjects got their own therapeutist. This therapeutist worked with the same subjects along the entire duration of the interventions, including the input and output testing, according to a rehabilitation plan agreed upon ahead of time.

DISCUSSION

Based on the results of the performed research, we have come to the following recommendations for practical treatment. A combination of somatic, psychological and cognitive deficiency can, in practice, create an impression that it is necessary to firstly take care of the somatic or psychological issues, i.e. the problem that

Contrast	Difference	Values +/-
MS-exp.group – in / RS exp.group - out	-1,85	1,8046
MS-con.group – in / RS con.group - out	2,37	1,4957

Fig. 3. Influence of intervention on social adaptation compared to input and output testing of the test and control groups of patients diagnosed with Multiple sclerosis.
Note: The comparison between the input and output test of MS diagnosed patients; MS - exp.group - in (Multiple sclerosis; test group; input test) / MS - exp.group - out (Multiple sclerosis; test group; output test) - P = 0.0878 and MS - con.group - in (Multiple sclerosis; control group; input test) / MS - con.group - out (Multiple sclerosis; control group; output test) - P = 0.07244. Source: research

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is most apparent and limiting. The cognitive side of the issue then takes a back seat, however it directly influences the other facets of the disease. During our longitudinal research, it became obvious that when combined/complex rehabilitation processes are applied, the patients exhibit improvements in the observed indicators. The majority of MS-diagnosed patients we observe lower stamina, caused by inactivity, which in turn leads to the worsening of the individual symptoms. The goal of the research was to look comprehensively at the patient and the development/support of all affected and unaffected areas.

The therapy chosen and practiced by us was built on active movement support together with cognitive rehabilitation elements. In practice, we talk about supportive therapy, which can be employed in parallel with pharmacotherapy (Gál, 2018; Novotná, 2016; Flemr *et al.* 2014). By using complex/combined therapy, we can observe significant improvement of the affected areas. The problem often encountered in practice is often encountered by the elderly, who live in nursing homes. There, the main issue is the disinterest of family and relatives, who may benefit the therapy itself with their presence. Previous research done on people diagnosed with Alzheimer's disease (according to ICD-10; F00.01) shows that subjects which were accompanied by family during the therapy, got better results in the output test than the group where family did not take part. However, it is impossible to compare these diagnoses. If we focus on the cognitive side of the issue, patients with multiple sclerosis and their spectrum of cognitive deficiencies varies from e.g. people who experienced a brain attack or people who experience dementia.

CONCLUSION

Patients diagnosed with multiple sclerosis often experience mild cognitive disability, and often it can easily go unnoticed in social interactions, however the cognitive functions can worsen over time. Therefore, it is necessary to stimulate these segments as a form of prevention. In this case, we are using symptomatic treatment, which helps young adults stay capable of work (Vostrý *et al.* 2019; Novotná *et al.* 2018; Šolcová, 2017; Charvet *et al.* 2017) The approach to patients can be distinguished into three basic types which we focused on during the therapy. The model is an A-B-C model, where A represents impairment in daily activities, B for behavioral changes and C cognitive functions. All these areas present certain limitations for the patient and they have to be taken into account during the rehabilitation. All in all, the approach points to the support of social adaptability. Based on the research we performed, we added category D to the existing model, which in our case represents depressions of the given clients. This is a psychiatric problem which may directly or indirectly influence the cooperation of the client, and thereby limit the potential improvement of the client's state. In

practice, a substantial portion of clients suffer from this issue and as such, it cannot be ignored. Following the aforementioned, in our observation the clients should be observed in four basic areas, A-B-C-D (Sumowski *et al.* 2018; Jirák *et al.* 2009; Vostrý *et al.* 2020).

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