Traditional Chinese Medicine in Distance Physiotherapy of non-specific Back Pain during the COVID-19 Pandemic

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Abstract:

This paper deals with the use of meridian exercises of Traditional Chinese medicine in physiotherapy. On a selected sample of 30 probands aged between 19 to 55 years who met the set criteria, the effect of exercises for non-specific pain in the cervical, thoracic and lumbar spine was examined. The pilot prospective study compares the intensity of pain in 3 areas of the back before the start of a 4-week cycle exercise at least 3 times a week and after the end of the exercise cycle. After a series of meridian exercises there was a statistically significant pain reduction in the cervical spine ($p < 0.05$), in the thoracic

spine ($p < 0.05$) and on the level ($p < 0.05$) in the lumbar spine. The pain frequency during the week decreased by an average ($p< 0.05$) of a day. The pilot study unequivocally confirmed the positive effect of meridian exercises on reducing the intensity of pain in 3 back areas as well as on reducing the frequency of perceived pain. The addressed issue has a perspective both on the level of physiotherapeutic procedures and their diagnostic use and from the point of view of Traditional Chinese Medicine with the impact of meridian exercises on individual elements, such as organ systems.

Introduction

Back pain is one of the most common diseases that has plagued humanity through history. The frequency of spinal diseases occurrence ranks second to seasonal viral diseases of the upper respiratory tract. According to statistics 70-85% of people at some life stage suffer from back pain. Their prevalence is 15-45% per year and the lifetime incidence reaches up to 84% [1, 6]. Pain can appear in all parts of the spine, most commonly in the neck and lumbar region. The occurrence ratio in individual spinal sections is 4: 2: 1 for lumbosacral, cervical and thoracic region [14]. Back pain mainly affects people in their productive period, where the maximum incidence peaks at 35-55 years of age [11, 14]. With increasing average age

of the population, the incidence of back pain rises. Taking into account the driving forces, conditions of its occurrence and the trends of incidence, which keep on shifting to lower age groups, back pain falls within the so-called civilization diseases. It often affects young women of fertile age and what is needed here is to act causally in prenatal period during psychophysical run-up to childbirth [12]. Most back pain conditions have a benign course. About 90% their causes are not known; therefore they are described as non-specific [9]. It

is definitely a physical activity that serves to avoid non-specific back pain. Physiotherapy enjoys large numbers of special methodologies and procedures that can prevent back pain with regular exercise. The aim of this paper is to point out the possibility of using Traditional Chinese Medicine exercises for non-specific back pain.

Traditional Chinese Medicine

Western culture doesn't provide any more than official school medicine (Western, modern), whereas in China there are two official schools of medicine, namely modern, Western Medicine and Traditional Chinese Medicine. The latter is characterized by its clear and utter indirectness. Diseases are not diagnosed histologically, laboratory-technically, radiologically, etc. Monitored are above all symptoms that are being analyzed [10]. Terms such as meridians or tendon-muscle pathways are not recognized in common medicine in our region, yet in Traditional Chinese Medicine it is a matter of everyday use like our terms muscle and bone. According to Traditional Chinese Medicine, Chi is the primary substance of the universe. It is understood to be a being-in-itself, in all its forms. It is neither an entity itself that could be somehow delimited or isolated, nor it is a product of an organism. Chi is the vital root of the organism. It is the force due to which an organism: comes to life; maintains its course and initiates all its functions [2].

Chi functions in the body are:

1. The function of the driving force – the basic energy that feeds all life corporal processes (activity of organs, metabolism of substances, formation of new blood)
2. Thermal insulation function – a source of heat for the human body
3. Protective function – prevents the body from entering external harmful factors
4. Retaining function – keeps the flow of body fluids in strict pathways
5. Transformation function – metabolism
6. Nutritional function – supplies nutrients to all parts of the body

There are 3 qualities of Chi in Traditional Chinese Medicine: germinal, hereditary, and energy coming with breathing. Movement is the essence of these 3 qualities. Their cycle in the body involves four basic movements: ascent,

descent, intake and release. The movement of Chi triggers and keeps the individual organs working and coordinates their interaction. Disrupted activity in at least one of the organs causes disruption of the whole organism. When the flow of Chi in the body is not uniform, it incites first mental and then functional and organic changes up to dying-away and death – time when the flow of Chi is fully interrupted. Chi flow affects person's emotions and will, mental and physical activity as well. If the flow of Chi is in balance, one is healthy, efficient, feels well, self-poised and cheerful. Chi can be perceived as a force that forms the basis of all activities of man and nature. Chi flows through man in pathways called meridians or acupuncture pathways [8]. It describes 12 proper pathways, the names of which are derived from the terms of the internal organs to which the individual meridians are related. These are the pathways of lungs, colon, kidneys, bladder, liver, gallbladder, heart, small intestine, spleen, stomach, pericardium, and triple warmer.

Aim

The aim of this work is to point out on the use of set of meridian exercises in physiotherapy, to ascertain the effect of meridian exercises on the reduction of non-specific pain in the cervical, thoracic and lumbar spine areas.

Participants

The whole group of probands participating in the study consisted of 30 addressed and selected individuals. From this sample, 5 were men (17%) and 25 women (83%), with an age average of 34 years, ranging from 19 to 55 years. Based on the information obtained the inclusion and exclusion criteria of the probands were determined. Since meridian exercises belong to a group of relaxation exercises, the first basic criterion for the selection of probands was the presence of physiological range of spine's mobility as well as that of large joints [5], while the mobility range should not exceed the limit of hypermobility by ensuring that no probands were diagnosed with hypermobility in the past.

The second basic selection criterion was the age limit from 19 to 55 years. The third basic selection criterion was that all participants were healthy people who had not been diagnosed with a serious illness and had aptitude for cooperation. The established exclusion criteria were based on contraindications to exercise, namely: pregnancy; women at puerperium; medical conditions after surgery or acute injuries; severe decompensated chronic diseases; conditions after operations of lumbar, knee or shoulder joints or spine; ongoing infectious diseases; feverish conditions. An informed consent to the personal data protection was obtained via the electronic form by which probands' filling in, confirmed they were duly familiarized with the nature of the study, its content and personal data protection and agreed with the included information. The online sheet was filled in anonymously with a four-character identification code established by each study participant.

Methods

For the purposes of elaborating a pilot prospective study, the method of a self-designed questionnaire was used, focusing on a quantitative analysis. The questionnaire contained 5 closed and 7 open questions with 100% return rate. The prospective study took place through November 2020 to February 2021. Due to changes in epidemiological situation in Slovakia associated with COVID-19, the course of the practical part of the study was carried out at a distance. Study data were obtained using an online form filled in by the proband himself. Before filling in all probands were thoroughly informed on: the goals; course; nature of the study; exercise contraindications; and the urgency to exercise 3 times a week.

Instructions for practicing meridian exercises were sent to them online in the form of a text document with appropriate pictures of performing individual exercises. Using the online form, the sex, age, health status and level of physical activity in the everyday life of the probands were ascertained. In its basic form it also focused on objective indicators of the range of mobility and symmetry of movements in each of the probands. The most important part of the form were questions focused on the individual perception of intensity and frequency of pain in the 3 parts of the back using a 10 point numerical pain scale [7] and on the frequency of perceived pain during the week. Probands were instructed as to the importance of performing exercises with no pain – in case of exercise difficulties in terms of cracking, peeling, joint pain, it was recommended to

change the position or exclude the exercise from the set, or contact a physiotherapist. During the study only one feedback was noted due to problems with one of the exercises; the problem was eliminated through a video call following due instruction. After initial instruction, filling out an online form, and self-study meridian exercises, subjects completed a 4 week exercise cycle with 3 exercises per week. Four weeks after the exercise cycle they filled out the online form again. All data were recorded in MS Excel table and then statistically processed using descriptive and analytical statistics. Within the analytical statistics framework we used a standardized two-way Student's paired t-test, where 0.05 value was determined for the level of alpha significance. The processed data are presented using pie and bar charts and tables.

Results

The research group consisted of 30 addressed and selected probands with an average age of 30 years ranging from 19 to 55 years. For the purposes of statistical processing, they were divided into several age categories by 7 years (Chart 1).

From the examined sample 6 subjects reported a manual type of employment, that is 20% of probands; whereas 63% of probands, 19 persons

Chart 1 Number of probands sampled into individual age categories

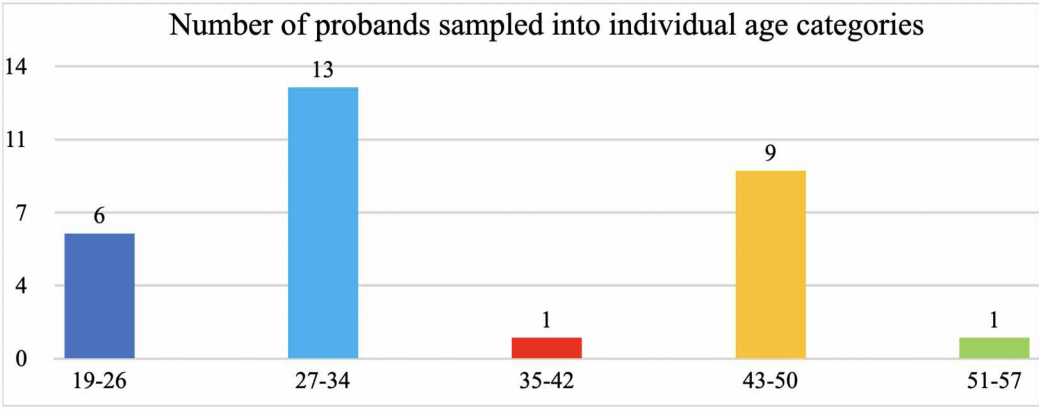
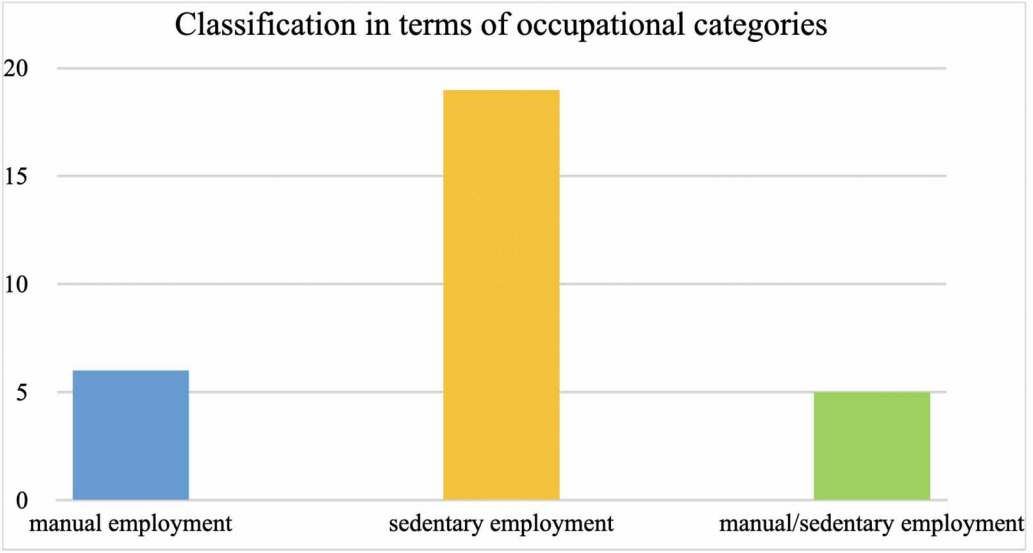


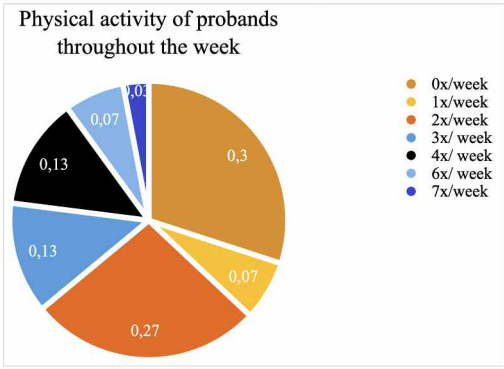
Chart 2 Subject classification in terms of occupational categories



reported a sedentary type of employment. Finally, 5 probands (17%) who participated in the study stated that their employment is both sedentary and manual (Chart 2).

The level of physical activity within a particular sport or individual exercise excluding walking, shows that up to 30% of probands do not in their daily lives practice any type of sport and only 36% of probands exercise 3 or more times a week (Chart 3).

Chart 3 Physical activity of probands throughout the week



Intensity of pain perceived in the cervical spine

Regarding improvement or worsening the intensity of perceived pain it was found that 43% of probands perceive a reduction in the intensity of pain in the cervical spine after a 4 week exercise cycle. In 40% of probands the intensity of perceived pain did not change and 17% of probands reported exacerbation of pain (Chart 4).

Depending on the change in cervical spine pain before and after exercise, the following data

Chart 4 Given percentage of the difference in pain intensity in the cervical spine area

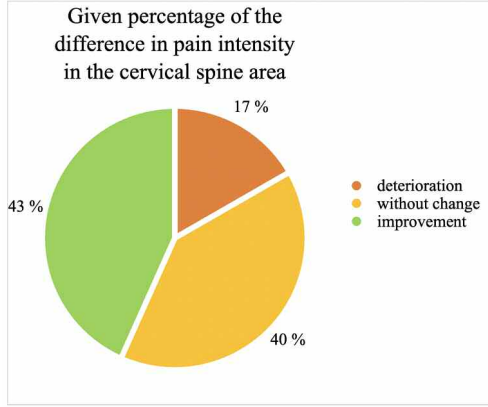
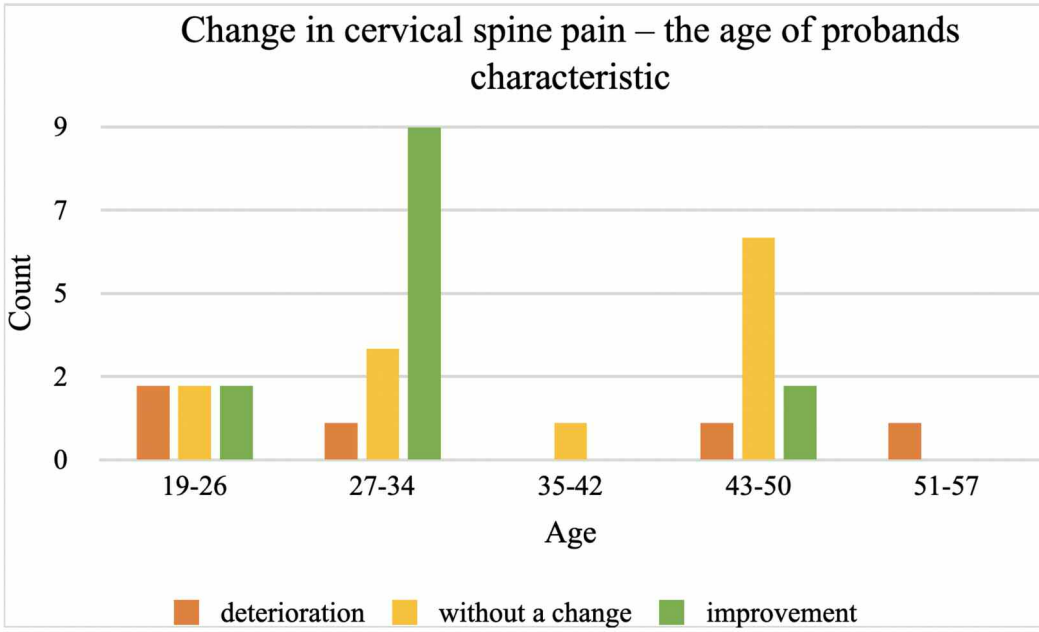


Chart 5 Change in cervical spine pain – the age of probands characteristic



were acquired. In the 19–26-years age group - 6 people; 27–34-years 13 people; 35–42-years only 1 proband; 43–50-years 9 people and in the 51-years-and-older only one person. The intensity of pain in the 19–26-year age group improved, worsened and stayed unchanged in the same number of probands. In the 27–34-years age group we see considerable improvement in 9 probands, situation of 3 probands stayed unchanged and intensity of pain worsened in just one person. The proband belonging to the 35–42-years age group reports status unchanged. The unchanged state of the intensity of cervical spine pain appeared mostly in 43–50-year age group in 6 probands, where only 2 people report improvement and 1 person deterioration. The proband from the 51-years-and-older age group reports improvement in pain intensity (Chart 5).

The intensity of pain in cervical spine area before the beginning of the exercise was on the numerical scale from 1 to 10 at an average level of 2.97. After 4 weeks of exercise this value decreased with the resulting average 2.3. After series of meridian exercises there was a statistically significant reduction of pain in cervical spine area M 0.67; p 0.04 (Table 1).

Table 1 Cervical spine pain intensity

Intensity of pain in cervical spine area – statistical indicators			
	C spine/ initial pain	C spine/ final pain	C spine/ difference
Mean	2,97	2,30	0,67
Median	2,00	2,00	0,00
Modus	2,00	1,00	0,00
Std. Deviation	1,79	1,29	1,73
Max	6	6	4
Min	1	1	-3
Variance	5	5	7
Sum	89	69	20
N	30	30	30
p			0,043

Intensity of pain perceived in the thoracic spine area

Regarding improvement, deterioration or unaltered status before and after exercise, there was an improvement in 47% of participants. 30% of probands report unaltered state of pain intensity in the thoracic spine area before and after

Chart 6 Given percentage of the difference in pain intensity in the thoracic spine area

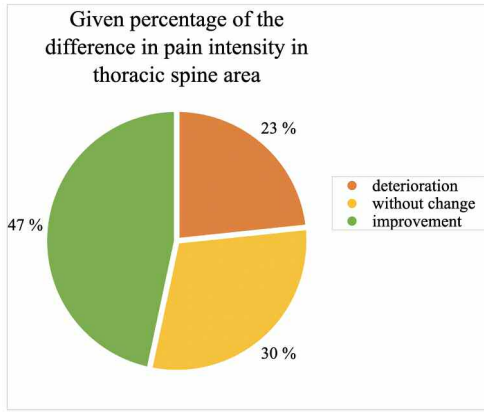
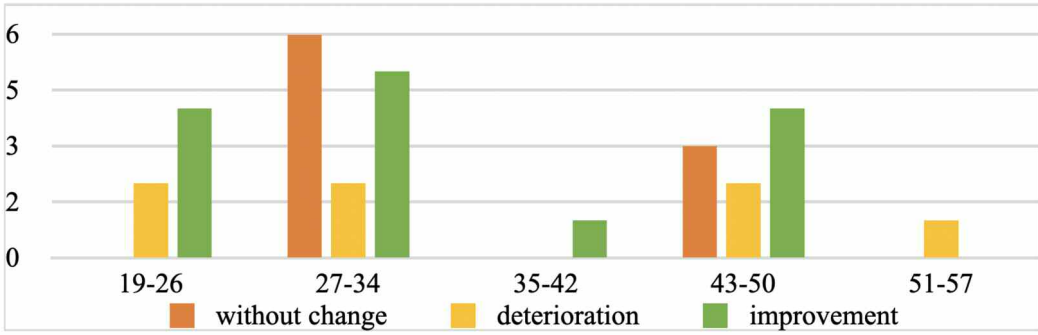


Chart 7 Change in thoracic spine pain – age characteristic



exercise and in 23% of probands the pain intensity has increased.

Dependence of change in the chest pain on age (Chart 6) is observed in the 19–26-year age group, where two thirds of the probands report improvement and one third deterioration. Unaltered state within this age group is not noted. In the contrary, in the 27–34-year age group 6 probands reported unaltered state of pain intensity, 5 probands had a state of reduced perceived pain and in 2 people the pain became more pronounced. The proband of 35–42-year age group reports pain improvement. The 43–50-year age group has the most cases of improvement, just one case less in unaltered state and two cases of pain intensity worsening in the thoracic spine area. The proband pertaining to 51-years-and-older age group reports worsening of perceived pain (Chart 7).

The average intensity of chest pain before exercise was 3.9. After 4 weeks of exercising the intensity of pain in this area decreased in average to 2.87 points on the numerical pain scale. After a series of meridian exercises there was a statis-

Table 2 Intensity of pain in the thoracic spine area

Intensity of pain in thoracic spine area – statistical indicators			
	Th spine/ initial pain	Th spine/ final pain	Th spine/ difference
Mean	3,90	2,87	1,03
Median	4,00	3,00	0,00
Modus	1,00	3,00	0,00
Std. Deviation	2,37	1,59	2,20
max	8	7	7
min	1	1	-2
Variance	7	6	9
N	30	30	30
p			0,016

Chart 8 Given percentage of the difference in pain intensity in the lumbar spine area

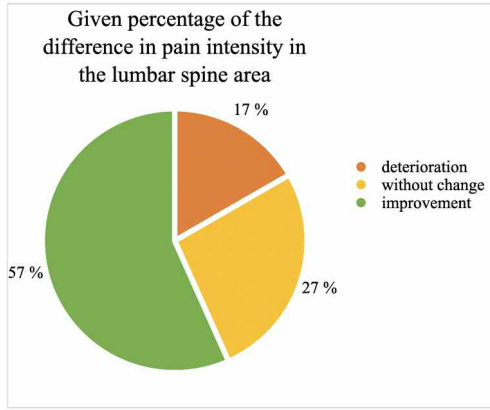
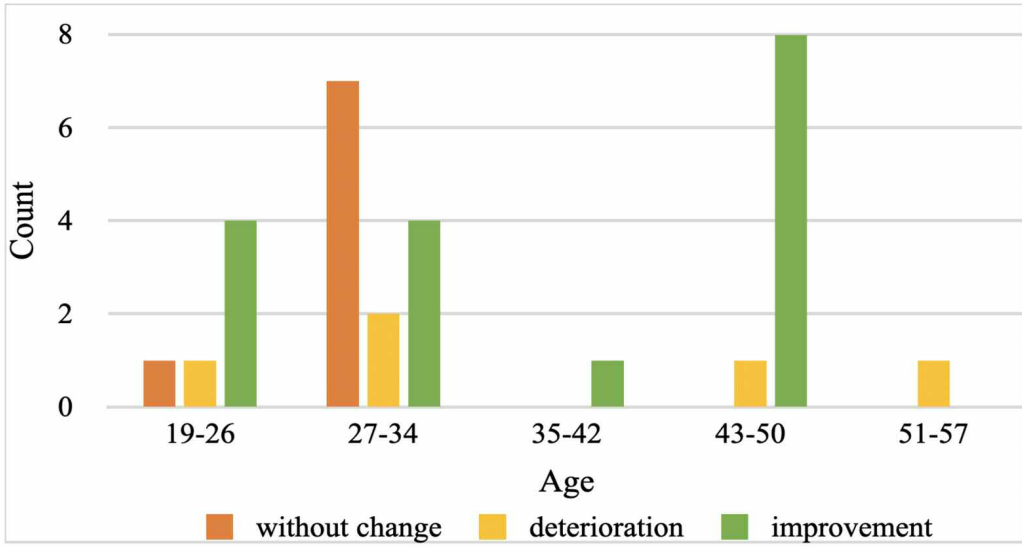


Chart 9 Change in lumbar spine pain – age of probands characteristic



tically significant reduction of pain in the thoracic spine area M 1, 03; p 0.02 (Table 2).

Intensity of perceived pain in the lumbar spine area

The percentage of probands in which the intensity of perceived lumbar spine pain has decreased was 56%. 27% of probands underwent no change in pain and 17% of probands reported worsening of perceived pain after 4 weeks of exercise (Chart 8).

The dependence of change in the pain intensity on age is shown in Chart 9. In the 19–26-year age group out of the total number of 6 people only 1 reported pain worsening and 1 whose pain intensity hasn't changed. The other 4 probands report a reduction in perceived pain. In the 27–34-year age group, the intensity of pain did not change in 7 probands, in 4 cases the pain decreased and 2 reported worsening of perceived pain. The proband in the 35–42-year age group observed improvement. In the 43–50-year age group, there was a reduction in perceived pain in the lumbar spine area in 8 of the total number of 9 people and worsening in one case. The proband belonging to the last age group reported worsening of perceived pain.

In the lumbar spine area we come across an average pain intensity of 3.43 before the start of exercise. As soon as the 3-times-a-week 4-week-exercise was completed, there was a statistically significant reduction in pain intensity on level M 1.03; p 0.001 (Table 3)

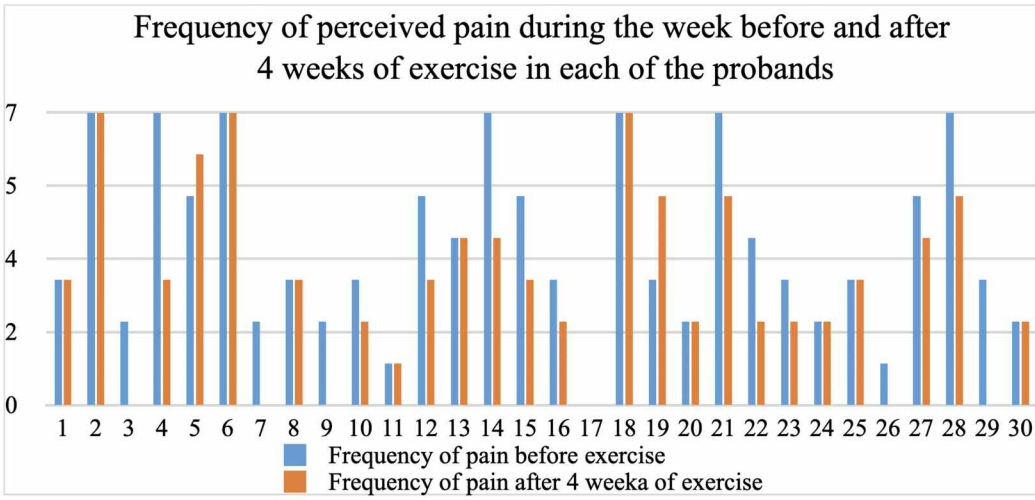
Table 3 Intensity of pain in the lumbar spine area

Intensity of pain in lumbar spine area – statistical indicators			
	L spine/ initial pain	L spine/ final pain	L spine/ difference
Mean	3,43	2,40	1,03
Median	2,50	2,00	1,00
Modus	1,00	2,00	0,00
Std. Deviation	2,49	1,38	1,79
max	10	6	6
min	1	1	-2
Variance	9	5	8
N	30	30	30
p			0,002

Frequency of perceived pain throughout the week

Chart 10 shows the frequency of pain before and after the cycle of meridian exercises in each of the probands. It indicates that in 5 probands the pain frequency decreased to "less than once

Chart 10 Frequency of perceived pain during the week before and after 4 weeks of exercise in each of the probands



a week" and only 2 probands reported an increase in pain frequency.

Chart 11 indicates changes in pain frequency before and after exercise. It demonstrates 55% of probands showing a decrease in pain frequency, in 40% change of their frequency, and 7% of probands reported an overall increase in pain frequency during the week.

Depending on the change in frequency with age, there was worsening of frequency only in the 43–50-year age group and in the 51-year-and-more age group. In the 27–34-year age group more than half of the probands report improvement and thus a decrease in the frequency of perceived pain, whereas in the 19–26-year age group the ratio of probands without change and those with improvement remained the same (Chart 12).

Average number of days with perceived pain before exercise was 3.83. After 4 weeks the fre-

Chart 11 Given percentage of the difference in pain frequency before and after 4 weeks of exercise

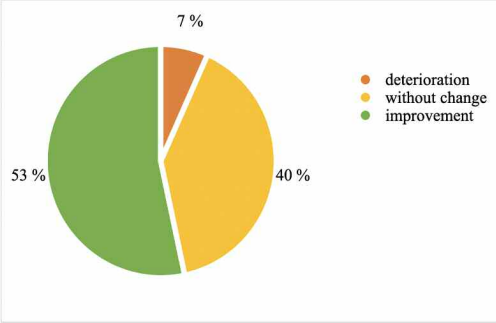
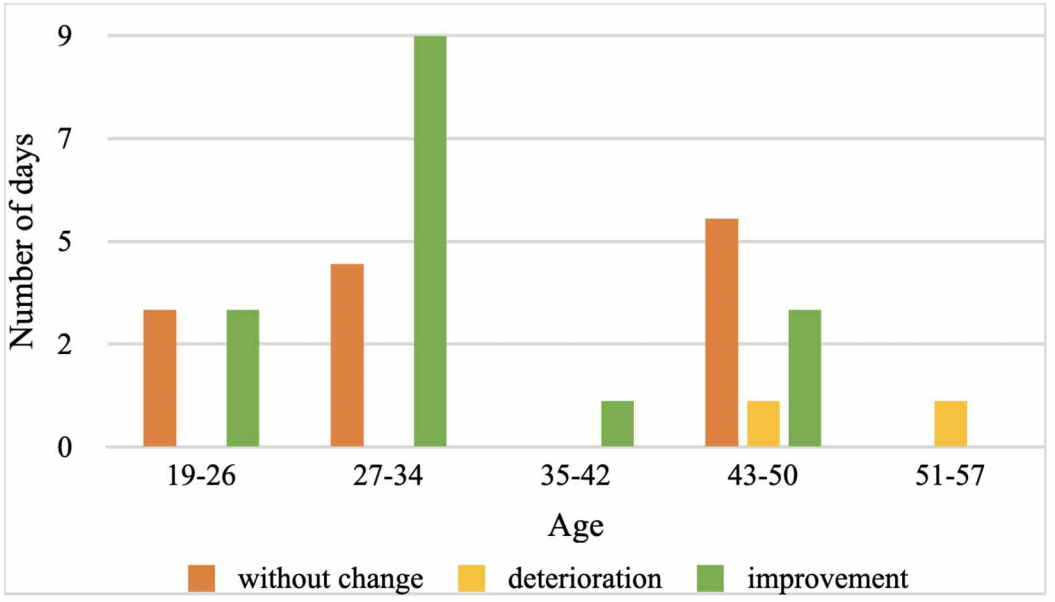


Table 4 Frequency of perceived pain throughout the week

Frequency of perceived pain throughout the week – statistical indicators			
	Frequency of pain on start	Frequency of pain after 4 weeks	Frequency of pain difference
Mean	3,83	2,90	0,93
Median	3,00	3,00	1,00
Modus	3,00	2,00	0,00
Std. Deviation	2,13	2,17	1,31
max	7	7	4
min	0	0	-2
Variance	7	7	6
N	30	30	30
p			0,001

Chart 12 Change in pain frequency – age of probands characteristic



quency of pain during a week decreased by 0.93 with the resulting average of 2.9 days. After series of meridian exercises there was a statistically significant reduction in pain M 0.93; p 0.000 (Table 4).

Chart 13 shows change in the intensity of cervical, thoracic and lumbar spine pain in each of the individual probands. Twenty-eight out of 30 subjects reported reduction in the intensity of perceived pain after four weeks in at least one of the three areas of the back by at least one degree of the numerical pain intensity scale.

Chart 13 Change in the intensity of cervical, thoracic and lumbar spine pain after 4 weeks in the pain intensities of the cervical, thoracic and lumbar spine areas were calculated and the average change in pain intensity of each of the probands was declared, which can be observed on the chart 14. Overall proband improvement average is 0.91, in 24 probands the overall pain intensity decreased, in 2 probands average pain intensity in cervical, thoracic and lumbar spine pain remained unaltered. Four people reported pain worsening.

The sums of the average intensity in the cervical, thoracic and lumbar spine pain were compared to the probands' age. The collected data can be observed in the resulting Chart 15. Since only 1 proband is included in the 35–42-year and 51–57-year age groups, these results are of no relevance compared to other groups because they may be a subject of accidental selection. The rest of age categories shows difference in average improvement, however their differences do not exceed 1 point of perceived pain intensity. Based on that data no claim can be drawn about a po-

Chart 13 Change in the intensity of cervical, thoracic and lumbar spine pain in each of the individual probands.

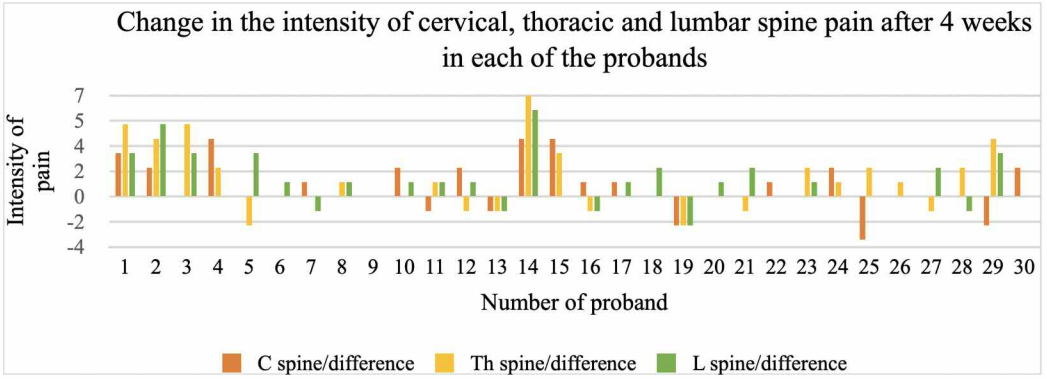
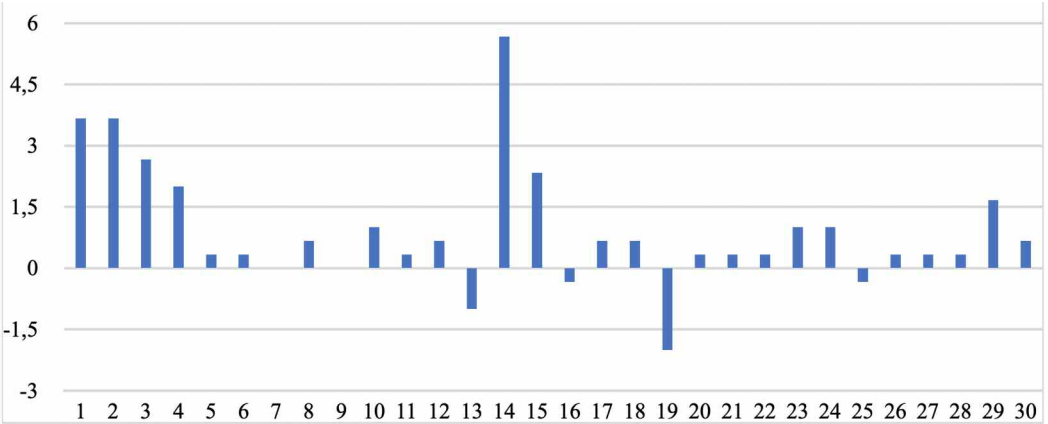


Chart 14 Average change in the sum of the intensity of cervical, thoracic and lumbar spine pain in each of the probands



ssible greater suitability of meridian exercises for a certain age group. In terms of data obtained, the most remarkable improvement was observed in the 43–50-year age group.

The dependence of the total change in the intensity of neck, chest and lumbar pain after 4 weeks on occupational categories is visualized in the Chart 16. Chart 16 shows that probands with manual type of work show a 0.94 point more notable improvement in pain intensity after 4 weeks of exercise than probands with sedentary type of employment. If the provided observation should be generalized, it would result from the chart that the more movement we have in everyday life, the more beneficial a certain type of rehabilitation exercise will be. However, due to small group of test-takers and a lack of verification tools this statement cannot be considered generally binding.

Conclusion

A prospective pilot study examined the effect of meridian exercises on non-specific back pain. This type of exercise draws its essence from the theory of Traditional Chinese Medicine, whose implementation in rehabilitation is expanding, be it owing to patient's or

the therapist's interest. For this reason, the effect of meridian exercises was through a pilot study objectified on non-specific back pain in healthy individuals. The study confirmed physiotherapy's utilization of meridian exercises as part of therapy and prevention, naturally with respect to contraindications and groups for which this type of exercise is not suitable.

One of the benefits of this methodology is also the fact that although 1 exercise of the whole set lasts in average 10-15 minutes, it certainly affects the intensity and frequency of perceived pain. The study clearly confirmed the positive effect of meridian exercises on reducing the intensity of pain in individual areas of the back as well as on reducing the frequency of perceived pain. The potential usage of this exercise system is wide, whether in terms of physiotherapeutic procedures and their use for various diagnoses or in terms of Traditional Chinese Medicine and the influence of meridian exercises on individual elements, such as organ systems of specific meridians and parts of the human body with which these meridians cohere.

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Chart 15 Average change in the pain intensity of the sum of cervical, thoracic & lumbar spine areas depending on occupational categories

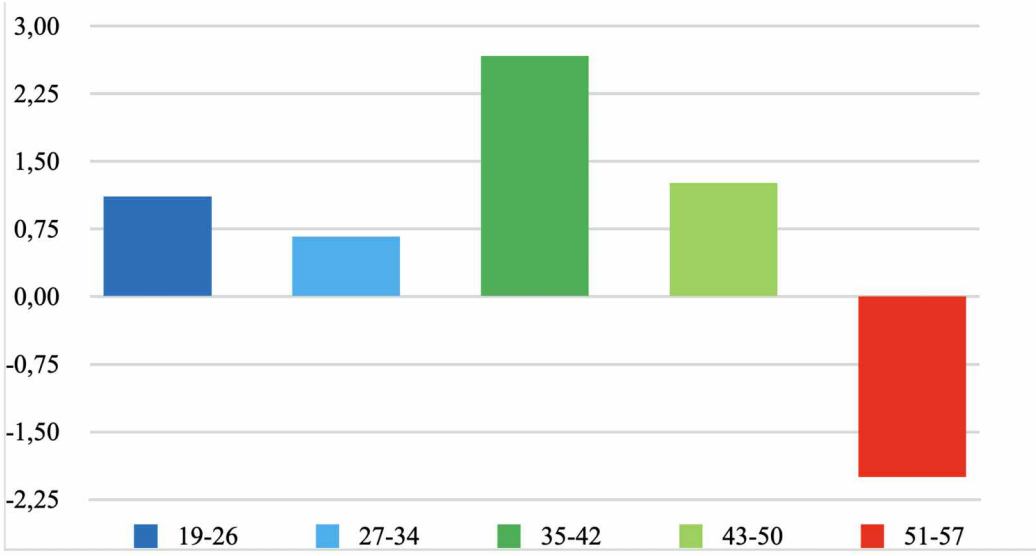

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Chart 16 Average change in the pain intensity of sum of cervical, thoracic and lumbar spine areas depending on occupational categories