NEUROLOGY AND NEUROSURGERY

THE EFFECT OF ACUPUNCTURE ON THE CORRECTION OF POST-STROKE DYSPHAGIA COMPARED TO METHODS OF PHYSICAL INFLUENCE

Shoboev A.E. [1],
Pavlov P.F. [1],
Kirgizova O.Yu. [2]

[1] Bokhan District Hospital
(1ya Klinicheskaya str. 18, build. 14,
Bokhan 669310, Russian Federation)
[2] Irkutsk State Medical Academy
of Postgraduate Education – Branch
Campus of the Russian Medical Academy
of Continuing Professional Education
(Yubileyniy 100, Irkutsk 664049,
Russian Federation)

Corresponding author:
Andrey E. Shoboev,
e-mail: shoboev.87@mail.ru

ABSTRACT

Background. *Dysphagia is a problematic field in the clinical work of neurologists, resuscitation experts and therapists due to the high percentage of secondary complications caused by aspiration pneumonia, nutritional deficiency, which affect the recovery process. This ultimately affects the main socio-medical indicators such as mortality, lethality, disability in structure of cerebrovascular diseases.*
Neurogenic dysphagia occurs in 25–65 % of patients with stroke, while mortality among patients with post-stroke dysphagia receiving tube feeding varies from 20 to 24 %.
The aim. *To evaluate the impact of reflexology in the treatment of post-stroke dysphagia in comparison with the methods of physical impact.*
Materials and methods. *An open clinical comparative study was conducted in two clinical bases: Republican Hospital named after N.A. Semashko (Ulan-Ude) and Bokhan District Hospital. In this clinical trial, 53 patients with swallowing disorders during the acute period of ischemic stroke were tested. When diagnosing dysphagia, a point scale of the Clinic of the Institute of the Brain was used, which assesses the degree of swallowing disorders before and after treatment. The comparative group receiving standard therapy in combination with physiotherapy (VOCASTIM) included 27 patients, the study group was comprised of 26 patients, who underwent basic therapy in combination with acupuncture (1 course – 10 sessions). In the course of the comparative clinical trial, statistical data were obtained that indicate the positive role of acupuncture in restoring the function of swallowing in patients with acute impairment of cerebral circulation.*
Results. *During the current clinical study, on the background of a 10-day course of reflexology with an exposure of 10–15 minutes and VOCASTIM physiotherapy for 10–15 minutes, the majority of patients experienced regression of post-stroke dysphagia.*
Conclusion. *According to the results of this study, the method of reflexology as a result of physiotherapy showed a faster recovery of swallowing function in the correction of neurogenic swallowing diseases, which causes cerebral infarction.*

Key words: *ischemic stroke, rehabilitation, reflexology, dysphagia, physiotherapy*

Received: 02.04.2022
Accepted: 18.01.2023
Published: 02.03.2023

For citation: Shoboev A.E., Pavlov P.F., Kirgizova O.Yu. The effect of acupuncture on the correction of post-stroke dysphagia compared to methods of physical influence. *Acta biomedica scientifica*. 2023; 8(1): 101-107. doi: 10.29413/ABS.2023-8.1.11

ВЛИЯНИЕ АКУПУНКТУРЫ НА КОРРЕКЦИЮ ПОСТИНСУЛЬТНОЙ ДИСФАГИИ В СРАВНЕНИИ С МЕТОДАМИ ФИЗИЧЕСКОГО ВОЗДЕЙСТВИЯ

Шобоев А.Э. [1],
Павлов П.Ф. [1],
Киргизова О.Ю. [2]

[1] ОГБУЗ «Боханская районная больница» (669310, Иркутская обл., п. Бохан, ул. 1-я Клиническая, 18, стр. 14, Россия)
[2] Иркутская государственная медицинская академия последипломного образования – филиал ФГБОУ ДПО «Российская медицинская академия непрерывного профессионального образования» Минздрава России (664049, г. Иркутск, Юбилейный, 100, Россия)

Автор, ответственный за переписку:
Шобоев Андрей Эдуардович,
e-mail: shoboev.87@mail.ru

РЕЗЮМЕ

Введение. *Дисфагия является проблемным полем в клинической работе неврологов, реаниматологов и терапевтов ввиду высокого процента вторичных осложнений, вызванных аспирационной пневмонией, нутритивным дефицитом, влияющих на восстановительный процесс, что в итоге влияет на основные социально-медицинские показатели, такие как смертность, летальность, инвалидизация в структуре цереброваскулярных заболеваний. Нейрогенная дисфагия встречается у 25–65 % больных с инсультом, при этом летальность среди пациентов с постинсультной дисфагией, получающих зондовое питание, варьирует от 20 до 24 %.*

Цель. *Оценить влияние рефлексотерапии в лечении постинсультной дисфагии в сравнении с методами физического воздействия.*

Материалы и методы. *Открытое клиническое сравнительное исследование проводилось на двух клинических базах: ГАУЗ «Республиканская клиническая больница имени Н.А. Семашко» МЗ Республики Бурятия и ОГБУЗ «Боханская районная больница». В данном клиническом исследовании апробированы 54 пациента, имеющие нарушения функции глотания в остром периоде ишемического инсульта. При диагностике дисфагии использовалась балльная шкала, разработанная ООО «Клиника института мозга», оценивающая степень нарушения функции глотания до и после лечения. В сравнительную группу, получающую стандартную терапию в сочетании с физиотерапией (VOCASTIM), вошло 27 больных; 27 пациентам, составившим исследуемую группу, проводилась базисная терапия в сочетании с иглорефлексотерапией (1 курс – 10 сеансов).*

Результаты. *В ходе нашего сравнительного клинического исследования на фоне проведённого 10-дневного курса рефлексотерапии с экспозицией 10–15 минут и физиотерапией VOCASTIM 10–15 минут, у большинства пациентов отмечается регресс постинсультной дисфагии.*

Заключение. *По результатам данного исследования, метод рефлексотерапии в сравнении с физиотерапией показал более эффективное восстановление функции глотания в коррекции нейрогенных глотательных нарушений, причиной которых является инфаркт мозга.*

Ключевые слова: *ишемический инсульт, реабилитация, рефлексотерапия, дисфагия, физиотерапия*

Статья получена: 02.04.2022
Статья принята: 18.01.2023
Статья опубликована: 02.03.2023

Для цитирования: Шобоев А.Э., Павлов П.Ф., Киргизова О.Ю. Влияние акупунктуры на коррекцию постинсультной дисфагии в сравнении с методами физического воздействия. *Acta biomedica scientifica*. 2023; 8(1): 101-107. doi: 10.29413/ABS.2023-8.1.11

INTRODUCTION

Stroke remains the most important medical and social problem, both in the world and in Russia, which is caused by high rates of morbidity, mortality and disability [1]. According to statistical analysis, stroke affects about 0.5 million people annually in Russia with an incidence rate of 3 per 1000 of the population [2].

The high level of disability is primarily due to the severity of neurological disorders which are difficult to correct. Dysphagia occupies the most significant place among neurological disorders, the cause being infarction of the stem structures and basal ganglia. Despite the achievements of modern medicine, dysphagia most often gives secondary complications in the form of aspiration pneumonia, reduces the patient's quality of life and requires constant monitoring by medical staff and relatives.

Swallowing is a multiphase motor process, which is realised through voluntary and involuntary (reflex) movements of the head and neck muscles, with three phases of the swallowing act: oral, pharyngeal and esophageal. The process of swallowing is carried out by 26 muscles with nerve regulation from six pairs of cranial nerves: V, VII pairs of cranial nerves with nuclear localisation at the level of the pons varolii and brain stem, IX–XII pairs with nuclear localisation at the level of the medulla oblongata and spinal cord I–V cervical segments.

Dysphagia is manifested by impaired passage of food from the mouth to the stomach and may be either neurogenic or mechanical, e. g. as a result of a neoplasm in the oesophagus. [3]. Depending on the phase of swallowing, oropharyngeal and oesophageal dysphagia are classified. The most frequent type of dysphagia is oropharyngeal, with an incidence of up to 81 %, as a consequence of damage to the centers regulating the swallowing act [4].

Dysphagia is quite common not only among older people in need of nursing care and ICU patients, but also among independent older people in their everyday environment. Mortality in patients with neurogenic dysphagia treated with tube feeding can be as high as 24 % [5]. According to one of the leading rehabilitation centers of the Clinical Institute of Brain LLC (Berezovsky, Russia), dysphagia occurs in almost every second patient who has suffered a traumatic brain injury, and in every fourth – after a stroke [6].

Neurogenic (motor) dysphagia in acute cerebrovascular accident (ACVA) is caused by ischaemic lesions of the cerebral cortex, basal ganglia, brain stem or cerebellum.

Neurogenic dysphagia in combination with motor disorders, for example, hemiparesis, requires increased attention and careful diagnosis [7, 8].

Originating in ancient China, reflexology has a deep history and successfully proves its effectiveness in the treatment of neurological diseases. The relevance of this topic arises from the low level of research in national and European medicine, where little published material is available.

In Russian medicine, there is evidence of a positive effect of both medicinal methods of treatment (cholinergic drugs – neuromidin, axamon) and physiotherapeutic methods (VOCASTIM) [9]. In turn, foreign scientific research has data on clinical studies conducted on the treatment of dysphagia by acupuncture. L. Chen et al. and W. Xia et al. studied the effect of acupuncture on the restoration of swallowing function in two clinical studies. The authors conducted the study in the acute period and early recovery period after stroke. The treatment period was 7 weeks in the first study and 4 weeks in the second, where there was positive evidence of efficacy of acupuncture compared to standard care methods [10, 11]. Based on available domestic and international studies, the aim of our study was to conduct a comparative analysis of traditional and unconventional methods of dysphagia treatment.

OBJECTIVE OF THE STUDY

To conduct a clinical study on the effectiveness of acupuncture in the correction of dysphagia in patients with acute ischemic stroke in comparison with physiotherapy.

THE AIM OF THE STUDY:

- to evaluate the effect of corporeal acupuncture on the treatment of dysphagia among patients in the acute period of ischaemic stroke;
- to analyze the effectiveness of physiotherapy in restoring swallowing function among patients with acute cerebrovascular accident;
- to compare the effects between acupuncture and physiotherapy in terms of the recovery process of the swallowing act.

MATERIALS AND METHODS

An open clinical comparative study was conducted in 2021 in two clinical centers: Republican Clinical Hospital named after N.A. Semashko of the Ministry of Health of the Republic of Buryatia and the Bokhan District Hospital. A total of 54 patients were followed up: 27 patients in the study group and 27 in the control group. The patients' ages were 46–78, with a mean age of 63. The numbers of males and females in both groups were comparable. In the majority of patients, the focus of ischaemic stroke was localised to the cortical and stem structures and was confirmed by neuroimaging, using 16-slice MSCT. In 79 % of cases, the stroke was verified in the middle cerebral artery circulation and in 21 % of cases in the areas supplied by the vertebrobasilar system.

All patients underwent a neurological examination according to the generally accepted method. In order to assess the degree of swallowing impairment, a point

scale developed by the Clinical Institute of Brain LLC (CIB) was used. Dysphagia was assessed by a medical speech therapist before and after an acupuncture session. The results were evaluated as follows: 0–2 score – absence of dysphagia, the diet is not limited; 3–7 score – mild dysphagia, a diet with positioning; 8–9 score – moderate dysphagia, a mild diet with restriction; 10–15 score – severe dysphagia, probe feeding is required, fibrolaryngoscopy, training feeding is required.

In the 1st control group (n = 27), patients with swallowing disorders received basic therapy in combination with muscle myostimulation with a VOCASTIM medical complex using plate electrodes. The place of impact is the projection of thyroid cartilage and vocal cords. Myostimulation was carried out in two stages: the first, preparatory stage, was performed with pulsed galvanic current at a frequency of 8 Hz; the second stage, stimulation was performed with monophasic triangular pulse current at a base frequency of 2.5 kHz for a duration of 5–7 minutes. The rate of the pulse current was adjusted individually according to each patient's individual sensations and before the act of swallowing occurred. The duration of stimulation was 10–15 minutes. The course therapy with the VOCASTIM device lasted for 10 days. Swallowing function was assessed using the CIB scale by a speech therapist before the first session and after the 10th session on the 14th day.

In the 2nd study group (n = 27), acupuncture therapy (APT) was administered in combination with baseline therapy for a 10-day session. The APT procedure was administered using 5 cm long disposable stainless-steel needles with a diameter of 0.25 mm. The depth of penetration of the needle is from 0.5 to 1 cun. The duration of the session is 10–15 minutes. The needle insertion procedure was carried out while the patient was lying on the couch in a stationary position. A requirement for the selection of patients in the main and control groups was that the patients were unconscious and without marked cognitive impairment or psychomotor agitation; patients with a high risk of lethal outcome were excluded from the study.

The type of study is a randomized open controlled study. The study was approved by the local Ethics Committee of the Irkutsk State Medical Academy of Postgraduate Education – Branch Campus of the Russian Medical Academy of Continuing Professional Education (Protocol No. 11 dated November 9, 2021). All patients signed a voluntary informed consent form.

Inclusion criteria: diagnosed ischaemic stroke of atherothrombotic genesis; age no older than 78 years; NIHSS score of 20 or less; no depression of consciousness (soporus, coma 1–3).

Exclusion criteria: malignant neoplasms, benign neoplasms located locally in the neck, pharynx, oesophagus; fever of undetermined significance; active tuberculosis; decompensated cardiopulmonary disease; mental illness; nutritional deficiency stage 1–3.

Statistical analysis was performed using Wilcoxon's test for two dependent samples, the pre-treatment and post-treatment scale. The difference in treatment outcomes between the two groups was assessed using the Mann – Whitney U-test.

RESULTS

As part of a comparative study conducted over 10–15 minutes of reflexology and 10–15 minutes of VOCASTIM physiotherapy, the majority of the patients showed a regression of symptoms such as gagging while eating, pain while swallowing, heartburn, salivation, impaired phonation, "wet" voice and malnutrition.

When assessing the swallowing function assessed on the CIB scale, dysphagia was observed in 54 patients, of which in group 1, 27 patients receiving VOCASTIM therapy had mainly an average degree of swallowing dysfunction, the average score on the CIB scale was 7.1; in group 2 (27 patients), mainly moderate degree of swallowing disorder, the average score was 7.2. The dynamics of the re-screening of the CIB swallowing score has been carried out on the 14th day of treatment. The re-assessment of swallowing function after 14 days in the baseline treatment group with VOCASTIM physiotherapy yielded an average score of 5.5. In the study group, after completing the 10th session of acupuncture therapy, the mean values were 4.1 (Fig. 1).

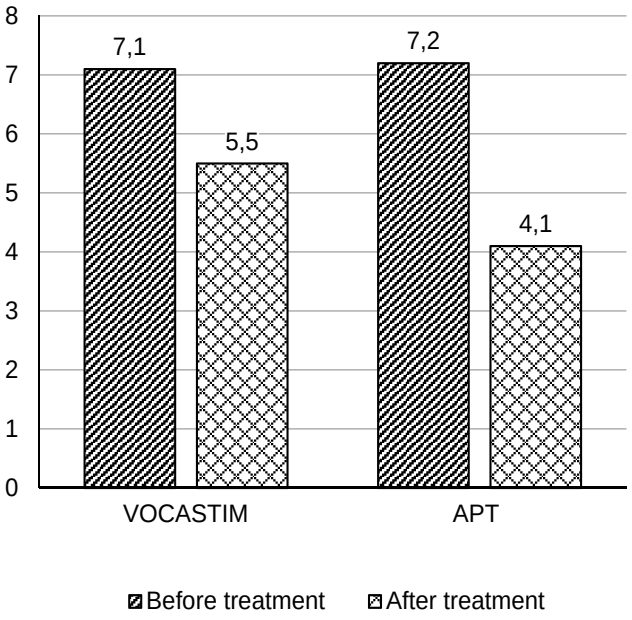

FIG. 1.
Mean CIB scale test value before and after treatment

Against the background of a course of physiotherapy with VOCASTIM device and acupuncture treatment we observed statistically significant effectiveness in restoring swallowing function – Wilcoxon Z-test – 4.1 and 4.5 in groups 1 and 2 respectively (Table 1).

TABLE 1

THE RESULTS OF A NON-PARAMETRIC ANALYSIS OF SHIFTS IN CIB SCALE VALUE BEFORE AND AFTER REHABILITATION TREATMENT IN THE STUDY GROUPS

Groups	Wilcoxon Z-test	*p*
Group 1 (basic + VOCASTIM)	4.1	< 0.001
Group 2 (basic + acupuncture)	4.5	< 0.0001

TABLE 2

THE RESULTS OF NON-PARAMETRIC ANALYSIS OF DIFFERENCES IN THE DISTRIBUTION OF SCALE VALUES BETWEEN GROUPS 1 AND 2 ACCORDING TO THE MANN – WHITNEY TEST

	Median (baseline + acupuncture)	Median (basic + VOCASTIM)	U-test	Z-test	*p*
Dysphagia at discharge	4	6	182	3.157	0.0015

The results of the differences in the distribution of values between groups of patients with the same baseline therapy approach demonstrate that acupuncture recovery rates are statistically significantly higher than those associated with physiotherapy (Table 2).

DISCUSSION

The results of our clinical study obtained among patients with impaired swallowing function caused by cerebral infarction showed positive findings when treated with the acupuncture technique. When comparing the results with those of studies by L. Chen et al. and W. Xia et al. in 2016 [10, 11], there was a positive effect of a longer treatment period of 4–7 weeks compared to our data, where the total course of treatment was 2 weeks of therapy. Most likely, the findings are the result of the different formulations used by the acupuncturist when choosing the treatment of the active biological points.

The positive effect of VOCASTIM's device electrical current is most likely due to the increased flow of afferent impulses from the muscles of the pharynx and the activation of neuroplasticity processes. The therapeutic mechanism of neuromuscular electro-stimulation is probably related to the principle of motor learning, based on repeated repetition of the act of swallowing. During the neuromuscular therapy sessions, the patient made up to 150 swallowing movements per session of electrostimulation, which had an overall positive effect on the tone of the submental muscle groups and consequently the swallowing act in general, as also confirmed by this study.

The role of acupuncture in restoring swallowing function is relevant both because of the high prevalence of dysphagia among post-stroke disorders as well as the positive effects according to the clinical studies conducted.

CONCLUSION

A neurological disorder after a stroke, such as dysphagia, has a difficult course of recovery. This clinical study examines alternative ways to restore swallowing function using acupuncture, as well as physical exposure.

Two groups with predominantly moderate impaired swallowing caused by ischaemic stroke were tested in this study. A comparative analysis was carried out between two groups with different methods of dysphagia treatment – physiotherapy (VOCASTIM device) and acupuncture techniques.

The results of the treatment showed positive changes in both groups, which proves the statistically significant effectiveness of physical and acupuncture treatment in restoring swallowing function.

It is worth noting that according to the results of thi study, the method of reflexotherapy in comparison with physiotherapy, in our opinion, showed a more effective recovery, which is probably associated primarily with a systemic reflexive effect on the neuromuscular system involved in the act of swallowing.

According to the findings, the role of reflexology in restoring swallowing function is statistically significant in effectiveness and can be used in the correction of neurogenic swallowing disorders caused by brain infarc-

tion, thereby affecting the improvement of the rehabilitation process.

Conflict of interest

The authors declare the absence of a conflict of interest.

REFERENCES

1. Suslina ZA, Piradov MA, Domashenko MA. Stroke: Assessment of the problem (15 years later). *Zhurnal nevrologii i psikhiatrii imeni S.S. Korsakova*. 2014; 114(11): 5-13. (In Russ.).
2. Starodubtseva OS, Begicheva SV. Analysis of the incidence of stroke using information technology. *Fundamental Research*. 2012; 8-2: 424-427. (In Russ.).
3. Reiser MF, Adam A, Avni F, Bartolozzi C. *Dysphagia: Diagnosis and treatment*. Springer: Science & Business Media; 2012.
4. Rofes L, Vilardell N, Clavé P. Post-stroke dysphagia: Progress at last. *Neurogastroenterol Motil*. 2013; 25(4): 278-282. doi: 10.1111/nmo.12112
5. Schepp SK, Tirschwell DL, Miller RM, Longstreth WT Jr. Swallowing screens after acute stroke: A systematic review. *Stroke*. 2012; 43(3): 869-871. doi: 10.1161/STROKEAHA.111.638254
6. Belkin AA, Ershov VI, Ivanova GE Impairment of swallowing in urgent conditions – postextubation dysphagia. *Russian Journal of Anaesthesiology and Reanimatology*. 2018; 63(3): 76-82. (In Russ.). doi: 10.17116/anaesthesiology201804176
7. Krylov VV, Gekht AB, Grigoryev AYu, Grin AA, Dashyan VG, Evzikov GYu, et al. *Neurosurgery and neuroreanimatology*. Moscow: ABV-press, 2018. (In Russ.).
8. Malagelada JR, Bazzoli F, Boeckxstaens G, De Looze D, Fried M, Kahrilas P, et al. World gastroenterology organisation global guidelines: Dysphagia – global guidelines and cascades update September 2014. *J Clin Gastroenterol*. 2015; 49(5): 370-378. doi: 10.1097/MCG.0000000000000307
9. Strelnikova IA, Poverennova IE, Neklyudova MA. Experience of VOCASTIM application in patients with acute dysphagic stroke. *Practical Medicine*. 2013; 1(66): 66-69. (In Russ.).
10. Chen L, Fang J, Ma R, Gu X, Chen L, Li J, et al. Additional effects of acupuncture on early comprehensive rehabilitation in patients with mild to moderate acute ischemic stroke: A multicenter randomized controlled trial. *BMC Complement Altern Med*. 2016; 16: 226. doi: 10.1186/s12906-016-1193-y
11. Xia W, Zheng C, Zhu S, Tang Z. Does the addition of specific acupuncture to standard swallowing training improve outcomes in patients with dysphagia after stroke? A randomized controlled trial. *Clin Rehabil*. 2016; 30(3): 237-246. doi: 10.1177/0269215515578698

ЛИТЕРАТУРА

1. Суслина З.А., Пирадов М.А., Домашенко М.А. Инсульт: оценки проблемы (15 лет спустя). *Журнал неврологии и психиатрии им. С.С. Корсакова*. 2014; 114(11): 5-13.
2. Стародубцева О.С., Бегичева С.В. Анализ заболеваемости инсультом с использованием информационных технологий. *Фундаментальные исследования*. 2012; 8-2: 424-427.
3. Reiser MF, Adam A, Avni F, Bartolozzi C. *Dysphagia: Diagnosis and treatment*. Springer: Science & Business Media; 2012.
4. Rofes L, Vilardell N, Clavé P. Post-stroke dysphagia: Progress at last. *Neurogastroenterol Motil*. 2013; 25(4): 278-282. doi: 10.1111/nmo.12112
5. Schepp SK, Tirschwell DL, Miller RM, Longstreth WT Jr. Swallowing screens after acute stroke: A systematic review. *Stroke*. 2012; 43(3): 869-871. doi: 10.1161/STROKEAHA.111.638254
6. Белкин А.А., Ершов В.И., Иванова Г.Е. Нарушение глотания при неотложных состояниях – постэкстубационная дисфагия. *Анестезиология и реаниматология*. 2018; 63(3): 76-82. doi: 10.17116/anaesthesiology201804176
7. Крылов В.В., Гехт А.Б., Григорьев А.Ю., Гринь А.А., Дашьян В.Г., Евзиков Г.Ю., и др. *Нейрохирургия и нейрореаниматология*. М.: АБВ-пресс, 2018.
8. Malagelada JR, Bazzoli F, Boeckxstaens G, De Looze D, Fried M, Kahrilas P, et al. World gastroenterology organisation global guidelines: Dysphagia – global guidelines and cascades update September 2014. *J Clin Gastroenterol*. 2015; 49(5): 370-378. doi: 10.1097/MCG.0000000000000307
9. Стрельникова И.А., Повереннова И.Е., Неклюдова М.А. Опыт применения аппарата VOCASTIM у больных с дисфагией в остром периоде инсульта. *Практическая медицина*. 2013; 1(66): 66-69.
10. Chen L, Fang J, Ma R, Gu X, Chen L, Li J, et al. Additional effects of acupuncture on early comprehensive rehabilitation in patients with mild to moderate acute ischemic stroke: A multicenter randomized controlled trial. *BMC Complement Altern Med*. 2016; 16: 226. doi: 10.1186/s12906-016-1193-y
11. Xia W, Zheng C, Zhu S, Tang Z. Does the addition of specific acupuncture to standard swallowing training improve outcomes in patients with dysphagia after stroke? A randomized controlled trial. *Clin Rehabil*. 2016; 30(3): 237-246. doi: 10.1177/0269215515578698

Information about the authors

Andrey E. Shoboev – Head of the Neurology Department for Patients with Acute Cerebrovascular Events, Bokhan District Hospital, e-mail: shoboev.87@mail.ru, https://orcid.org/0000-0002-5538-2419

Petr F. Pavlov – Physical Therapy Doctor, Acupuncturist, Bokhan District Hospital, e-mail: petr_58@internet.ru, https://orcid.org/0000-0002-3679-862X

Oksana Yu. Kirgizova – Head of the Department of Reflexotherapy and Cosmetology, Irkutsk State Medical Academy of Postgraduate Education – Branch Campus of the Russian Medical Academy of Continuing Professional Education, e-mail: kirgizova.ok@rambler.ru, https://orcid.org/0000-0003-1124-0301