Osteopathic treatment effectiveness evaluation of astheno-neurotic syndrome in post-COVID patients

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Abstract. The article highlights the materials from the research of the effectiveness of osteopathic treatment of patients with astheno-neurotic syndrome with post-COVID syndrome. The study involved 40 patients of both sexes aged between 35 and 65. Patients with chronic lung diseases, severe heart failure, and anemic syndrome were excluded. The osteopathic status, level of asthenia, level of life quality, status of the autonomic nervous system were assessed. The main group received osteopathic treatment, whereas the comparison group was observed without conducting treatment. It was determined that against osteopathic treatment in patients of the main group, there was an improvement in the craniosacral mechanism parameters, a lower degree of incidence of major complaints; a normalized vegetative status; reduced signs of astheno-neurotic syndrome, and an improved life quality. The effectiveness of the therapeutic measures allows recommending the inclusion of osteopathic treatment in rehabilitation treatment of patients with post-COVID syndrome.

Keywords: osteopathic treatment, post-COVID syndrome, vegetative status, life quality.

1. Introduction

Amid a growing number of patients who have experienced COVID-19, there is a need to develop methods for restorative treatment of post-COVID syndrome manifestations. Post-COVID syndrome is defined as a set of signs and symptoms that develop during or after COVID-19 and persist for more than 12 weeks, while the signs of the syndrome may occur episodically or be permanent. Post-COVID syndrome affects the functioning of a large number of organs and systems (respiratory, cardiovascular, and nervous) [1].

At present, several main theories of the formation of post-COVID syndrome are being considered, based on the mechanisms that occur during COVID-19 [2]: chronic hypoxia, pathological immune response, high virulence of the virus and neurotropism of immune complexes, endothelial dysfunction of cerebral vessels, and the state of intestinal microbiome. Disturbances of autonomic regulation are distinguished separately, which form a variety of clinical manifestations [1,3,4].

The most common complaints in post-COVID syndrome are such as an increased lassitude (fatigue), mood swings and emotions, and sleep disturbances [1,4,5,6]. In women, patients who have

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experienced a severe form of COVID-19, the symptoms of the syndrome are predominantly manifested. Regardless of the severity of the disease, more than half of the patients noted a deteriorated general health level [4]. In most patients with post-COVID syndrome, autonomic disorders are the main complaints [7].

In order to prevent the development of post-COVID syndrome, it is recommended to take measures aimed at preventing the development of pathogenetic mechanisms [2]: control of hypoxia and inflammation and decrease in the responsiveness of the immune system. Once the symptoms of post-COVID syndrome are identified, the main methods of rehabilitation treatment are symptomatic drug therapy [1], diet therapy, climatotherapy, respiratory therapy, and physiotherapy [8]. The WHO experts note that additional research is needed to find non-invasive diagnostic methods and non-drug treatment of post-COVID syndrome [9].

The effect of osteopathic correction on the normalization of vegetative status was shown in a systematic review by Schmid et al. The research illustrated that the use of osteopathic treatment may be effective in the recovery of patients after COVID-19 [10].

2. Materials and research methods

The aim of the research: to evaluate the effectiveness of osteopathic treatment of post-COVID astheno-neurotic syndrome.

Research objectives:

1) To study the osteopathic status of patients with astheno-neurotic syndrome against post-COVID syndrome and to identify the most common somatic dysfunctions.

2) To assess the dynamics of asthenic syndrome, vegetative status, and life quality indicators of patients following osteopathic treatment.

3) Based on objective data, to conduct a comparative analysis of the effectiveness of osteopathic treatment of patients with this pathology with a comparison group of patients, who did not receive osteopathic treatment.

The research included 40 patients with post-COVID astheno-neurotic syndrome who are undergoing outpatient treatment at the clinic of the Department of Restorative Medicine and Osteopathy, Institute of Medical Education, Yaroslav-the-Wise Novgorod State University, and at V. Andrianov Institute of Osteopathic Medicine, St. Petersburg, Russian Federation. The average age of patients was 43.9±8.4, including 30 (75%) females and 10 (25%) males. Coronavirus infection was diagnosed pursuant to clinical and anamnestic data and the results of serological and instrumental research methods.

Inclusion criteria: 35-65 years old; confirmed COVID infection; lung damage according to CT 2 report (10-50%).

Exclusion criteria from the group: malignant neoplasms; injuries and surgical interventions on the chest organs; bronchial asthma, COPD; idiopathic alveolitis (sarcoidosis, fibrosing alveolitis); heart failure functional class III-IV; anemic syndrome; increased markers of systemic inflammation.

Patients were randomly split into two groups: the main group (receiving osteopathic treatment) comprised of 20 people and the comparison group (not receiving treatment for astheno-neurotic syndrome) involved 20 people.

Osteopathic treatment was conducted during 10-12 weeks, once every other week. The selection of treatment techniques was determined on an individual basis, in accordance with the detected somatic dysfunctions.

2.1 Research methods

Conforming to the aim and objectives of the research, the following methods were used: assessment of the subjective state (collection of complaints); osteopathic examination; tests (assessment of the severity of asthenia and vegetative disorders, and assessment of life quality).

2.1.1 Assessment of subjective state

Throughout the survey, the patients revealed the most common complaints: general weakness and fatigue; sleep disturbance and concentration; pain in the left side of the chest with a subjective sensation; rhythm disturbance; dyspnea; and mood swings (emotional lability).

2.1.2 Assessment of the function of autonomic nervous system

The functional state of autonomic nervous system was assessed by the Vegetative Kerdo's index (VKI). The calculation of VKI was performed according to VKI formula = (1 - DBP/HR) * 100, where DBR is diastolic blood pressure (mm Hg), whereas HR is the heart rate per 1 minute (bpm). With full vegetative balance (eutonia) in the cardiovascular system, VKI=0. A positive value of the coefficient indicates the predominance of sympathetic influence, while a negative value reflects the predominance of parasympathetic influence.

2.1.3 Assessment of indicators of life quality and psycho-emotional status

The scale of the asthenic state (SAS) by L.D. Malkova, adapted by T. G. Chertova. The SAS was developed on the database of clinical and psychological observations and the MMPI test (Minnesota Multiphasic Personality Inventory), is intended for diagnosing an asthenic condition, and consists of 30 statements reflecting the characteristics of an asthenic condition.

The SF-36 questionnaire was used to assess life quality. All scales of this questionnaire are combined into two total dimensions: the mental component (5 - 8 scales) and the physical component (1 - 4 scales) of health. Each scale is expressed by a value ranging from 0 to 100 points. The assessment is conducted on the following scales: role functioning (PR) conditioned by physical condition, physical functioning (PF), general health (GH), pain intensity (BP), role functioning (RE) due to emotional state, vitality (VT), mental health (MH), social functioning (SF).

2.1.4 Assessment of osteopathic status

The osteopathic examination included an assessment of the state of musculoskeletal, craniosacral, and visceral systems according to generally accepted diagnostic schemes [11,12,13,14,15,16]. Within the osteopathic examination, the indicators of the craniosacral mechanism such as rhythm, amplitude and strength were assessed, as well as the mobility of the sutures and joints of the skull bones, segments of the upper cervical spine (C0-C1-C2), upper thoracic spine, ribs and sternum, and diaphragm mobility were assessed. A special attention was given to the identification of somatic dysfunctions of pericardium, lungs, liver, and small intestine.

2.1.5 Statistical data processing

Statistical data processing was performed with the use of Microsoft Office Excel. Descriptive statistics and assessment of the significance of the difference by Student's t-test for linked samples were used from the data analysis package.

The assessment of the statistical significance of the difference in the incidence of osteopathic dysfunctions and other frequency parameters before and after the treatment was carried out according to Pearson's chi-square test using STATISTICA 7.0 software package.

3. Research results

According to the results of the survey of the examined patients in both groups, it was found that the following complaints prevailed before the treatment: emotional lability was persistent in 90% of patients, shortness of breath and decreased performance – in 87.5%, anxiety and impaired concentration – in 82.5%, impaired sleep – in 80%.

In the main group and the comparison group, the Kerdo’s index had negative values, which indicated the predominant parasympathetic link of the autonomic nervous system.

When assessing asthenia in both groups before the treatment, the value of SAS indicators reached 65 points, and averaged value was 57.83 points, mild asthenia.

3.1 General structure of osteopathic dysfunctions

In patients of the main group and the comparison group (without significant differences between the groups), the following somatic dysfunctions of the craniosacral system were revealed: dysfunction of the petro-jugular and occipital-mastoid sutures (in 100% of patients), of fronto-ethmoid suture – in 83%, sphenoid-ethmoid – in 60%, compression of the sphenobasilar symphysis – in 80%, and asynchronism – in 60%.

In patients of the main group and the comparison group (without significant differences between the groups), the following somatic dysfunctions of musculoskeletal system were most often detected: C0-C1 dysfunction (in 98%), L5-S1 dysfunction – in 93%, dysfunction of the first rib – in 90%, Th10-Th12 – in 73%, Th4-Th5 – in 70%.

Among the somatic dysfunctions of the internal organs, the following ones were most often diagnosed: dysfunction of diaphragm – in 95%, of lungs – in 95%, of mediastinum – in 80%, of liver – in 75%, dysfunction of the ligament of the cupula of pleura – in 73%, of kidneys – in 55% of cases in patients in both groups.

The assessment of the dynamics of indicators was performed after osteopathic treatment in the main group.

3.2 Dynamics of complaints

It was found that after the treatment in the main group of patients, there was a decreased number of complaints about a reduced working capacity by 35%, of emotional lability – by 50%, impaired concentration and sleep disturbance – by 45%, and irritability and anxiety – by 30%. In the comparison group, there were no significant differences in the frequency of complaints before and after the treatment.

3.3 Dynamics of asthenic syndrome according to SAS

When assessing the severity of asthenia in the main group of patients after the treatment, there was a decrease in the average values by 4.7 points on the SAS scale (p:4.16E-17), whereas in the comparison group, the decrease was 0.8 points on the SAS scale (p:1.30E-3).

3.4 Dynamics of vegetative status according to the Kerdo's index

In the main group, there were signs of normalized vegetative status conditioned by a decreased influence of the parasympathetic component, from -3.29 units up to -0.35 units (p:1.57E-06). In the comparison group, the incidence of parasympathicotonia does not have significant dynamics.

3.5 Dynamics of life quality indicators according to the SF-36 questionnaire

An assessment of life quality in dynamics was carried out in both groups before and after the treatment. In the main group of patients after the treatment, compared with the baseline, there was an improvement in general health (GH) (p:1.01E-06), general emotional state (RE) (p:1.51E-14), and mental health (MH) (p:4.58E-09). When assessing the dynamics of life quality indicators in patients of the comparison group without osteopathic treatment, there were no statistically significant improvements ($p>0.05$).

3.6 Dynamics of somatic dysfunctions of the craniosacral system

After the osteopathic treatment in the main group, there was a significant decrease in the incidence of somatic dysfunction of craniosacral system: dysfunctions of the occipital-mastoid and petro-jugular sutures decreased by 85% ($\chi2 = 26.19$; $p<0.001$), of frontal-ethmoid – by 55% ($\chi2 = 10.23$; $p<0.01$), of sphenoid-ethmoid – by 45% ($\chi2 = 6.83$; $p<0.01$), and craniosacral asynchronism reduced by 55% ($\chi2 = 10.67$; $p<0.01$). Compression of sphenobasilar symphysis was not determined in the main group ($\chi2 = 18.57$; $p<0.001$). It should be noted that in the same periods of the study, in the comparison group, there was no significantly decreased incidence of signs of somatic dysfunctions, compared with the initial data ($p>0.05$).

3.7 Dynamics of indicators of craniosacral mechanism

In the main group, after osteopathic treatment, there was an increase in the values of CSM indicators: rhythm grew by 82% (p:3.53E-20), amplitude (p:1.38E-10) and strength – by 100% (p:5.99E-11). In the comparison group, there was no significant change in the CSM parameters.

3.8 Dynamics of somatic dysfunctions of musculoskeletal system

After osteopathic treatment in the main group, there was a significant decrease in the incidence of dysfunctions. There was a decrease in the incidence of structural dysfunctions: by 90% for the dysfunction of segments C0-C1 ($\chi2 = 28.9$; $p<0.001$), by 75% for the first rib ($\chi2 = 19.65$; $p<0.001$), by 70% for L5-S1 segments ($\chi2 = 16.96$; $p<0.001$), and by 60% for Th4-Th5 segments ($\chi2 = 12.6$; $p<0.001$). In the comparison group, there was no significant change in the incidence of somatic dysfunctions after the treatment.

3.9 Dynamics of somatic dysfunctions of internal organs

After the treatment in the main group, the incidence of somatic dysfunctions of the thoracic diaphragm decreased by 85% ($\chi2 = 26.19$; $p<0.001$), of lungs – by 70% ($\chi2 = 17.07$; $p<0.001$), of mediastinum – by 60% ($\chi2 = 12.22$; $p<0.001$), of ligaments of the cupula of pleura – by 55% ($\chi2 = 10.67$; $p<0.01$), of liver – by 50% ($\chi2 = 8.18$; $p<0.01$), and of kidneys – by 40% ($\chi2 = 5.41$; $p<0.05$).

Patients of the comparison group, without osteopathic treatment, did not reveal any statistically significant improvements ($p>0.05$).

4. Discussion

The results of the research indicate the effectiveness of osteopathic treatment in patients with post-COVID astheno-neurotic syndrome. In patients of the main group, there was an improvement in osteopathic status, a normalization of the vegetative status, and a decrease in the signs of astheno-neurotic syndrome.

5. Conclusion

1) According to the results of the research in both groups of patients, the most common somatic dysfunctions of the craniosacral (occipital-mastoid, petro-jugular, fronto-ethmoid sutures of the skull, compression of the sphenobasilar symphysis), musculoskeletal systems (C0-C1, L5-S1, Th11-Th12 segments, first rib), and internal organs (abdominal diaphragm, lungs, mediastinum, liver) were detected.
2) After osteopathic treatment in patients of the main group, there was a decrease in the severity of asthenia, there was a trend towards the eutonic state of the vegetative status, an improved life quality, with predominantly positive dynamics of general health (GH), general emotional state (RE) and mental health (MH).
3) According to the results of the research, patients of the main group showed a positive trend in terms of measured indicators (frequency of complaints, quality of life, vegetative status, frequency of somatic dysfunctions). In the comparison group, these indicators did not change significantly.

5.1 Practical recommendations

1) It is recommended to include osteopathic examination and correction of somatic dysfunctions in the complex rehabilitation treatment of patients with post-COVID astheno-neurotic syndrome.
2) When diagnosing and correcting, attention should be focused on compression of the sphenobasilar symphysis, craniosacral asynchronism, dysfunctions of the occipital-mastoid and petro-jugular sutures of the skull, somatic dysfunctions of the craniovertebral junction, thoracic diaphragm, lumbosacral region, mediastinum, lungs, and liver.

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