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COVID-19 INFECTION AND LOCOMOTOR PATHOLOGY SYMPTOMS – A SINGLE CENTER, RETROSPECTIVE QUESTIONNAIRE STUDY

Nikola Hariskov[1], Anita Ganovska[2], Steliana Gitsova[2], Manuela Gitsova[3], Maria Mateva[4], Mariana Yoncheva-Mihaylova[4], Mila Arnaudova[4], Alexandra Stoycheva[2], Metodi Kunchev[5], Stefan Kovachev[2*]

[1]Department of Orthopedics and Traumatology – Military Medical Academy, Sofia.
[2]Department of General and Oncological Gynecology - Military Medical Academy, Sofia.
[3]Department of Dermatology - Military Medical Academy, Sofia.
[4]Department of Endocrinology - Military Medical Academy, Sofia.
[5]Virology laboratory - Military Medical Academy, Sofia.

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***Corresponding Author**
Stefan Kovachev
Department of General and Oncological Gynecology - Military Medical Academy, Sofia.

ABSTRACT

People infected with SARS-Co-2 may manifest various types of morbidity and symptoms. **The aim** of this observational study is to establish whether SARS-Co-2 affects the locomotor system and how it is manifested. **Material and Methods:** The study is single centered, questionnaire, retrospective and is conducted (2020-2021 years) in the temporary clinics for treatment of Covid 19 in the Military Medical Hospital, Sofia. Forty-three patients, diagnosed with acute SARS-Co-2 infection via nasopharyngeal TaqPath™COVID 19 CE IVD RT PCR Kit (31/100% males – I group and 12/100% females - II group, aged 28-84 years) were included. All patients included in the study completed anonymously survey form regarding their symptoms in the locomotor system after they have developed the infection. **Results:** In the first group 48.39 % (n-15) of the male patients did not report any pains or aches, while among the female patients the percentage was 25%. Strong aches with serious restriction of movement in routine activities and very strong aches with total inability to do routine daily activities were observed respectively in n-2/6.45 % and n-1/3.23 % of the males and 0% of the females. The pains decreased in n-16/51.67 % of the males and n-5/41.67 % of the females and did not aggravate in any of the patients in survey. The usual locomotor movements were performed

without any difficulty in n-3/25 % of the females and n-16/51.61 % of the males, while n-3/9.68 % of the males included shared that they were completely unable to perform these locomotor movements. **Conclusions:** SARS-Co-2 infection seems to cause and aggravate aches and pains in the locomotor system. Male patients more frequently and more seriously seem to manifest such symptoms. The therapy implemented and the cure of SARS-Co-2 infection, resulted in the disappearance or the decrease in pathological locomotor symptoms.

KEYWORDS: SARS-Co-2; infection; locomotor system; symptoms; survey.

INTRODUCTION

In March 2020 the infection with SARS-CoV-2, defined as COVID-19 was officially declared a pandemic by the World Health Organization (Geographic Differences in COVID-19.[1] COVID-19 infection can cause different morbidity and symptoms in humans depending on their global, national and regional location.[1] They also appear to be related to individual's genetics, ethnicity, age and comorbidities.[2] Musculoskeletal symptoms of SARS-CoV-2 infection include fatigue, myalgia, and arthralgia.[3] They are explained by the presence of ACE2 and TMPRSS2 receptors on the cells and tissues that make up the locomotor system (LMS) and are used by SARS-CoV-2 for binding and further replication.[4] The musculoskeletal system is also affected by cytokines, which are almost always elevated in patients with COVID-19 infection.[5] Proinflammatory factors (IL-1β, IL-6, IL-12, TNF, and IFN-γ) can directly induce proteolysis of muscle fibers and block fibroblast activity, causing fibrosis resulting in muscle weakness.[4]

The purpose of this study is to determine what is the effect of SARS-CoV-2 infection on the human locomotor system.

MATERIAL AND METHODS

The study is a questionnaire, single-center, retrospective and is conducted in the temporary clinics for treatment of infected subjects with SARS-CoV-2 at the Military Medical Academy, Sofia over the period November 2020 - January 2021. It included 43 patients (31 men; 12 women) aged 28-84 years with acute mild to moderate SARS CoV2 infection.[6] They were divided by sex into two groups: Group I - Male n-31/100% and Group II - Female n-12/100%. The virus was detected by multiplex real-time RT-PCR test of nasopharyngeal swab for quantitative detection of nucleic acid by SARS CoV2 (TaqPath™ COVID-19 CE-IVD RT-PCR Kit, Applied Biosystems, Thermo Fisher Scientific, Life Technologies

Corporation, 6055 Sunol Blvd, Pleasanton, CA 94566). At the time of admission, all patients had a history and a comprehensive clinical examination. All patients enrolled in the study completed an anonymous questionnaire with the same 8 questions to assess the severity of the changes and concerning the post-disease symptoms associated with the musculoskeletal system:

1. Do you feel pain in the locomotor system?
2. Does the degree of pain change?
3. How do you feel when performing routine daily activities?
4. How do you feel in sitting position?
5. Mobility?
6. In which anatomical area of the musculoskeletal system do you experience the most intensive pain?
7. Do you need support when you move?
8. How did you feel when climbing stairs, just before admission to the hospital?

The last question 9 from the questionnaire "Is there an improvement in the clinical symptoms of LMS?" Patients were asked to answer upon the discharge. Participation in the study was voluntary after acquiring the consent of each patient. For the collection of personal data such as age, previous diseases and comorbidities, the Personal Data Protection Act (anonymity clause) was observed.

The treatment of patients was carried out according to the protocol established by the Clinic of Infectious Diseases at the Military Medical Academy. It comprised: dual antibiotic combination, proton pump inhibitor, hepatoprotector, corticosteroids in different dosages according to the clinical manifestation, probiotic and in particular cases antifungal, anticoagulant at varying dosage and expectorants, if necessary.

RESULTS

Our study included 43 (100%) volunteers: n-31/72.09% men aged 28 to 84 years and n-12 / 27.91% women aged 33 to 82 years. For comparison of the results, they were divided into two groups by sex: Group I - Male and Group II - Female. All of them answered the 9 questions from the survey, and their answers are presented in our results.

Table 1: Results of the answers to question 1 and question 2 of the survey.

1. Do you have pain in the musculoskeletal system? n/%	There is no pain or it can be ignored n/%	Mild pain, can be ignored, does not hinder daily activities n/%	Mild pain that does not interfere with normal daily activities and is affected by analgesics n/%	Moderately tolerable pain that intensifies at times. There are limitations in daily activities and need for stronger anelgesics. n/%	Severe pain with severe limitation of daily activities. n/%	Very severe pain with inability to perform routine daily activities. n/%
Male 31/100	21/48.39	6/12.9	6/19.35	3/9.68	2/6.45	1/3.23
Female 12/100	3/25	3/25	2/16.67	4/33.33	0/0	0/0
2. Does the degree of pain change? n%	The pain improves quickly n/%	The pain varies, but generally improves quickly n/%	The pain improves slowly n/%	The pain is constant n/%	The pain aggravates n/%	The pain aggravates quickly n/%
Male 31/100	16/51.67	6/19.35	3/9.68	2/6.45	4/12.9	0/0
Female 12/100	5/41.67	4/33.33	1/8.33	1/8.33	1/8.33	0/0

The results presented in Table 1 show that in 3/9.68% of male patients, the pain in LMS is strong or very strong and it severely or completely limits their daily activities. No female patient infected with SARS-CoV-2 reported this level of pain in the LMS in our study. With a higher percentage of 16/51.67% of men, the pain improves quickly in contrast to women, with a percentage of 5/41.67%. However, this pain deteriorate in 4/12.9% of male patients and in 1/8.3% of female patients.

Table 2: Results of the answers to question 3, question 4 and question 5 of the survey.

3. How do you feel when performing routine daily activities? n/%	I perform them without difficulty n/%	I perform them with difficulty n/%	Performance is impossible n/%
Male 31/100	16/51.61	12/38.71	3/9.68
Female 12/100	3/25	9/75	0/0
4. How do you feel in sedentary position?	Comfortable, I can sit for more than an hour.	I feel more comfortable in a semi-sedentary position.	I can not stay seated.
Male 31/100	10/32.26	10/32.26	11/35.48
Female 12/100	6/50	6/50	0/0

5. Mobility	No limitation in joint and muscle mobility	Feeling of limited mobility, which disappears after exercise	Permanent limitation of mobility
Male 31/100	14/45.16	12/38.71	5/16.13
Female 12/100	3/25	6/50	3/25

Performing normal daily activities is impossible in 3/.68% of male and in none of the female patients (Table 2). Again, 11/ 35.5% of men cannot stay in sedentary position, with 5/16.1% feeling permanently limited mobility. In women, such a disability is reported by 3/25%, but there is no patient who cannot take a sedentary position.

Table 3: Results of the answers to question 6 of the survey.

In which anatomical area of the musculoskeletal system do you experience the most pain					
6. Location of pain n/%	Back, waist n/%	Joints n/%	No pain n/%	Whole body n/%	Thighs n/%
Male 31/100	9/29.03	2/6.45	14/45.16	4/12.90	2/9.68
Female 12/100	5/41.67	6/50	1/8.33	0/0	0/0

9/29.03%, of men experience the most severe back and lower back pain while 14/45.16% report no pain. Women most frequently complain of joint pain 6/50%, with three out of six women explicitly emphasizing that the strongest pain is in the hips.

Table 4: Results of the answers to Question 7 and Question 8 of the survey.

7. Do you need support when you move n/%	No n/%	I walk alone, with difficulty n/%	I walk, but I need support (aids or another person) n/%	Impossible self movement n/%
Male 31/100	18/58.06	12/38.71	1/3.23	0/0
Female 12/100	6/50	4/33.33	2/16.67	0/0
8. How did you feel when climbing stairs, just before admission to the hospital	I climbed them without a problem	Climb them by railing support and shortness of breath	I climbed them with breaks	I was unable to climb
Male 31/100	4/12.9	9/29.03	4/12.9	14/45.16
Female 12/100	2/16.67	5/41.67	4/33.33	1/8.33

Self-movement with difficulty is observed in 12/38% of men and 4/33.33% of women. None of the patients reported inability of self-movement.

Table 5: Results of question 9 asked upon the discharge of patients.

9. Do you have an improvement in the clinical symptoms in LMS? n/%	There is a significant improvement n/%	Complaints persist n/%
Male 31/100	28/90.32	3/9.68
Female 12/100%	7/58.33	5/41.67

During the dehospitalization of the patients we inquired if there was an improvement in the clinical symptoms in LMS, as 35 of them or 81.40% answered that they had a significant improvement until complete relief of symptoms and the remaining 8 patients or 13.95% had an improvement but with persistent complaints.

DISCUSSION

The results of this study reveal the occurrence and varying degrees of painful pathological symptoms of LMS in SARS-CoV-2-infected patients. In n-3/9.68% of men (patients in group I) it completely limits or hinders their daily activities, while that is not observed in the women included in our study (group II). The intensity of pain and aches aggrevates in n-4/12.9% of men and in n-1/8.33% of women. There is a permanent restriction of mobility in n-5/16.13% of male and in n-3/25% of female patients. N-11/35.48% of men and n-0/0% of women cannot stay in sedentary position. In 29.03% (n-9) of men the pain location is in the back, and in n-2/6.45% in the joints, in n-4/12.9% in the whole body, while n-14/24.16% do not report any pain. In 41.67% of women it is in the back, in n-6/50% in the joints, while n-1/8.33% do not report pain. Climbing stairs at admission is difficult for n-9 / 29.03% of men and n-5/41.67% of women. N-2/16.67% of women and n-1/3.23% of men need support for movement. Symptoms improved after treatment in n- /58.33% of women and n-28/90.32% of men. The search for references on similar studies made in the electronic database (PubMed and Google Scholar), as well as in the available literature, found no other trials on a questionnaire basis to examine the effect of SARS-CoV-2 on LMS in infected patients. The findings confirmed the effects of Covid-19 on LMS - Effects of Covid-19 on the human musculoskeletal system.[7]

CONCLUSION

SARS-CoV-2 infection causes or exacerbates painful pathological symptoms of the locomotor system. They are more common and more severe in male patients. The therapy and subsequent recovery of SARS-CoV-2 in a large percentage of cases lead to the disappearance

and melioration of musculoskeletal pathological symptoms. Other similar and scientifically-based studies should be conducted to establish the causality and relationship between SARS-CoV-2 infection and the onset of symptoms by LMS.

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Authors declare that this is entire own work.

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