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METHODOLOGY OF BACK PAIN RELIEF USING ISOMETRIC-TENSION POST-COVID-19 DISEASE

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ABSTRACT
Objective – To establish a new and effective methodology for physical exercises to relieve back pain after Covid-19 disease.
Methods – This report deals with reviewing the author's methodology, which consists of isometric tension exercises based on karate blocking techniques. The exercises are five in number. The execution time is 7-8 minutes per set. Fit balls, foam rollers, and gym mats or equivalents may be used. A further study will be conducted to examine and evaluate the methodology on people with back pain after being infected with COVID-19. The individuals will be observed and measured with surveys. The results will be presented in further reports.
Discussion – Studies have shown that regular exercise helps to prevent pain (Sulejanov, 2009, Lizier et al., 2012, Washif et al., 2019) and it has been found that pain is worsened by Covid (Serrano-Ibáñez et al., 2021). Furthermore, as for the beneficial effect of isometric exercise on the body (Rio et al., 2017, Noorkõiv et al., 2015, Schott et al., 1995), this methodology differs in that it can be performed every day and in any place (gyms, medical centers, homes, and even at work). It does not take much time and is not complex. We assume that after applying the methodology and evaluating the results obtained, we will confirm the positive effect of the exercises on pain after Covid-19 disease.
Conclusion – In conclusion, after reviewing the methodology as well as the preliminary studies on the practical impact of physical exercise on the health of people with back pain, we assume positive results can be achieved. Therefore, the author's methodology will be applied to obtain data which is needed to produce a complete evaluation of its effectiveness in further reports.

Keywords: *pain, post-Covid, exercises, isometric*

INTRODUCTION

Covid-19 is a new coronavirus also known as SARS-CoV-2. The World Health Organization (WHO) announced it for the first time in December 2019 (WHO, 2021). According to studies in 2021, the most common accompanying symptoms after shortness of breath are muscle (myalgia), neuropathic, and joint pain (Weng et al., 2021).

Chronic pain increases stress, restricts physical activity, disrupts sleep, and reduces the possibility of complete recovery (Geneen et al., 2017). In all cases, the adequate treatment of the disease and the control of the pain increase the QoL of the patient (Megari, Kalliopi, 2013). In other words, inadequacy to control pain leads to a patient's inability to fully realise his/her intellectual, physical, educational, and professional abilities (Bogduk, 2006, Ahmed, Modic, 2007).

Pain is a biological phenomenon with a negative sign but with a positive sense. It is the first and most important sign of discomfort and should therefore be sought, localized, and characterised (Kolarov, 2003).

According to WHO, motor-physical activity is defined as any body movement produced by skeletal muscles that requires energy expenditure. Physical inactivity (lack of physical activity) has been identified as the fourth leading risk factor for global mortality (WHO, 2020). Studies show that in a sedentary lifestyle, physical activity helps people with chronic musculoskeletal pain (D'Silva et al., 2018, Luque-Suarez et al., 2018). Studies show that a significant and moderately strong positive relationship exists between the level of physical activity and QoL in adults with spinal cord injury (Sandy et al., 2008), and even helps people with multiple sclerosis (Motl, McAuley, 2009).

Physical activity, health, and QoL are closely linked. The human body is designed to move and therefore needs regular physical activity to function optimally and to avoid illness (Hills et al., 2015). It has been shown that sedentary lifestyles are a risk factor for the development of many chronic diseases, including back pain, one of the major causes of discomfort and a factor in decreasing QoL in the western world (COM, 2008). As during Covid-19 there

wasn't much movement and activity as a result of quarantines and a sedentary lifestyle has arisen, which led to an increase in the number of people with back pain.

The three predisposing factors for back pain and its repetition are largely related to the positions and their maintenance. The most important is the correct sitting position that supports the spine curves, followed by the reduced volume of lumbar extension, and lastly, the frequency of flexion (McKenzie, 2003).

Pain can occur in different locations of the spine and can be treated differently depending on the location and type of pain. Several medications may be used to reduce pain (Zdziarski et al., 2015). Nowadays, treatment of pain involves eliminating its cause by using intra-articular injections (Vincent et al., 2013) and NSAIDs (Wertli, Steurer, 2018, Chou, Huffman, 2007), but they can be painful and not long-lasting or with side effects.

However, other treatment options can be used, as studies show that regular exercise has been identified as a primary preventive and management of pain (Sulejanov, 2009, Lizier et al., 2012, Washif et al., 2019). It is considered that there is a strong connection between COVID and the worsening of the pain. (Serrano-Ibáñez et al., 2021).

It has been proven that if pain is not given sufficient attention, it may become chronic and will increase stress, restrict motor activity, disrupt sleep, and reduce the possibility of complete recovery. In all cases, adequate control of pain will reduce its accuracy.

Since the main goal of physical exercise as an activity for health is to develop physical education tools and methods aimed at enhancing the functional capabilities of the endocrine and immune systems for their vital functioning (Sulejanov, 2009), these methods may help the body to better recover its strength after Covid-19.

People who do little or no physical activity are more likely to get very sick from Covid-19 than those who are physically active. A Communicable Disease Centre's (CDC) systematic review found that physical activity is associated with a decrease in COVID-19 hospitalizations and deaths, while inactivity increases that risk (CDC, 2022).

Here comes the role of isometric exercises as they reduce pain subsequent to several different intensities and durations of isometric contractions (Lemley et al., 2014). Furthermore, isometric exercises have an effect on improving physical endurance and posture by strengthening and stabilising the muscles (Lum, Barnosa, 2019). They have various effects on the body, as findings show beneficial results after the execution of these types of contractions (Rio et al., 2017, Noorkõiv et al., 2015, Schott et al., 1995).

The purpose of this manuscript is to establish a new and effective methodology for physical exercises to relieve back pain after Covid-19 disease.

METHODS

The author's methodology is for blocking pain. It comprises a set of isometric-based exercises and blocking-protective techniques of martial arts karate (Shotokan). A further study will be conducted to examine and evaluate the methodology on people with back pain after being infected with Covid-19. The individuals will be observed and measured with surveys. The results will be presented in further reports.

Methodology of exercises used

The methodology states for coordination of the static tension (isometric) combined with the dynamic tension (isotonic), which encompasses the same level of the spinal column with consideration of rhythmic breathing. Fit-balls, foam rollers, and gym mats or equivalents may be used. As follows:

Table 1. *General over review of the author's training program*

Duration of the methodology	Every day for 10 days
Number of performances per day	5
Number of exercises	5
Number of phases	4
Number of phase repetitions	3
Duration of phases	5-6 sec.
Duration of exercise	1 min (3x20 sec.)
Series duration	7-8 min
Duration of breaks	20-40 sec.
Way of execution	Slow pace
Type of load	Isometric + isotonic
Breathing rhythm	Inhale at 1st phase and exhale in the 4th phase

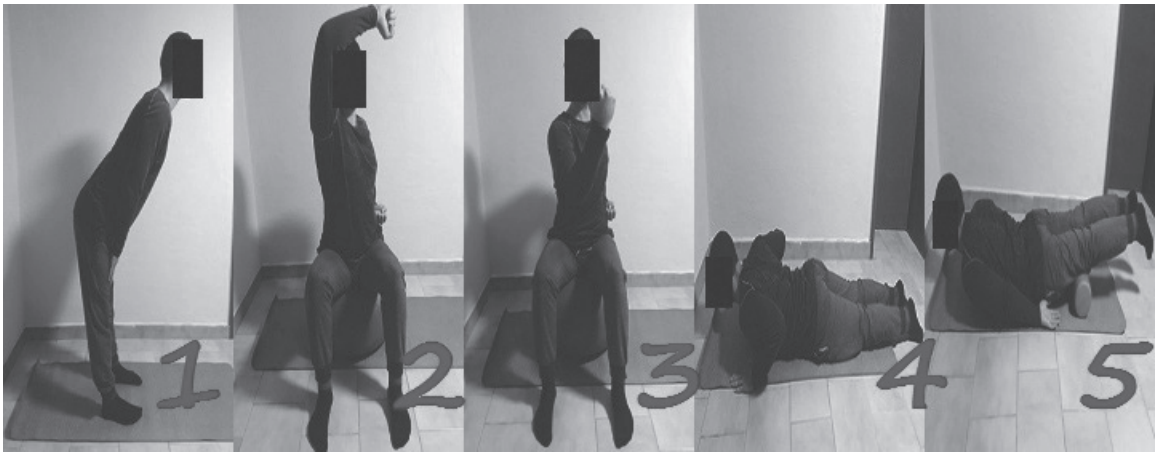


Figure 1. *Exercises that were used in author's methodology*

As illustrated in Figure 1, the author's methodology consists of five exercises. Each exercise has a different position, as the first is done standing, the second and the third are in a seated position, and the fourth and fifth are lying on the ground in a prone position. All the exercises emphasize the back muscles shown in Tables 1-5. It will be presented in detail for each exercise as a movement in each phase, activation, and influence.

Table 3. *Overview of phases and area of influence for the first exercise*

Phases	Movement	Activated nerves	Area of influence
Phase 1, 2, 3	Extension of thoracic lobe	Rami dorsales,	T1-T12
All phases	Lumbar extension	Thoracodorsalis, Rami dorsales	C6-C8 T12-L5
All phases	Scapula retraction	Accesorius, Dorsalis scapulae	C5
All phases	Extension of hip	Ischiadicus, Gluteus inferior, Gluteus superior	L2- S2
All phases	Plantar flexion	Tibialis, Fibularis superficialis	L4-S3

As can be seen in Table 2, above, in the first exercise, the set of movements that are involved, which comprise the use of the neck, back, hip, and leg muscles, This highlights the exercise's effects on the following areas: C5 to S3.

Table 4. *Overview of phases and area of influence for the second exercise*

Phases	Movement	Activated nerves	Area of influence
Phase 1, 2, 3, 4	Extension of thoracic lobe	Rami dorsales	T1-T12
All phases	Lumbar extension	Thoracodorsalis, Rami dorsales	C6-C8 T12-L5
Phase 2, 4	Torso rotation	Rami dorsales, Rami ventrales, ilioinguinalis, iliohypogastricus	T1-L1
All phases	Flexion in the shoulder	Axillaris, Pectoralis lateralis, Musculocutaneus	C5-C7
All phases	Extension in the shoulder	Axillaris, Subscapularis, Thoracodorsalis, Pectoralis lateralis, Pectoralis medialis, Radialis	C5-T1
Phase 2, 4	Internal rotation of the shoulder	Pectoralis lateralis, Axillaris, Thoracodorsalis, subscapularis	C5-C6
Phase 2, 3, 4	Abduction of the shoulder	Axillaris, Suprascapularis, subscapularis	C5-C6
All phases	Scapula retraction	Accesorius, Dorsalis scapulae	C5
Phase 2, 4	External rotation of the scapula	Accesorius, Thoracicus longus	C3-C6
All phases	Elbow flexion	Musculocutaneus, Radialis, Medianus ulnrais	C5-C8
Phase 3, 4	Elbow extension	Radialis	C6-C8
Phase 2, 3, 4	Supination	Radialis, musculocutaneus	C5-C6
Phase 2, 4	Pronation	medianus	C6-T1
All phases	Flexion of the fingers	Interosseus ant., Ulnaris, medianus	C7-T1
Phase 1, 3	Extension of the fingers	Interosseus post., ulnaris	C7-C8 T1

As shown in Table 3, above, in the second exercise, the set of movements that are involved includes neck muscles, back muscles, hip muscles, arm muscles, and leg muscles, which summarize the following area of impact of the exercise from C3-L5.

Table 5. *Overview of phases and area of influence for the third exercise*

Phases	Movement	Activated nerves	Area of influence
Phases 1, 2, 3, 4	Extension of thoracic lobe	Rami dorsales	T1-T12
All phases	Lumbar extension	Thoracodorsalis, Rami dorsales	C6-C8 T12-L5
Phase 2, 4	Torso rotation	Rami dorsales, Rami ventrales, ilioinguinalis, iliohypogastricus	T1-L1
All phases	Flexion in the shoulder	Axillaris, Pectoralis, lateralis, Musculocutaneus	C5-C7
Phase 2, 4	Extension in the shoulder	Axillaris, Subscapularis, Thoracodorsalis, Pectoralis lateralis, Pectoralis medialis, Radialis	C5-T1
Phase 2, 4	Horizontal adduction	Pectoralis lateralis, axillaris	C5-C6
All phases	Abduction of the shoulder	Axillaris, Suprascapularis, subscapularis	C5-C6

Phase 1, 3, 4	External rotation of the shoulder	Suprascapularis, axillaris	C5-C6
Phase 2, 4	Scapula protraction	Thoracicus longus, Pectoralis lateralis, Pectoralis medialis, Thoracodorsalis	C5-T1
All phases	Scapula retraction	Accesorius, Dorsalis scapulae	C5
All phases	Elbow flexion	Musculocutaneus, Radialis, Medianus, ulnrais	C5-C8
Phase 3, 4	Elbow extension	Radialis	C6-C8
Phase 2, 4	Supination	Radialis, musculocutaneus	C5-C6
Phase 3, 4	Pronation	medianus	C6-T1
Phase 2, 3, 4	Flexion of the fingers	Interosseus ant., Ulnaris, medianus	C7-T1
Phase 1, 3	Extension of the fingers	Interosseus post., ulnaris	C7-C8 T1

Table 4 shows that the third exercise involves a combination of movements that work the neck, back, hip, arm, and leg muscles. These actions outline the following regions of effect of the exercise from C5-L5.

Table 6. *Overview of phases and area of influence for the fourth exercise*

Phases	Movement	Activated nerves	Area of influence
Phase 1, 3	Head rotation	accessorius	C1-C8
Phase 1, 3	Neck rotation	Dorsalis scapulae, accessorius	C1-C8
Phase 1, 2, 3, 4	Neck extension	Dorsalis scapulae, accessorius	C1-C8
Phase 1, 2, 3, 4	Extension of thoracic lobe	Rami dorsales	T1-T12
Phase 1, 2, 3, 4	Lumbar extension	Thoracodorsalis. Rami dorsales	C6-C8 T12-L5
Phase 1, 3	Horizontal abduction of the shoulder	Axillaris, Subscapularis, Suprascapularis	C5-C6
Phase 1, 3	Scapula retraction	Accesorius, Dorsalis scapulae	C5
Phase 1, 3.	Extension of hip	Ischiadicus, Gluteus inferior, Gluteus superior	L2- S2
Phase 1, 3	Plantar flexion	Tibialis, Fibularis superficialis	L4-S3

The fourth exercise, as shown in Table 5 above, is a set of movements that include the neck, back, hip, and leg muscles, which summarises the following regions of effect of the exercise from C1-S3.

Table 7. *Overview of phases and area of influence for the fifth exercise*

Phases	Movement	Activated nerves	Area of influence
Phase 1, 2, 3, 4	Extension of thoracic lobe	Rami dorsales	T1-T12
All phase	Lumbar extension	Thoracodorsalis, Rami dorsales	C6-C8 T12-L5
All phase	Scapula retraction	Accesorius, Dorsalis scapulae	C5
Right / left leg	Flexion in the knee	Ischiadicus, Obturatorius, Femoralis, Tibialis	L2-S2
Right / left leg	Extension in the knee,	Femoralis, Gluteus superior	L2-L5
Right / left leg	Plantar flexion	Tibialis, Fibularis superficialis	L4-S3

Table 6 shows that the set of movements used in the fifth exercise engage the neck, back, and leg muscles, which summarizes the following region of effect of the exercise from C5-S3.

DISCUSSION

Studies have shown that regular exercise helps to prevent pain (Sulejanov, 2009, Lizier et al., 2012, Washif et al., 2019) and it has been found that pain is worsened by Covid (Serrano-Ibáñez et al., 2021). Furthermore, as for the beneficial effect of isometric exercise on the body (Rio et al., 2017, Noorkõiv et al., 2015, Schott et al., 1995), this methodology differs in that it can be performed every day and in any place (gyms, medical centers, homes, and even at work). It does not take much time and is not complex. We assume that after applying the methodology and evaluating the results obtained, we will confirm the positive effect of the exercises on pain after Covid-19 disease.

CONCLUSION

In conclusion, after reviewing the methodology as well as the preliminary studies on the practical impact of physical exercise on the health of people with back pain, we assume positive results can be achieved. Therefore, the author's methodology will be applied to obtain data which is needed to produce a complete evaluation of its effectiveness in further reports.

Hence, achieving this will benefit medical and sports science.

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