

NATIONAL SPORTS ACADEMY

"Vassil Levski"



Department of Weightlifting, Boxing, Fencing and Sports for All

**Bassel Mohamed Tahboub**

THE INTRODUCTION OF PHYSICAL ACTIVITY FOR PREVENTION OF  
ILLNESS AND IMPROVING THE QUALITY OF LIFE

**AUTOREFERATE**

Of dissertation for awarding the educational and scientific degree "Doctor"

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Scientific supervisor:

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Sofia, 2022

The dissertation is developed in a volume of 163 pages, is structured in an introduction and 3 chapters. It contains 52 tables, 59 figures including a bibliography of 175 literature sources, of which 29 in Cyrillic and 146 in Latin, as well as four appendices.

The dissertation was discussed and admitted to the official defense at an extended meeting of the Department of Weightlifting, Boxing, Fencing and Sports for All at the NSA "Vassil Levski", held on - .

The defense of the dissertation will take place on 17.01.2022 from 13:00 hours in the hall - of NSA "Vassil Levski" at an open meeting of the scientific jury consisting of:

Internal members:

1. –
2. –

Reserve member: –

External members:

1. –
2. –
3. –

Reserve member: –

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## INTRODUCTION

Covid-19 is a new coronavirus also known as SARS-CoV-2. The WHO announced it for the first time in December 2019. [2] It is a viral pneumonia characterized by common flu-like symptoms. As in more serious cases have signs of shortness of breath, back and chest pain, muscle and joint pain and neurological complications

According to studies in 2021 most common accompanying symptoms after shortness of breath are muscle (myalgia), neuropathic and joint pain (Weng LM, 2021).

According to Shyres et. Al., 2020 claim that these neurological effects (such as back pain, joint pain and headache) may last for at least months after infection, which suggests sensory neuronal involvement in persistent disease like Covid ( Shyres et. Al , 2020).

Pain is a biological phenomenon with a negative sign, but with a positive sense (Kolarov Z., 2003). If left untreated, can become chronic (CaryT. et. Al, 2020). During the pandemic, this type of pain (chronic) is affected by emotional distress and the effects of sensitization caused by Covid (Cohen SP et. Al, 2020).

Esteve R. et al. considers that there is a strong connection with Covid with the worsening of the pain (Esteve R. et al., 2021). Recent studies since shows that due to the sedentary life caused by the pandemic, people have suffered more back pain (Nieto R, 2020, Karos K. et al. 2020).

Pain worsens the quality of life as it does not allow for a fully emotional and social life. It is the first and most important sign of discomfort and should therefore be sought, localized and characterized (Kolarov Z., 2003).

The WHO identifies as the main problem in modern life the problem of spiritual and physical health, as well as a better quality of life.

In modern society, a large number of professions immobilize people and a very common problem is back pain. They occur in 60-80% of the adult population. They are not a separate disease, but a symptom of many different diseases. In many cases, the exact etiology remains hidden. It mainly affects people between the ages of 30 and 50 (W. Dankaerts, 2009).

The basic concept of quality of life is a multi- concept, including at least three areas - physical, psychological and social functioning.

It has been shown that pain worsens the quality of life as it does not allow for a fully emotional and social life (Kolarov Z., 2003. In all cases, the adequate treatment of the disease and the control of the pain increase the quality of life of the patient. In other words inadequacy to control pain leads to patient's inability to fully realize his / her intellectual, physical, educational and professional abilities (Bodgduk N. 2006, Modic M., 2007).

It has been shown that sedentary lifestyles are a risk factor for the development of many chronic diseases (Bortestein D. 2000). According to D'Silva A. et al.that in sedentary lifestyle, physical activity helps and affects quality of life (D'Silva A. et al. 2018). As studies made by J. Adrian et al. from 2019 show that regular exercise is identified as the main prevention and management of pain (J. Adrian et al., 2019).

Physical activity, health and quality of life are closely linked. The human body is designed to move and therefore needs regular physical activity to function optimally and to avoid illness (COM, 2008).

The main goal of physical activity for health is to develop physical education tools and methods aimed at enhancing the functional capabilities of the endocrine and immune system for its vital functioning (Seluyanov V., 2009). Physical (motor) activity during the Covid pandemic is considered to be interrelated, the higher the levels of physical activity the higher the level of quality of life (Zhang X. et. Al. 2020).

## **PURPOSE OF THE STUDY**

The aim is to establish and evaluate the effectiveness of a method of physical activity that reduces back pain after Covid and improves quality of life.

## **OBJECTIVES OF THE STUDY**

1. Research of the available literature and development of theoretical bases of the researched problem.
2. Development of an appropriate methodology for the researched problem.
3. Research of the methodology on an experimental group
4. Analysis of the results obtained to determine the effectiveness of the application program.
5. Preparation of conclusions and recommendations in accordance with the analysis of the results.

## **SUBJECT, OBJECT AND CONTINGENT OF THE STUDY**

**The subject** of the study is the effectiveness of the methodology for physical activity for the prevention of pain after Covid and improving the quality of life.

**The object** of the study is the quality of life of people with back pain spent Covid.

**The contingents** of the study are a total of 56 Bulgarians, aged between 25-65 years. which of them were 29 - control group and 27 - experimental group.

## **ORGANIZATION OF THE STUDY**

The current study was conducted in the period from Sept. 2020 to Aug. 2021 during the experiment, the persons we observed and studied were classified into a control and experimental group.

The experiment was conducted in Plovdiv. But due to the current measures imposed on the Covid-19 pandemic, we had to conduct the experiment online. Using the Facebook platform

to gather the contingent in separate groups and the Zoom platform to conduct online meetings to demonstrate and teach the proper implementation of the methodology. (ZOOM ID: 863 0250 7589 / 810 1657 8396)

The surveys were collected electronically about the experimental group. And the control group was distributed to the local GPs in Plovdiv through paper surveys.

Each individual was examined for 30 days. As individuals from the experimental group were subjected to the method twice with a ten-day break as follows; application of the methodology for 10 days is followed by 10 days of rest and then the methodology is repeated for 10 days. All subjects were surveyed four times on the 1st, 10th, 20th and 30th day.

## **RESEARCH METHODS**

### **1. Research of literary sources;**

The published materials on the topic of the dissertation have been studied in the National Library "Ivan Vazov" - Plovdiv, the library of NSA "Vassil Levski", electronic sources and Internet database such as PubMed, Elsevier, Scopus, Google Scholar, Cochrane and others. A total of literature sources on the researched problems of the dissertation were studied, as 168 sources of them are 27 in Cyrillic and 141 in Latin.

### **2. Numeric rating scale (NRS Pain)**

The NRS for pain is an 11-point numeric rating scale, with 0 representing “no pain” and 10 “unbearable pain.”. For practical convenience in analysing the results (L. Kraidzhikova, 2011) proposes the following grading for grouping the assessments: 0 - no pain (grade 0), 1 to 3 - mild pain (grade 1), 4 to 6 - moderate pain (score 2), 7 to 10 - severe pain (score 3).

### **3. Test „SAN“**

SAN-test (Doskin et al., 1973, Bulgarian translation: D. Kaikov). The test consists of 30 questions. The self-assessment of the tested persons is on a 9-point scale and the higher result shows a better condition. The state of the total indicators: self-confidence, activity and mood are based on 10 questions from the test, respectively (cited by Chervenkova, L. 2010).

The test is designed to study the mental and emotional state of individuals with indicators (self-esteem, activity and mood) related to the current state. To facilitate, we used the answers to each question to be in the form of a 7-point scale for each indicator, respectively. The total value of the scales of each indicator is divided by 10, so the maximum number of points for each indicator is 7.

#### 4. **Questionnaire „SF-8 Health survey“**

SF-8 is a short questionnaire with 8 questions, with a choice of different answers, which represent two final assessments, contains one question from each of the eight scales assessing different areas of health included in the widespread questionnaire "SF-36® Health survey". Each scale makes calculations from the answers to the individual question, the maximum number of points is 42 (22 for Physical Condition and 20 for Mental Condition) and the higher the score indicates the better the condition.

#### 5. **Questionnaire survey**

It is a questionnaire that includes 10 questions. It is attached to the dissertation.

#### 6. **Experiment of the methodology** (experimental group only)

The author's methodology for physical activity was applied in accordance with the presented hypothesis, purpose and tasks of the research.

#### 7. **Frequency analysis**

With the help of this analysis, the distribution of frequencies in percentages for each of the questions in the questionnaire was established.

#### 8. **Variation analysis**

This analysis gives us an idea of the average values ( $\bar{X}$ ) of the studied indicators, the standard deviations (S) and the coefficient of variation (V %).

#### 9. **Hypothesis testing**

To establish the reliability of the differences between the obtained mean values, we used Student's t-test for independent samples with a guarantee probability of  $P \geq 95.0\%$ .

#### 10. **Graphical analysis**

It illustrated the calculated coefficients in different types of tables and figures. This allows you to accurately and clearly reveal the individual patterns.

## **METHODOLOGY OF APPLIED PHYSICAL ACTIVITY (author's methodology)**

The author's training program is a method for blocking pain, is a set of exercises based on isometric and protective techniques of martial arts "karate" (shotokan).

The methodology is based on static tension (isometric) with dynamic tension (isotonic) covering the muscles and the peripheral nervous system from which the movement in the area of pain is performed).

The methodology is designed to perform a set of exercises five times a day for a period of at least 10 days to achieve the desired results. To facilitate the implementation of research activities, we performed the methodology for only 10 days, followed by a break of 10 days and then repeat the methodology for another 10 days. By filling out the questionnaires and tests before the start of the ten-day training and after the end of the performance.

Subsequently, the effects between the two control and experimental groups for this period were subjected to statistical analysis and comparison.

Table 1.

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 1 <sup>st</sup> phase and exhale in the 4 <sup>th</sup> phase

Characteristics for the training methodology

Table 1 presents the author's training methodology that was performed by the experimental group during the study. The overall program is presented in detail in the dissertation and extensively describes the way of performing the exercises and the desired impact.

## RESULTS ANALYSIS

### Analysis of the results of the survey

Table 2.

Gender	KG	EG
Men	59%	44%
Women	41%	56%

Results for question №1 from the survey

The data presented in Table 2 for processing the first question of the survey show that the majority of the respondents in the control group are men with a percentage of 59% and the majority of the experimental group are women with 56%. As with the small share in the control group are women with a percentage of 41% and in the experimental group are men with 44%.

Table 3.

Age	under 25	25-35	35-45	45-55	55-65	over 65
KG	3%	7%	14%	28%	24%	24%
EG	4%	37%	30%	7%	22%	0%

Results of question №2 from the survey

The data presented in Table 3 for processing the second question of the survey show that the largest percentage of respondents in the control group were aged 45-55 years with a percentage of 28% and the largest percentage in the experimental group were aged 25-35 years with 37 %. As the smallest percentage in the control group are under 25 years of age with 3% and in the experimental group over 65 years of age with 0%. We notice that the majority of the subjects in the control group are between 45 and 65 years old, and in the experimental group they are between 25 and 45 years old.

Table 4.

Height	under 160	160-170	170-180	180-190	over 190
KG	7%	48%	14%	28%	3%
EG	0%	52%	37%	11%	0%

Results of question №3 from the survey

The data presented in Table 4 for processing the third question of the survey show that a large percentage of respondents in the control group are between 160-170 cm with a percentage of 48% and in the experimental group are still between 160-170 cm with 52%. As the lowest percentage in the control group are over 190 cm with 3% and below 160 cm with 7% and in the experimental group over 190 cm and below 160 cm with 0%. We notice that in the big difference from the studied ones of the two groups they are between 170 and 190 cm, as the control group exceeds the experimental one in height of 170-180 cm and the experimental one exceeds the control one in height between 180-190 cm.

Table 5.

Weight	under 50	50-60	60-70	70-80	80-90	90-100	Over 100
KG	0%	7%	35%	21%	17%	14%	7%

<b>EG</b>	4%	33%	15%	22%	11%	7%	7%
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Results of question №4 from the survey

The data presented in Table 5 for processing the fourth question from the survey show that the largest percentage of subjects in the control group weighed between 60-70 kg with 35% and the largest percentage in the experimental group weighed between 50-60 kg with 33% . As the smallest percentage in both groups weighs less than 50 kg 0% of the control and 4% of the experimental. We notice that the studied by the control group exceeds the percentage of the experimental in weight of 80-90 kg and both groups have the same percentage in weight over 100 kg.

Table 6.

How long does the pain last	less than a month	more than a month
<b>KG</b>	55%	45%
<b>EG</b>	59%	41%

Results of question №6 from the survey

The data presented in Table 6 for the treatment of the sixth question of the survey show that the subjects in the control group exceeded the pain for more than a month by 45% and the experimental by 41%. As well as the experimental group exceed the pain for less than a month by 59% and the control group by 55%. We notice that both groups have a larger share with pain lasting less than a month.

Table 7.

Have you ever had Covid-19?	no	yes, with symptoms	yes, without symptoms
<b>KG</b>	83%	14%	3%

<b>EG</b>	0%	70%	30%
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Results of question №9 from the survey

The data presented in Table 7 for the processing of the ninth question from the survey show that the largest percentage of respondents in the control group did not suffer from Kovid by 83%. As the experimental group exceeds in "yes, with symptoms" by 70% and the control group by 14%.

Table 8.

How often do you exercise	I don't play sports	once a week	2-3 time a week	4-5 times a week	every day
<b>KG</b>	38%	28%	35%	0%	0%
<b>EG</b>	37%	11%	30%	22%	0%

Results of question №10 from the survey

The data presented in Table 8 for processing the tenth question from the survey show that the largest percentage of respondents in both groups did not play sports with approximately the same percentage of 38% for the control and 37% for the experimental, and the smallest share of both groups played sports. every day by 0% for both groups. We notice that the average percentages of both groups trained 2-3 times a week, with the control exceeding 1 time and the experimental 4-5 times a week.

### Analysis of three-dimensional frequency distribution

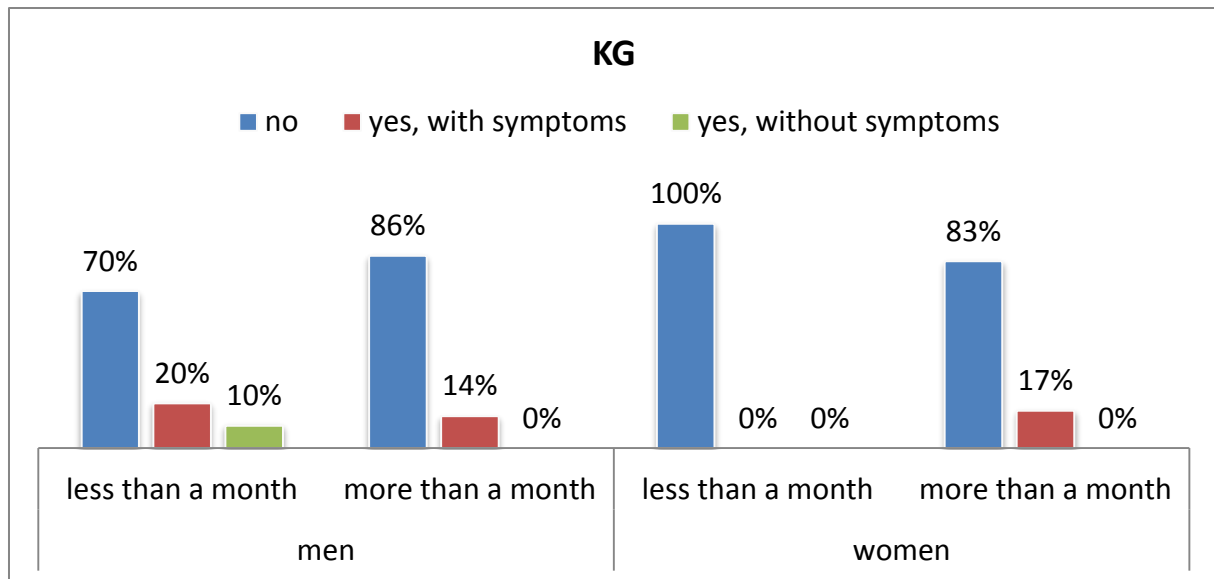


Figure 1 Results of three-dimensional distribution of frequencies between 1, 6 and 9 questions from the survey in the KG

The data presented in Figure 1 for processing the three-dimensional distribution of frequencies between the first, sixth and ninth questions of the survey show that, with the highest percentage of women in the control group with 100% in whom the pain lasted less than a month did not suffer from Covid. And those who lasted more than a month did not suffer from Covid, 83% and 17% had symptoms.

And with the highest percentage of men surveyed in the control group with 86% in whom the pain lasted more than a month did not suffer from Covid. And those who lasted less than a month did not suffer from Covid, 70% and 20% had symptoms.

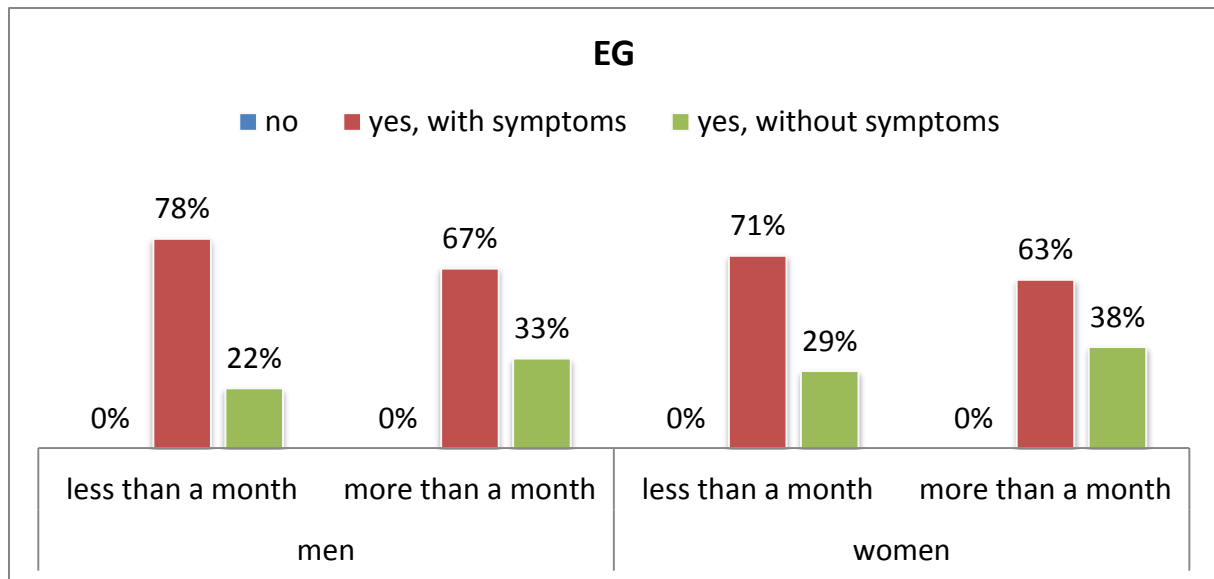


Figure 2 Results of three-dimensional distribution of frequencies between 1, 6 and 9 questions from the survey in the KG

The data presented in Figure 2 for processing the three-dimensional distribution of frequencies between the first, sixth and tenth question of the survey show that, with the highest percentage of women in the experimental group with 71% in whom the pain lasted less than a month . And those who lasted more than a month had 63% and 38% had no symptoms.

And with the highest percentage of men surveyed in the experimental group with 78% in whom the pain lasted less than a month had Covid with symptoms. And those who lasted more than a month were ill with Covid with symptoms were 67% and 33% were ill without symptoms.

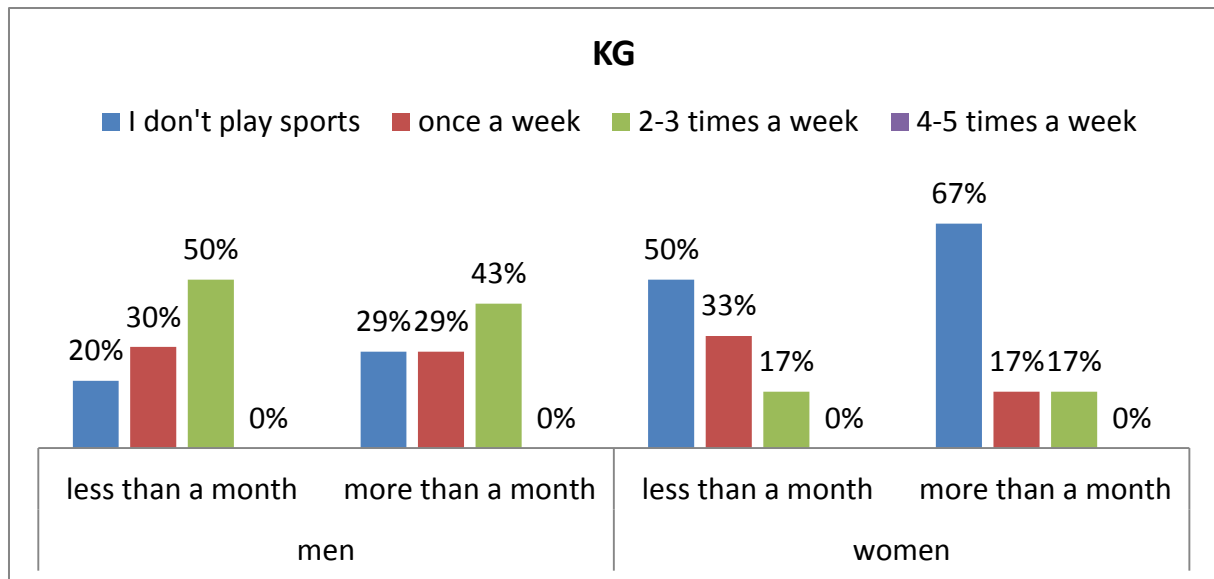


Figure 3 Results of three-dimensional distribution of frequencies between 1, 6 and 10 questions from the survey in the KG

The data presented in Figure 3 for processing the three-dimensional distribution of frequencies between the first, sixth and tenth question of the survey show that, with the highest percentage of surveyed women in the control group with 76% in whom the pain lasted more than a month did not train. And those who lasted less than a month did not train 50% and 33% once a week.

And with the highest percentage of surveyed men in the control group with 50% in whom the pain lasted less than a month trained 2-3 times a week. And those who lasted more than a month have trained 2-3 times and 43% and 29% have not trained.

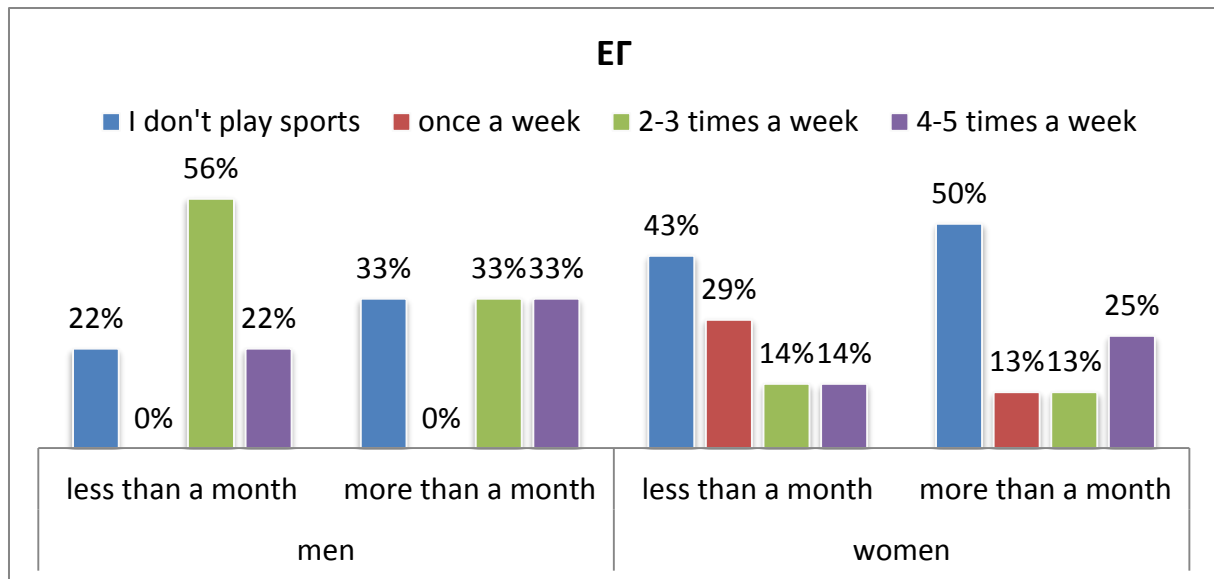


Figure 4 Results of three-dimensional distribution of frequencies between 1, 6 and 10 questions from the survey in the KG

The data presented in Figure 4 for processing the three-dimensional distribution of frequencies between the first, sixth and tenth question of the survey show that, with the highest percentage of women in the experimental group with 50% in whom the pain lasted more than a month did not train. And those who lasted less than a month did not train are 43% and 29% once a week.

And with the highest percentage of surveyed men in the experimental group with 56% in whom the pain lasted less than a month trained 2-3 times a week. And those who lasted more than a month have trained 2-3 times and 33% and 33% have not trained.

#### **Analysis of results from a pain rating scale**

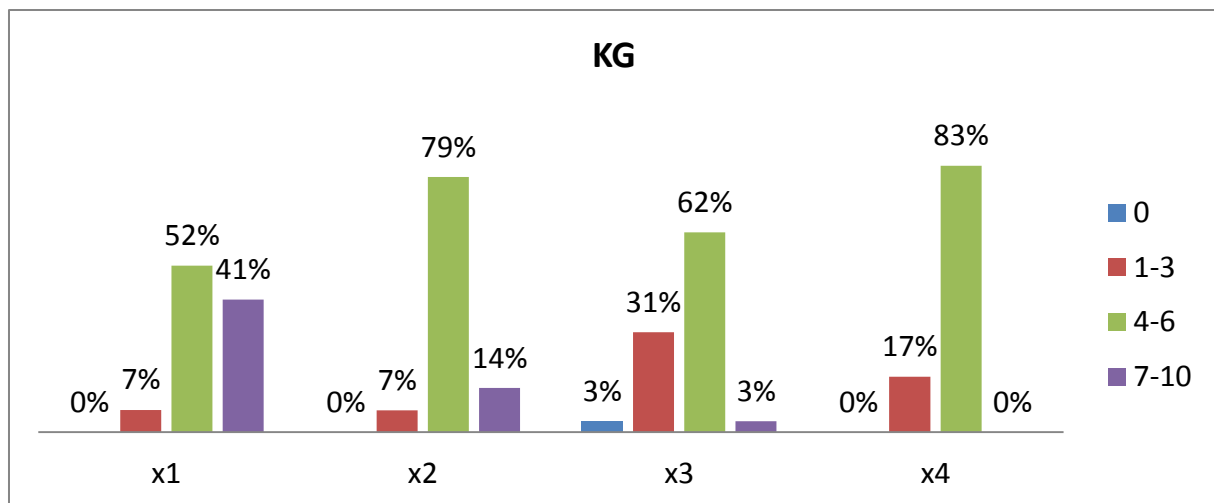


Figure 5 Results marked on the scale for pain of KG

The data presented in Figure 5 on the pain scale of the control group show that, on all dates with the highest percentages, pain between 4-6 was marked. As there is an increase from the first to the second date from 52 to 79% and from the third to the fourth date from 62 to 83%. Ratings 7-10 are the highest on the first date by 41% and decrease with each passing date. And the number of marks marked 1-3 is in the third and fourth dates, which indicates that there is a decrease in pain with each passing date.

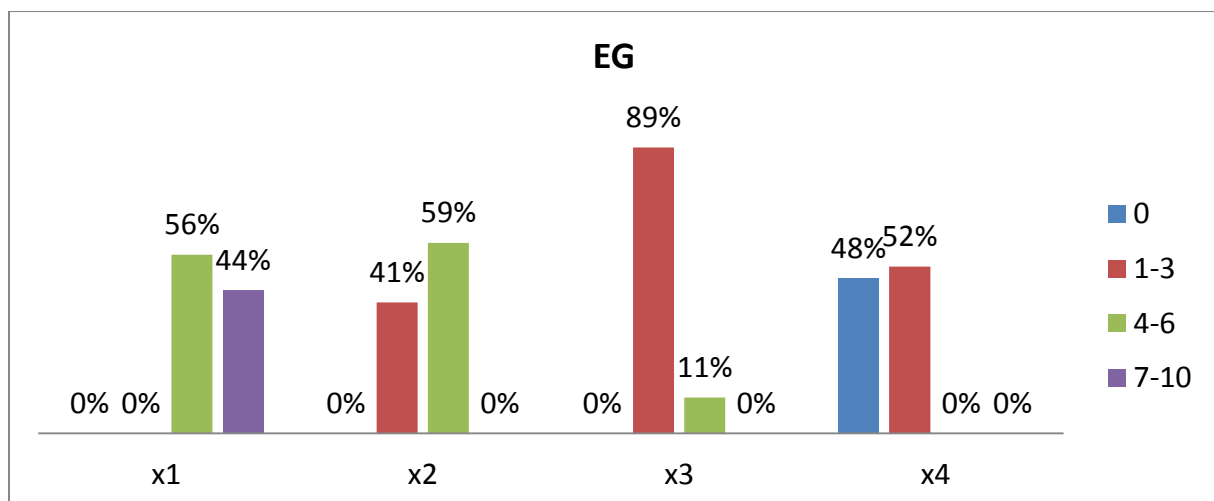


Figure 6 Results marked on the scale for pain of EG

The data presented in Figure 43 of the pain group of the experimental group show that, on the dates with the highest percentages, pain between 1-3 was marked. As marked scores of 7-10 there are only on the first date with 44% and on the last date marked score of 0 is with 48% this shows that there is a great reduction in pain with each passing date.

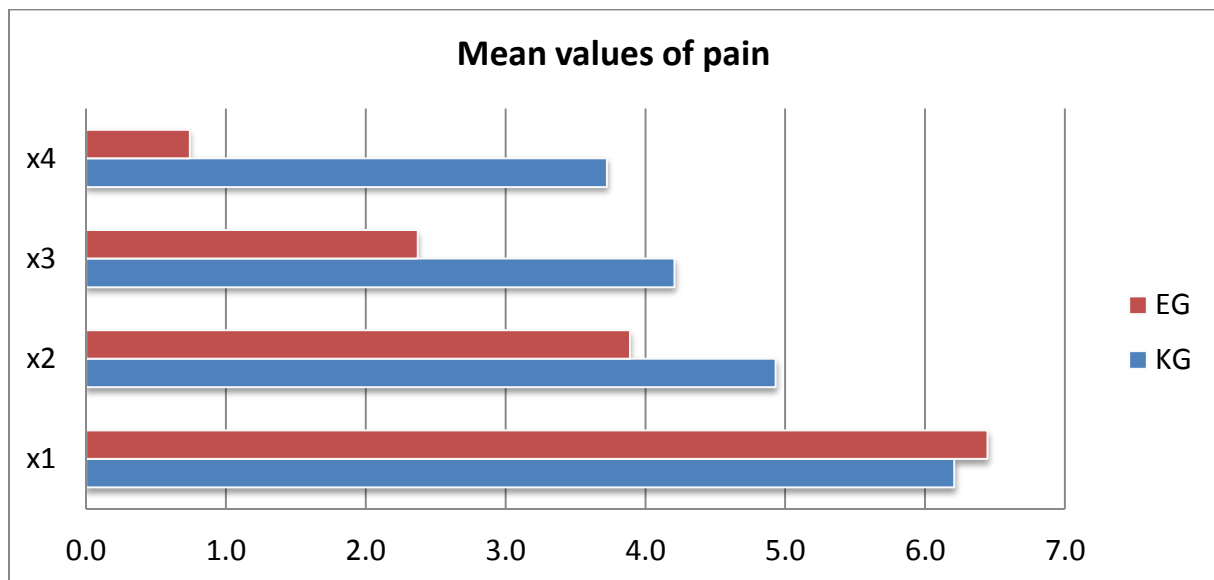


Figure 7 Results of average values on a pain scale

The data presented in Figure 7 for averages of the pain scale show that the averages from the first to the fourth date decreased in both groups, but in the experimental group it obviously decreased more. As the highest average value on the first date in the control group is 6.2 and in the experimental 6.4, but on the fourth date the values have a large difference of 3.7 in the control and only 0.7 in the experimental.

### Analysis of results from SF-8 Health survey

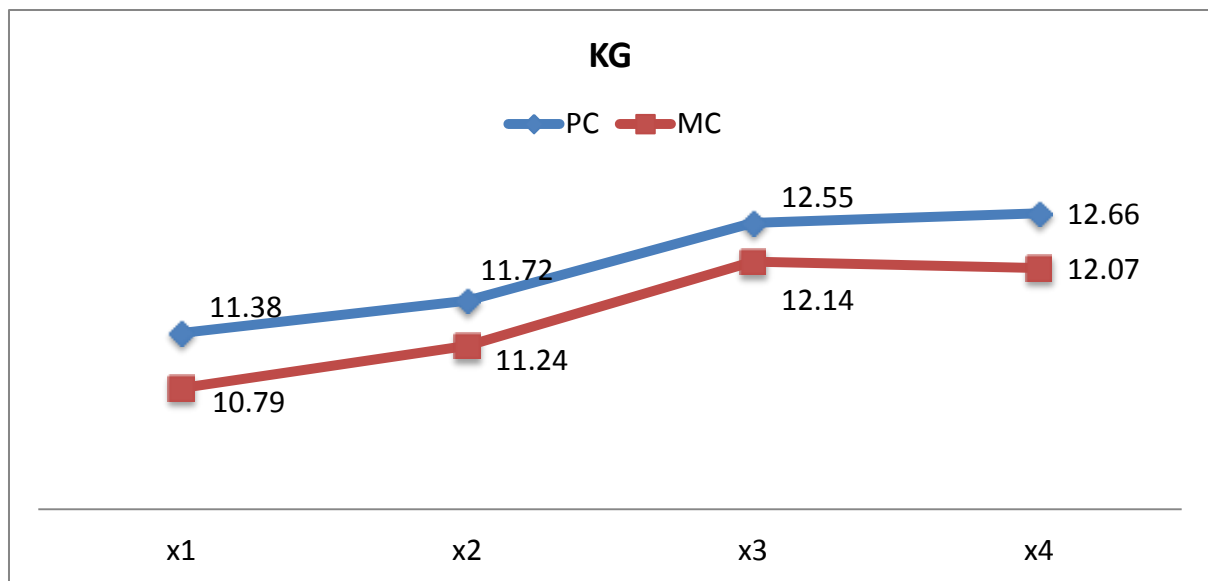


Figure 8 Results of the values for the indicators of the KG

The data presented in Figure 8 for the mean values of the SF-8 indicators of the control group show that the values from the first to the second date of the physical condition indicator increase, but from the third to the fourth date are almost the same, we notice that the values from the first to the second date of the indicator mental state again increases, but from the third to the fourth date decreases.

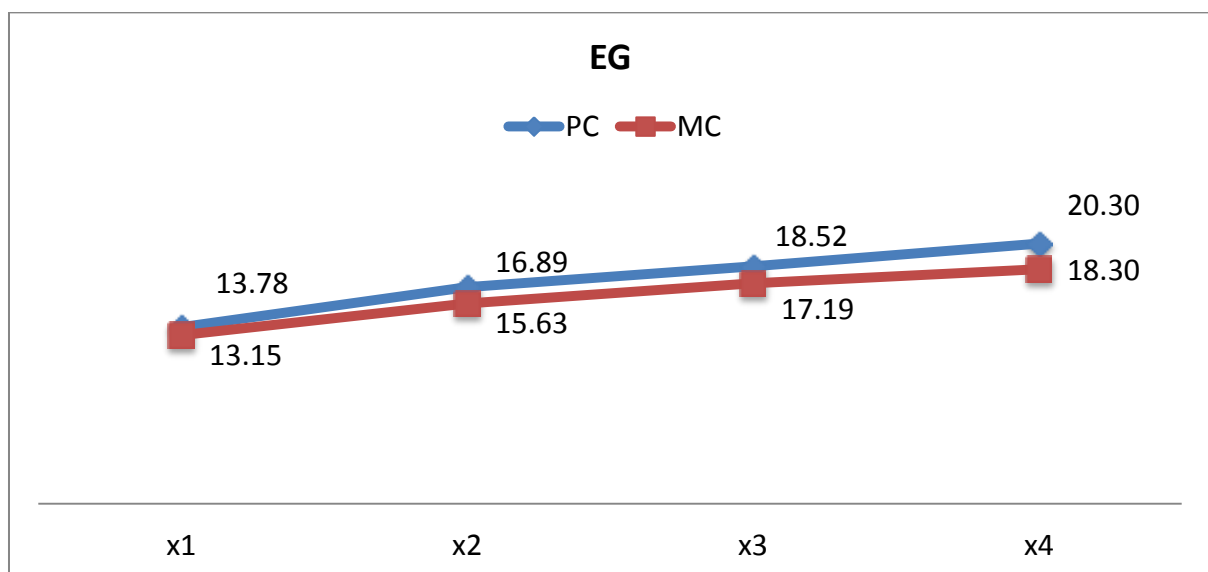


Figure 9 Results of the values for the indicators of the KG

The data presented in Figure 9 for the mean values of the SF-8 indicators of the experimental group show that the values from the first to the second date of the physical condition indicator increase, and from the third to the fourth date, we notice that the values from the first to the second date of indicator mental state again rises, and from the third to the fourth date. This shows that in both indicators there is a constant increase (improvement) of values.

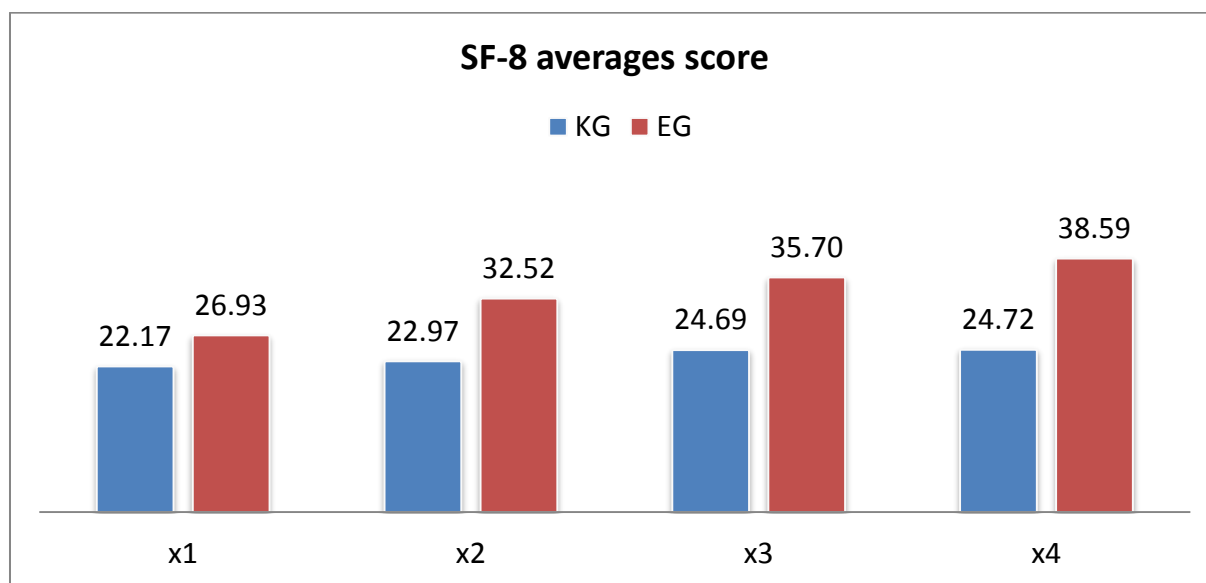


Figure 10 Results of averages of the overall SF-8 score

The data presented in Figure 10 for averages from the overall SF-8 score show that the averages from the first to the fourth date increased gradually in both groups, but in the experimental group they obviously increased more and on each date the scores were higher. As an average value on the first date in the control group is 22.17 and in the experimental 26.93 (difference 4.76), but on the fourth date the values have a larger difference (from 13.87) as 24.72 in the control and 38, 59 in the experimental.

### Analysis of SAN test results

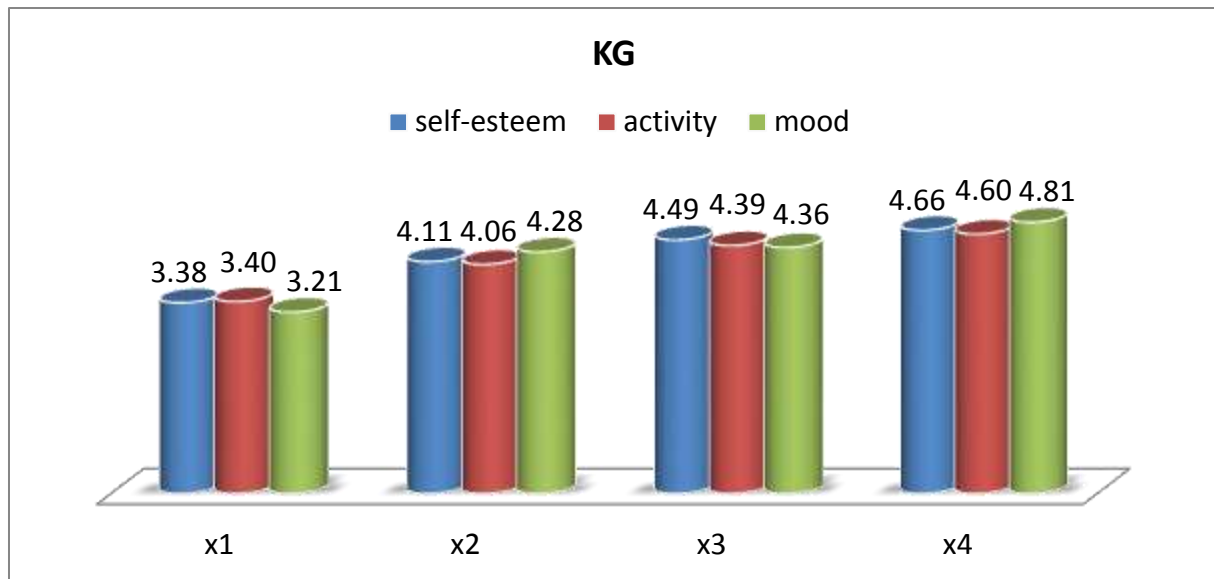


Figure 11 Results of the values for the indicators of the KG

The data presented in Figure 11 for the values of the indicators from the SAN test of the control group show that all values from the first to the fourth date for each indicator increase gradually on each subsequent date but there is a change in the position of the indicators. The highest score on the first date is the activity with 3.40, but on the second date it is the lowest with 4.06 and the highest is with the mood with 4.28. It can be seen that on the third date the self-esteem is in the first place with 4.49 and the mood in the last place with 4.36. As of the last date, he is in the mood again with 4.81.

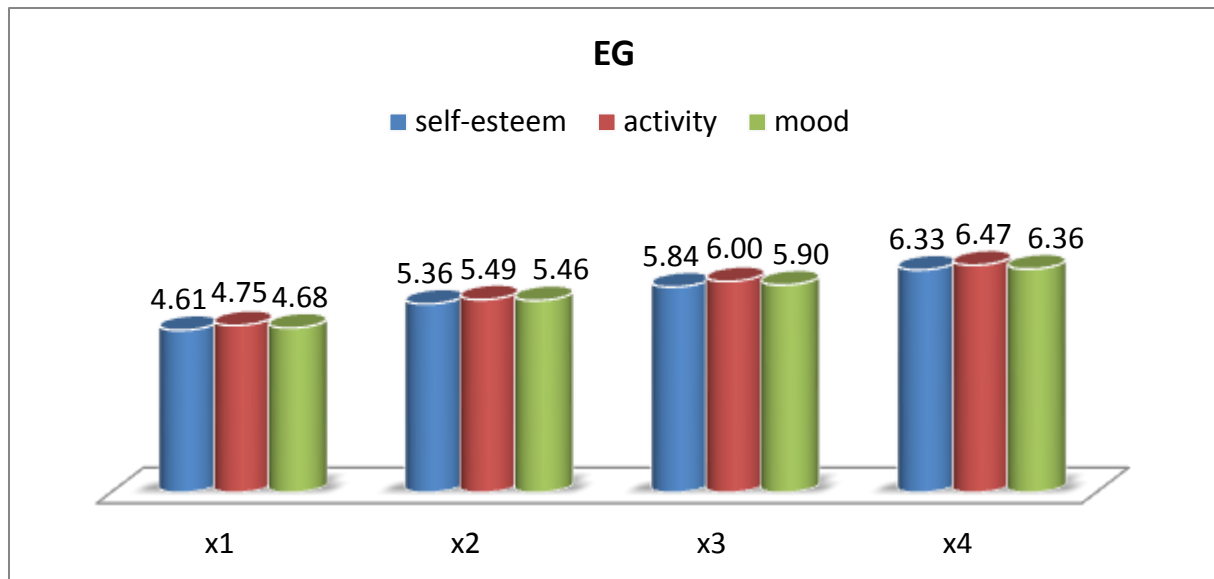


Figure 12 Results of the values for the indicators of the EG

The data presented in Figure 12 for the values of the indicators from the SAN test of the experimental group show that all values from the first to the fourth date for each indicator increase gradually on each subsequent date but the position of the indicators is maintained. The highest score on the first date is the activity with 4.75 and the self-esteem with the lowest 4.61. It is noticed that from the second to the fourth date with maintaining this order in the first place with the highest score is the activity of the second is the mood and the third is self-esteem. As of the last fourth date, the activity is 6.47 and the self-esteem is 6.33. This stable growth and maintaining a high level of activity combined with good self-esteem and mood is due to the good influence of the applied methodology.

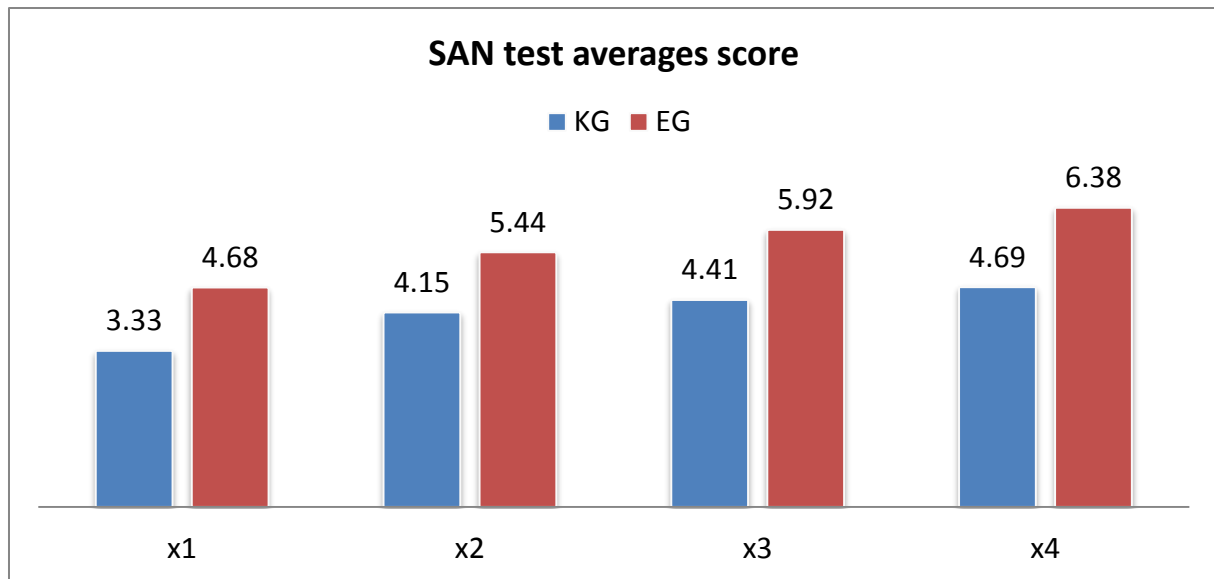


Figure 13 Results of averages of the overall SAN test score

The data presented in Figure 13 for the mean values of the overall assessment of the SAN test show that the mean values from the first to the fourth date increase gradually in both groups, but in the experimental group obviously increase more and on each date the scores are higher. The average value on the first date in the control group was 3.33 and in the experimental group 4.68 (difference 1.35), but on the fourth date the values had a larger difference (of 1.69) as 4.69 in the control group and 6, 38 in the experimental.

## CONCLUSION

Back pain is a serious medical and socio-economic problem. It impairs the quality of life of individuals, and especially those suffering from Covid. The methodology of sports applied by us and the results obtained give us reason to believe that it is appropriate and easily applicable in any sports and medical center and working and home conditions. This allows us to offer it as a routine prevention of recurrence of pain symptoms, and for all people with diseases with the same symptoms.

The study on men and women with back pain after Covid allowed us to obtain information about the opportunities to improve the quality of life of these people affected by the means of Sport.

We believe that with the results of the study we have achieved the main goal, namely to study the possibilities for improving the quality of life and reducing pain through physical activity (Sports) in people with back pain after Covid.

## **CONCLUSIONS**

1. The intensity of pain changed during the implementation of the method in both groups, but in the experimental group at the end of the study was significantly lower.
2. At the end of the study, the general health of the experimental group was statistically significantly better.
3. Indicators Physical activity and mood function are positively affected as in the experimental group there is a statistically significant difference.
4. The methodology we created is suitable for men and women with back pain after Covid. Applied systematically, it has a preventive effect against recurrence of pain symptoms, has a positive effect on general health and improves quality of life.

## **RECOMMENDATIONS**

1. The proposed author's methodology for physical activity (Sport) for back pain after Covid, can be used routinely by people who have Covid and by specialists helping to prevent pain in various stages and diseases.
2. To prevent back pain, we recommend performing slow-paced exercises with inhalation through the nose and exhalation through the mouth, to strengthen muscles, performed prophylactically at home or in specialized rooms.
3. The back should be protected from overload so as not to provoke a recurrence of pain symptoms in case of incorrect performance and overdose, observing and taking the correct position when performing the exercises, for the desired effect is maintained for 10 days.
4. The methodology we apply is suitable for relieving back pain. It improves the physical and mental condition of the person which will increase the level of quality of life.

5. The applied tests are standardized and suitable for studying the quality of life in people with back pain after Covid.

## **CONTRIBUTIONS OF THE DISSERTATION**

1. The health status of people after Covid was examined in terms of their physical and mental condition through the SF-8 questionnaire as well as their self-esteem, activity and mood through the SAN test.
2. A physical-motor program for independent performance is presented both in sports and medical centers and in a home environment, in accordance with the epidemic circumstances and instructions for proper implementation are given.
3. Developed and tested methodology for the prevention of back pain in athletes and non-athletes with exercises for the back muscles that can be applied by different age groups.
4. The application of our proposed methodology in sports and medical centers will contribute to the prevention of back pain during the pandemic.

## **PUBLICATIONS RELATED TO THE DISSERTATION**

1. **Tahboub B.** Methodology Of Physical Exercises To Manage Back Pain After Covid-19 Disease. In the Proceedings of the IAHCP Joint International Online Medical Conference, London, England, United Kingdom, 21 – 22 May 2022 – Book of proceedings, ISSN 1471 1346. London: Ideal Publishing, 2022.
2. **Tahboub B.** Using Physical Exercises for Back Pain Relieve After COVID-19 Infection. In the Proceedings of the IAHCP Joint International Online Medical Conference, London, England, United Kingdom, 21 – 22 December 2021 – Book of proceedings, ISSN 1471 1346. London: Ideal Publishing, 2021.