



## Health-related Quality of Life (HRQoL) of Patients Suffering from Fibromyalgia after the Classic and Tensegration Massage

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## Abstract

*Pain in the course of fibromyalgia (FMS) is a serious therapeutic problem of modern medicine. Patients experience generalized pain within the musculoskeletal system, which significantly reduces the perceived level of quality of life. The aim of the study was to analyze the impact of therapeutic massage on the alleviation of pain in fibromyalgia and the change in HRQoL after the use of this type of therapy, including the classic and tensegration massage. The study group consisted of 41 people suffering from FMS (F:21; M:20). The mean age of all the studies people was  $40 \pm 9.6$  years. All studied people participated in two short therapeutic series consisting of three procedures. The interval between the therapeutic series was two months. The series included: a single series of the classic massage and the tensegration massage, respectively. Before and after each of the therapeutic series, the patients completed a survey questionnaire, based on the EQ-5D-5L standard. The analysis for independent variables was carried out using the Mann-Whitney U test, the Wilcoxon pair order test for dependent variables, and the Spearman rank coefficient was determined. The assumed level of significance was  $p \leq 0.05$ . A greater effectiveness of the tensegration massage compared to the classic massage was confirmed by analyzing the results of EQ-5D-5L. Analysis of the relationship between the first and second measurement in each of the EQ-5D-5L domains before and after the massage indicated significant relationships in the case of the tensegration massage ( $p \leq 0.05$  in each domain except the self-care domain  $p = 0.116$ ). In the case of classical massage, a significant relationship was noted only in the domains of: pain and discomfort ( $p = 0.045$ ) and anxiety and depression ( $p = 0.012$ ). A significantly higher average level on the EQ-VAS scale was confirmed after the applied tensegration massage (I-TM:  $76.3 \pm 16.9$ ; II-TM:  $87.9 \pm 13.6$ ;  $p < 0.001$ ). In addition, the beneficial effect of physical activity and BMI on the effectiveness of fibromyalgia treatment and the level of HRQoL was demonstrated. Massage is an effective therapeutic method in fibromyalgia, allowing to improve health and thus HRQoL. Factors such as physical activity and BMI are also important.*

**Key words:** *fibromyalgia, classic massage, tensegrity massage, Health-related Quality of Life*

## Introduction

According to the World Health Organisation, the quality of life is a man's personal perception of his/her life situation in relation to the implementation of tasks, goals, and expectations set by society [1]. Quality of life is not synonymous with health, which is a much wider concept [2]. *Fibromyalgia syndrome* (FMS) is a disease of the group of chronic pain and, therefore, has a very large impact on reducing the quality of life of patients by reducing physical fitness or by emotional impairment. It can even lead to depression [3].

According to the American Society of Rheumatology, fibromyalgia is a disease of the group of soft tissue rheumatic diseases [4]. It is characterized by the presence of a triad of symptoms: chronic and extensive pain, sleep disorders, and mental or physical exhaustion [5–8]. Other symptoms include fatigue, poor tolerance to exercise, sleep disorders, cold hands and feet, body stiffness, swelling, dizziness, arrhythmias, shortness of breath, and many others. Symptoms often occur together and can intensify each other [4, 9–12]. The main causes of patients reporting for medical care are musculoskeletal pain and sleep disorders [13].

According to various data, fibromyalgia affects 2 to 4% of the population, mainly between 50 and 60 years of age [6, 1, 15]. In the available literature, data on the proportion of sick women and men show a very large variation [6, 16–18]. There is a misconception that fibromyalgia affects at least 80–90% of the female population [7, 17–19]. Whereas, two large population studies using modified diagnostic criteria showed that 60.8% and 60.5% of people with fibromyalgia were women [19, 20].

The etiology of the disease is unknown. The causes can be found in the excessive excitability of the structures conducting pain in the central nervous system. Risk factors include physical trauma, mental disorders, infectious diseases, genetics, and stress [3].

Long-lasting somatic and mental symptoms can lead to a deterioration in health-related quality of life (HRQOL), especially for women who most often experience significantly higher pain and discomfort. In addition, the age and

BMI values affect the limitation of physical fitness and thus affect the deterioration of the quality of life in patients with fibromyalgia [21, 22].

Studies have shown that numerous non-pharmacological treatments such as psychotherapy, physical therapy, education, and physiotherapy are effective in reducing the symptoms of FMS [23]. A comprehensive and multidisciplinary approach includes lifestyle modifications, pharmacological agents, as well as acupuncture, yoga, tai chi, and meditation [24].

### **Purpose of the study**

The purpose of the study was to initially evaluate the effectiveness of the classical massage and the tensegration massage in relieving pain and facilitating the daily functioning of patients with fibromyalgia.

The main purpose of the study was to compare the change in the sense of health assessed using EQ-5D-5L of people before and after the use of the classical massage and the tensegration massage. The impact of: gender, age, BMI index, and physical activity on HRQoL of people treated with classical massage and the tensegration massage was also assessed.

### **Materials and Methods**

#### **Respondents**

The study was carried out in 41 people (F:21; M:20) who were diagnosed with fibromyalgia. The respondents voluntarily agreed to participate in the study consisting in completing a questionnaire supplemented with a questionnaire standardized to assess the health condition of EQ-5D-5L.

The study was anonymous. Participants of the study gave written consent to participate in the study based on completing an anonymous questionnaire along with the EQ-5D-5L questionnaire. Each participant was informed about the purpose of the study, use of the questionnaire results for scientific purposes, and the possibility of withdrawing from participation in the study at every stage. The study did not pose any risk to the studied participant.

The study was carried out in accordance with the Helsinki Declaration (WMA Declaration of Helsinki Ethical Principles for Medical Research Involving Human Subjects) [25].

#### **European Questionnaire – Euro-Quality of Life Questionnaire (EQ-5D questionnaire)**

The EQ-5D questionnaire makes it possible to compare the health of a patient with a given disease unit with the assessment of the quality of life of the entire population using the form [26]. It consists of two parts: part 1 – descriptive and part 2 – visual analogue scale EQ-VAS. The first part of the questionnaire contains five domains, such as: movement, self-service, basic daily activities, pain/discomfort, and anxiety/depression. In each category, there are five possible levels: no problems, slight problems, moderate problems, severe problems, and extreme problems/unable. Patient screening with a given questionnaire can be entered at any stage of treatment [27, 28].

EQ-VAS is a visual analogue scale (from 0 to 100), where 0 is the worst health imaginable for the patient, and 100 is the best health that can be [27]. The studied person had to indicate the number that characterizes his/her current well-being [29].

The level of physical activity included in the analyses was specified in points. After summing up the scores assigned for: activity related to professional work and activity carried out outside professional work, it was possible to obtain:

- up to 5 points – for a person doing physical work and characterized by high physical activity outside of work,
- minimum 2 points – for a person who is mentally or professionally inactive and has a low level of physical activity outside of work.

#### ***Organization and course of the study***

Massages were carried out in series. Two series of massages were carried out on the patients. One series included the use of the classic massage, another of the tensegration massage. The series included three massages carried out with a two-month interval.

These therapies were carried out with a two-month interval between one and the other series of massages to reduce the impact of a series of classical massage treatments on the tensegration massage treatments.

### ***Statistical analysis***

Qualitative data were presented using a number and a percentage. Quantitative data were presented using: average value, standard deviation, median value, minimum value, maximum value, and upper and lower quartile. The verification of assumptions regarding the normality of the distribution of variables was carried out using the Shapiro-Wolf test. The lack of a normal distribution for measurable variables conditioned the use of non-parametric statistics. The Wilcoxon pair order test was used to analyze the relationship between two dependent variables. The Mann-Whitney U test was used to analyze the relationship between two independent variables. To assess the monotonic statistical relationship between the variables, the Spearman rank correlation coefficient was used. The Spearman's rho coefficient takes values from the range (-1;1), where the sign of the coefficient value determines the direction of correlation. A positive value means a direct proportional increase in both analyzed variables, while a negative sign means that an increase in one variable defines a decrease in the other. The absolute value of the coefficient determines the strength of the relationship between the analyzed variables. The value 0 means no dependence, while the value 1 of the coefficient means an ideal correlation [30]. The value of the Cronbach Alpha coefficient was also determined to assess the reliability of the EQ-5D-5L tool used in the study group. The coefficient gets a value between 0 and 1. The values higher than 0.7 are considered acceptable [31]. The data from the EQ-5D-5L questionnaire were presented in accordance with the recommendations of the EuroQoL group. EQ-5D-5L User Guide [32]. Statistical dependences were significant if their level of significance was  $p < 0.05$ .

## Result

### *Characteristics of the study group*

The study group consisted of 20 men and 21 women, men constituted 48.8% of the total, and women 51.2% of the total study group, respectively. The average age of the studied people was  $39.6 \pm 9.6$  years. The average value of the BMI index in the study group was  $23.9 \pm 5.2$ . The data are contained in Tables 1 and 2.

**Table 1.** Characteristics of the study group

Gender	N	%
Female	21	51.2
Male	20	48.8
Age	N	%
≤40 years	21	51.2
>40 years	20	48.8
BMI	N	%
<20	6	14.6
20–24.99	17	41.5
25–29.99	13	31.7
30–34.99	2	4.9
≥35	3	7.3
Type of work	N	%
mental work	22	53.7
physical work	19	46.3

N – number of observations; % – percent

**Table 2.** Characteristics of the study group – descriptive statistics of measurable variables – age and BMI

Variables	N	M	SD	Me	Min	Max	Q1	Q3
Age [years]	41	39.6	9.6	38.0	24.0	61.0	33.0	46.0
BMI	41	23.9	5.2	22.0	18.0	37.0	20.0	26.0

\* N – number of observations; M – average; SD – standard deviation; Me – median; *Min* – minimum; *Max* – maximum; *Q1* – lower quartile; *Q3* – upper quartile

### Analysis of data from the EQ-5D-5L and EQ-5D-5L VAS questionnaires

The EQ-5D-5L domain profiles are presented in accordance with the frequency of responses in individual dimensions, considering the measurement before and after the therapy with the classic massage and the tensegration massage. The detailed data are presented in Table 3.

**Table 3.** Profiles of EQ-5D-5L in the studied group

Dimension	Group			
	Classic massage		Tensegration massage	
	I	II	I	II
	N (%)	N (%)	N (%)	N (%)
MOBILITY				
No problems	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Slight problems	2 (4.9)	0 (0.0)	0 (0.0)	2 (4.9)
Moderate problems	0 (0.0)	3 (7.3)	0 (0.0)	0 (0.0)
Severe problems	11 (26.8)	10 (24.4)	9 (22.0)	11 (26.8)
Unable to walk about	28 (68.3)	28 (68.3)	32 (78.0)	28 (68.3)
SELF-CARE				
No problems	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Slight problems	1 (2.4)	0 (0.0)	0 (0.0)	1 (2.4)
Moderate problems	0 (0.0)	2 (4.9)	0 (0.0)	0 (0.0)
Severe problems	13 (31.7)	11 (26.8)	10 (24.4)	12 (29.3)
Unable to walk about	27 (65.9)	28 (68.3)	31 (75.6)	28 (68.3)
USUAL ACTIVITIES				
No problems	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Slight problems	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Moderate problems	2 (4.9)	2 (4.9)	0 (0.0)	3 (7.3)
Severe problems	14 (34.1)	14 (34.1)	11 (26.8)	14 (34.1)
Unable to walk about	25 (61.0)	25 (61.0)	30 (73.2)	24 (58.5)



Dimension	Group			
	Classic massage		Tensegration massage	
	I	II	I	II
	N (%)	N (%)	N (%)	N (%)
PAIN/DISCOMFORT				
No problems	0 (0.0)	1 (2.4)	0 (0.0)	0 (0.0)
Slight problems	15 (36.6)	11 (26.8)	0 (0.0)	15 (36.6)
Moderate problems	23 (56.1)	17 (41.5)	5 (12.2)	21 (51.2)
Severe problems	3 (7.3)	12 (29.3)	22 (53.7)	4 (9.8)
Unable to walk about	0 (0.0)	0 (0.0)	14 (34.1)	1 (2.4)
ANXIETY/DEPRESSION				
No problems	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Slight problems	8 (19.5)	3 (7.3)	2 (4.9)	8 (19.5)
Moderate problems	17 (41.5)	20 (48.8)	1 (2.4)	17 (41.5)
Severe problems	15 (36.6)	16 (39.0)	21 (51.2)	15 (36.6)
Unable to walk about	1 (2.4)	2 (4.9)	17 (41.5)	1 (2.4)

\* N – number of observations; % – percent; I – measurement before the massage therapy; II – measurement after the massage therapy

The reliability analysis indicated a high homogeneity of the EQ-5D-5L tool used for the analysis. The value of the Cronbach's alpha coefficient in five dimensions was 0.81, and in the case of EQ-VAS, it was 0.75, which means a satisfactory level of the coefficient and the reliability of the tool used in the studied group.

**Table 4.** Reliability of the EQ-5D-5L questionnaire used in the patients' group

EQ-5D-5L	Cronbach's alpha ( $\alpha$ )
Mobility	0.81
Self-care	0.81
Usual activities	0.81
Pain/Discomfort	0.81
Anxiety/Depression	0.81
EQ-VAS	0.76

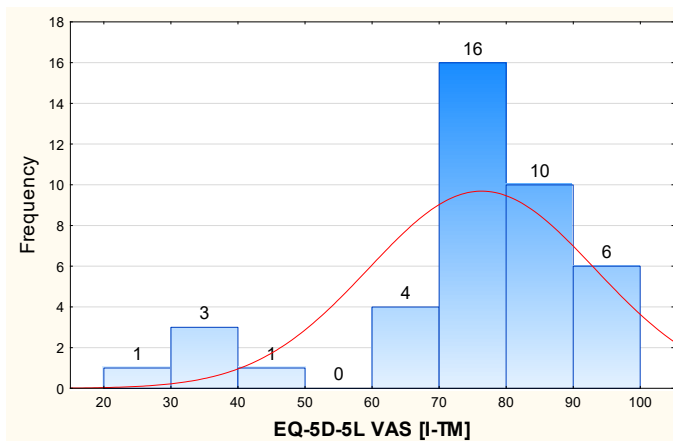
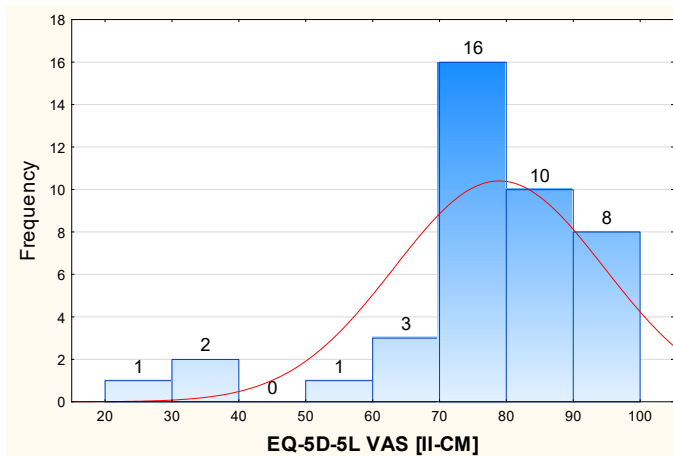
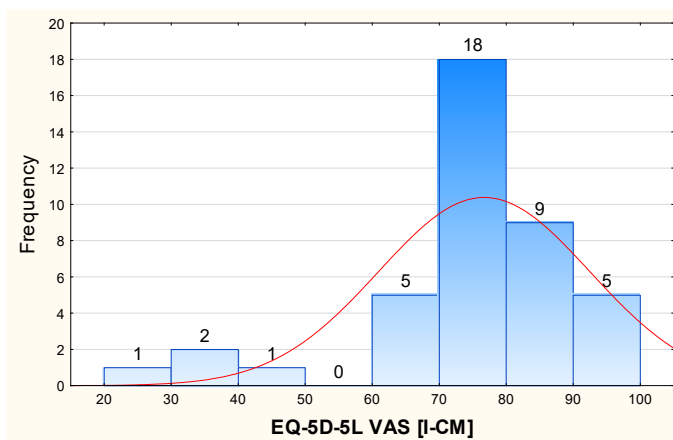
The data obtained from the questionnaire for the assessment of the quality of life of EQ-5D-5L within the five domains were analyzed. The relationship between the first and second measurement in the same domain before and after the initial classic massage was assessed, and then in the interval before the tensegration massage. Significant relationships between measurement I and II were indicated in each of the analyzed EQ-5D-5L domains in the case of the tensegration massage ( $p < 0.05$ ) except self-care ( $p = 0,116$ ). The use of classical massage allowed to indicate significant relationships only in the case of the domains: pain and discomfort ( $p = 0.045$ ) and anxiety and depression ( $p = 0.012$ ).

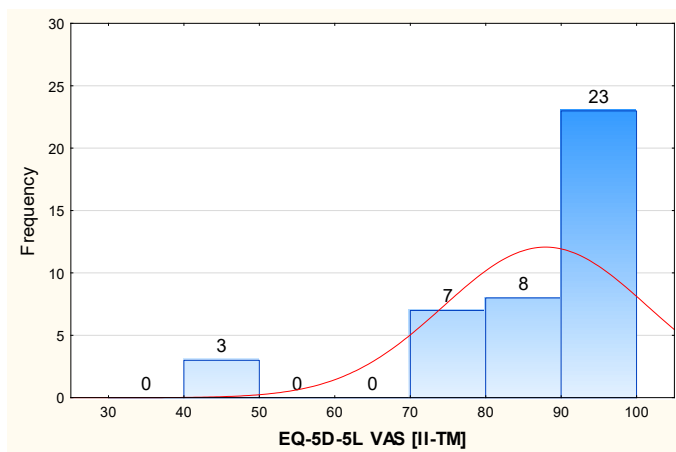
**Table 5.** Analysis of the relationship between the first and second measurement in each domain of the EQ-5D-5L questionnaire before and after the classic and tensegration massage

EQ-5D-5L		Group							
		Classic massage			p	Tensegration massage			p
		M	Me	SD		M	Me	SD	
Mobility	I	4.6	5.0	0.7	0.593	4.8	5.0	0.4	0.028
	II	4.6	5.0	0.6		4.6	5.0	0.7	
Self-care	I	4.6	5.0	0.6	0.593	4.8	5.0	0.4	0.116
	II	4.6	5.0	0.6		4.6	5.0	0.6	
Usual activities	I	4.6	5.0	0.6	1.000	4.7	5.0	0.4	0.018
	II	4.6	5.0	0.6		4.5	5.0	0.6	
Pain/Discomfort	I	2.7	3.0	0.6	0.045	4.2	4.0	0.7	<0.001
	II	3.0	3.0	0.8		2.8	3.0	0.7	
Anxiety/Depression	I	3.2	3.0	0.8	0.012	4.3	4.0	0.7	<0.001
	II	3.4	3.0	0.7		3.2	3.0	0.8	

I – measurement before the massage therapy; II – measurement after the massage therapy; M – average; Me – median; SD – standard deviation; p – level of statistical significance Wilcoxon test

The frequency of responses on the EQ-5D-5L VAS scale before and after the classic and tensegration massage session is presented in Figure 1.





\* EQ-5D-5L VAS[I-CM] – measurement before the classic massage therapy; EQ-5D-5L VAS[II-CM] – measurement after the classic massage therapy; EQ-5D-5L VAS[I-TM] – measurement before the tensegration massage therapy; EQ-5D-5L VAS[II-TM] – measurement after the tensegration massage therapy

**Figure 1.** Distribution of EQ-5D-5L VAS before and after the classical and tensegration massage therapy

The values of the EQ-5D-5L VAS scale were analyzed, considering the measurement before and after the classic massage, and subsequently at a 2-month interval before the tensegration massage. The value of the assessed level of health was significantly different between the measurements after the applied tensegration massage ( $p < 0.001$ ). The average indicated level before the massage was  $76.3 \pm 16.9$ , while after the massage it significantly increased to  $87.9 \pm 13.6$ . However, after the classic massage, no significant changes were recorded ( $p = 0.059$ ). The measurement value slightly increased in the second measurement from  $76.7 \pm 15.8$  to  $78.9 \pm 15.7$ .

**Table 6.** Analysis of the relationship between the first and second measurement of the EQ-5D-5L VAS scale level before and after the classic and tensegration massage

EQ-5D-5L VAS	N	M	SD	Me	Min – Max	Q1	Q3	p
I-CM	41	76.7	15.8	80.0	30.0–95.0	75.0	85.0	0.059
II-CM	41	78.9	15.7	80.0	30.0–95.0	75.0	90.0	
I-TM	41	76.3	16.9	80.0	30.0–95.0	75.0	85.0	<0.001
II-TM	41	87.9	13.6	95.0	45.0–100.0	85.0	95.0	

[I-CM] – measurement before the classic massage therapy; [II-CM] – measurement after the classic massage therapy; [I-TM] – measurement before the tensegration massage therapy; [II-TM] – measurement after the tensegration massage therapy; N – number of observations; M – average; SD – standard deviation; Me – median; Min – Max- reference minimum to maximum; Q1 – lower quartile; Q3 – upper quartile; p – level of statistical significance Wilcoxon test

Gender significantly differentiated the feeling of pain and discomfort in the first measurement before the classic massage. Men experienced significantly higher pain and discomfort compared to woman ( $F: 2.5 \pm 0.6$ ;  $M: 2.9 \pm 0.9$ ;  $p = 0.039$ ). The dependence on the borderline of significance between the assessment of the level of health in both groups before the tensegration massage was also indicated ( $p = 0.046$ ). Measurement of the level of health after the classic and tensegration massage did not significantly differentiate the measurements in the scope of other domains, both in the group of women and men ( $p > 0.05$ ).

**Table 7.** Analysis of the relationship between the EQ-5D-5L and EQ-5D-5L VAS domains, including gender

Variable	Gender						p
	Female (N = 21)			Male (N = 20)			
	M	Me	SD	M	Me	SD	
I – CM							
Mobility	4.5	5.0	0.9	4.7	5.0	0.5	0.689
Self-care	4.6	5.0	0.7	4.7	5.0	0.5	0.987
Usual activities	4.5	5.0	0.7	4.6	5.0	0.5	0.915
Pain/Discomfort	2.5	2.0	0.6	2.9	3.0	0.6	0.039
Anxiety/Depression	3.0	3.0	0.7	3.5	4.0	0.8	0.065
EQ-5D-5L VAS[I-CM]	71.2	80.0	18.9	82.5	80.0	8.8	0.067
II-CM							
Mobility	4.5	5.0	0.7	4.7	5.0	0.5	0.621
Self-care	4.6	5.0	0.7	4.7	5.0	0.5	0.848
Usual activities	4.5	5.0	0.7	4.6	5.0	0.5	0.915
Pain/Discomfort	2.8	3.0	0.9	3.2	3.0	0.7	0.212
Anxiety/Depression	3.3	3.0	0.7	3.5	4.0	0.8	0.336
EQ-5D-5L VAS [II-CM]	74.3	80.0	19.2	83.8	82.5	9.2	0.109
I-TM							
Mobility	4.9	5.0	0.4	4.7	5.0	0.5	0.237
Self-care	4.9	5.0	0.4	4.7	5.0	0.5	0.132
Usual activities	4.9	5.0	0.4	4.6	5.0	0.5	0.069
Pain/Discomfort	4.3	4.0	0.7	4.2	4.0	0.6	0.441
Anxiety/Depression	4.4	4.0	0.7	4.2	4.0	0.8	0.380
EQ-5D-5L VAS[I-TM]	70.0	80.0	20.1	83.0	82.5	9.1	0.046
II-TM							
Mobility	4.5	5.0	0.9	4.7	5.0	0.5	0.689
Self-care	4.6	5.0	0.7	4.7	5.0	0.5	0.760
Usual activities	4.4	5.0	0.7	4.6	5.0	0.5	0.601
Pain/Discomfort	2.7	2.0	0.9	2.9	3.0	0.6	0.130
Anxiety/Depression	3.0	3.0	0.7	3.5	4.0	0.8	0.065
EQ-5D-5L VAS[II-TM]	85.0	95.0	18.0	91.0	92.5	5.0	0.836

\* [I-CM] – measurement before the classic massage therapy; [II-CM] – measurement after the classic massage therapy; [I-TM] – measurement before the tensegration massage therapy; [II-TM] – measurement after the tensegration massage therapy; N – number of observations; M – average; Me – median; SD – standard deviation; p – level of statistical significance, the Mann – Whitney U test

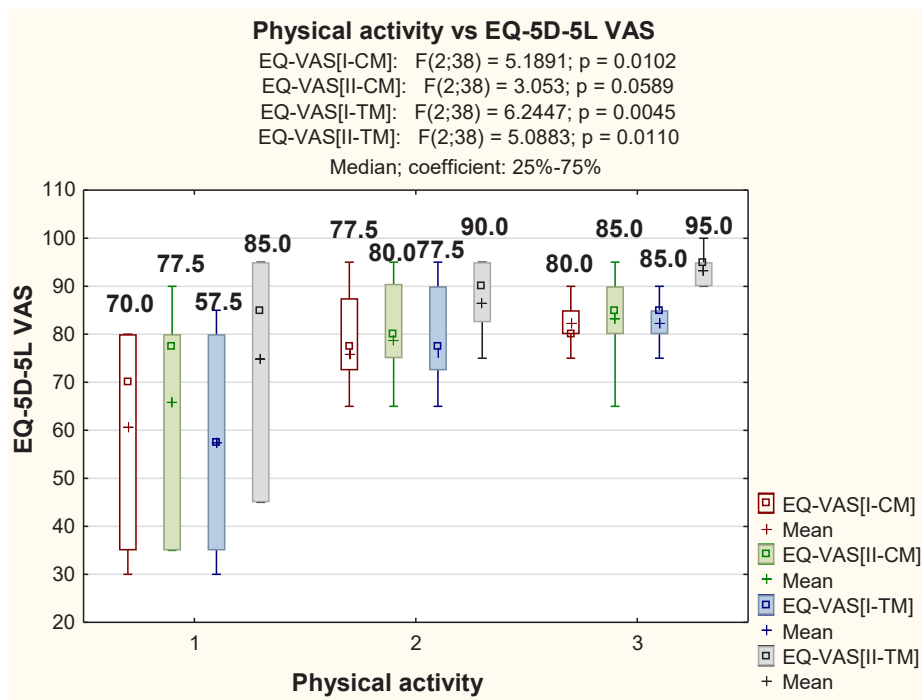
Correlations between individual domains in the first and second measurement and the following variables: age and BMI were analyzed. There was a significant relationship between the age and the 'Mobility' domain in the second measurement after the use of CM (II-CM 'Mobility';  $r = -0.3$ ;  $p = 0.034$ ) and the 'Usual activities' domain (II-CM 'Usual activities';  $r = -0.3$ ;  $p = 0.027$ ), and the 'Mobility' domain in the first measurement after TM (I-TM 'Mobility';  $r = -0.4$ ;  $p = 0.022$ ) and the 'Usual activities' domain (I-TM 'Usual activities';  $r = -0.3$ ;  $p = 0.028$ ). Correlation analysis for the BMI variable indicated a significant correlation with the following variables: 'Mobility' domain in the first measurement after CM application (I-CM 'Mobility';  $r = -0.4$ ;  $p = 0.011$ ), 'Usual activities' domain (I-CM 'Usual activities';  $r = -0.3$ ;  $p = 0.47$ ), 'Mobility' domain in the second measurement after CM (II-CM 'Mobility'  $r = -0.4$ ;  $p = 0.014$ ), 'Usual activities' domain (II-CM 'Usual activities';  $r = -0.4$ ;  $p = 0.003$ ), 'Mobility' domain in the first measurement after TM application (I-TM 'Mobility';  $r = -0.5$ ;  $p = 0.001$ ), 'Usual activities' domain (I-TM 'Usual activity';  $r = -0.5$ ;  $p = 0.001$ ), 'Mobility' domain in the second measurement after TM application (II-TM 'Mobility';  $r = -0.4$ ;  $p = 0.011$ ) and in EQ-VAS (II-TM 'EQ-5D-5L VAS'  $r = -0.4$ ;  $p = 0.004$ ).



**Table 8.** Analysis of the relationship between the domains of the EQ-5D-5L and EQ-5D-5L VAS questionnaires, considering the age and the value of the BMI index

Variable	Age		BMI	
	rho	p	rho	p
I – CM				
Mobility	-0.2	0.126	-0.4	0.011
Self-care	-0.2	0.266	-0.2	0.171
Usual activities	-0.3	0.064	-0.3	0.047
Pain/Discomfort	0.2	0.284	0.2	0.180
Anxiety/Depression	0.2	0.331	0.2	0.322
EQ-5D-5L VAS[I-CM]	-0.1	0.674	-0.3	0.068
II – CM				
Mobility	-0.3	0.034	-0.4	0.014
Self-care	-0.2	0.111	-0.2	0.126
Usual activities	-0.3	0.027	-0.4	0.003
Pain/Discomfort	0.02	0.881	0.2	0.234
Anxiety/Depression	0.1	0.518	0.05	0.777
EQ-5D-5L VAS [II-CM]	-0.1	0.566	-0.3	0.085
I – TM				
Mobility	-0.4	0.022	-0.5	0.001
Self-care	-0.2	0.221	-0.2	0.112
Usual activities	-0.3	0.028	-0.5	0.001
Pain/Discomfort	-0.1	0.524	-0.1	0.432
Anxiety/Depression	0.02	0.891	-0.3	0.092
EQ-5D-5L VAS[I-TM]	0.1	0.565	-0.3	0.103
II – TM				
Mobility	-0.2	0.126	-0.4	0.011
Self-care	-0.2	0.223	-0.2	0.146
Usual activities	-0.2	0.114	-0.1	0.205
Pain/Discomfort	0.1	0.362	0.1	0.514
Anxiety/Depression	0.2	0.331	0.2	0.322
EQ-5D-5L VAS[II-TM]	-0.1	0.522	-0.4	0.004

\* [I-CM] – measurement before the classic massage therapy; [II-CM] – measurement after the classic massage therapy; [I-TM] – measurement before the tensegration massage therapy; [II-TM] – measurement after the tensegration massage therapy; rho – Spearman's rho coefficient; p – level of statistical significance



\* EQ-5D-5L VAS[I-CM] – measurement before the classic massage therapy; EQ-5D-5L VAS[II-CM] – measurement after the classic massage therapy; EQ-5D-5L VAS[I-TM] – measurement before the tensegration massage therapy; EQ-5D-5L VAS[II-TM] – measurement after the tensegration massage therapy; Physical activity: 1 – low, 2 – median; 3 – high intensity

**Figure 2.** The level of health perceived according to the EQ-5D-5L VAS scale, considering the level of physical activity

The above figure indicates significant relationships between successive levels of physical activity and the perceived level of health on the day of the test according to the EQ-5D-5L VAS scale. The median values for the level of health in each of the applied forms of massage significantly increased in the second measurement after the applied procedure in the subsequent stages of physical activity. The analysis confirms that with a higher level of physical activity in correlation with the massage procedure used, the level of perceived health significantly increases ( $p < 0.05$ ) in the measurement of I-CM ( $p = 0.010$ ), I-TM ( $p = 0.004$ ) and II-TM ( $p = 0.011$ ).

## Discussion

The purpose of the carried-out study was to initially assess the impact of therapeutic massage on the alleviation of pain in fibromyalgia and the change in health after the classic and tensegration massage. The authors assessed the difference in the impact of both types of massage on HRQoL using the EQ-5D-5L tool.

Massage has a relaxing effect on the body, improves circulation and lymph flow, reduces muscle tension, reduces anxiety and stress, oxygenates tissues and removes metabolic products, and consequently reduces pain [33]. Considering the benefits of a massage, it seems to be a good method in the treatment of fibromyalgia [34, 35].

The study compared two types of massage – classical and tensegration. As a result of the phenomenon of tensegration, pain stemming from excessive tension of tissues will appear at the place of summing up the pull forces. Tensegration massage does not involve only working in the place where the pain is present, but also involves working on tissues that have direct or immediate structural contact with the tissues located at the place of pain [36].

The quality of life of elderly people is directly related to the state of health, and properly undertaken therapeutic measures allow increasing the comfort of life of patients. Massage is the most common method of treatment used in the elderly. The beneficial effects of massage in reducing pain, joint stiffness and improving physical performance have been demonstrated in a number of studies [37–40]. Elderly people are significantly more likely to suffer from three or more chronic diseases, which translates into reduced quality of life and experiencing psychological stress, which may aggravate pain in FMS [2]. Deterioration of quality of life is a common problem in patients with FMS.

The studies comparing patients with FMS with healthy population and sufferers of other chronic diseases have shown that they have significantly worse health status than patients with other chronic diseases, including osteoarthritis, rheumatoid arthritis, systemic lupus erythematosus, myocardial infarction, chronic obstructive pulmonary disease, congestive heart failure, hypertension, or diabetes [22, 41–44].

The author's studies, including an analysis of the impact of the age of the studied people on the changes in the quality of life of people provided with the classic massage and the tensegration massage, showed that after the classic massage, the patient's functionality in terms of movement ( $p = 0.034$ ) and usual activities ( $p = 0.027$ ) slightly improved. The same trend was observed before the tensegration massage.

The perception of fibromyalgia as almost exclusively a female disorder is not supported by data from impartial studies [7, 17]. Some sources report that fibromyalgia occurs in 2–8% of the US population and 2–4% of the world population, with an estimated prevalence of women of 61–90% [10, 15, 17–19]. However, the majority of published epidemiological studies show only a slight increase in the female/male ratio, as opposed to the observed ratio in clinical studies, where the majority are women [6, 7, 10, 14, 16, 17, 22, 45].

The studies carried out by Wolf et al. in 2018 showed that women had slightly more symptoms than men, including generalized pain (36.8% compared to 32.4%). The researchers also found a linear relationship between the female sex and the severity of fibromyalgia [17]. The author's own study showed the opposite relationship, that gender significantly differentiated the pain and discomfort sensation in the first measurement before the use of the classical massage, but female patients felt significantly lower intensity of pain and discomfort compared to men ( $F: 2.5 \pm 0.6$ ;  $M: 2.9 \pm 0.9$ ;  $p = 0.039$ ). There was also a relationship between the assessment of the EQ-5D-5L VAS level in both groups before carrying out the tensegration massage ( $p = 0.046$ ). Measurement of the level of quality of life after the classic massage and the tensegration massage did not significantly differentiate the measurements in the scope of other domains, both in the group of women and men ( $p > 0.05$ ).

The impact of the BMI on the level of perceived quality of life was assessed. The studies showed that people who had a BMI lower than average improved their quality of life in terms of movement and daily activities. However, higher BMI may be the result of increased muscle mass, especially in the case of people actively practicing sports. Many people, to increase the efficiency of the body, enrich their diet with supplements that deliberately

increase muscle mass, so the BMI coefficient, which indicates overweight or obesity, does not necessarily have a negative impact on the quality of life [46].

Among the people studied by the Clinic of Endocrinology and Internal Diseases of the Medical University of Gdańsk in 2012, a larger percentage involved people dissatisfied with their health due to excessive body weight (62.7%), while the others – 37.2% assessed their health as good. However, the results obtained in individual domains indicate a decrease in the quality of life in areas such as physical, psychological, or social [47]. The vast majority of people studied by the Department of Nursing and the Institute of Health Care of the Higher School of Higher Education in Tarnów, including 0.75 fractions of men and 0.90 fractions of women, believed that obesity may contribute to difficulty in movement, intensification of pain, and deterioration of the quality of life, which predisposes to the development of various diseases [48]. Similar conclusions were reached by Kim et al., who studied the relationship of the body mass index with the severity of symptoms and quality of life in patients with fibromyalgia. In the carried out studies, they showed that in patients with fibromyalgia, significant obesity ( $BMI \geq 35.0 \text{ kg/m}^2$ ) is associated with a higher severity of fibromyalgia symptoms and a lower level of QOL [49]. These conclusions confirm the hypothesis assumed in own study.

In the study of the impact of physical activity on changes in the quality of life of people provided with the classic massage and the tensegration massage, white-collar workers (53.70%) and blue-collar workers (46.30%) were distinguished. The analysis confirms that the higher the physical activity in correlation with the massage procedure used, the more the level of perceived quality of life significantly increases ( $p < 0.05$ ).

Another study assessing the effectiveness of various physical activities, compared to usual care in women with FMS, shows that in a 24-week combination of moderate intensity training improved the quality of life and health-related functions. In patients receiving usual care, there was no improvement in any of the domains [50]. In turn, another study showed that in women practicing yoga, there was a significant improvement in the range of standardized measurements of symptoms of FMS, including fatigue, mood, and pain. In addition, the combination with the massage program within

three months influenced the perceived stress index, cortisol concentration, pain intensity, and quality of life of patients with FMS [51].

The average indicated level of quality of life before the tensegration massage was  $76.3 \pm 16.9$ , and after the massage it significantly increased to  $87.9 \pm 13.6$ . However, after the classic massage, no significant changes were recorded ( $p = 0.059$ ). The value of the parameter slightly increased in the second measurement from 76.7 to 78.9. The study carried out by the University of Florida College of Nursing, USA, confirms that this disease affects many areas of the patient's life. The CESD results showed a high level of depression, which leads to a decrease in the quality of life [35]. In addition, patients with fibromyalgia report a significant impact of the disease on the quality of their life, and their mental health seems to affect the level of their disability perceived by them. Compared to patients with other pain, mental distress is higher in patients with FMS [52].

Gordon C. et al. showed that quality of life improved significantly after 15 sessions of mechanical massage compared to screening. In addition, the number of painful tenderness points decreased by approximately 50–60% [53].

In the literature on the issue of treatment of fibromyalgia, the authors studied the impact of various methods of treatment of this disease, both pharmacological and non-pharmacological. The majority of patients found that pharmacological treatment alone was inadequate for the majority of patients with FMS. Very often, patients seek help in non-pharmacological therapy, including massage, especially as it is a safe method of treating patients with the discussed disease [54]. The psychological aspect of massage is also important, including the impact of additional factors, i.e., the use of music or aromatherapy [37–39, 55, 56].

Pain has a significant impact on the mental, social, economic, and biological well-being of the FMS patient [40]. Reducing the pain in FMS triggers a chain reaction. The patient's mood improves, which in turn leads to better adaptation to pain and facilitates physical and mental activity. As a result, the quality of life of patients is improved. Physical exercise has a positive effect on the reduction of pain in patients with FMS [57], at the same time, it should be emphasized that post-exercise pain and fatigue are the most important

features of FMS. For this reason, low intensity exercises can be used as a basic element of therapy [58], additionally supplemented with cold therapy, which has an analgesic effect [59, 60].

In many studies, the effectiveness of massage in the fight against pain was assessed [61–69]. However, the physiological mechanisms responsible for the positive impact of this technique are still not fully understood. Some say that the effectiveness of the massage depends on its intensity. The studies using microneurography showed the existence of low-threshold, slow-conducting fibers in the superficial layers of the skin, which are activated mainly by delicate stimuli at low speed [64]. In contrast, stronger compression stimuli penetrating deeper layers of tissue activate rapidly conductive fibers, which allows for more effective blocking of the pain message reaching the central nervous system [61, 70].

Boehme et al. compared patients suffering from fibromyalgia with healthy controls using the functional magnetic resonance imaging (fMRI). Analysis of the activity of different parts of the cerebral cortex under the influence of a massage of different intensity showed some signs of anhedonia to a gentle touch in people with fibromyalgia [66]. Other researchers noted that the classic massage increases pain sensation, while gentle stroking techniques, lymphatic drainage, and superficial vacuum massage alleviate pain in patients with fibromyalgia [65]. Similar conclusions were reached by Liljencrantz and Olausson in their studies [67].

The classic massage is not only one of the most commonly practiced, but also one of the most valued forms of sensory stimulation, used in the treatment of pain and diseases and in order to improve the well-being of patients with pain [68]. Despite the fact that classical massage is a very often recommended form of therapy for pain of various origins, there are few studies in the medical literature confirming the therapeutic effect of massage on the body [62].

There are studies that showed positive and long-term effects after a massage, as well as a reduction in the use of pharmacological agents in people using massage treatments [40, 59]. In their systematic review and meta-analysis, Yuan et al. examined the effects of massage on pain, fatigue, stiffness,

anxiety, depression, sleep quality, and quality of life in patients with fibromyalgia. Their assessment concerned various forms of massage, including Swedish massage, connective tissue massage, and lymphatic drainage. The results showed moderate evidence of the effectiveness of various massage techniques in patients with FMS [71]. Other studies also found no clear benefit from massage in the treatment of fibromyalgia, back pain, or neck pain [72].

Experts from the European League Against Rheumatism (EULAR), in their 2017 guidelines, stress that non-pharmacological treatment should be a first-line option in the treatment of FMS. These include exercise, hydrotherapy, manual therapy, massage, cryotherapy, acupuncture, and cognitive-behavioral therapy [73]. Many of them recommend relaxation therapy, which was selected as an active control, because it is often integrated in the multidisciplinary rehabilitation of patients with FMS.

Physical therapy is strongly recommended in clinical guidelines for the management of fibromyalgia [73–75]. Regular exercise of moderate intensity is recommended in most FMS treatment programs [76]. It has a generally beneficial effect on health and additionally activates endogenous pain inhibition pathways; therefore, it can alleviate the symptoms of FMS. The beneficial effects of regular exercise in FMS, such as improving muscle function, health, and reducing pain intensity, were demonstrated several times in the studies [77–80]. The authors proved that moderate intensity exercises carried out at least twice a week increased aerobic efficiency and promoted improved functioning in everyday activities in people with fibromyalgia [11, 78, 79]. However, exercise intolerance is one of the key problems in FMS, and many patients experience worsening of symptoms for several days after exercise, which can be attributed to increased release of metabolic and inflammatory substances in the peripheral tissue [57, 58, 81, 82].

The researchers from Santa Catarina State University, Brazil, compared patients with regular physical activity with those who did not take any activity to better understand the impact of the lack of physical activity on quality of life and symptoms in patients with fibromyalgia. Patients who exercised regularly had a better overall quality of life than those who did not, and inactive patients were 1.77 times more likely to have a greater impact on quality



of life, and those with poor quality of sleep were 10.79 times more likely to have a worse quality of life. The studies showed that exercise can reduce the symptoms of fibromyalgia, and patients who exercise have better quality of life, fewer depressive symptoms, and better mood [80].

The authors studying plasma cytokines in fibromyalgia and their response to 15 weeks of exercise say that in patients with chronic pain, intense aerobic and isometric exercises can have an adverse effect, because sensitivity to pain can quickly increase after exercise [83]. In connection with the above, it is concluded that massage is a good method of treating pain in fibromyalgia, because it works in a different way than physical exercises, above all it does not cause fear of movement and activities that may cause pain or discomfort.

In 2019, a systematic review of the impact of massage on pain was published in one of the quarterly journals of the National Chamber of Physiotherapists, which unanimously presented negative conclusions about the ineffectiveness of massage, among others, for fibromyalgia syndrome. The review was aimed at summarizing and critically assessing the evidence from systematic reviews on the impact of massage on pain. Most systematic reviews (53.8%) showed ambiguous conclusions, 33.3% of them drew positive conclusions, and 12.8% – negative ones. The authors believe that massage therapy has a relative short-term effectiveness, there is no standardization of massage intervention, there are differences in the applied pressure, types of techniques and doses of massage, and the lack of control including placebo [33].

On the other hand, another study involving 10 women with FMS participating in a total of 15 sessions of mechanical massage once a week showed a significant improvement in pain intensity, physical fitness, number of tender points, etc. compared to the screening test and confirmed the need to conduct a controlled clinical study to determine its effectiveness [84].

Ekici et al. studied the effects of manual lymphatic drainage (MLDT) and connective tissue massage (CTM) therapy in women with primary fibromyalgia. 50 women participated in the study, randomly divided into two groups, one of them underwent MLDT massage and the other underwent CTM. The treatment program was carried out five times a week for three weeks in each group. The results presented by the authors state that it reduces pain,

improves health and quality of life, so it can be used in the treatment of patients with FMS [85].

In the EULAR FMS management recommendations, six reviews and one meta-analysis with nine studies and 404 patients with sessions of 25 to 90 minutes and 1 to 24 weeks of treatment were reported. Comparative treatments included percutaneous electrical nerve stimulation (tens), standard care, directed relaxation, and acupuncture. Overall, the massage was not associated with a significant improvement in pain (0.37, -0.19 to 0.93), but the subgroup analysis showed some evidence of a positive effect of the massage lasting  $\geq 5$  weeks, although this was based solely on lower quality studies [73].

The effect of the massage was also studied in two single-arm studies and six randomized controlled trials. All analyzed studies showed short-term benefits of massage, and only one study showed long-term benefits. Meta-analyses suggest that the massage therapy lasting  $> 5$  weeks significantly relieved pain, anxiety, and depression in patients with FMS [86]. It should also be noted that the intensity of the massage should be moderate in order to spare the patients excessive pain and bring the intended benefits [87].

The systematic review of the studies in the 1990–2013 period was aimed at assessing the effectiveness of massage in fibromyalgia. The effect of the massage itself on the symptoms and quality of life related to the health of adult patients with fibromyalgia was studied. The studies showed that most massage therapies consistently improved the quality of life of patients with fibromyalgia [71].

Based on the analyzed literature, the hypothesis of the effectiveness of the massage therapy in the group of patients with fibromyalgia is confirmed.

### **Study limitations**

In the study group of patients with fibromyalgia, only three massage procedures with a two-day interval were used to assess whether the type of massage used reduces pain and helps carry out daily activities after only a few sessions. The study was a preliminary analysis and assessment of the impact of the classic massage and the tensegration massage on the health condition

of patients with fibromyalgia, who are struggling with the entire spectrum of symptoms of the disease.

## Conclusions

- Massage is an effective therapeutic method in the studied group of patients with fibromyalgia.
- The technique of the carried-out massage is important in the effectiveness of the treatment; however, such factors as physical activity and BMI index of the studied people are also important.
- The tensegration massage therapy improves the ability to carry out everyday activities and move, and is a safe and effective method of therapy.

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