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Association between depression and oro-facial pain – a pilot study

Повезаност депресије и орофацијалног бола – пилот студија

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SUMMARY

Introduction/Objective Orofacial pain and depression are frequent symptoms when temporomandibular dysfunction TMD is present. The Aim of this prospective study was to evaluate the influence of pain intensity on the level of depression in patients with temporomandibular dysfunction.

Methods This study included 44 patients, heterogeneous in gender and age from 25 to 45 years. Subjects were evaluated for signs of painful temporomandibular dysfunction based on the Research Diagnostic Criteria for TMD protocol. The study protocol was composed of a combination of data on clinical signs, a pain scale numerical, VAS, and a depression related questionnaire (Symptoms Check List, SCL-90R).

Results When assessed the type of dysfunction and degree of the depression no statistically significant differences were found (p = 0.420). No statistically significant difference was observed in the age of respondents without depression, with moderate and severe depression (p = 0.859), Tere was no statistically significant difference observed in the degree of chronic pain in patients without depression and patients with a moderate and severe form of depression (p = 0.119). Pain on a numerical scale, did not differ significantly in relation to the occurrence and degree of depression (p = 0.171; p = 0.068; p = 0.091). However there was a statistically significant difference in the psychosocial status between the respondents in relation to the degree of depression regarding social life and daily activity (p = 0.010; p = 0.002).

Conclusion Depression can be one of the causes, but also a consequence of chronic oro-facial pain, and thus indirectly a factor that affects the psychosocial state and quality of life of the patients.

Keywords: depression; orofacial pain; temporomandibular dysfunction

САЖЕТАК

Увод /Циљ Орофацијални бол и депресија су чести симптоми када је присутна темпоромандибуларна дисфункција (ТМД). Циљ ове проспективне студије био је да се процени утицај интензитета бола на ниво депресије код пацијената са темпоромандибуларном дисфункцијом.

Методе Ова студија је обухватила 44 пацијента, хетерогених по полу и старости од 25 до 45 година. Испитаници су евалуирани да ли показују знаке болне темпоромандибуларне дисфункције на основу протокола истраживачких дијагностичких критеријума за ТМД. Протокол студије се састојао од комбинације података о клиничким знацима, нумеричке скале бола, ВАС и упитника везаног за депресију (Листа за проверу симптома, *SCL-90R*).

Резултати Приликом процене врсте дисфункције и степена депресије нису пронађене статистички значајне разлике (p = 0,420). Није примећена статистички значајна разлика у старости испитаника без депресије, са умереном и тешком депресијом (p = 0,859). Није примећена статистички значајна разлика у степену хроничног бола код пацијената без депресије и пацијената са умереним и тешким обликом депресије (p = 0,119). Бол на нумеричкој скали није се значајно разликовао у односу на појаву и степен депресије (p = 0,171; p = 0,068; p = 0,091). Међутим, постојала је статистички значајна разлика у психосоцијалном статусу између испитаника у односу на степен депресије у вези са друштвеним животом и свакодневним активностима (p = 0,010; p = 0,002).

Закључак Депресија може бити један од узрока, али и последица хроничног орофацијалног бола, а самим тим и индиректно фактор који утиче на психосоцијално стање и квалитет живота пацијената.

Кључне речи: депресија; орофацијални бол; темпоромандибуларна дисфункција

INTRODUCTION

Orofacial pain is an unpleasant sensory and emotional experience associated with immediate or potential tissue damage. The most common cause of pain in the oro-facial region of non-odontogenic origin are musculoskeletal disorders involving the muscles of the cervical spine, temporomandibular joints, and masticatory musculature [1, 2, 3]. Although they do not

jeopardize vital functions, musculoskeletal disorders significantly affect the quality of life [4, 5]. Patients with oro-facial pain are challenging for a therapist due to the complexity of the symptoms and signs they present, as well as the diversity of clinical forms of pain in the face and jaw region. Precisely for the above reasons, it was believed that myalgias from arthralgias originate from the same cause. Disorders involving the structures of the temporomandibular joint and masticatory muscles are classified as temporomandibular dysfunction (TMD) [6, 7, 8].

Depression, fear, anxiety, physical damage and disability caused by pain further complicate the existing condition, decreasing the patient's quality of life. Although depression is a common symptom in patients with chronic oro-facial pain, or chronic pain in general, there is no evidence that depression or any psychological disorder causes TMD symptoms. The claim that pain precedes depression is more likely [9,10].

The aim of this prospective study was to evaluate the influence of pain intensity on the level of depression in patients with temporomandibular dysfunction.

METHODS

The research was conducted as a prospective study that included 44 patients, heterogeneous in terms of gender and age. The sample was selected of patients who came to the Clinic for prosthodontics of the School of Dental Medicine, University of Belgrade with some of the symptoms and signs of TMD. Subjects that were evaluated to have signs of painful temporomandibular dysfunction based on the Research Diagnostic Criteria for TMD (RDC/TMD) protocol (Dworkin and LeResche) Appendix 1, were in an age range from 25 to 45 years.

The exclusion criteria:

1. Patients with the pain of other origin: odontogenic, neurogenic, vascular, inflammatory or related to tumor changes in the surrounding structures (ear, throat, eye, nose, sinuses),
2. Patients who had some other chronic disease that impairs the general health condition and gives a false image of temporomandibular dysfunctions,
3. patients younger than 25 and older than 45 years
4. patients who did not consent to participate in the study.

A detailed clinical examination of the orofacial system was performed in all subjects in order to determine the presence of symptoms and signs of temporomandibular dysfunction. Patients with symptoms and signs of temporomandibular dysfunction were included in the study. All subjects were healthy and thoroughly informed about the research protocol. Clinical examination and functional analysis of the oro-facial system were based on the diagnostic protocol RDC/TMD (Dworkin and LeResche, 1992) Appendix 1, one or more symptoms of muscle and/or joint painful dysfunction were recorded: 1. pain in the preauricular region, 2. pain or sensitivity when palpating the masticatory muscles, 3. limited and/or painful movements of the lower jaw, 4. deflection of the lower jaw during mouth opening and 5. presence of sound phenomena when opening the mouth.

The inclusion criteria for the study:

1. Subjects with intact teeth,
2. Subjects not surgically or orthodontically treated,
3. Subjects that were not under medication therapy

4. Presence of painful symptoms in the region of the face and jaws.

The study protocol was composed of a combination of data on clinical signs, a pain scale numerical, VAS, and a depression related questionnaire (Symptoms Check List, SCL-90R) (Appendix 2). For all respondents, the degree of chronic pain, the degree of depression (normal state, moderate depression, severe depression) was determined within the questionnaire (Axis II) Appendix 2.

In the list of questions Axis II related to pain and the psychosocial status of the subjects, data were obtained based on the subjects' answers to the questions offered in the RDC/TMD protocol.

The Axis II list includes: 1. A short questionnaire of 7 questions for evaluating the intensity of pain (0–4). 2. SCL-90 (Symptoms checklist 90) for expressing the degree of depression (normal state, moderate depression, severe depression). 3. The offered list of 10 functions of the orofacial system that are most often difficult to perform (it is necessary to determine the number of positive answers in relation with offered functions). Pain intensity was expressed by values from 0 to 100, which were calculated by multiplying the mean value obtained from the answers to questions 7, 8 and 9 by 10. In response to these questions, the respondent was asked to choose a value on the offered numerical scale from 0 to 10: mean value (current pain, worst pain experienced in the past 6 months, average pain in the past 6 months) x 10, changes in social contact were expressed in values from 0 to 100 and were the result of answers to questions 11, 12, 13. The respondent chose the value on the offered numerical scale from 0 to 10 mean value (daily activities, social activities) x 10, 0–29 = 0 points, 30–49 = 1 point, 50–69 = 2 points, 70 and more = 3 points. After the evaluation is completed and the results expressed in points are added up, chronic pain is expressed: Grade 0 – pain due to TMD has not been present in the last 6 months. Grade I – low pain intensity (pain intensity less than 50) and

slightly changed social contacts and (less than 3 points). Grade II – high pain intensity (greater than 50) and altered social contacts (more than 3 points).

To calculate the degree of depression, the answers to the questions in the questionnaire were used, expressed in numerical equivalents, and then summed up. The total was divided by the number of responses requested. If the obtained value was less than 0.535, depression was not present. In the interval from 0.535 to 1.105 the depression was moderate. A value greater than 1.105 indicated severe depression. The statistical software package SPSS for Windows (18.0) was used for data processing. At the beginning of the research, all variables were described using classic descriptive methods. Attributive features are described by absolute and relative numbers, and numerical measures of central tendency (arithmetic mean and median) and variability measures (standard deviation, minimum and maximum value), as well as 95% confidence interval. The choice of tests for the analysis of numerical features of observation depended on the nature of their distribution, which was examined using the Koglomorov–Smirnov test. In the case of a normal distribution of data and testing the difference between more than two groups of subjects, a one-factor analysis of variance was used, while for non-parametric data the Kruskal Wallis test was used. The threshold value for accepting the working hypothesis was set at $p < 0.05$.

Ethics: This study was approved by the Ethics Committee of the Faculty of dental medicine University of Belgrade by decision number 36/6.

RESULTS

Between the analyzed subpopulations of TMD, no statistically significant difference was observed in the severity of depression recorded during the examination (Table 1).

In the group of subjects with musculo-articular dysfunction, most subjects showed symptoms of moderate depression. Most of the respondents showed a moderate form of depression, regardless of the type of dysfunction. Excluding the degree of expression, depression is most prevalent in the group of respondents with signs of muscle dysfunction (Figure 1).

There was no statistically significant difference was observed in the age of respondents without depression, with moderate and severe depression (One-factor analysis of variance; $p = 0.859$), Table 2).

The age of the participants and the level of depression are presented in Figure 2.

The level of chronical pain related to the level of depression are presented in Table 3.

There was no statistically significant difference observed in the degree of chronic pain in patients without depression and patients with a moderate and severe form of depression (Table 4).

Pain intensity expressed on a numerical scale according to the degree of depression are presented in Table 5.

Severity of pain on a numerical scale and depression are presented in Figure 3.

Pain, measured by a numerical scale, did not differ statistically significantly in relation to the occurrence and degree of depression (Table 6).

Social life and depression are presented in Figure 4.

Daily activity and depression are presented in Figure 5.

There was a statistically significant difference in the psychosocial status between the respondents in relation to the degree of depression (Table 8).

DISCUSSION

The influence of psychogenic factors in the occurrence and development of temporomandibular disorders is particularly significant. Nevertheless, chronic pain can affect the patient's psychosocial status and thus worsen the existing condition. Masticatory muscles react to induced stress with increased activity, and their response to stress is significantly more intense than in other skeletal muscles [11–14].

Depression is a frequent companion of chronic pain conditions and it has been documented in the clinical population of temporomandibular dysfunctions. The International Classification (ICD-10 F 32) defines depression as a disease accompanied by a bad mood, a decrease in activity and vital energy, expressed in mild, moderate and severe depressive episodes [14, 15, 16].

Given that psychological disorders due to painful sensations are frequent companions of chronic as well as acute pain in the orofacial region, a shorter informative conversation between the therapist and the patient is necessary on the basis of which the primary assessment of psychological and psychosocial ability is performed. As an integral part of the evaluation of TMD patients, an examination and determination of psychological status should be included in order to detect symptoms of depression and possibly predict the chronicity of TMD [15–18].

Analyzing the results of our research, in the group of subjects with muscular and articular dysfunction, most subjects showed symptoms of moderate depression, regardless of the type of dysfunction. In each and every degree of expression, depression is most prevalent in the group of respondents with signs of muscle dysfunction. Nevertheless, there were no statistically significant differences between the assessed groups. (Table 1, Figure 1). When we compared the severity of depression regarding the age of the patients there was no statistically significant difference observed in the age of respondents without depression, with moderate and severe

depression (p = 0.859) (Table 2). The results show that the degree of chronic pain of the oro-facial system does not affect the expression of depression. When we compared the level of chronic pain – VAS scale, in relation with the level of depression, we used Kruskal–Wallis test to determine the significance of the assessed variables, there were no statistically significant differences observed in the degree of chronic pain in patients without depression and patients with a moderate and severe form of depression (Tables 3 and 4). When we assessed the level of pain registered on a numerical scale with the level of depression, it did not differ statistically significantly in relation to the occurrence and degree of depression (Tables 5 and 6). This was suggested by the other authors when they said that depression is independently associated with chronic oro-facial pain [2, 10]. Finally, when we wanted to assess the relation between psychosocial parameters like daily activity and social life, expressed on a numerical scale according to the degree of depression (Table 7) there was a statistically significant difference in the psychosocial status between the respondents in relation to the degree of depression ($p \leq 0.05$) (Table 8). Similarly, the other authors have proven that TMD through subsequent depression significantly influence on patients quality of life [5, 15]. In our study statistically significant difference was observed in the psychosocial status of the respondents in relation to the degree of depression. This means that the level of depression influenced the patients' daily activities as well as social life in terms of the intensity of the symptoms directly influencing the level of psychosocial parameters.

CONCLUSION

Depression can be one of the causes, but also a consequence of chronic oro-facial pain, and thus indirectly a factor that affects the psychosocial state and quality of life of the patients.

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Conflict of interest: None declared.

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Appendix 1. Diagnostic Protocol RDC/TMD, Dworkin & LeResche (1992)

INSTITUTION.....PATIENT NO.....
NAME AND SURNAME..... GENDER.....
YEAR OF BIRTH..... OCCUPATION..... TELEPHONE.....

Read each question carefully and circle only one answer:
1. How would you rate your general state of health: excellent, very good, good, satisfactory or bad?
excellent.....1
very good.....2
good.....3
satisfactory.....4
bad.....5

2. How would you rate the condition of your oral cavity: excellent, very good, good, satisfactory or bad?
excellent.....1
very good.....2
good.....3
satisfactory.....4
bad.....5

3. In the last 6 months, have you felt pain in the area of the face, jaw, temple, in front of the ear or in the ear itself? (Axis II)
No.....0
Yes.....1
(if you have not felt pain in the last 6 months, go to question no. 14)

4a. How many years ago did you first feel such pain? (Axis II)
..... year
(if the pain occurred for the first time in less than a year, skip the question and answer the following)
4b. How many months ago did you feel that pain for the first time? (Axis II) .....months

5. Is the pain constant, occasional, or does the pain appear only once? (Axis II) Constant.....1
Occasional.....2
Only once 3

6. Have you ever sought medical help for this?
No.....1
Yes, in the past 6 months.....2
Yes, more than 6 months ago.....3

7. How would you rate your current pain on a scale of 0-10, where the value 0 corresponds to a state without pain and the value 10 to a state of unbearable pain? (Axis II)
(no pain) (excruciating pain)
0 1 2 3 4 5 6 7 8 9 10

8. In the last 6 months, on a scale of 0-10, what was your worst pain? (Axis II)
(no pain) (excruciating pain)
0 1 2 3 4 5 6 7 8 9 10

9. In the past 6 months, what is the average value of pain experienced on a scale of 0-10? (Axis II)
(no pain) (excruciating pain)
0 1 2 3 4 5 6 7 8 9 10

10. In the last 6 months, how many days did you miss work or school because of pain in the face?
.....days

11. In the past 6 months, how much did pain interfere with your daily activities, expressed on a scale of 0-10?
(no interference) (impossibility to perform activities)
0 1 2 3 4 5 6 7 8 9 10

12. In the last 6 months, how much have your opportunities to participate in social and family life changed due to pain, expressed on a scale of 0-10?
(no changes) (major changes)
0 1 2 3 4 5 6 7 8 9 10

13. How much did the presence of pain affect your ability to work in the last 6 months (including household chores), expressed on a scale of 0-10?
(no changes) (major changes)
0 1 2 3 4 5 6 7 8 9 10

14a. Has it ever happened to you that you can't open your mouth all the way, ie. have you had the feeling that your jaw was "locked" in some position?
No.....0
Yes.....1
b. Was the limitation of mouth opening so pronounced that it prevented you from eating?

No.....0
Yes.....1

15a. Do you hear a popping sound when you open or close your mouth or when you yawn?

No.....0
Yes.....1

b. Do you hear a grinding noise when opening, closing or yawning?

No.....0
Yes.....1

c. Have you been told or noticed that you grind your teeth or clench your jaw during sleep?
No.....0
Yes.....1

d. Do you grind your teeth or clench your jaw during the day?

No.....0
Yes.....1

e. Do you feel pain or have a feeling of stiffness in your jaw in the morning after waking up?

No.....0
Yes.....1

f. Do you have "ringing" or any noises in your ears?

No.....0
Yes.....1

Mr. Have you noticed a change in your bite when you bite down on your back teeth?

No.....0
Yes.....1

16a. Have you had any other joint diseases (rheumatoid arthritis, lupus)?

No.....0
Yes.....1

b. Has anyone in your family had similar joint diseases?

No.....0
Yes.....1

c. Have you had or do you have swelling and pain in the area of the jaw joints?

No.....0
Yes.....1

d. Does the pain you feel in the area of the jaw joints last longer than a year?

No.....0
Yes.....1

17. a. Have you recently had an injury in the area of the face and jaws?

No.....0
Yes.....1

b. Did you have pain before the injury?

No.....0
Yes.....1

18. Have you had a headache in the past 6 months?

No.....0
Yes.....1

19. What type of activity does the existing problem limit or prevent? (Axis II)

	No	Yes
a. chewing	0	1
b. drinking liquids	0	1
c. taking solid food	0	1
d. taking soft food	0	1
e. laughing	0	1
f. brushing teeth and washing face	0	1
g. yawning	0	1
h. swallowing	0	1
i. speech	0	1
j. facial appearance	0	1

20 a. Do you use any medications?

No.....0
Yes.....1

b. How long have you been using the medication? .....

c. What kind of medicines do you use?

d. What dose of medicine are you using?.....

e. Do you take medicine regularly?

No.....0
Yes.....1

Appendix 2. Symptoms Check List, SLC-90 (Axis II)

Circle only one of the offered numbers given with the offered questions.
0.....not at all
1.....very little
2.....moderately
3.....expressed
4.....exceptionally

In the past few months, how often have you been upset by:

a. headaches 0 1 2 3 4
b. loss of interest in sex or sexual pleasure 0 1 2 3 4
c. fainting or dizziness 0 1 2 3 4
d. pain in the region of the heart and chest 0 1 2 3 4
e. feeling of loss of energy or stagnation, slowness 0 1 2 3 4
f. thoughts about death or dying 0 1 2 3 4
g. loss of appetite 0 1 2 3 4
h. tearfulness 0 1 2 3 4
i. self-blame due to some events 0 1 2 3 4
j. back pain 0 1 2 3 4
k. feelings of loneliness 0 1 2 3 4
l. indifference (melancholy) 0 1 2 3 4
m. excessive worries about something 0 1 2 3 4
n. lack of interest in the environment 0 1 2 3 4
o. feeling of pain and disgust in the stomach 0 1 2 3 4
p. muscle pain 0 1 2 3 4
q. difficulty falling asleep (it takes you a long time to fall asleep) 0 1 2 3 4
r. difficulty in breathing (hard to catch your breath) 0 1 2 3 4
s. hot-cold shifts 0 1 2 3 4
t. stiffness or feeling of "numbness" in some part of the body 0 1 2 3 4
u. presence of a "lump" in the throat 0 1 2 3 4
v. feelings of hopelessness 0 1 2 3 4
w. feeling of weakness in some part of the body 0 1 2 3 4
x. feeling of heaviness in arms and legs 0 1 2 3 4
y. thoughts about ending your life 0 1 2 3 4
z. excessive intake of food 0 1 2 3 4
aa. waking up early in the morning 0 1 2 3 4
bb. restless and interrupted sleep 0 1 2 3 4
cc. feels that everything is "hard" 0 1 2 3 4
dd. feeling "caught in a clip" 0 1 2 3 4
ff. feelings of guilt 0 1 2 3 4

Table 1. Level of depression relation with dyagnosis

Depression		Diagnosis			Significance
		Muscular dysfunction	Articular dysfunction	Muscular and articular dysfunction	
Level of depression n (%)	None	1 (14.3%)	8 (53.3%)	7 (31.8%)	p = 0.420
	Moderate	5 (71.4%)	5 (33.3%)	11 (50%)	
	Severe	1 (14.3%)	2 (13.3%)	4 (18.2%)	

*statisticaly significant difference

Table 2. Adulthood of the subjects related to the level of depression

Participant adulthood		Mean	Med	SD	Min	Max	95% CI
Age	No depression	39.06	39.50	8.378	23	54	34.60–43.53
	Moderate depression	38.33	36.00	12.16	22	55	32.80–43.87
	Severe depression	36.29	30.00	13.24	21	53	24.04–48.53

Table 3. Level of chronical pain related to the level of depression

Observed parameters		Mean	Med	SD	Min	Max	95% CI
Level of chronical pain	No depression	1.44	1.00	0.512	1	2	1.16–1.71
	Moderate depression	1.76	2.00	0.436	1	2	1.56–1.96
	Severe depression	1.71	2.00	0.488	1	2	1.26–2.17

Table 4. Level of chronical pain and depression

Observed parameters (X ± SD)	Depression			Significance[a]
	None	Moderate	Severe	
Level of chronical pain	1.44 ± 0.512	1.76 ± 0.436	1.71 ± 0.488	p = 0.119

*statistically significant difference
[a]Kruskal–Wallis test

Table 5. Pain intensity expressed on a numerical scale according to the degree of depression

Pain intensity		Mean	Med	SD	Min	Max	95% CI
Current pain	No depression	4.25	5.00	2.145	0	7	3.11–5.39
	Moderate depression	5.95	7.00	2.854	0	9	4.65–7.25
	Severe depression	4.57	6.00	3.823	0	9	1.04–8.11
Strongest pain	No depression	6.25	6.00	1.483	3	9	5.46–7.04
	Moderate depression	7.14	8.00	2.104	1	9	6.18–8.10
	Severe depression	8.14	8.00	1.345	6	10	6.90–9.39
Average pain	No depression	4.50	5.00	1.211	2	7	3.85–5.15
	Moderate depression	5.62	6.00	2.156	1	9	4.64–6.60
	Severe depression	6.00	6.00	1.414	4	8	4.69–7.31

Table 6. Subjectively assessed pain intensity with a numerical scale and depression

Intensity of pain (x ± sd)	Depression			Significance[a]
	None	Moderate	Severe	
Current pain	4.25 ± 2.145	5.95 ± 2.854	4.57 ± 3.823	p = 0.171
Strongest pain	6.25 ± 1.483	7.14 ± 2.104	8.14 ± 1.345	p = 0.068
Average pain	4.50 ± 1.211	5.62 ± 2.156	6.00 ± 1.414	p = 0.091

*statistical significance
[a]One-factor analysis of variance

Table 7. Psychosocial parameters expressed on a numerical scale according to the degree of depression

Psychosocial status		Mean	Med	SD	Min	Max	95% CI
Social life	No depression	0.56	0.50	0.629	0	2	0.23–.90
	Moderate depression	2.24	2.00	1.895	0	6	1.38–3.10
	Severe depression	3.43	4.00	3.155	0	8	0.51–6.35
Daily activity	No depression	1.88	2.00	1.628	0	7	1.01–2.74
	Moderate depression	3.62	3.00	2.148	0	9	2.52–4.72
	Severe depression	4.43	5.00	1.902	2	7	2.67–6.19

Table 8. Psychosocial status and depression

Observed parameters (X ± SD)	Depression			Significance[a]
	None	Moderate	Severe	
Social life	0.56 ± 0.629	2.24 ± 1.895	3.43 ± 3.155	p = 0.010*
Daily activity	1.88 ± 1.628	3.62 ± 2.148	4.43 ± 1.902	p = 0.002*

*statistically significant difference
[a]Kruskal–Wallis test

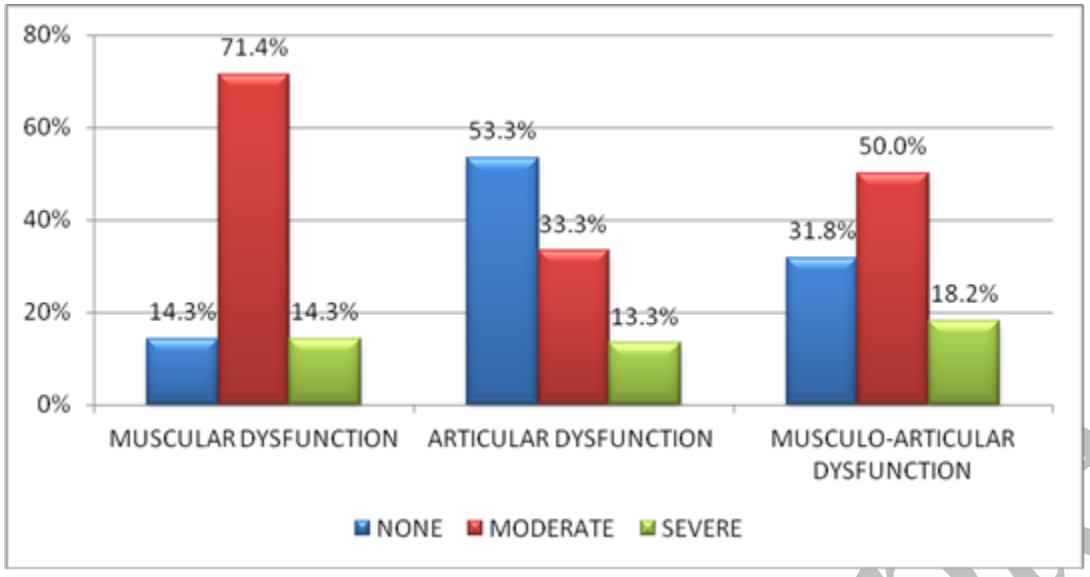

Figure 1. Dysfunction and degree of depression

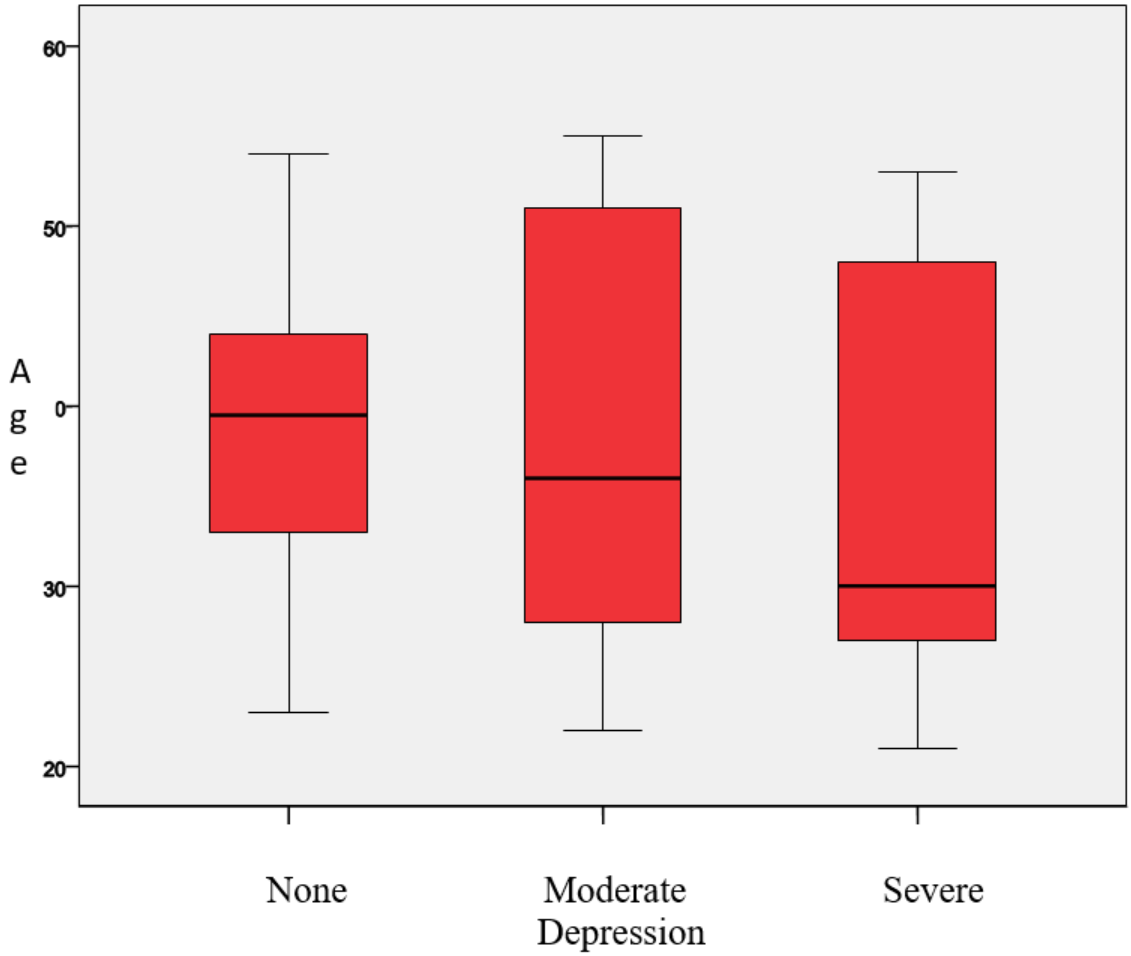

Figure 2. Age of the participants and the level of depression

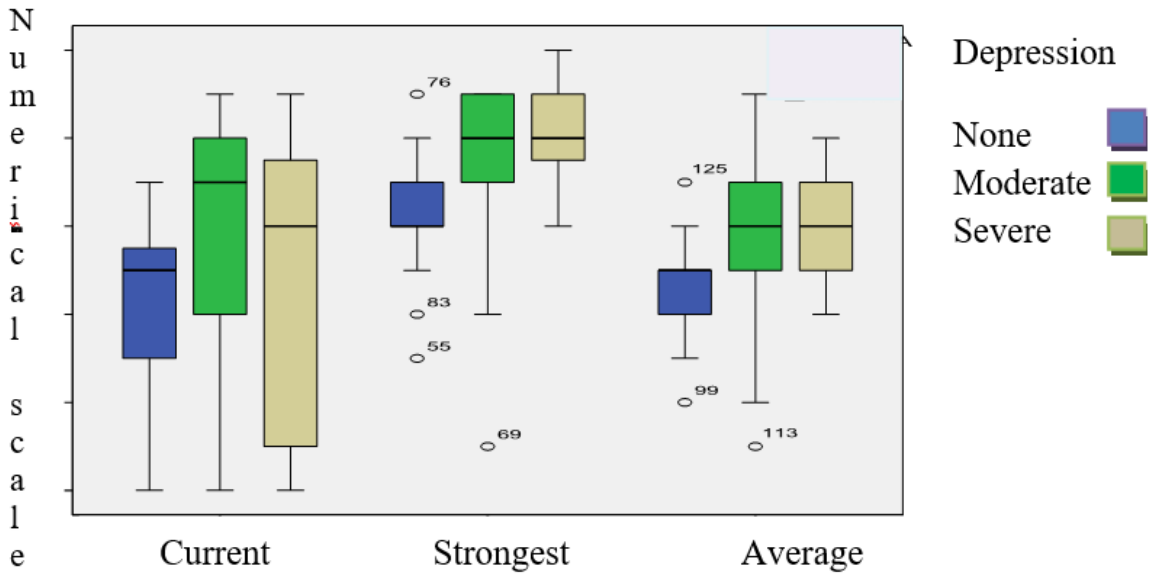

Figure 3. Severity of pain on a numerical scale and depression

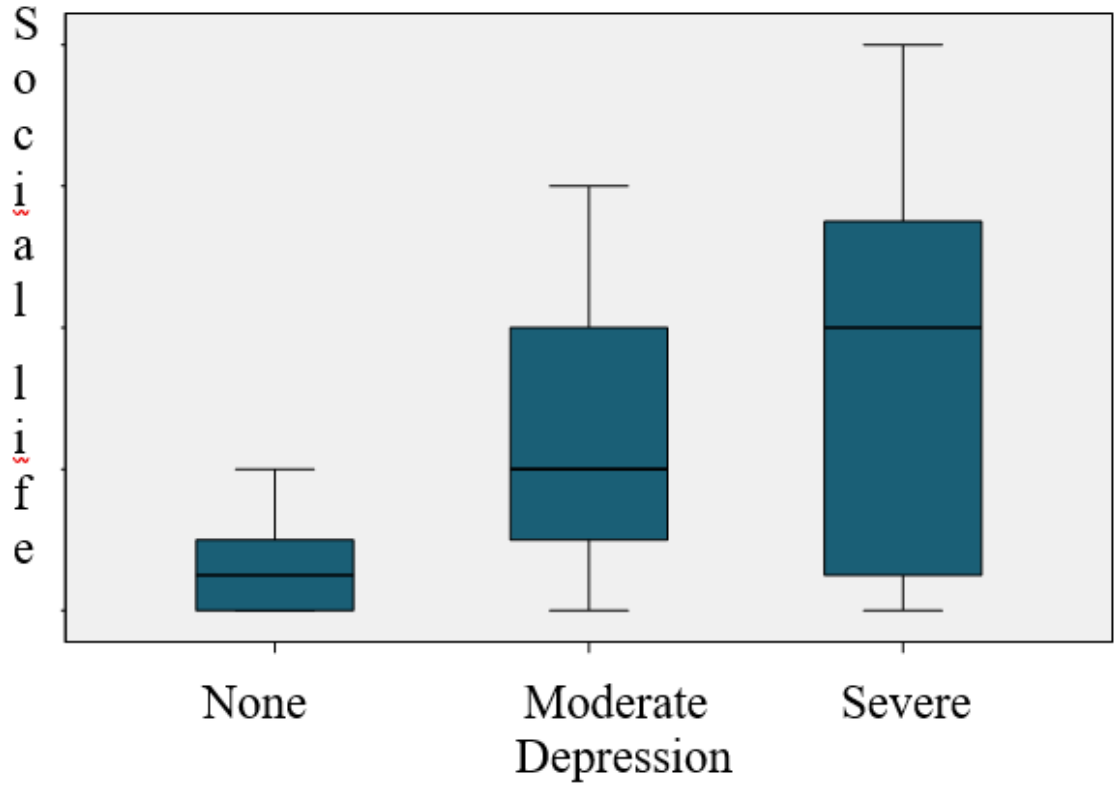

Figure 4. Social life and depression

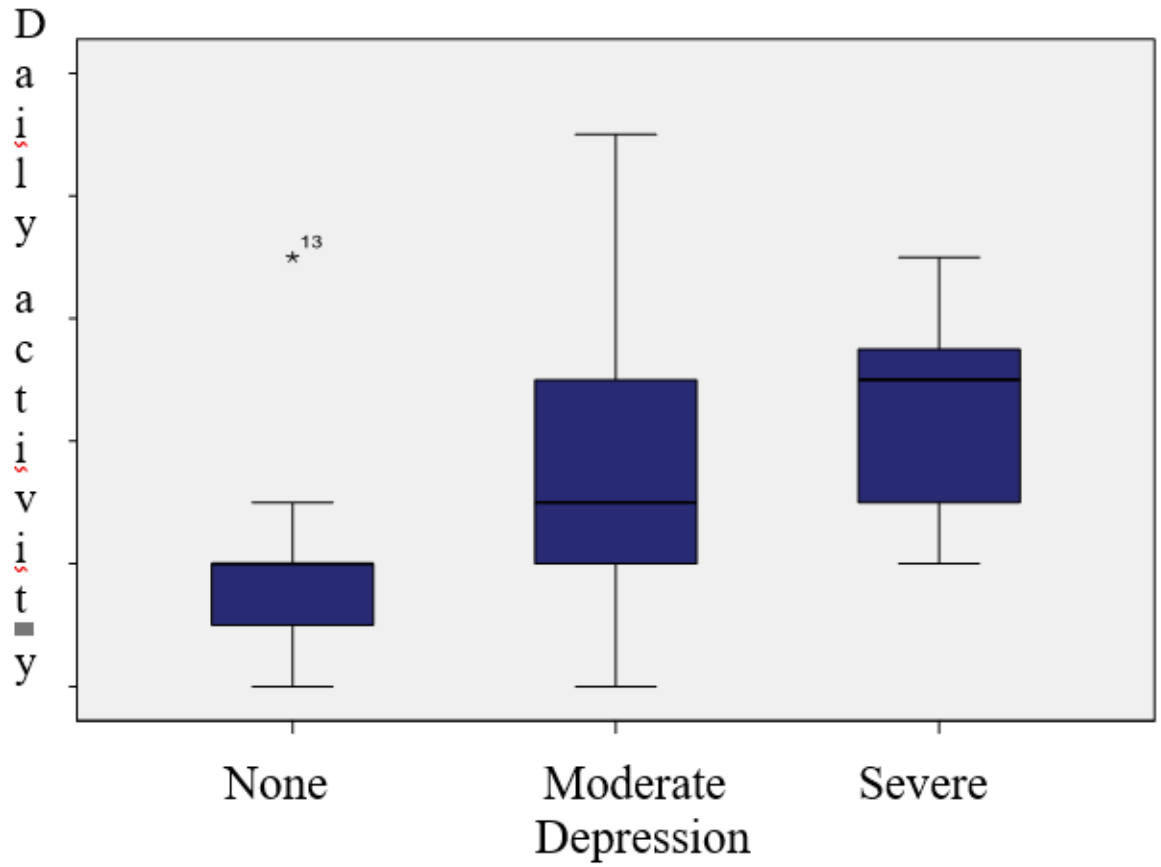

Figure 5. Daily activity and depression

