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Somatosensory Amplification, Health Anxiety and Pain Catastrophizing in Individuals with Chronic Musculoskeletal System Pain

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ABSTRACT

Objective: The present study aimed to evaluate the somatosensory amplification, pain catastrophizing levels, and health anxiety of the patients with musculoskeletal system pain through comparing them both with control group and with themselves.

Materials and Methods: Of all patients who applied to the physical therapy and rehabilitation outpatient clinic with a complaint of musculoskeletal pain and who met the criteria for inclusion. The patients diagnosed with fibromyalgia syndrome (FMS) and osteoarthritis (OA) based on American College of Rheumatology criteria and the patients diagnosed with cervical disc hernia (CDH) and lumbar disc hernia (LDH) based on anamnesis, physical examination, and imaging methods were included in the study. All participants were subjected to demographic data form, the pain catastrophizing scale (PCS), somatosensory amplification scale (SSAS), hospital anxiety-depression scale (HADS), and health anxiety inventory (HAI).

Results: The patient group had 120 patients (45 – FMS, 27 – OA, 29 – LDH, and 19 – CDH diagnoses) while the control had 70 individuals. There were no differences between the study groups for demographic data except for working status and economic level. It was determined that there were no differences between the patient and control groups for any subscales of HADS. For HAI only, the "negative consequences" subscale was lower in the patient group ($p=0.012$). It was also found that for SSAS and PCS, the patient group had higher scores than the controls ($p=0.008$ and $p<0.001$, respectively).

Conclusion: Patients presenting with chronic musculoskeletal system pain should also be supported psychiatrically to help them better with the prognosis of their ailments and to allow them to tolerate the pain and evaluate it without exaggerating the somatic symptoms.

Keywords: Catastrophizing, health anxiety, musculoskeletal system pain, somatization

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INTRODUCTION

Health anxiety (HA) is a person's over-interest in his own health status, feeling anxiety, and interpreting the usual changes in his body as symptoms of a serious disease (1). These individuals tend to develop a belief that the usual somatic symptoms and changes indicate serious diseases, and as a result, they tend to experience intense anxiety. While mild health anxiety helps to get medical attention when necessary, intense levels of anxiety often lead to disrupted functionality and turn into seeking medical attention (2). Individuals experiencing intense levels of HA think that they are prone to disease, seek reassurance about their illness, worry about the negative consequences of their illness, and become oversensitive to somatic symptoms (3). The way of managing somatic symptoms relates to how a person interprets any somatic symptom. The individual attributes the physical symptoms to situational factors such as fatigue or sleep-wake cycle change and normalizes them or attributes them to a somatic/mental ailment in a pathological manner. Somatosensory amplification concept, on the other hand, refers to the tendency to perceive normal somatic symptoms as excessive, harmful, and disturbing. This concept was suggested to be associated with various somatization tables, especially somatic symptom disorder and hypochondriasis (4).

Across different cultures throughout the world, physical symptoms are the most common form for an individual to express emotional distress and social problems (5). One of the somatic symptoms that are difficult to explain medically is common musculoskeletal pain (6). Musculoskeletal disorders are some of the most common causes of pain-related insufficiency and disability. Among the musculoskeletal disorder involving chronic pain are fibromyalgia syndrome (FMS), osteoarthritis (OA), cervical disc hernia (CDH), and lumbar disc hernia (LDH) (7). FMS is characterized by common and chronic musculoskeletal pain, accompanied by sleep disturbance, fatigue, and painful tender spots (8). OA is an ailment in which the joint and tissues surrounding the joint are affected by changes in the subchondral bone and by wearing of cartilage. OA is especially common in the overloading joints such as knees and hips (9). These four ailments are involved in chronic musculoskeletal pain. Pain catastrophizing concept related to poor response to treatment in diseases prognosing with chronic pain is a mental set that leads to a real or imagined pain (10).

Many studies were conducted in the literature separately dealing with anxiety, depression, somatization, or pain catastrophizing in musculoskeletal system disorders involving chronic pain (11, 12). However, to the best of our knowledge, there has been no study evaluating all these across the diseases while taking health anxiety levels into account. Thus, the aim of the present study was to evaluate health anxiety, somatosensory amplification, and pain catastrophizing levels of the patients with FMS, OA, CDH, and LDH diagnoses who applied to physical medicine and rehabilitation outpatient clinic through comparing them with healthy controls and with themselves.

MATERIALS and METHODS

Study Place

This study was carried out in physical medicine and rehabilitation outpatient clinic of Tokat State Hospital in the period from January 01, 2019, to December 31, 2019.

Diagnoses and Definitions

The study included 120 patients (45 FMS, 27 OA, 29 LDH, and 19 CDH diagnoses). A control group of 70 individuals was also included. The patients who applied to physical medicine and rehabilitation outpatient clinic of Tokat State Hospital with chronic and common musculoskeletal system pain complaint were informed about the study. These patients had FMS, knee OA, CDH, and LDH diagnoses. The patient groups included the patients diagnosed with FMS and OA based on American College of Rheumatology (8) criteria, and the patients diagnosed with CDH and LDH based on anamnesis, physical examination, and imaging methods at the outpatient clinic. These diseases were identified based on the physical therapy and rehabilitation diagnostic criteria. Radiological and disability scorings were not performed.

Including and Excluding Criteria

Only the volunteering patients who were 20–60 years old, literate and could give written consent and had the mental and intellectual capacity to answer the questions on data collection tools were included in the study. The individuals with general low status, chronic systemic diseases, inflammatory disease, neurodegenerative disease, diagnosed psychiatric disease and alcohol or substance addiction, and the individuals who were not willing to participate were excluded from the study. A healthy control group was established with individuals of matching age, gender, educational status, and demographic characteristics who did not have any musculoskeletal system pain complaint and any past or current psychiatric treatment and who met the study inclusion criteria. A total of 230 patients were interviewed for the study. Forty patients were excluded since they were not willing to participate. Of the remaining 190 patients, 20 patients who were illiterate, 15 patients who had psychiatric disease, and 20 patients who, partly or fully, failed to fill the data collection forms were excluded from the study. A total of 120 patients and 70 healthy controls who met the study inclusion criteria were included in the study.

Ethic Statement

The study was approved by Tokat Gaziosmanpaşa University, Non-Invasive Clinical Research Ethical Board (date: December 05, 2018, No: 83116987-628 and Project No: 18-KAEK-253). Study procedures were carried out in accordance with Helsinki Declaration. All participants signed a written consent form.

All participants filled data collection tools of demographic data form, the pain catastrophizing scale (PCS), somatosensory amplification scale (SSAS), hospital anxiety and depression scale (HADS), visual pain scale (VPS), and health anxiety inventory (HAI).

Data Collection Tools

Sociodemographic Data Form

This form was prepared by the authors based on the study aims considering the relevant literature. The form included questions about demographic information such as age, gender, marital, working, economical, and educational status. Besides, it also included questions regarding clinical evaluation such as past or current psychiatric treatment and presence of psychiatric disease requiring treatment in the family.

HADS

This is a 14-item self-reporting scale used to measure the severity of depression and anxiety symptoms of patients. Cutoff point for the anxiety subscale was calculated to be 11 and the cutoff point for the depression subscale was 8. The scale was developed by Zigmond and Snaith (13).

HAI

This inventory is used to measure the anxiety level experienced by the person himself/herself about his/her own health. The first 14 items question the emotions and reflections about the health status of the individual while the last four items question how the individual would feel and response if he/she had a serious disease. Higher scores of the inventory mean high levels of health anxiety. This inventory was developed by Salkovskis et al. and was adopted to Turkish by Aydemir et al. (3, 14).

SSAS

SSAS is a 10-question, Likert-type self-reporting scale evaluating an individual's amplification of usual and common somatosensory symptoms. A total exaggeration/amplification score is calculated through summing the scores for each question (15).

VPS

This is a 10 cm long vertical or horizontal line that starts with "No pain (0)" and ends with "Unbearable pain (10)" used to determine pain level. Patient marks the appropriate point on the line based on the pain he/she experiences (16).

The PCS

This scale was developed by Sullivan et al. (17) to identify the harmful, dangerous, negative reflections, emotions, and ineffective handling strategies about the pain experienced by patients. It is a Likert type, self-reporting scale, and every item of the scale is graded by points from 0 to 4. Total score varies from 0 to 52, and higher scores mean greater catastrophizing levels.

Statistical Analysis

Statistical analyses of the data were performed using SPSS for Windows 20 software (Statistical Package for the Social Sciences for Windows, ver. 20). The distribution of the data was analyzed using Kolmogorov–Smirnov test and when $p<0.05$ was considered, the distribution was considered normal. To present the information about the general characteristics of the participants, descriptive analyses, frequency and percent distributions, and

Table 1. Sociodemographic characteristics of participants

	Patient group (n=120) n (%)	Control group (n=70) n (%)	p
Gender			
Female/male	102/18 (85/15)	57/13 (81.4/18.6)	0.520
Marital status			
Married	109 (90.8)	60 (85.7)	
Single	6 (5)	6 (8.6)	0.536
Widowed	5 (4.2)	4 (5.7)	
Living place			
Provincial central town	90 (75)	55 (78.57)	0.125
District town	30 (25)	15 (21.42)	
Education level			
Literate	22 (18.3)	17 (24.3)	
Primary school graduate	60 (50.0)	41 (58.6)	0.178
High school graduate	19 (15.8)	6 (8.6)	
College graduate	19 (15.8)	6 (8.6)	
Working status			
Employment without a regular income	20 (16.7)	11 (15.7)	
Part-time employment	5 (4.2)	0	
Homemaker	81 (67.5)	59 (84.3)	0.002
Retired	14 (11.7)	0	
Economic status			
Low	34 (28.3)	25 (35.7)	
Moderate	55 (45.8)	14 (20)	0.001
High	(25.8)	31 (44.3)	
Previous psychiatric treatment			
Yes/no	0/120	0/70	

Neither the participants nor any of their family member had a psychiatric disorder requiring treatment. Values were given in the table as n (%). Chi-square and Fisher's exact test were used for statistical analyses. P<0.05 was considered statistically significant

mean±standard deviation were used. Data from the continuous variables were given as mean±standard deviation, while those from categorical variables were presented as n (%). For the SSAS variation considered as the primer, it was found to work with a total of 190 people, 70 individuals in control group and 120 persons in patient group with 80% power, 5% type 1 error, and an effect size of 0.375 using G * power 3.1.9 program. Qualitative variables of the study were demographic data such as age, gender, education and socioeconomic status, and psychiatric disease diagnosis of the person or the family members. Cross tables and Chi-square tests were used to reveal the associations between the qualitative variables. Quantitative data, on the other hand, were scores of HADS, SSAS, PCS, VAS, and HAI. To determine the associations between quantitative data, Mann–Whitney U-test or Kruskal–Wallis test was used when the parametric assumptions were not valid. When the parametric assumptions were valid, independent samples t-test or one-way analysis of variance was used. Tukey HSD test was applied for *post hoc* comparisons. In addition, Pearson correlation coefficient was used to reveal the relationships between the quantitative variables. p<0.05 was considered statistically significant.

RESULTS

The study included 190 individuals. The patient group had 120 patients (45 FMS, 27 OA, 29 LDH, and 19 CDH diagnoses). A control group of 70 individuals was also included. Mean age values based on different diagnoses in the patient group were as follows: FMS 41.84±9.73, OA 52.22±11.09, LDH 43.83±13.22, and CDH 54.56±9.67 years. Mean age in the control group, on the other hand, was 36.99±15.77 years. The patient group had 85% of female and 15% of male individuals. Patients' living place, marital, and educational status were not significantly different between the groups. Seventy-six individuals in the patient group and 59 in the control group were homemakers (p=0.002) (Table 1). The patients were not receiving any medical or physical therapy during the time they were included in the study.

In terms of quantitative variables, 40 patients in the patient group (33.33%) exceeded cutoff point for anxiety subscale while 30 patients (25%) exceeded cutoff point for depression subscale. In healthy control group, on the other hand, 17 (24.28%) and 16 individuals (22.85%) exceeded the cutoff points for anxiety and depression subscales, respectively. Scores of anxiety and depression subscale of

Table 2. Distribution of quantitative variables in the study groups

	Patient group (n=120) n (%)	Control group (n=70) n (%)	p
HADS			
Anxiety subscale	8.3±4.26	8.19±2.96	0.843
Depression subscale	6.33±3.2	6.56±3.05	0.637
Total score	14.63±6.65	14.74±5.06	0.905
HAI			
Score of body subscale	13.65±6.35	12.83±5.16	0.359
Negative consequences	3.32±2.31	4.21±2.35	0.012*
Total score	16.98±7.87	17.04±6.56	0.952
SSAS	29.43±7.9	26.46±6.47	0.008*
PCS	22.02±13.03	14.67±11.61	<0.001*
VAS	6.31±2.28	3.16±2.67	<0.001*
Years since the diagnosis	5.75±5.66	–	

HADS: Hospital anxiety and depression scale; HAI: Health anxiety inventory; SSAS: Somatosensory amplification scale; PCS: Pain catastrophizing scale; VAS: Visual analog scale. For statistical analyses, independent samples t-test; *: P<0.05

Table 3. Distribution of quantitative variables based on patients' diagnosis

	Control group (n=70)	FMS (n=45)	OA (n=27)	LDH (n=29)	CDH (n=19)	p
HADS						
Anxiety subscale	8.19±2.96	9.9±4.66	8.11±3.88	7.66±3.96	7.68±3.68	0.507
Depression subscale	6.56±3.05	7.2±3.47	5.33±3.13	3.97±2.64	6.26±3.12	0.146
Total score	14.74±5.06	16.29±7.2	13.44±6.08	13.62±5.95	13.95±6.81	0.250
HAI						
Score of body subscale	12.83±5.16^{ab}	15.58±5.85^{a}	10.89±6.05^{b}	12.9±4.16^{ab}	14.16±8.98^{ab}	0.016*
Negative consequences	4.21±2.35	3.49±2.26	3.15±2.38	2.97±1.97	3.74±2.84	0.093
Total score	17.04±6.56	19.07±7.48	14.04±7.53	15.86±5.28	17.89±10.97	0.064
SSAS	26.46±6.47^{a}	32.33±7.5^{b}	28.41±8.51^{ab}	27.07±6.76^{a}	27.63±8.03^{ab}	0.001*
PCS	14.67±11.61^{a}	21.87±11.3^{b}	22±12.8^{ab}	22.7±15.9^{b}	21.4±13.42^{ab}	0.006*
VAS	3.16±2.67^{a}	6.82±2.03^{b}	6.19±2.48^{b}	5.69±2.17^{b}	6.21±2.59^{b}	0.001*

FMS: Fibromyalgia syndrome; OA: Osteoarthritis; LDH: Lumbar disc hernia; CDH: Cervical disc hernia; HADS: Hospital anxiety and depression scale; HAI: Health anxiety inventory; SSAS: Somatosensory amplification scale; PCS: Pain catastrophizing scale; VAS: Visual analog scale. One-way analysis of variance (ANOVA) was used for statistical evaluations. ^{ab}The difference between the means with the same latter in the same line is not statistically different; *: P<0.05

HADS were not significantly different between the study groups. Besides, the study groups were not different for "body" and total scores of HAI. Score of "negative consequences" subscale, on the other hand, was much lower in the patient group (p=0.012). SSAS and PCS scores were much higher in the patient group (Table 2).

In terms of quantitative variables based on different diagnoses in the patient group, no subscale score of HADS, negative consequences subscale score, and total score of HAI were different (Table 3). Pearson correlation analysis in the patient group showed that duration of time (years) since the diagnosis was negatively correlated with SSAS. Both anxiety and depression subscales of HADS and all subscales of HAI were positively correlated with SSAS and PCS. VAS, on the other hand, had positive correlations with PCS, SSAS, and HADS (Table 4).

DISCUSSION

Health anxiety, somatosensory amplification, and pain catastrophizing levels of FMS, OA, CDH, and LDH patients who applied to physical medicine and rehabilitation outpatient clinic with musculoskeletal system pain for more than 6 months were studied through comparing them both with healthy controls and with themselves. Somatosensory amplification and pain catastrophizing were much higher in the patient group. The patient group had more patients with scores over the cutoff points for anxiety and depression subscales of HADS compared to the control, but the difference was not significant. Body subscale score and total score of HAI were not different between the study groups. However, the score of negative consequences subscale was higher in the healthy control group.

Table 4. Pearson correlation analysis of the patients

	HADS-anxiety subscale	HADS-depression subscale	HADS-total score	HAI-score of body subscale	HAI-negative consequences	HAI-total score	SSAS	PCS	VAS
HADS-anxiety	–	0.583*	0.921*	0.300*	0.314*	0.334*	0.540*	0.294*	0.337*
HADS-depression	0.583*	–	0.854*	0.297*	0.296*	0.327*	0.251*	0.273*	0.310*
HADS-total score	0.921*	0.854*	–	0.335*	0.344*	0.371*	0.467*	0.319*	0.364*
HAI-body	0.300*	0.297*	0.355*	–	0.555*	0.970*	0.300*	0.157	0.360*
HAI-negative consequences	0.314*	0.296*	0.344*	0.555*	–	0.741*	0.263*	0.152	0.131
HAI-total score	0.334*	0.327*	0.371*	0.970*	0.741*	–	0.335*	0.171	0.329*
SSAS	0.540*	0.251*	0.467*	0.319*	0.263*	0.335*	–	0.248*	0.295*
PCS	0.294*	0.273*	0.319*	0.157	0.152	0.171	0.248*	–	0.274*
VAS	0.337*	0.310*	0.364*	0.360*	0.131	0.329*	0.295*	0.274*	–

HADS: Hospital anxiety and depression scale; HAI: Health anxiety inventory; SSAS: Somatosensory amplification scale; PCS: Pain catastrophizing scale; VAS: Visual analog scale; Pearson correlation analysis was used. Values given in the table are r values. *P<0.05

Many studies in the literature evaluated the anxiety-depression levels of the patients with chronic, common pain in musculoskeletal system (7, 17–19). The most extensively studied disease for this purpose is FMS (17–19). In one of the studies, 67% of the patients with FMS diagnosis had anxiety and 87% had depressive symptoms (17). In another study, 64% of FMS patients had major depressive disorder diagnosis throughout life (18). Similarly, another study found that FMS patients had 17% and 9% higher anxiety and depression scores, respectively (19). Studies with OA patients also showed their higher psychological distress, anxiety, and depressive symptoms (7). It was speculated that the pain experienced by the patients was responsible for their high anxiety and depression scores. It was reported that due to the pain anxiety and depression levels of the patients increased, restricting their lives (7, 17–19). Similar to the studies in the literature, our results showed that the patients had higher scores for anxiety and depression subscales of HADS. Nevertheless, the difference between the study groups was not significant. This finding could be due to higher anxiety and depression levels than the expected levels in the healthy control group. Besides, in accordance with some studies (7), pain experienced by the patients was positively correlated with anxiety and depression levels.

Health anxiety (SA) is defined as a multidimensional concept with cognitive, emotional, and behavioral dimensions (20). Epidemiological research, on the other hand, defines the health anxiety as the fear of both ordinary and unusual bodily sensations, negative interpretation of fears, and mental symptoms associated with fears 21, (22). The individual believes that his/her health problems are not taken seriously enough and develops wrong strategies to deal with his/her health problems. Health anxiety of patients with chronic musculoskeletal pain was examined in a limited number of studies (23, 24). In the studies examining the anxiety levels of patients with musculoskeletal pain, on the other hand, anxiety levels of the patients were found to be higher than the healthy controls (7, 10). A study dealing with health anxiety in the myofascial pain syndrome found higher health anxiety levels in patients compared to the controls (24). In the present study, health anxiety levels of the patients were not different from that of the control group. However, the scores for the negative results subdimension were much lower in the patient group. This finding was interpreted as getting used to the negative consequences of the chronic pain experienced by the patients.

The way a person perceives somatic symptoms plays a fundamental role in somatization. A person can normalize, spiritualize, somatize, and attribute their somatic symptoms to a serious disease. This phenomenon is called somatosensory amplification (4). Somatosensory amplification could be observed in both psychiatric and physical diseases. Somatosensory amplification was studied in major depressive disorder, hypochondriasis, asthma, FMS, and migraine patients with chronic pain (4, 16). In migraine patients experiencing chronic pain, somatosensory amplification levels were higher compared to the healthy controls (25). Similarly, somatosensory amplification levels were high in FMS patients (4). In accordance with the literature, somatosensory amplification level was generally high in our group of patients with chronic pain than that in healthy controls in the present study. This difference was mainly due to FMS patient group. A separate analysis of the patients with different diagnoses revealed that the scores of FMS patients were higher than healthy controls and patients with LDH. Our study is the first dealing with somatosensory amplification levels in CDH and LDH patients. Based on our findings, somatosensory amplification levels of CDH and LDH patients were not different from those of healthy controls. The only study examining the somatosensory amplification levels of OA patients reported higher preoperative SSAS scores compared to the controls (26). However, the SSAS scores of OA patients were not different from the controls in the present study.

In the literature, levels of catastrophizing the pain in patients with chronic musculoskeletal pain were the subject of many studies (20, 27). In a study with FMS patients, high levels of catastrophizing were linked with the anxiety and pain levels of by the patients (20). In another study with FMS patients, a relationship was reported between the chronicity level of the disease and pain catastrophizing levels of the patients (27). In accordance with the literature, patient group with chronic paint complaint in the present study had higher levels of pain catastrophizing than the healthy controls. In terms of separate evaluation of diseases in

the patient group, scores of FMS and LDH patients were higher than those of the control group. As for somatosensory amplification, the present study was also first to evaluate the pain catastrophizing levels in CDH and LDH patients. Pain catastrophizing levels were not significantly different in CDH patients compared to the healthy controls. On the other hand, similar to FMS patients, pain catastrophizing levels of LDH patients were high compared to the controls. It was shown that pain catastrophizing levels were reduced postoperatively in OA patients (28). The abovementioned study did not employ a control group since it evaluated the effect of operation. In another study with OA patients, it was found that the patients had elevated preoperative pain catastrophizing levels. No relationship was found between the radiological findings and pain level (28). In the present study, however, pain catastrophizing level of the OA patients was not different from that in healthy control group. Nevertheless, in accordance with the results from many studies in the literature (20, 27, 28), there was a positive relationship between the pain catastrophizing levels and pain levels experienced by the patients in the present study.

There was no significant difference between the study groups for age, gender, marital status, the living place, and the level of education of the participants. Only the differences for the working and economic status were significant between the groups. There are studies in the literature reporting that there were associations between somatization and anxiety and that individuals with a low educational status had higher somatization and anxiety levels (4, 5). In addition, it was reported that anxiety level was higher and the threshold for tolerating the anxiety was lower in female gender (4). In the present study, no significant differences were observed between the study groups for the demographic characters such as gender and educational status that could affect the somatization and anxiety levels of the individuals. The working status was different between the study groups. This finding could mean that because of the pain, they experienced that the patients had difficulties to work in jobs with regular income.

Our results should be considered with some limitations. The first was the sectional design of the study. Relatively small patient population, self-reporting evaluation of the patients and the fact that SCID-V (the Structured Clinical Interview for DSM-5) was not used for the participants were among other limitations. Finally, the significant differences between the patient and control groups for working and economic status could be considered as a limitation. These limitations restrict the generalization and interpretation of our findings. For our findings to gain importance, more advanced studies with larger cohorts are needed.

CONCLUSION

Health anxiety, somatosensory amplification, and pain catastrophizing levels of the patients with FMS, OA, CDH, and LDH diagnoses considered to have chronic musculoskeletal system pain were studied together for the 1st time in the present study. The patient and control groups had similar anxiety and depression levels. Similarly, the study groups had comparable levels of body score and total score of health anxiety. However, the patient group had lower score for negative consequences subscale than healthy controls. Besides, the patient group had much higher levels of somatosensory amplification and pain catastrophizing compared to the healthy controls. Thus, to help better the patients monitored for chronic and common musculoskeletal pain complaint during the prognosis of their diseases, psychiatric support is recommended to improve their pain tolerance, to allow them to evaluate their somatosensory symptoms without exaggeration, and, consequently, to contribute to their healing process.

Ethics Committee Approval: The Tokat Gaziosmanpaşa University, Non-Invasive Clinical Research Ethical Committee granted approval for this study (date: 05.12.2018, number: 83116987-628).

Informed Consent: Written informed consent was obtained from patients who participated in this study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – FÖ, SO; Design – FÖ, SO; Supervision – FÖ, SO; Materials – FÖ, SO; Data Collection and/or Processing – FÖ, SO; Analysis and/or Interpretation – FÖ, SO; Literature Search – FÖ, SO; Writing – FÖ, SO; Critical Reviews – FÖ, SO.

Conflict of Interest: The authors have no conflict of interest to declare.

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