

Pain as a mediator in the temperament-alexithymia relationship in individuals suffering from rheumatoid arthritis

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Abstract. – **OBJECTIVE:** The study aims to establish a relationship between temperament traits, symptoms of alexithymia, and pain intensity in rheumatoid arthritis. Despite the significant progress seen in the area of RA treatment, pain, often life-long, remains the predominant symptom. This constant pain and progressing disability, as well as dependence upon other people cause RA patients to experience psychological stress that can be modified by individual patient traits. Recently, several authors have underlined the need to relate personality and temperament constructs to neurobiological processes that may underlie individual differences. It seems then that patient characteristics may play a significant role in the course of the disease.

PATIENTS AND METHODS: The study was performed on a group of patients (N=317) with rheumatoid arthritis diagnosed according to the current criteria of the American-European Consensus of 2010. All patients expressed voluntary consent to participate, and the study protocol was approved by the Local Ethics Committee. This was a survey-based study. It involved the application of the adult version of the Buss and Plomin EAS Temperament Questionnaire (EAS-D), which tests 3 main temperament domains: sociability, activity, and emotionality. The pain was measured on the Visual Analogue Scale (VAS). VAS is used to measure pain intensity. The level of alexithymia was tested using the Toronto Alexithymia Scale-20. The scale consists of 20 statements and includes 3 subscales that measure difficulty in describing feelings/emotions, difficulty in identifying feelings/emotions, and operational externally oriented thinking.

RESULTS: The analysis revealed that alexithymia is positively correlated only with one dimension of temperament, i.e., emotionality,

and with pain intensity. Moreover, high emotionality was positively correlated with pain. A simple mediation analysis revealed that pain intensity functioned as a mediator in the emotionality-alexithymia relationship.

CONCLUSIONS: The observed correlations indicate that RA patients with a high level of emotionality exhibit high alexithymia as they perceive pain related to the disease symptoms more intensely. The observed mediation is partial, meaning that there are also other mediating factors in this relationship.

Key Words:

Alexithymia, Temperament, Pain, Rheumatoid arthritis.

Introduction

Rheumatoid arthritis (RA) is a chronic, progressive, systemic connective tissue disease that mainly leads to joint damage, but also contributes to multiple organ complications¹. Despite the significant progress seen in the area of RA treatment, pain, often life-long, remains the predominant symptom. Disease modifying therapy effectively treats inflammation, but does not completely inhibit the progression of destructive joint lesions and does not completely eliminate the perceived pain. Despite undergoing apparently effective therapy, some RA patients still experience chronic pain that requires additional administration of analgesics^{2,3}.

Chronic pain may lead to sleep and appetite disorders, reduced physical activity, and increasing fatigue, which leads to additional deterioration

of the patients' conditions⁴. This constant pain and progressing disability as well as dependence upon other people cause RA patients to experience psychological stress that can be modified by, for instance, patient personality traits. Moreover, pain is always subjective and can also be modified by, for example, patient personality traits. Thus, it seems that patient personality traits may play a significant role in the course of the disease^{5,6}.

The concept of alexithymia, i.e. the lack of emotional awareness and inability to describe emotions, was first coined by Sifneos (1991)⁷ to describe a common trait of patients with psychosomatic conditions. It has been shown that alexithymia is associated with pain perception in patients with chronic myofascial pain and rheumatoid arthritis⁸. A broad spectrum of conditions where alexithymia predicts pain and functioning, suggests that this concept may reach beyond patients with psychosomatic conditions and encompass a population with a clear organic pathology.

Recently, several authors have underlined the need to relate personality constructs to neurobiological processes that may underlie individual personality differences. There is a positive relationship between the domain of identifying difficulties or describing emotions in alexithymia and anxiety symptoms, including difficulties in identifying feelings that increase the level of anxiety⁹. It has been suggested¹⁰ in the literature that, with respect to alexithymia, the Cloninger's psychobiological model of personality may be able to reliably predict psychopathological symptoms, and a significant majority of subjects with alexithymia were also severely burdened by anxiety.

The factors indicating a correlation between temperament, pain, and alexithymia warrant the need for their analysis. The study aims to establish a relationship between pain intensity in rheumatoid arthritis and temperament traits as well as symptoms of alexithymia.

Patients and Methods

Participants and Procedure

The study included data of N=317 adults: 257 women and 60 men, aged between 30 and 87 (M=53.53; SD=14.36). The respondents were rheumatoid arthritis patients, diagnosed based on the current criteria of the American-European Consensus Group of 2010¹¹. The following study inclusion criteria were applied: over 18 years old, disease duration of over 3 months, and expressed

informed written consent to participate. The following exclusion criteria were applied: history of acute infections, surgeries, or other acute complications within the past 3 months; concomitant heart, lung, kidney, or liver failure; diagnosed cancer; confirmed psychiatric diseases or mental disorders that would prevent patients from completing the questionnaires; pregnancy. All patients continued their treatments with disease modifying medications (both synthetic and biologic).

All patients expressed voluntary consent to participate, and the study protocol was approved by the Local Ethics Committee of the Bioethics Committee at Poznan University of Medical Sciences. The study was part of a research project entitled: *Psychological determinants of patient well-being in rheumatic diseases*.

There were no protocol deviations, and all questionnaires were completed in accordance with the above-mentioned instructions. The study was carried out in Poland at the W. Dega Teaching Hospital, Greater Poland Rheumatology Centre in Śrem, and at the 22nd Military Health Resort and Rehabilitation Hospital in Ciechocinek.

Every patient expressed verbal consent and signed a consent form, after which they completed a paper and pencil survey on the study inclusion criteria. The consent form for study participation included information about the general character of the study and its course. The duration of individual tests was approximately 25 min. The approval of the Ethics Committee was obtained on 7 December 2017, Resolution No.: 1228/17.

Instruments

This was a survey-based study. Participation was voluntary and anonymous. The subjects responded to a set of questionnaires that included the following instruments: Visual Analogue Scale and an alexithymia scale¹², which is a Polish version of the Toronto Alexithymia Scale-20 (TAS-20)¹³.

Temperament was tested with the use of the Buss and Plomin EAS Temperament Questionnaire. The adult version (EAS-D) was applied which tests 3 main temperament domains: sociability (e.g. "I like being with people"), activity (e.g. "I usually make an impression of being in a hurry"), and emotionality that includes dissatisfaction, fear, and anger (e.g. "I am easily frightened"). Subjects record their responses to the statements on a 5-point scale, where 1 represents "definitely not" and 5 represents "definitely yes"¹⁴.

The pain was measured on the Visual Analogue Scale (VAS). VAS is used to measure pain intensity¹⁵. A patient indicates pain intensity on a 10-cm horizontal line between values which stand for “no pain” and “the worst imaginable pain”.

The Toronto Alexithymia Scale-20 is applied to measure alexithymia. The scale consists of 20 statements and includes 3 subscales that measure difficulty in describing feelings/emotions (e.g. “It is difficult for me to find the right words to express my feelings”), difficulty in identifying feelings/emotions (e.g. “I am often troubled when I try to describe what feelings I experience”) and operational externally oriented thinking (e.g. “I prefer talking to people about everyday activities rather than about their feelings”). Subjects record their responses to the statements on a 5-point scale, where 1 represents “strongly disagree” and 5 represents “strongly agree”.

Statistical Analysis

Statistical analyses were carried out using the Statistical Package for Social Science version 25 (SPSS Inc., Armonk, NY, USA). Before analysing the relationship between the variables was preceded, a data completion procedure was performed using the EM model. Missing data were completed separately for each of the measured variables. The resultant χ^2 values showed that missing data occurred randomly and that none of the subjects missed more than 2% of the tested items.

The analysis of the collected data proceeded in three steps. To determine whether RA patients are at risk of alexithymia, the percentage of subjects who could be diagnosed with alexithymia was found. The results were compared with alexithymia prevalence data from the general population. Relationships between the tested variables were determined in the second step. Correlations between the variables were determined using the Pearson's r correlation coefficient (Table I). The

third step involved a simple mediation procedure. The hypothesis about the mediating role of pain in the relationship between temperament and alexithymia was tested using a mediation analysis as suggested by Preacher and Hayes¹⁶. The mediation analysis included a resampling procedure with five thousand repeats. A p -value of <0.05 was considered statistically significant.

To test for interactions between sociodemographic factors and the measured variables, subjects were compared according to gender and professional status. The association between age, illness duration, number of comorbidities, and measured variables was also tested. This procedure did not identify any differences between men and women in terms of pain perception, temperamental traits, and alexithymia (Table II). Professional status differentiated the subjects in terms of pain experience and the activity aspect of temperament. Retired individuals reported experiencing more severe pain compared to those who were working. Unemployed people had a lower intensity of activity (temperamental dimension) compared to those who were employed (Tables III and IV).

Older people experienced stronger pain, higher alexithymia, and higher intensity of the sociability aspect of temperament. In contrast, those with longer illness periods experienced lower intensities of the two temperament dimensions of activity and emotionality. People with more comorbidities experienced more acute alexithymia (Table V).

Results

To find out whether the RA patient population includes more cases of alexithymia than the general population, subjects were divided into three groups: patients that can be diagnosed with alex-

Table I. Descriptive statistics, Cronbach α reliability coefficients and Pearson's r correlation coefficients for the tested variables.

Range	M	SD	α	1	2	3	4
1. Pain	5.00-20.00	13.64	2.73	-			
2. Temperament – Sociability	7.00-20.00	13.25	3.15	.63	.01		
3. Temperament – Activity	12.00-57.00	34.67	8.47	.72	-.05	.23**	
4. Temperament – Emotionality	0.0-10.0	4.52	2.53	.83	.19**	-.22**	.18**
5. Alexithymia	22.00-82.00	56.38	12.01	.80	.20**	-.09	-.01.28**

* $p < 0.05$. ** $p < 0.01$.

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Table II. A comparison between men and women within the scope of the measured variables.

Variable	Gender		t test values			
	Women (n=257) M (SD)	Men (n=60) M (SD)	t	df	p	d
1. Pain	10.01 (4.24)	9.60 (3.91)	.685	315	.494	-
2. Temperament – Sociability	13.62 (2.61)	13.45 (3.17)	.445	315	.657	-
3. Temperament – Activity	13.26 (3.11)	12.84 (3.39)	.921	315	.358	-
4. Temperament – Emotionality	35.03 (8.40)	33.21 (8.31)	1.515	315	.131	-
5. Alexithymia	56.31 (12.11)	56.46 (10.70)	-.088	315	.930	-

Note: * $p < .05$. ** $p < .01$, *** $p < .001$.

Table III. Professional status vs. the measured variables.

	Analysis of cross-group effects	F test values		Effect intensity η^2
		F	p	
1. Pain	1<3	5.268	.006	0.35
2. Temperament – Sociability	-	2.717	.068	-
3. Temperament – Activity	1>2	6.026	.003	0.40
4. Temperament – Emotionality	-	1.051	.351	-
5. Alexithymia	-	1.878	.155	-

Source: Own work.

Table IV. Professional status vs. the measured variables.

	Employed (1) (n=153) M (SD)	Unemployed (2) (n=47) M (SD)	Retired (3) (n=117) M (SD)
1. Pain	9.12 (4.32)	10.45 (3.38)	10.77 (4.24)
2. Temperament – Sociability	13.38 (2.78)	13.25 (2.79)	14.01 (2.51)
3. Temperament – Activity	13.70 (3.00)	11.81 (3.07)	12.98 (3.31)
4. Temperament – Emotionality	35.37 (8.02)	34.47 (8.34)	33.82 (9.13)
5. Alexithymia	55.14 (12.42)	58.65 (10.29)	57.33 (11.59)

Source: Own work.

Table V. Relations between age, illness duration, and the measured variables.

	Age	Illness duration	Number of comorbidities
1. Pain	.24**	.001	.097
2. Temperament – Sociability	.21**	.08	.049
3. Temperament – Activity	-.04	-.18**	-.092
4. Temperament – Emotionality	-.06	-.21**	-.059
5. Alexithymia	.14*	-.07	.120*

* $p < 0.05$. ** $p < 0.01$.

ithymia, patients with probable alexithymia, and patients without alexithymia.

This was done in accordance with the recommendation of Bagby, Parker, and Taylor (1994)¹³, where the cut-offs were the following values from the TAS-20 Questionnaire: less than 52 points – no alexithymia, 52 to 60 points – possible alexithymia, more than 60 points – alexithymia. According to the results, alexithymia could be diagnosed in 138 subjects (38.4%), possible alexithymia was assigned to 111 subjects (30.9%) and no alexithymia was found in 110 subjects (30.6%). The prevalence of alexithymia in the RA population is higher than in the general population. It is estimated that alexithymia affects 10-13% of the population and occurs more frequently in men (12.8-17%) than in women (8.2-10%)¹⁷.

Pearson's *r* correlation coefficient to establish relationships between the variables included in the study (Table I). An analysis of its value revealed that alexithymia is positively correlated only with one dimension of temperament, i.e., emotionality ($r=0.28$; $p<0.01$), and with pain intensity ($r=0.20$; $p<0.01$). Moreover, high emotionality was positively correlated with pain ($r=0.19$; $p<0.01$).

A simple mediation analysis revealed that pain intensity functioned only as a mediator in the emotionality-alexithymia relationship. The observed correlations indicate that RA patients with a high level of emotionality exhibit high alexithymia as they perceive pain more intensely. The noted mediation is a partial mediation, meaning that there are also other mediating factors in this relationship (Figure 1).

Discussion

The results of the presented study reproduce and broaden the available reports on the relation-

ship between alexithymia and significant pain-related variables that have not been studied so far in the context of alexithymia and temperament traits. The results have implications for the understanding of the alexithymia construct in various disease entities and for the understanding of the relationship between alexithymia and the functioning of people suffering from rheumatoid arthritis.

Alexithymia is a term that has only recently appeared in clinical practice. It is defined as a difficulty in understanding, identifying, distinguishing, and expressing emotions¹⁸. According to Taylor (1994)¹⁹, alexithymia is not a disease, but rather a personality-related condition. Pennebaker (1997)²⁰ claims that alexithymic features are associated with autoreflexion and emotional inhibition. Because of the deficits in the area of emotional processing in cognitive processes, an individual focuses on physical elements of emotional stimulation. This condition is consistent with somatic symptoms observed frequently in such patients. Paez (1999)²¹ suggested that alexithymia, being a personal tendency and a coping style, has four components, including deficits in thinking about and communicating emotions, dissociation between emotional and physical reactions, and the conflict between a tendency to disclose secrets and suppressing this tendency.

Early definitions of this concept focussed on its potential role in somatization disorder and a hypothesis was put forward that individuals unable to identify or express their feelings directly probably do so in an indirect manner. In fact, research indicates weaker connections between alexithymia measures and sensory pain components than between alexithymia and psychological functioning and affective pain components.

In this context, the idea that alexithymic aspects are associated with the perception of bodily signals

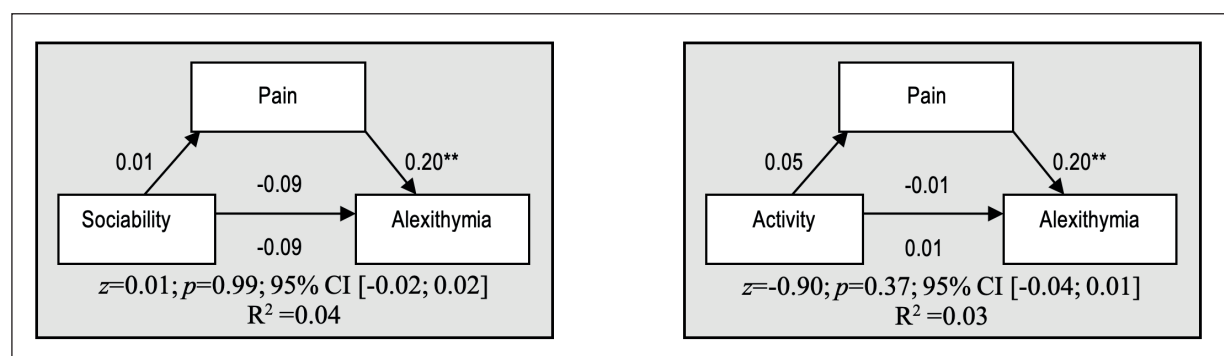


Figure 1. The mediating contribution of pain to the relationship between temperament and alexithymia.

is highly significant. When coping with emotionally modulated pain stimuli at the tolerance level, we use internal signals referring to changes in the body. Bodily signals and their perception (interoception) play an important role in several emotion theories²². In accordance with the Damasio's somatic marker hypothesis²³, they are essential for the consolidation of somatic markers that are needed to direct individual behaviour by signaling the relevance of the stimulus for the body.

Secondary alexithymia is understood as a consequence of events of psychological significance (e.g., extreme psychological trauma¹⁷) or medical-surgical events (e.g., infertility⁷, haemodialysis¹, or dependence⁶). In this perspective, alexithymia has been seen as a defence mechanism used to cope with the stress of medical illness¹⁹, for example, a chronic disease, such as haemophilia.

The results of the study build on the available knowledge by revealing that aspects of alexithymia show various correlations with pain perception and specific traits of temperament. The conducted study unambiguously confirms one of the set hypotheses, namely that the higher the level of alexithymia, the higher the level of perceived pain in the subjects. It also equivocally confirms that the higher the emotionality level in the subjects, the higher the level of alexithymia, which tells us about the contribution of temperament to the process of alexithymia analysis.

Buss and Plomin¹⁴ state that two definitional and inseparable criteria must be met to classify features of behaviour as temperamental. They have to be present since early childhood (for the first 2 years after birth) and there has to be a significant contribution of the genetic factor to individual differences in behavioural features²⁴. Taking into account these criteria and considerations as well as research evidence, Buss and Plomin¹⁴ distinguished three basic traits of temperament: emotionality, activity, and sociability, with EAS being the acronym frequently used to refer to their temperament theory.

The authors clearly defined emotionality as a tendency to be stimulated easily and intensely. This tendency is expressed in the primary emotion, referred to as distress. Emotionality is distress, the tendency to become nervous easily and intensely¹⁴. This distress can be observed from the first days of life in the form of crying. Fear is reflected by attempts to escape from stimuli that threaten the individual, whereas anger is reflected by attacking and complaining as a reaction to irritating or frustrating impressions from the en-

vironment¹⁴. When analysing EAS theories in the context of research results, it can be confirmed that a high level of emotionality as a trait revealing negative experiences is directly associated with a high intensity of alexithymic symptoms.

Another conclusion of the performed analyses is that this research area should be further explored. We suspect that if the study had been performed using a larger sample, more significant differences and correlations between the tested variables could have been disclosed. The subject matter addressed in this article remains an area of considerable scientific interest.

However, the analysis does have certain limitations. The results were mainly based on self-assessment. Alexithymic patients are probably unable to express themselves completely due to difficulties in cognitive emotional processing. The conclusions should not, therefore, be treated as ultimate, and further studies should be conducted with more subjects (not only adults) with rheumatoid arthritis, but also with other organic diseases with a psychosomatic component. Future analyses within this field will facilitate a thorough description of the problem and will help define even more effective algorithms for the evaluation of pain, temperament, and alexithymia.

Conclusions

A significant relationship was found between alexithymia and emotionality, which is a dimension of the subjects' temperament. This means that the higher the emotionality level in a subject, the higher the level of alexithymia.

It was noted that alexithymia is positively correlated with pain intensity. It means that the higher the level of alexithymia, the higher the level of perceived pain in a subject. Other factors are mediators in this correlation; hence, the character of the mediation is partial.

Conflict of Interests

The authors declare that they have no conflict of interest.

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