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Personality as significant predictor of post-stroke anxiety

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Abstract

OBJECTIVES: Anxiety in stroke patients is very frequent. It negatively influences the whole recovery process. The study objective is to study personality traits, age, gender, and type of stroke as predictors of anxiety in stroke patients.
METHODS: Research presents a prospective cross-sectional descriptive study. The sample consisted of 74 hospitalized stroke patients. The data collection methods were the HADS for anxiety measurement and the Mini IPIP for evaluation of five personality factors. Hierarchical multiple regression analysis was used to study the relationship between anxiety and personality variables, gender, age, and type of stroke.
RESULTS: We found three statistically significant predictors of anxiety in stroke patients. Neuroticism and low Agreeableness explain 50% of the variability of anxiety. Another statistically significant predictor was age; higher-level anxiety relates to lower age. Other personality traits (Extraversion, Openness to experience, and Conscientiousness), gender, and type of stroke do not appear as significant predictors of post-stroke anxiety.
CONCLUSION: Anxiety in stroke patients is predicted mostly by the personality traits and young age of patients. Knowing these predictors can result in early detection and management of emotional consequences of disease, and thus influence the whole recovery process.

INTRODUCTION

Anxiety is described as a commonly occurring manifestation after stroke and its presence is related to higher morbidity and mortality (Broomfield *et al.* 2015). It is one of the most frequent mood disorders in stroke patients (Al-Busaidi & Alamri 2016).

In the systematic review based on analysis of 44 studies, Campbell Burton *et al.* (2013) state the prevalence of anxiety in more than ¼ of stroke patients. Despite its high frequency in the studied population in comparison with other neuropsychological manifestations, anxiety has been studied significantly less than e.g. depression (Singleton *et al.* 2000). Generally, there is a lack of studies on

anxiety in stroke patients in comparison with the studies on physical complications in the studied population (Al-Busaidi & Alamri 2016).

Anxiety assessment within the first two weeks after stroke can significantly contribute to detection of patients at risk of clinical anxiety also later after stroke (Morrison *et al.* 2005), which significantly influences the whole recovery process and treatment (Sagen *et al.* 2010). Therefore, there is need for better understanding of predictors of anxiety, and its early detection and management (Campbell Burton *et al.* 2013; Broomfiel *et al.* 2014).

So far, age and gender related to prevalence of anxiety in stroke patients have been studied insufficiently. Based on the analysed studies in the systematic review by Campbell Burton *et al.* (2013), the results about the relationship between anxiety and age and gender are indifferent, while the relationship with age or gender cannot be unambiguously proved. But more often, it has been verified that age and gender do not relate to anxiety. The findings in other studies suggest that age and gender are the factors which relate to anxiety, while higher level of anxiety is present in the group of younger stroke patients (Barker-Collo 2007; Broomfield *et al.* 2014; Broomfield *et al.* 2015); with severe anxiety more likely to occur in women than in men (Al-Busaidi & Alamri 2016; Broomfield *et al.* 2014; Broomfield *et al.* 2015). Female gender has been even stated as one of the predictable factors of the risk of anxiety in stroke patients three years after stroke (Morrison *et al.* 2005).

In the studies on the effects of clinical factors on prevalence of anxiety in stroke patients, it is stated that anxiety symptoms are present after stroke, including TIA (transient ischemic attack), despite the differences in severity of damage (Broomfield *et al.* 2014). These findings suggest that the risk of anxiety after stroke can relate more to processing of a situation that is perceived as threatening at that moment. This knowledge suggests a new area of investigation on the relationship between personality traits and level of anxiety in stroke patients. Personality traits are general dispositions to respond to situations consistently. According to the author (McDowell 2006), anxiety as status is a response to a specific threatening situation, and people with high levels of trait anxiety (Neuroticism) are usually more prone to experience state anxiety. Besides Neuroticism (emotional lability), our interest is to study influence of other personality traits on anxiety in stroke patients, since research on the issue is still scarce. Known are only the findings that the personality traits Neuroticism and Extraversion were more frequent in the group of stroke patients without aphasia than in stroke patients with aphasia (Shehata *et al.* 2015).

Objectives

The study objective is to study two blocks of predictors of anxiety in stroke patients. The first block includes personality traits (the selected theory is the Five-Factor model) that can be behind state anxiety in stroke patients.

The second block consists of three factors (age, gender, and type of stroke) as other predictors of post-stroke anxiety. The reason for selection of the stated demographic and clinical factors was the current status of investigation, while the authors' findings are not unambiguous (age, gender) or are absent (type of stroke).

MATERIAL & METHODS

Research presents a prospective cross-sectional descriptive study. The target group was the patients hospitalized in the neurological clinic with the medical diagnoses Nontraumatic Intracerebral Haemorrhage (Code I61 in ICD-10) or Cerebral Infarction (Code I63 in ICD-10) diagnosed based on CT or MR examinations. The inclusion criteria were: the first stroke, lucid consciousness, being oriented, and a respondent's informed consent with research. The patients with aphasia were not included in the sample.

The sample consisted of 74 respondents, including 59.5% of men and 40.5% of women. Cerebral infarction was diagnosed in 86.5% of the patients, intracerebral haemorrhage in 13.5% of the patients. The respondents' age ranged from 37 to 89 years (M_{age}=66.64; SD_{age}=11.97).

The data collection was conducted from May 2015 to February 2016. The measurements were carried out by a nurse trained by a psychologist for administration of both used scales 72 hours after stroke. The research was approved by the Hospital Ethics Committee.

The data collection methods were the HADS for anxiety measurement and the Mini IPIP for evaluation of five personality factors.

The HADS (the Hospital Anxiety and Depression Scale) is the gold standard to detect anxiety and depression in patients. It was published by Zigmond and Snaith in 1983 (Zigmond & Snaith 1983). It is a 14-item self-assessment scale which measures mental status in the past week. Seven of the items relate to anxiety and seven relate to depression. In the study, we used the shortened version of the scale, the version HADS-A for measurement of anxiety only. Each item is scored on the four-point scale. The sum of the scored items states the total score. The scores 0–7 refer to status without anxiety, 8–10 mean borderline anxiety, and 11–21 refer to severe anxiety (McDowell 2006). It is an instrument validated in the groups of stroke patients, and also the most commonly used instrument to detect anxiety in the studied population of patients (Broomfield *et al.* 2014). The raw score of all seven items was used to determine prediction. Reliability of the sum score was good (α=0.88).

The Mini IPIP (the International Personality Item Pool) is a self-assessment questionnaire to determine five personality traits (factors), based on the Big-Five model (the Big Five personality theory). The questionnaire is used to measure Extraversion, Neuroticism,

Openness to experience, Agreeableness, and Conscientiousness. It contains 20 items, i.e. four items for each factor. The items are scored on the Likert-type scale from 1 to 5 where 1 is very inaccurate and 5 is very accurate (Hullová & Duriš 2016). Reliability for all five factors ranged (α=0.73–0.90).

The software SPSS 22.0 was used for statistical data analysis. Arithmetic mean, standard deviation, count, and percentage were used as descriptive characteristics. Hierarchical multiple regression analysis was used to study the relationship between anxiety (DV) and personality variables, gender, age, and type of stroke (IVs). The hierarchical method studies the relationships between the blocks of independent variables and a dependent variable (Tabachnick & Fidell 2007). It was used because the main objective was to study two blocks of predictors of anxiety in patients after stroke. Two models were compared by statistical significance difference change in tested models.

RESULTS

In our sample, 6.7% of the stroke patients were classified as definite abnormal for anxiety symptoms (HADS-A: ≥11), and 9.3% were classified as possible abnormal (HADS-A: 8–10); i.e. anxiety was found in 16% of the stroke patients. The HADS-A was used as a dependent variable in the main analysis. The raw score was used in regression analyses.

Model 1: The personality traits (Neuroticism, Extraversion, Openness to experience, Agreeableness, and Conscientiousness) were included in analysis in the first block. The model is statistically significant (F=15.42; p<0.001, Adj R²=0.497); the variables explain almost 50% of the variability of anxiety in the stroke patients (Table 1).

Neuroticism and Agreeableness (β=0.396, p=0.001; resp. β=−0.384, p=0.004; Table 2, Model 1) are statistically significant predictors of anxiety; anxiety levels are higher in higher Neuroticism and lower Agreeableness. Although also personality variable Extraversion is close to statistical significance (p=0.07), the strength of the relationship is weak (β=−0.16). Based on our results, we consider Neuroticism and Agreeableness significant predictors.

In the second model, we added three factors (gender, age, and type of damage) to the personality traits of the Five-Factor model that can appear as significant predictors, in accordance with current knowledge. The second block of variables improves the prediction ability of the model (by approx. 5%; F=12.36; p<0.001, Adj R²=0.554) statistically significantly ($p_{(F\_Change)}$=0.012).

Tab. 1. Overall evaluation of the model predicting post-stroke anxiety from personality and other predictors.

	R	Adj R²	F	*p*-value
Model 1 (Personality)	0.729	0.497	15.415	<0.001
Model 2 (Personality, Gender, Age, Type)	0.777	0.554	12.357	<0.001

DV: HADS-A, IVs: Personality (Neuroticism, Extraversion, Openness to experience, Agreeableness, Conscientiousness)

Tab. 2. Regression coefficients of post-stroke anxiety predictors in two models.

		B	SE(B)	β	t	*p*-value
Model 1	**Neuroticism**	**0.421**	**0.123**	**0.396**	**3.425**	**0.001**
	Extraversion	*−0.149*	*0.081*	*−0.161*	*−1.841*	*0.07*
	Openness to experience	0.002	0.095	0.002	0.02	0.984
	Agreeableness	**−0.403**	**0.135**	**−0.384**	**−2.992**	**0.004**
	Conscientiousness	0.035	0.117	0.039	0.299	0.766
Model 2	**Neuroticism**	**0.28**	**0.126**	**0.264**	**2.217**	**0.03**
	Extraversion	*−0.154*	*0.083*	*−0.166*	*−1.86*	*0.067*
	Openness to experience	−0.102	0.096	−0.093	−1.056	0.295
	Agreeableness	**−0.337**	**0.13**	**−0.321**	**−2.602**	**0.011**
	Conscientiousness	−0.192	0.13	−0.213	−1.477	0.145
	Gender	0.8	0.621	0.124	1.287	0.203
	Age	**−0.077**	**0.026**	**−0.288**	**−2.94**	**0.005**
	Type of diagnosis	1.189	0.756	0.128	1.574	0.12

B – non-standardised regression coefficient, SE(B) – standard error of non-standardised regression coefficient, β – standardised regression coefficient

Besides the personality traits Neuroticism and Agreeableness as in the first model (β=0.264, *p*=0.03; resp. β=−0.321, *p*=0.011; Table 2, Model 2), age is also a statistically significant predictor (β=−0.288, *p*=0.005) – higher-level anxiety was in the younger stroke patients.

DISCUSSION

Prevalence of anxiety in stroke patients is higher than prevalence of other mood disorders. In the systematic review, Campbell Burton *et al.* (2013) describe the prevalence of anxiety in over ¼ of stroke patients. Prevalence of depression is described in over 1/3 of stroke patients (Hackett *et al.* 2005). The findings by Broomfield *et al.* (2015) state severe anxiety in 15% of stroke patients and possible anxiety in 14%. Our findings in the sample show severe anxiety in 6.7% of the stroke patients, and possible anxiety in 9.3% of the stroke patients; i.e. 16% of the respondents suffered from anxiety. The findings by Al-Busaidi & Alamri (2016) are similar; they state possible or severe anxiety in 18.4% of stroke patients.

Mostly, anxiety is usually found already in the first days after stroke, still during patients' hospitalization (Campbell Burton *et al.* 2013). Anxiety, unlike depression, diagnosed during hospitalization predetermines its occurrence over time (Al-Busaidi & Alamri 2016). Three years following stroke, the level of anxiety remains stable, and is the most easily predicted by female gender and anxiety at the beginning of an illness (Morrison *et al.* 2005). Sagen *et al.* (2010) emphasize the need of anxiety assessment in the first two weeks after stroke, which can significantly contribute to detection of patients at risk of clinical anxiety, depression, and apathy.

Quality of life in stroke patients is predictable not only by the level of independence, or neurological status but also by the level of anxiety, and depression (Peixoto *et al.* 2017). The predictive value of emotional variables (anxiety and depression) in quality of life in stroke patients urges the need to provide a complex model of psychological care for stroke patients focused on detection of individual difficulties and development of alternatives or compensation expectations (Peixoto *et al.* 2017). In stroke patients, cognition and mood relate to anxiety more than physical independence; therefore, complex care including also care for psychological domains is necessary (Campbell Burton *et al.* 2013).

Because of the negative influence of mood disorders on the whole recovery process and quality of life after stroke (Donnellan *et al.* 2006), from the perspective of the whole society, early detection and early management of emotional consequences are necessary (Al-Busaidi & Alamri 2016; Broomfield *et al.* 2014). Better understanding of risk factors of development of mood disorders in stroke patients has become a challenge.

In literature, there are several risk factors that are clarified from the viewpoint of possible prediction of anxiety, such as social deprivation (Broomfield *et al.* 2015), socioeconomic deprivation, comorbidity, and a type of stroke (Broomfield *et al.* 2014), lacunar stroke and other types of stroke (Arba *et al.* 2016), aphasia (Shehata *et al.* 2015), or even localization by hemispheres (Barker-Collo 2007). Female gender and younger age are the risk factors the most commonly associated with anxiety, but not unambiguously confirmed, in stroke patients in accordance with analyses of 44 studies in the systematic review (Campbell Burton *et al.* 2013).

In our study, we studied personality as an explaining predictor of anxiety in stroke patients, which has been studied rarely so far. The background included the findings by Broomfield *et al.* (2014) that anxiety manifestations were present in patients with TIA as well as with stroke with worse neurological status. The question was if it is a stable pattern of behaviour in the threatening situation from the patients' viewpoint. Personality traits are general dispositions to respond to situations consistently. We studied the personality traits Neuroticism, Extraversion, Openness to experience, Agreeableness, and Conscientiousness, based on the Five-Factor model (Ruisel 2008). We found that the personality traits explain almost 50% of the variability of anxiety in stroke patients. Neuroticism and Agreeableness were found as the strongest predictors of anxiety. In the context of coping with a difficult situation, Neuroticism predicts ineffective coping, since it relates to person's instability in problem solving. Low Agreeableness also relates to ineffective coping since people actively do not seek support in other people, which means they are not active in problem solving (Ruisel 2008). According to our findings, Extraversion is almost statistically significant predictor of anxiety, but the strength of the relationship is weak; thus, we cannot support the findings by Shehata *et al.* (2015) who found both personality traits Neuroticism and Extraversion associated with anxiety in stroke patients.

In the studied context, the question remains to study premorbid personality traits in the context of development of stroke, since personality traits are stable behaviour patterns, i.e. they can contribute to an onset of disease. For example, in neurotic people, there is a decreased possibility of adaptation to life's demands, and thus this characteristic may lead to an increased susceptibility to diseases. On the contrary, people with an opposite type of personality will be more resistant to such changes, and will have personality traits such as optimism, a sense of coherence, or invincibility (Ruisel 2008). Agreeableness is a personality trait with interpersonal tendencies, and people are mentally healthier; on the contrary, low Agreeableness means the opposite.

We found that, besides the personality traits Neuroticism and Agreeableness, age is also a significant predictor of anxiety in stroke patients; higher-level anxiety was found in the younger patients. Younger patients are four times likely to have severe anxiety more often than older patients (Broomfield *et al.* 2015).

Our findings suggest that female gender is not a predictor of anxiety in stroke patients; thus, we do not support the findings on prediction of female gender in prevalence of anxiety in the studied population (Broomfield *et al.* 2014), or the findings that female gender is the only significant predictor of anxiety in stroke patients (Al-Busaidi & Alamri 2016).

Another studied risk factor was a type of stroke (focal cerebral ischemia, and intracerebral haemorrhage) which was not found as a significant predictor of anxiety in stroke patients.

CONCLUSION

Anxiety was found in 16% of the stroke patients. Its higher level was related to the personality traits Neuroticism and low Agreeableness, and was higher in younger patients. Personality traits seem to be stronger predictors of anxiety than other factors. These predictors should be studied further in larger samples as well as related to other demographic and clinical factors.

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