




ORIGINAL PAPER

THE CZECH VERSION OF THE SURGICAL FEAR QUESTIONNAIRE: MEASURING VALIDITY AND RELIABILITY

Renáta Zeleníková¹, Kristýna Kovářová², Petr Bujok³, Maurice Theunissen^{4,5}¹Department of Nursing and Midwifery, Faculty of Medicine, University of Ostrava, Czech Republic²Department of Nursing and Midwifery, Faculty of Medicine, University of Ostrava, Czech Republic (student)³Department of Informatics and Computers, Faculty of Science, University of Ostrava, Czech Republic⁴Department of Clinical Psychological Science, Maastricht University, the Netherlands⁵Department of Anesthesiology, Maastricht University Medical Center+, Maastricht, the Netherlands

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Abstract

Aim: The aim of the study was to examine the psychometric properties of the Czech version of the Surgical Fear Questionnaire. **Design:** A cross-sectional study design. STROBE guidelines for reporting observational studies were followed for the study. **Methods:** The study sample consisted of 332 adult patients from the Czech Republic. The Surgical Fear Questionnaire (SFQ) was used to measure preoperative fear. Cronbach's alpha was calculated to test reliability. The construct validity of the SFQ was tested using exploratory factor analysis. **Results:** Reliability of the instrument as a whole was confirmed by the high value of the Cronbach alpha coefficient (0.813). Two factors were identified for the Czech version of the SFQ in factor analysis. **Conclusion:** The Czech version of the Surgical Fear Questionnaire showed good validity and reliability and can be used in research and clinical practice. Further analysis of psychometric properties is needed to confirm these results.

Keywords: preoperative fear, reliability, surgery, Surgical Fear Questionnaire, validity.

Introduction

One of the most frequently recognized psychological reactions to stress before surgery is anxiety. It may occur in up to 80% of patients awaiting surgery (Zemla et al., 2019). Preoperative anxiety begins as soon as the procedure is planned and peaks on the day of surgery when the patient enters the hospital (Wilson et al., 2016). A maladaptive response to surgical stress negatively influences perioperative outcomes (Villa et al., 2020). In addition to emotional effects on patients, anxiety can result in longer hospital stay, and is associated with increased prevalence of acute and chronic postoperative pain (Theunissen et al., 2012). The factors that may influence preoperative anxiety, such as gender, pre-existing medical conditions, age, type of surgery, and previous experience of surgery, vary across studies performed in different countries (Matthias & Samarasekera, 2012).

Preoperative anxiety – a common unpleasant state of tension in patients awaiting surgery, is a topic that

requires further attention due to low implementation of assessment tools for measuring preoperative anxiety in clinical practice.

Based on research results, a recent update on the Guidelines of the European Society of Anaesthesiology recommends implementation of functional measurements, such as level of anxiety, into preoperative evaluations (De Hert et al., 2018). Assessments of patient anxiety were not included in previous guidelines.

According to Boker et al. (2002), anxiety assessment is feasible in the preoperative period. There are several tools for assessing fear before surgery available in current scientific literature. Besides generic tools to measure fear or anxiety, there are also tools designed specifically to measure fear and anxiety before surgery. The oldest of these, The Amsterdam Preoperative Anxiety and Information Scale (APAIS), was first published in 1996 (Moerman, 1996; Moerman et al., 1996). The APAIS contains six items, and measures anxiety before surgery, distinguishing between “anxiety about surgery”, “anxiety about anesthesia”, and “need of information”. All items are rated on a scale from 1 (not at all) to 5 (extremely). The APAIS has been translated into various languages – Chinese

Corresponding author: Renáta Zeleníková, Department of Nursing and Midwifery, Faculty of Medicine, University of Ostrava, Syllabova 19, Ostrava, Czech Republic; email: renata.zelenikova@osu.cz

(Wu et al., 2020), Czech (Zeleníková et al., 2017), French (Maurice-Szamburski et al., 2013), German (Berth et al., 2007), Italian (Buonanno et al., 2017), Japanese (Nishimori et al., 2002), Malay (Mohd Fahmi et al., 2015), Spanish (Vergara-Romero et al., 2017), Turkish (Çetinkaya et al., 2019) and others.

The Surgical Fear Questionnaire (SFQ) was published in 2014 (Theunissen et al., 2014). The SFQ contains eight items, and measures preoperative fear, distinguishing between “fear of short term consequences of surgery” and “fear of long term consequences of surgery”. All items are rated on a scale from 0 (not at all afraid) to 10 (very afraid) (Theunissen et al., 2014). The SFQ has been previously used in a number of countries in various languages – Dutch (Theunissen et al., 2014), Turkish (Bağdigen & Karaman, 2018), and Czech (Kovářová & Zeleníková, 2020). It has been validated in the Netherlands (Theunissen et al., 2014), and in Turkey (Bağdigen & Karaman, 2018).

The surgical anxiety questionnaire (SAQ), published in 2019, is the newest instrument (Burton et al., 2019). The SAQ contains 17 items divided into three subscales: concern about health (six items), concern about recovery (four items), and concerns about procedure (four items). An additional three items are also included in the total score (Burton et al., 2019). All items are rated on a scale from 0 (not at all) to 4 (extremely).

All three questionnaires (the APAIS, the SFQ, and the SAQ) are self-reporting. The APAIS and SFQ are very simple, short (fewer than ten items), and easy to use, even in clinical practice.

Preoperative anxiety should be evaluated routinely (Aust et al., 2018); therefore, a valid and reliable instrument is required.

In the Czech Republic, The APAIS, State-Trait Anxiety Inventory (STAI), Visual Analogue Scale (VAS), and SFQ measurement tools have been used to assess anxiety before surgery in research studies (Homzová & Zeleníková, 2015; Kovářová & Zeleníková, 2020; Zeleníková et al., 2017), but only the APAIS has been tested for psychometric properties (Zeleníková et al., 2017). The Czech version of the SFQ has not previously been tested for reliability and validity.

Aim

The aim of the study was to examine the psychometric properties of the Czech version of the Surgical Fear Questionnaire.

Methods

Design

A cross-sectional design.

STrengthening the Reporting of OBservational studies in Epidemiology (STROBE) guidelines for reporting observational studies were followed for the study.

Sample

As a rule of thumb, at least ten respondents per item should be chosen to set the sample size. From the total of 350 patients invited, 332 agreed to participate in the study. The study sample consisted of 332 adult patients from the Czech Republic. Patients were chosen from the surgical, orthopedic, and traumatology departments of a large Czech hospital with more than 500 beds. Participants were selected based on the following inclusion criteria: patients admitted to elective surgery at the surgical, orthopedic, or traumatology departments, age more than 18 years, Czech speaking patients, agreement to participation in the research study. Exclusion criterion: patients diagnosed with dementia.

Patients completed the Czech version of the SFQ in hospital one day before surgery. For statistical purposes, types of surgery were divided into two groups: minor and major surgery. Minor surgeries included thyroid gland, gastric, gall bladder, appendix, hernia, and variceal surgery, osteosynthesis removal, and arthroscopy. Major surgeries included liver, pancreas, and bowel surgery, limb fractures, and total joint replacement.

Data collection

Data were collected from September 2016 to December 2016, using paper questionnaires. To measure preoperative fear, three questionnaires were used: the SFQ, APAIS, and VAS.

The Czech version of the SFQ

The SFQ is a concise instrument for the assessment of surgical fear, suitable for most types of elective adult surgery (Theunissen et al., 2014; Theunissen et al., 2018). Permission to translate and use the SFQ scale was obtained from the author of the original version (Theunissen et al., 2014).

The SFQ was translated from English into Czech. The forward-backward translation process comprised several steps: separate forward translations by two independent professionals, a synthesis of the two forward translations into a single version; back translation into English by a professional translator; and comparison of the back translation with the original version.

The items 1–4 refer to the subscale “fear of short term consequences of surgery”; and the items 5–8 refer to the subscale “fear of long term consequences of surgery”. Participants rated all items on a scale from 0 (not at all afraid) to 10 (very afraid). Higher scores indicated higher levels of preoperative fear.

In addition, other two questionnaires were used: the Czech version of the APAIS (Zeleníková et al., 2017) and the VAS (Kindler et al., 2000).

The APAIS consists of six items on two scales: “APAIS-Anxiety” (four items) and “APAIS-Need-for-Information” (two items). “APAIS-Anxiety” has two subscales: “Anxiety about Anaesthesia” (two items) and “Anxiety about Surgery” (two items). Reliability of the whole scale of the Czech version of the APAIS measured by Cronbach’s alpha was 0.88 (Zeleníková et al., 2017). Participants rated items on a scale from 1 (not at all) to 5 (extremely). The higher the score, the higher the level of anxiety.

The Visual Analogue Scale for Anxiety (VAS-A) was used as a single item scale to assess anxiety before surgery (Kindler et al., 2000). In this study, a scale from 0 (not at all afraid) to 10 (very afraid) was used.

Data analysis

Descriptive statistics (mean, median, standard deviation, absolute and relative frequencies) were used to compute demographic data.

Convergent validity was tested by comparing the scores on the SFQ with the scores of other validated questionnaires. Convergent validity was assessed using the Spearman correlation coefficient. The construct validity of the SFQ was tested using exploratory factor analysis (EFA).

The Kaiser-Meyer-Olkin Measure of Sampling Adequacy and the Bartlett Test of Sphericity were conducted, followed by factor analysis. A Chi-squared test was performed as a goodness of fit-test to check appropriateness of the factor analysis for the data from the study sample. Cronbach’s alpha was calculated to test reliability. The known-group validity as a type of construct validity was measured using a two-samples Wilcoxon rank sum test.

Statistical analysis was conducted using the Statistical Package for Social Sciences (version 13.0) and JASP 0.10.2.0.

Results

Sample characteristics

The sample consisted of 171 female (51.5%) and 161 male (48.5%) patients, of whom 50.3% were in the

age group 19–64 years, and 49.7% participants were 65 years or older. Positive experience of surgery was reported by 223 participants (67.2%), whereas negative experience was reported by 32 participants (9.6%), and 77 patients had had no experience of surgery (23.2%). Minor surgeries were planned in 152 cases (45.8%), while major surgeries were planned in 180 cases (54.2%).

SFQ scores

The mean (SD) total preoperative anxiety score measured by the SFQ was 35.7 (SD 21.3), with the highest rated item being “I am afraid of the operation” 6.8 (SD 3.2) and the lowest rated item being “I am afraid the operation will fail” 2.4 (SD = 2.2). Higher scores indicated higher levels of preoperative fear. A detailed analysis of the prevalence of preoperative fear has recently been published in Czech (Kovářová & Zeleníková, 2020).

Construct validity

Bartlett’s Test of Sphericity indicated that it was appropriate to conduct factor analysis ($\chi^2 = 1291.0$; $df = 28$; $p < 0.001$). Small values (less than 0.05) for significance level indicate that a factor analysis of the data may be useful. Similarly, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (MSA) was higher than 0.50 (MSA = 0.72), which supports the relevance of the achieved EFA results. High values, close to 1.0, generally indicate that a factor analysis of the data may be useful. In addition, the Chi-square test indicated that it was appropriate to conduct factor analysis ($\chi^2 = 146.2$; $df = 13$; $p < 0.001$).

Data were subjected to principal component analysis with Varimax and Kaiser normalization to determine the factor structure of the questionnaire. Kaiser strategy was used (dropping all components with eigenvalues under 1.0). The EFA identified two factors with all eigenvalues more than 1.0 (2.3091; 2.2070), explaining a total of 85.2% of variance (Figure 1). Values of total variance explained above 60% are considered appropriate, indicating that the factorial model is adequate (Hair et al., 2019). The first factor explained 28.8% of variance. The second factor explained 56.4% of variance. All item loadings were over 0.4 in their respective factor. The first factor contained four items (3, 5, 6, 7). The second factor (1, 2, 4, 8) also contained four items (see Table 1).

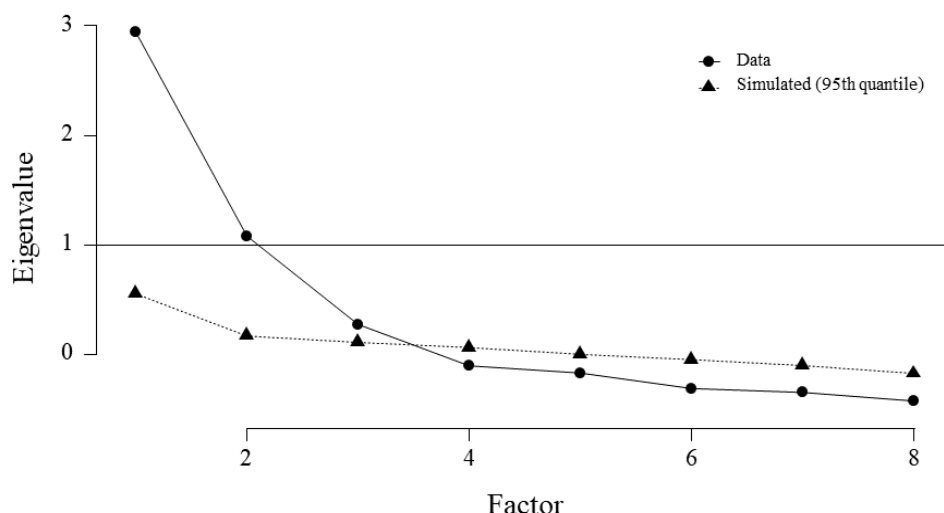


Figure 1 Scree plot

Table 1 Factor analysis

Item of SFQ	Factor 1	Factor 2	Uniqueness
I am afraid of the operation		0.7995	0.2588
I am afraid of the anaesthesia		0.9125	0.1655
I am afraid of pain after the operation	0.4054		0.8128
I am afraid of the unpleasant side effects (like nausea) after the operation		0.4880	0.7482
I am afraid my health will deteriorate because of the operation	0.8385		0.2931
I am afraid the operation will fail	0.7573		0.4046
I am afraid that I won't recover completely from the operation	0.8522		0.2024
I am afraid of the long duration of the rehabilitation after the operation		0.6140	0.5985

Convergent validity

Significant intercorrelations with other validated instruments for the measurement of preoperative fear such as the APAIS and VAS-A indicated good convergent validity of the SFQ. The strongest correlation was found between the SFQ and the VAS-A (0.80). The Czech version of the SFQ correlated highly with instruments measuring similar variables of preoperative fear (Table 2).

Known-group comparison validity

Based on results from previous research papers, we hypothesized that a higher level of preoperative fear

would be found in females, patients with major surgery, and older patients.

Female patients had a statistically significant higher level of preoperative fear measured across all scales. Patients undergoing major surgery also had a statistically significant higher level of preoperative fear measured across all scales (Table 3). Patients 65 years old and more had a statistically significant higher level of preoperative fear measured by the SFQ, VAS-A and APAIS2 (anxiety about surgery subscale).

Table 2 Correlations between scales measuring preoperative fear

Scales	VAS – anxiety	APAIS	APAIS1	APAIS2
VAS – anxiety	1			
APAIS	0.82*	1		
APAIS1	0.59*	0.84*	1	
APAIS2	0.92*	0.88*	0.59*	1
SFQ	0.81*	0.78*	0.63*	0.80*

* $p < 0.05$; APAIS – The Amsterdam Preoperative Anxiety and Information Scale; APAIS1 – anxiety about anesthesia subscale; APAIS2 – anxiety about surgery subscale; SFQ – Surgical Fear Questionnaire – total score; VAS – Visual Analogue Scale

Reliability

The Cronbach alpha coefficient was calculated for each newly developed component, as well as for the instrument as a whole. Reliability of the instrument

as a whole was confirmed by the high value of the Cronbach alpha coefficient ($\alpha = 0.813$). Cronbach's alpha for the SFQ-1 (1, 2, 4, 8) was 0.8028, and for the SFQ-2 (3, 5, 6, 7) 0.8156.

Table 3 Assessment of preoperative fear according to gender, type of surgery, and age (Wilcoxon rank sum tests)

	Scale	Variable	n	median	mean	SD	min.	max.	p-value
Gender	VAS-A	female	171	9	7.4	2.9	0	10	0.0018
		male	161	6	6.2	3.6	0	10	
	APAIS	female	171	21	19.8	5.5	7	30	0.0066
		male	161	18	18.1	5.8	6	30	
	APAIS1	female	171	6	5.9	2.1	2	10	0.0463
		male	161	5	5.4	2.1	2	10	
	APAIS2	female	171	8	7.6	2.6	2	10	0.0026
		male	161	7	6.7	2.8	2	10	
Type of surgery	SFQ	female	171	36	34	19.2	1	67	< 0.001
		male	161	28	28	15.9	0	77	
	VAS-A	minor surgery	152	5	5.0	3.1	0	10	< 0.001
		major surgery	180	10	8.3	2.7	0	10	
	APAIS	minor surgery	152	16	16.2	5.4	6	30	< 0.001
		major surgery	180	22	21.3	4.9	8	30	
	APAIS1	minor surgery	152	4	4.8	2.2	2	10	< 0.001
		major surgery	180	6	6.4	1.9	2	10	
	APAIS2	minor surgery	152	6	5.7	2.0	2	10	< 0.001
		major surgery	180	7	6.6	1.6	2	10	
	SFQ	minor surgery	152	19	21.3	13.1	0	54	< 0.001
		major surgery	180	39	38.9	13.3	6	77	
Age	VAS-A	19–64 years	167	6	6.3	3.3	0	10	0.0055
		65 years and more	165	9	7.3	3.3	0	10	
	APAIS	19–64 years	167	18	18.4	6.0	6	30	0.1049
		65 years and more	165	20	19.5	5.4	8	30	
	APAIS1	19–64 years	167	5	5.5	2.3	2	10	0.2067
		65 years and more	165	6	5.8	1.9	2	10	
	APAIS2	19–64 years	167	7	6.7	2.7	2	10	0.0025
		65 years and more	165	8	7.6	2.6	2	10	
	SFQ	19–64 years	167	26	27.5	14.9	0	67	< 0.001
		65 years and more	165	36	34.2	16.1	3	77	

VAS-A – Visual Analogue Scale (range of total score: 0–10); APAIS – The Amsterdam Preoperative Anxiety and Information Scale (range of total score: 6–30); APAIS1 – anxiety about anesthesia subscale (range of total score: 2–10); APAIS2 – anxiety about surgery subscale (range of total score: 2–10); SFQ – Surgical Fear Questionnaire (range of total score: 0–80); SD – standard deviation; min. – minimum; max. – maximum

Discussion

The main aim of this study was to establish the validity and reliability of the Czech version of the SFQ.

Using exploratory factor analysis, we identified two factors for the Czech version of the SFQ (as in the original version). However, two items loaded on different components to those in the original version. Our two factors can be labeled (as in the original) “fear of short term consequences of surgery” and “fear of long term consequences of surgery”. Under the first factor “fear of short term consequences of surgery” four items are included: “I am afraid of the operation”, “I am afraid of the anaesthesia”, “I am afraid of the unpleasant side

effects (like nausea) after the operation”, “I am afraid of the long duration of the rehabilitation after the operation”. The last item is different to the Dutch and Turkish versions, in which this item was included under the “fear of long term consequences of surgery” subscale. Participants from our sample considered this item (“I am afraid of the long duration of the rehabilitation after operation”) to be a short term consequence of surgery (probably assuming that the period of rehabilitation would be brief).

All items included in the first subscale were rated more highly (Kovářová & Zeleníková, 2020) than the items from the second subscale. Participants had higher levels of fear of operation, anaesthesia, side effects, and long duration of rehabilitation. These

were more serious worries for Czech patients in our research sample. All four items included in the second subscale were rated less highly.

The remaining four items were included under the second factor, “fear of long term consequences of surgery”: “*I am afraid of the pain after the operation*”; “*I am afraid my health will deteriorate because of the operation*”; “*I am afraid the operation will fail*”; “*I am afraid that I won’t recover completely from the operation*”. The first item relating to fear of pain after the operation was within the subscale of fear of short-term consequences in the original scale. This item was probably considered by our respondents to be a more serious problem, which might persist for a considerable time. This can be explained by current knowledge of chronic postoperative pain as being “pain lasting for months to years, resulting in patient suffering and ensuing economic consequences” (Correll, 2017). In addition to the type of surgery, other known risk factors for the development of chronic postoperative pain include psychological factors such as anxiety or depression; demographic characteristics, including female gender and younger age; surgical factors, including open approach and length of surgery of more than three hours; and, finally, pain intensity during the first days after the operation (Correll, 2017).

The Turkish version of the SFQ was found to have a similar structure to the original questionnaire, with a high level of validity and reliability (Bağdigen & Karaman, 2018). The mean score of the patients for the entire SFQ scale in the Turkish study was 37.55 (SD = 21.11) (Bağdigen & Karaman, 2018), patients from our study rated preoperative fear similarly (35.7; SD = 21.3).

Significant correlations with other validated instruments measuring preoperative fear indicated good convergent validity.

The Cronbach alpha of more than 0.8 confirmed good reliability. According to Hair et al. (2019), results greater than 0.9 indicate that the data are free of bias (highest value close to 1.0). However, when a construct has only a few items, the Cronbach alpha value tends to be smaller without implying bias. According to other authors (Peterson, 1994; Taber, 2018), values above 0.70 are acceptable.

Cronbach alpha for the total score of the SFQ was 0.765–0.920 for five studies in Theunissen et al. (2014), and 0.93 in the Turkish study (Bağdigen & Karaman, 2018).

The Czech version of the SFQ had satisfactory sensitivity for differences related to age, gender, and type of surgery. Female gender as a patient variable

has repeatedly been proven a risk factor of preoperative fear and anxiety (Celik & Edipoglu, 2018; Eberhart et al., 2020; Matthias & Samarasekera, 2012; Wu et al., 2020). Different findings for other variables have been reported in other studies. Unlike in our study, Celik and Edipoglu (2018) reported that older patients had lower levels of anxiety. In other studies, major surgery was also connected with higher anxiety (Burton et al., 2019; Wu et al., 2020).

Measuring preoperative fear with a valid and reliable instrument is an important condition for the implementation of effective interventions to reduce fear.

There are several options for decreasing fear of patients before surgery (Wilson et al., 2016). A considerable number of studies have examined the effect of any type of information on pre-operative anxiety, and effective communication strategies and provision of surgical information in video or written form, or in an interview conducted by healthcare providers (Ayyadhah Alanazi, 2014). For many patients, education before surgery can help them cope with preoperative anxiety. Alternatively, a recent systematic review (Villa et al., 2020) has confirmed the effect of psychological interventions on anxiety in adult patients awaiting abdominal surgery; cognitive behavioral therapy, for example, can be used as a safe, well-accepted, and effective intervention. Another nonpharmacological method for reducing anxiety is listening to music.

It can be concluded in accord with Wilson et al. (2016) that two ways of intervention for preoperative anxiety are available: pharmacological interventions (such as administering hypnotic medications), and non-pharmacological interventions (integrative preoperative meetings, music therapy, cognitive behavioral therapy, massage therapy etc.). To have a standardized measure to identify patients with high levels of anxiety before surgery and who will benefit from additional interventions may be helpful, and may ultimately result in improved patient outcomes and satisfaction.

Limitation of study

The English version of the SFQ was used to translate the SFQ into Czech, whereas the main validation was performed on the Dutch version. However, during the development of the Dutch scale, use was also made of English references. Our study population was limited to patients awaiting surgery in one hospital (monocentric), and, therefore, extrapolation of the results should be undertaken with caution. Another limitation may be the heterogenous study sample,

including patients with different surgeries. On the other hand, a strength was that our sample size had sufficient power for running a psychometric analysis. The rule of thumb (a ratio of five respondents per scale item) adopted by many researchers is usually recommended for the performance of Principal component analysis (Rattray & Jones, 2007). The ideal sample size for exploratory factor analysis is ten respondents per item on the scale (Hair et al., 2019). With 332 respondents in the research sample, both requirements were more than satisfied.

Another strength was that by simultaneous measurement of two other instruments for measuring preoperative anxiety, convergent validity of the SFQ could be established.

Conclusion

The paper presents the results of the psychometric properties of the Czech version of the SFQ. The instrument showed good validity and reliability and can be used in research and clinical practice. Further analysis of the psychometric properties is required to support the results of this analysis. We also recommend that research be conducted in specific patient populations (e.g., patients awaiting heart surgery).

Ethical aspects and conflict of interest

The study follows the basic ethical principles. The approval from hospital management and ethical committee was obtained. Patients were informed about the aim of the study prior to data collection and gave consent to be included in the study. Authors declare any conflict of interest.

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Author contributions

Conception and design (RZ, KK), data analysis and interpretation (RZ, KK, PB, MT), manuscript draft (RZ, PB, MT), critical revision of the manuscript (RZ, MT), final approval of the manuscript (RZ, KK, PB, MT).

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