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Original article

Development and Psychometric Evaluation of a Questionnaire for the Assessment of Carpal Tunnel Syndrome and Trigger Finger

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Abstract

Carpal tunnel syndrome and trigger finger are common hand disorders that often coexist and significantly affect hand function and quality of life. Existing patient-reported outcome measures, such as the Boston Carpal Tunnel Questionnaire, primarily focus on carpal tunnel syndrome and do not fully capture symptoms related to trigger finger. Therefore, there is a need for a comprehensive tool that evaluates both conditions.

The aim of this study was to evaluate the psychometric properties of a novel questionnaire we developed to assess symptoms, functional limitations, and risk factors associated with carpal tunnel syndrome and trigger finger.

Methods. A cross-sectional study included 54 patients with clinically confirmed carpal tunnel syndrome with or without concommitant trigger finger. The developed questionnaire consisted of sections assessing symptoms, functional limitations, and risk factors. Internal consistency was evaluated using Cronbach's alpha. Convergent validity was assessed using Spearman's correlation between the developed questionnaire and the Boston Carpal Tunnel Questionnaire. Floor and ceiling effects were also analyzed. Descriptive statistics were used to summarize demographic and clinical characteristics.

Results. The study included 54 female patients with a mean age of 58.8 ± 10.5 years. Isolated carpal tunnel syndrome was observed in 94.4% of patients, while 5.6% had concomitant trigger finger. The internal consistency of the symptom scale was acceptable (Cronbach's α=0.786), while the functional limitation scale demonstrated high reliability (Cronbach's α=0.895). Correlations between the developed questionnaire and BCTQ scales were weak and not statistically significant (r=0.114, p=0.416 for symptoms; r=0.191, p=0.170 for functional limitations). However, a strong positive correlation was observed

between the symptom and functional limitation scales of the developed questionnaire (r=0.693, p<0.001). No significant floor or ceiling effects were identified.
Conclusions. The developed questionnaire demonstrated acceptable reliability and satisfactory psychometric properties for assessing symptoms and functional limitations associated with carpal tunnel syndrome and trigger finger. The instrument may serve as a useful tool for comprehensive clinical assessment of patients with these conditions. Further studies with larger and more diverse populations are recommended.

Keywords: carpal tunnel syndrome, trigger finger, questionnaire, validation.

1. Introduction

Hand disorders significantly impact patients' quality of life, limiting daily activities and work capacity. One of the most common conditions is carpal tunnel syndrome (CTS), which develops due to compression of the median nerve in the carpal tunnel. Clinically, it presents with pain, numbness, tingling, and, in more severe cases, weakness of the hand and decreased grip strength [1]. According to the literature, the prevalence of CTS is approximately 2-3% of the population and is more common in women [2]. Furthermore, a common condition called trigger finger, in which the tendon's gliding within the tunnel is impaired, leads to pain, clicking, and locking of the fingers [3,4]. In some cases, these conditions may coexist in a single patient, complicating clinical assessment of the condition and severity of symptoms [5-7].

Questionnaires are widely used to objectively assess patient complaints, allowing for the assessment of symptom severity and functional limitations. One of the most widely used instruments is the Boston Carpal Tunnel Questionnaire (BCTQ), which includes symptom and functional status scales [8]. This questionnaire has been validated in many countries and has demonstrated good reliability and validity. However, existing questionnaires, including the BCTQ, primarily focus on assessing carpal tunnel syndrome alone and do not consider comorbid conditions such as stenotic tendinitis. This may lead to an inaccurate assessment of the patient's condition, especially when these conditions coexist. Therefore, there is a need to develop a new questionnaire that comprehensively assesses both the symptoms of carpal tunnel syndrome and the manifestations of trigger finger [9-11]. This could improve the accuracy of diagnosis and evaluate treatment effectiveness.

The aim of this study was to develop and validate a questionnaire for assessing the condition of patients with carpal tunnel syndrome and trigger finger.

2. Materials and methods

Participants

This study was a single-center observational study conducted at the tertiary hospital. The study was conducted from October 30, 2025, to December 1, 2025. 54 patients with clinically confirmed carpal tunnel syndrome and with or without concomitant trigger finger were included in the study. Approval was obtained from the local ethics committee on October 29, 2025, No. 3. All participants were informed about the study before providing written informed consent. Inclusion criteria: (1) age 18 years and older; (2) diagnosed with carpal tunnel syndrome and/or trigger finger; (3) ability to read, write, or understand Russian fluently. Exclusion criteria: (1) the presence of mental illness in the acute stage or other pronounced cognitive impairment; (2) concomitant infection; (3) the presence of upper limb trauma; (4) the presence of other concomitant upper limb neuropathies. All patients completed the authors' questionnaire, as well as the Boston Carpal Tunnel Questionnaire, to assess content validity.

Questionnaire for the Assessment of Carpal Tunnel Syndrome and Trigger Finger

Our questionnaire for the assessment of carpal tunnel syndrome and trigger finger consists of three main sections aimed at assessing symptoms, functional limitations, and risk factors for the disease. The questionnaire also includes questions characterizing the patient's demographic and clinical data, including age, gender, occupation, ethnicity, height, weight, and diagnosis.

The symptoms section includes six questions reflecting the most typical clinical manifestations of the disease (numbness, tingling, pain/burning in the wrist, finger snapping, finger stiffness, and weakness when gripping objects). Patients rated the severity of each symptom over the past two weeks on a 5-point scale (no - 0; no, but in the past - 1; yes, a little - 2; yes, moderate - 3; yes, severe/constant - 4).

The functional limitations section assesses impairments in hand function during daily activities and includes four questions reflecting difficulties with

typical daily activities (buttoning clothes, writing with a pen or pencil, holding a smartphone, and lifting objects such as a book, bottle, or teapot). The assessment was conducted using the same 5-point scale as in the symptoms section.

The risk factors section aims to identify risk factors for the development of carpal tunnel syndrome and trigger finger. The section includes questions about the presence of concomitant diseases and clinical conditions known as possible risk factors: diabetes mellitus (type 1 or 2), thyroid disease, benign hand formations (hygroma, ganglion, lipoma, fibroma), pregnancy, menopause, hormone therapy, arterial hypertension, rheumatoid arthritis, kidney disease, prostate disease (for men), mucopolysaccharidosis, amyloidosis, smoking, alcohol consumption, the presence of relatives with the same diseases, professional activity associated with repetitive hand movements, previous injuries to the hand or fingers.

Anthropometric factors were additionally taken into account; points were added for such parameters as female gender, height less than 160 cm for women, and height less than 170 cm for men.

At the end of the questionnaire, patients additionally assessed the overall impact of the hand disease on the quality of life using a visual analog scale (VAS) from 0 to 10 points, where 0 means the condition does not affect the quality of life, and 10 means the condition significantly impairs the quality of life.

Boston Carpal Tunnel Questionnaire

The Boston Carpal Tunnel Questionnaire (BCTQ), translated and validated into Russian, was used as a comparative instrument. It is one of the most widely used and validated instruments for assessing carpal tunnel syndrome. It consists of two subscales: the Symptom Severity Scale (SSS) and the Functional Status Scale (FSS). The SSS contains 11 questions, and the FSS contains 8 questions. Each question is rated on a scale of 1 to 5, with higher scores indicating greater symptom severity. The final scores are calculated as the arithmetic mean for each subscale.

Statistical Analysis

The Jamovi 2.6.44 software package was used for statistical data analysis. Descriptive statistical analysis was performed on patient characteristics and questionnaire results. For comparison with the symptom and functional limitation scales of the developed questionnaire, the corresponding scales of the BCTQ questionnaire, already translated and culturally adapted into Russian, were used. A summary of the statistical analysis and measurement characteristics is presented in Table 1.

Psychometric Analysis

Internal consistency was assessed using Cronbach's alpha, which measures the degree of correlation between questionnaire items. On a scale from 0 to 1, Cronbach's alpha values above 0.7 indicate satisfactory correlation, values of 0.8 indicate good correlation, and values of 0.9 indicate excellent correlation. Content validity was assessed using Spearman's rank correlation coefficient to compare the symptom and functional limitations scales of the developed questionnaire with the corresponding BCTQ scales across all patients. Additionally, floor and ceiling effects were assessed, which are determined if more than 15% of respondents select the maximum or minimum scores. Floor and ceiling effects were examined at a single time point, T1 (day 0).

Table 1 - Descriptive statistics of the questionnaire scales

Scale	N	Mean	SD	Median	Minimum	Maximum
Symptoms Scale	54	2.56	0.81	2.67	0.83	4.00
Functional limitations Scale	54	2.56	0.92	2.75	0.00	4.00
SSS (BCTQ)	54	3.15	0.96	3.32	1.55	4.45
FSS (BCTQ)	54	2.77	1.00	2.75	1.00	4.63

3. Results

The study included 54 patients with carpal tunnel syndrome, all female. The mean age of the patients was 58.8 ± 10.5 years. The mean height and weight were 160 ± 6.52 cm and 73.6 ± 13.3 kg, respectively. Most patients had isolated carpal tunnel syndrome (94.4%), while a combination of carpal tunnel syndrome and trigger finger was observed in 5.6%. Among comorbidities, the most common were hypertension (53.7%), followed by diabetes mellitus (25.9%), thyroid disease (16.7%), and rheumatoid arthritis (5.6%) (Table 2).

Descriptive statistics for the scales of the authors' questionnaire and the BCTQ are presented in Table 1.

The mean value for the symptom scale of the authors' questionnaire was 2.56 ± 0.81, and for the functional limitations scale, 2.66 ± 0.92. For the BCTQ questionnaire, the mean values were 3.15 ± 0.96 for the symptom scale and 2.77 ± 1.00 for the functional limitations scale.

Internal Consistency

The Cronbach's α coefficient for the symptom scale of the developed questionnaire was 0.786, indicating satisfactory internal consistency. For the functional limitations scale of the developed questionnaire, the Cronbach's α value was 0.895, indicating high reliability (Table 3).

Content Validity

No statistically significant correlation was found between the symptom scales of the developed questionnaire and the BCTQ (r = 0.114; p = 0.416). Similarly, the relationship between the functional scales also did not reach statistical significance (r = 0.191; p = 0.170). However, a statistically significant positive correlation was found between the symptom and functional limitation scales of the authors' questionnaire (r = 0.693; p < 0.001) (Table 4).

Floor and Ceiling Effects

An analysis of floor and ceiling effects revealed no significant effects for either scale. The proportion of patients scoring at the minimum and maximum possible values did not exceed 15%, indicating the absence of significant floor and ceiling effects..

Demographic characteristics. The majority of respondents were female (92.7%), consistent with the overall gender distribution in the profession. Participants ranged in age from 18 to 26 years and older, with the majority of those aged 18–20 (70.5%). The largest proportion of students were in their second year of study (44.9%), indicating a high level of involvement of junior students in clinical practice.

Table 2 - Demographic and clinical characteristics of the patients

Variable	Value
Female	54 (100%)
Carpal tunnel syndrome	51 (94.4%)
Carpal tunnel syndrome+trigger finger	3 (5.6%)
Diabetes mellitus	14 (25.9%)
Thyroid disease	9 (16.7%)
Arterial hypertension	29 (53.7%)
Rheumatoid arthritis	3 (5.6%)
Age, years	58.8±10.5 (38-84)
Height, cm	160±6.52 (150-176)
Weight, kg	73.6±13.3 (50-113)

Note: Data are presented as n (%) for categorical variables and mean ± SD (minimum–maximum) for continuous variables

Table 3 - Internal Consistency of the Carpal Tunnel Syndrome and Trigger Finger Questionnaire Scales

Scale of the questionnaire Number of questions	Number of questions	Cronbach α
Symptoms	6	0.786
Functional limitations	4	0.895

Table 4 - Content Validity (Spearman's correlation)

Variables	r	p
Questionnaires symptom scales	0.114	0.416
Questionnaires functional limitation scales	0.191	0.170
Questionnaire Symptoms - Functional Limitations Correlation	0.693	<0.001

4. Discussion

This study assessed the psychometric properties of the developed questionnaire for assessing symptoms of carpal tunnel syndrome and trigger finger. The results demonstrated satisfactory reliability and acceptable validity characteristics. The internal consistency of the developed questionnaire scales was good. The Cronbach's α coefficient for the symptom scale was 0.786, indicating satisfactory internal consistency, while

for the functional limitations scale, this value reached 0.895, demonstrating high reliability. These results indicate sufficient homogeneity of the items within each scale and confirm the consistency of the constructs they measure.

The convergent validity of the questionnaire was assessed by comparing its scales with the corresponding scales of the Boston Carpal Tunnel Questionnaire (BCTQ), one of the most widely used instruments for assessing carpal tunnel syndrome. However, no statistically significant correlation was found between the symptom and functional limitation scales of the developed questionnaire and the BCTQ scales. The obtained correlation coefficients were low and statistically insignificant. The lack of a significant correlation can be explained by differences in the conceptual focus of the instruments. The BCTQ primarily focuses on the classic manifestations of carpal tunnel syndrome, such as numbness, pain, and functional limitations of the hand, whereas the developed questionnaire additionally takes into account the symptoms and clinical features of trigger finger. Thus, differences in the structure and clinical focus of the questionnaires could have influenced the degree of their statistical correlation. At the same time, a statistically significant positive correlation was found between the symptom and functional limitation scales of the developed questionnaire ($r=0.693$; $p\leq0.001$). This indicates a close relationship between the severity of clinical symptoms and the degree of hand impairment. This result confirms the logical and clinical consistency of the developed instrument's structure.

Additional analysis of the response distribution revealed the absence of significant floor and ceiling effects. The proportion of patients who scored at the minimum or maximum scale values did not exceed the threshold of 15%, indicating a good distribution of responses and sufficient sensitivity of the scales to differences in symptom severity and functional impairment.

The clinical characteristics of the sample are also consistent with data presented in the literature. The majority of patients in the study were women, reflecting the known higher prevalence of carpal tunnel syndrome in the female population [12]. The most common comorbidities were hypertension, diabetes, and thyroid disease, which have previously been implicated as possible risk factors for carpal tunnel syndrome [13,14].

However, this study has several limitations. First, the relatively small sample size may limit the statistical power of the analysis and reduce the possibility of detecting weaker associations between questionnaire scores. Second, all study participants were women, which may limit the generalizability of the findings to the male population. Furthermore, the study was conducted at a single center, which may also limit the external validity of the findings. The study also did not conduct a test-retest analysis, which also requires further study.

5. Conclusion

The questionnaire developed by the authors for assessing carpal tunnel syndrome and trigger finger demonstrated satisfactory psychometric properties. Internal consistency indices of the scales are at an acceptable level, indicating the questionnaire's reliability. The lack of a significant correlation with the BCTQ questionnaire may be due to differences in the focus of the instruments, as the BCTQ does not consider the manifestations of trigger finger.

The proposed questionnaire can be used for a comprehensive assessment of patients with carpal tunnel syndrome, including those with concomitant trigger finger. However, further studies with a larger sample and additional psychometric testing are needed for final validation of the questionnaire.

Conflict of Interest. The authors declare that they have no conflicts of interest related to this study.

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Карпальды туннель синдромы мен стеноздаушы лигаментитті бағалауға арналған сауалнаманы әзірлеу және психометриялық талдау

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Түйіндеме

Карпальды туннель синдромы мен стеноздаушы лигаментит - қол басының ең жиі кездесетін патологияларының бірі болып табылады. Олар жиі жағдайда қатар дамып, қол қызметіне және науқастың өмір сапасына едәуір әсер етеді. Қазіргі таңда қолданылатын бағалау әдістері, мысалы, карпальды туннель синдромын бағалауға арналған Бостон сауалнамасы, негізінен бұл синдромның дара ағымына бағытталған және оның стеноздаушы лигаментитпен қатар жүрген нұсқасындағы клиникалық көрінісін толық көрсетпейді. Осыған байланысты екі патологияны да, сондай-ақ олардың бір мезгілде дамуын бағалауға мүмкіндік беретін кешенді құралға қажеттілік бар.

Зерттеудің мақсаты карпальды туннель синдромы мен стеноздаушы лигаментитке байланысты симптомдарды, функционалдық шектеулерді және қауіп факторларын бағалауға арналған біз құрастырған жаңа сауалнаманың психометриялық қасиеттерін бағалау болды.

Әдістері. Көлденең зерттеуге клиникалық тұрғыда расталған стеноздаушы лигаментит қосақталып кездескен немесе орын алмаған карпальды туннель синдромы бар 54 науқас енгізілді. Әзірленген сауалнама симптомдарды, функционалдық шектеулерді және қауіп факторларын бағалайтын бөлімдерден тұрды. Ішкі келісімділік альфа Кронбах коэффициенті арқылы бағаланды. Конвергенттік валидтілік әзірленген сауалнама мен білезік өзегі синдромын бағалауға арналған Бостон сауалнамасы арасындағы Спирмен корреляциясы арқылы анықталды. Сонымен қатар, «әсердің едені» (floor effects) және «әсердің төбесі» (ceiling effects) талданды. Демографиялық және клиникалық сипаттамаларды жинақтау үшін сипаттамалық статистика қолданылды.

Нәтижелері. Зерттеуге 54 әйел науқас қатысты, олардың орташа жасы 58,8±10,5 жыл. Науқастардың 94,4%-ында карпальды туннель синдромы жеке түрде байқалса, 5,6%-ында стеноздаушы лигаментит қатар анықталды. Симптомдар шкаласының ішкі келісімділігі қанағаттанарлық болды (Кронбах α=0,786), ал функционалды шектеулер шкаласы жоғары сенімділікті көрсетті (Кронбах α=0,895). Әзірленген сауалнама мен BCTQ шкалалары арасындағы корреляциялар әлсіз және статистикалық тұрғыда мәнді емес болды (симптомдар үшін r=0,114, p=0,416; функционалдық шектеулер үшін r=0,191, p=0,170). Алайда әзірленген сауалнаманың симптомдар және функционалдық шектеулер шкалалары арасында күшті оң корреляция байқалды (r = 0,693, p<0,001). «Әсердің едені» (floor effects) және «әсердің төбесіне» (ceiling effects) қатысты айтарлықтай айырмашылықтар анықталған жоқ.

Қорытынды. Әзірленген сауалнама карпальды туннель синдромы мен стеноздаушы лигаментитке байланысты симптомдар мен функционалдық шектеулерді бағалау үшін қолайлы сенімділік пен қанағаттанарлық психометриялық қасиеттер көрсетті. Бұл сауалнама аталған патологиялары бар науқастарды кешенді клиникалық бағалауда пайдалы құрал бола алады. Дегенмен, ірі көлемді және әртүрлі таңдамада қосымша зерттеулер жүргізу ұсынылады.

Түйін сөздер: карпальды туннель синдромы, стеноздаушы лигаментит, сауалнама, валидация.

Разработка и психометрический анализ опросника для оценки синдрома запястного канала и стенозирующего лигаментита

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Резюме

Синдром запястного канала и стенозирующий лигаментит - одни из самых распространенных патологий кисти, которые часто возникают одновременно и существенно влияют на функцию рук и качество жизни. Существующие методы оценки состояния пациентов, такие как Бостонский опросник по оценке синдрома запястного канала, в первую очередь ориентированы именно на его изолированное течение и не отражают полноценно его клиническую картину в случае его сочетания со стенозирующим лигаментитом. В связи с этим существует потребность в комплексном инструменте, который поможет в оценке обеих патологий, а также их симультанного развития.

Целью данного исследования была оценка психометрических свойств разработанного нами нового опросника, предназначенного для оценки симптомов, функциональных ограничений и факторов риска, связанных с синдромом запястного канала и стенозирующим лигаментитом.

Методы. В поперечное исследование были включены 54 пациента с клинически подтвержденным синдромом запястного канала с сопутствующим стенозирующим лигаментитом или без него. Разработанный опросник состоял из разделов, оценивающих симптомы, функциональные ограничения и факторы риска. Внутреннюю согласованность оценивали с помощью альфа Кронбаха. Конвергентную валидность оценивали с использованием корреляции Спирмена между разработанным опросником и Бостонским опросником по оценке синдрома запястного канала. Также были проанализированы эффекты «пола» (floor effects) или «потолка» (ceiling effects). Описательная статистика использовалась для обобщения демографических и клинических характеристик.

Результаты. В исследование были включены 54 пациента женского пола, средний возраст 58,8±10,5 года. Изолированный синдром запястного канала наблюдался у 94,4% пациентов, при этом у 5,6% имелся сопутствующий стенозирующий лигаментит. Внутренняя согласованность шкалы симптомов была приемлемой (α Кронбаха=0,786), тогда как шкала функциональных ограничений продемонстрировала высокую надежность (α Кронбаха=0,895). Корреляции между разработанным опросником и шкалами BCTQ были слабыми и статистически недостоверными (r=0,114, p=0,416 для симптомов; r=0,191, p=0,170 для функциональных ограничений). Однако между шкалами симптомов и функциональных ограничений разработанного опросника наблюдалась сильная положительная корреляция (r = 0,693, p< 0,001). Никаких существенных эффектов «пола» (floor effects) или «потолка» (ceiling effects) выявлено не было.

Выводы. Разработанный опросник продемонстрировал приемлемую надежность и удовлетворительные психометрические свойства для оценки симптомов и функциональных ограничений, связанных с синдромом запястного канала и стенозирующим лигаментитом. Опросник может служить полезным инструментом для комплексной клинической оценки пациентов с данными патологиями. Однако рекомендуется проведение дальнейших исследований, требующих более крупную и разнообразную выборку.

Ключевые слова: синдром запястного канала, стенозирующий лигаментит, опросник, валидация.