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ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии

საქართველოს სამედიცინო სიახლენი

GEORGIAN MEDICAL NEWS

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GMN: Georgian Medical News is peer-reviewed, published monthly journal committed to promoting the science and art of medicine and the betterment of public health, published by the GMN Editorial Board since 1994. GMN carries original scientific articles on medicine, biology and pharmacy, which are of experimental, theoretical and practical character; publishes original research, reviews, commentaries, editorials, essays, medical news, and correspondence in English and Russian.

GMN is indexed in MEDLINE, SCOPUS, PubMed and VINITI Russian Academy of Sciences. The full text content is available through EBSCO databases.

GMN: Медицинские новости Грузии - ежемесячный рецензируемый научный журнал, издаётся Редакционной коллегией с 1994 года на русском и английском языках в целях поддержки медицинской науки и улучшения здравоохранения. В журнале публикуются оригинальные научные статьи в области медицины, биологии и фармации, статьи обзорного характера, научные сообщения, новости медицины и здравоохранения. Журнал индексируется в MEDLINE, отражён в базе данных SCOPUS, PubMed и ВИНИТИ РАН. Полнотекстовые статьи журнала доступны через БД EBSCO.

GMN: Georgian Medical News – საქართველოს სამედიცინო სიახლენი – არის ყოველთვიური სამეცნიერო სამედიცინო რეცენზირებადი ჟურნალი, გამოიცემა 1994 წლიდან, წარმოადგენს სარედაქციო კოლეგიისა და აშშ-ის მეცნიერების, განათლების, ინდუსტრიის, ხელოვნებისა და ბუნებისმეტყველების საერთაშორისო აკადემიის ერთობლივ გამოცემას. GMN-ში რუსულ და ინგლისურ ენებზე ქვეყნდება ექსპერიმენტული, თეორიული და პრაქტიკული ხასიათის ორიგინალური სამეცნიერო სტატიები მედიცინის, ბიოლოგიისა და ფარმაციის სფეროში, მიმოხილვითი ხასიათის სტატიები.

ჟურნალი ინდექსირებულია MEDLINE-ის საერთაშორისო სისტემაში, ასახულია SCOPUS-ის, PubMed-ის და ВИНИТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებიდან.

WEBSITE

www.geomednews.com

К СВЕДЕНИЮ АВТОРОВ!

При направлении статьи в редакцию необходимо соблюдать следующие правила:

1. Статья должна быть представлена в двух экземплярах, на русском или английском языках, напечатанная через **полтора интервала на одной стороне стандартного листа с шириной левого поля в три сантиметра**. Используемый компьютерный шрифт для текста на русском и английском языках - **Times New Roman** (**Кириллица**), для текста на грузинском языке следует использовать **AcadNusx.** Размер шрифта - **12**. К рукописи, напечатанной на компьютере, должен быть приложен CD со статьей.

2. Размер статьи должен быть не менее десяти и не более двадцати страниц машинописи, включая указатель литературы и резюме на английском, русском и грузинском языках.

3. В статье должны быть освещены актуальность данного материала, методы и результаты исследования и их обсуждение.

При представлении в печать научных экспериментальных работ авторы должны указывать вид и количество экспериментальных животных, применявшиеся методы обезболивания и усыпления (в ходе острых опытов).

4. К статье должны быть приложены краткое (на полстраницы) резюме на английском, русском и грузинском языках (включающее следующие разделы: цель исследования, материал и методы, результаты и заключение) и список ключевых слов (key words).

5. Таблицы необходимо представлять в печатной форме. Фотокопии не принимаются. **Все цифровые, итоговые и процентные данные в таблицах должны соответствовать таковым в тексте статьи**. Таблицы и графики должны быть озаглавлены.

6. Фотографии должны быть контрастными, фотокопии с рентгенограмм - в позитивном изображении. Рисунки, чертежи и диаграммы следует озаглавить, пронумеровать и вставить в соответствующее место текста **в tiff формате**.

В подписях к микрофотографиям следует указывать степень увеличения через окуляр или объектив и метод окраски или импрегнации срезов.

7. Фамилии отечественных авторов приводятся в оригинальной транскрипции.

8. При оформлении и направлении статей в журнал МНГ просим авторов соблюдать правила, изложенные в «Единых требованиях к рукописям, представляемым в биомедицинские журналы», принятых Международным комитетом редакторов медицинских журналов - http://www.spinesurgery.ru/files/publish.pdf и http://www.nlm.nih.gov/bsd/uniform_requirements.html
В конце каждой оригинальной статьи приводится библиографический список. В список литературы включаются все материалы, на которые имеются ссылки в тексте. Список составляется в алфавитном порядке и нумеруется. Литературный источник приводится на языке оригинала. В списке литературы сначала приводятся работы, написанные знаками грузинского алфавита, затем кириллицей и латиницей. Ссылки на цитируемые работы в тексте статьи даются в квадратных скобках в виде номера, соответствующего номеру данной работы в списке литературы. Большинство цитированных источников должны быть за последние 5-7 лет.

9. Для получения права на публикацию статья должна иметь от руководителя работы или учреждения визу и сопроводительное отношение, написанные или напечатанные на бланке и заверенные подписью и печатью.

10. В конце статьи должны быть подписи всех авторов, полностью приведены их фамилии, имена и отчества, указаны служебный и домашний номера телефонов и адреса или иные координаты. Количество авторов (соавторов) не должно превышать пяти человек.

11. Редакция оставляет за собой право сокращать и исправлять статьи. Корректура авторам не высылается, вся работа и сверка проводится по авторскому оригиналу.

12. Недопустимо направление в редакцию работ, представленных к печати в иных издательствах или опубликованных в других изданиях.

При нарушении указанных правил статьи не рассматриваются.

REQUIREMENTS

Please note, materials submitted to the Editorial Office Staff are supposed to meet the following requirements:

1. Articles must be provided with a double copy, in English or Russian languages and typed or compu-ter-printed on a single side of standard typing paper, with the left margin of **3** centimeters width, and **1.5** spacing between the lines, typeface - **Times New Roman** (**Cyrillic**), print size - **12** (referring to Georgian and Russian materials). With computer-printed texts please enclose a CD carrying the same file titled with Latin symbols.

2. Size of the article, including index and resume in English, Russian and Georgian languages must be at least 10 pages and not exceed the limit of 20 pages of typed or computer-printed text.

3. Submitted material must include a coverage of a topical subject, research methods, results, and review.

Authors of the scientific-research works must indicate the number of experimental biological species drawn in, list the employed methods of anesthetization and soporific means used during acute tests.

4. Articles must have a short (half page) abstract in English, Russian and Georgian (including the following sections: aim of study, material and methods, results and conclusions) and a list of key words.

5. Tables must be presented in an original typed or computer-printed form, instead of a photocopied version. **Numbers, totals, percentile data on the tables must coincide with those in the texts of the articles.** Tables and graphs must be headed.

6. Photographs are required to be contrasted and must be submitted with doubles. Please number each photograph with a pencil on its back, indicate author's name, title of the article (short version), and mark out its top and bottom parts. Drawings must be accurate, drafts and diagrams drawn in Indian ink (or black ink). Photocopies of the X-ray photographs must be presented in a positive image in **tiff format**.

Accurately numbered subtitles for each illustration must be listed on a separate sheet of paper. In the subtitles for the microphotographs please indicate the ocular and objective lens magnification power, method of coloring or impregnation of the microscopic sections (preparations).

7. Please indicate last names, first and middle initials of the native authors, present names and initials of the foreign authors in the transcription of the original language, enclose in parenthesis corresponding number under which the author is listed in the reference materials.

8. Please follow guidance offered to authors by The International Committee of Medical Journal Editors guidance in its Uniform Requirements for Manuscripts Submitted to Biomedical Journals publication available online at: http://www.nlm.nih.gov/bsd/uniform_requirements.html
http://www.icmje.org/urm_full.pdf
In GMN style for each work cited in the text, a bibliographic reference is given, and this is located at the end of the article under the title "References". All references cited in the text must be listed. The list of references should be arranged alphabetically and then numbered. References are numbered in the text [numbers in square brackets] and in the reference list and numbers are repeated throughout the text as needed. The bibliographic description is given in the language of publication (citations in Georgian script are followed by Cyrillic and Latin).

9. To obtain the rights of publication articles must be accompanied by a visa from the project instructor or the establishment, where the work has been performed, and a reference letter, both written or typed on a special signed form, certified by a stamp or a seal.

10. Articles must be signed by all of the authors at the end, and they must be provided with a list of full names, office and home phone numbers and addresses or other non-office locations where the authors could be reached. The number of the authors (co-authors) must not exceed the limit of 5 people.

11. Editorial Staff reserves the rights to cut down in size and correct the articles. Proof-sheets are not sent out to the authors. The entire editorial and collation work is performed according to the author's original text.

12. Sending in the works that have already been assigned to the press by other Editorial Staffs or have been printed by other publishers is not permissible.

Articles that Fail to Meet the Aforementioned Requirements are not Assigned to be Reviewed.

ავტორთა საყურადღებოდ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დავიცვათ შემდეგი წესები:

1. სტატია უნდა წარმოადგინოთ 2 ცალად, რუსულ ან ინგლისურ ენებზე,დაბეჭდილი სტანდარტული ფურცლის 1 გვერდზე, 3 სმ სიგანის მარცხენა ველისა და სტრიქონებს შორის 1,5 ინტერვალის დაცვით. გამოყენებული კომპიუტერული შრიფტი რუსულ და ინგლისურენოვან ტექსტებში - **Times New Roman (Кириллица)**, ხოლო ქართულენოვან ტექსტში საჭიროა გამოვიყენოთ **AcadNusx.** შრიფტის ზომა – 12. სტატიას თან უნდა ახლდეს CD სტატიით.

2. სტატიის მოცულობა არ უნდა შეადგენდეს 10 გვერდზე ნაკლებს და 20 გვერდზე მეტს ლიტერატურის სიის და რეზიუმეების (ინგლისურ, რუსულ და ქართულ ენებზე) ჩათვლით.

3. სტატიაში საჭიროა გაშუქდეს: საკითხის აქტუალობა; კვლევის მიზანი; საკვლევი მასალა და გამოყენებული მეთოდები; მიღებული შედეგები და მათი განსჯა. ექსპერიმენტული ხასიათის სტატიების წარმოდგენისას ავტორებმა უნდა მიუთითონ საექსპერიმენტო ცხოველების სახეობა და რაოდენობა; გაუტკივარებისა და დაძინების მეთოდები (მწვავე ცდების პირობებში).

4. სტატიას თან უნდა ახლდეს რეზიუმე ინგლისურ, რუსულ და ქართულ ენებზე არანაკლებ ნახევარი გვერდის მოცულობისა (სათაურის, ავტორების, დაწესებულების მითითებით და უნდა შეიცავდეს შემდეგ განყოფილებებს: მიზანი, მასალა და მეთოდები, შედეგები და დასკვნები; ტექსტუალური ნაწილი არ უნდა იყოს 15 სტრიქონზე ნაკლები) და საკვანძო სიტყვების ჩამონათვალი (key words).

5. ცხრილები საჭიროა წარმოადგინოთ ნაბეჭდი სახით. ყველა ციფრული, შემაჯამებელი და პროცენტული მონაცემები უნდა შეესაბამებოდეს ტექსტში მოყვანილს.

6. ფოტოსურათები უნდა იყოს კონტრასტული; სურათები, ნახაზები, დიაგრამები - დასათაურებული, დანომრილი და სათანადო ადგილას ჩასმული. რენტგენოგრამების ფოტოასლები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალების შეღებვის ან იმპრეგნაციის მეთოდი და აღნიშნოთ სურათის ზედა და ქვედა ნაწილები.

7. სამამულო ავტორების გვარები სტატიაში აღინიშნება ინიციალების თანდართვით, უცხოურისა – უცხოური ტრანსკრიპციით.

8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხოური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიღრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი, წელი, ჟურნალის №, პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფჩხილებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიღრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანელის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა, მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა, რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შეჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

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RELIABILITY AND VALIDITY OF THE KAZAKH-LANGUAGE ACT QUESTIONNAIRE AS AN ASTHMA CONTROL TOOL

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Abstract.

Background: To date, several questionnaires have been developed as easy-to-use screening tools for assessing and monitoring asthma control as the Asthma Control Test (ACT). However, the assessment of the reliability of the ACT questionnaire translated into the Kazakh language has not been carried out yet. The study aimed to evaluate the reliability and validity of the Kazakh-language ACT questionnaire as an asthma control tool.

Methods: A multi-centre study was conducted in three Kazakhstan medical institutions for the period: from 02.05.2022 to 06.05.2022. The study included 222 Kazakh patients (Kazakhs in the third generation) with a confirmed diagnosis of bronchial asthma. In this study, the ACT questionnaire translated into Kazakh was used to assess the level of asthma control. The form of asthma was determined in accordance with the recommendations of the Global Initiative on Asthma (GINA). The internal consistency of the questionnaire was analysed by using the reliability index (Cronbach's alpha). The clinical and demographic data were collected, including data on the spirometry.

Results: The Kazakhstani version of the ACT questionnaire showed high reliability, with Cronbach's alpha of 0.991. The majority of patients (87.4%) had controlled asthma. A significant difference was found in ACT scores between patients with a duration of asthma of 0-12 months and those with asthma for 10 years or more. Similarly, significant differences were found in ACT scores based on the severity of asthma and the age of the patients.

Conclusions: The ACT questionnaire translated into Kazakh proved to be useful tools for assessing asthma control in the Kazakhstani population.

Trial registration: ClinicalTrials.gov (NCT05088512).

Key words. Asthma, questionnaire, control, validity, Kazakhstan.

Introduction.

Asthma is a chronic inflammatory lung disease that affects an estimated 300 million people [1-3]. Over the past decade, GINA's international guidelines for managing asthma have largely focused on the importance of long-term asthma management with the primary goal of achieving and maintaining symptom control [4-6]. The fact that the level of asthma control is often overestimated by both patients and physicians indicates that asthma management recommendations alone are not sufficient to provide a proper assessment of the disease [7]. This shortcoming in assessing asthma control indicates the need for a simple method to quantify asthma control by both patients and clinicians [8].

To date, there are several questionnaires designed as easy-to-use screening tools for assessing and tracking a multifaceted range of asthma interventions. For example, the Asthma Control Test (ACT) has been developed and validated [9-11]. It has been employed as screening tool to assess clinically relevant changes in individual patients in the previous 4 weeks (ACT) [12]. This questionnaire is simple and easy to complete by patients and allow practitioners to assess how well asthma symptoms are being controlled [13]. The GINA, ACT scales are widely used in clinical and scientific practice to assess asthma control [12].

Given that cultural factors can potentially influence responses to certain questionnaire questions, it is important that the questionnaire be cross-culturally validated, especially when translated into other languages [14]. However, to date, the validity and reliability of the Kazakh-translated version of the ACT have not been assessed in the Kazakh population.

Therefore, the aim of this study was to test the reliability and validity of the Kazakh-language translation of the ACT in the Kazakh population as a tool for asthma control.

Materials and Methods.

Setting and participants:

This multi-centre study involving patients diagnosed with asthma from the Center for Primary Health Care and Diagnostics of the S. D. Asfendiyarov KazNMU (Almaty), Medical Centre Hospital of President's Affairs Administration of the Republic of Kazakhstan (Astana), Corporate Fund "University Medical Center" Republican Diagnostic Center (Astana) in the period from 02.05.2022 to 05. 06.2022.

Inclusion Criteria:

Patients with diagnosed bronchial asthma; age 18-70 years; Kazakh descent (both paternal and maternal grandparents being ethnic Kazakhs); ability and willingness to give written informed consent; adherence to research protocol.

Exclusion Criteria:

Mental/legal incapacitation preventing informed consent; pregnancy or lactation; active/history of tuberculosis; severe/ decompensated liver, kidney, or cardiovascular diseases; severe/ decompensated endocrine disorders; autoimmune diseases; oncological diagnoses.

Questionnaire:

This study used the Asthma Control Test (ACT) questionnaire.

The ACT comprises five questions addressing asthma control over the prior 4 weeks. Each of these questions is based on

a 5-point scale, yielding a total maximum score of 25 points when all the responses are summed. A score of 25 indicates full control over asthma; a score within the 20-24 range signifies well-controlled asthma, and a score of 19 or lower denotes uncontrolled asthma [15]. Clinicians received training on the appropriate use of this questionnaire [16].

The questionnaire underwent a thorough translation process. Initially, it was directly translated from English to Kazakh and then backtranslated to English to verify accuracy. A dedicated team, including pulmonologists, allergists, and linguistic experts in both languages, supervised this. Three preliminary versions were produced, each tested on a subset of the population for clarity and relevancy, before finalization. The preliminary versions of the questionnaire were indeed tested on a smaller subset of the population to gauge clarity, comprehension, and relevancy. Feedback from these tests was incorporated into the final translation (Appendix 1).

Measurements.

The diagnosis of "asthma" in all patients was previously established, which was confirmed by the availability of medical records of inpatient treatment and / or seeking medical care on an outpatient basis.

Participants were categorized as having controlled, partially controlled, or uncontrolled asthma, as recommended by the Global Initiative for Asthma (GINA) [17]. Well-controlled asthma: daytime symptoms ≤ 2x/week; reliever need ≤ 2x/week; without activity limitation; without night waking. Partially controlled asthma: daytime symptoms > 2x/week; reliever need > 2x/week; any activity limitation; any night waking. Uncontrolled asthma: daytime symptoms > 2x/week; reliever need > 2x/week; any activity limitation; any night waking.

Asthma severity was classified according to GINA into the following forms: intermittent (symptoms less than once a week; brief exacerbations, nocturnal symptoms not more than twice a month; FEV_1 or PEF ≥80% predicted; PEF or FEV_1 variability <20%), mild persistent (symptoms more than once a week but less than once a day; exacerbations may affect activity and sleep; nocturnal symptoms more than twice a month; FEV_1 or PEF ≥80% predicted; PEF or FEV_1 variability <20–30%), moderate persistent (symptoms daily; exacerbations may affect activity and sleep; nocturnal symptoms more than once a week; daily use of inhaled short-acting b2-agonist; FEV_1 or PEF 60–80% predicted; PEF or FEV_1 variability >30%), severe persistent (symptoms daily; frequent exacerbations; frequent nocturnal asthma symptoms; limitation of physical activities; FEV_1 or PEF ≤60% predicted; PEF or FEV_1 variability >30%) [1,18].

In addition, clinical and demographic indicators, such as gender, age, were studied.

By age, patients were divided into 5 categories, such as 18-30 years old, 31-40 years old, 41-50 years old, 51-60 years old, and 61-70 years old.

According to the smoking status, the participants were divided into non-smokers and smokers. According to alcohol consumption, there was a division into 4 categories: does not drink alcohol, drinks alcohol daily, drinks alcohol once a week, drinks alcohol once a month. According to BMI, there was a division into 4 degrees, <18, 19-24, 25-29, >30.

Moreover, existence of family history of asthma was determined. Family history of asthma is the presence of asthma in direct family members, suggesting a potential genetic predisposition or familial inclination towards the onset of the condition. This is a descriptive label intended to highlight the familial prevalence of asthma rather than to classify it as a separate clinical entity.

The study of the functional state of the respiratory system was carried out using spirometry. The studies were carried out on the BTL-08 Spiro Pro setup. Spirometry performed under the research quality standards of the European Respiratory Society (ERS) and the American Thoracic Society (ATS) [19].

In the course of the work, the following spirometry parameters were analyzed: forced vital capacity (FVC), forced expiratory volume in 1 s (FEV_1), Gensler index (FEV_1/FVC), volume velocity in the middle section of the forced expiratory flow curve between 25 -75% of exhaled FVC (SOS25-75).

Statistical analysis.

The IBM SPSS Statistics v25(version 25.0, IBM SPSS Inc., Chicago, Illinois, USA) program was used for data analysis and statistical processing of the study results. For descriptive statistics, mean values (M), standard deviations (SD) and confidence intervals (95% CI) were calculated for the results of the ACT questionnaire, grouped by the level of control and severity of asthma. One-way analysis of variance (ANOVA) was used to compare the ACT scores between groups with different levels of asthma control (controlled, partially controlled, and uncontrolled) and asthma severity (intermittent, persistent mild, moderate, and severe).

Internal consistency reliability (Cronbach's coefficient α and Spearman's correlation coefficient) was used to assess the reliability of the ACT. A general rule of thumb is that an alpha of 0.7-0.8 is considered acceptable, 0.8-0.9 is good, and over 0.9 is excellent. When comparing groups by quantitative characteristics, the nonparametric Mann-Whitney U-test was used. Qualitative features were assessed using the $\chi 2$ test with Yates correction. The level of statistical significance was set at $p < 0.05$. To reduce the likelihood of Type I errors (false positives) in multiple tests, we applied the Bonferroni correction method. All results were presented in the form of tables and graphs illustrating the main findings of the study. To ensure statistical power, the sample size was calculated. Using a significance level of $\alpha = 0.05$ and a power of 80%, the minimal clinically significant effect was defined as the difference in asthma control rates between groups. The calculations were performed in G*Power, and the final sample size was adjusted for data variability and participant dropout, ensuring sufficient power for the study.

Results.

Among the study participants, 36.9% (n = 82) were men and 63.1% (n = 140) were women. The mean age of men was 35.3±13.9 years, and that of women was 31.5±10.9 years. Detailed clinical and demographic characteristics of study participants are presented in Table 1.

In terms of age groups, 50.0% (n=111) of the study participants fell into the 18-30 age category, while 23.9% (n=53) were

Table 1. *Clinical and demographic characteristics of patients with asthma.*

Indicator	Number
Gender, n (%)	
Male	82 (36,9)
Female	140 (63,1)
Age n (%),	
18-30 yrs	111(50,0)
31-40 yrs	53(23,9)
41-50 yrs	37(16,7)
51-60 yrs	17(7,7)
61-70 yrs	4(1,8)
Smoking	
No	181(81,5)
Yes	41(18,5)
Alcohol	
Doesn't use	195(87,8)
Once a week	2(,9)
Once a month	25(11,3)
BMI	
< 18	45(20,3)
19 to 24	107(48,2)
25 to 29	53(23,9)
> 30	17(7,7)
Family history of asthma	
Yes	167(75,2)
No	55(24,8)
Presence of atopic disease at the time of examination	
Atopic dermatitis	33(14,9)
Intermittent allergic rhinitis	113(50,9)
Persistent allergic rhinitis	70(31,5)
Contact allergic dermatitis	4(1,8)
Recurrent urticaria	2(0,9)
Duration of asthma	
0-12 months	136(61,3)
1-3 years	35(15,8)
3-5 years	21(9)
5-10 years	25(11,3)
10 or more years	5(2,3)
Multimorbid diseases	
No	204(91,9)
Chronic heart disease	13(5,8)
Chronic liver disease	2(0,9)
Chronic kidney disease	1(0,5)
Chronic diseases of the nervous system	2(0,9)
By level of control, GINA	
Controlled	194(87,4)
Partially controlled	25(11,3)
Uncontrollable	3(1,4)
By severity	
Intermittent	138(62,2)
Mild persistent	54(24,3)
Persistent moderate	27(12,2)
Severe persistent	3(1,4)

BMI: Body Mass Index; GINA: Global Initiative on Asthma.

in the 31-40 age group. The majority of study participants, 81.5% (n=181), were non-smokers and only 18.5% (n=41) were smokers. For alcohol use, 87.8% (n=195) of the study participants reported not consuming alcohol, while 11.3% (n=25) reported consuming alcohol once a month.

Based on Body Mass Index (BMI), 48.2% (n=107) of patients were of normal weight, 20.3% (n=45) were underweight, and 23.9% (n=53) were overweight. In terms of family history of asthma, 75.2% (n=167) of cases showed an existence of it.

The duration of asthma was 0-12 months for the majority of the cases, 61.3% (n=136). Only 2.3% (n=5) of cases reported a duration of asthma of 10 years or more. Multi-morbid diseases were absent in 91.9% (n=204) of cases, with chronic heart disease being identified in 14.9% (n=33) of asthma patients.

As per the Global Initiative for Asthma (GINA) classification, controlled asthma was identified in 87.4% (n= 194) of patients, while partially controlled and uncontrolled forms were found in 11.3% (n=25) and 1.4% (n=3) of cases, respectively.

The ACT questionnaire was validated by Cronbach's alpha, scoring 0.991, indicating high reliability of this questionnaire when translated into Kazakh (Table 2).

Table 2. *Assessment of the reliability of the ACT questionnaire.*

Questions	α-Cronbach
In the past 4 weeks, how often did your asthma prevent you from getting as much done at work, school or home?	0,989
During the past 4 weeks, how often have you had shortness of breath?	0,990
During the past 4 weeks, how often did your asthma symptoms (wheezing, coughing, shortness of breath, chest tightness or pain) wake you up at night or earlier than usual in the morning?	0,990
During the past 4 weeks, how often have you used your reliever medication (such as salbutamol)?	0,989
How would you rate your asthma control during the past 4 weeks?	0,988
α-Cronbach Total scores	**0,991**

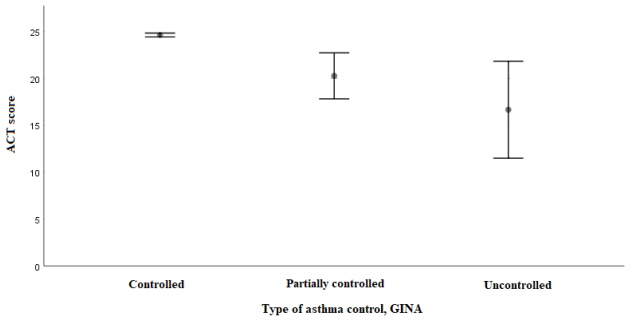

Figure 1. *ACT scores according to the control level according to the GINA classification.*

Table 3. *ACT score depending on the clinical and demographic characteristics of patients with asthma.*

Indicator	**ACT** (Mean ±SD)
Gender	
Male	23,8 ±2,9
Female	24,1 ±2,9
p ≥0,05	
Age	
18-30 yrs	24,4 ±1,6
31-40 yrs	23,0 ±3,6
41-50 yrs	24,1±2,1
51-60 yrs	24,6 ±2,5
p≥0,05	
BMI	
Below 18	24,8 ±0,94
19 to 24	23,8 ±3,42
25 to 29	23,8 ±2,9
Above 30	24,3 ±2,4
p≥0,05	
Smoking	
No	24,0 ±3,0
Yes	24,0 ±2,1
p≥0,05	
Alcohol	
Doesn't use	23,9 ±3,1
Once a week	25,0 ±0,0
Once a month	24,8 ±0,6
p≥0,05	
Family history of asthma	
Yes	24,5 ±2,4
No	22,6 ±3,7
p≥0,05	
Duration of asthma	
0-12 months	24,9 ±0,7
1-3 years	22,8 ±3,9
3-5 years	20,6 ±3,3
5 - 10 years	19,0 ±3,7
10 or more years	18,5 ±0,7
p ≤0,001*	
By severity	
Intermittent	24,9 ±0,5
Mild persistent	23,8 ±2,5
Persistent moderate	20,6±5,8
Severe persistent	16,7 ± 2,1
p≤0,001*	

**ANOVA; BMI: Body Mass Index.*

ACT scores varied significantly based on the control level of asthma as per the GINA classification (Figure 1). The mean ACT score was significantly higher in patients with controlled asthma (24.6±1.4 points), compared to those with uncontrolled asthma (16.7±2.1 points, $p < 0.001$). Patients with a partially controlled form of asthma had an intermediate score of 20.3±5.9 points.

ACT scores were significantly lower in patients with a longer duration of asthma (p=0.001), and in those with worsening asthma severity (p=0.001).

In the Table 4, the FEV1, FVC, and FEV1/FVC percentages are noteworthy. The Uncontrollable group displays lower FEV1 and FVC values than both the Controlled and Partially Controlled groups, with these differences being statistically significant in certain comparisons. Particularly, the FEV1 and FEV1/FVC percentages show significant differences when contrasting Controlled and Uncontrollable groups, as well as the Partially Controlled vs. Uncontrollable groups. The indices MOC 25 (L), MOC 50 (L), and MOC 75 (L) do not exhibit significant variations across the groups.

Discussion.

Given the above results, it's clear that the Kazakh version of the ACT questionnaire is valid and reliable tools for assessing asthma control.

This is the first study conducted in Kazakhstan to evaluate the reliability and validity of the Kazakh version of the ACT for patients with asthma. An important factor leading to uncontrolled asthma is an inadequate assessment of control, as highlighted in past research [20]. ACT questionnaire is recognized as reliable, standardized, and validated tool for assessing clinical control of asthma [21].

In our study, the reliability of the Kazakh version of the ACT (α-Cronbach -0.991) questionnaire was demonstrated, making it effective tool for monitoring asthma control. This value aligns with the internal consistency found in the original version and various translations of the ACT questionnaire [8,16,22-24].

Our study found that scores on the Kazakh ACT questionnaire aligned with the level of asthma control, as classified by the GINA guidelines [17]. Previous studies have confirmed that ACT correlate with peer-reviewed asthma control, even though correlation coefficients are around r = 0.5 [25].

An interesting finding of our study is the relationship between age, family history of asthma, duration and severity of asthma and the scores obtained on the ACT scale. This is important because it shows that this questionnaire not only provide an assessment of asthma control, but it can also provide some indication of the factors that may be influencing this control. This can offer valuable insights for clinicians and help inform more personalized approaches to asthma management.

Significantly, the demographic and clinical characteristics of patients showed some consistency on the ACT scale in our study. The duration and severity of asthma, in particular, displayed a statistically significant agreement on the ACT scale, which demonstrates the validity of the translated questionnaire.

Furthermore, we noticed a high prevalence of rhinitis in our study, which aligns with earlier research in Kazakhstan [26]. This highlights the importance of comprehensive management, considering co-existing conditions that can impact asthma control.

However, despite the high level of asthma control according to GINA, previous data indicates a lack of patient knowledge and skills regarding their asthma in Kazakhstan, while pharmacological treatment remains sub-optimal [26]. This emphasizes the need for ongoing educational efforts alongside the use of these questionnaires.

Table 4. *ACT and Pulmonary function test indices by level of control.*

Indicator	ACT			P_{1-2}	P_{1-3}	P_{2-3}
	Controlled	Partially Controlled	Uncontrollable			
FEV1 (%)	96,97 ±4.5	96,66 ±5.2	77,33 ±6.7	0,172	≤0,001*	≤0,05*
FVC (%)	97,25 ±4.0	97,43 ±4.8	88,67 ±5.6	0,467	≤0,05*	≤0,05*
FEV1/FVC (%)	95,36 ±3.5	94,97 ±4.1	84,33 ±4.9	0,098	≤0,05*	≤0,05*
MOC 25 (L)	5,93 ±0.3	5,12 ±0.35	4,73 ±0.4	0.681	0,432	0,231
MOC 50 (L)	4,18 ±0.25	3,73 ±0.28	3,61 ±0.3	0,089	0,184	0,121
MOC 75 (L)	2,02 ±0.15	1,76 ±0.18	1,78 ±0.17	0,165	0,214	0,159

**ANOVA; FEV1: Forced Expiratory Volume; FVC: Forced Vital Capacity.*

Conclusion.

The results of this study demonstrate that the ACT questionnaire, translated into Kazakh, provide a reliable and applicable method for evaluating external control measure in patients with asthma within the Kazakh population. Given their efficacy in monitoring asthma control, this questionnaire may serve as valuable tool for healthcare providers and patients alike, enabling more personalized and effective treatment plans. Continued use and further study of this tool could potentially optimize the prevention, management, and treatment of asthma in Kazakhstan, leading to improved patient outcomes and a better understanding of the disease within this specific demographic.

Study Limitations.

The results of this study should be interpreted in light of certain limitations. First, while the study's participants represent a broad range of individuals, the sample size may not have been sufficiently large or diverse to reflect the full spectrum of the asthma patient population in Kazakhstan. Due to the application of strict inclusion and exclusion criteria, there might have been a reduction in within-sample variability, which limits the generalizability of our findings to the broader population of patients with asthma.

Secondly, the potential for selection bias cannot be overlooked. The study's participants were drawn from a limited number of institutions, which might not accurately represent the diverse population of asthma patients across the country. The conclusions drawn from this research, therefore, may not be fully applicable to all individuals with asthma in Kazakhstan.

Moreover, the study relied on self-reported data from the ACT questionnaire, which may be subject to recall bias and subjectivity. It is important to consider these factors when interpreting the results.

Finally, the cross-sectional nature of this study limits our ability to infer causal relationships. Longitudinal studies would be beneficial to assess the long-term implications of the findings and to monitor changes over time in the asthma control of Kazakh patients.

Despite these limitations, this study makes an important contribution to our understanding of the reliability and applicability of the ACT questionnaire for assessing asthma control in the Kazakh language and setting. Future research should focus on expanding the sample size and diversifying the patient pool to improve the representativeness of the study. Additionally, conducting longitudinal studies will help evaluate the long-term effectiveness of this questionnaire in managing asthma.

Abbreviations.

ACQ: Asthma Control Questionnaire; ACT: Asthma Control Test; GINA: Global Initiative on Asthma; FEV1: Forced Expiratory Volume; PEF: Peak Expiratory Flow; BMI: Body mass index; ERS: European Respiratory Society; ATS: American Thoracic Society; FVC: Forced vital capacity.

Supplementary materials.

Appendix 1. Kazakh version of the ACT questionnaire.

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Authors' Contributions.

ZI, RB, MM, IF, ST, ST drafted the manuscript, ZI, RB, EK, GT, SO conducted the analyses, TS supervised the work, ZI, RB, MM, GT and EK designed and conducted the data collection. All authors read, revised and approved the final manuscript.

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Availability of data and materials.

All the available data was presented within the manuscript text.

Declarations.

Ethic approval and consent to participate.

The study was approved by the Local Ethics Committee of the S.D. Asfendiyarov Kazakh National Medical University, Almaty, Republic of Kazakhstan (protocol of the Local Ethics Commission No. 12 (118) of 28.09.2021). Moreover, the study was registered with ClinicalTrials.gov (NCT05088512). Participation in the study is completely voluntary. All participants signed an informed consent prior to the start of the study.

Consent for publication.

Not applicable.

Competing interests.

The authors declare no conflict of interest.

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