Socio-demographic factors of overweight patients with bronchial asthma associated with receiving counseling on weight loss: population study data

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ABSTRACT

BACKGROUND: Asthma and obesity have a close relationship: obesity is a risk factor for asthma, the link of its pathogenesis, a predictor of heavier flow and the worst control. One of the priorities of non-drug therapy of asthma is the fight against overweight. Preventive counseling allows doctors to teach patients the principles of a healthy lifestyle, including controlling body weight. There is no domestic population-based research that reflects the coverage of overweight persons with asthma of the counseling on weight loss in various socio-demographic groups. Thus our study is actual.

AIMS: Determine socio-demographic factors of overweight patients with bronchial asthma living in Russian urban areas associated with receiving counseling on weight loss.

MATERIALS AND METHODS: This study was based on a cross-sectional population-based study "Know Your Heart" (2015−2018, Arkhangelsk, Novosibirsk, *n*=4504). For this research, we selected overweight patients with asthma (*n*=167). We applied the CHAID (Chi-Squared Automatic Interaction Detection) decision tree to identify socio-demographic factors associated with receiving weight loss counseling. CHAID method allows for the automated classification of the sample and the detection of relationships between the predictors and the analyzed outcome.

RESULTS: The probability of obtaining counseling on weight loss increased by 1.39 times among retired women with obesity compared with the coverage level of counseling in the studied sample as a whole (61.7%). Among the men, the probability of obtaining counseling on weight loss increased 1.27 times in the presence of obesity. Reducing the likelihood of getting counseling both among women (1.39 times compared with the general indicator) and among men (2.2 times compared with the general indicator) was noted if their weight corresponded to the category of the excess body (BMI 25.0−29.9).

CONCLUSION: 61.7% of the overweight urban population of two regions of Russia with asthma received counseling on weight loss. Groups of overweight patients with asthma, which are statistically significantly less often obtaining counseling on weight loss: persons with BMI 25.0−29.9, regardless of gender, and non-retired women with BMI ⩾30.0. The decision tree developed by us will allow allergists-immunologists and doctors of related specialities to be wary of patients from the population groups identified in the study where the activity of conducting preventive counseling is reduced. In turn, this will increase the coverage of preventive counseling for patients with bronchial asthma and, as a result, will contribute to improving asthma control.

Keywords: preventive medicine; counseling; risk factors; body mass index; asthma

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Ассоциация социально-демографических факторов у пациентов с бронхиальной астмой и повышенной массой тела с получением профилактического консультирования по её снижению: данные популяционного исследования

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АННОТАЦИЯ

ОБОСНОВАНИЕ. Бронхиальная астма и ожирение имеют тесную взаимосвязь: ожирение является фактором риска развития бронхиальной астмы, звеном её патогенеза, предиктором более тяжёлого течения и худшего контроля. Одним из приоритетных направлений немедикаментозной терапии бронхиальной астмы является борьба с повышенной массой тела. Профилактическое консультирование позволяет врачам обучать пациентов принципам здорового образа жизни, в том числе контролю массы тела. Актуальность настоящего исследования обусловлена отсутствием отечественных популяционно-репрезентативных исследовательских работ, отражающих охват пациентов с бронхиальной астмой и повышенной массой тела профилактическим консультированием по её снижению в различных социально-демографических группах.

ЦЕЛЬ — проанализировать ассоциации социально-демографических факторов, характеризующих городское население России с бронхиальной астмой в анамнезе и повышенной массой тела, с получением профилактического консультирования по её снижению.

МАТЕРИАЛЫ И МЕТОДЫ. Для проведения настоящей работы была взята база данных исследования «Узнай своё сердце»: одномоментное эпидемиологическое исследование репрезентативной выборки городского населения России в возрасте 35–69 лет (2015–2018 гг., города Архангельск и Новосибирск, $n=4504$). Для исследования из общей выборки были отобраны лица с бронхиальной астмой и индексом массы тела (ИМТ) $\geqslant 25,0$ ($n=167$). Для выявления ассоциаций социально-демографических факторов с профилактическим консультированием по снижению массы тела было разработано дерево классификаций методом CHAID (Chi-Squared Automatic Interaction Detection). Этот метод позволяет в автоматизированном порядке осуществлять классификацию выборки и обнаруживать взаимосвязи между предполагаемыми предикторами и анализируемым исходом.

РЕЗУЛЬТАТЫ. Установлено, что у женщин с ИМТ $\geqslant 30,0$, имеющих статус пенсионера (вне зависимости от причины — возраст, инвалидность и т.д.), вероятность получения профилактического консультирования по снижению массы тела увеличивалась в 1,39 раза по сравнению с уровнем охвата в исследуемой выборке в целом (61,7%). Среди мужчин вероятность получения профилактического консультирования по снижению массы тела увеличивалась в 1,27 раза при наличии ожирения. Профилактическое консультирование проводилось реже как среди женщин (в 1,39 раза по отношению к общему показателю в выборке), так и среди мужчин (в 2,2 раза по сравнению с общевыборочным показателем), если их масса тела соответствовала категории избыточной (ИМТ 25,0–29,9).

ЗАКЛЮЧЕНИЕ. Нами продемонстрирован охват (61,7%) городского населения двух регионов России, страдающего бронхиальной астмой и повышенной массой тела, профилактическим консультированием по её снижению. Установлены группы пациентов с бронхиальной астмой, имеющих повышенный ИМТ, которые статистически значимо реже получают профилактическое консультирование по его снижению: лица с ИМТ от 25,0 до 29,9 вне зависимости от пола и женщины с ИМТ $\geqslant 30,0$, не имеющие пенсионного статуса. Разработанное нами дерево решений позволит сформировать у врачей аллергологов-иммунологов и врачей смежных специальностей настороженность к пациентам из выявленных в исследовании групп населения, где активность проведения профилактического консультирования снижена. В свою очередь это позволит увеличить охват профилактическим консультированием больных бронхиальной астмой и, как следствие, будет способствовать улучшению её контроля.

Background

Bronchial asthma (BA) is a chronic inflammatory disease of the respiratory system that is associated with changes in bronchial reactivity, hypersecretion, and edema of their mucous membranes, followed by bronchospasm, which is clinically manifested by expiratory suffocation attacks in a patient [1]. BA is a serious medical and social problem that leads to a significantly decreased quality of life of patients due to its global prevalence (morbidity 1%−8% of the population) [2].

Nowadays, the prevalence of overweight and obesity is an equally significant problem. According to the multicenter observational study of the epidemiology of cardiovascular diseases and their risk factors in the regions of the Russian Federation (ESSE-RF), the average prevalence of obesity among the adult population of the Russian population is approximately 29.7% and tends to increase [3, 4]. The prevalence of BA among patients with increased body mass index (BMI) was noted in 9%, which exceed the average in the population [5]. This is primarily related to the close relationship between BA and obesity due to common factors in their development pathogenesis. An increased BMI was revealed to have a significant effect on respiratory function and is a risk factor that worsens BA [6]. Thus, histological examination of the lung wall samples of patients with BA demonstrated that the accumulation of adipose tissue in the bronchi is directly proportional to the increased BMI [7]. Moreover, the commonality of the developmental processes of BA and an increased BMI gave grounds to distinguish a special phenotype of BA associated with obesity. Its pathogenesis is based on systemic inflammation accompanied by an imbalance in the level of adipokines (leptin and adiponectin) [8]. Adipokines can regulate the survival and function of eosinophils, as well as their migration from the red bone marrow to the respiratory tract. Studies revealed that a decreased body weight by 5%−10% leads to a significant improvement in the quality of life of patients with asthma [9]. Thus, one of the priority aspects of non-drug therapy for BA, which helps to reduce disease severity progression rate, to achieve control over BA symptoms, is the control of body weight and its reduction in the presence of deviations [10, 11].

One of the available, effective tools for interacting, motivating, and teaching patients a healthy lifestyle, as well as modifying the existing risk factors, particularly increased body weight, is the preventive counseling (PC) of patients by doctors of various specialties, including allergists-immunologists and pulmonologists. The efficiency of PC in motivating patients to reduce body weight has been demonstrated earlier in several studies [12, 13].

Research works that reflect the coverage of patients with BA having increased body weight with PC for its decrease in various socio-demographic groups in unavailable in the Russian population-representative.

Therefore, this study aimed to analyze the associations of socio-demographic factors that characterize the urban population of Russia with a history of BA and increased body weight, with obtaining PC for its reduction.

Materials and methods

Study design

This is an observational, cross-sectional, selective, and uncontrolled study.

Inclusion criteria

This study utilized the database of the study "Know Your Heart", which was conducted within the International Project on Cardiovascular Disease in Russia. "Know Your Heart" is an observational multicenter cross-sectional sampling, uncontrolled, and epidemiological study of a representative sample of the urban population (aged 35−69 years) of two regions of Russia, with 4504 respondents. Among the participants, individuals were first selected (*n*=3234) who, in the course of the survey, reported contact with the health care system at least once during the previous year (visiting doctors/hospitalization/calling for emergency medical care [EMC]); of these, participants were selected who reported a history of BA (*n*=211). Then the final sample was formed from respondents (*n*=167), who, according to the medical examination, had a BMI of 25.0 and higher (Fig. 1).

A detailed protocol for "Know Your Heart" was previously published by S. Cook et al. [14].

Research conditions

"Know your heart" was conducted in the cities of Arkhangelsk and Novosibirsk in two stages, namely (1) a survey to collect demographic, socio-economic, and anamnestic data of respondents, and (2) a comprehensive medical examination. A representative urban sample was formed by randomization stratified by gender, age, city, and region of residence, based on data that was provided by territorial compulsory health insurance funds. The multiple stratifications form a representative sample that reflects the variability of the socio-demographic characteristics of the urban population of Russia. The survey stage was conducted at home when specially trained interviewers visited addresses randomly selected from age and gender lists provided by the territorial bodies of compulsory health insurance. At the end of the survey, respondents were invited to stage 2 of the survey, which is a medical examination, in city medical organizations that provide primary health care. The main information that was analyzed in this study was collected at the survey stage. The BMI of respondents was determined during the medical examination.

Study duration

The baseline "Know Your Heart" was conducted in the period from 2015 to 2018. This study analyzed
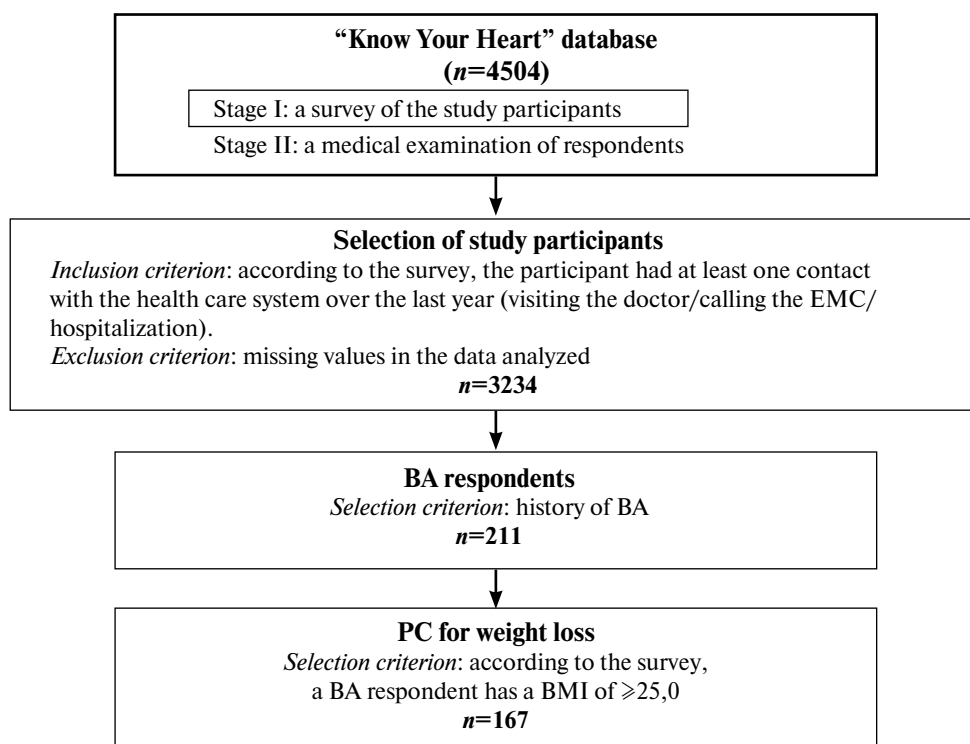
Fig. 1. Scheme for the selection of participants "Know your heart" for this study: the stage during which the database for analysis was collected is highlighted in red; body mass index was determined within the framework of stage II.

N o t e . EMC: emergency medical care; BA: bronchial asthma; PC: preventive counseling; BMI: body mass index.

the associations of socio-demographic factors that characterize the urban population of Russia with a history of BA and increased body weight, with PC for its reduction, in November 2021.

Study outcomes

The main outcome of the study included socio-demographic determination of the groups of patients with BA having increased body weight, with less frequent PC for weight loss.

Additional research outcomes included coverage level determination of the urban population of two regions of Russia, having BA and increased body weight, with PC for weight loss.

Predictor description, recording outcomes methods, and subgroup analysis

Demographic (gender and age), socio-economic (educational level, a permanent paid job, income level, retirement status, marital status, and the presence and number of children), and behavioral factors were selected, including the characteristics of the population's use of the health care system resources (self-assessment of health by the respondent; undergoing medical examination; the number of visits to the primary care physician, cardiologist, and doctors of other specialties per year; the number of hospitalizations and calls to EMC teams over the past 12 months), as well as the main risk factors for BA (smoking and increased BMI) to assess the impact on the probability of receiving PC for weight loss.

The gender of respondents was considered as a binary indicator (male/female), and the interviewer independently indicated it in the questionnaire. The age of participants was considered a discrete quantitative indicator.

According to the educational level, respondents were distributed into four categories, namely compulsory (incomplete secondary or primary vocational education), secondary general (complete secondary or vocational secondary education), vocational secondary (vocational secondary education or incomplete higher education), and higher education.

The presence of a permanently paid job was determined when the respondent positively answered the question "Are you an employee with a permanently paid job". The interviewer noted a positive retirement status when the research participant stated that he was a retiree. The presence of retirement status was unrelated to the age of the study participants, since some of the respondents, for example, had a retirement status due to their disability.

The participants' income was categorized as follows: the low-income group included people with pecuniary burdens when buying food and/or clothing; the middle-income group included participants who noted the emergence of pecuniary burdens when purchasing large household appliances; and the high-income category included participants who did not note the presence of the above-described financial difficulties.

Marital status was categorized as "single" if the respondent did not declare the existence of marriage,

including an unregistered one. In other cases, the respondent was considered married. In the presence of children, three groups were formed (no children, 1—2 children, and with many children).

The activity of using the health care system resources was analyzed according to the answers to the following questions: "How many times did you seek medical help from the following specialists over the last 12 months? Please indicate the number of visits to each specialist", "How many times have you been hospitalized over the last 12 months? (the number of nights/days in the hospital/inpatient facility)", and "How many times did you (someone for you) call an ambulance during the last 12 months? Indicate the number of times". According to the activity of visiting doctors, the respondents were distributed into four groups, namely "did not apply", "1—2 visits", "3—4 visits", and "≥5 visits". By the number of hospitalizations and calls to EMC during the year, they were distributed into three groups, namely "no hospitalizations/calls", "1—2 hospitalizations/EMC calls", and "≥3 hospitalizations/EMC calls".

The prophylactic medical examination information was only collected among respondents who were aware of the prophylactic medical examination program that is implemented in the country and received an invitation of participation by the following questions "Are you going to undergo or have already undergone the prophylactic medical examination?"; if the answer to this question is positive, the respondent was considered to have passed the prophylactic examination. For self-assessment of their health, the study participants answered the question "How would you assess your health in general?" and chose one of the proposed options (excellent, very good, good, moderate, and poor). Further, the respondents who answered "excellent", "very good", or "good" were categorized as having high self-esteem in health, whereas those who answered "moderate" or "poor" were assigned to the group of low self-esteem in health.

Smoking at the time of the study was revealed by the results of answers to the question "Do you currently smoke?"

According to BMI, which was calculated as part of "Know Your Heart" phase 2 during the medical examination, all participants were distributed into three categories, namely overweight (BMI of 25.0—29.9); degree 1 obesity (BMI of 30.0—34.9); and degree 2 obesity or higher (BMI ≥35.0).

PC participation was established when the respondent positively answered the question "Were you advised to change your lifestyle to improve your health, including bodyweight reduction, when visiting a doctor/s (district, cardiologist, and other specialists) over the last 12 months?".

Significant criteria for classifying the sample into subgroups were automatically determined when the statistical program constructed the decision tree.

Ethical considerations

"Know Your Heart" was approved by the ethical committees of the London School of Hygiene & Tropical Medicine (London, UK, protocol No. 8808 dated February 24, 2015); the Northern State Medical University (Arkhangelsk, Russia, protocol No. 01/01-15 of January 27, 2015); the Research Institute of Therapy and Preventive Medicine branch of the Institute of Cytology and Genetics of the Siberian Branch of the Russian Academy of Sciences (Novosibirsk, Russia, protocol unnnumbered dated December 26, 2014); and Novosibirsk State Medical University of the Ministry of Health of the Russian Federation (Novosibirsk, Russia, protocol No. 75 dated May 21, 2015).

This study was approved by the independent ethics committee of the National Medical Research Center for Preventive Medicine of the Ministry of Health of Russia (Moscow, Russia, protocol No. 02-03/19 of March 28, 2019).

Statistical analysis

Principles for calculating the sample size were the following. The sample size of "Know Your Heart" was determined by the study power set levels at 80.0% to compare the results with data from other large international epidemiological studies that study the prevalence and structure of cardiovascular pathology at the population level. The present study selected individuals with BA history and a BMI of 25.0 or higher ($n=167$) from all the participants in "Know Your Heart" (Fig. 1).

Statistical data analyses included statistical data analysis using the International Business Machines Statistical Package for the Social Sciences v.26.0 software (developed by IBM Statistics, USA). Qualitative data were presented as absolute values and percentages. Age was the only quantitative trait analyzed in this work. Before its presentation, the normality of data distribution was assessed using the Kolmogorov—Smirnov test with Lilliefors' correction. The critical level was considered at $p >0.05$, upon reaching which, the data distribution was considered normal. Age had a distribution other than normal, thus the median and interquartile range (Q1—Q3) was calculated when describing it.

Study participants of PC on weight loss were represented by the percentage of participants who received counseling. The Clopper—Pearson method was used to calculate the 95% confidence interval (CI).

A mathematical model of a classification tree (decision tree) was constructed on those who received and did not receive PC for weight loss. Of the 17 selected predictor parameters, 16 were categorical, of which 7 were binary (gender, work status, retirement status, marital status, self-assessment of health, smoking, and undergoing prophylactic medical examination) and 9 were ordinal (educational level; income level; the number of children; BMI; the number of visits during the year to a primary care physician, cardiologist,

or doctors of other specialties; and the number of hospitalizations and EMC calls by category), and 1 parameter (age) was quantitative. Gender was included in the model forcibly for the convenience of interpretation and practical application of the resulting decision tree by practicing physicians.

The classification tree was drawn up using the Chi-Squared Automatic Interaction Detection method, which is an automated multivariate analysis method used to classify a sample based on several predictors. Indicators of sensitivity, specificity, and general diagnostic value with 95% CI were used to assess the classification quality [15]. The critical level of significance in the work was the threshold of $p < 0.05$.

Results

Study participants

Among the urban population of two regions of Russia, who were in contact with the healthcare system, the prevalence of BA was 6.5% ($n=211$), wherein 79.1% ($n=167$) had an increased BMI.

Among the participants ($n=167$ with BA and increased body weight), the vast majority were females (128 patients; 76.6%), the median age was determined at the level of 59.0 years [52.0−63.0]. Most of the respondents (64; 38.3%) had vocational secondary education and 56 (33.5%) had higher education.

The respondents were almost equally distributed in terms of employment, wherein 50.3% (84 patients) did not have a permanent paid and 49.7% (83 patients) were employed.

According to the activity of the population seeking medical help, the distribution was as follows. 36.5% (61) of the respondents underwent a prophylactic medical examination, 85.6% (143) visited a primary care physician during the year, 41.9% (70) visited a cardiologist, and 77.8% (130) visited doctors of other specialties. Additionally, 23.4% (39) of patients were hospitalized over the 12 months and 29.3% (49) applied for EMC.

According to the main risk factors for BA, 20.4% (34) of the respondents were smokers, and according to BMI, 46.1% (77 patients) were overweight and 53.9% (90 patients) were obese. Almost all study participants (166; 99.4%) reported a low level of self-esteem for their health.

Main research findings

A decision tree was drawn up to determine the probability of receiving PC for weight loss among patients with BA from the risk group, depending on demographic, socio-economic, and behavioral characteristics, as well as risk factors for BA. As a result, a mathematical model was obtained, which included three aspects (gender, BMI, and retirement status) of the respondent as inclusion attributes. The resulting classification tree included three levels and contained eight nodes, five of which were terminal (Fig. 2). The Table presents the characteristics of the final decisions.

According to the presented data, in the case of obesity and retirement status in females, the chances of receiving PCs for weight loss increased by 1.39 times compared with the studied sample in general (61.7%). Among males, the probability of receiving PC for weight loss increased by 1.27 times only in the presence of obesity.

PC for weight loss was less frequently performed both among females (1.39 times compared to the general indicator in the sample) and males (2.2 times compared to the general indicator) if their body weight corresponded only to the overweight category (BMI of 25.0−29.9).

The resulting model sensitivity was 70.9% and specificity was 73.4%. The overall percentage of correctly predicted values of the dependent variable was 71.9%±3.5%.

Additional research findings

Generally, the level of coverage of the urban population in two regions with a history of BA and increased body weight ($n=103$) with PC for weight loss was 61.7% (95% CI — 53.8%−69.1%).

Discussion

The study results revealed a 6.5% BA prevalence. The obtained data are comparable with the epidemiological data of the current clinical guidelines for the management of patients with BA, where the same indicator is 6.9%. This indicates that the database underlying our study can be representative [16].

Our data revealed that almost 80.0% of patients with BA are overweight, and more than half of them are obese. Another 2019 population-representative study conducted in the USA revealed that 69.9% of patients with asthma have an increased BMI [17], and most of them (41.1%) have a BMI of 30.0 or higher, which is generally comparable to our results.

Our study demonstrated that the coverage of PC for weight loss in patients with BA history and increased body weight was low, amounting to 61.7%. "Know Your Heart" revealed 48.3% coverage with this type of PC of the urban population, regardless of the existing pathology, in contact with the health care system. Therefore, despite the insufficient coverage with the analyzed preventive medical service in the group of asthmatics and the general population, patients with BA still receive counseling more often on average.

Our study revealed that both females and males significantly more often receive PC for weight loss than the sample average if they have an increased BMI corresponding to the degree of obesity. Statistically significantly less attention on the part of medical specialists is paid to those categories of patients with BA whose BMI corresponds only to the overweight level since overweight patients may not have pronounced clinical manifestations of existing metabolic disorders, particularly shortness of breath, hyperhidrosis, joint pain, lower extremity edema, etc. Therefore, such patients are not always in the focus
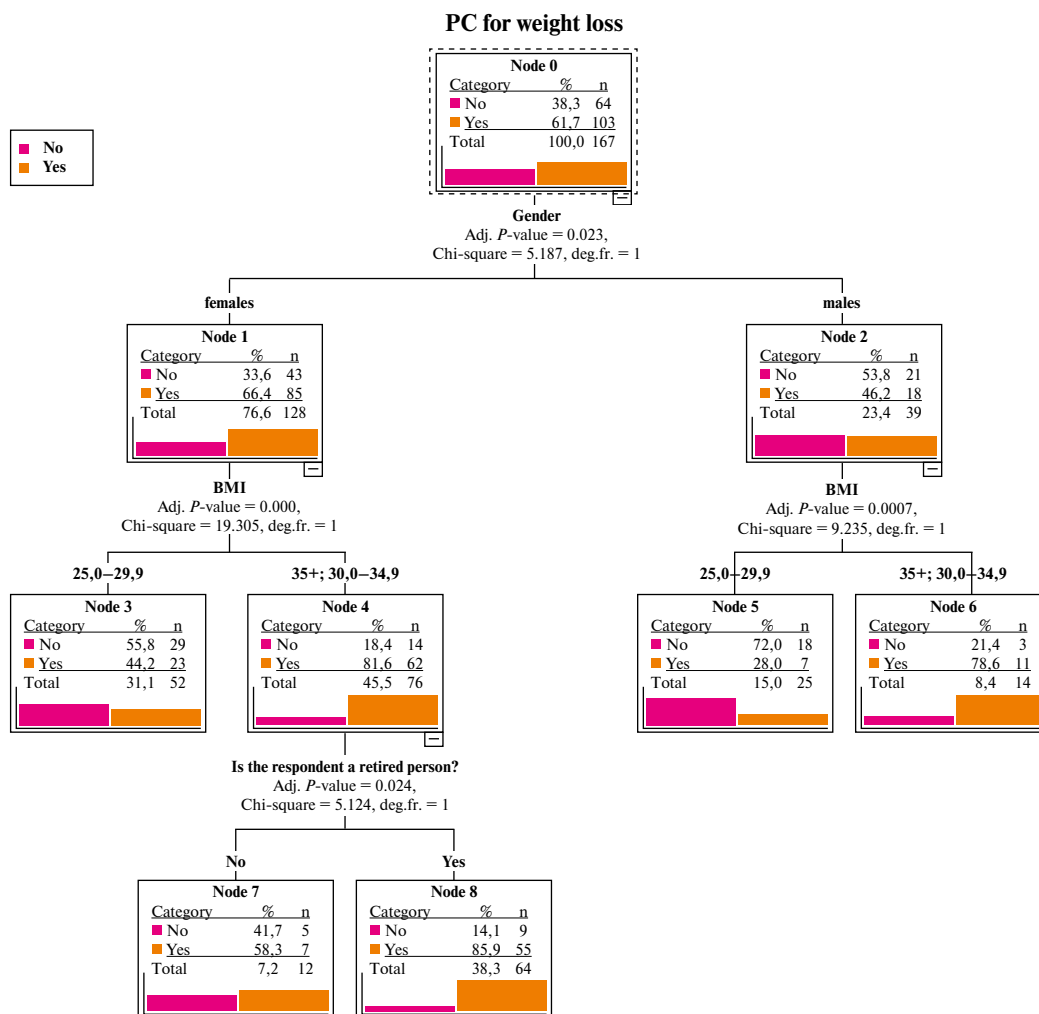
PC for weight loss

Fig. 2. Decision tree that determines the probability of obtaining a weight loss preventive counseling for different categories of overweight people with bronchial asthma.

N o t e . PC: preventive counseling; BMI: body mass index.

Table. Characteristics of terminal nodes (groups) of the resulting decision tree

Node number	Parameter value	Node share in the overall structure, n (%)	Patients received PC for weight loss, %	Index, %
8	Female Obesity Retirement status	64 (38.3)	85.9	139.3
6	Male Obesity	14 (8.4)	78.6	127.4
7	Female Obesity Lack of retirement status	12 (7.2)	58.3	94.6
3	Female Overweight	52 (31.1)	44.2	71.7
5	Male Overweight	25 (15.0)	28.0	45.4

N o t e . PC: preventive counseling.

of attention of the attending physician and do not receive all timely necessary recommendations, including PC. According to research results, obesity is a modifiable risk factor for a more severe course of BA, thus this can lead to adverse consequences for the patient [18]. Achieving normal body weight with a BMI of 25.0−29.9 is noted to be an easier and more achievable task than in the case of patients with obesity.

Moreover, our study revealed that overweight females receive PC for weight loss more often than males of the same weight category. This can be explained from the following perspective. On one hand, females are generally more responsible than males about their health, including BMI control. Females are more often concerned about the aesthetic aspect that accompanies issues of increased body weight [19, 20]. On the other hand, the level of preparedness and communication skills of consulting medical specialists does not always competently arrange the preventive work with the population on the issues of correcting excess body weight, especially with its male part [21].

Our results revealed an association between receiving counseling for weight loss and having retirement status. Thus, among female participants with a BMI of 30.0 or higher, PC on weight loss was performed 1.5 times more often by a pensioner respondent. Additionally, this is a positive trend. Most of the Russian population acquires retirement status by age. The burden of disease in humans is known to increase with aging [22]. Concurrently, obesity is established as a universal risk factor for the development and progression of chronic pathology, its decompensation, as well as a more severe course of acute pathology, which is especially relevant in the context of the coronavirus disease-2019 pandemic [23]. Therefore, counseling for patients of retirement age is undoubtedly one of the priority tasks of medical specialists. Moreover, combating obesity and controlling body weight are more achievable tasks at a young age due to fewer physical limitations, thereby lowering the prevalence of hypodynamia compared with older patients. Thus, when working with obese young patients with BA, doctors need to pay more attention to prevention issues, including in the PC format.

The interaction and support of the patient by doctors and other medical specialists in excess body weight management is an important component of successful weight loss [24]. However, the very question of efficiency of various forms of motivating patients to reduce body weight is a subject of research since proving statistically significant relationships between the PC performed and changes in the patient's body weight are not always possible, or the level of decrease is insignificant [25]. Russian studies that focused on assessing the efficiency of the PC technologies applied for reducing body weight among patients with BA in unavailable, which should be taken into account when planning future studies.

Study limitations

Within the study, the database was formed based on the obtained results by interviewing the participants of "Know Your Heart" interviews. The survey is a valid method of data collection; however, this can lead to certain distortion of the received information due to the risk of systematic errors associated, for example, with the misunderstanding of parties [26].

The results obtained on two representative urban samples have certain limitations in extrapolation to the entire population of Russia.

The present study included patients who sought medical help during the year preceding the participation in the survey, which may lead to some underestimation of the data on the coverage of patients with BA and increased body weight with PC for weight loss.

Additionally, our study was limited to an aged sample of 35−69 years. PC coverage analysis both among younger people and, conversely, among patients over 70 years old, is an urgent research task. All this must be taken into account in future research projects.

Conclusion

Therefore, for the first time, based on a one-stage epidemiological study, "Know Your Heart", we have demonstrated the coverage of the urban population with BA and increased body weight, of two regions of Russia using PC for weight loss (61.7%). We have identified groups of patients with BA with increased BMI who receive PC for its reduction statistically significantly less often, namely patients with BMI of 25.0−29.9 regardless of gender and females with BMI of 30.0 and higher without retirement status

The decision tree that we have developed will alert allergists-immunologists and doctors of related specialties in patients from the identified population groups in the study, where the activity of conducting PC is reduced. Thus, this will increase the coverage of PC for patients with BA and, therefore, will help improve its control.

Additional information

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