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EPIDEMIOLOGY OF KNEE OSTEOARTHRITIS AMONG RURAL RESIDENTS OF YAKUTIA

DOI 10.25789/YMJ.2019.68.12

УДК 616.72-002.775-036.2

Knee osteoarthritis is one of the most common rheumatologic problems. A population study was performed to study the epidemiology of osteoarthritis of the knee joints (gonarthrosis) among the rural indigenous people of Yakutia.

Material and methods: we performed a population study of the adult indigenous population (Yakuts) of 7 villages in central Yakutia. A total of 3.401 people took part in the screening study. The diagnosis of gonarthrosis was made using Altman et al. criteria (1991).

Results: the prevalence of gonarthrosis among the rural population of Yakutia was 12.8% (95% CI: 11.7-14.0) and depended on the age of the examined. Knee osteoarthritis was 2 times more often observed in women. Prevalence rates were 16.9% (95% CI: 15.3-18.7) in women and 7.8% (95% CI: 6.6-9.3) in men, respectively. The mean age of patients with gonarthrosis among the rural population was 56 years. Mechanical overload of the joint in the cold was proved to be the main risk factor for knee osteoarthritis for the rural population.

Conclusions: the high prevalence of gonarthrosis among the indigenous rural residents of Yakutia is due to the features of the population life in the region with extreme climate.

Keywords: epidemiology, gonarthrosis, Yakuts, rural population, Sakha (Yakutia) Republic.

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Introduction. Osteoarthritis (OA) is one of the most common chronic diseases, reducing the life quality of patients. The disease occupies a leading position in the structure of rheumatic diseases (RD). These diseases often lead to physical disability, and their treatment is the most expensive in the world. Analysis of statistical indicators for Russia in 2015-2016 showed that the main share among the class of diseases of the musculoskeletal system (MSSD) is made up of degenerative joint diseases (the incidence of OA is 4 350 465 cases in 2015; with a slight decrease in 2016 to 4 285 464 cases). Annually in the Russian Federation more than 600 OA new cases are recorded per 100 000 adults. More complete information on the prevalence of chronic RD in the population can be obtained in the course of large-scale epidemiological studies. The first studies of the RD epidemiology were conducted in the early 70s and 80s and differed in approaches to diagnosing the disease, and therefore, the prevalence rate varied widely from 4 to 64% [2, 7, 8, 9]. Epidemiological studies using common methods and diagnostic criteria began to be carried out only in the 90s. These researches indicate the OA widespread prevalence among workers in industrial enterprises and agriculture and range from 18 to 41% depending on the region [2, 8, 9]. The last large-scale study was initiated by the Institute of Rheumatology of the Russian Academy of Medical Sciences in the mid-2000s as part of the World Decade of Bones and Joints [3, 4]. The research program developed by the Institute of Rheumatology of the Russian Academy of Medical Sciences together with the Association of Rheumatologists of Russia included the study of the epidemiology and economic burden of rheumatic diseases in various regions of the country among different social groups. The project was implemented in 15 regions of the Russian Federation, including the Sakha (Yakutia) Republic.

The Sakha (Yakutia) Republic is located in the permafrost zone, 40% of the republic's territory lies beyond the Arctic Circle. The region is characterized by a long period of below zero temperatures, the absolute value of the minimum temperature and a significant difference in temperatures in the cold and warm periods of the year. As of January 1, 2018 964.3 thousand people live in the Republic (population density - 0.31 people / km2), including the rural population - 331.5 thousand (34.4%), urban - 632.9 (65.6%). According to 2010 census, the national composition of the population is represented by Yakuts (45.5%), Russians (41.2%), Ukrainians (3.6%), Evenks (1.9%), Evens (1.2%), and other nationalities (6.6%). The territory of the

Republic can be conditionally divided into three climatic and geographical zones, each of which has its own natural, socio-economic and demographic features: polar, central and southern [10]. The polar zone includes areas mainly inhabited by the peoples of the North: Evenks, Evens, Chukchi, Yukagirs. The population is engaged in reindeer husbandry, fur trade. The central zone includes relatively densely populated areas with developed livestock. The main population of this zone is the Yakuts (Sakha). The southern zone includes areas of industrial development, populated mainly by the non-indigenous.

The objective of the research was to study the prevalence, clinical manifestations and risk factors for gonarthrosis among rural residents of the Sakha (Yakutia) Republic.

Materials and research methods. A population study was carried out in 7 rural settlements of the central zone of the Republic and 3 randomized administrative districts of Yakutsk. The article presents the study results among the rural population.

For screening among the rural population, complete lists of residents over 18 years of age were obtained in the local administrations of the villages. The number of persons meeting the inclusion criteria was 4.128. The paramedical personnel and doctors filled out a screening questionnaire for each resident individually during door-to-door survey and in organized groups. A total of 3401 villagers were surveyed, which accounted for 82.4% of the initial list of adult residents (1867 women and 1534 men). Subsequently, a random sample of 695 people was formed from the number of respondents who answered positively to the question about the presence of pain in the knee and/or hip joints during current year. Of these, 687 (98.8%) took part in the study. All study participants underwent an in-depth clinical examination in order to verify the diagnosis. The examination program included the collection of anamnestic data, a physical examination of the joints by a rheumatologist, laboratory and instrumental methods of research (radiography of the affected joints, determination of ESR, CRP, rheumatoid factor). Imaging of the joints was carried out on a portable x-ray device on-site, ESR was determined in the laboratory of local hospital, titers of CRP and rheumatoid factor (RF) were determined later on the basis of the immunological laboratory of the Institute of Health. The diagnosis of gonarthrosis was based on the clinical and radiological criteria of Altman et al. [12].

Statistical processing of the material was carried out using the IBM SPSS Statistics 22 package. The Pearson criterion $\chi 2$ was used to compare the groups. The critical value of the level of statistical significance of differences (p) was taken to be 5%. To assess the risk, the prevalence ratio was calculated at 95% confidence intervals (CI).

Results and discussion. The diagnosis of OA was verified in 687 people (468 women and 219 men) who complained of pain in the knee and/or hip joints. According to Altman et al. criteria (1991) gonarthrosis was established in 436 of examined. Thus, the prevalence of gonarthrosis among rural residents of Yakutia (n = 3401) was 12.8% (95% CI: 11.7-14.0) (Table 1). The prevalence of gonarthrosis depends on the studied population and the epidemiological method used. Comparable prevalence rates were obtained in an epidemiological study conducted in the USA in 1971-1975 (First National Health and Nutrition Examination Survey (NHANES-1). In this study, which is similar in methodology, a clinical diagnosis of the knee OA was made in 12% of 6913 subjects, aged 25-74 years [1]. According to the data of L.I. Benevolenskaya, among 2659 identified patients, gonarthrosis was diagnosed in 76.8% of men and 68% of women [2].

The modern concept of the gonarthrosis etiology connects the development of the disease with the combined influence of both endo- and exogenous factors, i.e. the disease has a multifactorial origin. Among endogenous factors, gender and age play a role. According to domestic and foreign studies, gonarthrosis is more common in women aged 50 to 80 years [1, 2, 11, 12, 13].

In our study, gonarthrosis was also two times more likely to be present in women. Prevalence rates were 16.9% (95% CI: 15.3-18.7) in women and 7.8% (95% CI: 6.6-9.3) in men. The mean age of gonarthrosis patients among the rural population was 56 years. The disease more often began at the age of 40-49 years and reached a maximum frequency at 60-69 years.

In the Republic Sakha (Yakutia), such a factor as the vast permafrost zone leaves its mark on economic, sanitary-hygienic living conditions of people [5, 6, 7]. This is especially reflected in the life of rural residents.

When analyzing the influence of risk factors on the frequency of OA, the prevalence ratio was used as an effect measure (Table 2). The prevalence of gonarthrosis was 4.1 (2.3-7.2) times higher among respondents working at low temperatures than in people without a history of this factor. Significant risk factors for the development of OA were also long walking, the need to exert great efforts during work, lifting and carrying weights, stereotypical movements, prolonged forced position of the body, load on the knee

Table 1

Prevalence of gonarthrosis among the rural population of Yakutia (%) with 95% CI

Age, yrs	Male	Female	Both
18-29	0.8 (0-3.3)	0.0 (0-2.2)	0.4 (0-1.7)
30-39	1.2 (0.2-3.4)	2.5 (1.2-4.7)	1.9 (1.8-6.0)
40-49	6.7 (4.7-9.5)	17.1 (14.2-20.4)	12.4 (10.5-14.6)
50-29	10.3 (6.9-14.8)	27.7 (23.3-32.6)	20.5 (17.5-24.0)
60-69	25.8 (18.5-34.6)	52.4 (44.0-60.7)	40.1 (34.4-46.2)
70 and elder	26.4 (17.8-36.9)	26.2 (18.8-35.1)	26.3 (20.7-32.8)
18 and elder	7.8 (6.6-9.3)	16.9 (15.3-18.7)	12.8 (11.7-14.0)

Table 2

OA prevalence ratio in relation to the risk factors with 95% CI

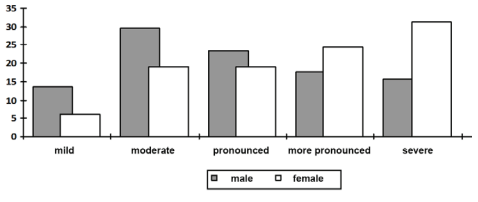
Risk factor	Prevalence ratio	p
Working at low temperature	4.1 (2.3-7.2)	<0.001
Forced position of the body	2.0 (1.5-2.6)	<0.001
Other statistical loads	2.2 (1.7-2.9)	<0.001
Long walking	2.0 (1.4-3.0)	<0.001
Squats	2.1 (1.5-2.7)	<0.001
Stereotypical movements	2.3 (1.8-2.9)	<0.001
Need to exert great efforts	2.1 (1.6-2.8)	<0.001
Lifting and carrying weights	1.3 (1.0-1.7)	0.044

joints associated with frequent squats.

Analysis of the severity of gonarthrosis according to the algo-functional index of Leken in relation to gender is presented in Fig. In men, gonarthrosis was more common with mild, moderate (29.5%) and severe (23.5%) severity, and in women - significantly pronounced (24.4%) and sharply expressed (31.3%) severity.

At analyzing research data from NHES and NHANES-1 Lawrence et al. it was found that the prevalence of mild, moderate and severe OA in the age groups of 35-44 and 45-54 years was 1.6 and 3.0% respectively, the prevalence of moderate and severe OA was 0.3 and 0.4%, respectively [1]. Thus, in the Yakut rural population, gonarthrosis of severe degrees of functional insufficiency is most common (Fig.).

The leading clinical symptom that reduces the quality of life of gonarthrosis



Leken's functional index by sex.

patients is pain. Table 3 presents the characteristics of the pain syndrome at knee OA according to the results of the questionnaire. Pain syndrome was most often manifested in the form of pain and discomfort at standing up from a sitting position (78.4%). Also, most of gonarthrosis patients (70.5%) noted morning stiffness for about 15 minutes or pain after getting out of bed. The next most characteristic sign was pain, aggravated after standing for 30 minutes (60.8%). More than half of patients noted night pain in the knee joints (65.0%).

Pain in 56.6% of patients was accompanied by a history of swelling of the knee joints. The joint swelling was most often noted by patients with a pronounced severity of gonarthrosis by Leken (32%).

Assessment of maximum distance without pain in the knee joints revealed that 60.2% of patients could walk more than 1 km without pain in the knee joints, but with limitations. A smaller proportion of patients noted a distance of 100 m to 1 km. 6.1% of respondents could walk less than 100 m only without pain. 15.6% of patients had to use a stick or crutch when walking.

Among the signs characterizing the existence of limitations in everyday life, the most common symptom was the inability to kneel due to pain in the knee joint (80.1%) and a sudden feeling of loss of support on the affected limb (54.8%).

Thus, gonarthrosis in the rural population of Yakutia has a pronounced degree of functional insufficiency, accompanied by a significant restriction of movement and pain.

Conclusion. The results of our study can serve as the basis for the planning of preventive and therapeutic care, taking into account working and life conditions of rural residents, timely diagnosis of the disease at the early stages of its development, adequate treatment, dispensary observation and rehabilitation treatment with the involvement of local hospitals.

Table 3

Characteristics of the pain syndrome at knee OA

Pain character	Definite OA		Probable OA		Manifesting OA	
	n	%	n	%	n	%
Night pain: only when moving or in a certain position	9	10.5	2	2.5	11	6.6
even without movement	51	59.3	57	71.2	108	65.0
morning stiffness for about 15 minutes or pain after getting out of bed: less than 15 min	58	67.4	59	73.7	117	70.5
more than 15 min	16	18.6	8	10.0	24	14.4
Pain. aggravated after standing for 30 minutes	55	63.9	46	57.5	101	60.8
Pain occurs when walking: only after passing a certain distance	56	65.1	51	63.7	107	92.2
from the outset. and then it is aggravated	16	18.6	21	26.3	37	22.3
Pain or discomfort when standing up	64	74.4	66	82.5	130	78.3

The study was carried out as basic part of the state task of the Ministry of Education and Science of the Russian Federation on the topic "Clinical and genetic aspects of diseases characteristic of the indigenous people of Yakutia in modern conditions" (state registration number 17.6344.2017 / 8.9).

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POSSIBILITIES OF PREDICTION OF NEUROTIC, STRESS-RELATED DISORDERS COURSE IN TERMS OF HORMONAL PARAMETERS

DOI 10.25789/YMJ.2019.68.13

УДК 616.8-085.851:616-006

One of the most common and universal disorders of mental adaptation are non-psychotic mental disorders, in which development a large role plays various endocrine and biochemical mechanisms of response to stress. The purpose of the study is to determine the contribution of the endocrine system to the formation of neurotic, stress-related disorders in order to identify the criteria for predicting their protracted course. Material and Methods. A comprehensive clinical-psychopathological and hormonal examination of 43 women (mean age 39.43±7.23 years) inpatient at the first clinical psychiatric unit of the clinic of Mental Health Research Institute of Tomsk NRMC with various types of the course of neurotic, stress-related disorders was performed. According to the criteria ICD-10 all patients were divided to clinical groups: adjustment disorders (F 43.2) and enduring personality change after psychiatric illness (F 62.1). Investigation of hormonal status included determination of concentrations of cortisol, prolactin and thyroid-stimulating hormone (TSH) in serum by the method Enzyme Immunoassay (EIA). The hormonal status of 32 healthy women was taken as a control. Results. A psychopathological investigation of patients showed that overexertion of protective mental mechanisms associated with the impact of a stressful situation can lead to a breakdown in adaptation, disturbances of normal functioning and the emergence of various neurotic symptoms that fall into the diagnostic category F 43.2 (adjustment disorders). As the damaging effects of unfavorable factors and stressful co-existence accumulated, the “health resources” decreased, which was a starting point in the formation of persistent personality changes and transition to another diagnostic category F 62.1 Persistent personality change after a mental disorder. The characteristics of the hormonal status of patients with a protracted neurotic, stress-related disorders were: high concentrations of cortisol, prolactin and low serum levels of thyrotropic hormone, which allows considering them as predictors of persistent personality change at early stage of the diseases. Conclusion We determined the hormonal criteria for predicting a protracted course of neurotic, stress-related disorders with the formation of a persistent personality changes at an early stage of the disease - at the stage of disorder of adaptive reactions.

Keywords: neurotic, stress-related disorders, adjustment disorders, enduring personality change, cortisol, prolactin, thyrotrophic hormone.

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Introduction. One of the most common and universal disorders of mental adaptation are non-psychotic mental disorders, in which development a large role is played by various endocrine and biochemical mechanisms of response to stress [1, 4]. These mechanisms are usually not the cause of the breakdown of adaptation, but its effect, since they are not specific to one or another stress factor and are aimed at achieving early compensation. [18]. Various adverse factors that can lead to maladjustment, accompany a person throughout life. However, in some individuals, adjustment disorders are acute, while others develop chronic forms of neurotic states. The question of why this is happening remains open, despite numerous studies in this field. The relevance of the problem of differentiated prediction of the course of such disorders has been dictated recently by the increasing prevalence of neurotic, stress-related disorders and the need to improve the quality of life, preserve and develop the labor potential of the population, taking into account the tasks and forecasts of the economic, social and psychological development of the country. Highlighting the criteria for distinguishing between initial and protracted forms of non-psychotic mental disorders helps to identify those suffering from these disorders at the early stages of the disease that helps to prevent an unfavorable trend in the dynamics of neurotic states. Under stress, an increase in the level of hormones is observed, which in physiological quantities are necessary for the normal functioning of all systems of the organism. But if an organism synthesizes an excessive amount of stress hormones for a long time, then undesirable reactions emerge in it, leading to the occurrence of pathological states and the development of various diseases. By additional assessment of the hormonal parameters to the general medical ones, which characterize the adaptation of the organism to the constantly changing environmental conditions, including the mobilization of the organism under the action of stress factors, a differentiated prediction of the course of non-psychotic mental disorders of the neurotic rank is carried out.

The purpose of the study is to determine the contribution of the endocrine system to the formation of neurotic, stress-related disorders in order to iden-