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## EPIDEMIOLOGICAL ASPECTS OF OSTEOARTHRITIS AND TOTAL ARTHROPLASTY

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### Abstract

**Background.** In the field of osteoarthritis study, both epidemiological and clinical researches are carried out. If epidemiological studies can identify the prevalence and risk factors for the development of the disease, then clinical studies reveal the prospects for drug and interventional therapy of osteoarthritis.

**Search strategy.** We have performed a search and analysis of relevant information of English-language and domestic sources published over the past 10 years. The search for English-language resources was carried out in the scientific database Pubmed (<https://www.ncbi.nlm.nih.gov>), to work with sources in Russian and Kazakh, the scientific electronic library e-Library (<https://elibrary.ru>) was used.

The Pubmed database was searched for: (Osteoarthritis [Mesh] And Osteoarthritis / Epidemiology [Mesh] (153 results), (Osteoarthritis [Mesh] And Osteoarthritis / Surgery [Mesh] (480 results), as well as ("Arthroplasty, replacement, knee / epidemiology" [Mesh]) and "Osteoarthritis" [Mesh] (59 results) ("Osteoarthritis, replacement", "Hip / epidemiology") [Mesh] (66 results). The eLibrary resource searched in Russian and English for the keywords: osteoarthritis, hip joint replacement, coxarthrosis, gonarthrosis, (4 results).

The criteria for inclusion in the review were: search depth: from January 1, 2009 to October 1, 2018; publication languages: English, Kazakh, Russian; age of study participant: 18 years and older; methods of intervention: surgical; type of articles - full-textured epidemiological and clinical studies.

**The results of the study.** A total of 762 articles were found. For the subsequent analysis, 33 articles were selected that met the inclusion criteria and excluded duplication or repetition of information.

**Conclusion.** The results of this review study showed that the prevalence of OA remains equally high throughout the world, and temporal trends reflect a trend towards an increase in morbidity due to an aging population and an increase in the proportion of obese patients. The highest epidemiological indicators of large joint arthroplasty (arthroplasty) for OA are traditionally observed in countries with a high standard of living. However, the widespread introduction of high-tech standards of medical care for patients with coxarthrosis and gonarthrosis in the Republic of Kazakhstan requires further study.

**Keywords:** *osteoarthritis, endoprosthetics, gonarthrosis, coxarthrosis, arthroplasty.*

### Резюме

## ЭПИДЕМИОЛОГИЧЕСКИЕ АСПЕКТЫ ОСТЕОАРТРОЗА И ТОТАЛЬНОГО ЭНДОПРОТЕЗИРОВАНИЯ

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**Актуальность.** В сфере изучения остеоартроза проводятся как эпидемиологические, так и клинические исследования. Если эпидемиологические исследования позволяют выявить распространенность и факторы риска развития заболевания, то клинические исследования раскрывают перспективы лекарственной и интервенционной терапии остеоартроза.

**Стратегия поиска.** Нами был выполнен поиск и анализ релевантной информации англоязычных и отечественных источников, опубликованных за последние 10 лет. Поиск англоязычных ресурсов проводился в научной базе данных Pubmed (<https://www.ncbi.nlm.nih.gov>), для работы источниками на русском и казахском языках использовалась научная электронная библиотека e-Library (<https://elibrary.ru>).

В базе данных Pubmed поиск осуществляли по запросам: («Остеоартрит» [Mesh] И «Остеоартрит / эпидемиология» [Mesh] (153 результатов), («Остеоартрит» [Mesh] И «Остеоартрит / хирургия» [Mesh] (480 результатов), а также («Артропластика, замена, колено / эпидемиология» [Mesh] И «Остеоартрит» [Mesh] (59 результатов) («Артроз, замена», «Бедро / эпидемиология») [Mesh] (66 результатов). В ресурсе eLibrary поиск

проводили на русском и английском языках по ключевым словам: остеоартроз, эндопротезирование тазобедренного сустава, коксартроз, гонартроз, (4 результата).

*Критериями включения* в обзор были: глубина поиска: с 1 января 2009 года по 1 октября 2018 года; языки публикации: английский, казахский, русский; возраст участника исследования: 18 лет и старше; методы вмешательства: хирургические; вид статей - полнотекстовые эпидемиологические и клинические исследования.

**Результаты исследования.** Всего было найдено 762 статьи. Для последующего анализа было отобрано 33 статьи, отвечающие критериям включения и исключающие дублирование или повтор информации.

**Заключение.** Результаты данного обзорного исследования показали, что распространенность ОА остается одинаково высокой во всем мире, а временные тенденции отражают тенденцию к увеличению заболеваемости вследствие старения населения и увеличения доли пациентов с ожирением. Самые высокие эпидемиологические показатели эндопротезирования крупных суставов (артропластики) при ОА традиционно наблюдаются в странах с высоким уровнем жизни. Однако широкое внедрение высокотехнологичных стандартов медицинской помощи пациентам с коксартрозом и гонартрозом в Республике Казахстан требует дальнейшего изучения.

**Ключевые слова:** остеоартроз, эндопротезирование, гонартроз, коксартроз, артропластика.

Түйіндеме

## ОСТЕОАРТРОЗДЫҢ ЖӘНЕ ЖАППАЙ ЭНДОПРОТЕЗДЕУДІҢ ЭПИДЕМИОЛОГИЯЛЫҚ АСПЕКТІЛЕРІ

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**Өзектілігі.** Остеоартрозды зерттеу саласында эпидемиологиялық, сондай -ақ клиникалық зерттеулер өткізіледі. Егер эпидемиологиялық зерттеулер ауруларды дамыту қаупінің таралуы мен факторларын анықтауға мүмкіндік берсе, онда клиникалық зерттеулер остеоартроздың дәрілік және интервенциялық терапиясының перспективаларын ашады.

**Іздену стратегиясы.** Бізбен соңғы 10 жылда жарияланған ағылшын тілдес және отандық түпнұсқаларды іздеу және релевантты ақпараттарды талдау орындалды.

Ағылшын тіліндегі ресурстарды іздеу Pubmed (<https://www.ncbi.nlm.nih.gov>) ғылыми базасында, орыс және қазақ тілдеріндегі дереккөздермен жұмыс жасау үшін, e-Library (<https://elibrary.ru>) ғылыми электрондық кітапханасы қолданылды. Pubmed мәліметтер базасында мынадай өтінімдер бойынша іздеулер: («Остеоартрит» [Mesh]) және «Остеоартрит/Эпидемиология» [Mesh] (153 нәтиже), («Остеоартрит» [Mesh]) және «Остеоартрит/ Хирургия» [Mesh] (480) нәтижелер), сонымен қатар («Артропластика, ауыстыру, тізе/эпидемиология» [Mesh]) және «Остеоартрит» [Mesh] (59 нәтиже) («Артроз, ауыстыру», «Жамбас/эпидемиология») [Mesh] (66 нәтиже). E-Library ресурсында орыс және ағылшын тілдерінде кілт сөздерді іздеу жүргізілді: остеоартроз, жамбас буындарын эндопротездеу, коксартроз, гонартроз, (4 нәтиже).

Шолуға *енгізу критерілері болды:* іздеу тереңдігі: 2009 жылдың 01 қаңтарынан 2018 жылдың 01 қазанына дейін; жарияланымдар тілі: ағылшын, қазақ, орыс; зерттеуге қатысушылар жасы: 18 жас және одан жоғары; араласу әдістері: хирургиялық; мақалалар түрі – толық мәтінді эпидемиологиялық және клиникалық зерттеулер.

**Зерттеу нәтижелері.** Барлығы 762 мақала табылды. Кейінгі талдау үшін қосу критерийлеріне сәйкес келетін және ақпараттың қайталануын немесе қайталануын болдырмайтын 33 мақала таңдалды.

**Қорытынды.** Осы шолу зерттеуінің нәтижелері бүкіл әлемде ОА-ның таралуы бірдей деңгейде болып отырғандығын көрсетті, ал уақытша үрдістер қартаюға және семіздікке шалдыққан науқастар санының өсуіне байланысты аурудың өсу тенденциясын көрсетеді. Үлкен бірлескен артропластиканың (артропластиканың) жоғары эпидемиологиялық көрсеткіштері өмір сүру деңгейі жоғары елдерде дәстүрлі түрде байқалады. Алайда, Қазақстан Республикасында коксартроз және гонартроз аурулары бар науқастарға медициналық көмектің жоғары технологиялық стандарттарын кеңінен енгізу әрі қарайғы зерттеуді талап етеді.

**Негізгі сөздер:** остеоартроз, эндопротездеу, гонартроз, коксартроз, артропластика.

### Библиографическая ссылка:

Серикова-Есенгельдина Д.С., Горемыкина М.В., Глушкова Н.Е. Эпидемиологические аспекты остеоартроза и тотального эндопротезирования // Наука и Здравоохранение. 2019. 5 (Т.21). С. 5-10.

Serikova-Esengeldina D.S., Goremykina M.V., Glushkova N.E. Epidemiological aspects of osteoarthritis and total arthroplasty // *Nauka i Zdravookhraneniye* [Science & Healthcare]. 2019, (Vol.21) 5, pp. 5-10.

Серикова-Есенгельдина Д.С., Горемыкина М.В., Глушкова Н.Е. Остеоартроздың және жаппай эндопротездеудің эпидемиологиялық аспектілері // Ғылым және Денсаулық сақтау. 2019. 5 (Т.21). Б. 5-10.

## Introduction

Osteoarthritis is a progressive degenerative joint change that occurs mainly in elderly people. Modern concepts of pathogenesis put in the forefront biochemical changes and biomechanical stress in affected articular cartilage, while the theory of age-related changes is considered to be obsolete [1, 17]. Among all the publishing of Europe and CIS countries the term "osteoarthritis/osteoarthritisdeformans" is most common.

In the international classification of diseases of the 10th revision osteoarthritis (OA) combines the following headings: M 15 (polyarthritis), M16 (coxarthrosis/hip arthrosis), M17 (gonarthrosis/knee arthrosis), M18 (arthrosis of the first metacarpal joint), M19 (other arthrosis). Such categorization is convenient, because it includes both primary and posttraumaticosteoarthritis [2].

Since OA is characterized mainly by the large joints (knee and hip) damage, it becomes clear why OA is the leading cause of functional insufficiency of the lower extremities among the elderly people. The proportion of OA in the rate of the average life expectancy decline is 40% among men and 47% among women. The risks increase even more in the category of adult population suffering from obesity [3].

Up to date, OA is one of the most common diseases in General medical practice with a projected increase in prevalence due to ageing of the population and increasing prevalence of obesity [3]. These data are confirmed in research made by Lawrence and co-author (2008), according to which the number of people suffering from OA at the age of 25 years and older has increased in one decade: from 21 million in 1995 to 27 million in 2005 [3]. The purpose of our review is to study the prevalence and other epidemiological indicators of OA and endoprosthetics of large joints according to foreign and domestic literature.

## Materials and methods

The search for English-language resources was carried out in the database of abstracts Pubmed (<https://www.ncbi.nlm.nih.gov>), for work with links in Russian and Kazakh languages were used scientific electronic library e-Library (<https://elibrary.ru>).

The following list of keywords was developed in order to search for information: osteoarthritis, endoprosthesis, gonarthrosis, coxarthrosis (osteoarthrosis, endoprosthetics/joint replacement, coxarthrosis, gonarthrosis).

The following search syntax was used on MeSH in the Pubmed online database: ("Osteoarthritis"[Mesh]) AND "Osteoarthritis/epidemiology"[Mesh] (153 results), ("Osteoarthritis"[Mesh]) AND "Osteoarthritis/surgery"[Mesh] (480 results), and ("Arthroplasty, Replacement, Knee/epidemiology"[Mesh]) AND "Osteoarthritis"[Mesh] (59 results) ("Osteoarthritis"[Mesh]) AND "Arthroplasty, Replacement, Hip/epidemiology"[Mesh] (66 results). The search by key words in Russian and English indicating the location was set up on the resource eLibrary: osteoarthritis, hip replacement, coxarthrosis, gonarthrosis, Kazakhstan, Russian Federation (4 results).

The main criteria included into the review were: the depth of the search: from January 1, 2009 to October 1, 2018; publication languages: English, Kazakh, Russian; age of the sample under study: 18 and older; methods of

intervention: surgical; type of articles – full-text epidemiological and clinical studies.

According to the results of the search for sources all authors of the article according to the search syntax and included criteria, as well as the elimination of duplicate entries were selected 33 articles for inclusion in the review.

## Results

### Prevalence and incidence of osteoarthritis

Osteoarthritis is the most common disease of the musculoskeletal system and one of the most important public health problems [4,18]. Although epidemiological data on the prevalence and incidence of OA vary according to the results of numerous studies, one thing remains common for all sources – a significant number of the adult population is exposed to the studied pathology [5,6]. It is worth noting the approaches used in the diagnosis of OA. OA may be defined on pathological and radiological study, as well as clinically. In the English-language literature, the most popular method is x-ray examination with the interpretation of the results by Kellgren and Lawrence system. The scale ranks the degree of severity from 0 to 4 points with the intelligence of AO by x-ray signs in the presence of 2 points or more [19].

Recent cohort and population-based studies present results on the prevalence of OA in various joints based on both clinical and radiological data. According to the study made by Kim with co-authors (2014), age-standardized prevalence of OA based on clinical and radiological criteria was 19.6% (95% CI 16.7-23.0%) and 4.2% (95% CI 2.9-6.1%), respectively. The sample included 978 people aged 50 year old and older who lived in the city of Framingham from 2002 to 2005 (middle age 63.5 years old; women 56%). Another interesting result of the study was the fact that the frequency of diagnosis of hip joint OA, exposed on the basis of x-ray examination, in men was statistically significantly higher than in women (24.7% vs. 13.6%;  $p < 0.001$ ) (7).

The prevalence of knee joint OA in Malmo (Sweden) in a cohort of adults aged 56 to 84 years old according to clinical and radiological data was 25.5% (95% CI 24.1-26.1%) and 15.4% (95% CI 14.2-16.7%), respectively. The study involved 10,000 residents, 62% of whom were women, and the average age of the sample was 70 years old (standard deviation is 7.6 years). The average body mass index in the studied population was 27.1 kg / m<sup>2</sup> [8]. According to Kalichman and co-authors (2014) the frequency of OA of the foot joints varies from 0.1% to 61%, and such a scale depends on age, gender and clinical features [9].

A large population-based two-stage cross-sectional study was conducted in the UK as part of the North Staffordshire Osteoarthritis Project. Twenty-six thousand adults over 50 years old were interviewed using specially designed questionnaires, the response rate was 72%. About half of the respondents were affected by at least one group of joints (hip, knee, hands and feet) (53.23%; 95% CI 52.3 – 54.1%), and one in five participants with OA had joint function disorders (21.87%; 95% CI 21.2 – 22.5%). The more groups of joints were involved in the pathological process, the higher chance of the development of functional disorders. According to the North Staffordshire Osteoarthritis Project, the prevalence of OA was higher among women,

and the risk of development was associated with age. When extrapolating the results of this study to the population of England, the authors suggested that the prevalence of OA with functional joint disorders can reach 3.5 million, including 1.45 million patients aged 50-65 years old and 370000 patients older than 85 years [10].

According to a systematic review conducted as part of the global burden of disease study (2010), the prevalence of OA of knee joint is 3.8% and coxarthrosis is 0.85%. Among the 300 studied diseases, OA ranks 11th among the causes of disability in the adult population [11]. A growing number of studies on the prevalence and incidence of OA use huge administrative databases [12,13,14,15]. The Moriatis study (2014) used a Swedish population register covering data from 1998 to 2012. The authors analyzed data from the town of Skane in southern Sweden with a population of 1.24 million people. Over 15 years, the register recorded all cases of OA carpometacarpal articulation diagnosed by a General practitioner in the adult population over 20 years old. According to the results of the analysis, the frequency of the studied nosology among adults averaged 1.4% (2.2% among women and 0.62% among men). The average age of patients with OA carpometacarpal was  $67.7 \pm 11.4$  years; 78.5% of diagnoses were determined in female patients. The highest frequency of the disease recorded among women aged 70-74 years old (5.3%) and men aged 80-84 years old (1.7 percent). The age of the first diagnosis of the studied nosology also has gender characteristics (60-69 years old – in women; 70-79 years old – in men) (12). The continuation of this study was the prediction of the disease prevalence in 2032 based on the analysis of 531254 records of the health Register Skane. The incidence of OA among persons aged over 45 years old in 2012 was 26.6% (95% CI 26.5-26.8%). In most cases knee joints were affected (13.8%), followed by hip joints (5.8%) and wrist joints (3.1%). In every fourth recorded case, the patient had multiple affected joints. The authors' calculations predict an increase in the prevalence of OA among people older than 45 from 26.6% to 29.5% (any joint), from 13.8% to 15.7% for gonarthrosis and from 5.8% to 6.9% for coxarthrosis by 2032 [15].

Another population-based study on the incidence of OA was conducted in Western Canada in 2014. The authors analyzed a database of calls for medical help ( $n=640000$ ) in British Columbia in the period from 1991/1992 to 2008/2009. As the criteria for the diagnosis of OA, the researchers chose: 1 – at least one General practitioner visitor an apply to hospital; 2-at least 2 doctor visits or 1 apply to a hospital. In 2008/2009, the overall incidence of OA according to criterion 1 was 14.6% among men and 16.3% among women (per 1000 person in a year). Between 2000/2001 and 2008/2009, the overall crude incidence increased by 2.5-3.3% for men and women. Age-standardized incidence increased by 0.6-0.8% among men, there was not observed such trend among women [13]. A similar study was also conducted in Spain, the register SIDIAP contained records of more than 5 million inhabitants of Catalonia. The incidence was assessed with the consideration of the OA diagnosis of the knee, hip joints and hands with the use of ICD-10 coding among persons older than 40 years old in the period from 2006 to 2010. According to the results of the study, the authors noted a

constant increase in gonarthrosis and coxarthrosis due to age. The highest ratio of the prevalence of nosology in women to the same indicator among men was the highest in the age group of 70-75 years old, while the mentioned indicator for the OA of the joints of the hands was the highest in the group of 50-55 years old [14].

We have to understand that studies based on the analysis of databases of the register have certain limitations in view of the inaccuracies of diagnosis in accordance with ICD-10, but at the same time, without a large population-based studies, it is impossible to study the burden and trends in the development of the disease [16]. An example of a population-based study using Kazakhstan's national statistical data is the article by M. Nogayeva (2015). According to the author in the structure of diseases of the musculoskeletal system in 2012, gonarthrosis accounted for 10.9%, and coxarthrosis was first diagnosed in 4.4% of cases. Dynamics of growth of hip and ankle joints OA for 2011-2012 was 1.1% [24].

We should also focus on the epidemiological indicators of post-traumatic osteoarthritis (POA), since this class of joint lesions has a slightly different etiopathogenetic characteristic [23]. The results of analytical studies indicate a higher (4.2 times) risk of gonarthrosis in persons with a history of knee injuries [20]. The epidemiological situation is rather different with regard to the prevalence of ankle OA. According Valderabano (2009) 78% with the ankle joint POA indicate a history of trauma to the specified region of body [21]. Among the risk factors for the development of POA it is worth noting the intense physical activity on the affected joints. For example, the frequency of post-traumatic coxarthrosis among military personnel can reach 20% [22].

#### **Epidemiology of hip and knee endoprosthetics in osteoarthritis**

Endoprosthetics (another term used in foreign literature – arthroplasty) is the most frequently recommended modality of surgical intervention in the final stages of the hip and knee joints OA [25,26]. From the standpoint of evidence-based medicine, this approach is also justified: the results of a systematic review of Nelson and co-authors (2014) showed that elective endoprosthetics may be recommended for a certain proportion of patients with gonarthrosis or coxarthrosis, while arthroscopy with removal of damaged tissues is not recommended in cases of symptomatic gonarthrosis [27].

Information on the prevalence of surgical interventions in OA varies depending on the specifics of the studied region. So, according to Kremers and co-authors (2010) the frequency of total endoprosthetics in the United States in 2010 was 0.83% and 1.52% for hip and knee joints, respectively. The frequency of interventions was significantly higher among women and increased with age, reaching 5.26% for total hip replacement and 10.38% for gonarthrosis in persons over 80 years old. The presented data was obtained in the analysis of 2.5 million and 4.7 million cases of endoprosthesis replacement in coxarthrosis and gonarthrosis, respectively [28].

The fact of high prevalence of endoprosthesis replacement in the countries with developed economy is remarkable. The frequency of endoprosthetics in the knee joints pathology in the United Kingdom in 2009 reached

77500 cases, while 103601 similar surgeries were performed in South Korea in 2002-2005 [29,30]. In the United States of America the rate of joint replacement in knee OA increased from 31.2 per 100,000 person-years (95% CI of 25.3-37.1 per cent) in the period 1971-1976 to 220.9 (95% CI 206.7-235.0%) in 2008 (31). In the United Kingdom, the same rate also increased from 43 per 100,000 person-years in 1991 to 137 per 100,000 person-years in 2006 for women [32]. Similar trends are also observed in South Korea, and Scandinavia [33]. Carr and co-authors (2012) note the importance of maintaining national registers of endoprosthesis cases in OA not only for epidemiological descriptive studies, but also for monitoring long-term outcomes of surgical intervention in this category of patients [34].

Epidemiological characteristics of endoprosthesis in knee and hip joints OA also has age, gender and ethnic characteristics. According to Gulliford and co-authors (2010) the average age of knee replacement patients in the UK was 70 years old, with a statistically significant change between 1991 and 2006. The ratio of operated women to men accounts to 1.4:1 [32], that also remained stable under study over 15 years. Blum and co-authors (2012) note the phenomenon of less popularity of endoprosthesis among people of the Negro race in comparison to the representatives of the European race in the United States [35]. In addition, one should not forget about the differences in the health systems of different countries in determining the criteria that serve as absolute and relative indications for surgical intervention in OA of large joints [36]. In the Republic of Kazakhstan, according to Zharmukhambetov E. (2014), the number of surgical interventions on the joints in 2013 amounted to 12,717 cases, the share of endoprosthesis in coxarthrosis was 24.7%, and in gonarthrosis – 10.8%. The author of the study notes that the number of surgical interventions for knee replacement increased by 64.3% (517 to 1447) in the period from 2011 to 2013 [37].

#### Conclusion

The literature review of the English-language and domestic literature showed that the prevalence of OA remains equally high throughout the world, and the time trends reflect the tendency to increase morbidity due to the aging of the population and the increase in the proportion of patients with obesity. The highest epidemiological indicators of large joint endoprosthesis (arthroplasty) in OA have traditionally been observed in countries with a high standard of living. However, the widespread introduction of high-tech medical care standards for patients with coxarthrosis and gonarthrosis in the Republic of Kazakhstan leads to further study of other aspects of the disease.

#### Литература:

1. Жармухамбетов А. Современные технологии в организации травматолого-ортопедической помощи в Казахстане // Вестник Казахского Национального медицинского университета. 2014. №4, С. 451-452.
2. Ногаева М.Г. Остеоартроз у взрослого населения Республики Казахстан // Терапевтический архив 2015. №5. С.65-68.

3. Allen K.D., Golightly Y.M. Epidemiology of osteoarthritis: state of the evidence // Current opinion in rheumatology. 2015;27(3):276-283.

4. American Academy of Orthopaedic Surgeons. *Treatment of Osteoarthritis of the Knee*. 2nd ed Rosemont, IL: American Academy of Orthopaedic Surgeons; 2013. 255 p.

5. Biarnés M. et al. Precision medicine for age-related macular degeneration: Current developments and prospects // Expert Review of Precision Medicine and Drug Development. 2018. Vol. 3. №. 4. P. 249-263. <http://apps.who.int/classifications/icd10/browse/2016/en#/M15-M19> (дата обращения 02.09.2018)

6. Bennell K.L., Wrigley T.V., Hunt M.A., Lim B.W., Hinman R.S. Update on the role of muscle in the genesis and management of knee osteoarthritis // Rheum Dis Clin N Am 2013;39:145–76.

7. Bijlsma J.W., Berenbaum F., Lafeber F.P. Osteoarthritis: an update with relevance for clinical practice // The Lancet, 2011. 377(9783), 2115–2126.

8. Blum M.A., Ibrahim S.A. Race/Ethnicity and Use of Elective Joint Replacement in the Management of End-Stage Knee/Hip Osteoarthritis // Clinics in Geriatric Medicine, 2012. 28(3), 521–532. doi:10.1016/j.cger.2012.05.002

9. Carr A.J., Robertsson O., Graves S., Price A.J., Arden N.K., Judge A., Beard D.J. Knee replacement // The Lancet. 2012. 379(9823), 1331–1340.

10. Cibulka M.T., White D.M., Woehrle J., Harris-Hayes M., Ensey K., Fagerson T.L. et al. Hip pain and mobility deficits-hip osteoarthritis: clinical practice guidelines linked to the international classification of functioning, disability, and health from the orthopaedic section of the American Physical Therapy Association // J Orthop Sports Phys Ther 2009; 39: A1–25.

11. Cross M., Smith E., Hoy D. et al. The global burden of hip and knee osteoarthritis: estimates from the global burden of disease 2010 study // Ann Rheum Dis. 2014;73:1323–1330.

12. Cross J.D., Ficke J.R., Hsu J.R., Masini B.D., Wenke J.C. Battlefield orthopaedic injuries cause the majority of long-term disabilities // J Am Acad Orthop Surg. 2011; 19 suppl 1: S1– S7.

13. Culliford D.J., Maskell J., Beard D.J., Murray D.W., Price A.J., Arden N.K. Temporal trends in hip and knee replacement in the United Kingdom: 1991 to 2006 // J Bone Joint Surg Br 2010; 92: 130–35.

14. Dowsey M.M., Gunn J., Choong P.F. M. Selecting those to refer for joint replacement: Who will likely benefit and who will not? // Best Practice & Research Clinical Rheumatology, (2014). 28(1), 157–171. doi:10.1016/j.berh.2014.01.005

15. International Statistical Classification of Diseases and Related Health Problems 10th Revision <http://apps.who.int/classifications/icd10/browse/2016/en#/M15-M19> (дата обращения 02.09.2018)

16. Johnson V.L., Hunter D.J. The epidemiology of osteoarthritis // Best Pract Res Clin Rheumatol. 2014;28:5–15.

17. Kalichman L., Hernández-Molina G. Midfoot and forefoot osteoarthritis. The Foot, 2014. 24(3), 128–134.

18. Kim H.A., Kim S., Seo Y.I. et al. The epidemiology of total knee replacement in South Korea: national registry data // *Rheumatology (Oxford)* 2009; 47: 88–91.
19. Kim C., Linsenmeyer K.D., Vlad S.C., et al. Prevalence of radiographic and symptomatic hip osteoarthritis in an urban United States community: the Framingham osteoarthritis study // *Arthritis Rheumatol.* 2014; 66: 3013–3017.
20. Lane N.E., Shidara K., Wise B.L. Osteoarthritis year in review 2016: clinical // *Osteoarthritis and Cartilage*, 2017. 25(2), pp. 209–215.
21. Lawrence R.C., Felson D.T., Helmick C.G., Arnold L.M., Choi H., Deyo R.A. et al. Estimates of the prevalence of arthritis and other rheumatic conditions in the United States. Part 2. *Arthritis Rheum* 2008;58:26–35.
22. Maradit Kremers H., Larson D.R., Crowson C.S. et al. Prevalence of Total Hip and Knee Replacement in the United States // *The Journal of Bone and Joint Surgery American volume*. 2015;97(17):1386-1397.
23. Moriatis Wolf J., Turkiewicz A., Atroshi I., Englund M. Prevalence of doctor-diagnosed thumb carpometacarpal joint osteoarthritis: an analysis of Swedish healthcare // *Arthritis Care Res.* 2014;66:961–965.
24. Muthuri S.G., Mc Williams D.F., Doherty M., Zhang W. History of knee injuries and knee osteoarthritis: a meta-analysis of observational studies // *Osteoarthritis Cartilage*. 2011; 19 11: 1286– 1293.
25. National Joint Registry. National Joint Registry for England and Wales: 7th annual report. 2010. <http://www.njrcentre.org.uk/NjrCentre/Portals/0/NJR%207th%20Annual%20Report%202010.pdf> (accessed Dec 16, 2011).
26. Nelson A.E., Allen K.D., Golightly Y.M., Goode A.P., Jordan J.M. A systematic review of recommendations and guidelines for the management of osteoarthritis: The Chronic Osteoarthritis Management Initiative of the U.S. Bone and Joint Initiative // *Seminars in Arthritis and Rheumatism*, 2014. 43(6), 701–712.
27. Neogi T., Zhang Y. Epidemiology of osteoarthritis // *Rheum Dis Clin North Am.* 2013; 39:1–19.
28. Prieto-Alhambra D., Judge A., Javaid M.K. et al. Incidence and risk factors for clinically diagnosed knee, hip and hand osteoarthritis: influences of age, gender and osteoarthritis affecting other joints // *Ann Rheum Dis.* 2014; 73 : 1659–1664.
29. Rahman M.M., Cibere J., Goldsmith C.H. et al. Osteoarthritis incidence and trends in administrative health records from British Columbia, Canada // *J Rheumatol.* 2014;41:1147–1154.
30. Robertsson O., Bizjajeva S., Fenstad A.M. et al. Knee arthroplasty in Denmark, Norway and Sweden // *Acta Orthop* 2010; 81: 82–89.
31. Singh J., Vessely M., Harmsen W. et al. A population-based study of trends in the use of total hip and total knee arthroplasty, 1969–2008 // *Mayo Clin Proc.* 2010; 85: 898–904.
32. Thomas A.C., Hubbard-Turner T., Wikstrom E.A., Palmieri-Smith R.M. Epidemiology of Posttraumatic Osteoarthritis // *Journal of Athletic Training.* 2017; 52(6): 491-496. doi:10.4085/1062-6050-51.5.08.
33. Thomas E., Peat G., Croft P. Defining and mapping the person with osteoarthritis for population studies and public health // *Rheumatology (Oxford, England)*. 2014; 53(2): 338-345. doi:10.1093/rheumatology/ket346.
34. Turkiewicz A., Petersson I.F., Bjork J., et al. Current and future impact of osteoarthritis on healthcare: a population-based study with projections to year 2032. // *Osteoarthritis Cartilage.* 2014; 22:1826–1832.
35. Turkiewicz A., Gerhardsson de Verdier M., Engström G., Nilsson P.M., Mellström C., Lohmander S.L., Englund M. Prevalence of knee pain and knee OA in southern Sweden and the proportion that seeks medical care // *Rheumatology*, Volume 54, Issue 5, 1 May 2015, Pages 827–835.
36. Valderrabano V., Horisberger M., Russell I., Dougall H., Hintermann B. Etiology of ankle osteoarthritis // *Clin Orthop Relat Res.* 2009; 467 7: 1800–1806.
37. Zhang W., Nuki G., Moskowitz R.W., Abramson S., Altman R.D., Arden N.K. et al. OARSI recommendations for the management of hip and knee osteoarthritis: part III: Changes in evidence following systematic cumulative update of research published through January 2009 // *Osteoarthritis Cartilage.* 2010;18:476-99.

#### References:

1. Zharmukhambetov A. Sovremennyye tekhnologii v organizatsii travmatologo-ortopedicheskoi pomoshchi v Kazakhstane [Modern technologies in the organization of trauma and orthopedic care in Kazakhstan]. *Vestnik Kazakhskogo Natsional'nogo meditsinskogo universiteta* [Bulletin of the Kazakh National Medical University]. 2014. №4, pp. 451-452. [in Russian]
2. Nogaeva M.G. Osteoartroz u vzroslogo naseleniya Respubliki Kazakhstan [Osteoarthrosis in the adult population of the Republic of Kazakhstan]. *Terapevticheskiy arkhiv* [Therapeutic Archive]. 2015. №5. pp.65-68. [in Russian]

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