

An elderly person as a patient at risk in analgesic treatment – a review of the literature

Osoba starsza jako pacjent wysokiego ryzyka w leczeniu przeciwbólowym – przegląd literatury

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Abstract

The increasing prevalence of aging populations worldwide poses profound challenges for healthcare, particularly in managing pain in older adults. As life expectancy rises and birth rates decline, the proportion of older individuals grows, significantly impacting healthcare systems, economies, and societal structures. Physiological changes in older adults affect drug metabolism and the effectiveness of pain therapy. Additionally, psychological and social factors such as depression and social isolation complicate the management of pain, emphasizing the need for an interdisciplinary approach that includes physiological, psychological, and social assessments to ensure effective and safe treatment. (Gerontol Pol 2024; 32; 99-104) doi: 10.53139/GP.20243215

Keywords: pain management, pharmacotherapy, aging population, analgesic therapy

Streszczenie

Rosnąca liczba osób starszych na całym świecie stawia przed systemem opieki zdrowotnej poważne wyzwania, szczególnie w zakresie zarządzania bólem u osób starszych. W miarę wzrostu przewidywanej długości życia i spadku wskaźnika urodzeń, udział osób starszych w populacji rośnie, znacząco wpływając na systemy opieki zdrowotnej, gospodarki i struktury społeczne. Zmiany fizjologiczne, zachodzące w organizmie osób starszych wpływają na metabolizm leków i skuteczność terapii przeciwbólowej. Ponadto, czynniki psychologiczne i społeczne takie jak depresja i izolacja społeczna komplikują zarządzanie bólem, podkreślając potrzebę interdyscyplinarnego podejścia, które obejmuje ocenę fizjologiczną, psychologiczną i społeczną, aby zapewnić skuteczne i bezpieczne leczenie. (Gerontol Pol 2024; 32; 99-104) doi: 10.53139/GP.20243215

Słowa kluczowe: leczenie bólu, farmakoterapia, starzenie się społeczeństwa, terapia przeciwbólowa

Introduction

The demographic aspects of population aging are gaining increasing importance in the context of global social changes and health challenges. There is a steady increase in average life expectancy and a decline in the birth rate, leading to an increased proportion of older individuals in the population. This trend has far-reaching consequences for healthcare systems, economies, and society as a whole [1]. According to the latest report from the Central Statistical Office of Poland in September 2023, the percentage of older people in Poland

shows a steady increase. In 2023, individuals of post-productive age (60 years and older for women and 65 years and older for men) constituted 22.9% of the entire population, marking a noticeable increase compared to previous years. For comparison, in 2020, this age group represented 22.2% of society. An even more significant change is visible over a longer time frame: in 2010, the percentage of older people was 16.8%, in 2000 it was 14.8%, and in 1990 just 12.8%. These data underscore the growing trend of societal aging in Poland [2].

Physiological changes associated with aging directly affect the effectiveness and safety of analgesic therapy

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in older individuals. Aging is associated with natural changes in many physiological systems, including drug metabolism, which can influence the pharmacokinetics and pharmacodynamics of analgesic drugs used [3]. Furthermore, there is an increased risk of chronic comorbid diseases, which can further complicate the choice of appropriate analgesic agents. Reductions in body mass, water content, or an increase in fat tissue affect the distribution, absorption, and elimination of drugs, raising the risk of complications [4].

Equally important are the psychological and social aspects of pain treatment in older individuals, which play a crucial role in evaluating the effectiveness of analgesic therapy. Older adults may experience depression related to chronic pain, negatively affecting their quality of life and potentially limiting the effectiveness of pain treatment [5]. Chronic pain in older individuals is often underdiagnosed and untreated due to communication difficulties, especially in patients with cognitive disorders [6]. Additionally, social isolation can hinder access to healthcare [5]. Therefore, a comprehensive assessment of pain in older individuals should include not only physiological aspects but also psychological, social, and environmental factors to ensure effective and safe analgesic treatment. An interdisciplinary approach, involving collaboration between physicians, nurses, and specialists in psychological and social care, is crucial in optimizing analgesic therapy, especially for this patient group [7].

Results

Age-related changes in physiology affect the effectiveness and safety of pharmacotherapy

Pain management is crucial in the elderly because if left untreated, it becomes a factor that generates functional impairment, contributing to depression, appetite and sleep disorders, and isolation. Elderly people exposed to pain are more susceptible to diseases [8]. However, you should be aware that when selecting the appropriate analgesic therapy, the physician encounters issues related to the numerous changes in the human body that occur with age (Figure 1).

Firstly, how pain is perceived changes with age, especially proprioception decreases. Along with neurological changes, metabolic changes occur in elderly people. This significantly impacts the pharmacokinetics and pharmacodynamics of drugs [9].

These changes include decreased secretion of hydrochloric acid, which increases the pH of the gastric juice, decreased peristalsis, slow intestinal transit, loss of liver

parenchyma by up to 35%, decreased elasticity of the respiratory tract, weakening of the respiratory muscles, decreased neuronal volume, decreased volume central circulation and many others [10].

Among various age-related changes in human physiology, the most important is the reduction of blood flow in the kidneys and liver, which limits the metabolism and excretion of drugs. The resulting accumulation of drugs and their metabolites increases the risk of adverse events [11].

When selecting the appropriate analgesic treatment, attention should be paid to the fact that older people have a narrower therapeutic index of drugs, reduced absorption, variable volume of distribution, increased response to protein-bound drugs due to hypoalbuminemia, and reduced receptor density. All these factors cause the effects of pharmacotherapy in the elderly to be less predictable and associated with an increased risk of complications [7].

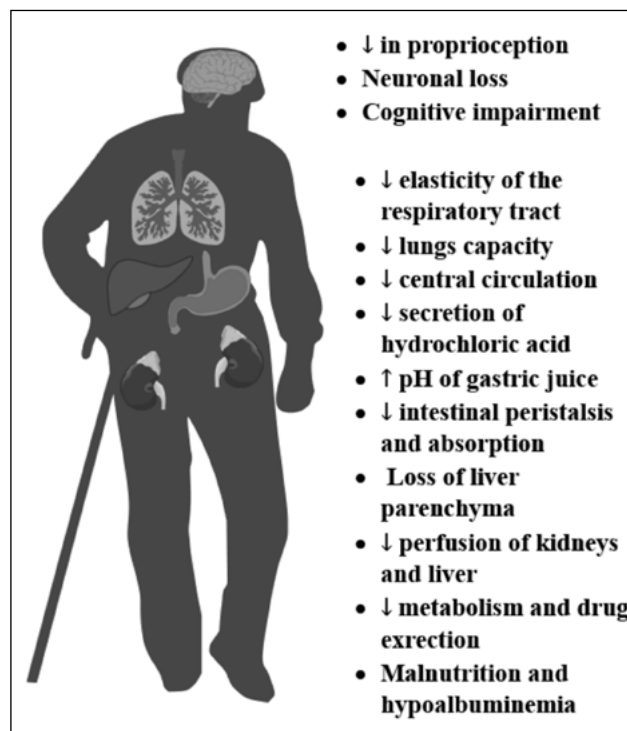


Figure 1. Changes in human physiology associated with aging affect analgesic therapy (figure under Common Creative license)

Principles of implementing analgesic therapy and pain scales

To facilitate the selection of appropriate analgesic treatment, it is worth following the analgesic ladder, i.e. gradual titration of analgesic drugs upwards to the patient's needs [12].

The concept of an analgesic ladder was introduced by the World Health Organization (WHO) in 1986. origi-

nally as a method of treating pain in people with cancer [13].

Initially, it consisted of three stages. Level I includes non-opioid analgesics for the treatment of mild pain, which include nonsteroidal anti-inflammatory drugs (NSAIDs) and acetaminophen with or without an adjuvant. Stage II includes weak opioids such as codeine, tramadol, or hydrocodone or low doses of strong opioids with or without adjuvants and non-opioid analgesics. This stage is used to treat moderate pain. In stage III, due to severe pain, strong opioids such as morphine, fentanyl, and oxycodone are used with or without drugs found in stage I [14,15].

An adjuvant should be understood as all types of co-analgesics, such as antidepressants from the tricyclic antidepressants (TCA) group or serotonin-norepinephrine reuptake inhibitors (SNRIs), selective serotonin reuptake inhibitors (SSRIs), antiepileptic drugs, e.g. gabapentin, lidocaine patches, or topical corticosteroids. Over the years, however, its use has expanded to include the treatment of acute and chronic non-cancer conditions, including the treatment of degenerative disease or neuropathic pain. Level IV has also been added, which includes all non-pharmacological procedures that help relieve pain, such as epidural anesthesia, intrathecal drug administration, several neurosurgical procedures, and many others [16].

The choice of an analgesic agent should be adapted to the pain intensity reported by the patient. To assess the pain intensity we can utilize e.g. the Numeric Rating Scale (NRS), the Visual Analogue Scale (VAS), and the Verbal Descriptor Scale (VDS). The usefulness of these scales has been proven among older patients. However, using the scales mentioned above may be difficult in patients with cognitive impairment such as dementia. In that case, we can use observational tools such as the Abbey Scale, Doloplus-2, Pain Assessment Checklist for Seniors with Limited Ability to Communicate (PACSLAC), and Pain Assessment in Advanced Dementia (PAINAD) scale [17].

Complications of analgesic therapy in elderly

Chronic pain may affect even up to 40% of elderly patients [18]. Unfortunately, despite so many treatment modifications leading to improved pain management, it is still associated with many side effects. Our intervention should be associated with the lowest possible risk of side effects. Medical history of comorbidities and concomitant use of other drugs may significantly limit the possibility of using particular analgesic agents (Table I).

Chronic use of non-selective NSAIDs such as aspirin, diclofenac, or ketoprofen should be avoided in patients with a history of dyspepsia, unexplained iron-deficiency anemia, or peptic ulcer. When we decide to use non-selective NSAIDs, concomitant use of gastroprotective drugs such as proton pump inhibitors (PPI) or misoprostol is recommended. To reduce the risk of gastrointestinal side effects, it is also recommended to replace non-selective with COX-2-specific NSAIDs [19].

Reducing NSAID-induced gastrointestinal injury may be particularly important in elderly patients. A recent meta-analysis showed that the mortality rate in peptic ulcer bleeding is associated with the number of patient comorbidities including hepatic or renal dysfunctions and the presence of malignant processes [20]. These data indicate that elderly patients are at high risk of developing serious adverse events associated with the use of NSAIDs.

NSAIDs should be also avoided in patients with creatinine clearance of less than 30 mL/minute or patients with creatinine clearance between 30-59 ml/min with concomitant use of potentially nephrotoxic drugs such as ACE inhibitors, sartans, or diuretics. Even up to 46% of patients from the 70+ years age group have chronic kidney disease (CKD) [21]. Therefore renal function tests should be performed before starting chronic therapy with NSAIDs to screen for undiagnosed CKD. In addition, because of the well-documented nephrotoxicity of NSAIDs, renal function should be regularly monitored during long-term NSAID therapy.

Table I. Adverse event risk of NSAIDs, opioids, acetaminophen, and SSRIs

Drug/Drug Group	Risks
NSAIDs (Non-Steroidal Anti-Inflammatory Drugs)	<ul style="list-style-type: none"> – May decrease the effectiveness of antihypertensive medications, including ACE inhibitors, sartans, thiazide diuretics, beta-blockers, and calcium channel blockers. – Risk of increased liver damage when used with other hepatotoxic drugs.
Opioids	<ul style="list-style-type: none"> – Risk of respiratory depression, especially in elderly patients with comorbidities such as obstructive sleep apnea and chronic obstructive pulmonary disease (COPD). – Increased risk of falls and bone fractures due to dizziness, sedation, and orthostatic hypotension.
Acetaminophen (Paracetamol)	<ul style="list-style-type: none"> – At high doses, especially in elderly patients with malnutrition, increased risk of liver damage.
Selective Serotonin Reuptake Inhibitors (SSRIs)	<ul style="list-style-type: none"> – Increased risk of gastrointestinal bleeding when used concurrently with NSAIDs..

NSAIDs should be also used with caution in patients with cardiovascular diseases (CVD) such as heart failure, hypertension, and ischemic heart disease. The prevalence of CVD increases with age and is associated with a greater risk of hospitalization and mortality rate. Data provided by The American Heart Association (AHA) indicates that up to 86% of 80+ years patients have CVD [22]. Following recommendations, in patients with cardiovascular risk, the use of naproxen and low doses of ibuprofen is preferred while coxibs should be avoided [23]. Moreover, physicians and patients should be aware that concomitant use of NSAIDs may attenuate the cardioprotective and antiplatelet properties of aspirin [24].

In the group of people over 50 years of age, the use of NSAIDs is associated with an increased risk of acute myocardial infarction, especially in the case of naproxen and diclofenac [25].

Recent studies suggest that in case of mild/moderate pain the drug of choice in the geriatric population, especially with multi-morbidity, should be acetaminophen. Acetaminophen at doses between 3000-4000 mg daily is not associated with a higher incidence of liver injury among older patients. In addition, acetaminophen is associated with a lower risk of acute kidney injury, peptic ulcer, and bronchospasm compared to loxoprofen, diclofenac, and celecoxib [26,27].

Most often, paracetamol-induced acute liver failure occurs in the event of an overdose for suicidal purposes or as an unintentional result, e.g. in cases of malnutrition, which increases the effect of the drug. This is especially important in older people who may suffer from malnutrition, thus becoming more susceptible to the harmful effects of paracetamol [28,29].

Another wide group of analgetic is opioids, used predominantly in cases of modest/severe pain. The results of a recently published nationwide cross-sectional study from Denmark, indicate the prevalence of opioid use among elderly patients increased significantly between 2000-2015 [30]. Following the Annual Surveillance Report of Drug-related Risk and Outcomes published by the Centers for Disease Control and Prevention (CDC) in 2019, nearly 15% of US citizens had at least 1 prescription for the opioid drug. What is more, the frequency of opioid prescriptions was the highest among the +65 years age group and amounted to 25% of all opioid prescriptions [31].

Opioid therapy among geriatric patients is associated with specific complications and limitations. Therefore opioid therapy in the elderly requires compliance with several basic rules. Firstly, because the response of elderly patients to opioid drugs is less predictable compared with younger individuals, we should initiate our the-

rapy with decreased doses and prolonged dose intervals. To achieve the proper analgesic effect while minimizing the risk of adverse events, the dose of an opioid agent should be slowly titrated (*start slow, go slow*). Due to the risk of respiratory depression, opioids should be used with caution in elderly with comorbidities including obstructive sleep apnea and chronic obstructive pulmonary disease [32].

Opioids are also associated with an increased risk of falls and bone fractures in elderly patients. Fall risk is the highest at the beginning of the therapy and results from dizziness, sedation, and orthostatic hypotension caused by opioids. In addition, the mechanism underlying opioid-related falls may be hyponatremia, a common dyselectrolytemia caused by tramadol [33].

Chronic therapy with opioids requires careful monitoring, especially in patients with other risk factors for falls and fall-induced injuries including cognitive impairment, gait disorders, polypharmacy, previous history of falls, recent surgical intervention, and fear of falling [34].

It is on note that certain comorbidities may affect the safety of therapy with certain opioids. Due to the risk of accumulation of neurotoxic metabolites, morphine should be avoided in patients with CKD. In such patients, we should prefer using fentanyl or methadone. Since most opioids are metabolized in the hepatocytes, daily doses of opioids should be reduced in case of liver insufficiency [35]. Patients with a history of epilepsy should avoid tramadol. This is because tramadol decreases the seizure threshold in axons and may attenuate the efficiency of anti-seizure therapy [36].

Conclusions

The aging demographic is increasingly significant in the context of global social changes and healthcare challenges, marked by a consistent rise in life expectancy and a decline in birth rates. This trend is notably impacting healthcare systems, the economy, and society, with a particularly observable shift in Poland where the elderly population is steadily increasing. This article reviews the multifaceted challenges of managing pain in the elderly, highlighting the complexities introduced by physiological changes due to aging, which influence drug metabolism and, consequently, the effectiveness and safety of pharmacotherapy.

Critical to this discussion are the risks associated with drug-drug interactions in the elderly, especially concerning the use of NSAIDs, opioids, acetaminophen, and SSRIs. The review highlights the need to adopt an interdisciplinary approach to pain management that includes pharmacological interventions that take into account the

physiological, psychological, and social dimensions of pain in older people and the changes that occur in their bodies. It elaborates on the WHO's analgesic ladder and the adaptation of pain scales suited to the elderly, advocating for cautious pharmacotherapy.

In conclusion, effective pain management in the elderly requires a holistic and comprehensive pain management strategy. This approach not only addresses the immediate challenges of drug metabolism but also aligns

with broader objectives of enhancing the quality of life and healthcare outcomes for the aging population. Future research is essential to refine these strategies, ensuring they are responsive to the unique needs of the elderly and supported by evidence-based practices.

Conflict of interest

None

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