https://doi.org/10.32921/2225-9929-2024-3-57-28-33
*UDC 364.012*
*IRSTI 76.75.31*

*Review article*

# Cognitive impairment as a medical and social problem: Risk factors and prevention

Assel Tukinova [1], Zhanna Mussabekova [2]

[1] *Teacher of the department of epidemiology and biostatistics, Semey Medical University, Semey, Kazakhstan.*
*E-mail: tukinova_asel@mail.ru*
[2] *Dean of school of Postgraduate Education, Alumni Employability and Career, Semey Medical University, Semey, Kazakhstan.*
*E-mail: janna.asemkanovna@mail.ru*

**Abstract**

*Aging is accompanied by cognitive decline, which can lead to dementia. The prevalence of dementia is projected to increase in the next decade due to increased life expectancy.*

*A literature search was conducted to identify studies on cognitive impairment as a medical and social problem, prevention, and risk factors published from 2013 to 2023 (10 years). The online databases PubMed, Google Scholar, Elsevier were used to search the literature.*

*Mental health problems are underestimated by health professionals and the elderly themselves, and the malady associated with this problem makes people reluctant to seek help.*

*Clinically, cognitive impairment can cause serious social, occupational impairment. Lifestyle and cognitive therapy can improve memory at least as well as drug therapy. Many researchers have studied risk factors for cognitive impairment. Among them, the main ones are age, cholesterol, high blood pressure, obesity, depression, education, nutrition, sleep, mental state, physical and social activity. Comprehensive screening of clinical, cognitive and functional areas of fitness is mandatory for older people in order to eliminate modifiable risk factors through specially designed rehabilitation programs. Cognitive impairment is one of the important medical and social problems in modern society, as it is a condition preceding dementia. The observed aging of the world population contributes to the risk of an increase in the prevalence of cognitive impairment.*

*Keywords: cognitive impairment, prevention, risk factors.*

Corresponding author: Assel Tukinova, Teacher of the department of epidemiology and biostatistics, Semey Medical University, Semey, Kazakhstan.
Postal code: 071400
Address: Kazakhstan, Abai Region, Semey city, 103 Abay St.
Phone +7 777 980 93 17
E-mail: tukinova_asel@mail.ru

J Health Dev 2024; 3 (57): 28-33
Recieved: 17-06-2024
Accepted: 03-08-2024

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## Introduction

By 2050, the World Health Organization (WHO) estimates that there will be 2 billion people over the age of 60 in the world [1]. Particularly rapid population aging is occurring in low- and middle-income countries. Persons of elderly and senile age can be easily attributed to the risk group for the occurrence of mental disorders. This is due both to the physiological processes occurring in the body from a certain age, and to psychological and social factors. Aging is accompanied by cognitive decline, which can lead to dementia. The prevalence of dementia is projected to increase in the next decade due to increased life expectancy.

The main consequences of cognitive impairment in the elderly include impaired quality of life, loss of social functions, and eventually dependence on home care or hospitalization, which entails huge financial resources from the public health system [2].

A literature search was conducted to identify studies on cognitive impairment as a medical and social problem, prevention, and risk factors published from 2013 to 2023 (10 years).

## Literature Search Strategy

A literature search was conducted to identify studies on cognitive impairment as a medical and social problem, prevention, and risk factors published from 2013 to 2023 (10 years). The online databases PubMed, Google Scholar, Elsevier were used to search the literature. Only peer-reviewed articles in English that mentioned "prevention, risk factors for cognitive impairment" were taken into account. Study selection process is presented in Figure 1.

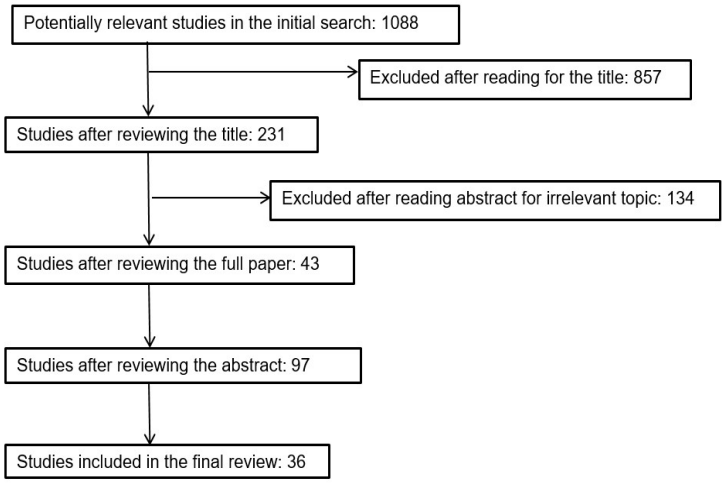



*Figure 1 - Study selection process flow chart*

## Cognitive impairment as a medical and social problem

The global prevalence of dementia is 1.2-7.2% [3], and the population of older people with dementia is expected to increase in line with global aging. The reported proportion of people with mild cognitive impairment (MCI) is 5.0% - 36.7% higher than the proportion of people with dementia; however, most cases of MCI and dementia in the elderly often remain undiagnosed and unrecognized [4]. The number of people over 65 years of age is increasing everywhere [5]. All over the world, the population is rapidly aging. Between 2015 and 2050, the proportion of the world's population over 60 is expected to nearly double, from 12% to 22%. Mental and neurological disorders in the elderly account for 6.6% of total disability for this age group. Approximately 15% of people aged 60 years and older suffer from mental disorders [6].

Dementia is a syndrome, usually chronic or progressive, in which there is deterioration in memory, thinking, behavior, and the ability to carry out daily activities. It mainly affects the elderly, although it is not a normal part of aging. An estimated 50 million people worldwide are living with dementia, almost 60% living in low- and middle-income countries. The number of people with dementia is projected to reach 82 million in 2030 and 152 million in 2050 [7]. Today there are serious social and economic problems associated with the direct costs of medical, social and informal care related to dementia. In addition, the physical, emotional and economic pressures can cause great stress for families and caregivers of people with dementia. Therefore, there is a need for support from the health system of the social, financial and legal systems for both people with dementia and those who care for them [8]. Health services deal with a large number of elderly patients. Although the vast majority of elderly people have fairly good health and lead an active lifestyle, a significant number of them are at risk of developing various chronic conditions and mental disorders, including dementia. It is estimated that 46.8 million people worldwide suffer from dementia, which causes a serious burden on medical, social and informal care [9]. One of the clinical conditions preceding dementia is cognitive impairment (CI). In fact, one-third of CI patients are thought to develop dementia. Thus, early detection of CI may provide several benefits, including early diagnosis of dementia and access to treatment, delay or even reversal of CI [10]. The United Nations (UN) has not yet proposed a clear criterion for defining old age, but as a general rule, people aged 60 and over are classified as older people.

Although some degree of memory weakness is normal in older age, the term "dementia" is also used to refer to memory decline and forgetfulness among this age group. Since the symptoms appear gradually, they may not attract attention for a long time, and thus, it can be misinterpreted that such behavior is part of the aging process. It is noted that the prevalence of CI exceeds 40% among the elderly [11]. On the other hand, the existing term "mild cognitive impairment" describes the course of a neurodegenerative disease in which cognitive functions are not normal compared to age expectations, but daily functions are not impaired to qualify for a diagnosis of dementia [12].

Individuals with MCI have subjective cognitive complaints that are usually corroborated by an informant, preserved general cognitive functioning, impairment in one or more cognitive areas (memory, attention-executive function, visuospatial skills, and/or language), and essentially lead normal daily activity. MCI remains a clinical diagnosis, aided by a thorough history, neurologic examination, mental status screening, and formal neuropsychological testing [13]. MCI is not synonymous with Alzheimer's disease (AD) and does not always lead to dementia. Universal screening for certain age groups would be ideal, but is currently limited due to a lack of established guidelines, ignorance of clinicians, and time and cost constraints. There are currently no pharmacological treatments that have proven to slow or treat the progression of MCI to dementia; however, there is evidence that lifestyle modifications, including diet, exercise, and cognitive stimulation, can be effective [14].

Along with physicians, nurses play an important role in the diagnosis and post - diagnosis periods for patients with early CI. Older people living in rural areas are often left behind, while their stories can provide information to help nurses better provide early interventions to improve cognitive health [15]. Primary health care (PHC) should be the place for early detection of MCI and dementia; however, a significant part of these processes still remains unattended. Family physicians may not have enough time or experience for cognitive testing. Caring for a patient with cognitive and neuropsychiatric disorders is a certain stress, and caregivers of patients with dementia subsequently experience severe psychological stress, reduced life satisfaction and progression of depression. This means that dementia is not only a neurological disease, but also a serious public health problem [6].

MCI is an intermediate stage on the trajectory from normal cognitive health to dementia. Patients with MCI have a high rate of dementia progression over a relatively short period [16-18]. Even among people who return to normal cognitive activity at some point in time, the incidence of subsequent MCI or dementia is higher than among those who have never suffered from MCI. In addition to MCI, the other two classifications include cognitive impairment without dementia, which covers a wider range of cognitive impairment, and MCI due to AD, primarily identifying people with AD [19].

Mental health problems are underestimated by health professionals and the elderly themselves, and the malady associated with this problem makes people reluctant to seek help [7]. Clinically, cognitive impairment can cause serious social, occupational impairment [20].

## Prevention of cognitive impairment in the elderly

One possibility of increasing the average age in the population and preventing cognitive impairment is the optimal diet. Of the various dietary components, vitamins B9 and B12 are thought to contribute to the optimal course of aging [12]. Morimoto S.S. et al. have developed some types of computerized cognitive remediation (CCR) based on neuroplasticity that target the brain regions responsible for executive functioning, and preliminary studies are encouraging [20].

A japanese study compared the effects of a combination of soy peptide supplementation and exercise on cognitive function in older adults. The randomized, unblinded, controlled clinical trial involved 67 participants aged 60 years or more with non-cognitive dysfunction, who were divided into two groups according to the intervention method: the exercise group (Ex group, n=36) and the exercise plus nutrition group (Ex group) + Nt, n=31). The Ex group performed a memory exercise for 15 minutes and an aerobic exercise for 45 minutes once a week for 90 days. The Ex + Nt group completed the same workout plus received soy peptide for 90 days. Mini-Mental Status Score, Track Making Test A/B Score, Skeletal Muscle Mass Index, Grip Strength, Gait Speed, and Geriatric Depression Scale were measured at baseline and after the intervention. A two-way analysis of variance was performed to compare between pre - and post-measurements to determine intervention effects. The significance level was set at <5%. A combination of exercise and soy peptide supplementation was effective in improving some of the cognitive performance [21, 22].

Since there is currently no effective pharmacological treatment for subjective cognitive decline and MCI, modifiable risk factors for cognitive decline and dementia have received increased attention in the literature as a focus for clinical trials. Physical activity is one of the strongest protective lifestyle factors. In the future, research is needed to help provide specific recommendations for exercise intensity, effective strategies to promote behavior change [23, 24]. In the absence of treatment options, WHO emphasizes that effective prevention strategies are key to countering the dementia epidemic. Considering the complex nature of dementia, trials that simultaneously target multiple risk factors should be particularly effective for prevention. However, only a few such multicomponent trials have been launched so far, and they have shown promising results [25].

Cognitive decline and dementia are serious threats to the independence and quality of life of older people. Therefore, identifying interventions that help maintain cognitive function in older adults or reduce the risk of dementia is a research priority. Cognitive training uses the repetitive practice of standard exercises that target one or more cognitive areas and is designed to maintain optimal cognitive function. There is evidence that computer-assisted cognitive training for at least 12 weeks has a beneficial effect on cognitive function in healthy adults aged 65 and over [26].

The mental health of the elderly is enhanced by active and healthy aging, including conditions that allow them to lead a healthy lifestyle. The prerequisites for meeting their needs are:

- safety and freedom;
- supportive housing policy;
- social support;
- medical and social programs intended for persons suffering from chronic or recurrent mental illnesses;
- elder abuse prevention programs.

Equally important is long-term care for older people with mental health conditions [7].

In order to maintain autonomy and social participation, it is recommended that the elderly themselves perform their daily activities. Daily activity is recognized as one of the most effective factors in maintaining the health and success of the elderly [11]. Cognitive memory training, in turn, may improve memory function in older people with MCI, as it is assumed that brain plasticity is preserved in them [27,28].

The available data confirm that lifestyle and cognitive therapy can improve memory at least as well as drug therapy. A number of researchers believe that daily activity is recognized as one of the effective factors for maintaining health and success by the elderly.

## Risk factors for the development of cognitive impairment

Multiple mental health risk factors are allowed at any point in life. Older people experience not only the stresses of life that are common to all people, but also the stresses that occur later in life, such as significant permanent loss and decline in functional abilities. For example, older people may experience decreased mobility, chronic pain, weakness, or other health problems for which they require long-term care. All of these stresses can lead to isolation, loneliness or psychological distress for them [7]. Factors such as cholesterol levels, high blood pressure, obesity, depression, education, diet, sleep, mental health, and physical and social activity also play a role [11].

In a study conducted in Ecuador, the prevalence of CI was higher with age > 65 years and low level of education. Significant risk factors such as hypertension, diabetes mellitus and illiteracy, which are the most common, were identified [10].

Another risk factor for dementia is smoking, which, together with vascular changes caused by atherosclerosis, can account for almost 40% of all cases of dementia [12]. It has been shown that the decline in cognitive health is probably inextricably linked to many aspects of general health, namely, cardiological status, mental health (depression), chronic pain and mobility, at least among the elderly. When these problems are present, social functioning can also suffer [29]. Subjective cognitive decline (SCD) is common in older adults and may be an early marker of future cognitive decline. Studies by spanish, australian, brazilian and american scientists show that SCD is more closely associated with concomitant symptoms of depression than with objective cognitive characteristics in non-hispanic whites, but it is unknown whether the associations of SCD, cognitive functions and depression are manifested differently in Spanish - speaking elderly people [30,31]. The prevalence of MCI in adults aged ≥65 years is 10–20%; the risk increases with age, and men are at higher risk than women. International studies indicate the impact of gender differences on cognitive functioning [32]. In older patients with MCI, clinicians should consider depression, polypharmacy, and uncontrolled cardiovascular disease risk factors that may increase the risk of CI and other adverse outcomes [33].

International studies show the impact of gender differences on cognitive functioning. It was found that the number of cases of moderate cognitive impairment per year in men was higher than in women. Men, on the other hand, had a higher incidence of mild cognitive impairment. An important difference between women and men was a significantly higher representation of depression. Women are at greater risk of developing dementia associated with Alzheimer's disease, while men are at greater risk of developing vascular dementia [34]. Thyroid hormones have been reported to be associated with cognitive decline and AD. An association has been shown between thyroid function and cerebral blood flow in patients with AD. The present study showed the association of thyroid-stimulating hormone with regional cerebral blood flow in the group of individuals with MCI and the association of free triiodothyronine with regional cerebral blood flow in the group of individuals with AD [35].

The available data suggest that a significant proportion of cases of age-related cognitive decline and dementia can be prevented by changing risk factors, including education, depressive symptomatology, physical activity, social activity and participation in cognitive-stimulating activities.

Many researchers have studied risk factors for cognitive impairment [12,17,18]. Among them, the main ones are age, cholesterol, high blood pressure, obesity, depression, education, nutrition, sleep, mental state, physical and social activity. They show that cognitive impairment is inextricably linked with many aspects of general health. Carers often focus only on the physical needs of the patient. Social interaction or hobbies are often neglected, which is a major problem. Therefore, a comprehensive screening of clinical, cognitive and functional areas of fitness is mandatory for older people in order to eliminate modifiable risk factors through specially designed rehabilitation programs.

## Conclusions

Thus, cognitive impairment is one of the important medical and social problems in modern society, as it is a condition preceding dementia. The observed aging of the world population contributes to the risk of an increase in the prevalence of cognitive impairment. Therefore, PHC should be a place for early detection of MCI and prevention of dementia. Thus, timely detection and adequate treatment of cognitive impairment can improve the quality of life of patients, their close relatives and caregivers.

Contribution of the authors. A.R.T. - writing; Zh.A.M. - editing, methodology.

Conflicts of Interest - none.

Financing - none.

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# Когнитивті бұзылулар медициналық-әлеуметтік проблема ретінде: Қауіп-қатер факторлары және алдын алу

Тукинова А.Р. [1], Мусабекова Ж.А. [2]

[1] Эпидемиология және биостатистика кафедрасының оқытушысы, Семей медицина университеті, Семей, Казахстан. E-mail: tukinova_asel@mail.ru

[2] Дипломнан кейінгі білім беру, жұмысқа орналасу және түлектердің мансабы мектебінің деканы, Семей медицина университеті, Семей, Казахстан. E-mail: janna.asemkanovna@mail.ru

**Түйіндеме**

Қартаю когнитивті қабілеттің төмендеуімен бірге жүреді, бұл деменцияға әкелуі мүмкін. Деменцияның таралуы өмір сүру ұзақтығының артуына байланысты келесі онжылдықта артады деп болжануда.

Онжылдық, яғни 2013-2023 жылдар аралығында жарияланған когнитивті бұзылулар медициналық және әлеуметтік проблема ретінде, алдын алу және қауіп-қатер факторлары туралы зерттеулерді анықтау үшін әдебиеттерді іздеу жүргізілді. Әдебиеттерді іздеу үшін PubMed, Google Scholar, Elsevier және Web of science онлайн дерекқорлары пайдаланылды.

Психикалық денсаулық мәселелерін Денсаулық сақтау мамандары мен қарттардың өздері бағаламайды және бұл мәселеге байланысты ауру адамдарды көмек сұрауға құлықсыз етеді.

Клиникалық когнитивті бұзылулар ауыр әлеуметтік және кәсіби бұзылуларды тудыруы мүмкін. Өмір сүру салты мен когнитивті терапия, кем дегенде, дәрілік терапия сияқты есте сақтау қабілетін жақсарта алады. Көптеген зерттеушілер когнитивті бұзылулардың қауіп-қатер факторларын зерттеді. Олардың ішінде жас, холестерин деңгейі, жоғары қан қысымы, семіздік, депрессия, білім, тамақтану, ұйқы, психикалық күй, физикалық және әлеуметтік белсенділік негізгі болып табылады. Арнайы әзірленген оңалту бағдарламалары арқылы өзгертілетін қауіп-қатер факторларын жою мақсатында егде жастағы адамдар үшін клиникалық, когнитивті және функционалдық дене шынықтыру саласының жан-жақты скринингі міндетті болып табылады. Когнитивті бұзылулар қазіргі қоғамдағы маңызды медициналық және әлеуметтік мәселелердің бірі болып табылады, өйткені бұл - деменцияға дейінгі жағдай. Жер шарындағы халықтың қартаюы когнитивті бұзылулардың таралу қаупін арттырады.

Түйін сөздер: когнитивті бұзылыс, алдын алу, қауіп-қатер факторлары.

# Когнитивные нарушения как медико-социальная проблема: Факторы риска и профилактика

Тукинова А.Р. [1], Мусабекова Ж.А. [2]

[1] Преподаватель кафедры эпидемиологии и биостатистики, Медицинский университет Семей, Семей, Казахстан. E-mail: tukinova_asel@mail.ru

[2] Декан школы постдипломного образования, трудоустройства и карьеры выпускников, Медицинский университет Семей, Семей, Казахстан. E-mail: janna.asemkanovna@mail.ru

**Абстракт**

Старение сопровождается снижением когнитивных способностей, что может привести к деменции. По прогнозам, распространенность деменции увеличится в следующем десятилетии в связи с увеличением продолжительности жизни.

Был проведен поиск литературы для выявления исследований когнитивных нарушений как медицинской и социальной проблемы, профилактики и факторов риска, опубликованных в период с 2013 по 2023 год (10 лет). Для поиска литературы использовались онлайн - базы данных PubMed, Google Scholar и Elsevier.

Проблемы психического здоровья недооцениваются медицинскими работниками и самими пожилыми людьми, и заболевание, связанное с этой проблемой, заставляет людей неохотно обращаться за помощью.

Клинически когнитивные нарушения могут вызывать серьезные социальные и профессиональные нарушения. Образ жизни и когнитивная терапия могут улучшить память, по крайней мере, так же, как медикаментозная терапия. Многие исследователи изучали факторы риска когнитивных нарушений. Среди них основными являются возраст, уровень холестерина, высокое кровяное давление, ожирение, депрессия, образование, питание, сон, психическое состояние, физическая и социальная активность. Всесторонний скрининг клинической, когнитивной и функциональной сферы физической подготовки является обязательным для пожилых людей с целью устранения модифицируемых факторов риска с помощью специально разработанных программ реабилитации. Когнитивные нарушения являются одной из важных медицинских и социальных проблем в современном обществе, поскольку это состояние, предшествующее деменции. Наблюдаемое старение населения земного шара повышает риск увеличения распространенности когнитивных нарушений.

Ключевые слова: когнитивное нарушение, профилактика, факторы риска.