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CROSS-SECTIONAL STUDY

# Risk factors of cognitive impairment in elderly people in the Republic of Kazakhstan

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**ABSTRACT**
OBJECTIVE: To study the risk factors of cognitive impairment in elderly people in the Republic of Kazakhstan.
METHODS: Study design – cross - sectional. 385 elderly people randomly selected from all over Kazakhstan took part in the survey. The questionnaire for the elderly included socio-demographic data and a small test that determines the absence or the risk of developing cognitive impairment.
RESULTS: Incomplete secondary education increases the risk of developing CI 4.92 times, secondary education 1.24, secondary special education 2.25 times compared to higher education. The absence of work at this time increases the risk of cognitive impairment compared to those who continue to work 2.24 times, being retired 0.42 times. Smoking increases the risk of developing CI compared to those who do not smoke 2.51 times, smoking history 0.86 times. Alcohol consumption increases the risk of developing CI compared to those who do not drink alcohol 1.62 times, other (on holidays) 0.31 times .
CONCLUSION: Prevention of dementia does not exist today, but it is possible to reduce the risk of its development. Risk factors increase the chances of getting sick but also serve as guidelines that can be influenced *(Tab. 3, Ref. 17)*. *Text in PDF www.elis.sk*
KEY WORDS: risk factor, cognitive impairment, elderly people.

## Introduction

The improvement of medical care has significantly increased the average life expectancy, which has led to a significant increase in the number of people aged 65 and older. Memory impairment is a common consequence of the aging process in the elderly and can be a marker of Alzheimer's disease (AD) and dementia. Mild cognitive impairment (MCI) is a common condition in the elderly. It is characterized by a deterioration of memory, attention and cognitive functions that goes beyond what is expected, depending on age and level of education. MCI does not have a significant impact on people's daily activities. It can act as a transitional level of dementia development with a conversion rate of 10–15 % per year. Thus, it is extremely important to protect the elderly from MCI and the development of dementia (1).

The prevalence of dementia increases exponentially with age and doubles every five years after age 65. In higher-income countries, the prevalence is 5–10 % among people aged 65 and older, usually more among women than men, largely because women live longer than men. Life expectancy is increasing across the planet, with population ageing occurring most rapidly in low- and middle-income countries, where, consequently, the prevalence of dementia is expected to increase. New research suggests that prevalence may be leveling off or even declining in high-income countries. Risk factors are factors associated with an increased incidence rate, a higher chance of developing the disease, or an earlier onset of the disease (2).

The development of cognitive impairments (CI) can be delayed if their risk factors are identified and detected, if the trend of their development can be predicted, and if early intervention can be carried out. Cognitive impairments impact on the quality of life, social functioning and well-being of older people. With an increase of average life expectancy, CI becomes a serious social and medical problem. In addition to the development of pharmacological means for the prevention and treatment of CI, it is necessary to study and eliminate modifiable risk factors that may be associated with or contribute to CI (3).

Kazakhstan, like other countries, is at the stage of demographic aging. The transience of time, the routine way of life lead to the fact that most elderly people do not attach importance to the beginning or already existing changes in their cognitive sphere. All this is a consequence of the lack of awareness of the population about CI. For example, not treated arterial hypertension leads to CI. Therefore, it is necessary that everyone thinks about the prevention of CI in advance, when changes of the cognitive sphere are less pronounced and there is still an opportunity to help the patient. Prevention of CI, timely detection, treatment and rehabilitation are a step towards improving the quality of life of the

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patient and his family, longer preservation of independence of the elderly, their active longevity.

## Materials and methods

A sociological study was carried out to study the risk factors of the development of cognitive impairment in the elderly. Study design – cross-sectional.

*Inclusion criteria*: elderly people aged from 60 to 74 years inclusive, voluntary participation in the study, capable persons.

*Exclusion criteria*: refusal to participate in the study, incapacitated persons, people under the age of 60 and over 74 years old.

385 elderly people (60–74 years old) randomly selected from all over Kazakhstan took part in the survey. The sample size was calculated using an online calculator called socioline.ru. The questionnaire for the elderly was developed based on international research (4), included socio-demographic data and a small test (a short version of the Montreal scale on a 12-point scale) that determines the absence of cognitive impairment or the risk of developing cognitive impairment. The test included 3 tasks: 1) Name 11 words with the letter «F»; 2) Name the current date, month, year, day of the week, country and city; 3) Name 5 words that the respondent was asked to remember at the beginning of the test. The maximum score was 12. If the respondent scored 10 or more points in total, this indicated the absence of cognitive impairment, if less than 10 points, it indicated a possible risk of cognitive impairment.

*Statistical analysis*

Descriptive statistics were used to analyze the data. In order to determine the risk factors of cognitive disorders in the elderly, a multiple logistic regression analysis was performed. Statistical analysis was carried out using the SPSS version 20.0 program. The level of statistical significance was set at $p < 0.05$.

## Results

Depending on the place of residence, urban residents prevailed with a slight advantage (59.5 %). In terms of regions, 30.1 % of the surveyed elderly lived in South Kazakhstan, 25.5 % – in East Kazakhstan, 23.1 % – in North Kazakhstan, 10.9 % – in West and 10.6 % – in Central Kazakhstan. The average age of the elderly was 66.75 ± 3.77.

Table 1 presents the results of socio-demographic data of the respondents, such as gender and national differences, marital status, education, employment and profession, place and living conditions, bad habits, hobbies, whether he attends interest clubs.

As can be seen from Table 1, among the respondents there were 34.3 % men (n = 132), and 65.7 % women (n = 253). Respondents of Kazakh nationality were 71.2 % (n = 274) people, other nationalities were 28.8 % (n = 111) people. Slightly more than half of the respondents (54.0%) were married. According to the level of education, a larger percentage (41.8 %) were people with higher education. By profession, 58.2 % were employees. The majority of respondents (55.3 %) did not work at the moment of the survey, were retired and had hobbies (55.6 %). The predominant part of the elderly (78.4 %) were not single, lived with a family. The majority of respondents noted that they do not smoke or drink alcohol (75.1 %, 73.0 %). The elderly people who participated in the survey mostly answered that they do not attend interest clubs (94.8 %).

**Tab. 1. Socio-demographic data of respondents.**

| Variables | | n (%) |
|---|---|---|
| Gender | Male | 132 (34.3) |
| | Female | 253 (65.7) |
| Nationality | Kazakhs | 274 (71.2) |
| | Others | 111 (28.8) |
| Marital status | Single | 25 (6.5) |
| | Divorced | 42 (10.9) |
| | Widower / Widow | 110 (28.6) |
| | Married | 208 (54.0) |
| Education | Incomplete secondary | 9 (2.3) |
| | Secondary education | 107 (27.8) |
| | Secondary special education | 108 (28.1) |
| | Higher education | 161 (41.8) |
| Profession | Employee | 224 (58.2) |
| | Service sector employees | 64 (16.6) |
| | Working professions | 26 (6.84) |
| | Missed response | 14 (3.6) |
| | Retired people | 10 (2.6) |
| | Housewife | 47 (12.2) |
| Are you currently working? | Working | 49 (12.7) |
| | Not working | 123 (31.9) |
| | Retired | 213 (55.3) |
| Current living conditions | With a family | 302 (78.4) |
| | Alone | 83 (21.6) |
| Do you have a hobby or any favorite activity? | Yes | 214 (55,6) |
| | No | 171 (44.4) |
| Attitude to smoking | Smoke | 48 (12.5) |
| | Don‘t smoke | 289 (75.1) |
| | Smoked | 48 (12.5) |
| Do you consume alcohol? | Yes | 85 (22.1) |
| | No | 281 (73.0) |
| | Other | 19 (4.9) |
| Place of residence | City | 229 (59.5) |
| | Village | 156 (40.5) |
| Do you visit interest clubs? | Yes | 20 (5.2) |
| | No | 365 (94.8) |

Table 2 presents the results of the test for the detection of cognitive impairment in study participants. The study participants were offered 3 tasks, for the correct performance of which they scored a certain number of points. According to the first task, if the subject completed the task, he received 1 point, if he did not complete it or did not complete it completely, then 0 points. The table shows that only 54.5 % of elderly people have fully completed the task. For the second task, 6 questions had to be answered, 1 point was awarded for each of the correctly answered questions. 81.6 % of the elderly answered all 6 questions.

Despite the fact that the tasks were very easy, 18.4 % of elderly people did not answer all the questions correctly. The third task was fully completed by only 19.0 % of the elderly.

The results of the test of elderly people were distributed as follows: 54.5 % (n = 210) of respondents received 10 or more points, which indicates the absence of cognitive impairment, while 45.5 % (n = 175) of study participants scored less than 10 points, which indicates the risk of cognitive impairment in these individuals.

**Tab. 2. The results of the test for the detection of cognitive impairment in the elderly.**

| Task | Score for completion | Respondents' results | | |
|---|---|---|---|---|
| | | Number of points received | n | % |
| *1. task:* Name any words with the letter F (11 words or more) | 1 score | 0 | 175 | 45.5 |
| | | 1 | 210 | 54.5 |
| *2. task* Name: 1) the current Date; 2) the current Month; 3) the current Year; 4) the current Day of the week; 5) Your Country; 6) Your City | 6 scores | 0 | 1 | 0.3 |
| | | 1 | 1 | 0.3 |
| | | 3 | 17 | 4.4 |
| | | 4 | 2 | 0.5 |
| | | 5 | 50 | 13.0 |
| | | 6 | 314 | 81.6 |
| *3. task:* Name the words that you were asked to remember at the beginning of the test: | 5 scores (5 words) | 0 | 45 | 11.7 |
| | | 1 | 9 | 2.3 |
| | | 2 | 27 | 7.0 |
| | | 3 | 86 | 22.3 |
| | | 4 | 145 | 37.7 |
| | | 5 | 73 | 19.0 |

**Tab. 3. Results of logistic regression to identify risk factors for cognitive impairment in the elderly.**

| Variables | Uncorrected odds ratio | 95% CI | corrected odds ratio | 95% CI | p |
|---|---|---|---|---|---|
| Marital status | | | | | |
| Single | 0.09 | 0.02 –0.42 | 6.63 | 1.27–34.72 | 0.051 |
| Divorced | 0.06 | 0.01–0.26 | 1.24 | 0.46–3.35 | |
| Widower/Widow | 0.06 | 0.01–0.26 | 0.65 | 0.34–1.24 | |
| Married | 1.00 | Reference | 1.00 | Reference | |
| Education | | | | | |
| Incomplete secondary | 5.59 | 1.13–27.77 | 4.92 | 0.98–24.63 | 0.001 |
| Secondary education | 1.89 | 1.15–3.10 | 1.24 | 0.58–2.64 | |
| Secondary special | 1.28 | 0.78–2.09 | 2.25 | 1.04–4.87 | |
| Higher education | 1.00 | Reference | 1.00 | Reference | |
| Are you currently working? | | | | | |
| Work | 1.00 | Reference | 1.00 | Reference | 0.000 |
| Do not work | 2.79 | 1.40–5.53 | 2.24 | 0.85–5.89 | |
| Retired | 1.06 | 0.56–2.01 | 0.42 | 0.17–1.05 | |
| Smoking | | | | | |
| do not smoke | 1.00 | Reference | 1.00 | Reference | 0.020 |
| smoke | 1.23 | 0.66–2.27 | 2.51 | 1.07–5.89 | |
| Smoked | 0.48 | 0.20–1.22 | 0.86 | 0,33–2,22 | |
| Alcohol consumption | | | | | |
| No | 1.00 | Reference | 1.00 | Reference | 0.035 |
| Yes | 1.35 | 0.82–2.22 | 1.62 | 0.19–13.69 | |
| Other (on holidays) | 14.08 | 3.05–64.98 | 0.31 | 0.09–1.13 | |

The average score received by respondents for the test was 9.53 ± 1.69. Thus, the presence of risk factors for cognitive disorders in 45.5 % of respondents was revealed, which requires attention from medical professionals.

Table 3 presents the results of logistic regression to identify risk factors for the development of CI in the elderly.

The model includes the following variables: «education» (p = 0.001), «are you currently working?» (p = 0.000), «smoking» (p = 0.001), «alcohol consumption» (p = 0.035). As a result, incomplete secondary education increases the risk of developing CI 4.92 times, secondary education 1.24, secondary special education 2.25 times compared to higher education. The absence of work at this time 2.24 times, being retired 0.42 times increases the risk of cognitive impairment compared to those who continue to work. Smoking increases the risk of developing CI 2.51 times; smoking history 0.86 times increases the risk of developing CI compared to those who do not smoke. Alcohol consumption increases the risk of developing CI 1.62 times, other (on holidays) 0.31 times compared to those who do not drink alcohol.

## Discussion

Many researchers have studied risk factors of cognitive impairment. Among them, the main ones are age, cholesterol, high blood pressure, obesity, depression, education, nutrition, sleep, and mental state, physical and social activity. They have shown that cognitive impairment is inextricably linked to many aspects of overall health. Caregivers often focus only on the physical needs of the patient. Social interaction or hobbies are often ignored, which is a serious problem. Therefore, comprehensive screening of clinical, cognitive and functional areas of fitness is mandatory for the elderly in order to eliminate modifiable risk factors, with the help of specially designed rehabilitation programs (5–7). With increasing age, it becomes more difficult to switch from one activity to another, it becomes more difficult to master new knowledge and skills, and cognitive rigidity develops. If the patient has several risk factors, then the severity of CI is also summed up. Old age is becoming one of the risk factors for CI, and age-associated pathologies have been increasing in recent years. Older people are much more likely to experience stress, decreased motor activity, pain, weakness and other health problems, care is required for them, all their problems lead to loneliness and even more stress (8). Activities such as social interaction or hobbies are often ignored, which is a serious problem. It was observed that elderly people with disabilities usually feel worse and lose confidence in communicating with other people (9). International studies show the influence 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 had a higher incidence of mild cognitive impairment. An important difference between women and men was a significantly higher representation of the depression index. Women are at greater risk of developing dementia associated with Alzheimer's disease, whereas men are at greater risk of developing vascular dementia (10).

According to our study, the presence of risk factors for cognitive disorders was detected in 45.5 % of respondents, which requires attention from health authorities in order to timely prevent

further progression of cognitive disorders in them. Factors such as incomplete secondary education, secondary education, secondary special education, lack of work at a given time, pension, smoking, alcohol consumption increase the risk of cognitive impairment.

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 (11). It was found that both education and the complexity of the profession independently contribute to the risk of dementia (12). In our study, we also found that incomplete secondary education increased the risk of developing CI 4.92 times, secondary education 1.24, secondary specialized education 2.25 times compared with higher education.

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 (13). According to a study of Chinese scientists, smokers have an increased risk of developing dementia, and quitting smoking reduces the risk to the level of those who have never smoked (14). We obtained the results that smoking increases the risk of developing CI 2.51 times, the history of smoking 0.86 times compared with those who do not smoke.

In a study conducted in the USA, complete abstinence from alcohol and infrequent use were associated with lower cognitive performance among participants (15). Alcohol consumption increased the risk of mild cognitive impairment and dementia, especially early onset dementia. An assessment of the proportion of alcohol-related dementia cases showed that 3.2 % and 7.8 % of new cases of dementia were associated with high levels of alcohol consumption, in women and men, respectively (16). In our study, we obtained the following results that drinking alcohol increases the risk of developing CI 1.62 times, another by 0.31 compared to those who do not drink alcohol.

PHC in Kazakhstan includes pre-medical or qualified medical care without round-the-clock medical supervision, which includes preventive measures and identification of risk factors, screening studies for early detection of diseases, etc. (17). A large role in identifying risk factors and increasing awareness of cognitive impairment among the population belongs to family doctors and nurses. Knowing the whole family, including the older generation, a general practitioner can alert family members and help manage risk factors. He can also help to detect dementia early, give recommendations, prescribe treatment and refer, if necessary, to a specialist.

This cross-sectional study has some limitations that need to be considered when interpreting the results. Respondents may not always be honest in their answers, this may distort the results. Selective sampling is also a limitation. The results become outdated over time. However, this is the first study in which elderly people from all over the region of Kazakhstan participated. We used foreign experience to identify the risk of cognitive impairment in the elderly.

## Conclusion

Prevention of dementia does not exist today, but it is possible to reduce the risk of its development. Risk factors increase the chances of getting sick, but also serve as guidelines that can be influenced. Not all risk factors are modifiable, that is not everything can be influenced. But most risk factors can and should be corrected to prevent the development of such severe condition as dementia.

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