

# Education Level Does Not Affect Prevalence of Dementia in a Bulgarian Population

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## Citation

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## Abstract

Low education is commonly regarded as a risk factor for dementia, its role being confirmed in numerous studies. Some investigators, however, have reported only partial association between education and dementia, or no association at all. No studies on this topic have been performed in Bulgaria. The aim of our study was to assess whether prevalence of dementia varies among subgroups of Bulgarian citizens with different education degrees. Questions on the level of education, according to the national educational standards, were included in the screening interview of the first two-phase prevalence study of cognitive disturbances in the town of Varna, Bulgaria. We assessed the relationship between education and dementia, diagnosed according to DSM-IV criteria, as well as between education and neuropsychological test performance. While education affected MMSE scores, no statistically significant relationship with the diagnosis was found. Our results do not conform to the common conception stating that dementia prevalence is inversely related to the level of education. A larger study with a more uniform distribution of subjects according to education may be required in order to confirm these findings.

## INTRODUCTION

Low education is a commonly cited risk factor for dementia. Its role has been confirmed in numerous studies. Moreover, poorly educated subjects diagnosed with dementia may experience quicker cognitive decline than those with higher educational level.<sup>1-4</sup> Education could therefore be considered as a “cognitive reserve” allowing the person a longer normal level of functioning until dementia shows up. This hypothesis may be substantiated by a possible higher synaptic density obtained on the basis of stimulation.<sup>5</sup> Some investigators, however, have reported only partial association between education and dementia, no association at all, or even quicker cognitive decline in patients with high education. According to Wilson et al.<sup>6</sup> higher educational attainments may be associated with a slightly accelerated rate of cognitive decline in Alzheimer’s disease. A study of Unverzagt et al.<sup>7</sup> demonstrated that at comparable levels of clinical dementia severity, greater cognitive decline may occur in highly educated patients. No studies on this topic have been performed in Bulgaria thus far.

The purpose of our study was to assess the possible variations of dementia prevalence and MMSE test scores among subgroups of Bulgarian citizens with different degrees of education.

## SUBJECTS AND METHODS

Questions on the level of education according to the national educational standards were included in the screening interview of the first two-phase prevalence study of cognitive disturbances in the town of Varna, Bulgaria. The study sample included 605 randomly selected subjects over the age of 65 years. Apart from the level of education, the screening questionnaire gathered information on demographics, professional activities, current health state and medical history, motor functions, dietary habits, alcohol consumption, smoking, previous and current therapy. Two neuropsychological screening tests (the Mini-Mental State Examination<sup>8</sup> and the Memory Impairment Screen<sup>9</sup>) were included, as well as an Instrumental activities of daily living assessment scale (the Four-Item IADL).<sup>10</sup> We assessed the possible relationship between education and dementia diagnosed according to DSM-IV<sup>11</sup> criteria, as well as between education and MMSE scores.

## RESULTS

Five hundred and forty subjects (89%) signed the informed consent and completed the screening phase of the study, while 65 (11%) were non-responders (Table 1). Fifteen participants (2.8%) had basic level of education (<8 years), 151 (28.0%) had primary (8 years), 249 (46.1%) had

secondary education (11-12 years), 41 (7.6%) had a college degree, while university degree was reported by 84 subjects (15.6%) (Fig. 1). Women predominated in all groups except for university degree where men were more prevalent (Fig. 2). The diagnosis was established at the First clinic of Neurology of "Sveta Marina" University Hospital in Varna, Bulgaria. CT or MRI were performed in all subjects and were in line with the diagnosis, while additional HMPAO SPECT imaging was carried out in selected cases. Dementia was diagnosed in 65 subjects (7.2%).

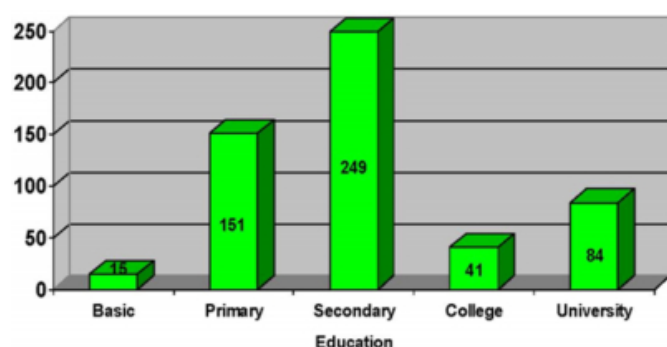
**Figure 1**

Table 1. Study sample by age and sex.

|                       | Number (M/F)  | Age (years) |
|-----------------------|---------------|-------------|
| <b>Total</b>          | 605 (260/345) | 73.15±5.69  |
| <b>Responders</b>     | 540 (223/317) | 72.95±5.50  |
| <b>Non-responders</b> | 65 (37/28)    | 74.75±6.88  |

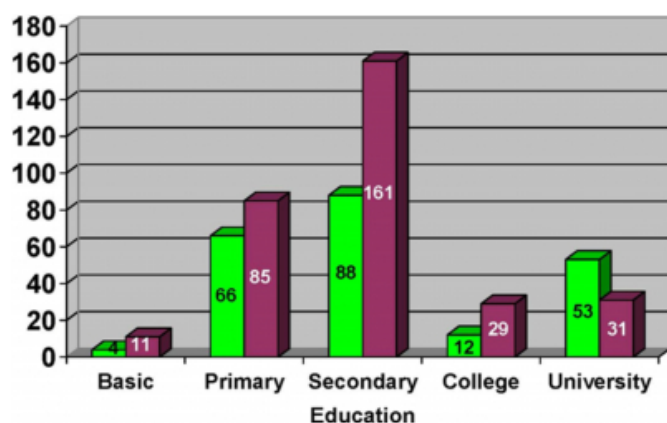
**Figure 2**

Fig. 1. Distribution of subjects according to the level of education.



**Figure 3**

Fig. 2. Distribution of subjects according to sex and level of education.

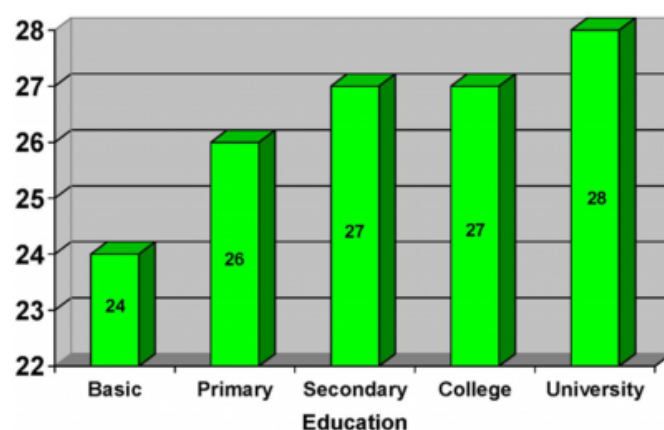


MMSE and scores tended to rise in line with higher

education (Fig. 3). Statistically significant differences were demonstrated between the average MMSE scores of the groups with basic education and secondary/college degree, as well as between those with primary education and secondary/university degree ( $p < 0.05$ ) (Table 2). Logistic regression analysis showed no statistically significant differences in dementia risk between different levels of education ( $p = 0.89$ ,  $OR = 1.02$ ).

**Figure 4**

Fig. 3. Average MMSE scores according to the level of education



**Figure 5**

Table. 2. Comparison of MMSE scores between groups with different education levels (significant differences presented in bold)

| Education (I)     | Education (II) | $\Delta \bar{x}$ (I-II) | SE    | p                | 95% CI |       |
|-------------------|----------------|-------------------------|-------|------------------|--------|-------|
|                   |                |                         |       |                  | From   | To    |
| <b>Basic</b>      | Primary        | -1,696                  | 0,921 | 0,495            | -4,54  | 1,15  |
|                   | Secondary      | -2,884                  | 0,904 | <b>0,039</b>     | -5,68  | -0,09 |
|                   | College        | -2,694                  | 1,026 | 0,143            | -5,87  | 0,48  |
|                   | University     | -3,824                  | 0,953 | <b>0,003</b>     | -6,77  | -0,88 |
| <b>Primary</b>    | Basic          | 1,696                   | 0,921 | 0,495            | -1,15  | 4,54  |
|                   | Secondary      | -1,188                  | 0,351 | <b>0,023</b>     | -2,27  | -0,10 |
|                   | College        | -0,998                  | 0,599 | 0,596            | -2,85  | 0,85  |
|                   | University     | -2,128                  | 0,463 | <b>&lt;0,001</b> | -3,56  | -0,70 |
| <b>Secondary</b>  | Basic          | 2,884                   | 0,904 | <b>0,039</b>     | 0,09   | 5,68  |
|                   | Primary        | 1,188                   | 0,351 | <b>0,023</b>     | 0,10   | 2,27  |
|                   | College        | 0,190                   | 0,573 | 0,999            | -1,58  | 1,96  |
|                   | University     | -0,939                  | 0,429 | 0,310            | -2,27  | 0,39  |
| <b>College</b>    | Basic          | 2,694                   | 1,026 | 0,143            | -0,48  | 5,87  |
|                   | Primary        | 0,998                   | 0,599 | 0,596            | -0,85  | 2,85  |
|                   | Secondary      | -0,190                  | 0,573 | 0,999            | -1,96  | 1,58  |
|                   | University     | -1,130                  | 0,648 | 0,552            | -3,13  | 0,87  |
| <b>University</b> | Basic          | 3,824                   | 0,953 | <b>0,003</b>     | 0,88   | 6,77  |
|                   | Primary        | 2,128                   | 0,463 | <b>&lt;0,001</b> | 0,70   | 3,56  |
|                   | Secondary      | 0,939                   | 0,429 | 0,310            | -0,39  | 2,27  |
|                   | College        | 1,130                   | 0,648 | 0,552            | -0,87  | 3,13  |

## DISCUSSION

In our population lower education was associated with poorer MMSE performance but not with higher prevalence of dementia. Our results do not conform to the common conception stating that dementia prevalence is inversely related to the level of education, though other authors also report findings similar to ours. Such discrepancies may be related to different factors. Above all, neuropsychological instruments for routine application have not been created to match specific competences and skills dependent on

education. Though correction coefficients are available for some tests, they are generally far from being perfect. Differences in subject samples and methods used may be another important issue leading to contradictory results among studies. As no other data are available for our population, therefore no comparison can be made, a larger, dedicated study with a more uniform distribution of subjects according to education may be required in order to confirm our results.

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