Table 3 Multiple regression model output

Dependent variable	MMSE Score		
Independent variables	***P* value**	**R^2**	**Adjusted R^2**
Cumulative of all the 13 Significant Variables (including Education/Age/Number of Children/Marriage Status/Blood Glucose/Physical Exercise/Family Structure/Dysuria/Coffee Drinking/Constipation/Sleeping time/ApoE Allele/Obesity)	<0.001	0.304	0.297

Discussion

This study is the first to reveal the prevalence of CI and the associated factors among elderly people in Shanghai urban over the past decade. The prevalence of CI(2-3%) is significant lower compared to the similar investigations from Eureapean countries and Northern American according to the Chinese representive studies before 2001 years [1,2]. However, recent studies showed that the truths might probably be the opposite with a more relative high value. The present study proposed that in urban of China, the prevalence of CI were closer to that of most Western countries [11,12] and our previous study in suburban of China [7]. For this disparity, except for ethnic difference (Chinese Han ethnicity and Caucasian), the most important possible explanation might that the changes of the proportion of aging peoples result in the increasing ratio of CI: the senile population increased markedly (over 7% in total populations) compared to the proportions of the total in China since 2001.

Furthermore, the thirteen associated factors screened out might have profound implications to the individuals, the governments and even the whole Society. Among all the factors locked, education, age, number of children, or ApoE genotype are those nearly impossible so far for human beings to alter or reverse. “Age” itself is actually a universal risk factor to nearly every disease except for those only attack the young. However, family structure, marriage status and a healthy life style with enough exercise, frequent coffee drinking along with active interventions against chronic diseases might help to prevent the onset or slow down the progress of CI [13-15]. According to the risk factor ranking, the prevalence of CI might be reduced by encouraging elder people living with their spouse or offsprings [16]. Living with relatives meant more communications and more interactions both physically and mentally [17]. Drinking more coffee, having enough sleep and consulting the physicians once the problems like prostate hypertrophy (which is the main cause of dysuria) or constipation appear are also beneficial for CI preventing. Maintaining an appropriate blood glucose level might also be preventive by resisting the degeneration of the vascular system, sensitizing the utilization of the glucose and thus satisfying the energy demand of the local neural systems [18]. Exercise stimulates the execration of 5-HT which sustains the functional activity of neurons and maintains a high spirit [15]. Additionally, the results revealed that the ApoE allele is a significant risk factor for CI similar with previous studies [19-21]. However, in considering its weighing on the influence of CI onset it is far less enough to be recommended as a diagnosis predictor clinically. As a clinical physician facing the patients, sociological and physiological factors are, if not more, as important as molecular genetics.

However, with the regression approach we totally screened out thirteen significant objective factors associated with CI among the sample population. Combined together, these thirteen factors could only explain 30% of the CI occurrence. One explanation is that we might have lost other important risk factors like hypertension and smoking. In fact, according to our results, though there is an augmentation trend of CI rate in those who smoke or have hypertension, they are not statistically significant either by Chi-square test or in a regression model. Thus, we presumed that CI is influenced by multiple factors. Different populations have varied sets of significant risk factors. The results we obtained only represent the urban population in Luwan, Shanghai.

The present study is limited by its cross-sectional nature and only included one urban areas. Determining of CI mainly depended on MMSE scores rather than neuroimage results and other neuropsychiatric scales. Additionally, the methods for investigate the prevalence of CI with these two different cut-off criteria, including the attained education level(AEL) and MMSE cut-off score of 23/24 or 24/25 without education adjustment CI [8]. Therefore, we need modify the methods for study and reasonability compare with Western countries which most employed the latter methods. Additionally, we found that the relative highly educated sample in the present study rather than our previous relatively low educated have a relative high prevalence of CI, except for sample discrepancy, it seem like that high education is not an independent protective factor which will be affected by other factors. Therefore, further prospective study for the Chinese people requires to be investigated at more large scale in the future.

Abbreviations

CI: Cognitive Impairment; MMSE: Mini-Mental State Examination; AD: Alzheimer’s disease; AEL: Attained Education Level.

Competing interests

The authors declare that they have no competing interests.