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The global prevalence of mild cognitive impairment in geriatric population with emphasis on influential factors: a systematic review and meta-analysis

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Abstract

Background Mild cognitive impairment (MCI) is a common disorder among the geriatric population (GP). MCI induces adverse effects on life quality by disrupting of natural aging process, daily activities, and memory. This systematic review and meta-analysis study aimed to investigate the global prevalence of MCI in GP with an emphasis on associated influential factors.

Methods Electronic databases of PubMed, Scopus, WoS, Embase, ScienceDirect, and Google Scholar were systematically searched (by November 2024) using the MeSH-based keywords. Collected references were imported into the Citation Management Software of EndNote (v.8) for duplicate detection. Paper screenings and quality assessments were applied based on the inclusion and exclusion criteria. Then, eligible papers were gathered and data analysis was performed using CMA software (v.2).

Results In the review of 51 eligible studies ($n=287,689$ elderly individuals), the global prevalence of mild cognitive impairment in geriatric population was found 23.7% (95%CI:18.6–29.6). According to the meta-regression analysis, following the increase in sample size and year of paper publication, the mild cognitive impairment index decreased and increased, respectively. Besides, age, educational level, and depression status were considered the most critical influential factors of mild cognitive impairment in geriatric population.

Conclusion According to the relatively high prevalence of mild cognitive impairment in geriatric population, determination of proper health strategies seems necessary for diagnosis and treatment of mild cognitive impairment along with awareness and management of associated consequences in geriatric population.

Clinical trial number Not applicable.

Keywords Mild cognitive impairment, Elderly, Meta-analysis

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Background

Cognitive decline in the elderly contains a wide range of spectrum which is classified as normal cognitive decline with age to mild cognitive impairment (MCI) and dementia [1]. The milder type is known as mild cognitive impairment, a borderline between normal aging and dementia, characterized by memory loss [2].

Mild cognitive impairment is an early stage of memory loss or other cognitive ability loss (such as language or visual/spatial perception) in individuals who preserve the ability to independent daily activities [3]. Individuals with mild cognitive impairment usually experience cognitive decline with minimal impairment in normal life activities [4]. Based on cross-sectional studies conducted in Kazakhstan and Iran, age, gender, dietary habits, education level, economic status, and stroke are among the factors affecting the incidence of mild cognitive impairment in the geriatric population (GP) [5, 6].

The global elderly population is increasing dramatically, with the estimation of 2.1 billion geriatric population by 2050 to 3.1 billion by 2100 [1]. The prevalence of mild cognitive impairment in adults > 60 years ranges from 6.7 to 25.2% which increases with age and lower educational attainment, especially commonly in men [7–9].

Mild cognitive impairment can directly affect daily physical, psychological, and social activities [10]. However, mild cognitive impairment can potentially lead to other unpleasant complications such as memory impairment [11], various types of sleep disorders (such as insomnia), sleep-disordered breathing, and restless leg syndrome [12]. Also, the incidence of psychological disorders, such as depression, is more common in mild cognitive impairment individuals with higher risks of other severe cognitive impairments [13].

Mild cognitive impairment is recognized as a clinical and transitional stage between healthy aging and dementia. Since diagnosis and screening of mild cognitive impairment is considered a major and important "Target" to delay the progression of dementia, the attention to prevalence and epidemiology of mild cognitive impairment is a critical approach to effectively guide health policymakers and properly direct the allocation of health resources, along with to develop relevant strategies for the prevention and treatment of this type of disorder. However, published studies reported heterogeneous and different prevalences in different countries, making this recommendation difficult for policymakers. Therefore, according to the severe complications and various reports regarding mild cognitive impairment in geriatric population, the present study aimed to investigate the global prevalence of mild cognitive impairment in the elderly population, along with the associated influencing factors. In addition, this study aimed to provide a comprehensive review of this type of disorder in the elderly, as well as provision of a valid report on the effective factors through a comprehensive assessment of whole relevant databases.

Methods

PRISMA statement criteria

All protocols of study selection were applied according to PRISMA 2020 statement criteria [14] by November 22, 2024. For systematic searching, the main MeSH-based keywords of "Prevalence", "Cognitive disorders", "Cognitive declines", "Cognitive effect", "Mild cognitive impairments", "Elderly", "geriatric" were totally used to apply searchin in valid databases of PubMed, WoS, Scopus, Embase, and ScienceDirect. Besides, the Google Scholar search engine and citations of collected articles were assessed manually to collect probable relevant studies. All collected citations were imported into the EndNote Citation Management Software (v,8x) for further assessments.

PubMed search strategy sample: ((((((Prevalence[Title/Abstract]) AND (Cognitive disorders[Title/Abstract])) OR (Cognitive declines[Title/Abstract])) OR (Cognitive effect[Title/Abstract])) OR (Mild cognitive impairments[Title/Abstract])) AND (Elderly[Title/Abstract])) OR (geriatric[Title/Abstract])))))).

Inclusion and exclusion criteria

All English-based studies as well as non-English articles containing an English abstract (cohort, case-control, and cross-sectional) with available and extractable statistics reporting the prevalence of mild cognitive impairment in geriatric population were included for data extraction and meta-analysis. In addition, non-English studies with insufficient or unextractable data, reviews, interventional, and case studies were excluded from the investigation.

Study selection

Following the insertion of collected citations into the EndNote software, duplicate papers were detected and merged. In primary screening, the Title and Abstract of collected papers were assessed. During secondary screening, full texts of the articles were also investigated. All irrelevant papers were excluded based on the inclusion/exclusion criteria. To avoid any potential bias and data loss, all study selection stages were applied independently by two researchers. The corresponding author was also responsible for management and final decisions regarding any disagreements.

Qualitative assessment

The Newcastle-Ottawa Scale (NOS), as a quality assessment tool for observational studies recommended by the Cochrane Collaboration, was hired for qualitative assessments in this study [15]. The NOS contained a maximum

number of nine points for the least risk of bias in three domains; 1) selection of study groups (4 points); comparability of groups (2 points); and ascertainment of exposure and outcomes (3 points) for case-control and cohort studies, respectively [15], and 11 scores possible. Eventually, articles were classified into high (NOS score ≥ 5 points) or low quality (NOS score < 5 points).

Data extraction and meta-analysis

The Name of the first author, Year of paper publication, Country, Sample size, Age range, Prevalence, and Data collection tool were extracted from the eligible papers. For meta-analysis, the Comprehensive Meta-Analysis (v.2) software was used. In this regard, the I^2 test was performed to examine the heterogeneity of studies, and publication bias was investigated using the Egger test and Funnel plot. Meta-regression was performed based on sample size and year of study, as well as subgroup analysis based on continent and type of study.

Results

General reports

In the review of 1180 studies collected from the reviewed databases, 1174 and 6 investigations were included following the systematic review and citations assessments, respectively. Besides, 336 duplicate studies were excluded. Then, among 844 reviewed studies, 735 papers were excluded due to the inclusion and exclusion criteria. During secondary screening, 109 articles were reviewed and 56 irrelevant studies with no sufficient extractable data were excluded. 2 poor-quality studies were also ignored. Finally, 51 eligible high-quality studies were included for data extraction and meta-analysis (Fig. 1). Static information of the first author's name, associated reference, year of paper publication, country, type of study, sample size, prevalence of mild cognitive impairment, age of the participants, and the diagnostic tool were totally provided in Table 1.

Meta-analysis and meta-regression findings

Most investigations were cross-sectional studies conducted in Asia; also, 5 investigations were cohort studies. Following meta-analysis, the highest prevalence of mild cognitive impairment (93%) in geriatric population was related to the study of Pradhan et al., in Nepal [3], and the lowest index (1.7%) was associated with the study of Khedr et al. in Egypt [16]. In a review of 51 eligible studies with a sample size of 287,689 geriatric population, the I^2 index showed high heterogeneity levels (I^2:99.7); thus, the Random Effect Model was used for meta-analysis. In total, the global prevalence of mild cognitive impairment in geriatric population was reported as 23.7% (95%CI:18.6–29.6) (Fig. 2). In this figure, the prevalence of each study was represented by a square and a horizontal line inside the square was 95% confidence interval for each study. Finally, the diamond at the end of the figure shows the outcome and overall prevalence of all studies. Also, the Egger test indicated the presence of publication bias among the studies (p:0.008) (Fig. 3). Following the examination of the factors affecting the heterogeneity index and the effect of sample size, it was reported that by the increasing sample size, the global prevalence of mild cognitive impairment in geriatric population decreases significantly ($p < 0.05$) (Fig. 4) and also following the increase in years of study, the global prevalence of mild cognitive impairment in geriatric population increases significantly ($p < 0.05$) (Fig. 5).

Based on the results represented in Table 2, reporting the global prevalence of mild cognitive impairment in geriatric population by the type of studies and the continent, it is reported that in 47 cross-sectional studies, the mild cognitive impairment prevalence was 24.8 (95%CI:21.9–28), and in 4 cohort studies the mild cognitive impairment prevalence was 13 (95%CI: 2.3–48.4). Based on the continental analysis, the highest frequency and prevalence were reported in the African continent with the prevalence of 26.4 (95%CI: 15.4–41.6), and the Asian continent with the prevalence of 25.4 (95%CI: 22-29.1) (Table 2).

Influential factors on the occurrence of mild cognitive impairment in geriatric population

Based on relevant studies, some critical factors including education levels, age range, and depression were considered as intervening factors in the occurrence of mild cognitive impairment (Table 3). In 7 studies [4, 26, 30, 35, 36, 38, 54], the educational level was identified as a relevant factor for development of mild cognitive impairment. In this regard, low education level was considered as a main risk factor for high mild cognitive impairment status. According to 9 studies [4, 25, 27, 30, 32, 40, 49, 54, 58], the age is associated with mild cognitive impairment occurrence rate. Thus, higher age groups represent more susceptibility to mild cognitive impairment occurrence. Four studies [4, 28, 58, 62] stated that depression is a considerable influential factor for mild cognitive impairment in geriatric population. In this regard, other risk factors include low socioeconomic status [30, 35], stroke [4, 41], high blood pressure [4, 38], low physical activity [4], and female gender [54, 58].

Discussion

The aim of the present systematic review and meta-analysis study was to investigate the global prevalence of mild cognitive impairment in geriatric population, which was found 23.7% in total. Meta-regression analysis revealed that following the increase in the year of paper publication, the overall prevalence of mild cognitive impairment

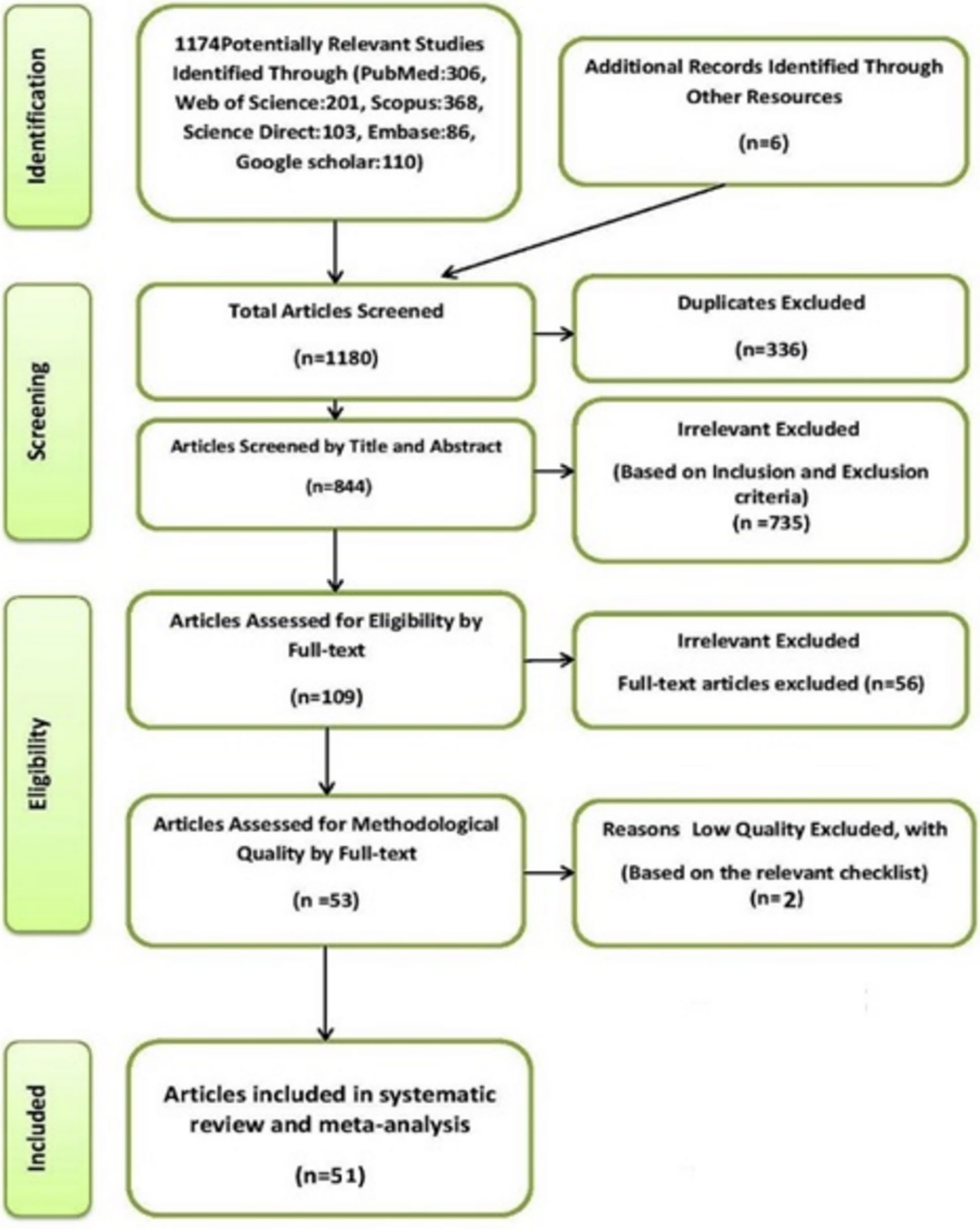

Fig. 1 PRISMA flow diagram for study selection

Table 1 Summary of characteristics of included studies representing the prevalence of mild cognitive impairment in elderly individuals

First author`s name	Year	Country	Type of Study	Sample size	Female participants (%)	Male participants (%)	Mild cognitive impairment Prevalence in geriatric population (%)	Data extraction tool	Range and cutoff	Age
Achary et al. [17]	2023	India	cross-sectional	365	58.9	41.1	9.3	HMSE, MoCA-B	score > 23, score 19–25	≥ 60
Alagiakrishnan et al. [18]	2005	Canada	cross-sectional	41	7.3	92.7	9.8	MMSE	range 12–28	65–92
Alkhunizan et al. [19]	2018	Saudi Arabia	cross-sectional	171	43	57	38.6	MoCA	range 75–62	≥ 60
Anieto et al. [20]	2023	Southern Nigeria	cross-sectional	160	60	40	59.4	10-WDRT	range 0–10, score of ≤ 2	65–74
Amer et al. [21]	2012	Egypt	cross-sectional	100	54	46	32	MMSE, MoCA	Scores below 26	≥ 60
Boongird et al. [22]	2010	Thailand	cross-sectional	177	67.8	32.2	60.5	MMSE	-	75.0 ± 0.7
Bickel et al. [23]	2018	Germany	cross-sectional	1468	51.7	48.3	19.8	CDR	value of 0.5	≥ 65
Khedr et al. [24]	2014	Egypt	cross-sectional	691	50.8	49.2	1.7	MMSE, HADS, MES, CDR	core range 75–62	≥ 60
Guo et al. [25]	2011	China	cross-sectional	264	49.2	50.8	13.3	MMSE, HDS	MMSE ≤ 24 and HDS were ≤ 24	≥ 65
Mooi And Hamid [26]	2016	Malaysia	cross-sectional	2112	51.4	48.6	68	MMSE	score of 21 and less	≥ 60
Mariel et al. [27]	2024	Mexico	cross-sectional	382	66.2	33.8	28	MoCA	19 to 22 points	≥ 60
Mohan et al. [28]	2019	India	cross-sectional	426	62	38	26.06	m-ACE	-	≥ 60
Mohammad et al. [4]	2022	Malaysia	cross-sectional	244	0	100	29.9	MoCA-BM	score below 23	≥ 60
Rao et al. [29]	2018	China	cross-sectional	2111	59.5	40.5	14.2	MMSE, MoCA, CDR	Scale score of ≤ 2	≥ 65
Song et al. [30]	2021	China	cross-sectional	1760	100	0	21.5	MMSE, MoCA	score < 26	≥ 60
Liu et al. [31]	2021	China	cross-sectional	2644	50.1	49.9	27.8	ADL, CDR (Petersen's criteria)	CDR = 0.5	≥ 65
Liu et al. [32]	2018	China	cross-sectional	622	57.6	42.4	34.1	AD8	score of 2 or greater	≥ 65
Pradhan et al. [3]	2020	Nepal	cross-sectional	115	54.8	45.2	93	MoCA	-	≥ 60
Saikia and Rajendran [33]	2020	India	cross-sectional	576	50	50	22.4	HMSE	-	≥ 60
Kim et al. [9]	2019	Japan	cross-sectional	1192	0	100	26.3	MMSE	19–26	≥ 70
Xu et al. [34]	2024	China	cross-sectional	2598	54	46	15.7	MMSE, CDR	ranging from 0 to 30	≥ 60
Xu et al. [35]	2014	China	cross-sectional	2426	60.7	39.3	21.3	MMSE, MoCA	MMSE (≤ 27), MoCA (< 26)	≥ 60
Cheng et al. [36]	2022	China	cross-sectional	4010	51	49	10.07	MMSE	MMSE (0 to 30)	≥ 60
Cong et al. [37]	2023	China	cross-sectional	5068	56	44	26.48	ADLs, MMSE, CDR (Petersen's criteria)	score ≥ 1.0	≥ 60
Jia et al. [38]	2020	China	cross-sectional	46,011	50.3	49.7	15.6	MMSE, CDR	-	≥ 60
Lype et al. [39]	2023	China	cross-sectional	311	59.2	40.8	18.6	EASI	-	≥ 65
Rostami et al. [6]	2024	Iran	cross-sectional	506	49.6	50.4	21.9	MMSE	19–26	≥ 60
Tsoy et al. [5]	2019	Kazakhstan	cross-sectional	662	25	75	30/4	MoCA	scored 26 or lower	≥ 60
Wang et al. [40]	2024	China	cross-sectional	706	42.9	57.1	32	MMSE	19–26	≥ 60
Wang et al. [41]	2015	China	cross-sectional	3136	59.3	40.7	20	MMSE, MoCA	MMSE (≤ 27), MoCA (< 26)	≥ 60
Tawfik et al. [42]	2024	Egypt	cross-sectional	470	27.9	72.1	37.7	MoCA	19–25	≥ 60
Rahman and El Gaafary [43]	2009	Egypt	cross-sectional	268	45	55	38.8	MoCA	score below 26	≥ 60

Table 1 (continued)

First author`s name	Year	Country	Type of Study	Sample size	Female participants (%)	Male participants (%)	Mild cognitive impairment Prevalence in geriatric population (%)	Data extraction tool	Range and cutoff	Age
Limongi et al. [44]	2017	Italy	Population-based cohort	2337	58.3	41.7	21.6	ADL, MMSE, CDT	MMSE score ≤ 27, CDT score ≤ 8	≥ 65
Ma et al. [45]	2022	China	cross-sectional	9036	56.5	43.5	18.1	ADL, MMSE	17–24	≥ 65
Lwi et al. [46]	2019	USA	cohort	168,111	100	0	1.8	ICD-9	-	≥ 65
Nguyen et al. [47]	2019	Vietnam	cross-sectional	367	60	40	14.4	IADL	-	≥ 60
Ogunniyi et al. [48]	2016	Nigeria	cross-sectional	613	69.7	30.3	18.1	IDEA	score below 8	≥ 65
Panghal et al. [49]	2022	India	cross-sectional	135	49.6	50.4	30	HMSE	ranged from 0 to 30	≥ 60
Xu et al. [50]	2020	China	cross-sectional	1262	55.5	44.5	25	MMSE	0 to 30	≥ 65
Xi et al. [51]	2022	China	cross-sectional	4275	100	0	28.6	C-MMSE	0–30	≥ 65
Hendlmeier et al. [52]	2019	Germany	cross-sectional	1468	53.8	46.2	19.7	CDR	0–3	≥ 65
Tranah et al. [53]	2011	USA	cohort	1282	100	0	24	MMSE	score < 8	≥ 65
Sun et al. [54]	2014	Taiwan	cross-sectional	10,432	52.3	47.7	19.63	CDR, TMSE	13–24	≥ 65
Shahar et al. [55]	2013	Malaysia	cross-sectional	318	59	41	21.1	ADL, MMSE, CDR	-	≥ 60
Roberts et al. [56]	2010	USA	cross-sectional	1233	48	52	13.2	CDR	-	≥ 70
Reitz et al. [57]	2008	USA	cohort	678	70.4	29.6	23.9	DSM-IV	-	≥ 65
Khater and abouelezz [58]	2011	Egypt	cross-sectional	120	53.3	46.7	38.3	MMSE, MoCA	scores below 26	≥ 60
Kitro et al. [59]	2024	Thailand	cross-sectional	984	62.2	37.8	35.5	TMSE	score below 24	≥ 60
Kim et al. [60]	2022	Korea	cross-sectional	806	58	42	35.3	MMSE-KC	0 to 30	≥ 60
Liu et al. [61]	2017	China	cross-sectional	2102	59.6	40.4	15.9	MMSE	17–24	≥ 60
Assaf et al. [62]	2021	Lebanon	cross-sectional	337	47.2	58.2	14.8	MoCA	≥ 26	≥ 60

HMSE: Hindi Mental Status Examination, MCAB: Montreal Cognitive Assessment Basic, MMSE: Mini-Mental State Examination, 10WDRT: 10-Word Delayed Recall Test, CDR: Clinical Dementia Rating, HADS: Hospital Anxiety and Depression Scale, MES: Management Expectations Survey, ACE: Adverse Childhood Experience, ADL: Activities of Daily Living, DSI: Dementia Screening Interview, EASI: Elder Abuse Suspicion Index, CDT: Clock Drawing Test, ICD: International Classification of Diseases, IADL: Instrumental Activities of Daily Living, and TMSE: Thai Mental State Examination

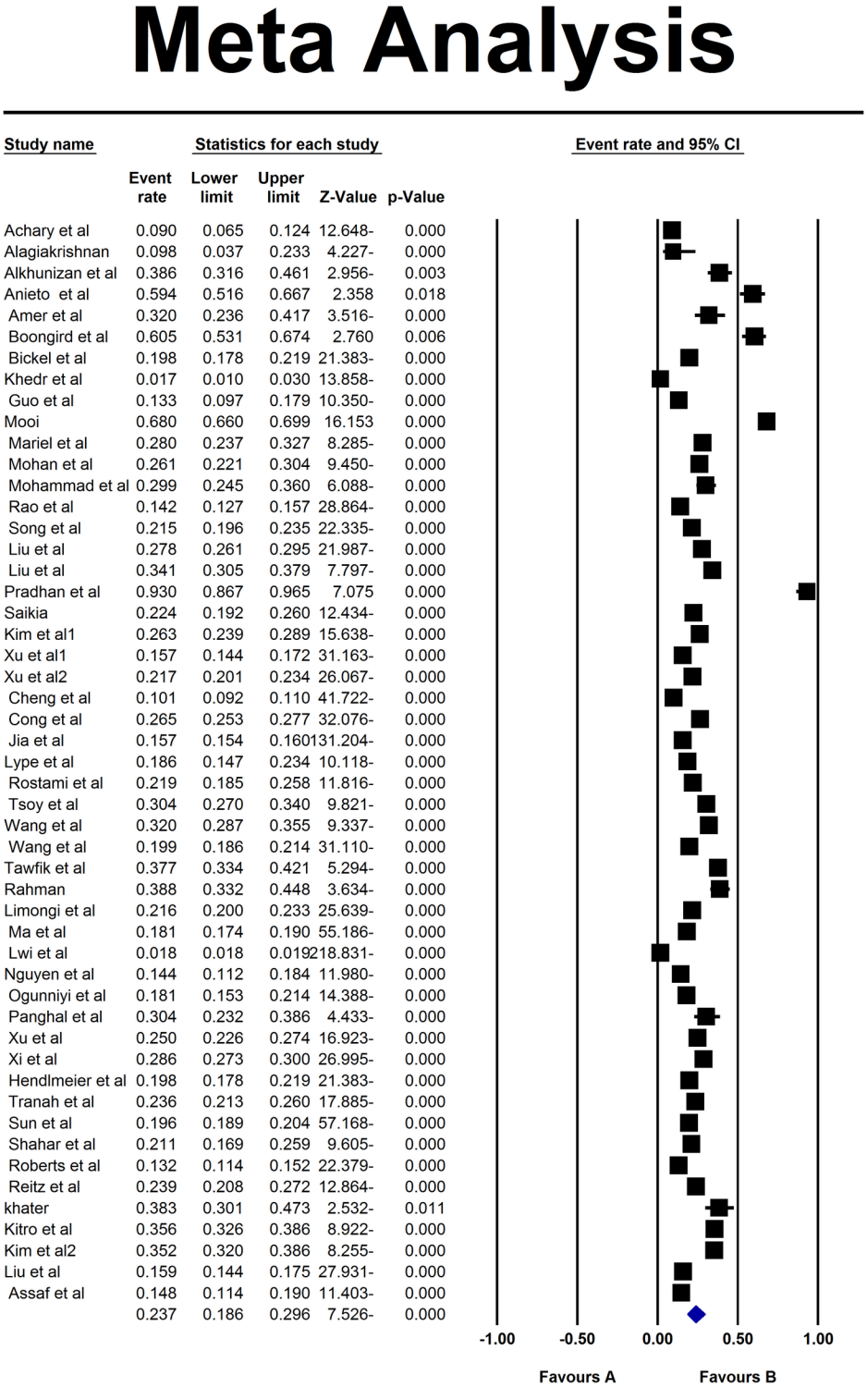

Fig. 2 Forest plot representing of global prevalence of mild cognitive impairment in the geriatric population based on random effect model

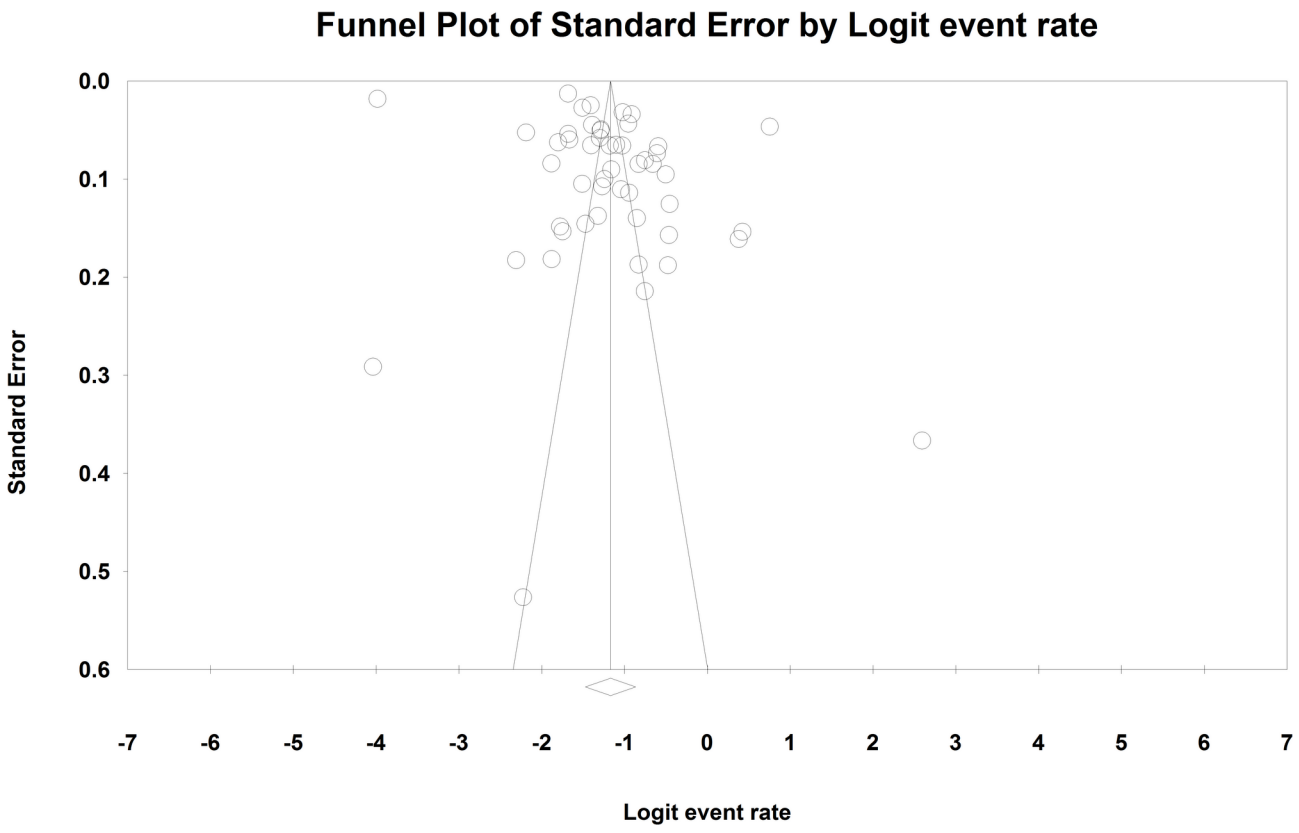

Fig. 3 Funnel plot examining publication bias in the reviewed studies

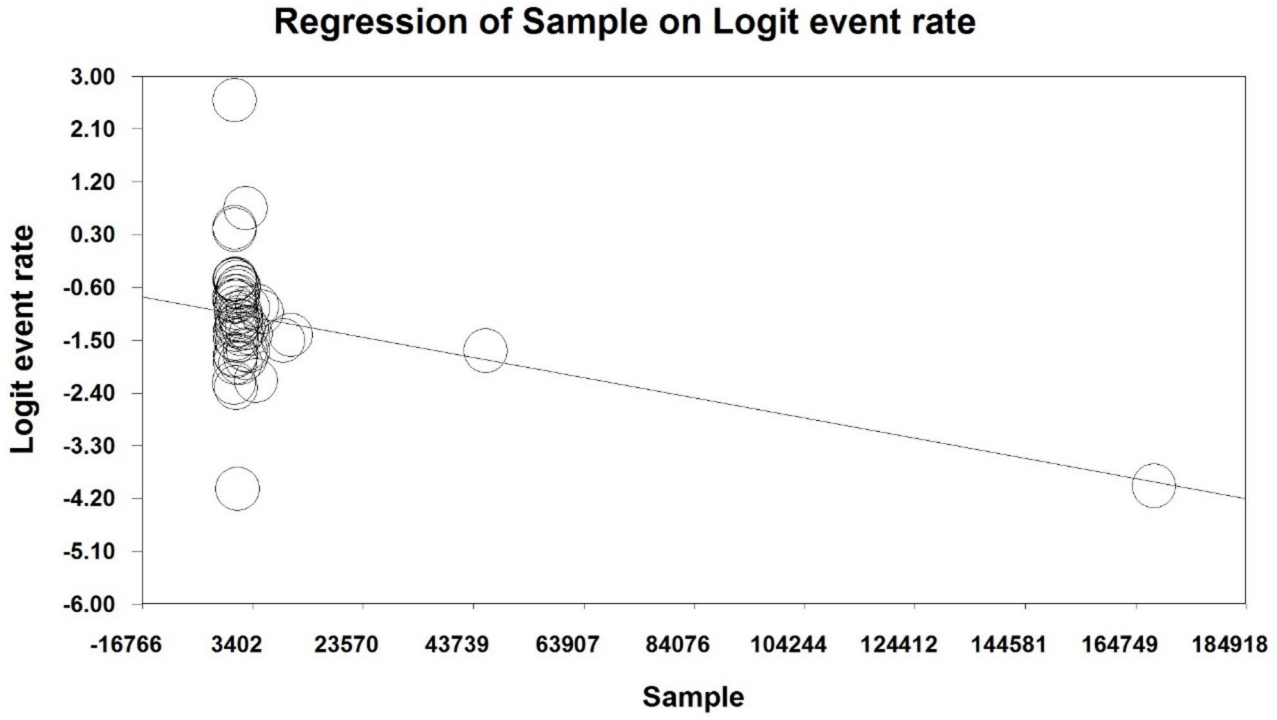

Fig. 4 Meta-regression analysis representing the effect of sample size on the global prevalence of mild cognitive impairment in the geriatric population

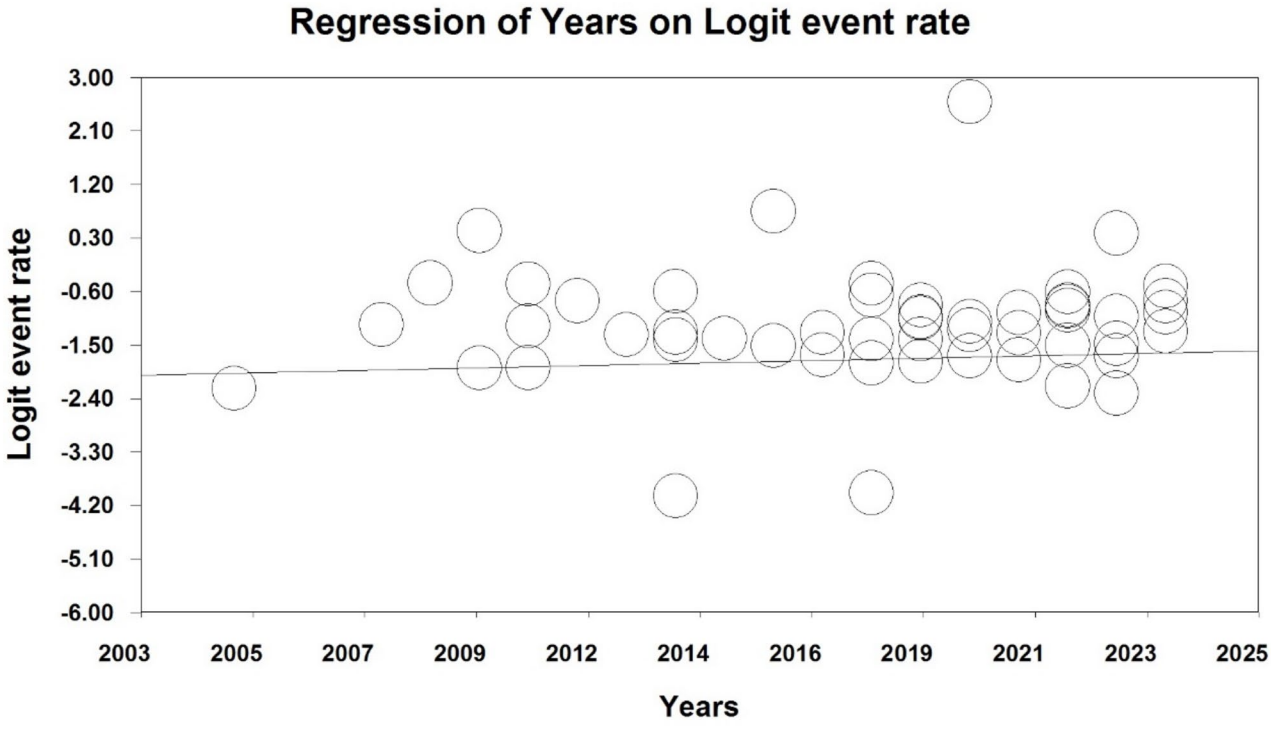

Fig. 5 Meta-regression analysis representing the effect of year of paper publication on the global prevalence of mild cognitive impairment in the geriatric population

Table 2 The global prevalence of mild cognitive impairment in geriatric population by type of studies

Sub-group		*N*	Sample size	I^2	Egger test	Prevalence (95% CI)
Study type	Cross-sectional	47	115,281	99.02	0.016	24.8 (95%CI: 21.9–28)
	Cohort	4	172,408	99.9	0.055	13 (95%CI: 2.3–48.4)
Continent	America	6	171,727	99.8	0.042	13.1 (95%CI: 3.3–39.9)
	Africa	7	2422	97.5	0.556	26.4 (95%CI: 15.4–41.6)
	Europe	3	5273	26.8	-	20.5 (95%CI: 19.3–21.8)
	Asia	35	108,267	99.2	0.024	25.4 (95%CI: 22-29.1)

in geriatric population increases; in other words, the prevalence of mild cognitive impairment in geriatric population increases over time. Besides, the overall prevalence of mild cognitive impairment accelerates following the increase in the sample size.

According to the results of this study, the global prevalence of mild cognitive impairment in geriatric population was reported at 23.7%. Also, following the examination of the factors affecting the heterogeneity of studies and the effect of sample size on heterogeneity, it was reported that by the increase in sample size, the global prevalence of mild cognitive impairment in the elderly decreases, and also with increasing years of study, the global prevalence of mild cognitive impairment in the elderly increases. In this study, age, education, and depression were also identified as the most important factors associated with mild cognitive impairment in geriatric population.

The criteria for mild cognitive impairment are the absence of considerable impairment in daily activities, memory impairment, and the absence of Alzheimer's disease symptoms [63]. mild cognitive impairment is defined as an emerging clinical syndrome with a progressive nature [64]. However, many mild cognitive impairment patients represent no progression to Alzheimer's disease or even revert to their primary pre-disease state [64]. Many studies addressed the importance of mild cognitive impairment in GP [4, 28, 58, 62].

Although there are various reports regarding the prevalence of mild cognitive impairment in geriatric population, most studies confirmed a considerable percentage of mild cognitive impairment in elderly individuals. In a study conducted by Shahar et al., the prevalence of mild cognitive impairment in 318 elderly individuals > 60 years was 21.1% [55], this value was also found 23.9% in study of Reitz et al. [57], 22.4% in a cross-sectional study conducted in India [33], 24% according to the study of

Table 3 Characteristics of studies included in the systematic review

Author	Age	Year	Country	Sample size	*P*-value	OR (95%CI)	Risk factor	Tool
Mohammad et al. [4]	≥60	2022	Malaysia	244	0.043	2.98 (1.03–8.78)	Lower education level	MoCA-BM
					< 0.001	4.57 (2.22, 9.90)	Old age	
					0.019	2.63 (1.14, 6.09)	Depression	
					0.035	2.22 (1.06, 4.67)	Hypertension	
					10.29 (4.87, 21.727)	-	Physical activity	
					< 0.001	10.67 (2.77, 41.13)	Stroke	
Mooi And Hamid [26]	≥60	2016	Malaysia	2112	< 0.001	2.35 (4.58–10.25)	Lower education level	MMSE
Song et al. [30]	≥60	2021	China	1760	< 0.001	4.0 (3.2–5.1)	Lower education level	MMSE & MoCA
					< 0.001	1.6 (1.4–1.9)	Old age	
					0.003	1.3 (1.1–1.6)	Poor economic status	
Sun et al. [54]	>65	2014	Taiwan	10,432	< 0.001	1.63(1.24–2.13)	Lower education level	Interview & CDR
					< 0.001	3.27(2.76–3.87)	Old age	
					< 0.001	1.28 (1.13–1.45)	Gender Female	
Cheng et al. [36]	≥60	2022	China	4010	0.001	0.67 (0.56, 0.81)	Lower education level	MMSE
Jia et al. [38]	≥60	2020	China	46,011	< 0·0001	3·48 (3·25–3·73)	Lower education level	MMSE & CDR
					< 0·0001	1·62 (1·54–1·71)	Hypertension	
Xu et al. [35]	≥60	2014	China	2426	< 0.001	2.439 (1.623–3.663)	Lower education level	Questionnaire (MMSE & MoCA)
					< 0.001	2.882 (1.949–4.255)	Poor economic status	
khater and abouelezz [58]	≥60	2011	Egypt	120	0	1.14(1.063–1.22)	Old age	MMSE & MoCA
					0	3.39(1.32–8.74)	Depression	
					0.025	2.9 (1.14, 7.36)	Gender Female	
Panghal et al. [49]	≥60	2022	India	135	< 0.001	36.21(6.23-210.59)	Old age	HMSE
Liu et al. [32]	≥65	2018	China	622	0.01	2.529(1.249–5.122)	Old age	AD8
Mariel et al. [27]	≥60	2024	Mexico	382	< 0.001	1.072(1.034–1.111)	Old age	MoCA
Wang et al. [40]	≥60	2024	China	706	< 0.001	4.773 (2.571–8.859)	Old age	MMSE
Guo et al. [25]	≥65	2012	China	264	0.000	6.304(3.049–13.034)	Old age	MMSE & HDS
Wang et al. [41]	≥60	2015	China	3136	< 0.0001	1.4 (1.03–1.9)	Stroke	MMSE & MoCA
Assaf et al. [62]	≥60	2021	Lebanon	337	0.004	2.847(1.392–5.819)	Depression	MoCA
Mohan et al. [28]	≥60	2019	India	426	0.009	2.17 (1.21 to 3.89)	Depression	m-ACE

HMSE: The Hindi Mental Status Examination, MCAB: Montreal Cognitive Assessment Basic, MMSE: Mini-Mental State Examination, 10WDRT: 10-Word Delayed Recall Test, CDR: Clinical Dementia Rating, HADS: Hospital Anxiety and Depression Scale, MES: Management Expectations Survey, ACE: Adverse Childhood Experience, ADL: Activities of Daily Living, DSI: Dementia Screening Interview, EASI: Elder Abuse Suspicion Index, CDT: Clock Drawing Test, ICD: International Classification of Diseases, IADL: Instrumental Activities of Daily Living, and TMSE: Thai Mental State Examination

Tranah et al. in the USA [53], and 21.3% according to the study of Xu et al. in China [35].

According to the relatively significant prevalence of mild cognitive impairment in geriatric population, attention to treatment or preventive strategies seems important issue. Regarding the treatment of mild cognitive impairment, many medical efforts are focused on the improvement of cognitive function, delaying mild cognitive impairment progression, or prevention of cognitive impairment [64]. Since there are no effective medications for mild cognitive impairment, attention to non-pharmacological factors and preventive measures can be impressive in this regard [8]; stop drinking alcohol, aerobic exercise, Mediterranean diet regimen, Chinese acupuncture, and cognitive interventions [63]. Contrary to the studies reviewed, some investigations reported a low prevalence of mild cognitive impairment. For example, Khedr et al. found this value as 1.7% in Egypt [24].

Alagiakrishnan et al. also stated that 9.8% of Canadian geriatric populations are diagnosed as mild cognitive impairment patients [18]. It should be noted that over time, the level of life expectancy and access to health services are increased, which is totally caused by increasing the number of geriatric population and associated mild cognitive impairment. On the other hand, the increase in the prevalence of chronic diseases and psychological disorders following the alteration in lifestyle can also be a justification for the increase in mild cognitive impairment prevalence over time. However, in the study of Pradhan et al., the prevalence of mild cognitive impairment in geriatric population was reported as 93% [3].

Other studies reported the mild cognitive impairment prevalence at higher levels than the findings of the present study; 60.5% and 59.4% respectively in Thailand and southern Nigeria [20, 22]. Studies approved the considerable role of influential factors on mild cognitive impairment occurrence; low educational levels [4, 26, 30, 35, 36, 38, 54], the incidence of stroke [4, 41], high blood pressure [4, 38], economic status [30, 35], physical activity [4], age [4, 25, 27, 30, 32, 40, 49, 54, 58], and gender [54, 58]. Thus, the presence of these interfering factors can potentially lead to various mild cognitive impairment reports in geriatric population. Also, different measurement tools and implementation methods can induce considerable effects on mild cognitive impairment prevalence rate.

A review of studies in this field reported that the prevalence of mild cognitive impairment increases significantly with age [65–67]. Research also suggested that mild cognitive impairment correlates can vary between age groups; in this regard, depression and BMI ≥ 30 kg/m^2 are associated with an increased risk of mild cognitive impairment among adults aged 50–64 years [68]. Other studies reported that the aging process is often accompanied by changes in the brain, such as general atrophy, especially in the hippocampus, and increased neuronal fragility in memory-related areas, and such characteristics may increase the risk of mild cognitive impairment in the elderly [69].

Limitation

Since most studies were conducted in Asia, it is recommended to apply mild cognitive impairment -associated research in other continents, for future studies. Also, since the present study was conducted in English-based languages, non-English articles with no English abstracts were excluded due to the inaccessibility of all parts of the article. Another limitation of this study is the different cutoffs in diagnostic tools for determining cognitive impairment in the elderly, which indicates that most definitions do not conform to Peterson's criteria, and, also that the cutoff for it in the studies mentioned and objectively measured in the tests, and these studies show that cognitive impairment is independently managed.

Conclusion

According to the findings of the present study, the global prevalence of mild cognitive impairment in geriatric population is 23.7%. Thus, health policymakers are recommended to use the results of the present meta-analysis in order to achieve awareness for geriatric population and their caregivers and periodic examinations to prevent mild cognitive impairment development.

Abbreviations

MCI	Mild cognitive impairment
GP	Geriatric population
NOS	The newcastle-ottawa scale

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Author contributions

NS and FL and MM contributed to the design, MM statistical analysis, and participated in most of the study steps. MM and AA and SR and PH prepared the manuscript. MM and JF and HN and PH and FL assisted in designing the study, and helped in the, interpretation of the study. All authors have read and approved the content of the manuscript.

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Data availability

Datasets are available through the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate

Ethics approval was received from the ethic committee of deputy of research and technology, Kermanshah University of Medical Sciences (IR.KUMS.REC.1403.562).

Consent for publication

Not applicable.

Competing interests
The authors declare no competing interests.

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