Prevalence of depression among Egyptian male older adults with subjective cognitive decline.

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Abstract

Background: Depression is a growing mental health issue worldwide and considered a challenge for health and economic policy makers with its effect on general health, quality of life, and economic burden, and it is also considered an early symptom of subjective cognitive decline (SCD). Thus, the aim of this study is to investigate the prevalence of depression among a sample of Egyptian male older adults with subjective cognitive decline.

Methods: Data was collected from 200 male participants from the community and visitors of the outpatient and memory clinics in Ain shams university hospitals in Cairo Egypt, among the age group of 60 years and older. All participants were subjected to demographic data collection, assessment of depression by the Arabic version of Patient Health Questionnaire (PHQ-9), and assessment of cognition by using the Arabic version of Addenbrooke's Cognitive Examination III (ACE III) for the educated group and Rowland Universal Dementia Assessment Scale (RUDAS) for the illiterate group.

Results: The participants mean age was 65.7 (± 5.9), where 53.5% of them had SCD and 46.5% had Mild Cognitive Impairment (MCI). The total prevalence of depression among all participants was 53.5% and the mild form was the most common 50.0%. The prevalence of depression among the SCD group was 52.3 %, while among MCI group it was 54.8%.

Conclusion: The prevalence of depression among participants with SCD showed no significant difference when compared to those with MCI.

Keywords: Depression, Subjective Cognitive Decline (SCD), Older adults, Males

Introduction

Aging is what results from the process of accumulation of multiple different life-time events of molecular and cellular damage, which causes a gradual progressive decline of different functions including physical and mental abilities, leading to higher chances of diseases and death at the end. These biological changes are not consistent and do not happen with a constant rate [1].

People 60 years old and above, constitute 12% of the global population, and it is predicted to reach 22% by the year 2050 [2]. In the developed countries the older age population in the society is growing, due to lower fertility and higher longevity [3], this also extended to the developing countries, as the growing older population exceeds the developed countries despite of the economic difficulties [4].

Subjective cognitive decline (SCD) also known as Subjective Memory Impairment (SMI), refers to any self-perceived or subjective experience of worsening of cognitive functions [5], yet there is no actual change in the cognitive abilities [6], as there is absence of impaired performance on the cognitive assessment tools [7].

There is a growing importance of early detection of SCD as it is considered one of the earliest symptoms of dementia including Alzheimer's disease (AD) even before the decline of cognitive performance that is associated with mild cognitive impairment (MCI) [8], with multiple studies showing the strong association between SCD and the risk of development of dementia later in their life [9].

The worldwide prevalence of SCD ranged from 6.1% to 52.7%, where it was slightly higher among males with 26.6% compared to prevalence of 24.9% in females, while with aging it has an ascending pattern except for the age group from 65 to 69 years, where the numbers were as follows; from 60 to 64 years old it was 27.4%, from 65 to 69 was 23.2%, from 70 to 74 was 27.9%, from 75 to 79 was 28.1%, and both groups of 80 to 84 and 85 and more were 28.1%. To the best of our knowledge there are no estimates of prevalence of SCD in Egypt in the published literature [10].

The prevalence of depression among elderly population worldwide ranges from 4.6 - 9.3% for the age group 75 years and older [11], and it is higher among hospitalized and patients who need home care with prevalence of 11.5%, and 13.5% respectively in comparison to community dwelling which ranged from 1% to 5% [12].

In Egypt the prevalence of depression among elderly above 60 years old the prevalence ranged from 23.7% to 74.5% for elderly in residential and household communities [13], 37.5% for older adults in geriatric homes, and 72% for inpatient [14].

Both SCD and depression were found to be risk factors to each other, as older population with SCD are more prone to develop depression than the those without SCD [15]. On the other hand, depressed individuals have higher risk to progress to SCD compared to the non-depressed. Assessment tools revealed that higher scores in depression assessment tools are associated with lower scores in the assessment of cognition specially memory [16].

SCD could precede the symptoms of depression in some cases which might be due to an underlying neurodegenerative disorder that can develop to dementia such as AD [17], where the risk to develop cognitive decline elevates with the coexistence of depression and SCD than each one of them alone [18].

Several mechanisms play a role in the relation between the occurrence of depression among patients with SCD. One of these mechanisms is the changes of neuroplasticity and in the size hippocampus that occurs as a result of the oxidative stress [19] that will cause increased risk of inflammation resulting in alteration in the targeting mechanism of the brain derived neurotrophic factor (BDNF) caused by decline of the tropomyosin receptor kinase B (Trk B) receptor function and its expression [20].

Another mechanism that plays a role in the association of depression with cognition is the changes in the mesolimbic system due to disturbance in the dopamine pathway that results in the affection of the mood and cognition specially the episodic memory. Also, there is elevation in the glucocorticoid levels due to damage in the hypothalamic-pituitary-adrenal axis that results in both depression and affection of the autobiographical memory [20].

So, the current study aimed to investigate the prevalence of depression among sample of Egyptian male older adults with SCD.

Methods

A cross sectional study was conducted on a random sample of 200 male older adults aged 60 years and above in Cairo, Egypt, among the visitors of Ain-shams Geriatric and Internal Medicine Hospital's outpatient clinics including the geriatric memory clinic and community dwelling population.

The sample size estimate of 200 male older adults was found enough to fulfill the study aims, where the prevalence of depression was assumed to range from 10 - 20% (15% ± 5%) and at 95% confidence level, and this was done by the PASS 11 computer program and calculated by the

community department in the Faculty of Medicine, Ain Shams University.

The recruitment process was done by asking all candidates directly about whether they experienced memory decline which is sustained and progressive in nature during the previous year. Candidates who were included were those who responded with "YES" with no current diagnosis of dementia, no delirium, no major depression, no acute medical illness that might affect the cognitive status (i.e., acute infections, decompensated end-organ disease, critical illness, etc.) and those who did not receive antipsychotics recently.

After discussing the study procedures an informed consent was taken from each individual before participating. The study was approved by the Medical Research Ethics Committee of the Faculty of medicine, Ain Shams university (MS209/2020).

All participants were assessed by:

- History taking including personal history, history of present illness, drug history, past history, and family history.

- Assessment of depression using the Arabic form of the nine items Patient Health Questionnaire (PHQ-9) which is available as open source on ResearchGate. It is a valid and reliable test in detecting depression severity. Symptoms of depression should be lasting for at least 2 weeks duration, and each point evaluated with different weights (Not at all = 0, Several days = 1, More than half the days = 2, Nearly every day = 3), and the score is interpreted as follows: **[21] [22]**
  a) 0 to 4 there is no depression,
  b) From 5 to 9 mild depression,
  c) From 10 to 14 moderate depression,
  d) From 15 to 19 moderately severe, and from 20 to 27 severe.

All participants had either depressed mood or loss of interest (the core symptoms for diagnosing depression in the Diagnostic and Statistical Manual of Mental Disorders-5 (DSM-5) criteria) **[23]** or both. The nine items of PHQ9 presents the nine symptoms of depression in DSM-5 criteria. The diagnosis of major depressive disorder (MDD) in DSM-5 criteria requires the presence of at least 5 symptoms (of which one of the core

symptoms must be present) for at least 2 weeks and causing significant distress for the patient. Many studies reported that a score of 10 or above in PHQ9 mostly represents MDD, as reported by *Levis and colleagues* **[24]** in their meta-analysis.

Minor depression was diagnosed according to DSM-4 criteria **[25]** by the presence of 2-4 symptoms of depression causing significant distress to the patient. These symptoms must include either depressed mood or loss of interest. It was presented in DSM-5 criteria under the category of 'Other Specified Depressive Disorders'. Patients with mild depression in PHQ9 in this study represents minor depression. Therefore, all depressed participants in our study had either minor or major depression, not just depressive symptoms.

- Assessment of cognitive status for the educated was done using the Arabic version of Addenbrooke's Cognitive Examination III (ACE III) with a total score of 100 where a score of ≥ 82 was considered normal, and between 75 and 81 was considered MCI. **[26] [27].** Two of the authors of the Arabic version are also researchers in our study, and it is also available as open source on ResearchGate.

- Assessment of cognitive status for the illiterate was done using the Arabic version of the Rowland Universal Dementia Assessment Scale (RUDAS), with a total score of 30, a score of 23 or above was considered normal, and 19 to 22 was considered MCI **[28] [29]**. Permission was taken from Nielsen and colleagues in Lebanon before the start of the study.

Statistical analysis

Appropriate statistical methods were used to present and analyze the data.

Quantitative variables presented as mean and standard deviation and the independent t-test was used to compare the two groups. Qualitative data was presented as frequency and proportion and chi-square test was used to compare the two groups. Independent t test and ANOVA test were used for comparing quantitative variables between groups. Fisher exact test and chi square test were used to test the association between

qualitative variables. Pearson correlation coefficient was used to measure relationship between two quantitative variables. Data entry and statistical analysis were done on a personal computer using statistical package for social science (SPSS), version 20 (SPSS Inc., Chicago, IL).

Results

Table (1) described demographic data of participants, where the mean age was 65.7 ($\pm$ 5.9) years. Regarding marital status 169 (84.5%) of participants were married. Concerning living arrangement 179 (89.5%) lived with others while the remaining lived alone. For the educational level of the participants the mean educational years was 11.7 ($\pm$ 5.9), where the number of the educated was 165 (82.5%) and the number of illiterates was 35 (17.5%). For the working status 123 (61.5%) were retired. Lastly, the family history of dementia among participants showed that 177 (88.5%) had no family history.

Table (2) showed that 107 (53.5%) of participants had SCD while 93 (46.5%) had MCI.

Table (3) showed the prevalence of depression among participants was 53.5% affecting 107 of total participants. While 93 (46.5%) had no depression. Regarding the severity of depression, the number of participants with mild depression was 100 (50%) of total number of participants, the number of moderate depression participants was 6 (3%), and the moderate to severe depression was 1 (0.5%).

Table (4) and Fig. (1) showed that among the SCD cases 51 (47.7%) had no depression of the total number of participants with SCD, while among the participants with MCI 42 (45.2%) had no depression. While for the depressed participants the percentage showed no difference between both groups, where among those with MCI 51 (54.8%) of them had depression, while 56 (52.3%) of cases had depression and SCD, and the difference between the two groups did not reach the level of statistical significance (P-Value = 0.723).

Table (5) and Fig. (2 and 3) showed that the majority of participants had mild depression, where the prevalence of mild depression among SCD group was 54 (50.5%) and among MCI group was 46 (49.5%). The prevalence of moderate depression among SCD group was 2 (1.9 %) and among MCI group was 4 (4.3%). The prevalence of moderate to severe depression among MCI group was 1 (1.1%), and there were no participants with moderate to severe depression among SCD group. It was not statistically significant (P-Value = 0.530).

Table (6) showed a weak positive correlation between ACE III scores and PHQ-9 scores, and a weak negative correlation between RUDAS scores and PHQ-9 scores, and both did not reach the level of statistical significance with P-Value = 0.783 and P-Value = 0.372 respectively.

Table 1: Demographic data of participants

	mean (± SD)		min – max	
Age	65.7 (± 5.9)		60 - 88	
Education years	11.7 (± 5.9)		0 - 21	
		N		**%**
Working status	**Working**	77		38.5
	Retired	123		61.5
Marital status	**Single**	9		4.5
	Married	169		84.5
	Widow	14		7
	Divorced	8		4
Living	**Alone**	21		10.5
	With others	179		89.5
Education	**Educated**	165		82.5
	Illiterate	35		17.5
Family history of dementia *	**No**	177		88.5
	Yes	23		11.5

SD = standard deviation

* Other risk factors for dementia like alcoholism, head trauma, sport injuries, etc. were beyond the scope of our article.

Table 2: Cognitive status among participants

	N	%
SCD	107	53.5
MCI	93	46.5
Total	200	100

N = number   SCD = subjective cognitive decline   MCI = mild cognitive impairment

Table 3: Prevalence of depression among participants and the severity of depression

	N	%
No depression	93	46.5
Mild depression	100	50.0
Moderate depression	6	3.0
Moderate to severe depression	1	0.5
Total	200	100

Table 4: Prevalence of depression among participants with SCD vs MCI

	SCD		MCI		Chi-squared	P
	N	%	N	%		
No Depression	51	47.7	42	45.2		
Depression	56	52.3	51	54.8	0.125	0.723
Total	107	100	93	100		

P value significant if < 0.05

Fig. 1: Prevalence of depression among participants with SCD vs MCI
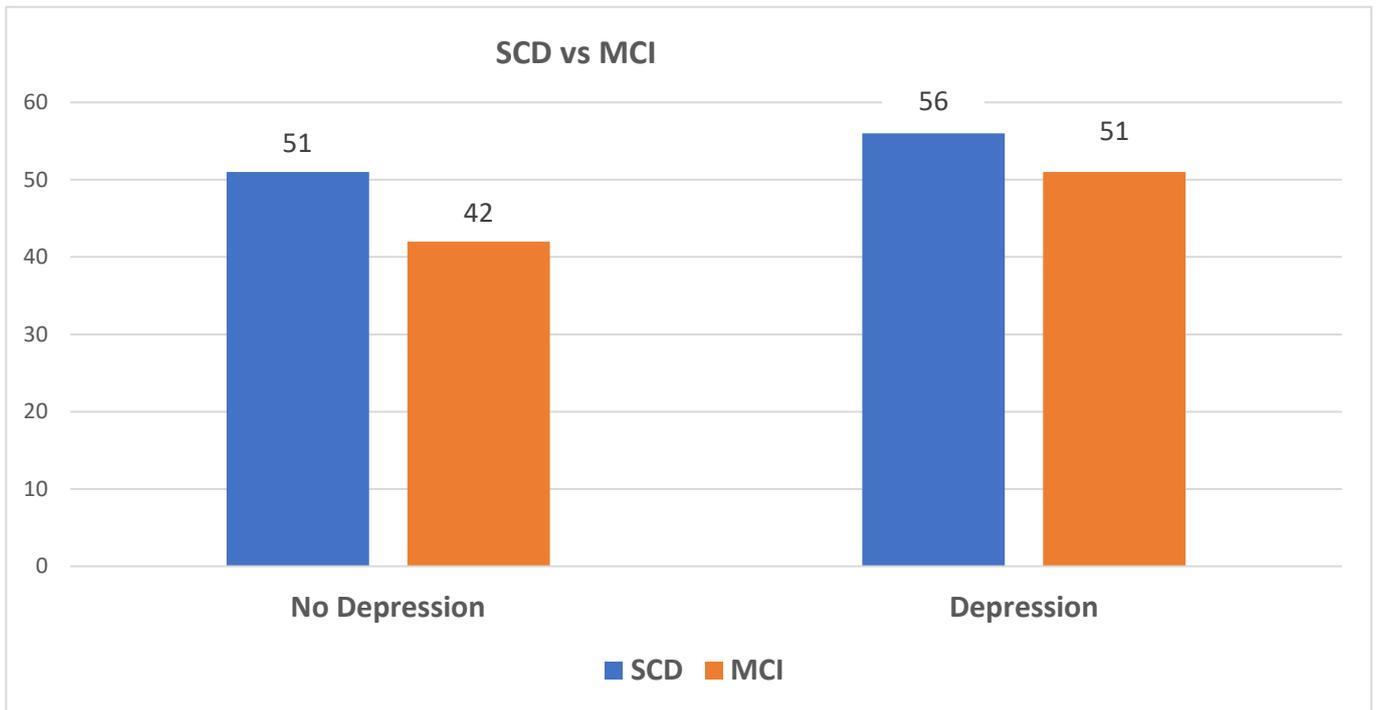
Table 5: Prevalence of depression severity among participants with SCD vs MCI

	SCD		MCI		Chi-squared	P
	N	%	N	%		
No depression	51	47.7	42	45.2		
Mild	54	50.5	46	49.5		
Moderate	2	1.9	4	4.3	2.21	0.530
Moderate to severe	0	0.0 %	1	1.1		
Total	107	100	93	100		

P value significant if < 0.05

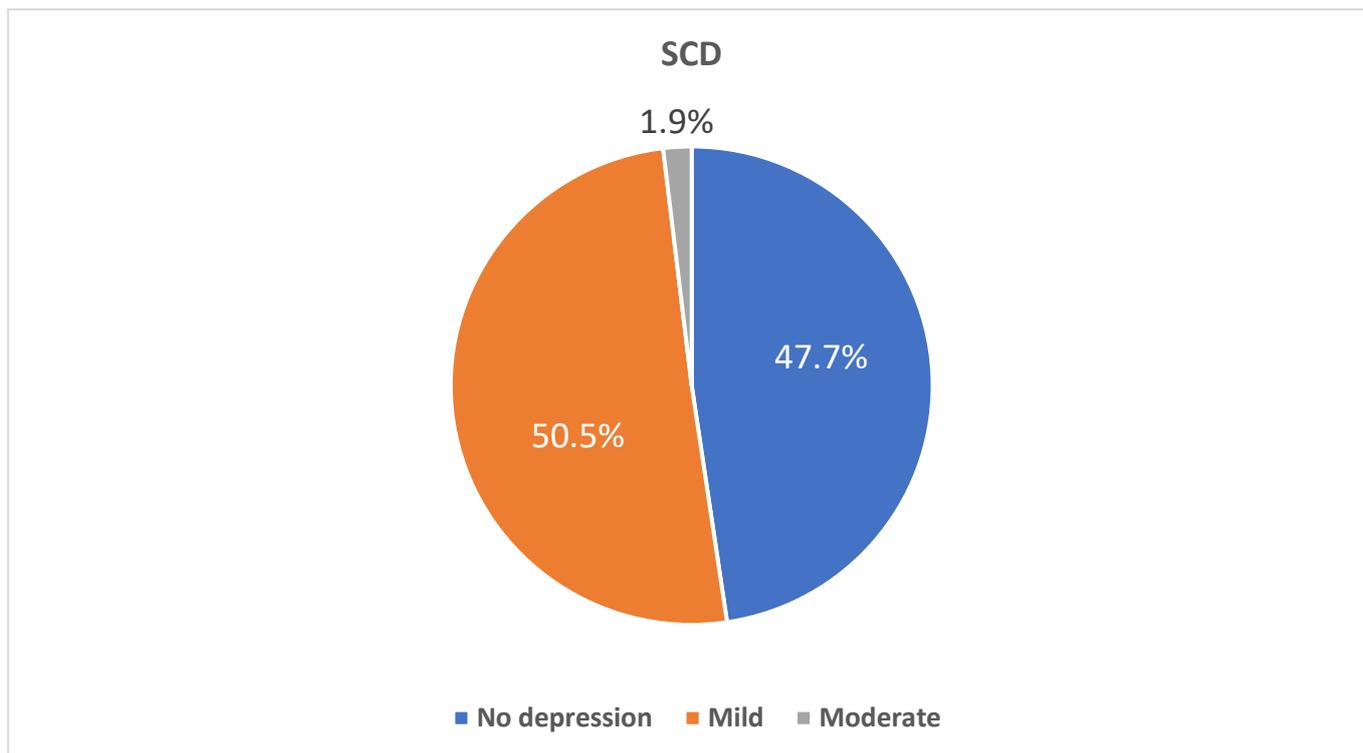**Fig. 2: Prevalence of depression severity among participants among SCD group**

SCD

- No depression — 47.7%
- Mild — 50.5%
- Moderate — 1.9%

Fig. 3: Prevalence of depression severity among participants among MCI group

MCI

- No depression — 45.2%
- Mild — 49.5%
- Moderate — 4.3%
- Moderate to severe — 1.1%
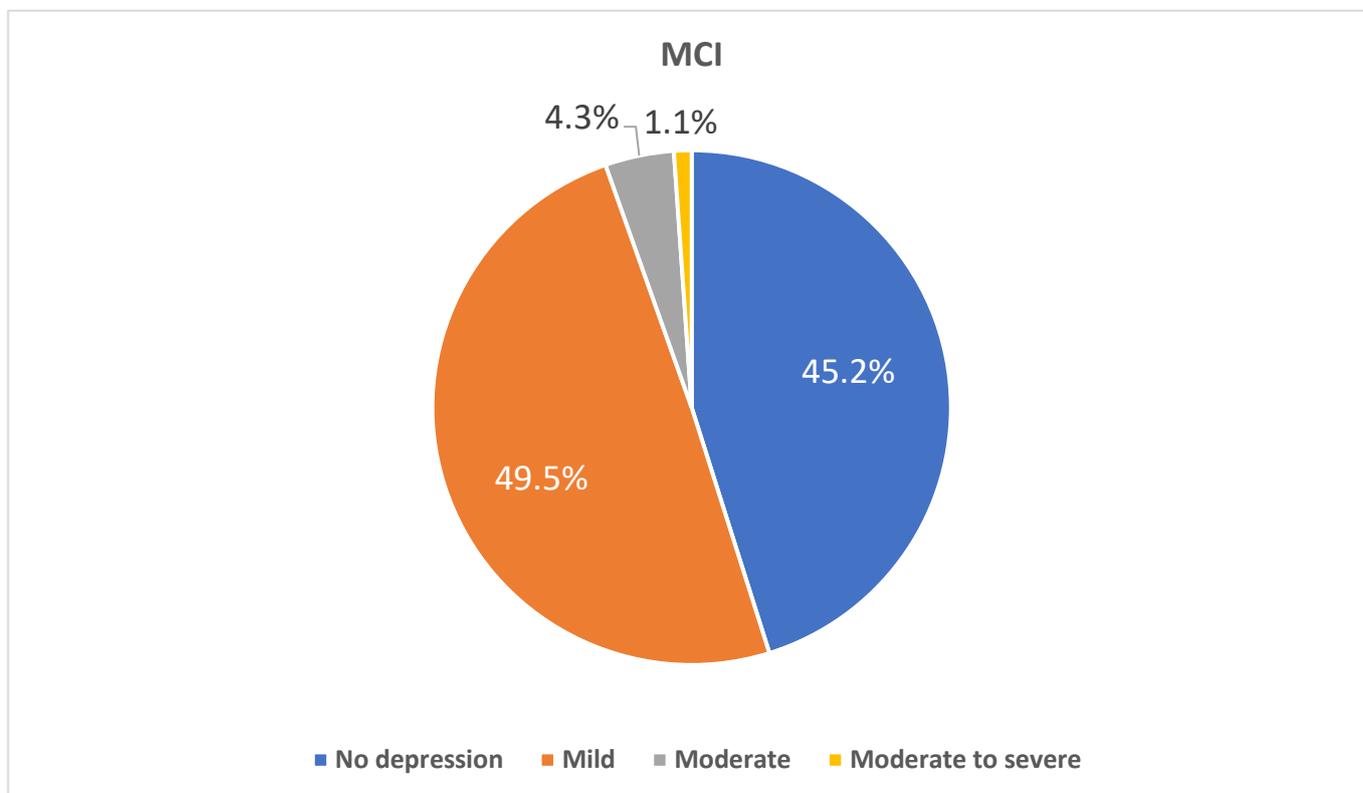
Table 6: Correlations of test scores

			ACE III score	RUDAS score
ACE III score		**r**	—	—
		df	—	—
		P	—	—
		N	—	—
RUDAS score		**r**	—	—
		df	—	—
		P	—	—
		N	—	—
PHQ-9 score		**r**	0.022	- 0.156
		df	163	33
		P	0.783	0.372
		N	165	35

P value significant if < 0.05   N = number   r = Pearson correlation coefficient   df = degree of freedom

Correlation between ACE III and Rudas was not performed as they were performed for participants with different educational levels.

Discussion

The prevalence of cognitive impairment is increasing worldwide including the developing countries. SCD might be an early form of cognitive impairment, so it is the target nowadays for early intervention to prevent the progression to dementia, this includes management of risk factors. Depression is considered one of the risk factors for the development of cognitive decline and progression to dementia, so early identification of depression and its management is of utmost importance.

The current study was conducted on older adult Egyptian males from Cairo where the mean age of participants was 65.7 (± 5.9), and the majority of them had no family history of dementia, educated, married, not living alone, and are retired.

Our results also showed that 82.5% of our participants are educated, 38.5% only were employed, more than 80% of participants were married and they lived with their families. More than half of the participants had SCD which is not in line with *(Röhr et al., 2020)* **[10]** where the estimated prevalence among male older adults was half of ours and goes lower in the *(Centers for Disease Control and*

Prevention, 2019) **[30]** statistics which states that the prevalence of SCD among older adults from both sexes was 11.7%, and among men of all ages was 11.3%. this difference in results between our study and the other studies might be because all the participants we investigated had either SCD or MCI and there were no control groups.

The prevalence of depression in this study was 53.5% as a total (about 50% of the study population having mild depression which represents minor depression). *(Antony et al., 2023)* reported in their multi-stage cross sectional study conducted in rural Odisha that 44.4% of their older population had depression **[31]**. They included 520 elderly participants, of which 479 were assessed by Geriatric Depression Scale 15 (GDS-15) with application of Hamilton depression rating scale−17 (HDRS-17) for those who screened positive by GDS-15. This is higher than the different estimates of prevalence of depression among older adults of both sexes, which varied according to different studies ranging from 5.7% in the *(World Health Organization, 2023)* **[32]** and 31.74% in *(Zenebe et al., 2021)* **[33]**. Generally, in India the prevalence of depression among older adult males reached up to 80% and 75.5% among both sexes according to *(Mandolikar et al., 2017)* **[34]**.

While regarding the coexistence of depression with SCD, 52.3% of our participants with SCD had comorbid depression which is double the percentage from *(Wang et al., 2021)* **[35]** which is near 25%. And as regard the coexistence of depression with MCI, 54.8% of our subjects had both depression and MCI. While *(Ismail et al., 2017)* **[36]** showed that 32% of patients with MCI had depression.

In this study mild depression is prevalent in both SCD and MCI groups, while moderate depression was more prevalent among the MCI group. We had limited number of moderate to severe patients among the MCI group, and no cases in the SCD group. There were no cases of severe depression among both groups. While among both groups, we found that 50% of the total participants had the mild form of depression, and 3% and 0.5% had the moderate and moderate to severe forms respectively.

Regarding other studies in India *(Mandolikar et al., 2017)* **[34]** found that mild depression among both sexes was near 85% of their depressed population, and around 15% had the severe form, and *(Antony et al., 2023)* **[31]** found that 74.2% of their depressed participants had the mild form, 14.5% had moderate depression, and around 1.9% had severe depression. On the other hand, *(Kleisiaris et al., 2013)* **[37]** recruited 200 participants from nursing homes who were assessed with using the Zung Self-Rating Depression Scale and found that 46.5% of males had mild and moderate forms of depression, while in both sexes 52.0% had mild depression, and 6.5% were moderate. This variation in the prevalence of depression could be due to the variation of social, educational, economical, and cultural factors in different societies and geographical regions.

There is a limitation in the studies about the prevalence of different types of depression according to the severity among SCD and MCI patients. However, there is one study *(Smith et al., 2022)* **[38]** that compared between the prevalence of the subsyndromal depression, presence of depressive symptoms, and depression, and its relation to cognitive complaints on a random sample of 24,086 participants aged 65 years and older out of total sample size 237,952 representing different age groups worldwide, where special subjective cognitive complaints (SCC) assessment questionnaire developed specifically for the World Health Survey was used alongside the International Classification of Diseases, Tenth Revision the Diagnostic Criteria for Research version (ICD-10-DCR) for assessment of depression, and it found that the mean scores of SCC increases with increasing severity of depression, where depression had higher scores than depressive symptoms which had higher scores than subsyndromal depression. The study had different classification from ours as they included depressive symptoms or (brief depressive episode) which does not meet the criteria of 2 weeks duration.

Another study *(Zlatar et al., 2018)* **[39]** showed that there is a relationship between different levels of cognitive status i.e., SCD and MCI and

depression and its assessment scores even in its minimal and mild forms.

In our study we found that there is a weak positive correlation between the test scores of ACE III and the test scores of PHQ-9, which did not reach the level of statistical significance. and there is a weak negative correlation between the test scores of RUDAS and the test scores of PHQ-9, which was not also statistically significant. On the other hand, *(Bunce et al., 2014)* **[40]** found that the cognitive status as an outcome is predicted by the depressive symptoms in old age. Also, *(Kim, 2022)* **[41]** found that there is a strong relationship between depression and worsening of cognitive functions. To the best of our knowledge, till the time of writing this paper there is no published research specifically assessing the correlations of the test scores of PHQ-9 with the test scores of ACE III and RUDAS.

Conclusion

The prevalence of depression among participants with SCD showed no significant difference when compared to those with MCI, as most of them had mild depression.

Limitations of the study

The results showed less variation, where most participants had mild depression which needs further research. Moreover, the biggest portion of our sample are educated because:

- All participants are males with cultural privilege and higher chances of education.
- This generation received free education during the Nasserism period in Egypt.
- The majority of excluded participants due to dementia were illiterate.

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Author Contributions

The corresponding author was responsible for collecting samples and participants, while all other authors participated in drafting and revision, and contributed significantly to the study's concept and design.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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