

# Cognitive Status among Retirees in Relation to Periodontal Health Condition in Middle Euphrates Region-Iraq

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**Abstract:** *Background:* Cognitive impairment is an early symptom of dementia that may affect oral health which is a critical and often overlooked component of an older adult's health and well-being. The aim of the present study was to assess the prevalence and severity of periodontal health condition in relation to cognitive status among retirees. *Materials and methods:* The sample included 198 dentate retirees 50 years old and older from the offices of (Qi-Cards) in Middle Euphrates Region-Iraq who completed the study cognitive measure using Self-Administered Gerocognitive Examination test and dental examination to assess the periodontal status using Community periodontal according to WHO guidelines. Descriptive statistics and data were analyzed. *Results:* There was a highly significant association between periodontal CPI codes and cognitive status. Differences in mean sextant of healthy periodontium, bleeding and calculus among cognitive group were found to be significant. Highly statistical significant association was found between CPI codes and the only executive domains of SAGE test; *Conclusion:* Across the spectrum of cognitive status as scores got lower individuals' periodontal health got worse. Therefore, adequate awareness regarding oral hygiene and importance on primary prevention could help in reducing the prevalence of periodontal disease to a great extent.

**Keywords:** Cognitive, retirees, periodontal health

## 1. Introduction

The prevalence of age-related health problems is becoming an important public health concern as proportions of older individuals in populations worldwide grow [1]. This has also resulted in an increase in the number of people with non-communicable diseases, including dementia. Although dementia mainly affects older people, it is not a normal part of ageing [2,3]. Cognitive impairment and dementia are increasing globally and are predicted to increase proportionately more in developing regions [4,5]. Cognitive deficit or cognitive impairment is an inclusive term to describe any characteristic that acts as a barrier to the cognition process [6]. One of the greatest health threats of the twenty-first century has been cognitive frailty and cognitive decline of old age. These changes reduce the physiologic and social values of the dentitions.

## 2. Literature Survey

The greatest risk factor for cognitive decline in older adults is age itself [7].

Dementia may have different etiologies. Alzheimer's disease is the most common form of dementia and is characterized by pathological changes in the brain that result in loss of memory, thinking, and language skills, as well as changes in behavior, and that ultimately lead to a complete loss of functional ability [8].

Dementia is typically diagnosed when acquired cognitive impairment has become severe enough to compromise social and/or occupational functioning. Cognitive status was assessed using the Self-Administered Gerocognitive Examination (SAGE) [9].

Periodontal diseases are the most prevalent in adult population [10]. It affects the supporting and investing tissues of the teeth and recognized as a major health problem all over the world [11]. The severity of disease may vary, but in most countries the adult populations experience distressing symptoms of periodontal disease such as bleeding and receding gums and loosening and migration of teeth. The WHO Community Periodontal Index is a practical and relevant procedure for assessing periodontal treatment needs of populations [12]. The etiology is complex involving the presence of pathogenic bacteria found in dental plaque and individual variation in host immune response. It is a common source of chronic systemic infection in humans. Inflammation recognized as a potential mediator for the association between periodontal disease and Alzheimer's disease [13-15].

Since no previous Iraqi study was found concerning this subject this study was carried out to explore the prevalence and severity of Periodontal health status in relation to cognitive impairment among retirees aged (+ 50 years) in Middle Euphrates Region –Iraq.

## 3. Material and methodology

The study included sample of retirees, they were chosen from many Offices of Smart Cards (Qi –cards) in Middle Euphrates Region –Iraq. Both gender were included as they can read and write and those who don't have medical problems and not receive any neurological or psychiatric drugs. The participants were asked to fill out a medical history questionnaire provided by the researcher in order to determine if they were suitable for inclusion into this study. Included a representative sample, those were received (Self-

Administered Gerocognitive Examination) (SAGE) test for cognitive status assessment, after translated into its Arabic version through many steps of truthfulness of translation by a number of experts from Baghdad University. This study was conducted with a written informed consent obtained from study participants. 198 healthy retirees with no systemic or taking any psychological drugs these information obtained by retirees own words after getting case sheets ..

Cognitive status was assessed using the Self-Administered Gerocognitive Examination (SAGE)-SAGE is a brief, reliable, validated, self-administered cognitive assessment tool with 4 equivalent interchangeable forms reducing the typical delay in identifying cognitive impairment in individuals and sensitive to changes over time, pen and paper, self-administered. Not requiring office personnel time or equipment & easily incorporated in any health-care setting, 20 seconds to score. Four distinct, equivalent forms, practical to rapidly screen large numbers of individuals in the community at the same time. The scores of this test ranged (0-22), categorizing the retirees into three groups. (17-22): Very likely to be normal: no further evaluation. 15-16: Likely to have Mild Cognitive Impairment (MCI): screening evaluation recommended 0-14: Likely to have a dementia condition: screening evaluation recommended. The test was applied in the Arabic version and the value of reliability coefficient in Cronbach's way (0.738). And for testing the sincerity, researcher has concluded that the correlation coefficients are all statistically significant at ( $p=0.000$ ) and this pointed for the internal consistency among test.

For the assessment of the periodontal status. The examination of the subjects in this study was conducted according to WHO guidelines using the WHO CPITN –E probe. The teeth examined were 17, 16, 11, 26, 27, 36, 37, 31, 46 and 47 [16]. To avoid the bias, the author himself examined all the subjects.

#### 4. Result and Discussion

The occurrence of gingival bleeding among normal cognitive retirees was 44.95%, the demented retirees showed high percentages with shallow pockets (10.61%) while MCI group showed highest percentage with calculus however there was a highly significant association between periodontal CPI codes and cognitive status ( $F=38.819, P=0.000$ ), table(1). Differences in mean sextant with healthy periodontium, bleeding and calculus among group were found to be significant ( $F=4.064, p=0.019, F=3.599, p=0.029, F=3.215, p=0.042$  respectively), further analysis using post hoc tests (Games-Howell test) showed the normal cognitive group had higher mean value than demented retirees  $m.d=0.88, p=0.00$ , this was for healthy periodontium. Concerning gingival bleeding normal retirees with mean value higher than the demented group  $m.d=0.76, p=0.04$ . For calculus the demented with mean value higher than normal cognitive group  $m.d=0.61, p=0.05$  however data analysis concerning differences in mean sextants with shallow pockets and excluded sextants were highly significantly differ among retirees with different cognitive status ( $F=6.373, p=0.003^{**}, F=6.754, p=0.001^{**}$ ), further

analysis using Games-Howell test shows that the mean sextants of demented group was higher than normal cognitive group  $m.d=0.69, p=0.00$ , concerning shallow pockets and for excluded sextants the mean value of demented higher than the normal cognitive group  $m.d=0.40, p=0.00$ . While the mean sextant with deep pocket shows no significant difference among retirees with different cognitive status even though the MCI group had higher mean value than normal and dementia groups, table(2).

This study showed that the association of CPI codes and the scores of each domain of SAGE test of highly statistical significant association was found only with the executive domain ( $F=28.759, P=0.003$ ) but no significant association were observed with domains of orientation, language, reasoning, visuospatial and memory,  $p>0.05$ . table(3).

#### 5. Discussion

This study was the first to be conducted on retirees using CPI index and also the first using the Arabic version of cognitive assessment tool called Self-Administered Gerocognitive Examination test (SAGE) and related with periodontal health condition in Middle Euphrates Region – Iraq. SAGE, a brief, validated, self-administered cognitive assessment tool, There are many excellent cognitive screening tools, but most are not self-administered [17-18]. Although web-based cognitive testing is becoming more popular to self-assess and monitor cognition, many cognitively impaired subjects shy away from being tested at all, and some on-line testing has shown poor validity as compared with pencil-and-paper screening [19]. Although there is debate about whether proactive community-based screening is meaningful in predicting deficits upon further testing, there are reports showing positive correlation [20]. There is also some concern that cognitive screening may cause harm or undue anxiety to the subjects. This may be less of an issue with SAGE, as there is no administrator asking questions and no time limit to complete it.

For those testing below limits, it may prompt an early search for reversible and treatable causes of cognitive loss, and, if indicated, result in the early use of cognitive enhancers that may potentially delay disability, preserve function, and improve quality of life [21].

Oral health is an integral part of general health. The universality of periodontal disease is very well established and oral appearance affects self-esteem and the willingness to interact with others. Appropriate nutritional intake can also be influenced by incapacity to masticate or persisting pain due to oral diseases [22]. Several attempts have been made to develop methods for assessing periodontal disease status and treatment needs on a population basis which would help in the planning of dental public health services. The CPITN is a useful approach to screening population because it uses accepted clinical criteria, partial mouth scoring and a simple recording procedure, which permits rapid assessment of individuals for periodontal conditions related to treatment needs [23].

The present study showed that, across the spectrum of cognitive status (normal, Mild Cognitive Impairment (MCI)

and seriously cognitive impaired) as measured by (Self-Administered Gero-cognitive Examination) (SAGE), as scores got lower individuals' periodontal health status got progressively worse. Cognitive decline is often an early sign of a progressive dementing disorder such as Alzheimer's Disease (AD). Individuals with lower cognitive function may not view dental care as a high priority and may have limited self-awareness of dental care needs. In addition, a decline in cognition may be reflected as a decline in Instrumental Activities of Daily Living (IADL) performance, specifically a decline in the quality and regularity of oral hygiene[24]. The study also revealed that the mean number of sextants with excluded were increasing as the grade of cognition status increases which could be explained by the increases in missing teeth with cognitively impaired retirees that reported by this study with statistically high significant differences the same for the mean sextants of calculus and shallow pockets which are indicators for progressing in periodontal diseases which contributed to increase the mean of excluded sextants.

These changes may partially explain the association between cognition and periodontal health condition in particular and oral health in general. A number of reasons might be given for the relationship between periodontitis and increased cognitive decline. Firstly, the study needs to be replicated to overcome chance bias. Secondly, it is possible that participants with a more precipitous rate of cognitive decline become more susceptible to periodontitis through an unknown mechanism that is independent to the degree of cognitive impairment[25] or, thirdly, that periodontitis is a reflection of a confounding factor such as a compromised or modified inflammatory or immune response that is also a driver of cognitive decline progression.

Highly statistical significant association was found between CPI codes and the only domains of SAGE test; the executive domain. This might be attributed to the correlation of the executive domain to the total SAGE test scores. This correlation was high in relation to other six domains,

## 6. Study Limitations

There are some limitations inherent in the survey data. Due to the cross-sectional nature of the data, this cannot fully keep apart the causal relationship between cognitive status and periodontal health, aware that the linkage between the two is complex. Many of the observed oral health problems may have occurred earlier in life, and decline in oral health may have been a precursor of cognitive decline[26]. However, deterioration of oral health is also common among old individuals. In addition, periodontal disease leading to tooth loss can also be rapid in elderly persons [27,28]. Therefore, here, cannot rule out the possibility that cognitive impairment precipitated the deterioration of oral health. Another limitation is that the SAGE, the single cognitive test that is self-administered and first used in its Arabic version that there were no data present to compare with. Future longitudinal studies need to further explore the casual relationship between cognitive function and periodontal health. Additional measures are also needed to more comprehensively assess cognitive status.

## 7. Conclusion and Future Scope

The findings in this study suggest that retirees with low cognitive function are at risk for poor periodontal health. These findings provide a knowledge base from which to develop preventive strategies for early intervention to address oral health problems among older adults. If longitudinal data confirm the causal relationship between cognition and oral health, then early detection of deteriorating oral health in relation to cognitive function could have a profound impact on development of appropriate and effective interventions. This could then (a) assist in maintaining good oral health among individuals with mild cognitive impairment, (b) assist patients and caregivers in making adjustments in oral care patterns, and (c) help dental care professionals be more proactive in assisting patients with referrals and develop oral health programs to promote practical preventive strategies.

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**Table 1:** Distribution of the retirees according to maximum CPI score by cognitive status

		Cognitive status		
		Normal	Dementia	MCI
<b>Healthy</b>	No.	1	0	<b>0</b>
	% CPI	100.00	0.00	<b>0.00</b>
	% Total	0.05	0.00	<b>0.00</b>
<b>Bleeding</b>	No.	89	12	<b>5</b>
	% CPI	83.96	11.32	<b>4.72</b>
	% Total	44.95	6.06	<b>2.53</b>
<b>Calculus</b>	No.	19	7	<b>6</b>
	% CPI	59.38	21.88	<b>18.75</b>
	% Total	9.60	3.54	<b>3.03</b>
<b>Shallow pocket</b>	No.	18	21	<b>3</b>
	% CPI	42.86	50.00	<b>7.14</b>
	% Total	9.09	10.61	<b>1.52</b>
<b>Deep Pocket</b>	No.	9	3	<b>5</b>
	% CPI	52.94	17.65	<b>29.41</b>
	% Total	<b>4.55</b>	<b>1.52</b>	<b>2.53</b>

**Table 2:** Mean number of sextants of periodontal index (CPI) by cognitive status

Cognitive Status	Sextants affected by CPI codes											
	Healthy		Bleeding		Calculus		Shallow pockets		Deep pockets		Excluded sextants	
	Mean	± SE	Mean	± SE	Mean	± SE	Mean	± SE	Mean	± SE	Mean	± SE
<b>Normal</b>	1.65	0.16	2.69	0.18	0.64	0.11	0.35	0.09	0.13	0.06	0.53	<b>0.06</b>
<b>Dementia</b>	0.77	0.18	1.93	0.25	1.16	0.2	1.05	0.2	0.19	0.14	0.93	<b>0.13</b>
<b>MCI</b>	1.37	0.43	1.79	0.46	1.21	0.42	0.79	0.24	0.58	0.29	0.26	<b>0.15</b>
<b>F</b>	4.8		3.59		3.21		6.37		1.47		<b>6.75</b>	
<b>P</b>	<b>0.00**</b>		<b>0.02*</b>		<b>0.04*</b>		<b>0.00**</b>		<b>0.24</b>		<b>0.00**</b>	

\*=Sig. at P<0.05, \*\*=H.S at P<0.01

**Table 3:** Distribution of the retirees according to maximum CPI scores by Self-Administered Gerocognitive Examination test domains

SAGE DOMAINS	Healthy		Bleeding		Calculus		Shallow pockets		Deep pocket		F	Sig.	
	No	%	No	%	No	%	No	%	No	%			
Orientation	0	0	0	4	12.5	3	27.3	4	18.2	0	0	17.03	0.55
	1	0	0	1	3.1	0	0	0	0	0	0		
	2	0	0	6	18.8	0	0	6	27.3	0	0		
	3	0	0	2	6.3	1	9.1	0	0	1	25		
	4	1	100	19	59.4	7	63.6	12	54.5	3	75		
Language	0	0	0	1	3.1	0	0	2	9.1	0	0	18.51	0.23
	1	0	0	3	9.4	3	27.3	1	4.5	0	0		
	2	1	100	4	12.5	1	9.1	7	31.8	2	50		
	3	0	0	5	15.6	3	27.3	5	22.7	1	25		
	4	0	0	19	59.4	4	36.4	7	31.8	1	25		
Reasoning	0	0	0	1	3.1	1	9.1	2	9.1	0	0	16.92	0.39
	1	0	0	3	9.4	1	9.1	1	4.5	0	0		
	2	0	0	13	40.6	3	27.3	10	45.5	3	75		
	3	0	0	14	43.8	4	36.4	9	40.9	1	25		
	4	1	100	1	3.1	2	18.2	0	0	0	0		
Visuospatial	0	0	0	4	12.5	2	18.2	7	31.8	0	0	18.48	0.21
	1	0	0	2	6.3	2	18.2	5	22.7	1	25		
	2	0	0	3	9.4	0	0	3	13.6	1	25		
	3	0	0	2	6.3	2	18.2	1	4.5	0	0		
	4	1	100	21	65.6	5	45.5	6	27.3	2	50		
Executive	0	0	0	7	21.9	5	45.5	11	50	1	25	28.75	0.003*
	1	1	100	0	0	2	18.2	4	18.2	1	25		
	2	0	0	9	28.1	1	9.1	3	13.6	2	50		
	3	0	0	6	18.8	1	9.1	4	18.2	0	0		
	4	0	0	10	31.3	2	18.2	0	0	0	0		
Memory	0	0	0	12	37.5	4	36.4	14	63.6	3	75	11.98	0.08
	1	0	0	11	34.4	3	27.3	7	31.8	0	0		
	2	1	100	9	28.1	4	36.4	1	4.5	1	25		

\*=Sig. at P<0.05

