

# Coronal Dental Caries in Relation to Cognitive Status among Retirees in Middle Euphrates Region –Iraq

Imad Jabbar Waheeb Jaaafar<sup>1</sup>, Ban Sahib Diab<sup>2</sup>

<sup>1</sup>Specialist Dentist in Ministry of Health /Special Center for Dentistry /Al-Diwaniya \_Iraq

<sup>2</sup>Assistant Professor/College of Dentistry/Pediatric and Preventive Department/University of Baghdad/Iraq

**Abstract:** *Background:* Cognitive impairment significantly affects the quality of daily living which compromises oral health in older adults including dental caries that remains the most important dental health problem in developing countries. The aim of this study was examination the association between cognitive status and coronal dental caries among retirees in Middle Euphrates Region-Iraq. *Materials and methods:* The sample included 198 dentate retirees with 50 years old and older from the offices of (Qi-Cards) who completed the study cognitive measure using Self-Administered Gerocognitive Examination test (SAGE) and dental examination by application of DMFS index according to WHO criteria. *Result:* The occurrence of dental caries among the retirees was 98.5 %. Data analysis showed that the means of DMFS and missing surfaces (MS) were statistically highly significant differ among retirees with different cognitive status. While the mean decayed surfaces (DS) and filled surfaces (FS) were highest among demenated retirees and Mild Cognitive Impairment group respectively however these differences were statistically not significant. Retirees with different scores of each domain of SAGE showed statistically significant differences with means of DMFS and missing surfaces (MS). *Conclusion:* poorer cognitive ability was directly associated with poorer dental status, namely missing and total DMF surfaces.

**Keywords:** Cognitive impairment, retirees, dental caries

## 1. Introduction

Cognitive impairment ranges in severity, and can result in loss of higher level reasoning, memory loss, learning disabilities, attention deficits, decreased intelligence, and other reductions in mental functions, it significantly affects activities of daily living and compromises dental health, systemic health and quality of life in older adults. Many factors, including dementia may contribute to cognitive impairment in older adults. Most people with dementia live in developing countries [1,2].

Dementia may have different etiologies. Alzheimer's disease constituted (60–80%) of dementia [3], Alzheimer's disease is the fifth-leading cause of death for that age 65 and older [4]. Mild cognitive impairment (MCI) is a state intermediate between normal cognition and dementia, with essentially preserved functional abilities. Cognitive status was assessed using the Self-Administered Gerocognitive Examination (SAGE) [5]. Oral health is a critical and often neglected component of an older adult's health and well-being [6-8]. In previous studies they examined the relationship between cognitive function and oral health have primarily focused on patients with Alzheimer's disease (AD) or other dementias. These findings involving individuals with diagnosed dementia may not apply to older individuals across the full range of cognitive function, including the large number of persons with undiagnosed dementia [9] or with cognitive impairment not severe enough to meet criteria for dementia [10].

Dental caries remains the most important dental health problem in developing countries. Dental caries is —a multifactorial disease mainly consisting of three parameter, contributing for the initiation of caries namely, host factor,

microorganism and diet [11]. Dental caries has become a significant oral health problem for older adults. This development is due in part to the increasing longevity of the population and the increases in tooth retention in this age group.

Since no previous Iraqi study was found regarding this subject this study was carried out to seek the relation between cognitive impairment that represented as prodromal to Alzheimer disease and dental caries as risk factor among retirees aged (+ 50 years) in Middle Euphrates Region –Iraq.

## 2. Subjects, materials and methods:

This study was conducted with a written informed consent obtained from study participants. The study included participants of retirees. 198 healthy retirees with age range (50-87) years. 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

Cognitive status was assessed using the Self-Administered Gerocognitive Examination (SAGE). SAGE is a brief, reliable, validated, self-administered cognitive assessment tool with four equivalent interchangeable forms reducing the typical delay in identifying cognitive impairment in individuals and sensitive to changes over time, pen and paper, self-administered. The scores of this test ranged (0-22), categorizing the retirees into three groups: normal group, no need for further evaluation, mild Cognitive Impairment (MCI) group: screening evaluation recommended and dementia group, screening evaluation

recommended also. The test was applied in the Arabic version, the reliability and the sincerity of the test were statistically significant at ( $p=0.00$ ) and this pointed for the internal consistency among test. Caries experience in the present study was determined by the Decayed- Missing Filled Surfaces (DMFS) index by WHO in 1997 in which all teeth are examined and all third molars were included. Plain mouth mirror and CPI probe were used in the examination. Each tooth was recorded, scored as 4 surfaces for anterior teeth and 5 surfaces for posterior teeth. Retained root was recorded as 4 D for anterior teeth, 5 D for posterior teeth. Missing tooth was recorded as 4 M for anterior teeth, 5 M for posterior teeth. Tooth with crown was recorded as 4 F for anterior teeth, 5 F for posterior teeth. To avoid bias, the author himself examined all the subjects. Statistical analysis was carried out using SPSS program.

### 3. Results and Discussion

The data of preset study showed that the occurrence of dental caries among the retirees was 98.5 %. The mean value of DMFS was  $38.98 \pm 1.95$ . Lowest occurrence of dental caries was found among the retirees with dementia (95.3%) followed by normal group with occurrence of 99.3%, while MCI group had dental caries of (100.0%), table (1).

The mean of decayed surfaces (DS) was highest among dementia and lowest among normal cognitive retirees, however, no statistical significant difference was found among the three groups also the mean of filled surfaces (FS) was highest among MCI group and lowest among demented retirees with no statistical significant difference was found among the three groups. As a result to that the DFS value showed no statistically significant difference with higher mean value among demented retirees and lower among normal group. On the other hand, the means of DMFS and missing surfaces (MS) were statistically highly significant differ among retirees with different cognitive status ( $F=10.472$ ,  $P=0.000$   $F=12.689$ ,  $P=0.000$  respectively). Further analysis by Games-Howell test showed that the means of DMFS were found to be significantly higher among the dementia group than the normal group (m.d. = -19.668,  $P$  value=0.001) and the MCI group (m.d.=21.611,  $P$  value=0.03). Games-Howell test also showed that the means of MS were found to be significantly higher among demented group than the normal (m.d.= -19.848,  $p=0.003$ ) and MCI group (m.d.= 27.941,  $p=0.000$ ) (table2).

The association between caries experience in term of DS, MS, FS, DFS and DMFS and scores of each six domains of SAGE test showed that the means of DMFS and missing surfaces (MS) were statistically significant differ among retirees with different score of orientation domains groups ( $F=2.525$ ,  $P=0.042$ ,  $F=2.292$ ,  $P=0.002$  respectively) while other component showed no statistical significant difference. Language domain showed no statistical significant differences among different scores with DMFS and its components ( $P>0.05$ ), while for reasoning domain a highly statistical significant difference was observed for DMFS and MS components with the four scores of this domain ( $F=6.125$ ,  $P=0.001$  and  $F=4.929$ ,  $P=0.021$  respectively) the same for the visuospatial domain with a highly statistical significant differences was observed for DMFS and MS

components with the four scores of this domain ( $F=6.434$ ,  $P=0.000$  and  $F=8.033$ ,  $P=0.000$  respectively) while for the executive domain all of with statistically significant differences with the four scores of this domain. Regarding the memory domain showed only MS component and DMFS with high statistical significant differences with the three scores of this domain ( $F=10.503$ ,  $P=0.000$ ,  $F=7.567$ ,  $P=0.00$  respectively) (table3).

#### 3.1 Discussion

Dentate older people should be the target of intensive monitoring and preventive efforts at both the clinical practice and public health levels. Early detection and subsequent reduction of modifiable risk factors for cognitive decline is important for extending healthy life expectancy in the currently aging society

The present study overcome some of the controversy of the previous studies in examining the link between cognitive function and dental status among community-dwelling older adults by (i) the use of a cognitive measure applied on healthy normal population of retirees in Middle Euphrates Region –Iraq

This study was the first to be conducted on retirees using the Arabic version of cognitive assessment tool called Self-Administered Gerocognitive Examination test (SAGE) and related with dental health status in Middle Euphrates Region –Iraq. SAGE, a brief, validated, self-administered cognitive assessment tool, in this study most individuals completed the SAGE within 10–15 minutes. Cognitive measuring tests are many and need resources while the self-administered ones are less [12,13]. Although web-based cognitive measuring test more to self-assess and monitor cognition, has shown poor validity as compared with pencil-and-paper screening [14]. 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. If the patient scores well on SAGE, the clinician may determine that no further evaluation is indicated, potentially saving costs for the patient and time for the physician. For patients scoring less well on SAGE, the practitioner may wish to continue with a staged screening process such as assessment with an informant screen [15–19], or further evaluations. There are limitations with the SAGE instrument as a screening tool. Individuals must be literate and have adequate vision and writing skills to answer the questions. The SAGE can be administered to these individuals verbally, but then it loses its practicality. Earlier diagnosed patients may be better able to express their wishes and participate more fully in their future care plans. Families could be educated and encouraged to start planning ahead for needed social and legal services and might increase patient supervision to promote safety and avoid financial predators. Overall this may lead to an improvement in the quality of life for cognitively impaired patients and a reduction in burden for their caregivers.

Oral health is an integral part of general health. The prevalence of caries has decreased markedly among both children and adults, whereas the prevalence of caries among

older adults aged 70 years and older remains high[20-21]. The data of preset study showed that the occurrence of dental caries was 98.5 %. Unfortunately there were no previous Iraqi studies concerning dental caries of retirees with age 50years and older to compare with. However the mean value of DMFS were different among different groups of cognitive status in addition concerning its components, both the decayed and filled surfaces components were higher in demented and MCI groups than the normal cognitive group although there were no statistical significant differences that might be explained to the fact that dental caries is a multifactorial disease but here might partly attributed to the neglect regarding dental care and periodic visits to dentists although they were chosen healthy retirees but old age had impact on oral health and cognitive dysfunction as they retired and became less care and had diminished social network[22-24], and also might be explained because of age-related salivary changes, poor diet.

For the severity of dental caries in term of value of DFS, here it is important to consider the number of the remaining teeth for the calculation the incidence of caries among older people, and this point was one of the limitation in this study, however the severity of caries of moderate type was with all cognitive groups but of no statistical significant difference which explained that the MS component of DMFS index constituted the main bulk of this index.

The means of DMFS and missing surfaces (MS) were statistically significant differ among retirees with different score of each domain of SAGE test this explained the consistency of this test to assess the cognitive status among retirees.

#### 4. Conclusion and Future Scope

In this study cognitive-impaired retirees were recording higher caries experience mean than normal cognitive retirees. This study invites further scope for cross-sectional and longitudinal study for the upcoming scholar and researcher. Hopefully, this kind of study will bring awareness to authorities and numerous caregivers of cognitively-impaired adults in the world. Dental caries and its complications can be easily prevented by simple measures like good oral hygiene and early treatment. Therefore, there is a need to address the problem of dental caries in the community. Besides generating awareness, treatment and restorative services need to be made available and accessible to the elderly population dentate older people should be the target of intensive monitoring and preventive efforts at both the clinical practice and public health levels. There is no easily identifiable bullet for preventing caries in that age group, but the use of evidence-based preventive interventions (such as fluoride) should suffice. Thus, this study can be considered as a base line data that allows studying dental caries among permanent dentition, also allows the comparison with other studies in other parts of the world for both dental caries and cognitive status among those populations.

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**Table 1:** Distribution of the retirees according to the occurrence of dental caries

Cognitive status	Dental caries	
	No.	%
Normal	135	99.3
Dementia	41	95.3
MCI*	19	100.0

\* MCI= Mild Cognitive Impairment

**Table 2:** Caries experience representing by DMFS and its components among retirees in relation to cognitive status

Cognitive status	Caries experience									
	DS		MS		FS		DFS		DMFS	
	M	±SE	M	±SE	M	±SE	M	±SE	M	±SE
Normal	4.51	0.58	24.20	1.99	6.21	0.73	10.65	1.08	34.90	2.18
Dementia	7.33	1.43	44.05	5.29	6.19	1.27	13.28	2.16	54.56	4.86
MCI	6.63	1.51	16.11	2.73	10.21	3.07	16.84	3.54	32.95	4.05
ANOVA	F	2.70	12.68		1.68		2.15		10.47	
	Sig	0.07	0.00*		0.18		0.11		0.00*	

\* Highly significant P<0.01

**Table 3:** Caries experience representing by DMFS and its components in relation to SAGE domains among retirees

SAGE domains	Caries experience										
		DS		MS		FS		DFS		DMFS	
		M	±SE	M	±SE	M	±SE	M	±SE	M	±SE
<b>Orientation</b>											
	0	4.45	1.18	39.70	8.05	5.50	2.55	9.95	2.70	50.10	7.00
	1	5.00	1.54	39.20	17.29	6.00	6.00	11.00	6.66	50.20	14.98
	2	6.81	2.24	32.14	7.72	8.81	2.473	15.61	3.52	47.57	7.87
	3	5.12	2.32	41.00	9.11	7.12	3.314	12.25	5.29	53.25	8.71
	4	5.25	0.62	24.29	1.89	6.40	0.689	11.52	1.08	34.99	2.05
ANOVA	F	0.28		2.52		0.40		0.54		2.94	
	Sig.	0.89		0.042*		0.80		0.70		0.021*	
<b>Language</b>											
	0	3.67	1.11	25.00	8.94	6.67	3.37	10.33	3.37	35.33	8.36
	1	7.71	2.82	42.36	9.62	1.43	1.42	9.14	3.85	52.21	10.26
	2	6.48	1.26	35.00	6.01	8.00	1.52	13.79	2.27	44.79	5.64
	3	4.00	0.75	27.03	3.29	5.51	0.73	9.51	1.02	36.63	3.44
	4	5.57	0.87	23.72	2.49	7.65	1.19	13.24	1.72	36.82	2.66
ANOVA	F	1.10		2.14		1.84		1.02		1.42	
	Sig.	0.35		0.07		0.12		0.39		0.22	
<b>Reasoning</b>											
	0	7.69	2.41	41.23	8.61	8.85	1.90	15.76	3.72	48.85	6.49
	1	4.53	1.20	49.67	8.08	4.93	1.56	9.46	2.06	59.13	6.38
	2	5.62	0.93	30.00	3.93	4.77	1.41	10.41	1.89	40.32	4.23
	3	5.27	0.84	23.74	2.25	7.26	0.88	12.43	1.40	36.15	2.53
	4	3.20	0.84	10.33	1.03	9.27	1.83	12.46	2.15	22.80	2.01
ANOVA	F	0.69		6.12		1.39		0.62		4.29	
	Sig.	0.59		0.00**		0.23		0.64		0.002**	
<b>Visuospatial</b>											

	0	6.84	2.02	48.74	7.71	4.95	1.911	11.78	2.42	60.42	7.41
	1	5.29	2.08	44.93	8.16	5.50	1.88	10.78	3.52	55.71	6.36
	2	6.52	1.62	32.10	5.84	11.67	2.43	17.71	3.64	50.29	5.98
	3	6.23	1.34	22.10	2.66	6.85	1.45	13.11	2.29	35.38	3.31
	4	4.23	0.56	22.97	2.66	5.78	0.81	9.90	1.09	31.45	2.61
<b>ANOVA</b>	F	1.02		6.434		2.078		1.66		8.033	
	Sig.	0.39		0.00**		0.085		0.15		0.00**	
<b>Executive</b>											
	0	6.68	1.29	45.80	5.23	5.73	1.19	12.18	1.86	55.52	4.65
	1	11.26	2.74	21.91	3.57	8.35	1.79	19.17	4.17	40.91	5.30
	2	4.00	0.61	26.75	3.62	9.00	1.40	13.00	1.38	39.72	3.50
	3	3.35	0.87	22.56	4.34	2.29	0.81	5.64	1.58	28.18	4.79
	4	3.98	0.64	19.91	2.62	7.40	1.49	11.42	1.87	31.3	3.02
<b>ANOVA</b>	F	5.91		7.73		3.16		3.88		7.25	
	Sig.	0.00**		0.00**		0.015*		0.005**		0.00**	
<b>Memory</b>											
	0	5.87	0.86	37.29	3.69	5.96	1.08	11.72	1.56	47.53	3.57
	1	3.51	0.63	28.65	4.25	7.14	1.30	10.64	1.45	39.30	4.23
	2	5.62	0.91	18.79	1.91	6.91	1.00	12.41	1.59	31.19	2.41
	<b>ANOVA</b>	F	1.36		10.50		0.29		0.22		7.56
	Sig.	0.25		0.00**		0.74		0.79		0.001**	

\*Significant P<0.01\*\* Highly significant P<0.01

