DENTAL CARIES EXPERIENCE ASSOCIATE WITH MENTAL ISSUES AND HYPERTENSION IN ASIAN AMERICANS

Yilan **Miao**[1], Alexandre R. **Vieira**[1*]

[1]Department of Oral Biology, School of Dental Medicine, University of Pittsburgh, Pittsburgh, PA, USA.

Palavras-chave: Asiáticos. Americanos asiáticos. Status dental. Cárie. Periodontite.

RESUMO

Objetivo: Determinar se medidas de saúde oral (cárie dentária e periodontite) estão associadas com doenças cardiovasculares e mentais em asiáticos americanos. **Métodos:** Dados de saúde, experiência de cárie (CPOD e CPOS) e periodontitie de asiáticos americanos foram obtidos do Registro Odontológico e Repositório de DNA da Universidade de Pittsburgh. O total de 6.117 pessoas estava disponível no registro e 309 asiáticos americanos foram estudados (292 adultos e 17 crianças abaixo de 12 anos). As frequências de doença mental e hipertensão, dependendo da experiência de cárie e periodontite, foram avaliadas e os testes qui-quadrado e exato de Fisher foram usados com alfa de 0,05 para determinar diferenças estatísticas. **Resultados:** A média de CPOD dos 292 adultos foi de 10,1 e a média de CPOS foi 27,5, o que é parecido com os valores esperados de CPOD de adultos nos Estados Unidos (9,0-11,3). A média de CPOD das 17 crianças menores de 12 anos foi 1,8 e a do CPOS foi 3,8, o que também é similar aos valores de CPOD em crianças dos Estaods Unidos (1,2-2,6). Experiência de cárie mais severa associou-se com ter problema de saúde mental (p=0,02) e hipertensão (p=0,02). Não se encontrou associação entre periodontite e problemas mentais ou cardiovasculares na amostra. **Conclusão:** Experiência de cárie mais severa em asiáticos americanos associa-se com doença mental e cardiovascular.

Keywords: Asians. Asian Americans. Dental Status. Caries. Periodontitis.

ABSTRACT

Objective: To determine if oral health indicators (dental caries experience and periodontitis) associate with mental and cardiovascular health issues in Asian Americans. **Methods:** Medical history data, dental caries experience (DMFT and DMFS; Decayed, Missing due to caries, Filled Teeth/Surface), and periodontitis status of Asian Americans were obtained from the Dental Registry and DNA Repository at University of Pittsburgh School of Dental Medicine. A total of 6,117 individuals were evaluated and among which dental status of 309 Asian American subjects (292 adults and 17 children under the age of twelve) were analyzed. The frequency of mental health issues and hypertension depending on dental caries experience (Decayed, Missing due to caries, Filled Teeth or Surfaces, DMFT/DMFS) and periodontitis were evaluated and chi-square or Fisher's exact test were used with an alpha of 0.05 to determine statistical differences. **Results:** For the 292 Asian American adult subjects, the mean DMFT was 10.1 and mean DMFS was 27.5, which is similar to the expected values in adult DMFT (9.0-11.3) for the United States. For the 17 Asian American children subjects under age of twelve, the mean DMFT was 1.8 and mean DMFS was 3.8, which also fell into the expected values for children DMFT for the United States (1.2-2.6). More severe dental caries experience was associated with having an underlying mental health issue (p=0.02) and hypertension (p=0.02). No associations between having periodontitis and mental or cardiovascular issues were found in the cohort. **Conclusion:** More severe dental caries experience of Asian Americans associate with mental and cardiovascular issues.

Submitted: September 2, 2019
Modification: November 11, 2019
Accepted: December 3, 2019

***Correspondence to:**
Alexandre R. Vieira
Address: Department of Oral Biology, 412 Salk Pavilion, School of Dental Medicine, University of Pittsburgh, 335 Sutherland Street, Pittsburgh, PA, USA 15261.
Telephone number: +1 (412) 383-8972
Email: arv11@pitt.edu

INTRODUCTION

Asian Americans are the third most significant minority ethnic group in the United States, after African Americans and Hispanic Americans. However, most Asian Americans in the US have arrived after the passage of the 1965 Immigration and Nationality Act, which has ended the exclusion of Asian immigrants.[1] Since then, the Asian American population has increased from 491,000 in 1960 to 22,408,646 in 2017, representing a 4564% increase.[2] This makes Asian Americans 6.9% of the US population and they are generally less studied then their White US counterparts.

Associations between oral health issues such as caries and periodontitis and overall health problems such as mental and cardiovascular risks are likely to involve and relate to inflammation. Individuals with mental health disorders have difficulties with oral hygiene, self-care, and higher frequency of other comorbidities. Poor mental health has been associated with dental caries, periodontitis, dry mouth, behavioral changes, comorbid physical disease, smoking, alcohol and substance abuse, and susceptibility to oral infection.[3-9] Similarly, cardiovascular diseases and diabetes associate with worse oral health indicators.[10,11] However, data are scarce regarding the impact on oral health of comorbidities of Asian Americans[12,13] and the aim of this study was to determine if mental and cardiovascular issues associated with worse oral health indicators in Asian Americans.

MATERIALS AND METHODS

The clinical information of Asian-American patients was obtained from the Dental Registry and DNA Repository (DRDR) project at University of Pittsburgh School of Dental Medicine (IRB approval # 0606091). Most patients seeking treatment are from the great Pittsburgh area, and the subjects represent well the ethnic groups of the city and its surroundings. Starting in September of 2006, all individuals who sought treatment at University of Pittsburgh School of Dental Medicine were invited to be part of the registry. Medical history data, caries experience (DMFT and DMFS; Decayed, Missing due to caries, Filled Teeth/Surface), and periodontitis status of Asian Americans were obtained by full mouth probing. Self-reported mental health status (depression and psychiatric disorders) and cardiovascular risks (high blood pressure were computed. Dental assessments were done by students under the supervision of faculty. By the time of this project, a total of 6,117 individuals (recruited between 2006 and 2018) were evaluated and among which dental status of 309 Asian American subjects (292 adults and 17 children under the age of twelve) were analyzed for this study. In this study, the origin of "Asian Americans" refer to the whole continent of Asian, including western Asia countries such as Saudi Arabia, Turkey, and Israel. Individuals self-report their geographic origin. To analyze dental caries experience, individuals were defined as having high caries experience (DMFT $\geq$ 10 or DMFS 28) and low caries experience (DMFT <10 or DMFS < 28). All other variables were defined as having or not the condition. Chi-square or Fisher's exact tests were used for all comparisons with alpha of 0.05.

RESULTS

Among the Asian American subjects, teenagers and adults had a mean DMFT of 10.1 and DMFS of 27.5 (Table 1), and mean age of 32.59 years (ranging from 13 to 78), with 55% female. These data fall into the range reported to the World Health organization (WHO) for the United States,[14] which has DMFT 9.0—13.9. Asia for the most part has lower reported DMFT (Table 1). For the children included in this study, the mean DMFT was 1.8, and the correlated DMFS was 3.8, with mean age 8.13 years (ranging from 4 to 12) and nine females. These data fall into the mean DMFT range reported to WHO for children in the United States (1.2—2.6).[14]

Table 1: *Dental Caries Experience of Asian American subjects and populations from selected countries in North America and Asia (from Petersen[14]).*

	DMFT (teenagers and adults)	DMFT (12-year old, only four children contributed to the value)
Asian Americans	10.1	1.8
WHO region/country		
North America		
USA	9.0-13.9	1.2-2.6
Canada	>13.9	1.2-2.6
Asia		
China	<5.0	<1.2
India	5.0-8.9	1.2-2.6
Japan	9.0-13.9	1.2-2.6
North Korea	<5.0	2.7-4.4
South Korea	9.0-13.9	2.7-4.4
Mongolia	9.0-13.9	1.2-2.6
Vietnam	5.0-8.9	1.2-2.6
Thailand	5.0-8.9	1.2-2.6
Singapore	9.0-13.9	<1.2
Philippines	>13.9	>4.4
Sri Lanka	9.0-13.9	1.2-2.6
Malaysia	9.0-13.9	1.2-2.6
Indonesia	5.0-8.9	1.2-2.6
Nepal	<5.0	<1.2
Pakistan	<5.0	<1.2
Afghanistan	5.0-8.9	2.7-4.4
Kazakhstan	5.0-8.9	1.2-2.6
Iran	9.0-13.9	1.2-2.6
Iraq	5.0-8.9	1.2-2.6
Saudi Arabia	5.0-8.9	1.2-2.6
United Arab Emirates	5.0-8.9	1.2-2.6
Yemen	5.0-8.9	2.7-4.4
Israel	9.0-13.9	1.2-2.6
Syria	9.0-13.9	1.2-2.6

The frequency of periodontitis, mental diseases (depression, anxiety, or psychiatric disorders), diabetes, hypertension, and cardiovascular diseases (atherosclerosis, stroke, or heart attack) is shown in Table 2. Adults with mental disorders were less likely to be caries free (Table 3). Individuals with hypertension were also less likely to be caries free (Table 4). Those differences were not seen for cardiovascular diseases, and periodontitis (Table 5-8).

Table 2: *Other clinical systemic diseases associated with Asian American subjects.*

	Periodontal Diseases	Mental Diseases	Diabetes	Hypertension	Cardiovascular Diseases
Total	124	17	6	18	8
Children	5	4	0	0	0
Adults	119	13	6	18	8

Table 3: *Dental caries experience (DMFT/DMFS) in adults with self-reported mental.*

Adults		Dental Caries Experience		
		High	**Low**	
Mental Diseases	**Yes**	9	2	*p*=0.02
	No	92	107	

Table 4: *Dental caries experience (DMFT/DMFS) in adults with hypertension.*

Adults		Dental Caries Experience		
		High	**Low**	
Hypertension	**Yes**	11	3	*p*=0.02
	No	90	106	

Table 5: *Dental caries experience (DMFT/DMFS) in adults with cardiovascular diseases.*

Adults		Dental Caries Experience		
		High	**Low**	
Cardiovascular Diseases	**Yes**	4	2	*p*=0.29
	No	96	119	

Table 6: *Periodontitis in adults with mental diseases.*

Adults		Periodontitis		
		Yes	**No**	
Mental Diseases	**Yes**	6	7	*p*=0.68
	No	113	166	

Table 7: *Periodontitis in adults with hypertension.*

Adults		Periodontitis		
		Yes	**No**	
Hypertension	**Yes**	9	9	*p*=0.41
	No	110	164	

Table 8: *Periodontitis in adults with cardiovascular diseases.*

Adults		Periodontitis		
		Yes	**No**	
Cardiovascular Diseases	**Yes**	4	4	*p*=0.23
	No	115	177	

DISCUSSION

There are two interesting observations from these data. First, it is apparent that caries experience of Asian individuals in the Pittsburgh area is worse than the reported national data obtained from Asian countries through the World Health Organization. One could expect that the conditions in the United States would permit an improvement in oral health outcomes. There is a number of possibilities that may explain this finding, including national data of Asian countries underestimates the real prevalence of the disease or the caries experience in Pittsburgh is overall worse than other parts of the United States. The US has greater sugar consumption (amount, frequency of intake, types) in general compared to developing countries in Asia. Besides, Pittsburgh is the largest city in the poorest area in the country, the Appalachian mountains. Although Pittsburgh has had fluoridated water since 1953, nearly half of the children in Pittsburgh between six and eight had cavities according to the 2002 State Department of Health report.[15] More than 70% of fifteen-year-old teenagers have had cavities, and about 30% children at Pittsburgh have untreated cavities.

Individuals caries free were less likely to have underlying mental disorders or hypertension. Underlying mechanisms explaining this may include good oral hygiene and dietary habits, and less prominent inflammatory responses. These findings agree with published data that show individuals with mental health issues have more dental caries[9,16-18] and individuals with hypertension have more tooth loss.[19,20]

In comparison to our published data on the project that include Whites and Blacks, the Asian Americans have slightly lower caries experience.[21,22] Our study has the typical limitations of a cohort study that rely on medical records. Records are filled by multiple professionals and there is a chance information is recorded with differences. Overall health status was self-reported. Also, some of our comparisons included a small number of observations.

In summary, Native Asians national caries experience data reported to the World Health Organisation appears to suggest Asian American immigrants in the Pittsburgh area have the same and some instances worse dental caries experience. Asian Americans with underlying mental health issues or hypertension are less likely to be caries free or low caries experience.

Acknowledgements

The Dental Registry and DNA Repository is supported by the University of Pittsburgh School of Dental Medicine. Y.M. was supported by the Biomedical Master's Program, University of Pittsburgh School of Medicine.

REFERENCES

1. National Academies of Sciences, Engineering, and Medicine. 2015. The integration of immigrants into American society. Washington D.C.: The National Academy Press. https://doi.org/10.17226/21746.

2. López G, Ruiz NG, Patten E. 2017. Key facts about Asian Americans, a diverse and growing population. Factank. News in the numbers. Pew Research Center. https://www.pewresearch.org/fact-tank/2017/09/08/key-facts-about-asian-americans/

3. Cooper-Kazaz R, Levy DH, Zini A, Sgan-Cohen HD. Severity of psychiatric disorders and dental health among psychiatric outpatients in Jerusalem, Israel. Isr J Psychiatry Relat Sci. 2015;52(2):119-120.

4. Heaton LJ, Swigart K, McNelis, G, Milgrom P, Downing DF. Oral health in patients taking psychotropic medications: results from a pharmacy-based pilot study. J Amer Pharmacists Assoc. 2016; 56(4), 412–417.e1. http://doi.org/10.1016/j.japh.2016.03.009

5. Kisely S, Baghaie H, Lalloo R, Johnson NW. Association between poor oral health and eating disorders: systematic review and meta-analysis. Br J Psychiatry. 2015 Oct;207(4):299-305. doi: 10.1192/bjp.bp.114.156323.

6. Kisely S, Baghaie H, Lalloo R, Siskind D, Johnson NW. A systematic review and meta-analysis of the association between poor oral health and severe mental illness. Psychosom Med. 2015 Jan;77(1):83-92. doi: 10.1097/PSY.0000000000000135.

7. Kisely S, Sawyer E, Siskind D, Lalloo R. The oral health of people with anxiety and depressive disorders - a systematic review and meta-analysis. J Affect Disord. 2016 Aug;200:119-132. doi: 10.1016/j.jad.2016.04.040.

8. Kisely S. No Mental Health without Oral Health. Canadian Journal of Psychiatry. Revue Canadienne de Psychiatrie. 2016;61(5), 277–282. http://doi.org/10.1177/0706743716632523

9. Latif T, Vieira AR. Oral health of individuals with mental health disorders. Rio de Janeiro Dent J 2018;3(2):19-25.

10. Holmlund A, Lampa E, Lind L. Oral health and cardiovascular disease in a cohort of periodontitis patients. Atherosclerosis 2017;262:101-106.

11. Dar-Odeh N, Borzangy S, Babkair H, Farghal L, Shahin G, Fadhlalmawla S, Alhazmi W, Taher S, Abu-Hammad O. Association of dental caries, retained roots, and missing teeth with physical status, diabetes mellitus and hypertension in women of the reproductive age. Int J Environ Res Public Health 2019; 16(14):E2565. doi: 10.3390/ijerph16142565.

12. Shiboski CH, Gansky SA, Ramos-Gomez F, Ngo L, Isman R, Pollick HF. The association of early childhood caries and race/ethnicity among California preschool children. J Public Health Dent 2003; 63(1):38-46.

13. Chinn CH, Cruz GD, Chan A. Caries experience among Chinese-American children in Manhattan Chinatown. N Y State Dent J. 2011 Jun-Jul;77(4):43-7.

14. Petersen PE. The world oral health report 2003: continuous improvement of oral health in the 21st century—the approach of the WHO global health programme. Geneva:
World Health Organization, 2003: 10-33.
15. Status of Oral Health in Pennsylvania. PA Department of Health: Harrisburg, PA, USA, 2002: 51.
16. Kisely S, Baghaie H, Lalloo R, Siskind D, Johnson NW. A systematic review and meta-analysis of the association between poor oral health and severe mental illness. Psychosom Med. 2015 Jan;77(1):83-92. doi: 10.1097/ PSY.0000000000000135.
17. Kisely S, Sawyer E, Siskind D, Lalloo R. The oral health of people with anxiety and depressive disorders - a systematic review and meta-analysis. J Affect Disord. 2016 Aug;200:119- 132. doi: 10.1016/j.jad.2016.04.040.
18. Kisely S. No Mental Health without Oral Health. Canadian Journal of Psychiatry. Revue Canadienne de Psychiatrie. 2016;61(5):277–282. http://doi.org/10.1177/0706743716632523
19. Vieira AR, Hilands KM, Braun TW. Saving more teeth – A case for personalized care. J Pers Med. 2015;:30-35. doi:10.3390/ jpm5010030.
20. Dar-Odeh N, Borzangy S, Babkair H, Farghal L, Shahin G, Fadhlalmawla S, Alhazmi W, Taher S, Abu-Hammad O. Association of dental caries, retained roots, and missing teeth with physical status, diabetes mellitus and hypertension in women of the reproductive age. Int J Environ Res Public Health. 2019 Jul 18;16(14):E2565. doi:10.3390/ijerph16142565.
21. Küchler EC, Deeley K, Ho B, Linkowski S, Meyer C, Noel J, Kouzbari MZ, Bezamat M, Granjeiro JM, Antunes LS, Antunes LA, de Abreu FV, Costa MC, Tannure PN, Seymen F, Koruyucu M, Patir A, Mereb JC, Poletta FA, Castilla EE, Orioli IM, Marazita ML, Vieira AR. Genetic mapping of high caries experience on human chromosome 13. BMC Med Genet. 2013 Nov 5;14:116. doi: 10.1186/1471-2350-14-116.
22. Küchler EC, Feng P, Deeley K, Fitzgerald CA, Meyer C, Gorbunov A, Bezamat M, Reis MF, Noel J, Kouzbari MZ, Granjeiro JM, Antunes LS, Antunes LA, de Abreu FV, Costa MC, Tannure PN, Seymen F, Koruyucu M, Patir A, Vieira AR. Fine mapping of locus Xq25.1-27-2 for a low caries experience phenotype. Arch Oral Biol. 2014 May;59(5):479-86. doi: 10.1016/j.archoralbio.2014.02.009.