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Research Article

Patterns of Partial Edentulism Among Diabetic and Non-Diabetic Patients at King Abdul-Aziz Medical City, Jeddah, Saudi Arabia – Cross Sectional Study.

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Abstract

Background: World Health Organization (WHO) documented Diabetes Mellitus (DM) as the seventh most common chronic disease in the world. In Saudi Arabia, 23.9% of the population has DM. Many studies showed that diabetic patients have higher rate of alveolar bone loss and missing teeth comparing to non – diabetic patients. Kennedy's classification is commonly used to describe the distribution of edentulous areas in the arch. According to Kennedy's classification, the suitable prosthetic option will be selected and designed to replace missing tooth/teeth.

Objective: To compare the frequency patterns of partial edentulism among diabetic and non-diabetic patients according to Kennedy's classification at KAMC-Jeddah.

Methodology: This study performed at the dental department of KAMC. 502 patients were selected randomly. The diabetic and non – diabetic patients were 248 and 254, respectively. All patients were classified according to Kennedy's classification using panoramic radiograph and medical records. The data were collected and analyzed used SAS version 9.4 and Fisher Exact test.

Result: Kennedy's CI III was the most prevalent in non-diabetic patients and in the upper jaw for diabetic patients, while CI I was the most common in diabetic lower jaws. Kennedy's CI IV was the least prevalent in diabetic and non- diabetic patients for maxilla and mandible.

Conclusion: The distribution of Kennedy's classification among diabetic and non-diabetic patients was significant.

Keyword: Edentulism, Partial Edentulous, Kennedy's Classification, Diabetic, Age, Gender, Saudi Arabia.

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INTRODUCTION:

Diabetes mellitus (DM) is considered as one of the most prevalent systemic diseases globally 1. World Health Organization (WHO) documented DM as the seventh most common disease in the world 2. Furthermore, the rate of DM in Saudi Arabia is ranked second in the Middle East and the seventh in the world 2. Moreover, in a comparative study reported that a proximally 23.9% of DM in Saudi Arabia 3. DM was increased ten times more in the past three years in Saudi Arabia 2. DM is a chronic inflammatory disease which is classified into two types; Type 1 DM and Type 2 DM. The most common type is type 2 DM, which has a prevalence of 90% worldwide 4.

There is a clear relationship between oral health and DM 5. Periodontal diseases are common oral manifestations in diabetic patients 6. Previous studies reported that periodontal disease is the sixth commonest complication of diabetic patients 1,6,7. Diabetic patients are at a higher risk of gingivitis, periodontitis and multiple preapical lesions 8. Presence of high levels of sugar in the saliva due to the increase of blood glucose level which leads to dental caries 9. Various studies showed that diabetic patients have high rate of alveolar bone loss and missing teeth 4,10. This leads to multiple spaces known as edentulous ridges that could be either complete or partial absence of the teeth 11.

Partially edentulous spaces are categorized according to various classifications, and the most common classification used is Kennedy's that was designed by (Edward Kennedy's in 1925) 12. Kennedy's classification depends on correlation between the position of edentulous spaces and remaining natural teeth 13. These classifications have four main categories.

- Class I: Bilateral edentulous area present posterior to remaining teeth.
- Class II: Unilateral edentulous area present posterior to remaining natural teeth.
- Class III: Unilateral edentulous area with natural teeth both anterior and posterior to it.
- Class IV: Single but bilateral edentulous area present anterior to remaining natural teeth 12.

The importance of Kennedy's classification that it gives general idea about all possible treatment options for each category. Some categories such as CI I and CI II have only two treatment options either implant or removable partial prosthesis, while CI III and CI IV have one more option which is fixed partial prosthesis 14. Kennedy's classification has another important role in formulating the suitable design for partial

denture, and it's used to facilitate the communication between, dentists, dental technicians and dental students 12.

To the best of our knowledge, studies are lacking in Saudi Arabia regarding the prevalence of different patterns of partial edentulous ridges between diabetic patients and non-diabetic patients. Therefore, the aim of this study is to compare the patterns of partial edentulism between diabetic patients and non-diabetic patients according to Kennedy's classification at King Abdul-Aziz Medical City (KAMC), Jeddah.

MATERIALS AND METHODS:

Medical records and panoramic radiographs in KAMC were used in this study. 502 partially edentulous patients' records were selected from Prosthodontics department database randomly. Nearly half of them were diabetic patients. The inclusion criteria were the following; the age of the patients above 20 years old age, presence of panoramic radiograph, clear medical condition and presence of missing tooth/teeth at least in one arch. Patients having bone diseases or cancer were excluded from this study. Patients with complete edentulous ridges were excluded too.

Patients' medical conditions, age and sex were recorded. All patients were divided according to medical records into two groups; non – diabetic patients' group (NDG) and diabetic patients' group (DG) with total number of 254 patients and 248 patients, respectively. Both types of DM were included in (DG). The total number of partially edentulous arches included in this study was 844 arches divided as 404 arches for NDG and 440 arches for DG.

Radiographic evaluation:

Panoramic radiographs were examined by one prosthodontist. Patients with only missing wisdom tooth/teeth were excluded. After checking patients' records and panoramic radiographs, any remaining roots, hopeless teeth, or indicated for extraction were considered as missing tooth/teeth. If the wisdom tooth was an abutment, it was considered bounded saddle. On the other hand, if the wisdom tooth was not in the prosthetic design, it was considered free end saddle. In each group, patients' arches were classified according Kennedy's classification into four subgroups. Kennedy's modifications were ignored to avoid the complexity.

Statistical analysis:

Data were collected and analyzed using software (SAS) (version 9.4). The test is chi-square (Fisher-

exact test). The p-values that we considered as significant is < 0.05 .

RESULT:

The total number of inspected patients' records was 502 patients' records. 254 of them were non-diabetic patients while the remaining 248 were diabetic patients. Table 1 shows the distribution of the patients

sample according to medical condition along with age and gender. The sample shows that 45% of the NDG were between 31 to 40 years old, while 61% of DG were above 60 years. Gender distribution in this study was 229(45.62%) male and 273(54.38%) female. The DG was 125(50.40%) male and 123(49.60%) female, while the NDG was 104(40.94%) male and 150(59.06%) female.

Table 1: Demographic data.

Variable		NDG N (%)	DG N (%)	Total N (%)
Age	20 to 30	25(9.84)	2(0.81)	27(5.37)
	31 to 40	114(44.88)	5(2.02)	119(23.71)
	41 to 50	37(14.57)	16(6.45)	53(10.56)
	51 to 60	42(16.54)	74(29.84)	116(23.11)
	>60	36(14.17)	151(60.89)	187(37.25)
	Total	254(50.60)	248(49.40)	502 (100.0)

Variable		NDG N (%)	DG N (%)	Total N (%)
Gender	Male	104(40.94)	125(50.40)	229(45.61)
	Female	150(59.06)	123(49.60)	273(54.38)
	Total	254(50.60)	248(49.40)	502

Table 2 shows distribution of Kennedy's classification in relation to age for both arches. CI III was the highest class for age between 31 to 40 years in upper and lower arches 70% and 60% respectively. For the age more than 60 years, 40% of CI III was in the upper arch, while in the lower arch 40.61% was for CI I. CI IV is the least Class for both arches. Age distribution in relation to Kennedy's classification of the upper and lower arch were significant P – value (0.0005 for upper - 0.0001 for lower).

According to Table 3 the gender distribution in relation to Kennedy's classification for the upper arch, CI III was the most common for males and females 99(51.56%) and 113(51.13 %), respectively. For the lower arch, the most

common seen was CI III for both males and females 85(44.27%) / 90(37.66%) respectively.

Regardless the arch location, there was a significant difference in distribution of Kennedy's classification among NDG and DG. For NDG, the most common was CI III (55%) followed by CI II (27%), CI I(16%) and CI IV(1%) while for DG the results show that CI III was the most common (37%) followed by CI I (32%), CI II (29%) and CI IV(2%), respectively. In addition, the most common Kennedy's Class among NDG Kennedy's CI III was the most frequent in upper and lower arches with 61% and 50%, respectively. For DG in the upper arch was CI III (42.40%) followed by CI II (31.80%) while, in the lower arch the most frequent was CI I (39.91%) followed by CI III (31.84%). (Table 4).

Table 2: Distribution of Kennedy's Classes Relation to Age.

Kennedy's Classes		CI I N (%)	CI II N (%)	CI III N (%)	CI IV N (%)	Total N	P- value	
Age	Upper	20 to 30	2(14.29)	3(21.43)	9(64.29)	0(0)	14	0.0005*
		31to 40	7(7.78)	16(17.78)	63(70.0)	4(4.44)	90	
		41 to 50	4(8.16)	13(26.53)	31(63.27)	1(2.04)	49	
		51 to 60	18(18)	36(36)	45(45)	1(1.0)	100	
		>60	40(25)	52(32.5)	64(40)	4(2.5)	160	
		Total N	71	120	212	10	413	
	Lower	20 to 30	5(22.73)	6(27.27)	11(50)	0(0)	22	0.0001*
		31to 40	13(13.27)	26(26.53)	59(60.2)	0(0)	98	
		41 to 50	11(26.19)	9(21.43)	22(52.38)	0(0)	42	
		51 to 60	37(35.58)	34(32.69)	33(31.73)	0(0)	107	
		>60	67(40.61)	45(27.27)	50(30.3)	3(1.82)	165	
		Total N	133	120	175	3	431	

*Significant value.

Table 3: Distribution of Kennedy's Classes Relation to Gender.

Kennedy's Classes		CI I N (%)	CI II N (%)	CI III N (%)	CI IV N (%)	Total N	P- value	
Gender	Upper	Male	38(19.8)	47(24.48)	99(51.56)	8(4.17)	192	0.0365*
		Female	33(14.93)	73(33.03)	113(51.13)	2(0.9)	221	
		Total N	71	120	212	10	413	
	Lower	Male	56(29.17)	48(25)	85(44.27)	3(1.56)	192	0.102
		Female	77(32.22)	72(30.13)	90(37.66)	0(0)	239	
		Total N	133	120	175	3	431	

*Significant value.

Table 4: Distribution of Kennedy's Classes Among DM And Non-DM Patient.

Kennedy's Classes		CI I N (%)	CI II N (%)	CI III N (%)	CI IV N (%)	Total N	P- value
Total	NDG	64(15.84)	111(27.48)	224(55.45)	5(1.24)	404	0.000000 22*
	DG	140(31.82)	129(29.32)	163(37.05)	8(1.82)	440	
Upper arch	NDG	20(10.20)	51(26.02)	120(61.22)	5(2.55)	196	0.0003*
	DG	51(23.50)	69(31.80)	92(42.40)	5(2.30)	217	
	Total N	71	120	212	10	413	
Lower arch	NDG	44(21.15)	60(28.85)	104(50.00)	0(0.0)	208	0.0001*
	DG	89(39.91)	60(26.91)	71(31.84)	3(1.35)	223	
	Total N	133	120	175	3	431	

*Significant value.

DISCUSSION:

The primary purpose for in this study was to compare the prevalence of Kennedy's classification. Patel et al (2013) in USA compared the percentage of missing teeth in 50 years old diabetic and non-diabetic patients, the percentages were 28% missing teeth in diabetic patients and 14% in non-diabetic patients 11. In cross section study by Izuora et al (2016) in USA among 202 diabetic participants, study reported 93.5% of them had reported with missing teeth 15. In Bačić et al (1988) in Yugoslavia, a comparison study comparison between 222 diabetic patients with mean age 46.9 years and 189 non-diabetic patients with mean age 43.9 years. They found that the diabetic patients significantly have more missing teeth comparing to non-diabetic patients $P < 0.001$ 16. Many studies documented that Kennedy's CI III was the most commonly found in both upper and lower arches while Kennedy's CI IV was the least common class 17,18. In a study carried by Almutairy et al (2017) in Al-Qassim, examined 215 female and 269 male patients. The percentage of Kennedy's CI III was 60.7% of males and 50.2% of females for maxillary arch, while, in the mandibular arch 55.9% of males and 59.6% of females 17. Cr-Co RPD laboratory authorization forms for 200 patients with mean age 44.5 years were reviewed by AL-Dwairi and Ziad (2006) in Jordan. The total number of RPD was 350 and the most common design was CI III in both maxilla (47%) and mandible (45%) 19.

Previous study of Kennedy's Classification and treatment options by Charyeva et al (2012) has shown that the highest prevalence of the four classes was CI III in both arches with a percentage of 50% in the upper arch and 41.1% in the lower arch which have been treated by fixed partial denture. CI IV was the least prevalence in both arches with 7.1% -5.6 % in the upper and lower arch respectively. Most of those cases were treated with removable partial denture 20. Budtz-Jørgensen (1994) in University of Geneva concluded that the best treatment option for any prosthetic treatment depends on abutment prognosis and bone condition. Also, he found that removable partial denture was the first simple treatment option to treat Kennedy's CI I. 21.

Rashid and Ayoub (2017) in India found that the prevalence of Kennedy's CI III was 49% in age of 20–29 years patients and 55% in age 30 – 39 years patients. Kennedy's CI II and CI I were mostly in age 50-59 / 60-70 years patients 22. Most of previous studies about pattern of partial edentulism related to gender have concluded that there is no significant difference between gender and Kennedy's classes of

partial edentulism. In contrast, a little study showed significant difference between males and females in relation to Kennedy's classification 17,22,23,24. This study reported that there was a no significant difference related to gender in the lower arch However, there was a significant difference in the upper arch.

CONCLUSION:

Within limitations of this study, the following were concluded:

- The prevalence of Kennedy's classification among diabetic and non-diabetic patients was statically significant.
- Kennedy's CI III was the most prevalent in non-diabetic patients and in the upper jaw for diabetic patients, while CI I was the most common in diabetic the lower jaw for diabetic patients.
- Kennedy's CI IV was the least prevalent in diabetic and non- diabetic patients for maxilla and mandible.

ETHICAL APPROVAL:

Approved at date of 9th august 2017 by IRP (institutional review board) - western region - minister of national guard – health affairs and as well, approved by KAIMRC (King Abdallah International Medical Research Center).

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