Oral Health Conditions and Medical Complications of Type 2 Diabetics

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Introduction

- **What is Diabetic mellitus?**
  - a group of metabolic disorders distinguished by altered glucose tolerance and impaired carbohydrate metabolism.
  - characterized by hyperglycemia (elevated blood glucose) that results from defects in secretion of the hormone insulin, or from impaired insulin action, or both. Alterations in lipid and protein metabolism are also seen.
  - Chronic hyperglycemia is associated with long-term dysfunction and damage to numerous end-organs, with marked effects on the eyes, kidneys, heart, nerves, and blood vessels.

Introduction

- *Complications of diabetes*
  - retinopathy
  - nephropathy
  - neuropathy
  - hypertension
  - Cerebral vascular accident
  - Coronary heart disease
  - Peripheral vascular disease

Introduction

- Diabetes mellitus is a risk factor for periodontal diseases
- Periodontal status demonstrates significant heterogeneity within the diabetic population.
- Many of the periodontal changes seen in diabetes reflect similar changes seen in other end-organ systems such as the retina and glomerulus
- Scientific evidence supports the concept that periodontal disease truly is the sixth complication of diabetes.

Aims and Objectives

- To study the oral health conditions of type II diabetes

- To evaluate the associations between tooth and gum conditions with diabetic control and complication history of the cohort of subjects surveyed

Materials and Methods

- **Sample**
  - Adults aged >40 years old
  - Tested group
    - individuals with type II diabetes attending out patient clinic of a regional hospital
  - Control group
    - age- and sex-matched
    - free from diabetes and any one of the diabetic medical complications except essential hypertension

Materials and Methods

- **Data Collection**
  - **Oral Health survey**
    - Questionnaire
    - Clinical Examination
      - CPI – Community Periodontal Index for Treatment Need
      - Loss of Periodontal Attachment
      - DMFT
    - Laboratory Test
      - Glycosylated haemoglobin (HbA1c)
      - Random Plasma Glucose Test
    - Retrospective study of medical history

Materials and Methods

- ## Data Analysis
  - ### Windows Excel
    - Chi-square test
    - P-value for statistical significance difference : 0.05

Results and Discussion

- **Profile of Subjects**
  - 525 participants
  - Tested group : 364
    - 121 new cases
    - 73 subjects - failure for subsequent follow-up
  - Control group : 161

Results and Discussion

Demographic Data of subjects

		Diabetic status			last dental attendence (year)	
		n	age	SD	mean	SD
Men	DM	169	62.1	10.6	2.53	1.35
	Non-DM	75	64.4	11.1	2.71	1.25
Women	DM	195	64.9	9.4	2.26	1.36
	Non-DM	86	63.8	10.2	2.29	1.19
Total	DM	364	63.6	10.1	2.39	1.36
	Non-DM	161	64.1	10.6	2.48	1.23

Family income profiles for subjects

Family income	Control		Test	
(HK$/month)	Men	Women	Men	Women
<5000	56	72	104	183
5000-10000	7	6	40	7
10000-35000	12	7	22	2
>35000	0	1	3	3

Diabetic history of subjects

	n	Age of onset (year)	SD	Time since DM diagnosis (year)	SD	HbA1c %	SD	FBS mg/ml[a]	SD
Men	169	55.3	11	6.8	6.4	7.8	1.3	8.3	2.4
Women	195	55.9	10.5	8.9[b]	7	8	1.3	8.6	2.9
Total	364	55.6	10.7	8	6.8	7.9	1.3	8.5	2.7

Results and Discussion

- **Descriptive Statistics**
  - Clinical Examination(Tested group VS control)
    - CPI
    - Aloss
    - DMFT
  - Tested group
    - HbA1c VS CPI/Aloss/DMFT

Results and Discussion

Percentage distribution of subjects according to highest CPI or ALoss score (by sextant)

		Diabetic status	n	Percentage subjects with highest score				
				0	1	2	3	4
CPI	Men	DM	147[c]	0	0	9.5	34	56.5
		Non-DM	72[d]	0	0	11.1	48.6	40.3
	Women	DM	161[c]	0	0	12.4	44.1	43.5
		Non-DM	81[d]	0	0	13.6	54.3	32.1
	Total	DM	308[c]	0	0	11	39.3	49.7[e]
		Non-DM	153[d]	0	0	12.5	51.6	35.9
ALoss	Men	DM	145[f]	8.3	33.1	36.6	17.2	4.8
		Non-DM	72[g]	4.2	43.1	37.5	9.7	5.6
	Women	DM	158[f]	10.1	46.2	30.4	8.9	4.4
		Non-DM	78[g]	17.9	52.6	23.1	6.4	0
	Total	DM	303[f]	9.2	39.9	33.3	12.9	4.6
		Non-DM	150[g]	11.3	48	30	8	2.7

Results and Discussion

Caries status (mean values) of subjects according to gender and diabetic status

	Diabetic status	n	% with DMFT >0	DT	MT	FT	DMFT	DMFT (SE)
Men	DM	169	98	1.4	12.2	1.6	15.2	0.8
	Non-DM	75	97	2.4[a]	9.2	1.5	13.2	1
Women	DM	195	100	1.2	15.3[b]	1.6	18.1[c]	0.6
	Non-DM	86	100	1.7	11.7	2.3	15.7	0.9
Total	DM	364	99	1.3[d]	13.9[e]	1.6	16.8[f]	0.5
	Non-DM	161	99	2.1	10.5	2	14.5	0.7

Results and Discussion

Proportion of edentulous subjects

	Diabetic status	Edentulism	
		n	%
Men	DM	18	10.7
	Non-DM	2	2.7
Women	DM	29	14.9
	Non-DM	3	3.5
Total	DM	47	12.9
	Non-DM	5	3.1

Results and Discussion

- **Descriptive Statistics**
  - Retrospective study of medical history
  - Tested group
    - Total complication
  - Control group
    - Essential hypertension

Results and Discussion

	Number of complications subjects with								
	0	1	2	3	4	5	6	7	Total
Men	22	31	27	20	5	5	3	1	114
Women	29	42	39	31	23	11	2	0	177
Total	51	73	66	51	28	16	5	1	291

	Number of each complication of subjects						
	Nephropathy	Retinopathy	Hypertension	Cerebral Vascular Accident	Neuropathy	Coronary Heart Disease	Peripheral Vascular Disease
Men	53	33	69	7	30	14	9
Women	77	77	127	4	63	23	11
Total	130	103	196	11	93	37	20

Results and Discussion

Control subjects with or without Hypertension

	with Hypertension	without Hypertension	Total
Men	33	42	75
Women	43	46	86
Total	85	76	161

Results and Discussion

- ## Analytical Statistics
  - Multiple Linear Regression Analysis
    - Tested group – HighCPI VS Nephro/Hypr (table)
  - Missing Teeth (edentulism) – tested VS control

Results and Discussion

Linear multiple regression model for subjects with highest CPI

	B	SE	Beta	t	P
Aloss score	0.234	0.050	0.323	4.652	<0.0001
DMFT	-0.019	0.005	-0.223	-4.012	<0.0001
Nephropathy	0.317	0.105	0.231	3.024	0.003
Hypertension	0.235	0.100	0.167	2.352	0.020
Adjusted R^2 = 0.295 , F = 13.483 , P = <0.0001.					

Linear multiple regression model for subjects with highest attachment loss

	B	SE	Beta	t	P
CPI	0.350	0.071	0.254	4.945	<0.0001
Age	0.029	0.005	0.270	5.517	<0.0001
Adjusted R^2 = 0.473 , F = 72.605 , P = <0.0001.					

Results and Discussion

Linear multiple regression model for subjects with tooth loss

	B	SE	Beta	t	P
CPI	-1.375	0.575	-0.116	-2.392	0.017
Attachment Loss	0.897	0.407	0.104	2.203	0.029
DT	-1.666	0.234	-0.456	-7.118	<0.0001
FT	-0.400	0.132	-0.131	-3.024	0.003

Adjusted R^2 = 0.584 , F = 42.948 , P = <0.0001.

Results and Discussion

Linear multiple regression model for control subjects with highest CPI

	B	SE	Beta	t	P
Attachment Loss	0.261	0.066	0.357	3.973	<0.0002
Adjusted R^2 = 0.274 , F = 15.075 , P = <0.0001.					

Linear multiple regression model for control subjects with highest attachment loss

	B	SE	Beta	t	P
FT	0.038	0.019	0.120	2.021	0.045
Age	0.032	0.005	0.381	6.155	<0.0001
Sex	-0.223	0.104	-0.125	-2.146	0.034
CPI	0.333	0.081	0.244	4.092	<0.0001
Adjusted R^2 = 0.570 , F = 25.687 , P = <0.0001.					

Results and Discussion

Linear multiple regression model for control subjects with tooth loss

	B	SE	Beta	t	P
DT	-2.136	0.321	-0.859	-6.661	<0.0001
Age	0.200	0.039	0.309	5.152	<0.0001
Adjusted R^2 = 0.543 , F = 36.478 , P = <0.0001.					

Conclusions

- Dental caries and treatment need of surveyed predominantly low socioeconomic class subjects were high

- Type II diabetes subjects appeared to be affected more by missing teeth and periodontitis

- Periodontal disease severity of subjects appeared to be associated with co-existence of diabetic nephropathy

Recommendation

■ Further investigations for elucidation of the association of diabetic nephropathy with diabetic oral complications

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