Medical Conditions and Periodontitis in Thai Adults

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จุฬาลงกรณ์มหาวิทยาลัย

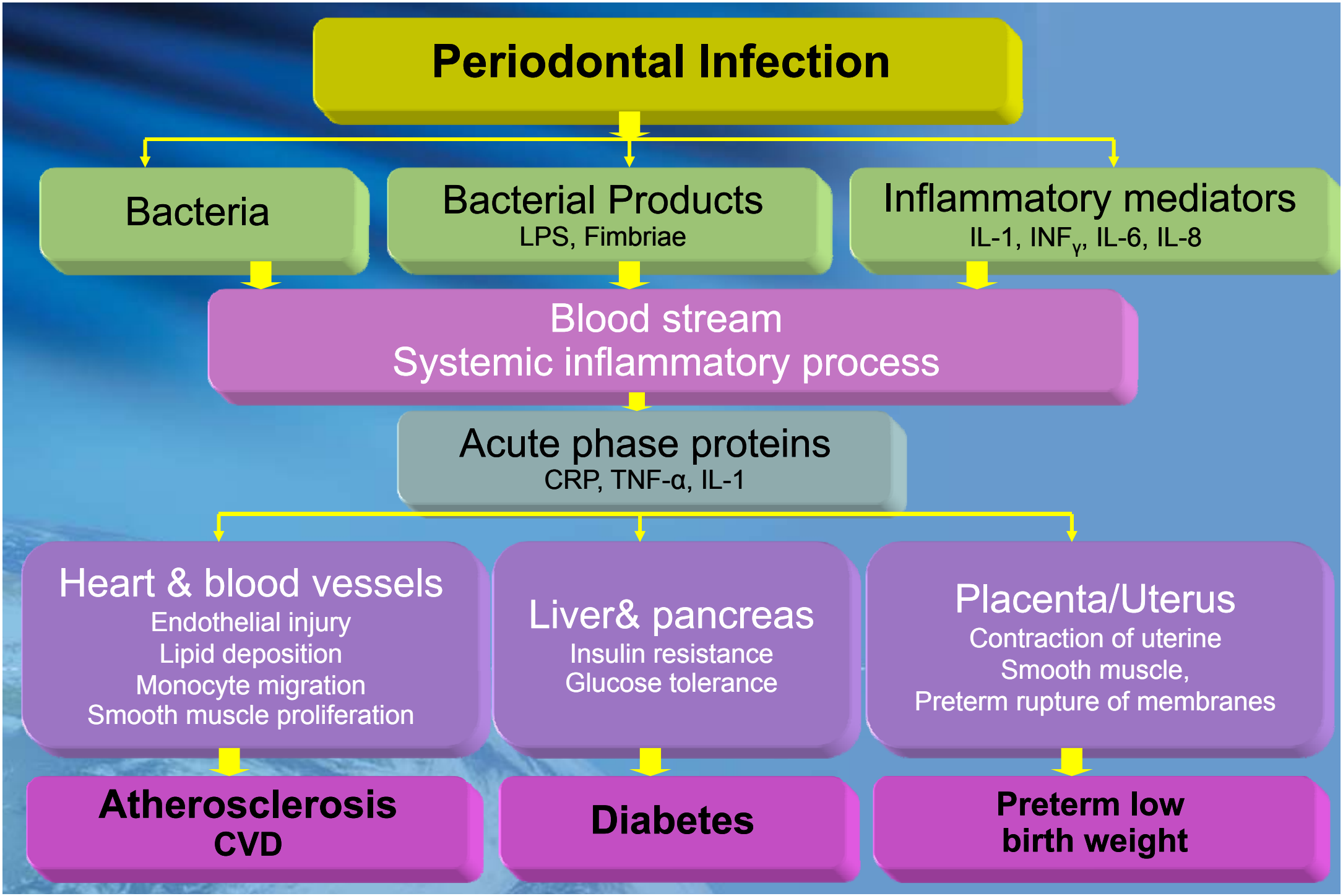
Oral health and Systemic health connection

Several epidemiological and clinical studies have revealed significant associations between **periodontal diseases** and systemic diseases:

cardiovascular diseases

diabetes mellitus

pre-term low birth weight


Periodontal Infection
Bacteria
Bacterial Products
LPS, Fimbriae
Inflammatory mediators
IL-1, INFγ, IL-6, IL-8
Blood stream
Systemic inflammatory process
Acute phase proteins
CRP, TNF-α, IL-1
Heart & blood vessels
Endothelial injury
Lipid deposition
Monocyte migration
Smooth muscle proliferation
Liver& pancreas
Insulin resistance
Glucose tolerance
Placenta/Uterus
Contraction of uterine
Smooth muscle,
Preterm rupture of membranes
Atherosclerosis
CVD
Diabetes
Preterm low
birth weight

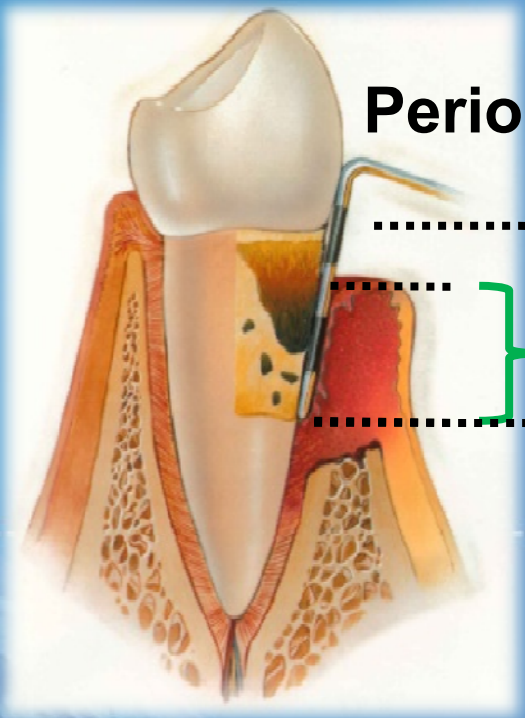
EGAT Study

Epidemiological study of periodontal diseases in EGAT

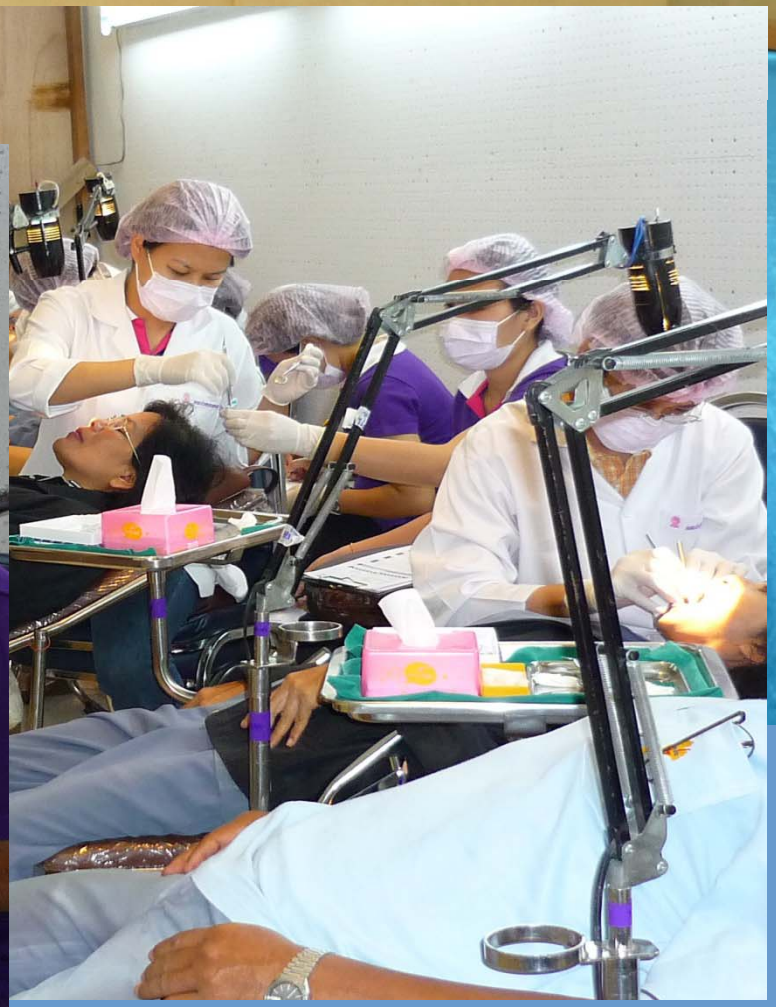
Half mouth Full mouth Periodontal exam
Half mouth Full mouth Plaque score
Treatment Plaque sample
Saliva sample
Treatment recommended

Periodontal examination

Probing depth : PD
Clinical attachment level : CAL



EGAT Study



EGAT Study

ตารางที่ 3 อัตราเสี่ยงหยาบของสภาวะโรคปริทันต์ต่อโรคหัวใจและหลอดเลือด

Table 3 *Crude odds ratio of the association between periodontal status and cardiovascular diseases*

	Odds ratio	95% confidence interval
Periodontitis	1.04	0.72 – 1.51
Plaque ≥ 60%	1.17	0.87 – 1.54
Mean attachment level ≥ 3.3 mm.*	1.74	0.84 – 3.61

*cut point is calculated from mean probing depth and attachment level of subjects with periodontitis

From this cross-sectional study,
no significant association between Perio & CVD was found.

ได้รับการซักประวัติ ตรวจร่างกาย ตรวจทางห้องปฏิบัติการ และตรวจสภาวะปริทันต์ โดยการสุ่มตรวจ 2 ส่วนของช่องปาก ประเมินสภาวะของโรคปริทันต์อักเสบจากร้อยละของ คราบจุลินทรีย์ ความลึกของร่องลึกปริทันต์ ระดับการยึดเกาะของอวัยวะปริทันต์ และจัดกลุ่ม

Epidemiolgical study: EGAT 1/3 and 1/4 (5 years duration)

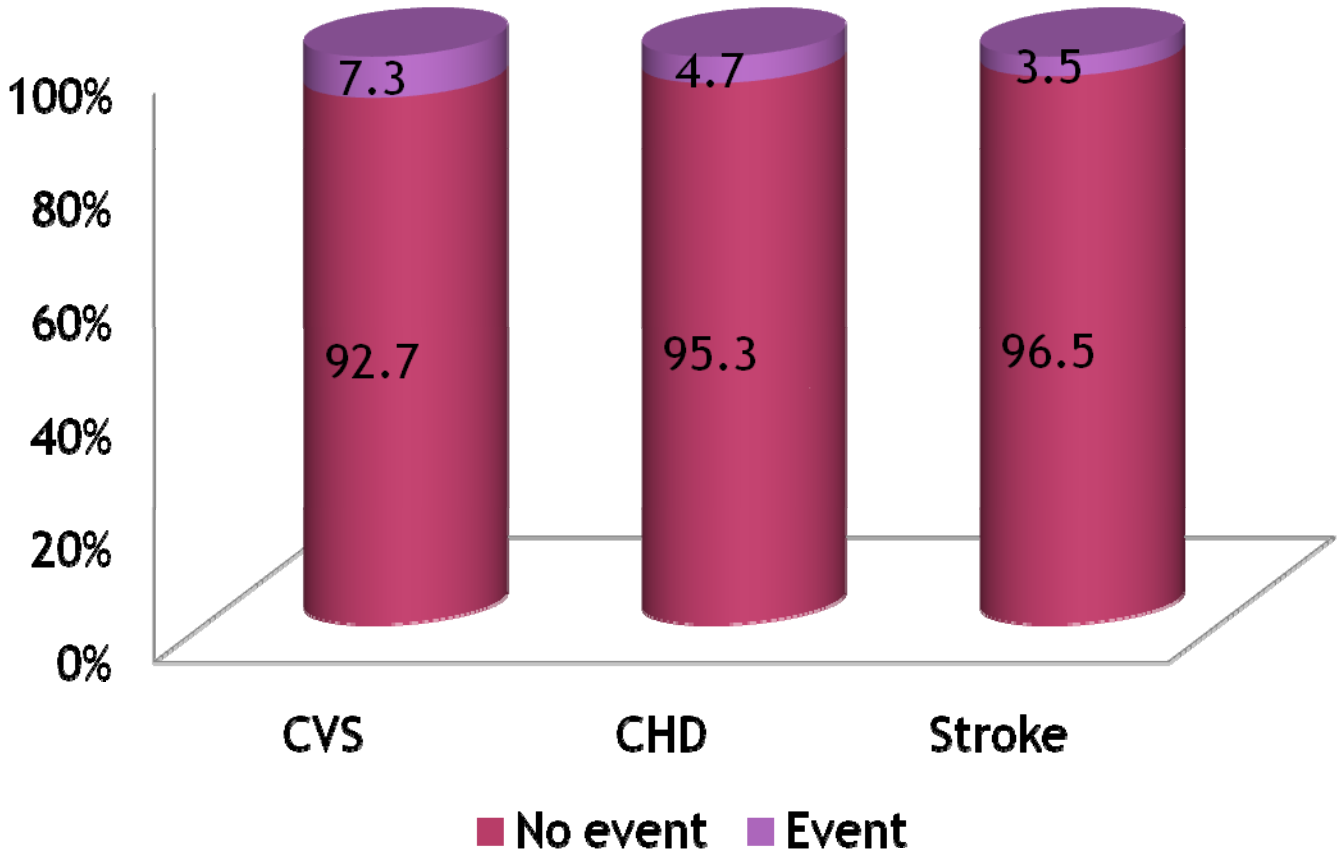
Objective

- To study the association between periodontitis and incidence of cardiovascular disease during 5 years (2002-2007).

- EGAT 1/3 (2002): Total 2,005 subjects (aged 50-73 yrs.)
- EGAT 1/4 (2007): Total 1,532 subjects
- Have both medical and dental examination

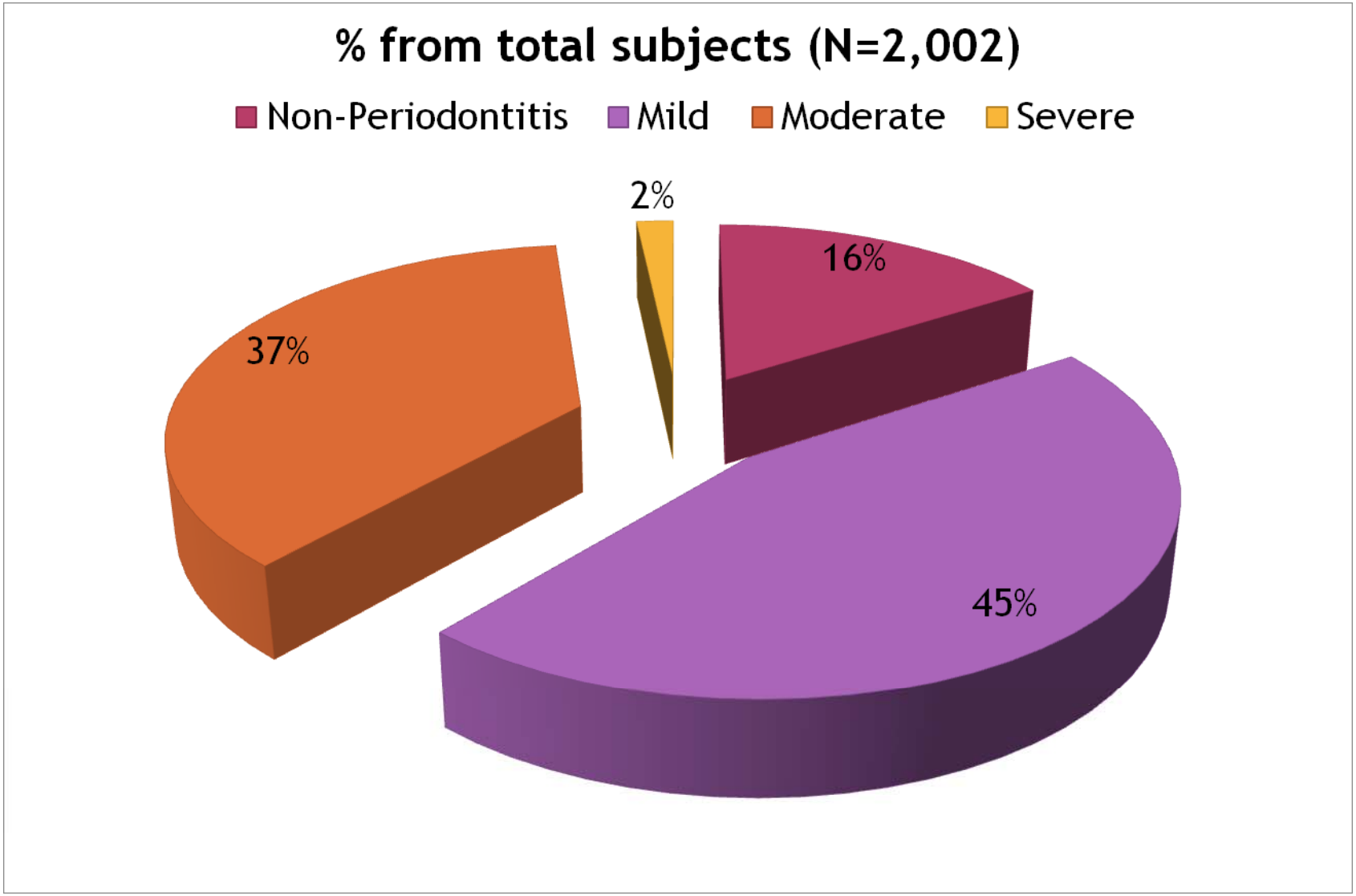
Incidence of cardiovascular disease event (N = 2,002)

Between year 2002-2007



CVS: Cardiovascular disease, CHD: Coronary heart disease

Subjects classified by type of periodontal disease



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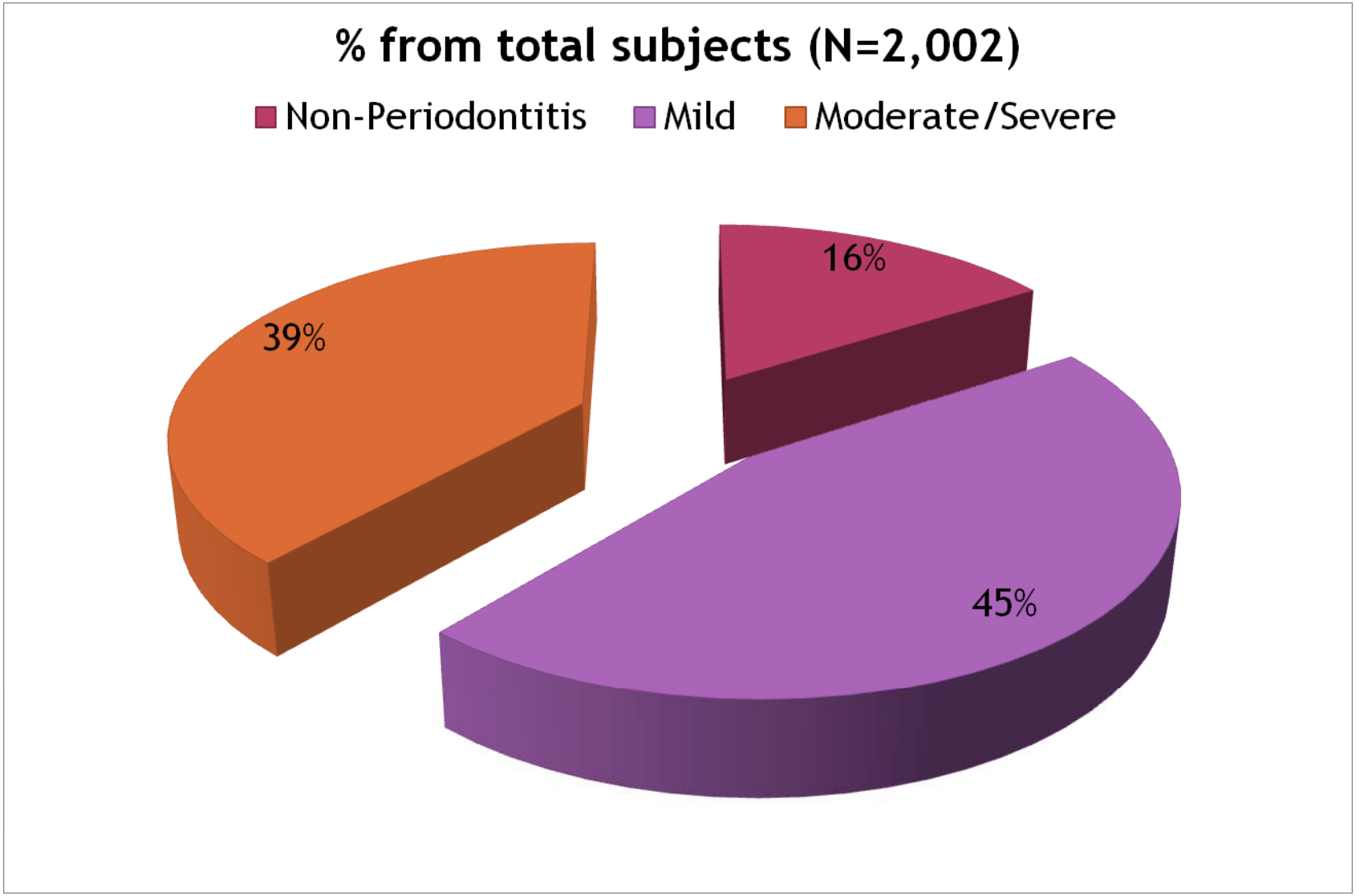


Classification of periodontitis

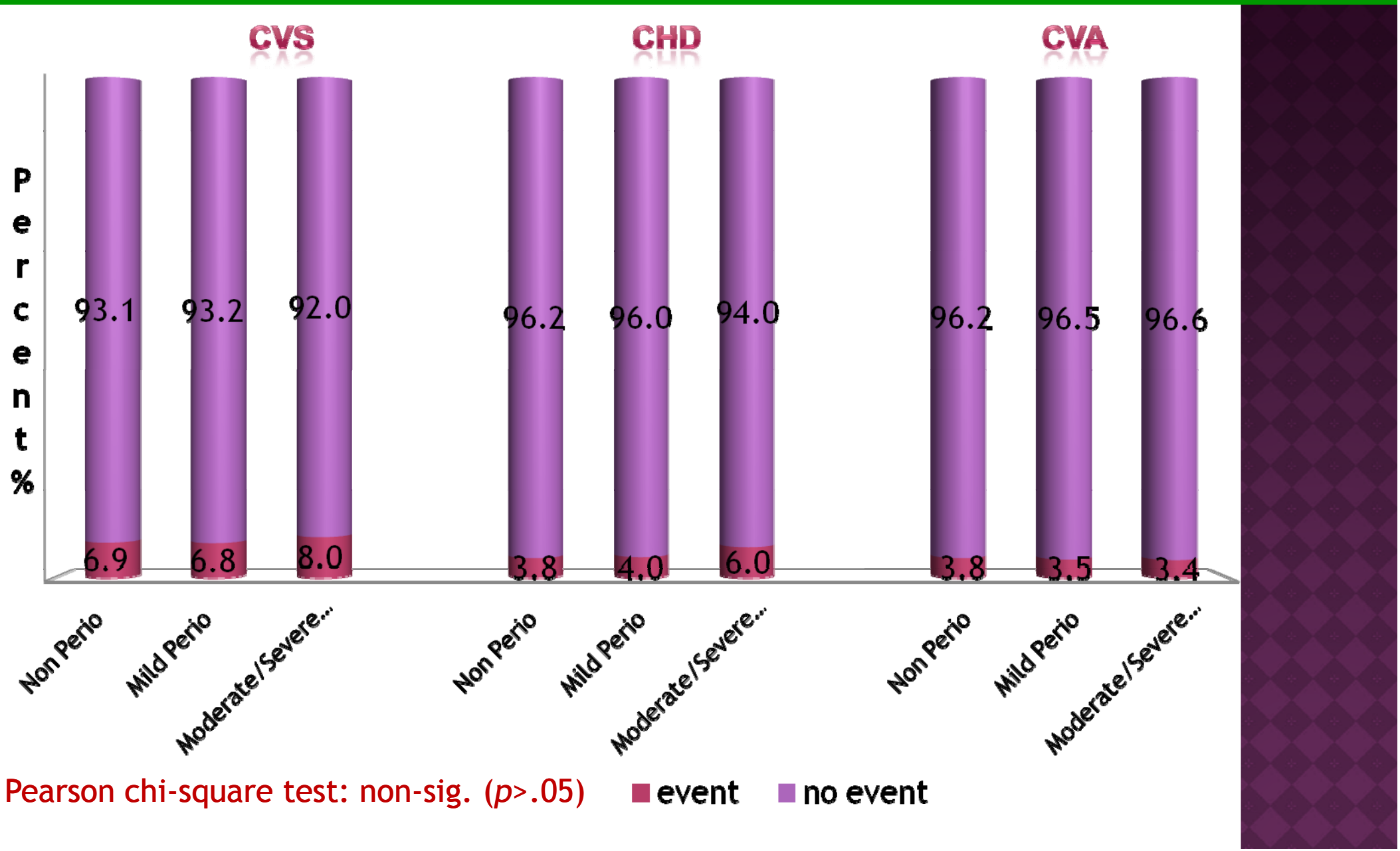
Using extent and severity

Albander et al, JP 1999

Presence of ≥3 mm PD and ≥3 mm CAL at the same site

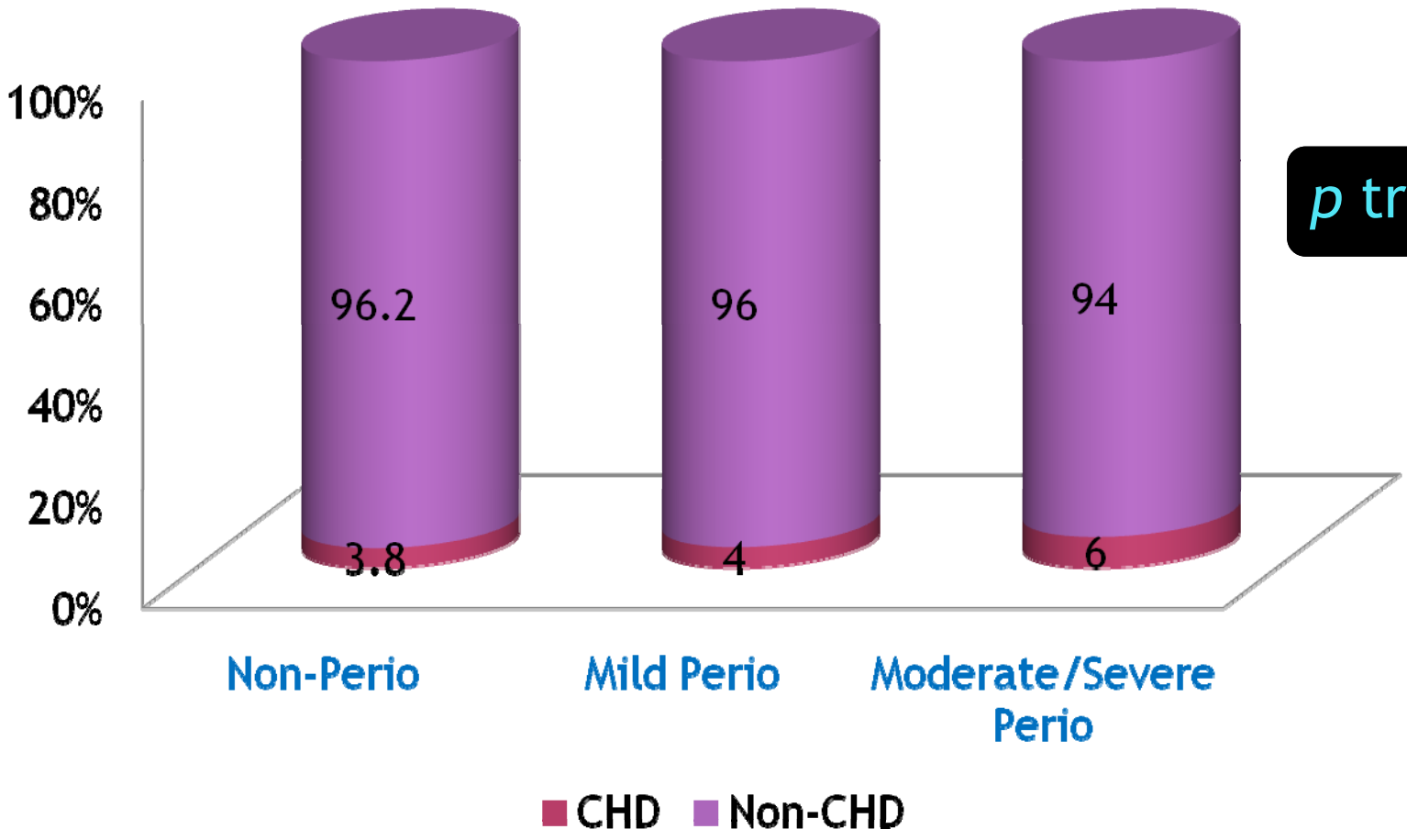
Classification	Definition
Severe	≥2 or ≥30% teeth having ≥5 mm PD ≥4 or ≥60% teeth having ≥4 mm PD
Moderate	≥1 teeth having ≥5 mm PD ≥2 or ≥30% teeth having ≥4 mm PD
Mild	≥1 teeth having ≥3 mm PD
No periodontitis	Do not fulfill any of the above criteria

Cardiovascular disease event in 5 years compared between different severity of periodontitis



Pearson chi-square test: non-sig. (p>.05)

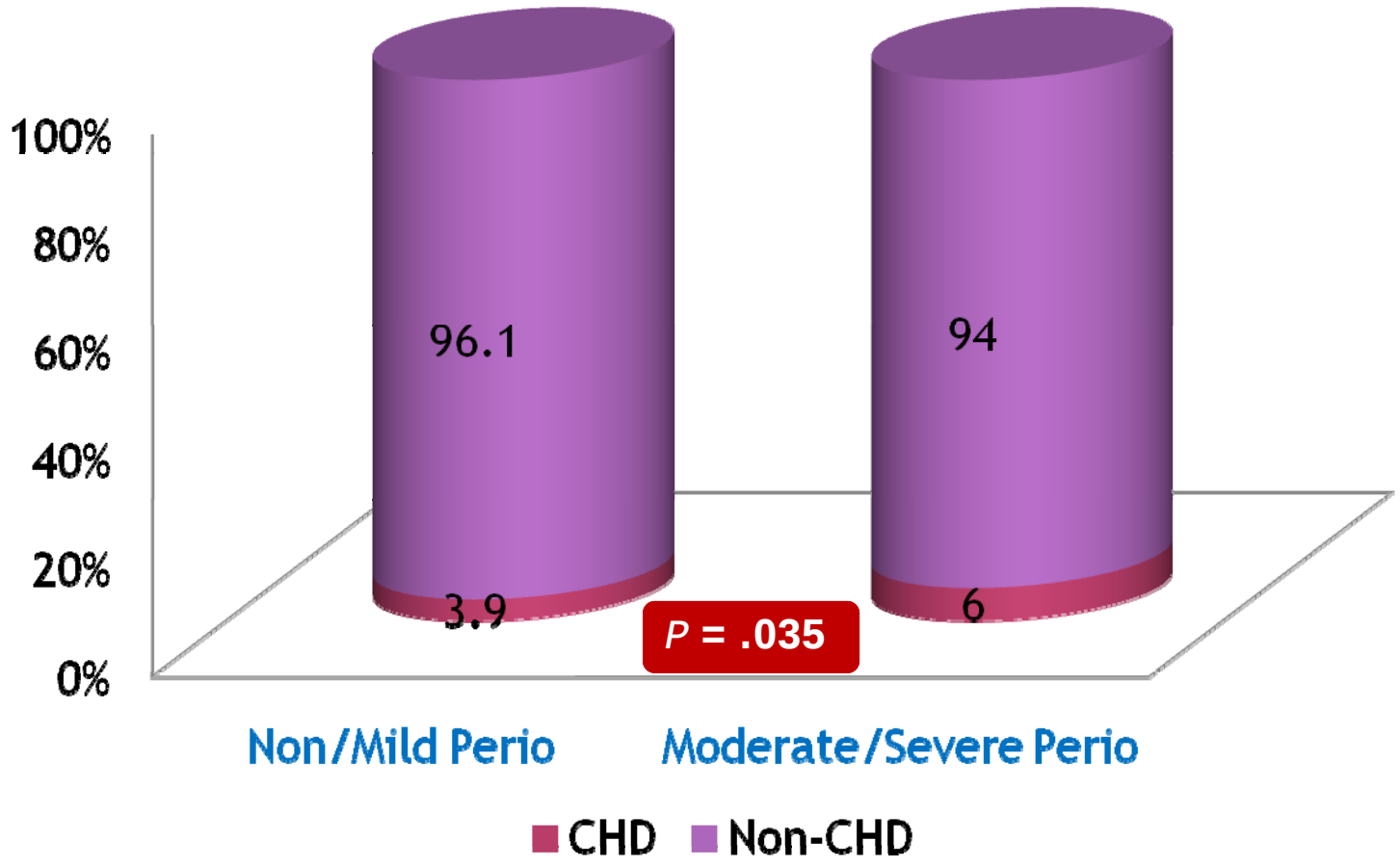
Coronary heart disease event in 5 years compared between different severity of periodontitis



p trend = .057

Pearson chi-square test: non-sig. (*p*>.05)

Coronary heart disease event in 5 years compared between 2 different groups of periodontitis



Pearson chi-square test: sig. (p=.035)

Epidemiolgical study: EGAT 1/3 and 1/4 (5 years duration)

Conclusion

- Incidence of **coronary heart disease** during 5 years in **moderate/severe periodontitis** group is significantly higher than in no/mild periodontitis group.

EGAT Study

- A large number of studies reported the connection between periodontitis and systemic health.
- Patients with periodontitis may be at risk to develop many systemic disorders.
- Annual medical checkup, which includes medical examinations and chemical blood test, may provide significant information of general health status and indicates the risks for some systemic diseases.

Medical check-up values and periodontitis in non-DM and non-smokers

EGAT 1/3

Medical check-up values and periodontitis in non-DM and non-smokers

Objective

To study the relationship between medical checkup values and the severity of periodontitis in non-diabetic and non-smoking subjects.

Medical checkup values	χ^2	*p*-value	*Gamma*
BMI ≥25	9.805	0.020*	0.088
Systolic BP ≥140	7.980	0.046*	0.133
Diastolic BP≥90	17.444	0.001*	0.180
Cholesterol (≥240 mg/dl)	4.021	0.259	0.032
HDL (≤40 mg/dl)	4.126	0.248	0.840
LDL (≥160 mg/dl)	5.734	0.125	0.042
Triglyceride (≥200 mg/dl)	5.579	0.134	0.054
Sodium (≥144 mEq/L)	1.815	0.612	-0.054
Potassium (≥5.2 mEq/L)	0.047	0.997	-0.030
Chloride (≥111 mMol/L)	1.236	0.744	-0.247
Calcium (10.9 mg/dl)	5.388	0.146	0.783
CO_2 (29 mMol/L)	2.904	0.407	-0.061
Creatinine (>1.3 mg/dl)	11.565	0.009	0.264
Serum urea nitrogen (>20 mg/dl)	0.424	0.935	0.042
Total protein (>7.9 g/dl)	10.253	0.017	0.142
Alkaline phosphatase (>147 IU/L)	2.897	0.408	0.017
Total bilirubin (>1.9 mg/dl)	2.601	0.457	0.294
Direct bilirubin ((>0.4 mg/dl)	8.339	0.039	0.711
Alanine amino-transferase (>37 IU/L)	4.384	0.223	0.039
Aspartate amino-transferase (>34 IU/L	1.312	0.726	0.045
Gamma-mutranspeptidase (>51 IU/L)	7.967	0.047	0.148
Albumin (>5 g/dl)	1.677	0.642	-0.034
Uric acid (>8.8 mg/dl)	3.034	0.386	0.170

Medical check-up values and periodontitis in non-DM and non-smokers

Medical Examination	Severity of Periodontitis				N	X^2	*p*-value	*Gamma*
	no	mild	mod	severe				
BMI					1396	9.805	0.020*	0.088
<25 kg/mm^2	23.50%	42.30%	27%	7.30%	823			
≥25 kg/mm^2	16.90%	47.10%	27.10%	8.90%	573			
Systolic BP					1400	7.980	0.046*	0.133
<140 mmHg	207 (23.2%)	392 (43.8%)	229 (25.6%)	66 (7.4%)	894			
≥140 mmHg	84 (16.6%)	226 (44.7%)	151 (29.8%)	45 (8.9%)	506			
Diastolic BP					1400	17.444	0.001*	0.180
<90 mmHg	202 (24.7%)	357 (43.6%)	200 (24.4%)	60 (7.3%)	819			
≥90 mmHg	89 (15.3%)	261 (44.9%)	180 (31.0%)	51 (8.8%)	581			

Medical check-up values and periodontitis in non-DM and non-smokers

Blood chemistry*	Severity of Periodontitis				N	χ^2	*p*-value	*Gamma*
	no	mild	mod	severe				
Creatinine**						11.565	0.009	0.264
≤1.3 mg/dl	283 (21.2%)	599 (44.8%)	349 (26.1%)	105 (7.9%)	1336			
>1.3 mg/dl	10 (12.5%)	29 (36.3%)	34 (42.5%)	7 (8.8%)	80			
Total protein						10.253	0.017	0.142
≤7.9 g/dl	110 (24.8%)	198 (44.7%)	109 (24.6%)	26 (5.9%)	443			
>7.9 g/dl	183 (18.8%)	430 (44.1%)	275 (28.2%)	86 (8.8%)	974			
Direct bilirubin						8.339	0.039	0.711
≤0.4 mg/dl	292 (20.7%)	627 (44.5%)	379 (26.9%)	111 (7.9%)	1409			
>0.4 mg/dl	0 (0%)	1 (14.3%)	5 (71.4%)	1 (14.3%)	7			

* According to http://www.nlm.nih.gov/medlineplus/ency/article/003468.htm

** According to http://www.thailabonline.com/lab-normalrange.htm

Medical check-up values and periodontitis in non-DM and non-smokers

Conclusion

This study demonstrates the associations between severity of periodontitis and the elevated values of *direct bilirubin, creatinine, total protein, diastolic, systolic blood pressure, and BMI* (≥25) in non-diabetic and non-smoking subjects.

- **Elevated total protein and direct bilirubin may be related to abnormal liver function.**
- **Increased serum creatinine may indicate an association between periodontitis and renal insufficiency.**
- **High blood pressure and obesity (BMI $\geq$25 mm^2) are the components of metabolic syndrome which increases the risk of cardiovascular morbidity and mortality.**

EGAT Study

- **Metabolic syndrome is defined as the concurrence of**
  - **hypertension**
  - **atherogenic lipid profiles (hypertriglyceridemia and low HDL)**
  - **obesity**
  - **insulin resistance**

(NCEP ATPIII, 2001)

EGAT Study

- The significance of metabolic syndrome is that it can aggravate type II DM and cardiovascular disease.
- Since both periodontitis and the metabolic syndrome are associated with systemic inflammation and insulin resistance, these two diseases may be linked through a common pathophysiological pathway.

Relationship between Periodontitis and Metabolic Syndrome in Thai Adults

Objective

To investigate the relationship between periodontitis and metabolic syndrome in a group of Thai adults.

EGAT 1/3

Metaboic syndrome components	Severity of Periodontitis				N	*P*-value*
	no	mild	mod	severe		
Fasting plasma glucose (mg/dl)					1999	
<110	177 (17.3%)	428 (41.9%)	306 (30.0%)	110 (10.8)	1021	
≥110	182 (18.6%)	414 (42.3%)	281 (28.7%)	101 (10.3%)	978	0.401
Triglyceride (mg/dl)					1999	
<150	233 (18.7%)	528 (42.4%)	362 (29.1%)	122 (9.8%)	1245	
≥150	125 (16.6%)	314 (41.6%)	226 (30.0%)	89 (11.8%)	754	0.577
Blood pressure (mm Hg)					1980	
Systolic <130 and diastolic <85	211 (21.6%)	410 (42.1%)	258 (26.5%)	96 (9.8%)	975	
Systolic ≥30 or diastolic ≥85	145 (14.4%)	421 (41.9%)	325 (32.3%)	114 (11.3%)	1005	0.000
Waist circumference					1969	
<102 cm in men and <88 cm in women	305 (18.0%)	706 (41.7%)	498 (29.4%)	186 (11.0%)	1695	
≥102 cm in men and ≥88 cm in women	52 (19.0%)	123 44.9%)	79 (28.8%)	20 (7.3%)	274	0.456
HDL cholesterol (mg/dl)					1999	
Male ≥40, female ≥50	310 (18.7%)	691 (41.7%)	494 (29.8%)	163 (9.8%)	1658	
Male <40, female <50	48 (14.1%)	151 (44.3%)	94 (27.6%)	48 (14.1%)	341	0.03
Metaboic syndrome diagnosis					1956	
0-2 components	224 (20.3%)	468 (42.3%)	313 (28.3%)	101 (9.1%)	1106	
≥3 components	130 (15.3%)	352 (41.4%)	263 (30.9%)	105 (12.4%)	850	0.022

Components of Metabolic Syndrome	Severity of Periodontitis	Crude OR* (95% CI)	*P*-value	Adjusted OR* (95% CI)	*P*-value
high blood pressure					
	no	1		1	
	mild	1.353 (1.032 - 1.775)	0.029	1.251 (0.949 - 1.651)	0.113
	moderate	1.729 (1.302 - 2.296)	0.000	1.560 (1.165 - 2.089)	0.003
	severe	1.167 (1.128 - 2.319)	0.009	1.410 (0.972 - 2.046)	0.071
low HDL					
	no	1		1	
	mild	1.411 (0.993 - 2.005)	0.055	1.495 (1.046 - 2.138)	0.027
	moderate	1.229 (0.844 - 1.789)	0.282	1.348 (0.917 - 1.980)	0.129
	severe	1.902 (1.222 - 2.961)	0.004	2.201 (1.390 - 3.483)	0.001
Metaboic syndrome diagnosis					
(≥3 components)	no	1		1	
	mild	1.296 (1.003 - 1.675)	0.048	1.150 (0.884 - 1.496)	0.297
	moderate	1.448 (1.104 - 1.899)	0.007	1.222 (0.923 - 1.616)	0.161
	severe	1.791 (1.264 - 2.538)	0.001	1.412 (0.986 - 2.022)	0.060

Relationship between Periodontitis and Metabolic Syndrome in Thai Adults

Conclusions

- The present study demonstrates non-significant relationship between metabolic syndrome and severity of periodontitis.
- Of 5 components of metabolic syndrome, higher risks for high BP and low HDL were found in periodontitis group.

Ongoing Epidemiological Research from EGAT Study

- Longitudinal study on association between periodontitis and cardiovascular disease
- Association between periodontitis and renal disease
- Association between periodontitis and metabolic syndrome
- Association between periodontitis and liver disease

ขอขอบพระคุณ

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การไฟฟ้าฝ่ายผลิตแห่งประเทศไทย

ผู้สนับสนุนทุนวิจัย

สำนักงานกองทุนสนับสนุนการสร้างเสริมสุขภาพ (*สสส.*)

: EGAT 1/3 ปี 2545

: EGAT 2/2 ปี 2546

สำนักงานคณะกรรมการวิจัยแห่งชาติ (*วช.*) : EGAT 2/3 ปี 2552

ศาสตราจารย์ นายแพทย์ ปิยะมิตร ศรีธรา