

ASSESSMENT OF THE EFFECT OF CARVEDILOL ON THE PERIODONTAL STATUS

Cristina-Maria Gavrilescu¹, Anca Stan², Roxana Timofte², Maria-Mădălina Bodescu^{1*}, Paloma Manea¹, Roxana Barbu¹, Rodica Ghiuru¹, Crânguța Paraschiv¹

¹“Grigore T. Popa” University of Medicine and Pharmacy - Iași, Romania, Faculty Medicine

²“Dental Medical Cabinet Judent - Iași, Romania

*Corresponding author: Maria-Mădălina Bodescu, PhD, DDS
“Grigore T. Popa” University of Medicine and Pharmacy
- Iași, Romania
e-mail: ciobanelmariamadalina1978@yahoo.com

ABSTRACT

Background Oxidative stress plays an important part in the pathogenesis of periodontitis and improving the oxidative status is beneficial for its evolution. Carvedilol is a betablocker that has antiproliferative effects and that inhibits the action of oxygen-free radicals. The aim of this study was to evaluate the effect of carvedilol on the periodontal status. **Material and methods** 31 patients that were chronically receiving carvedilol for 6 months (group I) were compared regarding their periodontal status with a lot of 12 control patients (that received other types of antihypertensive drugs. The periodontal status was evaluated by measuring gingival index, plaque index and papillary bleeding index. **Results** The average clinical measurements demonstrated significantly better parameters ($P < 0.001$) in group I compared to group II. **Conclusions** The average periodontal status of the patients treated with Carvedilol was better, possibly because of its antioxidant effect.

Keywords: carvedilol, oxidative stress, periodontitis

INTRODUCTION

There are lots of evidence that oxidative stress plays an important part in the pathogenesis of periodontitis in diabetic (1) or non diabetic patients (2,3,4). There are also data proving that increasing the antioxidant defense helps the amelioration of the periodontal status (5,6,7).

Carvedilol is a nonselective betablocker with lots of advantages in clinical practice that seem connected to its anti-inflammatory and antioxidant effects (8,9,10). It is used to treat hypertension associated with heart failure or not. It has been proved on a rat model with periodontitis that carvedilol could be beneficial in periodontal disease in virtue

of its anti-inflammatory and antioxidant properties (11).

We aimed to study whether patients treated with carvedilol had any advantage regarding their periodontal status compared to other antihypertensive drugs.

MATERIAL AND METHODS

We have recruited 43 of the hypertensive patients treated in the Vth Internal Medicine and Geriatrics Gerontology Clinic (Clinical Hospital CF Iași) between September 2013-May 2014. Group I included 31 patients chronically treated with carvedilol, while group II included 12 patients receiving other antihypertensive medication.

We have evaluated every patient in the Clinic and in a Dental Medical Cabinet at the beginning of the study and after six months of enrolment. We performed a medical history, physical examination for each patient and evaluated parameters considered as associated with oxidative stress, such as gamma-glutamyl transferase (GGT) and uric acid.

The periodontal status was evaluated using the API (Aproximal Plaque Index), the BI (bleeding index) and GI (gingival index).

The inclusion criteria were: known periodontal disease, diagnostic of hypertension and the consent of the patients to enter the study.

The exclusion criteria were: absent periodontal disease, presence of diabetes mellitus and the refuse of the patients to enter the study.

All the patients who entered the study were informed of the purpose of the study and they gave a written consent.

The data were statistically analysed using

Statistical Package for Social Sciences (SPSS19.00) for MS Window, considering a statistical significance for $p \leq 0,05$.

RESULTS

Evolution of periodontal status of patients in lot I (treated with carvedilol)

The mean value of initial GI in the beginning of the study was $1,45 \pm 0,79$, the value being with 28,27% higher then that of the GI after 6 months: $1,04 \pm 0,12$, the difference being statistically significant (CI 95% 0,11 to 0,70; $p=0.009$). The mean value of API has been $59,74 \pm 15,27$ in the moment of enrolment, with 21,39 % higher then after 6 months ($46,96 \pm 13,59$), which is also a statistically significant difference (CI 95% 4,77 to 20,70; $p=0.003$). The mean value of BI has been of $55,74 \pm 14,48$ in the beginning of the study, with 25,8 % more than in the end of it: $41,35 \pm 7,71$, a significant difference (CI 95% 9,93 to 17,67; $p=0.001$) (table 1).

Table 1. Comparative parodontal status of patients in lot I

		Paired Differences							
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	GI before - GI after 6 months	,40	,81	,14	,11	,70	2,80	30	,009
Pair 2	API before - API after 6 months	12,77	21,81	3,91	4,77	20,77	3,26	30	,003
Pair 3	BI before - BI after 6 months	13,8	10,55	1,89	9,93	17,67	7,28	30	,001

Evolution of periodontal status of patients in lot II (other antihypertensive drugs)

The mean value of GI in the beginning of the study was $1,47 \pm 0,87$, with 13,06 % more than the value in the end of the study ($1,45 \pm 0,96$), statistically insignificant (CI 95% 0,82 to 0,64; $p=0.078$). The mean value

of the initial API was $62,08 \pm 15,44$, being with 8,45 % greater than the value after 6 months ($56,83 \pm 16,28$), with no statistic relevant difference (CI 95% -7,44 to 20,717,970; $p=0.038$). The mean value of the initial BI was $53,25 \pm 16,54$, with 3,09% greater than the value in the end of the study

(51,6±13,07), the difference being 14.18; p=0.089) (table 2). statistically insignificant. (CI 95% -16,01 to

Table 2. Comparative periodontal status of patients in lot II

		Paired Differences							
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	GI before -GI after 6 months	-,09	1,15	,33	-,82	,640	-,276	11	,78
Pair 2	API before - API after 6 months	5,25	20,02	5,78	-7,47	17,97	,908	11	,38
Pair 3	BI before - BI after 6 months	-,916	23,76	6,85	-16,01	14,184	-,134	11	,89

The comparative analysis of the bacterial plaque and of the degree of gingival inflammation revealed no significant difference between the two lots in the beginning of the study ($p \geq 0,05$), before the initiation of the treatment with carvedilol or other type of antihypertensive medication (fig.1, table 3).

Comparative analysis in the end of the study revealed significant differences of the

API, GI and BI of the patients having been treated with carvedilol and of those being treated with other antihypertensive medication ($p \leq 0,05$) (fig 2, table 4).

As markers of oxidative stress for the studied patients we used the gamma-glutamyl transferase (GGT) and uric acid, considering them useful as relevant and cheap (10).

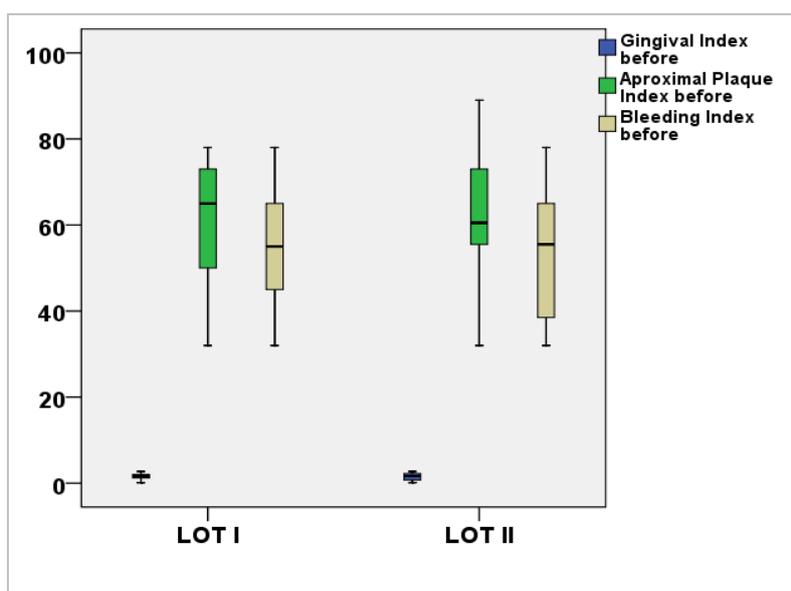


Figure 1. Comparative evaluation of the periodontal status in lot I and II
Mean values of the GI, API, BI in the beginning of the study in the two lots of patients

Table 3. Comparative analysis of the parodontal status and of the oral hygiene for the two lots of patients in the beginning of the study

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
GI before	Equal variances assumed	,14	,70	-,072	41	,943	-,020	,27	-,58	,54
	Equal variances not assumed			-,069	18,57	,945	-,020	,29	-,62	,58
API before	Equal variances assumed	,09	,76	-,449	41	,655	-2,34	5,20	-12,86	8,17
	Equal variances not assumed			-,447	19,86	,660	-2,34	5,23	-13,26	8,58
BI before	Equal variances assumed	,65	,42	,373	41	,711	1,91	5,12	-8,43	12,25
	Equal variances not assumed			,351	17,91	,729	1,91	5,43	-9,517	13,34

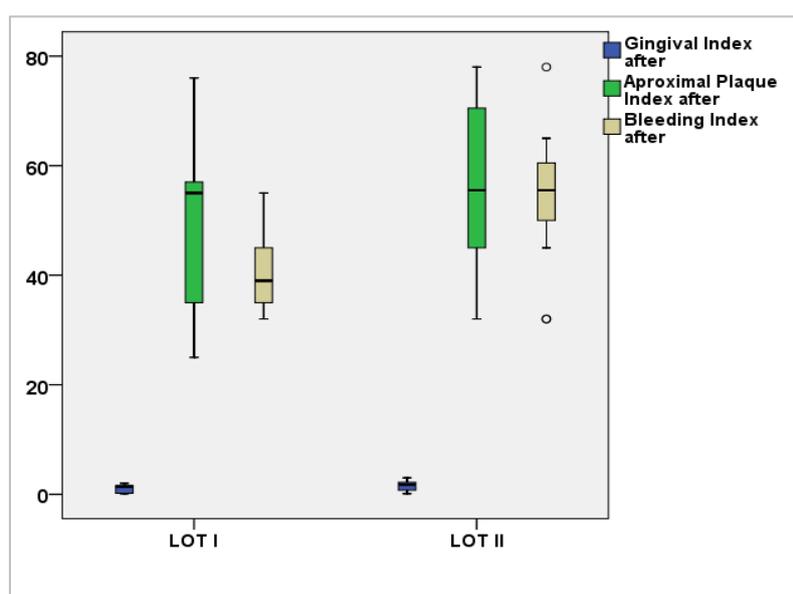


Figure 2. Mean values of the GI, API, BI in two lots of patients after 6 months of antihypertensive treatment

In the beginning of the study there were no significant differences between these markers in the two lots, while at the end, GGT and uric acid were significantly lower in the first lot (that received carvedilol).

The data support the presumption that carvedilol beneficially influenced the periodontal status via its antioxidant effect. Carvedilol is a nonselective β blocker with α -adrenergic receptor antagonism properties which makes it very useful in ischemic heart

disease (12) and in hypertensive patients with heart failure because it improves the left ventricular ejection fraction (13). That's why it is widely used in Internal Medicine, Cardiology and Gerontology. Further studies

are needed to confirm our hypothesis of its improving the periodontal disease, which would be of most interest for many patients with cardiovascular disease, especially the elderly.

Table 4. Comparative analysis of the parodontal status and of the oral hygiene for the two lots of patients in the end of the study (after 6 months of antihypertensive treatment)

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
GI after 6 months	Equal variances assumed	1,4	,23	-1,98	41	,054	-,52	,26	-1,0	,01
	Equal variances not assumed			-1,71	15,6	,107	-,52	,30	-1,1	,12
API after 6 months	Equal variances assumed	,3	,58	-2,02	41	,050	-9,86	4,8	-19,7	-,00
	Equal variances not assumed			-1,86	17,2	,080	-9,86	5,29	-21,02	1,29
BI after 6 months	Equal variances assumed	1,5	,22	-3,98	41	,000	-12,81	3,2	-19,3	-6,31
	Equal variances not assumed			-3,18	14,0	,007	-12,81	4,0	-21,4	-4,18

Table 5 Comparative analysis of GGT and uric acid in patients of the two lots in the beginning and in the end of the study

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
uric acid before	Equal variances assumed	,41	,523	,039	41	,969	,009	,24	-,48	,50
	Equal variances not assumed			,040	20,9	,968	,009	,24	-,49	,51
uric acid after 3 months	Equal variances assumed	1,6	,201	-8,7	41	,000	-2,95	,33	-3,63	-2,27
	Equal variances not assumed			-10,	30,8	,000	-2,95	,28	-3,52	-2,37
GGT before	Equal variances assumed	1,7	,197	-1,3	41	,179	-3,15	2,30	-7,81	1,50

	Equal variances not assumed			-1,2	16,0	,246	-3,15	2,61	-8,70	2,39
GGT after 3 month	Equal variances assumed	18,3	,000	-5,7	41	,000	-9,66	1,68	-13,07	-6,27
	Equal variances not assumed			-3,9	12,18	,002	-9,66	2,42	-14,9	-4,38

CONCLUSIONS

- Chronic administration of carvedilol on a six months period proved a significant amelioration of the API, GI and BI compared to the administration of other antihypertensive medication.
- Some markers of oxidative stress (gamma-glutamyl transferase and uric acid) proved a significant improvement after administration of carvedilol, which makes it very probable that the amelioration of the parodontal status is connected to its antioxidant effect.
- Carvedilol proves to be a first choice medication of hypertension or heart failure in patients with periodontitis.

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