

PATIENTS WITH TYPE 1 OR TYPE 2 DIABETES HAVE SIMILARLY INCREASED PULSATILITY STRESS AT COMPARABLE AGE OF 50 YEARS



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Background and Aims:

Arterial pulse pressure (PP) is considered as an independent cardiovascular risk factor in both patients with type 1 (T1DM) and type 2 (T2DM) diabetes mellitus. However, patients with each type of diabetes are exposed to a quite different toxic vascular environment. We compared PP and PP x heart rate (HR) double product (PPxHR = "pulsatile stress") during an active orthostatic test in patients with T1DM and patients with T2DM matched for age (40-60 years), and in respective lean and obese subjects

Methods: Population

| | T1DM | T2DM | LC | OC |
|--------------------------|----------|----------|----------|----------|
| N (Male/Female) | 20/20 | 20/20 | 20/20 | 20/20 |
| Age (yrs) | 50±6 | 50±6 | 50±6 | 50±6 |
| BMI (kg/m ²) | 23.0±2.0 | 29.7±2.7 | 22.2±2.6 | 28.6±2.7 |
| Diabetes duration (yrs) | 23±11 | 8±7 | - | - |
| HbA _{1c} (%) | 8.4±1.1 | 7.6±1.2 | - | - |

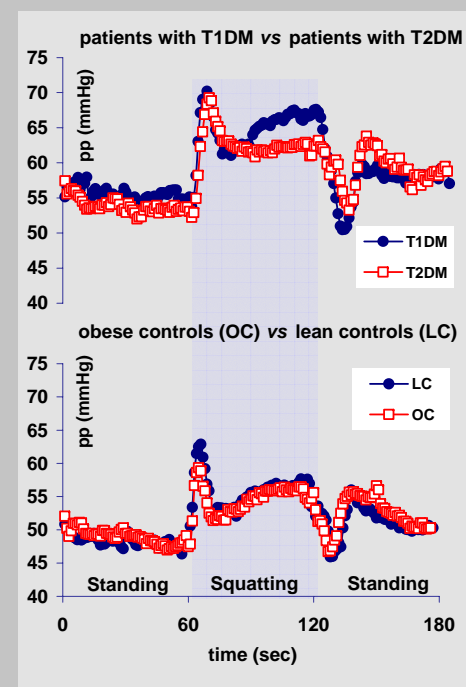
- Patients with T1DM or T2DM were compared with two groups of 40 age- and BMI-matched healthy subjects :
LC= lean controls; OC=obese controls.
- Sex ratio 1/1 in all groups
- Patients taking antihypertensive agents or with renal insufficiency were excluded.

Squatting Test

All patients were evaluated with a continuous noninvasive arterial blood pressure monitoring (Finapres®) in standing (1min), squatting (1min) and standing again (1min).



PP changes during an orthostatic test



Results:

| | T1DM | T2DM | p | LC | OC | p |
|-----------------------------------|-----------------------------|-----------------------------|------|----------------|----------------|------|
| Overall values | | | | | | |
| MAP (mm Hg) | 84±13 | 88±13 | 0.25 | 85±12 | 86±12 | 0.65 |
| PP (mm Hg) | 59±13 ^a | 58±16 ^a | 0.79 | 52±5 | 52±13 | 0.96 |
| HR (bpm) | 88±3 ^b | 91±10 ^b | 0.23 | 80±9 | 84±13 | 0.20 |
| PPxHR (mmHg*min ⁻¹) | 5263 ^c ± 1563 | 5359 ^c ± 1641 | 0.78 | 4121 ± 1120 | 4321 ± 1277 | 0.45 |
| Changes during Squatting | | | | | | |
| Δ MAP (mm Hg) | 8±7 | 10±9 | 0.24 | 5±4 | 7±8 | 0.50 |
| Δ PP (mmHg) | 10±8 | 8±11 | 0.43 | 7±6 | 8±11 | 0.31 |
| Δ HR (/min) | -6±7 | -6±7 ^a | 0.94 | -6±6 | -2±7 | 0.20 |
| Δ PPxHR (mmHg*min ⁻¹) | 557 ± 935 | 449 ± 942 | 0.60 | 276 ± 532 | 404 ± 743 | 0.37 |

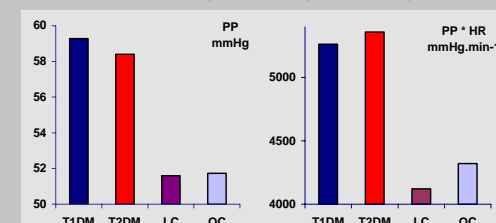
Comparisons T1DM versus lean controls (LC) and T2DM versus obese controls (OC): a: p<0.05 b: p<0.01 c: p<0.01

- Despite similar mean arterial pressure (MAP), patients with T1DM and patients with T2DM showed significantly higher PP, HR and PPxHR double product levels than corresponding controls

- However, there were no significant differences between patients with T1DM and T2DM regarding mean overall values of MAP, HR and PPxHR product.

- During the transition from standing to squatting position, PP increase and HR reduction were significant but similar in both T1DM and T2DM groups, resulting in a similar modest and non significant rise in PPxHR

Overall mean values of PP(left) and PP*HR (right) during squatting



Conclusion:

Patients with T1DM have similarly increased PP, an indirect marker of arterial stiffness, and PPxHR double product, an index of pulsatile stress, as non-hypertensive patients with T2DM at similar mean age of 50 years. We hypothesize that such comparable pulsatile stress despite quite different natural history of the diabetic disease may be explained by a much longer exposure to chronic hyperglycaemia in patients with T1DM, on the one hand, and by the presence of associated risk factors such as obesity and insulin resistance in patients with T2DM, on the other hand.