BLOOD PRESSURE SEASONALITY IN HEMODIALYSIS PATIENTS:
RESULTS FROM FIVE EUROPEAN CITIES OF DIFFERENT LATITUDES

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INTRODUCTION, AIMS

Seasons and climate have been shown to influence the regulation of blood pressure (BP).[1] There are some evidence that this phenomenon varies across geographical locations.[2]

Our aim was to precisely estimate within-patient BP seasonality in places from different latitudes and climates.

METHODS

This is a retrospective longitudinal cohort study. Over a period of 5 years (1995-1999), patients with a history of 6 months of hemodialysis (HD) from 5 European facilities were considered for inclusion. The facilities selected for their latitudes were located in Santa Cruz de Tenerife (Spain), Seville (Spain), Montpellier (France), Ottignies (Belgium), Umea (Sweden), **figure 1**.

For each patient, records of BP were collected from all dialysis sessions (total of 90 258 dialysis sessions). Individual monthly means were computed and data from patients present at least 6 months in the study were analyzed. The association between location (city or latitude), seasonality (season, month or climate) and pre-dialysis systolic BP (preHD SBP) were analyzed by mixed model.

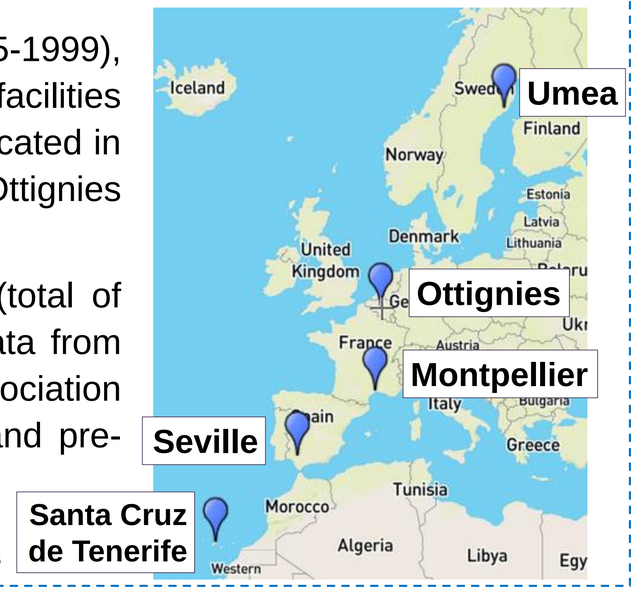

Figure 1. Location of the 5 selected HD facilities

RESULTS

1. PATIENTS

261 patients and 6 903 monthly observations met selection and quality criteria (mean: 26.4 observations/patient). Patients were followed a median duration of 2 (IQR: 1 ; 3) years. Patients characteristics are described in **table 1**.

	Study Cohort (n = 261)	Missing data (n (%))
Age (years)	55.3 (16.4)	176 (67%)
HD vintage (years)	4.1 [1.3 ; 8.3]	176 (67%)
Female (%)	45%	92 (35%)
Diabetes (%)	14%	177 (68%)
HTA (%)	35%	177 (68%)
PreHD SBP (mmHg)	144.4 (20.0)	0 (0%)
PreHD DBP (mmHg)	78.8 (11.5)	0 (0%)
PreHD weight (kg)	66.8 (14.5)	0 (0%)
IDWL (kg)	2.1 (1.1)	0 (0%)
Relative IDWL (% of postHD weight)	3.3 (1.8)	0 (0%)

Table 1. Baseline patients characteristics

Footnote: Data presented as mean (standard error), median [interquatile range] or percentage. IDWL = intradialytic weight loss.

2. SBP AND LATITUDE

The level of preHD SBP varied across facilities. It was associated with latitude (**figure 2)**.

The general tendency for change was 3.7 mmHg/10 degrees, P < 0.001 (estimate and p-value obtained from mixed model).

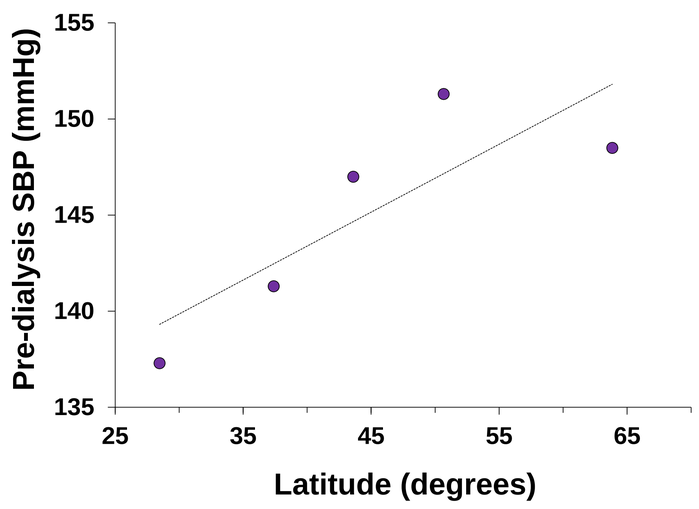

Figure 2. Mean SBP level in the five HD facilities

3. SEASONALITY

There was a clear seasonal change in preHD SBP with magnitudes up to 8.1 mmHg. The lowest values were observed in Summer, and the highest in Winter ($P_{season} < 0.001$).

Seasonality was present in all 5 cities (**figure 3, left**), with amplitudes between 4.4 mmHg (Umea, Ottignies) and 6.1 mmHg (Santa Cruz de Tenerife). Minimal SBP values occurred in May (Ottignies, Montpellier), June (Seville) and July (Seville, Umea).

In addition, there was a tendency to an association between latitude and the amplitude of seasonal change (**figure 3, right**).

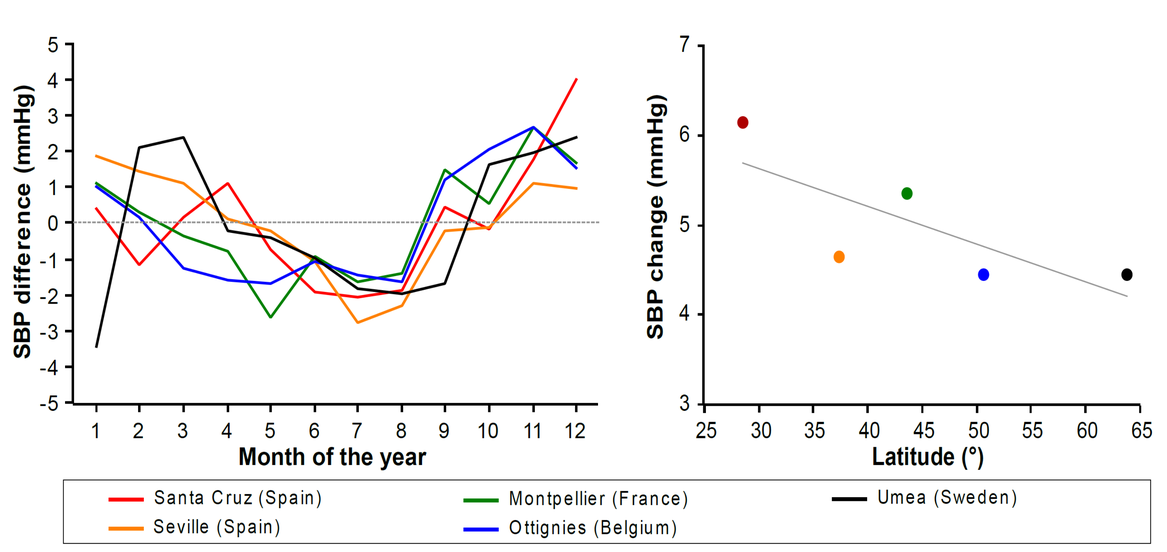

Figure 3. Change in preHD SBP over the months in 5 European cities (left) and amplitudes of change ordered by latitude (right).

Left panel: Months are numbered from 1 (January) to 12 (December). SBP differences between monthly SBP and mean SBP are displayed. Right panel: SBP changes between maximal and minimal monthly SBP from each city are depicted.

4. CLIMATE

The change in preHD SBP level was explained by changes in climate, most importantly outdoor temperatures and sunshine duration (both P < 0.001). The effect of temperature varied across cities ($P_{interaction}$ = 0.01), with a tendency to greater effects in the south ($P_{interaction}$ = 0.1).

CONCLUSIONS

BP seasonality is observed in HD patients from different European cities. The seasonal change in SBP can be as high as 8 mmHg on average.

In southern places, BP displayed greater seasonal changes which can be explained by differences in climate and in response to climate.

There is a need to consider these effects when evaluating and treating BP in this population and potentially in others.

References

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