Scholars Academic Journal of Biosciences (SAJB)
Sch. Acad. J. Biosci., 2015; 3(6):526-530
©Scholars Academic and Scientific Publisher
(An International Publisher for Academic and Scientific Resources)
www.saspublisher.com
ISSN 2321-6883 (Online)
ISSN 2347-9515 (Print)

Research Article

Seasonal changes in clinical parameters in chronic hemodialysed in Morocco

Zemraoui Nadir [1], Rachid Seddiki [2], Belarbi Marouane [1], Asserraji Mohammed [1], Maoujoud Omar [3], Alayoud Ahmed [3].

[1]Service de néphrologie-hémodialyse, Hôpital Militaire Avicenne, Marrakech, Marocco
[2]Service d'Anesthésie-Réanimation, Hôpital Militaire Avicenne, Marrakech, Marocco.
[3]Service de néphrologie-hémodialyse, premier centre médico-chirurgical, Agadir, Marocco

***Corresponding author**
Zemraoui Nadir
Email: zemraoui.nadir1@gmail.com

Abstract: Different seasonal variations in dialytic parameters, especially blood pressure have been observed in different parts of the world. In this study we followed the seasonal variation of a number of clinical parameters in a group of chronic hemodialysed patients in southern Morocco. This is a 28 months retrospective study, from May 2007 to September 2009 in the military hemodialysis center of Agadir in southern Morocco, where were listed different dialysis clinical parameters over time (days and months) and compared during two periods: cold period and warm one. During the study period, 16,000 renal epuration therapy sessions were performed. A significant seasonal variation was observed regarding inter-dialysis weight gain (IDWG), blood pressures (systolic, diastolic and mean) before and after dialysis. The ultrafiltration rate values were lower during warm while intra-dialysis hypotension was more common during the cold period. We conclude that there is seasonal variation of a number of dialytic parameters that must be kept in mind during the clinical monitoring of renal purification treatment sessions especially in areas with large variations in temperature.
Keywords: Hemodialysis - Seasonal Variations - Temperature - Morocco.

INTRODUCTION

Different seasonal variations in dialytic parameters, especially blood pressure have been observed in different parts of the world (Europe, America, Asia), these variations may be correlated with temperature and relative humidity. [1] The objective of this study is to follow the seasonal variation of a number of clinical parameters for hemodialysis in a group of renal impaired patients in southern Morocco; a region with a Mediterranean climate characterized by cold temperatures in winter and hot in summer.

PATIENTS AND METHODS

This is a 28 months retrospective study, from May 2007 to September 2009 in the military hemodialysis center of Agadir in southern Morocco. 61 stable chronic hemodialysed patients were included. Dialysis was performed in three sessions of four hours per week. The various causes of end stage renal disease (ESRD) were: vascular nephropathy (11%), interstitial nephropathy (4.2%), glomerular diseases (3.8%), diabetic nephropathy (32%) and undetermined origin (49%). All treatment sessions were monitored in real time to a computer system for data acquisition (Software Finess, Fresinus).

The various studied parameters were:

- The blood pressure before and after dialysis: systolic, diastolic and mean: Pre Systolic Blood Pressue, Pre Diastolic Blood Pressure, Post Systolic Blood Pressure, Post Diastolic Blood Pressure, Pre Mean Blood Pressure and Post Mean Blood Pressure.
- The Heart rate before (prepulse) and after dialysis (Post Pulse)
- The Inter-dialysis weight gain (IDWG) = Weight before dialysis - Dry Weight
- The ultrafiltration rate and the ultrafiltration total volume
- The occurrence of intra dialysis hypotension

We have followed the evolution of these parameters during the entire period (days and months) to compare them in two different temperature periods.

- The cold period: from November to April
- The hot season: May to October

Statistical analysis was performed using SPSS software. The comparative study was performed by the Student test for quantitative parameters and the chi-square test for qualitative parameters. The correlation was investigated by linear regression.

RESULTS

During the study period, 16,000 renal purification therapy sessions were performed. A significant seasonal variation was found for IDWG, systolic blood pressure before and after dialysis, diastolic blood pressure before and after dialysis and mean arterial pressure before and after dialysis. The ultrafiltration rate had lower values during the warm period (Figures 2, 3, 4).

The intra-dialysis hypotension and pre-dialysis hypertension were more frequent during the cold period. IDWG was lower during the warm period (see Table 1).

Our study revealed a correlation between: Pre-dialysis blood pressure and IDWG (R = 0.4, p = 0.0001) (Fig-5)

Table-1: Comparision of dialytic settings between cold and hot periods

	Cold Period	Hot Period	p
Inter-dialysis weight gain (kilo)	2.5± 1.17	1.9± 1.19	0,030
Inter-dialysis weight gain > 2kilos (%)	48	44	0,025
Pre systolic blood pressure (mmHg)	147±24	132±23	<0,0001
Pre mean blood pressure (mmHg)	96±18	83±18	<0,0001
Pre diastolic blood pressure (mmHg)	72±12	61±11	<0,0001
Post systolic blood pressure (mmHg)	134±25	121±23	<0,0001
Post diastolic blood pressure (mmHg)	72±15	65±15	<0,0001
Post mean blood pressure (mmHg)	93,7±18	81±17	<0,0001
Ultrafiltration volume (ml)	2413±965	1808±960	<0,0001
PrePulse	70 ± 12	83±13	<0,0001
PostPulse	76,5±14	77±14	0,250
Intradialytic Hypotension (%)	6,1	5,2	0,019

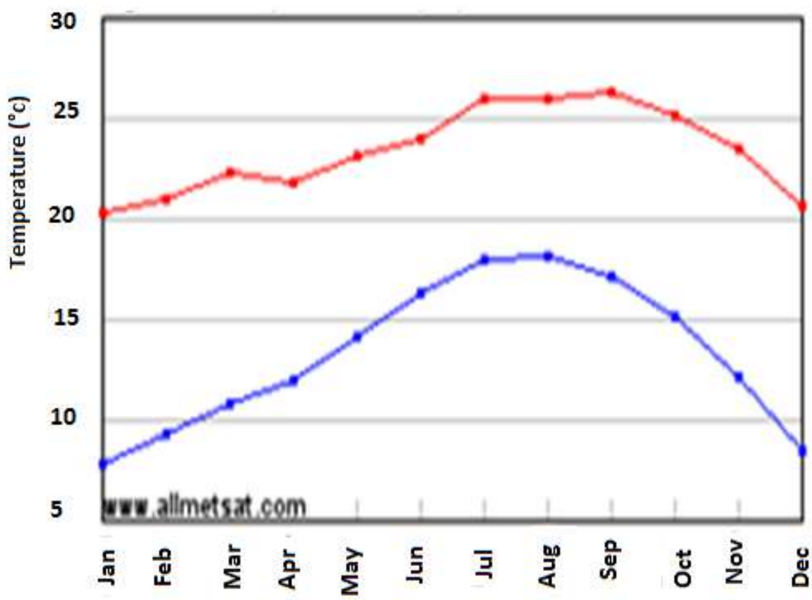

Fig-1: Monthly average of daily minimum and maximum temperatures of the city of Agadir

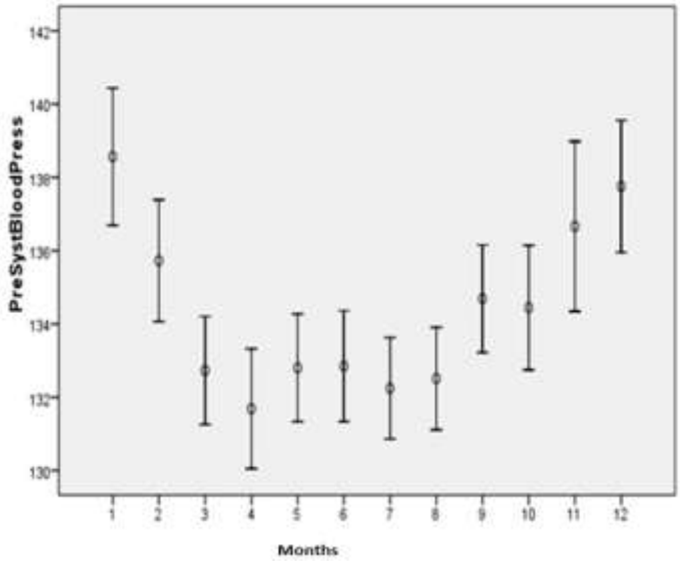

Fig-2: Changes in pre-dialysis systolic blood pressure with months

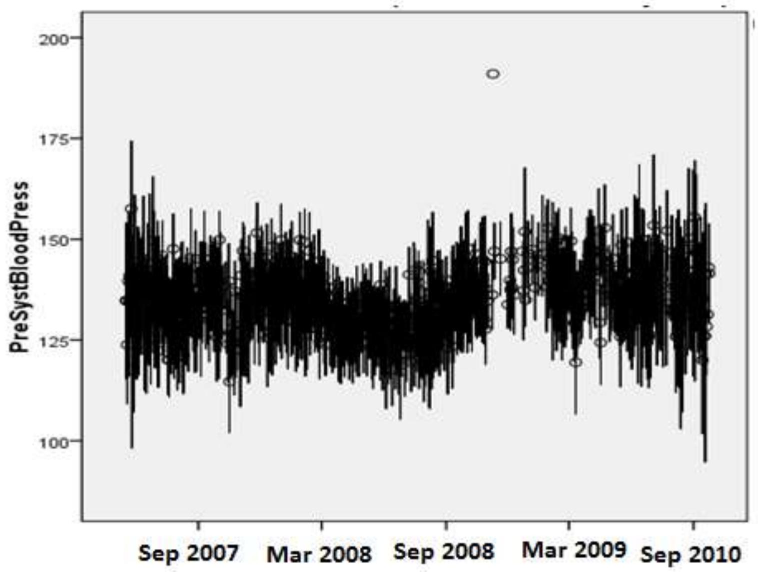

Fig-3: Changes in pre-dialysis systolic blood pressure with days

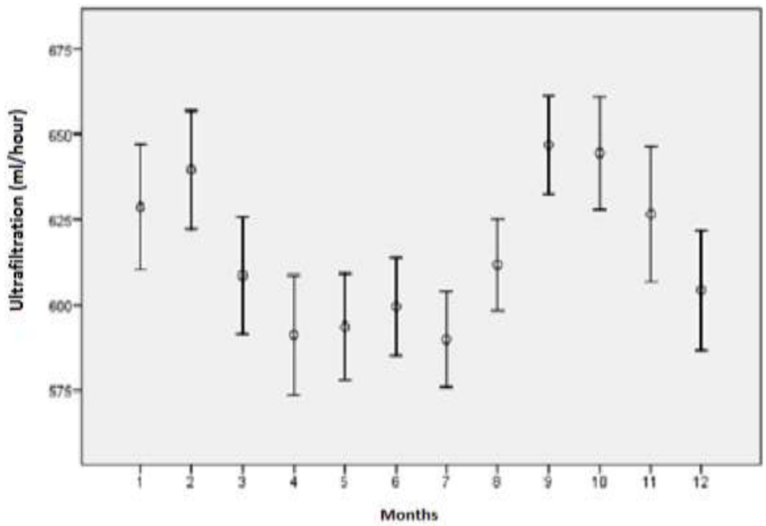

Fig-4: Evolution of the ultrafiltration with months

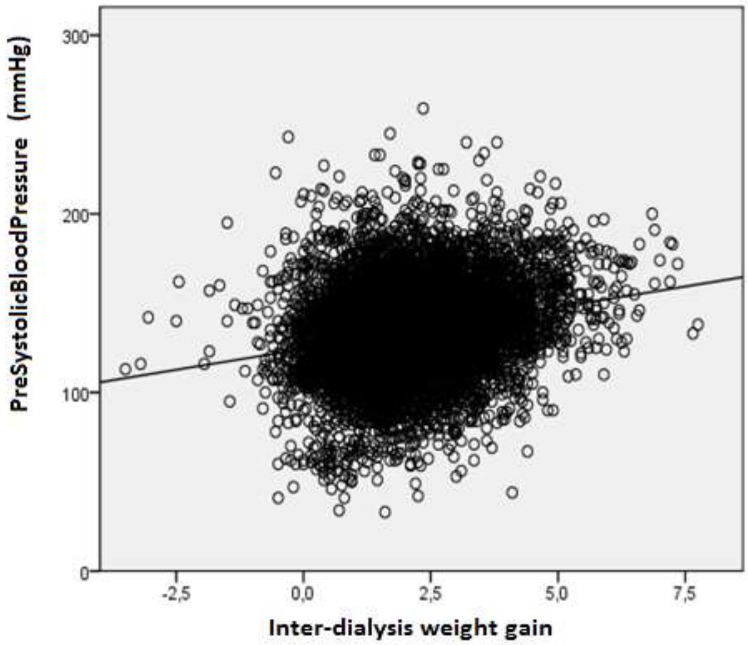

Fig-5: Correlation between interdialytic weight gain and pre-dialysis systolic blood pressure (R = 0, 4, p =0, 0001)

DISCUSSION

Seasonal variability was found for different physiological and pathological parameters in the general population [2, 3]. Just as with hemodialysis, different studies have shown the existence of a seasonal variation of some clinical and biological parameters [1].

Among the general population, blood pressure varies seasonally with a maximum in winter; the same observation was objectified in hemodialysis in different parts of the world [4.5.6]: Asia, America and Europe [7.8.9.10.17]. Our study confirmed these changes for both the diastolic and systolic pre-dialysis blood pressure.

This can be explained by:

The evolution of IDWG; Hwang showed the existence of a seasonal variation of this weight gain with time. In our study; IDWG and the ultrafiltration rate varied sinusoidally with higher values during cold periods .We also confirmed the results of Sposito et al on the existence of a correlation between bloods during the hot period.

In addition to physical factors (temperature and pressure and weight gain. [11] Argil et al suggested that the evolution of insensible losses of water with temperature could be responsible for these significant changes in weight gain especially in anuric subjects. [12]

The change in vascular resistance: indeed, vasodilation associated with high ambient temperatures can explain lower blood pressures during hot periods [13]. In our study vascular resistance has not been studied, but (the mean blood pressure / heart rate) ratio, reflecting the product of vascular resistance and stroke volume, was lower humidity), this seasonal variation in blood pressure can also be due to physiological factors (hormonal changes, sympathetic activity) [1]. Rostand suggests that seasonal variation of parathyroid hormone and calcium following variation of vitamin D can explain this variability of blood pressure [14].

Our study showed the existence of a seasonal variation of post-dialysis blood pressure following the pre-dialytic pressures. However, this seasonal variation was not found in the Kovacis study [1].

These seasonal changes in the weight gain and the ultrafiltration rate can explain the frequency of intra-dialysis hypotension during the cold period.

Goriz et al showed a seasonal variation in the risk of thrombosis of arteriovenous fistulas with a higher frequency in summer. [16] In our study, this risk has not been evaluated, but we noted a seasonal variation of the transmembrane pressure, blood flow of venous pressure and arterial pressures of the extracorporeal circuit, with no explanation for that.

CONCLUSION

At the end of this study, we emphasize the existence of seasonal variations in a number of dialytic parameters that must be kept in mind during the clinical monitoring of extrarenal purification sessions especially in areas with large variations in temperature and humidity.

REFERENCES

1. Shahar DR, Froom P, Harari G, Yerushalmi N, Lubin F, Kristal-Boneh E ; Changes in dietary

intake account for seasonal changes in cardiovascular disease risk factors. Eur J Clin Nutr, 1999; 53(5): 395-400.

2. Boulay F, Berthier F, Sisteron O, Gendreike Y, Gibelin P; Seasonal variation in chronic heart failure hospitalizations and mortality in France. Circulation, 1999; 100(3): 280-286.
3. V Kovacic; Seasonal Variations of Clinical and Biochemical Parameters in Chronic Haemodialysis. Ann Acad Med Singapore, 2004; 33:763-768.
4. BRENNAN PJ, GREENBERG G, MIALL WE; Seasonal variation in arterial blood pressure. BMJ, 1982; 285(6346): 919–923.
5. Kristal-Boneh E, Froom P, Harari G, Ribak J; Association of calcitriol and blood pressure in normotensive men. Hypertension, 1997; 30(5): 1289-1294.
6. Jenner DA, English DR, Vandongen R, Beilin LJ, Armstrong BK, Dunbar D; Environmental temperature and blood pressure in 9-year-old Australian children. Journal of hypertension, 1987; 5(6): 637-644.
7. Tozawa M, Iseki K, Iseki C, Morita O, Yoshi S, Fukiyama K; Seasonal blood pressure and body weight variation in patients on chronic hemodialysis. American journal of nephrology, 1999; 19(6): 660-667.
8. Argiles A, Mourad G, Mion C; Seasonal changes in blood pressure in patients with end-stage renal disease treated with hemodialysis. New England Journal of Medicine, 1998; 339(19): 1364-1370.
9. Castro MCMD, Mion JrD, Marcondes M, Sabbaga E; Seasonal variation of blood pressure in maintenance hemodialysis. Sao Paulo Medical Journal, 1998; 116(4): 1774-1777.
10. Argani H, Javanshir MR; Seasonal variations of blood pressure in hemodialysis and renal transplant recipients. In Transplantation proceedings, 2004; 36(1): 148-149.
11. Spósito M, Nieto FJ, Ventura JE; Seasonal variations of blood pressure and overhydration in patients on chronic hemodialysis. American journal of kidney diseases, 2000; 35(5): 812-818.
12. Argiles A, Lorho R, Servel MF, Chong G, Kerr PG, Mourad G; Seasonal modifications in blood pressure are mainly related to interdialytic body weight gain in dialysis patients. Kidney international, 2004; 65(5): 1795-1801.
13. Cheung AK, Yan G, Greene T, Daugirdas JT, Dwyer JT, Levin NW, Eknoyan G; Seasonal variations in clinical and laboratory variables among chronic hemodialysis patients. Journal of the American Society of Nephrology, 2002; 13(9): 2345-2352.
14. ROSTAND SG; Seasonal changes in blood pressure in patients undergoing dialysis. N Engl J Med, 1999; 340: 965-966.
15. Hwang JC, Wang CT, Chien CC; Effect of climatic temperature on fluid gain in hemodialysispatients with different degrees of overhydration. Blood purification, 2007; 25(5-6): 473-479.
16. Górriz JL, Manzanera MJ, Hoyos SP, Sancho A, Molina P, Ávila A, Pallardó LM; Seasonality in vascular access thrombosis in hemodialysis. Nefrologia, 2007; 27(1): 62-67.
17. Woods HF, Cheng CT, Lim PS; Climate and volume and blood pressure trends in Taiwanese hemodialysis patients. Blood purification, 2008; 26(5): 404-406.
18. Bruce N, Elford J, Wannamethee G, Shaper AG; The contribution of environmental temperature and humidity to geographic variations in blood pressure. Journal of hypertension, 1991; 9(9): 851-858.