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Research Paper

Profile of Serum Protein Electrophoresis in a Population of Chronic Hemodialysis Patients

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SUMMARY:
Hemodialysis is a known renal replacement technique responsible for disruption of protein metabolism by several mechanisms including chronic inflammation, oxidative stress, nutritional abnormalities, and the infectious complications due to immune deficiency it causes.
The monitoring and exploration of this metabolism is very important in the management of chronic hemodialysis patients. It is done by the specific prescription of plasma proteins, but also by the electrophoresis of serum proteins which a biochemical balance which allows the quantitative and qualitative determination of a set of protein fractions and the analysis of these fractions in the form of protein profiles. directing towards different pathological syndromes (inflammatory syndrome, immunological syndrome, undernutrition syndrome, anemic syndrome, nephrotic syndrome).
The objective of our work is to describe the distribution of protein profiles on serum protein electrophoresis and to report the interest of its prescription in the exploration of protein metabolism in a population undergoing chronic hemodialysis.

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I. INTRODUCTION:

End-stage chronic renal failure at the hemodialysis stage is a ground for protein metabolism disturbances. Its treatment is based on hemodialysis, a renal replacement technique associated with excessive production of free radicals leading to the generation of oxidative stress (OS) and the release of inflammatory factors responsible for chronic inflammation [1].

Serum Protein Electrophoresis (SPE) is a medical biology exam that aims to separate and analyze serum proteins. Its indications are multiple, the main one being the search for immunoglobinopathy but also the evaluation of the repercussions of a known pathology, or even to ensure the follow-up: hepatic damage (including cirrhosis or hepatitis), renal damage (including nephrotic syndrome) [2-3].

II. MATERIAL AND METHODS :

This is a descriptive retrospective study on a population of 100 chronic hemodialysis patients collected in the biochemistry department of the Avicenne military hospital in Marrakech and the private Atlas hemodialysis center during a period of 3 years from 2014 to 2017. An operating sheet was drawn up comprising a set of clinical and biological parameters .

III. RESULTS:

We identified 100 chronic hemodialysis patients, 54 patients were female, ie 54%, and 46 were male, ie 46%. The female sex was predominant with a male / female sex ratio of 0.85.
The age of our patients was on average 59.13 years ± 13.22
The most common cause of renal failure was vascular nephropathy (21%) followed by diabetic nephropathy (18%) and polycystic kidney disease (12%).
Therapeutically, the average length of time for dialysis was 99.24 months ± 61.44 months and the vascular access was arteriovenous fistula (AVF) (97%), central venous access (tunilized catheter) (2%). An 8 year old child on peritoneal dialysis.

Electrophoresis of plasma proteins showed a normal profile in 36% of cases while the most frequent pathological profile was the inflammatory profile with a rate of 24% (table 1).

Table 1: Protein profiles by plasma protein electrophoresis.

The protein profile	Percentage
The normal profile	36%
The inflammatory profile	24 %
Polyclonal gamma globulinemia	19 %
Undernutrition syndrome	13%
Anemic syndrome	8%
Nephrotic syndrome	5%

=> The association of the inflammatory protein profile with certain epidemiological, clinical and biological parameters (table 2)

Association with epidemiological parameters:

The inflammatory protein profile was more common in the elderly
> = 50 years (45.8%) and in males (46.4%) but without a statically significant association in the two cases.

Association with clinical parameters:

The inflammatory protein profile was more observed in the following situations:

- in patients with vascular nephropathy (55.6%).
- In case of diabetic nephropathy (50%)
- In patients who have been on hemodialysis for> = 10 years (40.9%)

However, no statically significant difference was found.

Association with biological parameters

The inflammatory protein profile was statically significant in association with positive C-reactive protein (CRP) (p <0.001).

He was also more found:

- in patients with hypoalbuminemia.
- In patients with positive HCV serology.

But without statically significant difference in the 2 cases.

=> The association of the polyclonal Gammaglobulinemia protein profile with certain epidemiological, clinical, and biological parameters (table 2)

Association with epidemiological parameters:

The relative frequency of the polyclonal gammaglobulinemia protein profile was high (36.6%) in patients> = 50 years of age with no statically significant difference (P = 0.420)

This protein profile was also more frequent in males (40%) without having a statically significant association (P = 0.311)

Association with clinical parameters:

The polyclonal gamma globulinemia profile was more common in the following situations:

- In case of vascular nephropathy (50%)
- In case of diabetic nephropathy (37.5%)
- If hemodialysis has been in service> = 10 years (35%)

Association with biological parameters:

The polyclonal gamma globulinemia profile was more observed in patients with hypoalbuminemia (50%), and in patients with positive HBV serology (50%) but without statically significant difference in the two cases.

Table 2: The association of the inflammatory profile and polyclonal Gammaglobulinemia protein profile with certain epidemiological, clinical, and biological parametersAssociation

Epidemiological parameter			Protein profile Polyclonal gamma globulinemia		Protein profile inflammatory	
			effective	p-Value	effective	p-Value
Age >= 50 ans	**Yes**		36,6%	0,420	45,8%	0,061
	No		28,6%		16,7%	
Sex	**Male**		40%	0,311	46,4%	0,246
	Female		30%		34,4%	
Initial Nephropathy	**Vascular nephropathy**	**Yes**	50%	0,271	55,6 %	0,251
		No	31,9%		37,3%	
	Diabetic nephropathy	**Yes**	37,5%	0,571	50%	0,357
		No	34%		38%	
	Polycystosis renal	**Yes**	28,6%	0,541	28,6%	0,412
		No	35,4%		41,5%	

Number of years in hemodialysis> 10 years	**Yes**	35%	0,592	40,9%	0,563
	no	34,3%		39,5%	
RCP	**Positive**	33,3%	0,586	65,5%	**< 0,001**
	negative	35%		16,1%	
Albumin	**Normal**	34%	0,576	36,4%	0,078
	hypoalbuminemia	50%		80%	
Serology HCV	**positive**	0%	0,655	80%	0,078
	Negative	35,2%		36 ,4%	
Serology HBV	**Positive**	50%	0,576	0%	0,6
	néeative	34%		40,7%	

IV. DISCUSSION :

Protein metabolism is affected by chronic renal failure, regardless of its stage or its modalities of replacement therapy, hemodialysis, peritoneal dialysis or kidney transplantation. More than renal failure by itself, it is the conditions associated with it, primarily chronic inflammation, oxidative stress, uremia, metabolic acidosis and peripheral insulin resistance that lead to the responsible phenomena. catabolism and disruption of protein metabolism [4].

The disturbance of this metabolism can be explored apart from the specific dosage of each protein, by the electrophoresis of serum proteins, From this analysis the EPS makes it possible to make the diagnosis of several protein profiles, in our study two protein profiles the more represented in the sample, the inflammatory profile and the polyclonal gammaglobulinemia [5].

The most represented pathological protein profile is the inflammatory profile in 24% of cases, this result can be explained by the disruption of protein metabolism secondary to the chronic inflammation encountered in hemodialysis. Thus in 30 In patients treated by hemodialysis, the prevalence of chronic inflammation, without an identifiable infectious or neoplastic cause, is significant. Kaysen's group was the first to show that CRP was frequently elevated in dialysis patients, with a strong negative correlation with markers of nutritional status [6].

The causes of inflammation are multifactorial, some of which are specific to dialytic therapy. The bio-incompatibility of the dialysis membrane and the possible contamination of the dialysate with fragments of bacterial endotoxins are factors that may trigger the activation of phagocytic cells and the subsequent generation of oxidants [7]. the other causes of inflammation are detailed in the following table.

Table 3: causes of inflammation.

Acute inflammation	Chronic inflammation
• **Acute inflammation** Bacterial (bacteremia - septicemia) Viral Mycotics Mycobacterials • **Infection of vascular access** Infection of puncture points or the path Infected thrombosis Infected false aneurysm Endoluminal biofilm • **Organic infection** Pulmonary Digestive Cardiac, endocarditis Urinary Osteoarticular other	• **Vascular access** Reaction to material Progressive thrombosis (recent, old) Infected thrombosis Latent infection (endoluminal biofilm) • **Microbial or endotoxin contamination of the dialysate** • **Hemo-incompatibility of the dialysis system** • **Organic cause independent of dialysis** Acute or progressive hepatitis Subacute endocarditis - septic metastasis Mycobacteria Systemic inflammatory disease Chronic renal transplant rejection Other pathology

The inflammatory profile was statically significant in association with a positive CRP. in fact in a recent study carried out in Bordeaux in the hemodialysis department of the Saint-André hospital, which takes care of patients with significant comorbidities, the concentration of C-reactive protein (CRP) was greater than 5 mg / l (laboratory normal) in 70% of patients, and greater than 10 mg / l in 50% of them. Similarly, interleukin-6 concentrations were above the upper limit of normality of 10 pg / ml in 94% of the population. According to another study by Claude Level et al which evaluated the inflammatory state of a hemodialysis population based on a new marker of inflammation procalcitonin (PCT), Fifty-seven percent of the PCT values were greater than the normal limit greater than 0.5 ng / ml [8]. thus, depending on the markers considered, more than half of hemodialysis patients present a chronic inflammatory state in a population treated in a center [8].

Polyclonal hypergammaglobulinemia results from the overproduction of immunoglobulins by several lines of plasma cells. Monoclonal gammopathy represents the activation of a single plasma cell and is usually

associated with several malignant diseases, including multiple myeloma, primary systemic amyloidosis, and other lymphoproliferative disorders. In contrast, polyclonal gammopathy represents the diffuse activation of B cells, and is associated with a heterogeneous group of non-malignant conditions, including inflammation and diseases related to the immune system. [9]

The "classic" etiologies of polyclonal hypergammaglobulinemia are reputed to be viral infections (HIV), chronic parasitic and bacterial infections, liver disease, sarcoidosis, Gougerot Sjögren's syndrome, Lupus, and lymphoproliferative syndromes. [10]

The profile of polyclonal gamma globulin was observed in 19 cases, i.e. 19% of hemodialysis patients in our series, It is associated with liver disease in 10.52% (2 cases), with infection in 26.31% (5 cases), to a neoplastic pathology in 10.52% (2 cases), no case of autoimmune disease was associated with polyclonal gamma globulinemia in our series.

In 52.63% (10 cases) polyclonal gamma globulinemia was present without association with any specific etiological diagnosis.

V. CONCLUSION :

Our work was the first of its kind in Morocco, the inflammatory and immunological protein profile such as polyclonal hypergammaglobulinemia were the most found, the other profiles mainly the profile of undernutrition, anemic and nephrotic are less frequent, this observation can be explained by the frequency of factors of chronic inflammation and immunological stimulation in hemodialysis

A set of recommendations are therefore essential to limit chronic inflammation in chronic hemodialysis patients.

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