



# A Study of the Variation of Uremia, Creatinine and Total Proteinemia during Heart Failure

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**How to cite this paper:** Kamb, A.M.R., Ndaya, K.A., Kimuni, K.C., Kalenga, M.P. and Mwinkeu, K.N. (2018) A Study of the Variation of Uremia, Creatinine and Total Proteinemia during Heart Failure. *Open Access Library Journal*, 5: e4313. <https://doi.org/10.4236/oalib.1104313>

**Received:** January 5, 2018

**Accepted:** March 3, 2018

**Published:** March 6, 2018

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## Abstract

Some diseases are accompanied with a change in biological parameters of which the dosage is possible in urine or blood. Previous studies have shown changes in parameters in kidney failure. The latter causes an impairment of the heart function later on. We have carried out a study of changes in biological parameters in people suffering exclusively from heart failure without any associated diseases or complications. The present research has been an analytic and case control one. It has been focused on urine, creatinine and on the total proteins found in the blood of heart failure patients diagnosed and hospitalized in the cardiologic Centre of Lubumbashi (D R Congo). Out of a population of 60 patients, our research has revealed a high level of urea and creatinine in the blood during heart failure, whereas the rate of total proteins has remained in the acceptable threshold.

## Subject Areas

Biochemistry, Pathology

## Keywords

Variation, Uremia-Creatinine, Total Proteinemia, Heart Failure

## 1. Introduction

The human heart is a hollow muscular pump which ensures the circulation of the blood through rhythmic contractions towards vessels. However, a deficient heart does no longer ensure sufficient blood flow for a good function of tissues. Cardiac failure is a complex clinical syndrome stemming from any structural or functional abnormality of the heart and which impairs the ability of the ventricles to fill with blood and to pump it.

At the level of biochemistry, there are some changes of parameters during heart failure. Once heart failure is diagnosed, it is urgent that dosages of some biological parameters such as urea, creatinine, and heart enzymes can be carried out. It is normally recognized that there is a link between creatinine and kidney function. With regard to the present study, its contribution lies in the determination of the changes in the parameters studied during heart failure excluding any other associations or complications. This will make it possible to guide the management and monitoring of patients suffering from heart failure in order to improve its quality.

Thus, we confine the present study to the three following parameters: urea, creatinine and the total protein of blood in order to study their variation during cardiac failure.

## 2. Patients and Method

Our investigation has been carried out at the cardio logical Centre of Lubumbashi located on Kilela-Balanda Street. In an exhaustive manner, we have collected our data from sixty patients both male and female having variable age for a period from March to May 2015.

Among those patients, thirty cases were suffering from heart failure (diagnosis confirmed by Doppler ultrasonography and these patients have been admitted in the same centre for hospitalization), thirty were considered as case controls and were not affected by heart failure. Moreover, we have excluded any patient smoking cigarettes, drinking alcohol, under medication treatment or suffering from any disease like kidney failure.

This research was a case-control analytical study. The treatment of data was carried out through Epi Info. Different methods of analysis for parameters were used:

- The calorimetric method was used for urea at ureasis;
- The Jaffe method was used for creatinine; and
- The Biuret method was used for total proteins.

The values of these parameters were compared between groups of cases and the control group.

## 3. Results

The average value of creatininemia has been of  $1.036 \pm 0.264$  mg/dl in the controls and of  $2.06 \pm 1.56$  mg/dl in the cases. The cardiopathy has raised the level of creatininemia of which the normal threshold amounts to 0.6 - 1.4 mg/dl\*. This interval involves the values of creatinine from 0.6 to 1.1 mg/dl in the woman and of 0.7 - 1.4 mg/dl in man (cypress diagnostics, 2015 <http://www.disgnostics.be>) (Table 1).

The average value of uremia has been of  $77.43 \pm 66.38$  mg/dl in heart disease case and  $32.5 \pm 11.12$  mg/dl in the control group. The rising-of uremia has been noticed during heart disease (Table 2).

Heart disease did not influence the proteinemia significantly. Moreover, this table shows that the average value of proteinemia has been of  $7.01 \pm 1.44$  mg/dl in the cases and of  $6.55 \pm 1.19$  mg/dl in the control group (**Table 3**).

The risk is increased in men (more than 3 times) with a significant difference in relation to women (**Table 4**).

The average age in the heart patients has been of 30 years and of 40.2 years in the control group. Moreover, 23.3% of the cases and the control group were aged between 30 and 40 years (**Table 5**).

**Table 1.** The creatininemia values in the concerned population.

Creatinine	Case		Control	
	Size	%	Size	%
>0.6	0	0	2	6.7
0.6 - 1.4*	13	43.3	27	90
<1.4	17	56.7	1	3.3
<b>Total</b>	<b>30</b>	<b>100</b>	<b>30</b>	<b>100</b>

$p = 0.0000126$ , OR = 0.03, CI<sup>95%</sup> = [0.00; 0.25].

**Table 2.** The values of uremia in the concerned population.

Urea	Case		Control	
	Size	%	Size	%
15 - 45	10	33.3	26	86.7
>46	20	66.7	4	13.3
<b>Total</b>	<b>30</b>	<b>100</b>	<b>30</b>	<b>100</b>

$p = 0.0000248$ , OR = 0.08, CI<sup>95%</sup> = [0.02; 0.32].

**Table 3.** The values of proteinemia in the concerned population.

Proteins	Case		Control	
	Size	%	Size	%
>6.6	12	40	14	46.6
6.6 - 8.3	11	36.7	14	46.6
<8.3	7	23.3	2	6.7
<b>Total</b>	<b>30</b>	<b>100</b>	<b>30</b>	<b>100</b>

$p = 0.081$ , OR = 0.22 CI<sup>95%</sup> = [0.03; 1.59].

**Table 4.** The sex of the concerned patients.

Sex	Case		Control	
	Size	%	Size	%
Male	18	60	10	33.3
Female	12	40	20	66.7
<b>Total</b>	<b>30</b>	<b>100</b>	<b>30</b>	<b>100</b>

$p = 0.038$ , OR = 3, CI<sup>95%</sup> = [1.04; 8.6].

**Table 5.** Age of the patients.

Age	Case		Control	
	Size	%	Size	%
12 - 20	3	10	3	10
20 - 30	4	13.3	5	16.7
30 - 40	7	23.3	7	23.3
40 - 50	4	13.3	7	23.3
50 - 60	5	16.7	3	10
60 - 70	4	13.3	5	16.7
<b>Total</b>	<b>30</b>	<b>100</b>	<b>30</b>	<b>100</b>

#### 4. Discussion

Metabolic diseases become more frequent in our environment. They require more attentiveness and monitoring. We focus our researches on the biological variations during heart failure. We are at the same time interested in uremia, creatinemia and total proteins without taking into account the different stages of heart failure. Contrary to Maurey [1] who said that the urine analysis provides precious information on the function of the organism, our study focuses on blood sampling.

Generally speaking, urea and creatinine are used for the estimation of glomerulus function and their usefulness in the clearance of urine [2]. Our results have been similar to those of other researchers. In a separate way, heart failure is also known by the increase of urea and creatinine in the blood [3]. As to creatinemia, in particular, its increase is also observed in the case of cardiac failure [4]. This is not the case with uremia. Our results have demonstrated a significant increase ( $p < 0.05$ ) of both the rate of creatinine and urea in heart patients of variable age.

With regard to total proteinemia, we have observed it at the normal threshold of 6.6 to 8.3 g/dl [4]. A kidney failure has been detected in more than one third of patients suffering from heart failure [5].

The deterioration of the kidney function during the evolution of heart failure is facilitated by age, a current comorbidity nowadays, and sometimes previous autonomous kidney pathology. Nevertheless, the prevalence of kidney failure may affect between 25% and 40% in heart patients. These rates may again be higher in patients of more than 75 years of age.

Our results have demonstrated that independently from kidney failure, heart failure has significantly increased the rate of urea and creatinine. As to proteinemia, the results have been in disparity and have shown that its titre has not evolved at the rhythm of the heart disease.

With regard to proteinemia, the results have been in disparity and have demonstrated that its titre has evolved at the rhythm of the heart disease. Though in the case of kidney failure consecutive to a heart disease, a reduction of protei-

nemia has been observed in the total proteins of serum [6]. In association, at an advanced stage of kidney disease, when the creatinine is increased, and when the glomerulus filtration also decreases, the heart problems appear [7].

In relation to sex, men have been four times more exposed to the risk of developing heart failure than women (OR = 3;  $p = 0.038$ ). Our results have been similar to those which have found that the male sex was the most affected. This is the case of Jamal Kheyi Abdelilah with 72% of men [8], Kambale Kande with 63 men and 48 women [9]. By contrast, some studies have found the predominance of female patients [10] [11] [12]. Therefore, all the subjects are concerned by heart failure. It is only a matter of realizing risk factors so that the disease may set off.

The average age in heart patients was of 30 years, and the majority of cases, that is 23.3%, were aged between 30 and 40 years. There is therefore a similarity with the results found by Mouanodji who had found 32 years as the average age [13] or largely over 30 years [7] [10] [14] [15] [16].

## 5. Conclusion

For everything being considered, our study has shown that there is a rise of urea and creatinine during heart failure, whereas the rate of total proteins has not undergone any variations. A deeper research on a sample of a large size in relation to the stages of the disease is therefore necessary for more reliability of the conclusion.

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