

Full Length Research Paper

Adult hemodialysis patients: A prospective study on the use of intravenous L-carnitine

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The use of L-carnitine is very popular in recent years, but because of the lack of clinical trials, they are still sufficiently descriptive, and thus remain a mystery. However, a very common complication in hemodialysis patients is caused by a decrease in the serious incidence put forward by recent studies. This study aims to show if there are common reduced complications in patients using L-carnitine. All the patients treated in our center, and who were included in this study and in each session (three sessions per week for at least four hours of receiving treatment), comprised adults. The assessment of hepatitis B virus and hepatitis C virus (HBS-HCV) positive patients in the infectious diseases specialist took an active part of this study. Our unit of L-carnitine application did not meet our criteria, except a few exceptions, where all patients 3/7 were 1 g IV. The excessive risk group of patients with high blood pressure arterial, in terms of intra-ocular bleeding, were evaluated by a specialist in eye diseases. In this evaluation, dialysis dose adjustments used in the treatment of heparin were taken into consideration. According to the guideline study, some of the incidence of complications are: Hypotension, muscle cramp, restless leg syndrome, nausea and vomiting, headache, chest and back pain, itching and chills and fever. For L-carnitine used in our center during the 12-month period in patients with complications, an average reduction was seen in densities and growth rates of the guideline study according to the following figures: 20% reduction in the incidence of hypotension, 36% reduction in the incidence of muscle cramps, 50% reduction in the incidence of restless leg syndrome, 100% reduction in the incidence of nausea and vomiting, 100% reduction in the incidence of chest and back pain, no change was seen in headache and chills and fever complications, while an increase of 40% was observed for itching. In this study, no change was observed in headache and chills and fever symptoms; although aside itching, all other complications reduced. In patients, itching was examined at the front of those people diagnosed with familial Mediterranean fever (FMF) and in elderly people, and it was concluded that the situation may be a factor for the increase in complications.

Key words: L-Carnitine, hemodialysis complications, end-stage renal disease (ESRD).

INTRODUCTION

Carnitine is extremely circulated, it especially abounds in the muscle. It is compounded from lysine and methionine in liver and kidney. Activation of lower fatty acids and their oxidization in the inside part of the mitochondria can be possibly transpire without dependence on another carnitine, but the long chain acyl-CoA will not

comprehend the inner membrane of the mitochondria and become oxidized unless they form acylcarnitines (John et al., 2003). If something is lacking in this enzyme, the long-chain fatty acids begin their nourishment and the fats collected in the body can not be collapsed or adapted. These fatty acids are not transformed into energy, because they are made of lead; and they typically indicate symptoms of this disorder, like feebleness, hypoglycemia and a cardiac dysrhythmia.

Free long-chain fatty acids or those that are connected

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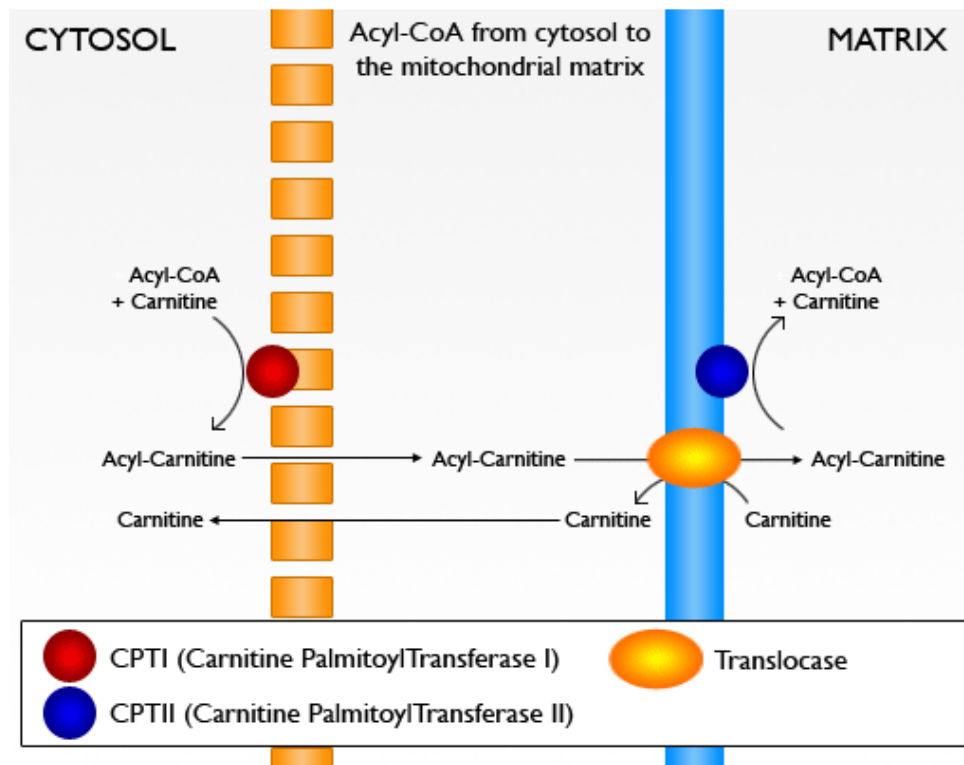


Figure 1. Acyl-CoA from cytosol to the mitochondrial matrix.

with carnitine can influence the electrical belongings of cardiac cells bringing about an irregular heart beat. Fatty acids can also be formed in tissues and can injure the heart, liver and muscles, causing further serious complications. Carnitine transfers long-chain acyl groups from fatty acids to the mitochondrial matrix, in order for it to crush them down through β -oxidation to acetyl-CoA, and procure utilizable energy by way of the citric acid cycle. In some organisms, like fungi, the acetate is accustomed in the glyoxylate cycle due to gluconeogenesis and the arrangement of carbohydrates. Fatty acids can be activated in front of the acid that caused the carnitine molecule to form acyl-carnitine. The free fatty acid in the cytosol is fastened and accompanied with a thioester obligation to coenzyme A. This reaction is catalyzed from the approach of the enzyme's fatty acyl-CoA synthetase and is finalized with the approach of inorganic pyrophosphatase. Carnitine acyltransferase I experiences allosteric repression as compared to malonyl-CoA, which is an intermediate in fatty acid biosynthesis, and stops the unproductive cycling intermediate of β -oxidation together with fatty acid synthesis (Figure 1). One of the first studies done by Ahmad et al. (1990) is L-carnitine treatment in dialysis patients. In this study, the double blind method was used, and it was ultimately derived that muscle cramps were less common in patients with L-carnitine and has been shown (Ahmad et al, 1990). On the other hand, end-

stage renal disease (ESRD) patients underwent L-carnitine in the treatment of anemia, or rHuEPO was used against the resistant cases, but is not yet proven to be effectively positive.

METHODS

A total number of 70 patients treated in the hemodialysis center per month were included in this study. The study was categorized into sessions. Each session was done for at least four hours of receiving treatment, while three sessions were done per week. The patients used for this study comprised adults. The assessment of HBS-HCV positive patients in the infectious diseases specialist, took an active part of this study, which was conducted from November 2008 to October 2009, containing a 12-month retrospective periyotu. Almost all the patients in our unit of L-carnitine therapy did not meet the inclusion criteria, except a few exceptions. This study had the following inclusion criteria:

1. Adult hemodialysis patients with no peritoneal dialysis;
2. Bicarbonate hemodialysis treatment 3 times per wee;
3. Acceptance of the special diet for patients with ESRD;
4. Severe uncontrolled hypertension (systolic > 170, diastolic > 115) should not be seen;
5. ECHO not to be identified according to the results of chronic heart failure;
6. Unstable angina should not be seen;
7. Important liver disease like cirrhosis and chronic active hepatitis should not be seen;
8. Systemic haematological disease and malignancy should not be seen;

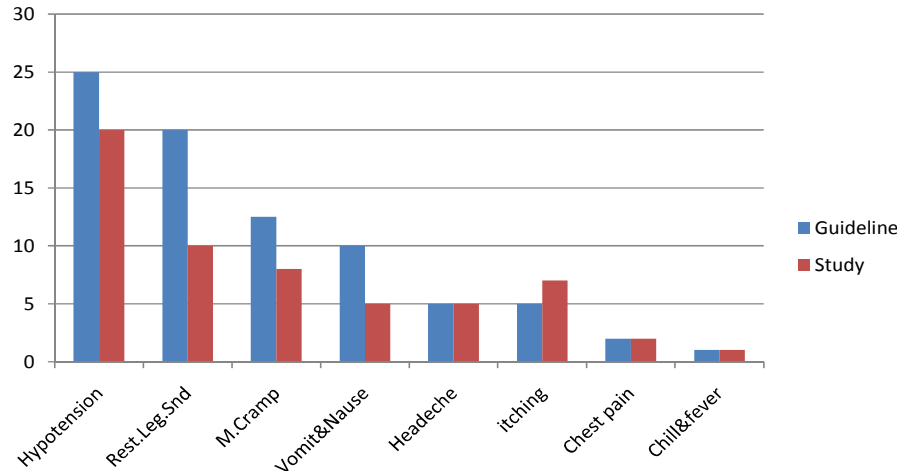


Figure 2. Hemodialysis patients' frequent complication in guideline and our study.

Table 1. Percent values of hemodialysis patients' frequent complication in guideline and our study.

Guideline mean	%	Our study mean	%
Hypotension	25	Hypotension	20
Restless leg syndrome	20	Restless leg syndrome	10
Muscle cramp	12.5	Muscle cramp	8
Vomiting and nausea	10	Vomiting and nausea	5
Headache	5	Headache	5
Itching	5	Itching	7
Chest and back pain	2	Chest and back pain	2
Chill and fever	1	Chill and fever	1

There are statistically significant differences between complications, guideline mean values and our study values ($P = 0.002 < 0.05$).

- 9. Uncontrolled diabetes should not be seen;
- 10. No usage of drugs and alcohol;
- 11. Patients should not be pregnant.

In studying L-carnitine, 3/7 1 g IV was applied. Arterial blood pressure measurements were done for every 30 patients having very serious fluctuations and hyper-hypo; although L-carnitine treatment was suspended. The excessive risk group of patients with high blood pressure arterial, in terms of intra-ocular bleeding, were evaluated by a specialist in eye diseases. In this evaluation, dialysis dose adjustments were considered for the treatment of heparin, and low molecular weight heparin was applied (LMWH). In the study, Daugirdas's guideline also stated a common complication in hemodialysis patients, 8 of which were selected for center frequency comparison. The following were arranged in order of frequency of complications in the selected guideline: 1) hypotension, 2) muscle cramps, 3) restless leg syndrome, 4) nausea and vomiting, 5) headache, 6) chest and back pain, 7) itching, and 8) chills and fever.

RESULTS

In this study, the incidence of complications are; (1) hypotension (20%), (2) restless leg syndrome (10%), (3) muscle cramps (8%), (4) itching (7%), (5) headache

(5%), (6) nausea and vomiting (5%), (7) chest and back pain (1%), and (8) chills and fever (1%). Guidelines on the incidence of complications are: (1) Hypotension (20 to 30%) with a mean of 25%; (2) Muscle cramps (5 to 20%) with a mean of 12.5%; (3) Restless leg syndrome (20%); (4) nausea and vomiting (5 to 15%) with a mean of 10%; (5) headache (5%); (6) Itching (5%); (7) Chest and back pain (2%), and (8) Chills and fever (1%) (Figure 2 and Table 1).

In the study's center, L-carnitine was used during the 12-month period in patients with complications. However, according to the figures, an average reduction was seen in densities and growth rates of the guidelines, that is, 20% reduction in the incidence of hypotension, 36% reduction in the incidence of muscle cramps, 50% reduction in the incidence of restless leg syndrome, 100% reduction in the incidence of nausea and vomiting and 100% decrease in the incidence of pain in the chest and back. It was observed that no change in complications was seen with regards to headache and chills-fire, although an increase of 40% was found in pruritus semptomunda.

DISCUSSION

L-Carnitine treatment in dialysis patients is one of the first studies conducted by Ahmad et al. (1990), concerning its use. In this study, double blind, ultimately derived from muscle cramps which are less common in patients with L-carnitine, has been shown (Ahmad et al., 1990). In some studies carried out, the treatment of anemia in ESRD patients was done by L-carnitine, or rHuEPO was used against the resistant cases, where positive evidence is observed for the effectiveness (John et al., 2003). As it is known, L-carnitine, particularly in the muscles, plays a vital role in the cell's energy production, whereas long-chain fatty acid is carried out as a function of mitochondria transporter (Figure 1).

ESRD'li in patients treated with hemodialysis, kidney function and reduced levels of L-carnitine appears to remain outside. The research reveals that during hemodialysis treatment, in addition to a decrease in dietary carnitine, carnitine is removed from the body. Therefore, the dialysis patients are found with low muscle carnitine levels (Yazar et al., 2009). In this research, it was observed that the use of L-carnitine in these patients showed frequent complications in the muscle function, and strength increases and decreases. In our study that was done in our center, a comparison of our complications was done with Harold B. and John T. guideline and Daugirdas's identification of complications that occur during hemodialysis. In our study, it was noted that aside itching, other complications were considerably less seen. On the other hand, the patients of this study were of advanced age. Hemodialysis patients in this age group had a high prevalence of secondary hyperparathyroidism seen in our center, in addition to the height of the incidence of familial Mediterranean fever (FMF) (Yazar et al., 2009; Yazar and Kayhan, 2010), which described an increase in itching complication. In our opinion, the incidence of complications in hemodialysis patients with L-carnitine, by revealing the reduced treatment alone, significantly increases the quality and satisfaction of the patient. However, patient satisfaction is very important for the adequacy of hemodialysis in terms of research, that is, the patient is happy for the stipulated time (4 h) needed to complete the session without cramps and muscle pain (Yazar et al., 2009; Yazar and Kayhan, 2010).

Conclusion

In this study, hemodialysis patients, with a common complication, were treated in our center by the use of L-carnitine which decreased the occurrences of different

symptoms, aside itching, headache and chills and fever, but no change was recorded. Itching symptoms were examined in the patients, the majority of which were elderly people diagnosed with FMF front. However, it was concluded that this situation may lead to an increased incidence of pruritus.

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