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**RESEARCH ARTICLE**

# STUDY OF EFFECT OF HEPATITIS C VIIRUS ON DEXA SCAN IN PREVALENT HEMODIALYSIS PATIENTS

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**ABSTRACT**

Studying whether HCV infection is associated with osteoporosis or not , has yielded controversial results, especially so in Hemodialysis patients with superadded HCV infection . Forty patients on prevalent HD were included in this study. Twenty patients were HCV +ve and twenty patients were HCV – ve. For all patients, the following was done: Complete physical examination and DEXA T - & Z- scores of both lumbar and femoral regions, Hb, blood urea, serum creatinine, serum Iron, ALT, AST, CRP, serum Albumin, serum calcium, serum phosphorus, PTH, and serum Alkaline Phosphatase. We found that osteoporotic DEXA scores were more present among HCV + ve than HCV – ve patients ($P < 0.05$), and that lumbar region was more affected than femoral region in both groups.



## INTRODUCTION

As patients with chronic kidney disease may develop renal osteodystrophy, whole body dual energy X – Ray absorptiometry (DEXA) is used to assess bone mineral density (Antjie *et al*., 2010).

The chronic kidney disease – mineral and bone disorder (CKD – MBD) clinical practice guidelines by KDIGO, (2009 ), suggests that bone mass density testing should not be performed routinely because bone mineral density doesn ‘t predict fracture risk as it does in the general population, and it doesn‘t predict the type of renal osteodystrophy (Soichiro *et al*., 2012).

Early detection of reduced bone mineral density is an important means of prevention, and DEXA is the most helpful modality (El – Husseini *et al*., 2013).

The prevalence of hepatitis C among the Egyptian population is one of the highest registered in all age groups (Atkinson *et al*., 1956; Abdel – Aziz *et al*., 2000).

The prevalence of HCV antibody is high in patients undergoing haemodialysis. (Jabbari *et al*., 2008). The association between osteopenia and various types of liver disease has been described for more than half a century.(Atkinson *et al*,1956).

Data from several studies suggested that HCV by itself provokes osteopenia, (Schiefke *et al*., 2005; Hofmann *et al*., 2008; Nanda *et al*., 2009 ; Pelazas – Gonzalez *et al*. , 2013), and that there was a relation between the severity of liver disease and the degree of bone loss at the spine or femoral neck , (Lin *et al*. , 2012).

## PATIENTS AND METHODS

Forty patients on prevalent hemodialysis were randomly chosen from Ahmed Maher Hospital and El – Zaytoon Specialized Hospital (Cairo - Egypt ). All patients were on hemodialysis sessions thrice weekly , every session lasting for 4 hours, using high flux filters and bicarbonate dialysate solution. All our patients were complaining of bone pains.

Our patients were subdivided into 2 patients groups, matched together as regards age, sex, and hemdialysis duration. Group A: Twenty HCV positive HD patients (Hepatitis C virus antibody or Hepatitis C virus antigen or both). Group B: Twenty HCV negative HD patients. Our patients were not receiving any kind of antiviral therapy. For the two groups the following was done: Complete physical examination, laboratory parameters measured according to standard methods used within the two hospitals: Hemoglobin (g / dl), blood Urea (mg / dl), serum

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Creatinine (mg / dl), serum Iron (ug / dl), serum ALT (U / L), serum AST (U / L) , CRP (mg / L), serum Albumin (g / dl), serum Calcium in mg / dl (using unicell DXC600 Beckman by arsenzo III method), serum phosphorus in mg / dl (using unicell DXC 600 Beckman by Phospho – Molib. Method), Parathyroid hormone in pg / ml (using Cabas e411 by Chemilumin method), & Alkaline Phosphatase in IU / L (using CXg – Alx by DGRC method). Administered drug doses (Erythropoietin, Iron, One alpha – Calcidiol, and elemental Calcium suuply ).Abdominal Ultrasonography was performed to exclude cirrhosis .DEXA using LUNAR Dpx – MD +, 8548, Code number 60719, manufactured by GE medical system LUNAR, Madison / Wi USA 2001 . A T-score is a number of standard deviations from peak bone mass of healthy women aged 20-29. A T-score of -2.5 or less was diagnostic of osteoporosis, while a T-score of -1 to -2.5 is diagnostic of osteopenia. (Neustadt and Pieczenik, 2012). The Z- score is the number of SD an individual BMD value deviates from the mean value in age-, race - and sex – matched healthy subjects of general population. As recommended by the WHO, we defined osteopenia as a Z – SCORE between -1 and -2.5, and osteoporosis as a Z – score less than or equal to 2.5 .(Kanis *et al*., 1994).

An informed consent was taken from all patients before start of the study.

Exclusion Criteria included patients under age 18 years ,patients having Diabetes Mellitus, patients having malignancy and infiltrative bone disease, patients suffering from cirrhosis (as proved by ultrasonography) or liver cell failure, patients having ALT levels more than twice normal, hepatiitis B virus and HIV positive patients, patients who had performed barium study for the previous 10 days, patients having prior bone scan, patients who have performed parathyroidectomy.

**Statistical Analysis**

Independent t- test was used to compare means from two independent samples. Pearson Correlation test was used to estimate the strength of linear relationship between two continuous variables. Multiple regression analysis was performed to estimate the variables that affected different Lumbar and Femoral DEXA parameters .Odd ' s Ratio (OR) was calculated using Logistic Regression Analysis, dependent variable was HCV grouping. P value $< 0.05$ is considered as significant, P value from 0.051 to 0.07 is considered as borderline significant, P value $< 0.01$ is considered as highly significant, and P value $> 0.07$ is considered as non – significant.

## RESULTS

Mean age of HCV positive group A (47.9 $\pm$ 9.45 years) didn ' t show any significant difference as compared to HCV negative group B mean age (48.2 $\pm$ 9,64 years), (P = 0.921). Female patients constituted 45 % (9 patients out of 20) in each of HCV positive group A and HCV negative group B, while male patients constituted 55 % (11 patients out of 20) within the same two groups , with no statistically significant difference in gender distribution between the 2 groups (P = 1.000).Hemodialysis duration was (9.05 $\pm$ 5.04 years) in HCV +ve group A and (7.80 $\pm$ 3.32 years) in HCV –ve group B, with no significant difference between them.

There was no statistically significant difference between HCV +ve group A and HCV – ve group B as regards the following drug doses ($p > 0.094$): Epo dose being 32000 $\pm$ 12640 IU / month in group A and 27560 $\pm$ 14840 IU / month in group B; IV iron dose being 55.4 $\pm$ 20.2 mg / month in group A and 44.6 $\pm$ 21.8 mg / month in group B; One alphacalcidiol dose being 3.86 $\pm$ 2.40 µg / week in group A and 3.67 $\pm$ 1.32 µg / week in group B; and elemental Calcium dose being 3450 $\pm$ 1200 mg / day in group A and 3475 $\pm$ 1665 mg / day in group B.

## DISCUSSION

Chronic kidney disease (CKD) affects 10 % of the population and is associated with alterations in bone and mineral metabolism (Cunningham, 2007).

Renal osteodystrophy, which is seen in patients with chronic renal failure, is a pathology that causes morbidity and disturbs the life quality. It was firstly defined by Liu and Chu in 1943. (Mandiroglu *et al*., 2013)

Osteitis fibrosa cystica, osteomalacia , adynamic bone disease (ABH ) and osteoporosis are the clinical components of CKD – MBD (Mandiroglu *et al*., 2013). Several types of disorders can be observed, ranging from high - turnover (hyperparathyroidism) to low – turnover bone lesions (adynamic bone). In addition to renal failure, CKD – MBD may be worsened from a combination of various factors such as vitamin D deficiency, hyper – parathyroidism, malnutrition, the use of certain drugs (previous corticosteroids or immunosuppressive use, phosphate binders, vitamin D analogs), or hypogonadism .(Cunningham, 2007).

Poor nutritional state, heparin use, inadequate dialysis , and chronic acidosis were contributing factors to osteoporosis in dialysis patients. (Sit *et al*., 2007; Kayabasi *et al*., 2010).

Compared to a normal population, fracture occurrence is higher in CKD patients at all skeletal sites e.g. hip , vertebral, wrist, as soon as GFR falls below 60 ml / min per 1.73 $m^2$. (Nickolas *et al*., 2006; Ensrud *et al*., 2007). In dialyzed patients (end – stage renal disease , ESRD), there is a fourfold increased risk of hip fracture (Alem *et al.* , 2000; Miller, 2005; Miller *et al*., 2005), that positively correlates with age, duration of dialysis , low parathyroid hormone (PTH) levels (Coco and Rush, 2000), female gender, low body mass index (BMI), presence of peripheral vascular disease, and tobacco abuse (Alem *et al.* , 2000).

Recently, association between metabolic bone disease and chronic liver diseases has been increasingly reported, including many authors to create a new entity known as' hepatic osteodystrophy '.The importance of such a condition is further increased by morbidity of these two

diseases, which greatly reduce patients quality of life because of frequent fractures, especially vertebral and femoral neck ones. The explanation for the association between bone diseases and chronic liver disease is still uncertain, and involves many factors : from hypogonadism to use of corticosteroid drugs , and from genetic factors to interferon therapy .(Mansueto *et al.* , 2011) .

The prevalence of osteoporosis among patients with chronic liver disease ranges from 10 % to 60 % . (El – Husseini *et al.* , 2013).

Unlike vertebral fractures, femoral neck and extremities ones, are less frequent in patients with chronic liver disease .(Sanchez and Aranda – Michael, 2006).

The most dangerous aspect of osteoporosis is not a T – score .If you have osteoporosis and fracture a hip, there is a 20 % chance of dying within the year. After a hip fracture, only 50% of people regain the same level of independence they had before the injury (Gregg *et al.*, 1998).

In our study, Lumbar DEXA parameters were significantly and insignificantly lower in HCV + ve group A HD patients than HCV – ve group B HD patents: L2 T – score (P = 0.005), (OR = 0.515, Sig = 0.015, 95 % CI = 0.301 – 0.88), L2 Z –score (P = 0.005), (OR = 0.518 , Sig = 0.012, 95 % CI = 0.31 – 0.866), L2 L4 Z –score (P = 0.004), (OR = 0.494, Sig = 0.012, 95 % CI = 0.285 – 0.854).

Femoral DEXA parameters were significantly and insignificantly lower in HCV + ve group A HD patents than HCV - ve group B HD patients: Ne Z – score (p = 0.07), (OR = 0.563, Sig = 0.079 , 95 % CI = 0.296 – 1.069), Wa Z – score (P = 0.045), (OR = 0.608, Sig = 0.054, 95 % CI = 0.367 – 1.008), Tot Z – score (P = 0.071), (OR = 0.503, Sig = 0.078 , 95 % CI = 0.235 – 1.079).

These results may be due to superadded lowering bone density effects of each of chronic hepatitis and HCV infection to the lowering bone density effect of ESRD and Hemodialysis procedure. The impaired hydroxylation of vitamin D3 in the kidneys of HD patients has been exacerbated by the compromised hydroxylation of the same vitamin within the HCV infected liver.

Mandiroglu *et al.*, 2013, have found that DEXA values of HD cases were significantly lower than the control group , without renal or bone pathology. ($P < 0.05$).They also found that Femoral and Lumbar BMD values among Hemodialysis patients were respectively - 1.7 and -1.5.

It was reported that, bone loss on femur neck is higher than lumbar vertebra in HD patients, because decrease in load at femur is more prevalent than lumbar vertebrae due to decreased physical activity (Asaka *et al.*, 1992; Rizzoli *et al.*, 1995).

Stein *et al.*, 1996, used Z- score , and found 8 % prevalence of osteopenia at the lumbar spine, and 13 % at the femoral Neck.

Arici *et al.*, 2000, found that bone mass of HD patients was lower than that of controls, but spinal BMD was not different.

Schiefke *et al.*, 2005, reported that bone mass density was low in patients with chronic non – cirrhotic hepatopathy, suffering from chronic viral infection by hepatitis C virus.

The effect of chronic HCV infection on bone disease is poorly understood. Although some studies have reported an increased prevalence of osteoporosis in patients with chronic HCV, (Corazza *et al.*, 2000; Schiefke *et al.*, 2005), others did not find this effect (Gonzalez – Calvin *et al.*, 2004; Yucel *et al.*, 2004; Nanda *et al.*, 2009), especially in non – cirrhotic HCV – positive patients . (Chen *et al.*, 1996; Gallego – Rojo *et al.*, 1998; Corazza *et al.*, 2000), in their studies determined the prevalence of osteoporosis as ranging from 0 to 37.5 %, within the sub – group of patients with Child – Pugh Class A viral cirrhosis.

In our study, mathematically speaking, on adding the mean values of lumbar T – and Z – scores to their + ve and - veSD values, we found that: All lumbar T – and Z – score values ranged from osteopenia levels to osteoporosis levels within HCV + ve HD group A, while within HCV – ve HD group B, only L2L4 T- score was extending from osteopenia to osteoporosis range, and the remaining lumbar T – and Z – score values within this group, were within osteopenia range only.

In our study, mathematically speaking, on adding the mean values of femoral T – and Z – scores to their + ve and -ve SD values, we found that: All HCV – ve HD group B femoral T – and Z – score values were within osteopenia range only, while within HCV +ve HD group A, only Ne T – score and Wa T – score values were extending from osteopenia to osteoporosis range, while the remaining femoral T – and Z – score values were within osteopenia range only.

From previous results, we could deduce that HCV +ve HD patients bone mineral density was more affected than HCV – ve HD patients, and that in both groups, lumbar region was more affected than femoral region, in a more obvious way in HCV +ve than in HCV – ve patients. Femoral bone mineral density T – and Z – score values were affected in a lower than expected extent within HCV + ve patients.

Mahmoudi *et al.*, 2011, stated that the low rate of osteoporosis at the femoral neck of their patients could be explained by a much lower turnover of cortical bone than that of trabecular bone and the fact that the lumbar spine is mostly affected in cirrhosis . Their study showed that in compensated cirrhosis patients, a prevalence of osteoporosis up to 11 % at the lumbar spine, and 4 % at femoral Neck was present.

In our study, we found that age mean value was slightly higher in HCV –ve patients than HCV +ve patients in a statistically insignificant way, (P = 0.921).

Within HCV +ve group A patients , age had a significant inverse correlation to each of Ward Z – score (r = - .496, P = 0.026) & Trochanter T – score (r = - 0.488, P = 0.029). This may suggest that Hemodialysis patients with co – existant age range around 50 years and HCV positive status are more prone for having femoral osteoporosis. This relationship didn ' t exist in the studied HCV – ve group B, although they had nearly the same age mean value, which shows the impact of HCV infection on femoral bone density in hemodialyzed patients. In a regression analysis within HCV +ve group A, age showed an inverse borderline significant impact on Ward Z – score (t = - 2.005,P = 0.062), and this confirmed previous results.

Advanced age was identified as a risk factor for dcreased bone mineral density in the general population. (Kayabasi *et al*., 2010)

Mansueto *et al*., 2011, reported that risk of fractures increases gradually with advanced age.

Dialysis duration was insignificantly higher in HCV +ve patients than HCV -ve patients, and it didn ' t show any significant correlation to any of the studied laboratory or DEXA parameters, within both groups. Also , in Regression Analysis, HD duration didn 't show any significant impact upon any of the studied parameters within both groups, which means that it didn ' t affect our results in any way.

Mandiroglu *et al*., 2013, found that hemodialysis duration showed an inverse significant relationship with Femur Neck BMD (P < 0.05).

HCV infection duration within HCV positive group A didn ' t show any significant correlation to DEXA parameters & it also didn ' t have any significant impact upon these same parameters, using Regression Analysis within the same group. This means that time didn ' t play a role in the effect of HCV infection on our results.

Sex distribution was the same within HCV+ve group A & HCV –ve group B, and it didn ' t play any role in creating significant and insignificant differences between various DEXA parameters measured within the two groups .Inspite of this, we found that within HCV +ve group A , Ne T-score mean value was significantly lower in females than males (P = 0.048), and that Tot T-score had a borderline significantly lower mean value in female patients explained as an exaggeration of the normally higher bone density present in male human beings as compared to female human beings within this same age range and also this could be due to the different hormonal constitution, as all our female patients were menopausal (wether because of the enrolled patients age range or to the presence of chronic renal failure, and also the superadded chronic inflammatory state due to hemodialysis and chronic HCV infection).These findings didn ' t exist among HCV- ve group B male and female patients.

Female gender was identified as a risk factor for dcreased bone mineral density, in the general population .(Kayabasi *et al.* , 2010).

Mahmoudi *et al*., 2011, reported that all mineral density indices (lumbar and femoral T – scores, total, lumbar and femoral BMD), were significantly lower in women compared to males. Female gender was an independent factor for osteoporosis in patients with chronic liver disease.

Mandiroglu *et al*.,2013, found that in Women on HD, Femoral Neck BMD values were lower than Lumbar spine BMD values.

Kayabasi *et al*., 2010, found that according to T – score measurement in peritoneal dialysis, Osteoporosis was found in 23.5 % of female patients and in 21.4 % of male patients at femoral Neck , and in 8.8 % of female patients and in 3.6% of male patients at lumbar spine.

Arase *et al*., 2010, has found that postmenopausal women with chronic liver disease caused by hepatitis C virus had a cumulative development rate of bone fractures as high as 17.4 % at 15$^{th}$ year.

Serum Creatinine was significantly lower in HCV +ve group A patients than HCV - ve group B patients (P = 0.046), with a borderline significant Odds Ratio (OR = 0.619, Sig = 0.054 , 95 % CI = 0.380 – 1.009).

Serum creatinine showed a positive Correlation with L2 T-score within HCV – ve group B (r = 0.478 , P = 0.033), while this relationship didn ' t exist within HCV +ve group A .

In a Regression Analysis within HCV + ve group A , Serum Creatinine had an inverse borderline significant effect on Tro T – score (t = - 2.018, P = 0.067). This relationshipdidn ' t exist within HCV – ve group B.

This may imply that in Hemodialysis patients, in most instances, the lower creatinine levels coincide with lower DEXA parameters values, except in the presence of HCV infection where inverse relationships takes place due to some not yet known cause, despite the well known relationship of chronic liver disease and osteoporosis.

Ensrud *et al*., (2007), observed an inverse correlation between femoral neck BMD and risk of hip and spine fractures in women with moderate to severe renal impairement.

Serum Albumin had a borderline significantly lower mean value within HCV +ve group A as compared to HCV -ve group B (P = 0.051), with a borderline significant Odds Ratio (OR = 0.229, Sig = 0.060, 95 % CI = 0.049 – 1.065),

this may be due to the chronic hepatic inflammatory state associated with HCV infection.

We didn ' t find any significant Correlation between Serum Albumin and any of the Lumbar or Femoral DEXA parameters, within both HCV +ve and HCV –ve patient groups.

In a Regression Analysis, within HCV –ve group B, Serum Albumin has shown a significant positive impact on L2 L4 T- score (t = 2.693 , Sig = 0.02).This relationship didn ' t exist within HCV + ve group A, which had a lower mean value of Serum Albumin, which could be the cause of not having a significant impact on L2 L4 T – score.

In a Regression Analysis, Serum Albumin had a positive significant impact on Neck T – score (t = 2.426 , P = 0.032), within HCV – ve group B and this was expected as serum Albumin is one of the important nutrition state markers and its relationship to serum Calcium is well established.

The inverse relationship of each of Serum Creatinine and Serum Albumin to DEXA parameters within HCV + ve patients versus the direct relationship within HCV – ve patients, reflects the inverse biochemical state relationships of HCV + ve patients on HD, which are superadded to the already present disturbances of chronic renal failure and Hemodialysis procedure.

ALT mean value was significantly higher in HCV +ve group A patients than HCV - ve group B patients (P = 0.002), with a significant Odds Ratio (OR = 1.131, Sig = 0.007, 95 % CI = 1.034 – 1.237).

ALT showed positive Correlation with Neck T – score within HCV – ve group B (r = 0.533 , P = 0.016), while it didn ' t show this relationship within HCV +ve group A .

Again in a Regression Analysis within HCV – ve patients, ALT had a significant positive impact on Ward Triangle T- score (t = 2.238,P = 0.045). This Regression Analysis results didn ' t exist within HCV + ve patients, who seemed to be less prone to be affected by their elevated ALT mean value .This relationship needs to be further studied within HCV – ve HD patients.

The previous results were partially explained by finding that CRP was only insignificantly higher within HCV + ve patients as compared to HCV –ve patients (P = 0.560)., and this was controversal to what was expected.

In a Regression Analysis within HCV + vepatients, CRP had a positive significant impact on Ward Triangle T – score (t = 2.492, P = 0.028), and these conflicting results didn ' t exist within HCV – ve group B, may be due to a subtle inflammatory state present within HCV + ve patients which is not reflected obviously enough upon CRP levels, and it seems that HCV infection superimposed on HD protected patients against additional effects of chronic hepatic inflammatory state on bone mineral density.

Hosny *et al*., 2015, reported that CRP median levels were within normal range in both HD patients with and without HCV infection, although it was insignificantly higher in HCV positive patient group.

PTH mean value was much significantly higher within HCV – ve patients than HCV + ve patients (P = 0.026), with a significant Odds Ratio (OR = 0.999, Sig = 0.041, 95 % CI = 0.998 – 1.000). HCV + ve patients seemed to be somehow protected against having very much elevated levels of PTH as compared to HCV – ve patients.

Within HCV –ve group B, PTH showed an inverse significant Correlation to Ward Z – score (r = -0.479, P = 0.033), and a borderline inverse Correlation to each of Wa T – score (r = -,0.428, P = 0.06), Tro Z – score (r = - 0.427, P = 0.06), and Tot Z – score (r = - 0.424, P = 0.07).These relationships didn ' t exist within HCV +ve group A patients.

In a Regression Analysis within HCV + ve group A , PTH had a positive significant impact on Tot T – score (t = 2.352, P = 0.037), and a borderline positive significant effect on Neck T – score (t = 2.082 , P = 0.055). Again, HCV + ve patients has shown conflicting results as regards PTH relationship to their Femoral DEXA parameters, which could mean that in case of HCV + ve HD patients, the facts settled to HCV - ve HD patients cannot be applied. Somehow, above – normal PTH levels which were significantly lower in the HCV +veHD group, .were not the only factor leading to lower DEXA values on comparing this group with an age- and a sex- matched HCV – ve group.

Chronic PTH hypersecretion is related to high turnover bone disease, with increased risk of fractures and bone deformities (Martin and Gonzalez, 2007).

Schiefke *et al*., 2005, suggested that i PTH could be partially responsible for shifting bone metabolism towards bone resorption, even in young patients with chronic hepatitis .

Asaka *et al*., 1992; Rahimian *et al*., 2008; and Mandiroglu *et al*., 2013, found an inverse relationship between i PTH and BMD values, among Hemodialysis patients.

Schiefke *et al*., 2005, reported that elevation of i PTH serum levels inversely correlated with Femoral Neck BMD and directly correlated with an increase in bone Alkaline Phosphatase, without further evidence of a high - turnover bone loss.

Mansueto *et al*., 2011, reported that both in hepatic inflammation and fibrosis, the increase in osteoclasts activity, resulting in enhanced bone resorption, is mediated by osteoclastogenic pro – inflammatory cytokines, such as IL – 1 and TNF. Alkaline Phosphatase (ALP) was insignificantly higher in HCV – ve group B than HCV + ve group A (P = 0.447), which could mean that bone turnover rate is less in HCV +ve patients. In a Regression

Analysis within HCV + vegroup A , Serum Alkaline Phosphatase had a significant positive effect on Tro T – score (t = 2.713 , P = 0.016). Also, Serum Alkaline Phosphatase had a positive significant effect on Tro T – score (t = 2.379, P = 0.031), within HCV - ve group B.

This means that bone turnover disease was not much high in our HCV + ve HD patients and that within both groups, and inspite of the significant difference in the very high PTH levels and the DEXA parameters values between the 2 groups, the same pattern of relationship existed between bone turnover biochemical parameters and femoral DEXA parameters. The lesser level of Alkaline Phosphatase which suits the lower bone density parameters values, reflected the effect of HCV + ve infection, but this effect magnitude was much less than what was expected. This suggested that, may be uremic toxic milieu wasn ' t much suitable for HCV to act on bone remodeling process enough, in order to decrease much the values of bone density parameters, and we do believe in the presence of other mechanisms leading to the lower bone mass density values within this group.

Reduction of bone formation, observed in patients with chronic liver disease, was associated with low serum levels of insulin - like growth factor -1 ( IGF -1 ) , protein known to be involved in bone remodeling and maintenance of bone mass.(Gallego – Rojo *et al.* , 1998 ).

Mandiroglu *et al*., 2013, found that serum ALP level were significantly higher in HD patients than in control subjects with no renal or bone pathology. Suchowierska and Mysliwiec, 2010, reported that it is known that there is no correlation between serum ALP level and clinical types of renal osteodystrophy.

Within HCV + ve group A , One Alpha Calcidiol dose had a direct significant Correlation to L2L4 T – score (r = 0.791, P = 0.034), and Neck T – score (r = 0.791 , P = 0.034), and borderline Significant Correlation to Neck Z – score (r = 0.718, P = 0.069), and these Correlations didn ' t exist within HCV – ve group B. Within HCV – ve group B, elemental Calcium had a direct significant Correlation to Tro Z – score (r = 0.697, P = 0.001) and borderline direct significant Correlation to each of Tro T – score (r = 0.412, P = 0.08) and Tot Z – score (r = 0.437, P = 0.07) and these correlations didn ' t exist within HCV + ve group A .

## CONCLUSION

HCV positive Hemodialysis patients are more prone to have a greater degree of bone mineral density loss and osteoporosis than HCV negative Hemodialysis patients . In both groups, lumbar region was more affected than femoral region.

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