

hydrogen peroxide may cause inhibition of SOD activity<sup>16</sup>. On comparison between pre and post dialysis groups the antioxidant enzymes levels of SOD, catalases, GPX were significantly increased. There is conflicting report on the antioxidant level during dialysis; some authors have registered no change<sup>17</sup>, whereas some have reported decreased levels and some have reported increased levels<sup>18,19</sup>. Our study shows increase of antioxidant level during dialysis. When Group II, IIIA and Group VA were compared with group IV of tuberculosis group it was found that the levels of antioxidant enzymes such as SOD, catalase, GPX were significantly lower. This shows that in patients renal disease with and tuberculosis (dual disease), the antioxidant enzymes are further diminished when compared to patients who had pulmonary tuberculosis alone. The levels of vitamin C were significantly lower in group II, IIIA, IV and VA when compared to Group I. During dialysis Vitamin C was significantly reduced indicating that it is lost in the dialysate as it is water soluble. It has been suggested that concentration of Vitamin C in hemodialyzed patients are lower than those of controls, and they fall even further after hemodialysis<sup>20</sup>. This further supports the study that there is depletion of vitamin C in CKD patients. When CKD patients of Group II, III and V compared to patients with pulmonary tuberculosis (Group IV), vitamin C levels were significantly low in CKD groups. In order to restrict potassium intake, most dialysis patients are advised to consume only a very limited amount of fruits, the dietary intake of vitamin C, is likely to be poor. Non enzymatic antioxidant of Vitamin E was significantly reduced. Plasma Vitamin E levels are reported to be highly variable in CKD and patients on hemodialysis but not routinely depressed and may even be elevated above control levels<sup>21</sup>. High plasma Vitamin E levels were observed in patients with CKD<sup>22</sup>. According to Syein G et al<sup>23</sup> reported that under normal conditions of conservative or dialysis treatment of CKD patients, Vitamin E seems not to be a factor concerning uremic symptoms and there seems to be no need for Vitamin E supplementation. This further supports this studies observation. However in patients with tuberculosis Vitamin E levels were low when compared to controls. Ongoing activation of lung macrophage and associated free radical mediated pulmonary fibrosis may result in chronic oxidative stress with consequent diversion of Vitamin E to the lungs of patients with pulmonary underlying the increase of Vitamin E is not clear. Lipid peroxidation as a measured by levels of MDA was significantly increased in Group II, III, IV and V when compared to group I of healthy subjects. When the mean of pre and post dialysis levels of MDA are compared the level of MDA was lower in post hemodialysis. This shows that during the MDA levels reduced due to the removal of uremic toxins, corrections of azotemia and improvement in cardiovascular status after dialysis<sup>24,25,26</sup>. The levels of MDA in patients with tuberculosis were significantly lower than that of CKD patients. This shows that CKD patients have more antioxidant stress than that of tuberculosis patients. In CKD / TB patients the MDA levels were significantly increased that that of Group II, Group IV. This show that in dual disease there is ongoing high level of oxidant stress observed.

## CONCLUSIONS

Evaluation of plasma malondialdehyde (MDA) as a measure of lipid peroxidation and estimation of antioxidant enzymes can lead to a better understanding of free radical damage as a result of oxidative stress in patients of CKD, patients with pulmonary tuberculosis and those of CKD with TB. In patients with CKD and in those with pulmonary tuberculosis, the mean plasma MDA levels were higher and the hemolysate concentrations of antioxidants enzymes were lower than in healthy volunteers. The mean levels of these substances were slightly lower in patients with pulmonary tuberculosis when compared to that of the levels in patients with CKD.

However, Vitamin E levels were found to be greater in patients with CKD when compared to healthy volunteers and in patients with tuberculosis. The mechanism behind the increased levels of Vitamin E in patients with CKD would need further study. In patients with CKD and tuberculosis, the mean plasma MDA levels were found to be higher and levels of antioxidant enzymes were lower than the healthy volunteers. When comparing the mean values of MDA in patients with CKD, tuberculosis and patients of CKD with pulmonary tuberculosis it was found that the mean levels of MDA was significantly higher in the patients with CKD and Tuberculosis. The increased MDA levels and lower antioxidant enzymes levels in patients with CKD and tuberculosis denotes the increased free radical damage in these patients when compared to patients with either of these conditions separately.

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