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A Study on Quality of Life, Oxidative Stress and Antioxidant Status Associated with Clinical and Biochemical Parameters in Chronic Kidney Disease Patients on Hemodialysis

Shivagovindan.K.P[2]*, V.Kuzhandai Velu[2] S.SakthiDasan[1] and S.Bhaskaran[3]

[1]Department of Biochemistry, Melmaruvathur Adhiparasakthi Institute of Medical science and Research. Melmaruvathur-603 319, Tamilnadu, India.

[2]Department of Biochemistry, Mahatma Gandhi Medical College and Hospital; Sri Balaji Vidyapeeth University, Pondicherry, India.

[3]Department of Nephrology, Melmaruvathur Adhiparasakthi Institute of Medical science and Research. Melmaruvathur603 319, Tamilnadu, India.

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KEYWORDS

Quality of life (QOL), Oxidative stress (OS), Hemodialysis (HD), TBARS (Thiobarbituric acid reactive substance), GSSG (Oxidized glutathione), GSH (Reduced Glutathione), GPX (Glutathione Peroxidase).

ABSTRACT:

Background: Chronic Kidney Disease (CKD) is an emerging non-communicable disease of publi health importance. Oxidative stress (OS) has been implicated in the pathogenesis of cardiovascular deat and CKD patients are at increased risk of both OS and cardiovascular death. Among the many chroni diseases that affect the population, CKD is considered a pathology without expectation of the cure, wit rapidly and progressive evolution, triggering diverse reactions for patients and compromise the quality c life (QOL).

Methods: This cross sectional study consisted of 98 patients with CKD undergoing dialysis treatment i Hemodialysis unit of a tertiary care hospital Melmaruvathur Tamil Nadu. Patients included with CKI over 18 to 75 years old, both genders and dialysis treatment for more than six months. The routin biochemical, clinical, anthropometric parameters and duration of dialysis collected from medica recorded data. The venous blood collected from post Hemodialysis patient, serum separated and analyse for oxidative stress as Thiobarbituric acid substance (TBARS), Oxidised glutathione (GSSG) reduce glutathione (GSH) and antioxidant status as Superoxide dismutase (SOD), Catalase (CAT) an Glutathione Peroxidase (GPO) by spectrophotometer assay. Short form (SF) 12 is a tool of questionnair used to assess quality of life.

Results: Age grouped as three groups such as less than 30yrs, 30 to 50yrs and above 51yrs. Associatio between age, quality of life and gender in which pain interference (p value 0.024) and emotiona problems with social activities (p value 0.050), general health (p value 0.012) were significant at 95% 0.05 Level. Comparison of lipid parameters with BMI in Kg/m2, TBARS & GSSG/GSH ratio a Oxidative stress and SOD, CAT, GPX as antioxidant status were highly significant (p value 0.0001) a 95% < 0.05 significance level by independent't' test. Correlation of oxidative stress (TBARS GSSG/GSH) and antioxidant status (SOD, CAT, GPX) in which TBARS with Catalase (0.306),GP (0.239), GSSG/GSH with SOD (0.478), CAT (0.601), GPX (0.465), SOD with CAT (0.668) and GP (0.551), CAT with GPX (0.749) were significant but no difference with TBARS,SOD and similarly SBI lipid parameters at 0.01 and 0.05 levels by Pearson correlation (2-tailed).

Conclusions: Oxidative stress plays an important role and progress cardiovascular complications i chronic kidney disease by decreasing antioxidant status which is reduced by using antioxidant coate membranes such as Vitamin E coated dialyzer. Specialized nursing and health care providers is require to maintain and manage on physical and mental health status to improve QOL in HD patients.

Journal of Chemical Health Risks

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1. Introduction

Chronic Kidney Disease (CKD) is an emerging noncommunicable disease of public health importance.[1]CKD is a prevalent, worldwide condition and the number of patients affected continues to increase.[2]Chronic kidney disease (CKD) is a global health problem with high mortality and modality rates.[3]In the terminal phase of CKD, Hemodialysis (HD) is the most widely used renal replacement therapy throughout the world, contributing to increased patient survival.[4]Globally, the estimated number of individuals affected by kidney disease exceeds 850 million with 843.6 million accounted for by CKD.[5] The global prevalence of kidney failure is uncertain, but was estimated to be 0.07%, or approximately 5.3 million people in 2017 [6], with other estimates ranging as high as 9.7 million. Worldwide, millions of people die of kidney failure each year owing to a lack of access to kidney renal transplantation (KRT).[7]

The number of deaths attributable to CKD in India rose from 0.59 million in 1990 to 1.18 million in 2016. [8]In India, it has been recently estimated that the age-adjusted incidence rate of End stage renal Disease (ESRD) to be 229 per million population (pmp), and > 100,000 new patients enter renal replacement programme annually.[9] A 2018 estimate put the number of patients on chronic dialysis in India at about 175,000, giving a prevalence of 129 per million populations.[10] The number of people receiving renal replacement therapy exceeds 2.5 million and is projected to double to 5.4 million by 2030; however, in many countries, there is a shortage of renal replacement services, and an estimated 2.3-7.1 million adults have died prematurely from lack of access this treatment.[11] World Kidney Day 2019 offers an opportunity to raise awareness of kidney disease and highlight disparities in its burden and current state of global capacity for prevention and management.[12]

Quality of life is defined by WHO as "the individual's perception of their position in life within the context of the culture and values systems in which are inserted, and in relation to their goals, expectations, standards and concerns"[13] In CKD patients undergoing Hemodialysis (HD), the main tool used to measure QOL is the Kidney Disease and Quality of Life Short Form (KDQOL-SF TM) [14, 15] Malondialdehyde (MDA) is a secondary by-product of cellular lipid peroxidation of polyunsaturated fatty acids [16] formed within the intracellular space by the degradation of membrane phospholipids.[17] Increased MDA and other biomarkers of oxidative stress (OS) contribute to elevated morbidity and mortality in HD patients.[18] Thiobarbituric acid-reactive substance (TBARS) is a marker of oxidative stress, which is a simple, inexpensive but less specific method to evaluate oxidative stress.[19]

There are a number of antioxidants present in the body and derived from the diet. Based on the location, they can be divided into intracellular and extra cellular antioxidants. Intracellular enzymatic antioxidants are Superoxide Dismutase (SOD), Catalase and Gluta-thione. Main non-enzymatic cellular antioxidant is reduced glutathione (GSH). Glutathione reductase (GR), Antioxidant enzymes such as catalase, superoxide dismutase and glutathione peroxidase maintain a reducing tone within cells.[20]

Chronic diseases have received increased attention from health professionals by presenting high rate of morbidity and mortality rates. Thus, it becomes a major concern for the public health field. Among the many chronic diseases that affect the population, CKD is considered a pathology without expectation of the cure, with rapidly and progressive evolution, triggering diverse reactions for patients and compromise the quality of life (QOL).[21, 22]

The basic marker of oxidative stress is the level of TBARS-thiobarbituric acid reactive substances (most often dialdehydes). Their formation results from degradation by free radicals of polyunsaturated fatty acids present in lipids.[23]Although much more elevated in patients undergoing HD. [24, 25] TBARS plasma levels are less elevated in conservatively-treated patients with renal failure. [23, 25]SOD and GPx are the enzymes of antioxidant defence in our body. As oxidative stress increases, the defence mechanism is overwhelmed by the repeated onslaught of the (reactive oxygen species) ROS, resulting in lower levels of these enzymes. It is also possible that persons with CKD have a lower concentration of antioxidant enzymes making them susceptible to the disease in the first place. [26, 27]

Glutathione is a tri peptidic thiol found in the inside of all animal cells and likely is the most cellular antioxidant. Oxidized glutathione (GSSG) is highly

Journal of Chemical Health Risks

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toxic to cells so that the organism tends to reduce GSSG to GSH through glutathione reductase. Thus, determining GSSG/GSH ratio is considered a reliable estimate of the degree of cellular oxidative stress. [28, 29]

The present study was to determine the quality of life (QOL) in ongoing Hemodialysis patients by using KDQOL SF-12 tool and to find the association of antioxidant status by measuring the SOD, Catalase, glutathione Peroxidase and oxidative stress by TBARS and the ratio of GSSH/GSH with biochemical parameters (Total cholesterol, Triglyceride, low density lipoprotein LDL, very low density lipoprotein VLDL, High density lipoprotein HDL, ratio TC/HDL) and clinical parameters such as Body mass Index (BMI) and Blood pressure.

2. Materials and method:

Study design: This cross sectional study was carried out at Melmaruvathur Adhiparasakthi Institute of Medical science and research, Tamil Nadu, India. The study protocol was reviewed and approved by institutional ethics committee: Registered Number. ECR/1487/Inst/TN/2020 MAPIMS/IEC/52/2022 based on ICMR guidelines on biomedical research in human beings and clinical practice. The written informed consent was obtained from participants voluntarily involved in the study.

3. Study subject:

The sample consisted of 98 patients with CKD undergoing dialysis treatment in Hemodialysis unit of a tertiary care hospital Melmaruvathur Tamil Nadu. The research included patients with CKD over 18 to 75 years old, both genders, who were undergoing dialysis treatment for more than six months.

Patients with smokers, antioxidant supplements, kidney transplantation or any acute cardiovascular event in the 3 months before screening and those receiving whole day tube feeding at the acute stage, hospitalized and who had suffered a stroke excluded from the study. The routine biochemical parameters such as Haemoglobin level, Haematocrit level, RBC, WBC, serum urea, serum creatinine, serum albumin are obtained from recorded medical data. Similarly, clinical parameters duration of dialysis are noted and anthropometric parameters such as height, weight, BMI and clinical parameters such as Systolic blood pressure and Diastolic blood pressure are also obtained from collected medical data.

4. Blood sampling and Biochemical analysis:

The venous blood collected from post Hemodialysis patient, serum separated and stored at -80 degree Celsius for further analysis of Thiobarbituric acid substance, Oxidised (GSSG) and reduced glutathione (GSH), superoxide dismutase (SOD), Catalase (CAT) and Glutathione Peroxidase (GPO).

5. Methodology:

TBARS (Lipid Peroxidase LPO assay) – is spectrophotometer assay measured by the reaction mixture consists of 100 µl sample and 2.5 ml of reagent (0.375% Thiobarbituric acid TBA, 15% Trichloroacetic acid TCA, 0.25N hydrochloric acid HCl). Boil for 10 min in water bath, observe for pink colour and cool. Sonicate for 30 min and centrifuge at 10000 rotation per minute (rpm) for 10 min. Collect supernatant and measure Optical Density at 532 nm. Melanoaldehyde was used as standard. Oxidised glutathione GSSG is determined by Reagent A - 0.2M sodium phosphate buffer (PH 7) containing 0.01M Ethyelene diamine tetra acetic acid EDTA, 0.5M glutathione reductase and 0.3mM NADPH and Reagent B-1mM DTNB(5,5'-Dithiobis-(2-nitrobenzoic acid) (Ellman's reagent) in 0.2m sodium phosphate buffer PH 7.5 containing EDTA. 100µl of samples was diluted with 100 µl of phosphoric acid. To this, 0.1ml of reagents A was added and added 0.1ml of reagent B to this mixture and mixed well. Optical density per minute was measured at 412nm. Reduced glutathione (GSH) was measured by 100 µl of sample was treated with 5% TCA, centrifuged at 10,000 rpm for 10 minutes and supernatant was collected. 100 µl of supernatant was taken to which 1 ml of phosphate buffer was added. To this 2 ml of DTNB added. After 10 minutes absorbance was read at 412 nm. Ratio of oxidized glutathione (GSSG) to reduced glutathione (GSH) was measured.

Superoxide dismutase (SOD) (Kakkar et.al, 1984)[30] was assayed by reagents consist of Carbonate buffer – 0.05M, pH 10.2, EDTA – 0.49M, and Epinephrine – 3.0M. 0.1ml of samples was diluted with 0.5 ml of distilled water. To this, 0.25 ml ethanol and 0.15 ml of chloroform, all reagents chilled, were added. The

Journal of Chemical Health Risks

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JCHR (2024) 14(3), 565-578 | ISSN:2251-6727

mixture was shaken for 1 minute and centrifuged at 2000 rpm. The enzyme in the supernatant was determined. To 0.5 ml of the supernatant, 1.5 ml of buffer was added. The reaction was initiated by the addition of 0.4 ml epinephrine and change in optical density per minute was measured at 470 nm in a SOD activity was expressed as unit per litre U/l. Change in optical density per minute at 50% inhibition to adrenochrome transition by the enzyme is taken as one enzyme unit.

Catalase (CAT) was assayed by reagents consist of Potassium dichromate prepared 50 ml of a 5% aqueous solution of potassium dichromate in distilled water. Slowly add 150 ml of glacial acetic acid to the dichromate solution of 0.2 M hydrogen peroxide H2O2 and Phosphate buffer 0.01M (pH 7.8). The assay mixture contained 2.5 ml of phosphate buffer, 2 ml of H2O2 hydrogen peroxide and 0.1 ml of sample. 1 ml was taken from above solution and added to 2 ml of dichromate/acetic acid reagent. Then the mixture was heated for 10 min in a boiling water bath. After cooling, the OD was measured at 570 nm. H2O2

Glutathione peroxidise (GPX) was measured by reagents consist of phosphate buffer saline PBS (0.4M) pH 7, EDTA 0.8mM, Sodium azide 10Mm, reduced glutathione 4Mm, Hydrogen peroxide 2.5Mm, TCA 10%, 0.3M disodium hydrogen phosphate and DTNB 40mg in 100ml. 100µl of samples was diluted with 0.2ml of EDTA and 0.1ml of sodium azide. To this, 0.1ml H2O2 and 0.2 ml of reduced glutathione was added 0.4ml PBS. The mixture was incubated at 37oc for 10mins.and added 0.5ml of TCA and 3ml of Na2HPO4.finally added 1ml of DTNB solution and the optical density was measured at 420nm. GPX activity was expressed as min/mg protein.

Short form (SF) 12 is a tool of questionnaire used to assess quality of life in Hemodialysis patients which is grouped on age as three groups such as less than 30yrs, 30 to50yrs, above 51yrs of age and gender as male and female. It consist of 12 questions each with score 1, 2, 3, 4, 5, 6 based on physical functioning (PF), role limitations due to physical health (RP), Bodily pain (BP), general health perception (GH), Social functioning (SF), role limitations due to emotional problems, Vitality (VT) and mental Health (MH). Activities with severe and moderate, physical health with accomplished less or not, kind of work, emotional problems with careful activities accomplished less or not, interfere of pain in normal work in home and outside home, feelings for past four weeks with calm, peaceful, downhearted, blue and energy and social activities of physical and emotional problems.

6. Results:

SF 12 form of questionnaire for Quality of life in Hemodialysis patient grouped as age and gender shown in the Table 1. Age grouped as three groups such as less than 30yrs, 30 to 50yrs and above 51yrs. Association between age and quality of life by Independent ‘t’ test were significant in pain interference (p value 0.024) and emotional problems with social activities (p value 0.050) with value at 95% < 0.05 significance Level. Quality of life in general health activities with severe and moderate, physical health with accomplished less or not, kind of work, emotional problems with careful activities accomplished less or not, feelings for past four weeks with calm, peaceful, downhearted, blue and energy were no difference between them at the 95% significant level. Association between gender (male and female) with quality of life in Hemodialysis patient by Independent‘t’ test were significant in general health (p value 0.012) with value at 95% < 0.05 significance Level.

Table 2 shown the comparison of lipid parameters with BMI in Kg/m2, TBARS & GSSG/GSH ratio as Oxidative stress and SOD, CAT, GPX as antioxidant status in Hemodialysis patient by independent‘t’ test were highly significant (p value 0.0001) at 95% < 0.05 significance Level.

Table 3 shown the comparison of oxidative stress (TBARS, GSSG/GSH) and antioxidant status (SOD, CAT, GPX) by independent‘t’ test were highly significant (p value 0.0001) at 95% < 0.05 significance Level.

Table 4 shown the correlation of oxidative stress (TBARS, GSSG/GSH) and antioxidant status (SOD, CAT, GPX) by Pearson correlation in which TBARS with Catalase (0.306) significant at 0.01 levels, GPX (0.239) significant at 0.05 levels and SOD shows no difference significant at 0.05 or 0.01 levels. GSSG/GSH with SOD (0.478), CAT (0.601), GPX (0.465) significant at 0.01 levels. SOD with CAT (0.668) and

Journal of Chemical Health Risks

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JCHR (2024) 14(3), 565-578 | ISSN:2251-6727

GPX (0.551) significant at 0.01 level. CAT with GPX (0.749) significant at 0.01 levels.

Table 5 shown the correlation of SBP and lipid parameters such as Lipid TC, HDL, LDL, VLDL, ratio (TC/HDL) by Pearson correlation (2-tailed) in which SBP were no difference between lipid parameters at significant 0.01 or 0.05 levels.

7. Discussions:

Chronic diseases have received increased attention from health professionals by presenting high rate of morbidity and mortality rates. Thus, it becomes a major concern for the public health field. Among the many chronic diseases that affect the population, Chronic Kidney Disease (CKD) is considered a pathology without expectation of the cure, with rapidly and progressive evolution, triggering diverse reactions for patients and compromise the QOL.[31, 32]

The CKD and dialysis treatment trigger different situations for the patient, affecting different aspects related to health. The treatment conditions and chronic disease progression limits the CKD carrier's and, therefore, they are aggressive factors that trigger stress, social isolation as well as limitations to the possibility of locomotion and tours, decreased physical activity, dependency and feelings of fear and uncertainty regarding health and welfare. Therefore, the QOL is an extremely important factor because it directly affects the effectiveness of treatments and interventions in health [33, 31]

Even with technological and therapeutic advances achieved until today, to improve the clinical condition and increase CKD carrier survival, their level of quality of life continues to decline.[34] Therefore this study was done to assess quality of life in Hemodialysis patients. In our study Quality of life in Hemodialysis patients with bodily pain (BP) and role limitations due to emotional problems (RE) have significant interference of pain and emotional problems with social activities at 95% level of significance. Pain impacted many aspects of participant's daily lives including eating, sleeping, socializing and engaging in physical activity. It also impacted heavily on the participant's emotional state which created barriers and influenced coping mechanisms and willingness to seek support as well as acceptance of analgesics and health care services.[35]

A recent Meta-analysis of pain in the CKD population reporting on 40,678 individuals with CKD [36] found that the pooled prevalence of pain for dialysis patients was 63% (95% Confidence Interval CI: 57–68) and in those with non-dialysis CKD 63% (95% CI: 55–70). Davison et al.[37] reported more detail in their exploration of pain in people with CKD, and found that 49% of patients experienced pain that was moderate to severe in intensity. The heavy emotional burden from pain, including feelings of loss of control, uncertainty, frustration and desperation were key themes identified in this study, along with a sense of social isolation due to the restrictions imposed by pain. The emotionally debilitating experience of pain may contribute to the high rates of mental health conditions, such as depression and anxiety, experienced at nearly three times greater rates in those with kidney failure than the general population.[38]

Higher proportion of women experience chronic pain than men, and that this pain is frequently more severe, recurrent and persistent. The mechanisms responsible for these differences remain unclear.[39] Factors likely to contribute include the impact of sex hormones and genotype, sex-linked variation in the cortical processing of pain stimuli, differences in coping mechanisms between genders, as well as socio cultural beliefs leading to biased reporting from males due to concerns surrounding masculinity and pain acceptance.[35] The present study showed no difference in pain between male and female. The quality of life in general health perception (GH) were significant in male and female at 95% level of significance but there was no difference in age group between less than 30yrs, 31to 50yrs and above 51yrs. Similarly, Mandoorah al.[40] showed that patients older than 60 years had the worst report of the quality of life.

Bayoumi et.al.[41] supported that age, dialysis duration and male gender were negative predictors of quality of life. Seica et.al [42] claimed that older age, female gender, lower socioeconomic status and higher educational level were associated with lower quality of life. Alshraifeen e. al [43] demonstrated that advanced age was associated with better overall mental health but worse physical functionality.

Thenmozhi P [44] found that majority of the patients were male and in the age group of 51 years and above were

Journal of Chemical Health Risks

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not having adequate QOL in the domains of PH, mental health, kidney disease problem and had better score in PS which reveals that they had good encouragement and interaction with the dialysis staff of both medical and nursing. Furthermore, it showed that had low score in role limitation caused by physical and emotional health due to signs and symptoms associated with kidney disease, which causes burden in their lives.

In analyzing the QoL of patients undergoing HD, physical functioning and burden of CKD dimensions seem to be related and dependent on physical health. [45, 46] These dimensions are related to patient's constant complaints such as a lack of energy, feelings of discouragement and fatigue, which probably decrease the scores in these dimensions, possibly due to changes in their health condition related to the disease and to the treatment.[47] Our study showed no significant difference between age group and gender at the level of 95% significance based on Physical functioning (PF), role limitations due to physical health (RP), social functioning (SF), VT (Vitality) and MH (Mental health).

In the general population, mortality rate is known to decrease when body mass index (BMI) is low. [48] On the other hand, in patients on Hemodialysis (HD), a direct relation between obesity and survival persists with a wide variation in body weight.[49] Additionally, Beddhu et al. analyzing 70,028 patients on dialysis, have shown that a BMI elevated due to an increase in Body fat (BF) was correlated with an increase in the prevalence of atherosclerosis, and, subsequently with an increase in mortality. This shows that traditional risk factors for CVD, such as overweight, are relevant in the population with CKRD.[50] The present study also shows highly significant at 95% level between the comparison of lipid parameters and BMI.

Under normal conditions, the concentration of antioxidants is noticeably higher than the concentration of oxidised products. In this way, the continual production of free radicals, deriving from cell metabolism, is regulated and neutralised by the antioxidants. Effective antioxidant protection requires synchronised action from the three studied enzymes: superoxide dismutase, glutathione peroxidase and Catalase [51]

Oxidative stress (OS) has been implicated in the pathogenesis of cardiovascular death and CKD patients are at increased risk of both OS and cardiovascular death. Incidence of cardiovascular events and death has been reported to increase soon after commencement of HD, however the mechanism responsible is not fully understood.[52] Adeyemi Ogunleye et.al are in consonance with observed significant difference in the levels of total antioxidants after HD in previous studies and also showed a significant reduction in the total antioxidant capacity in patients undergoing HD. They also further suggests that loss of antioxidants across the semipermeable dialyzer bio-incompatible membrane during the course of HD may play a significant role in increased oxidative stress in patients undergoing HD and may partly contribute to increased mortality.[53-55] Our study also showed significant at 95% level between oxidative stress (TBARS, GSSG/GSH) and Antioxidant status SOD, CAT, GPX.

It has been established that Hemodialysis itself accelerates lipid peroxidation in blood.[56] It has also been reported that Hemodialysis causes a broad pattern of tissue injury in patients on regular hemodialysis.[57] Ross et al. have argued that Hemodialysis patients are at increased risk from oxidative stress due to glutathione deficiency in whole blood and erythrocytes.[58] Jackson et al. reported that depletion of some antioxidants leads to accelerated atherogenesis in Hemodialysis patients.[59] In oxidative stress, the production of reactive oxygen species (ROS) exceeds the scavenging capacity of antioxidant systems.[60,61] Our study also shows significant Correlation at the 0.01 level (2-tailed) between oxidative stress (TBARS, GSSG/GSH) and Antioxidant status SOD, CAT, GPX.

While the use of HPLC following TBARs can improve the specificity of MDA quantification, the spectrum of MDA measurement approaches makes comparisons between measurement modalities challenging. This, coupled with concerns regarding the specificity and sensitivity of the TBARS assay to accurately quantify MDA, questions its reliability as an absolute indicator of lipid peroxidation, as opposed to a broad predictor of OS.[62] Peter Bergin et.al. study supports the use of Vitamin E (VE) supplementation in reducing OS in HD patients although concerns over the validity of their findings remain given the high levels of heterogeneity observed between studies.[63]However, the use of vitamin

Journal of Chemical Health Risks

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JCHR (2024) 14(3), 565-578 | ISSN:2251-6727

E coated dialyzers has been suggested to reduce oxidative stress and endothelial dysfunction associated with HD.[64] Improved measurement and reporting of future MDA assays will elucidate the true potential of VE supplementation on OS in HD patients to reduce morbidity and mortality and improved quality of life for HD patients.[65]

In chronic HD patients, there are three different time periods for BP recordings: peridialysis, intradialysis, and interdialysis.[66] The optimal BP of chronic HD patients recommended by the KDOQI guidelines is based on peridialysis BP, rather than intradialytic or interdialysis BP (K/DOQI) [67] Yang et al study indicated that a rise in post dialysis SBP in chronic HD patients was associated with a higher risk of both long-term cardiovascular and all-cause mortality throughout the 4 years of follow-up.[68] Our study had no significant difference between SBP and Lipid parameters. Due to oliguria or even anuria, most end-stage renal disease (ESRD) patients undergoing maintenance Hemodialysis (HD) require ultrafiltration during HD in order to maintain a euvolemic status. Although the volume dependent component of hypertension may be corrected by fluid removal, a proportion of HD patients experience post dialysis BP rise. The underlying mechanisms of intradialytic hypertension are complex and have been considered to be caused by clinically silent fluid overload, activation of the renin-angiotensin axis, sympathetic over activity, endothelial dysfunction, and sodium loading during HD.[69-76]

Strength of the study was quality of life related to Physical functioning, social functioning, vitality and mental health were better in our study. Comparatively male patients had good quality of life than females. Limitations of the study in quality of life the association was only between Age group, gender but it has to associated based on BMI, Vintage (duration of dialysis), Blood pressure and other biochemical parameters. The present study for oxidative stress was only between TBARS, GSSG/GSH whereas other parameters such as MDA (Malondialdehyde), 8 hydroxy 2 deoxyguanosine can be included in the study. Antioxidant coated membranes such as Vitamin E coated dialyzer can be used to decrease oxidative stress. This is a cross sectional study design on post Hemodialysis patients where the above analysis can be done between pre-post dialysis and prospective cohort study to follow the patients for further analysis.

8. Conclusion:

Oxidative stress plays an important role and progress cardiovascular complications in chronic kidney disease by decreasing antioxidant status. Oxidative stress decreased in Hemodialysis patients by using antioxidant coated membranes such as Vitamin E coated dialyzer.[63,64]

Specialized nursing and health care providers is required to maintain and manage quality of life in Hemodialysis patients by decreasing pain burden and designing exercise plan such as intra dilaytic exercise, dietetic strategies, yoga meditation, counselling for psych emotional problem and focus on physical and mental health status to improve QOL in HD patients.

Acknowledgement: Nil

Table 1: Association of Quality of life between age and gender

SL. No	Quality of life	Age group			Gender	
		Below 30 yrs	31-50yrs	Above 51	Male	Female
Q1	Health rating in general (GH)					
	Excellent	0 (0.0)	7 (41.2)	10 (58.8)	16 (94.1)	1 (5.9)
	Very Good	2 (5.4)	15 (40.50)	20 (54.1)	35 (94.6)	2 (5.4)
	Good	0 (0.0)	8 (29.6)	19 (70.4)	18 (66.7)	9 (33.3)
	Fair	0 (0.0)	5 (29.4)	12 (70.6)	13 (76.5)	4 (23.5)
	P-Value	0.537			0.012*	
Q2	Limitations in moderate physical activities (PF)					
	Yes, Limited A Lot	0 (0.0)	17 (41.5)	24 (58.5)	33 (80.5)	8 (19.5)
	Yes, Limit	2 (4.8)	15 (35.7)	25 (59.5)	35 (83.3)	7 (16.7)

Journal of Chemical Health Risks

www.jchr.org

JCHR (2024) 14(3), 565-578 | ISSN:2251-6727

	ed A Little					
	No, Not Limited At All	0 (0.0)	3 (20.2)	12 (80.0)	14 (93.3)	1 (6.7)
	P-Value	0.289			0.514	
Q3	Limitations in climbing several flights of stairs (PF)					
	Yes, Limited A Lot	0 (0.0)	11 (39.3)	17 (60.7)	25 (89.3)	3 (10.7)
	Yes, Limited A Little	2 (5.0)	14 (35.0)	24 (60.0)	33 (82.5)	7 (17.5)
	No, Not Limited At All	0 (0.0)	10 (33.3)	20 (66.7)	24 (80.0)	6 (20.2)
	P-Value	0.526			0.612	
Q4	Accomplished less due to physical health (RP)					
	Yes	0 (0.0)	11 (55.0)	9 (45.0)	18 (90.0)	2 (10.0)
	No	2 (2.6)	24 (30.8)	52 (66.7)	64 (82.1)	14 (17.9)
	P-value	0.115			0.391	
Q5	Limited in kind of work or activities due to physical health (RP)					
	Yes	0 (0.0)	12 (38.7)	19 (61.3)	28 (90.3)	39.7)
	No	2 (3.0)	23 (34.3)	42 (62.7)	54 (80.6)	13 (19.4)
	P-Value	0.593			0.226	
Q6	Accomplished less due to emotional problems (RE)					
	Yes	2 (2.5)	30 (37.5)	48 (60.0)	68 (85.0)	12 (15.0)
	No	0 (0.0)	5 (27.8)	13 (72.2)	14 (77.8)	4 (22.2)
	P-Value	0.551			0.454	
Q7	Interference of physical health or emotional problems with social activities (SF)					
	Yes	2 (3.0)	28 (42.4)	36 (54.5)	54 (81.8)	12 (18.2)
	No	0 (0.0)	7 (21.9)	25 (78.1)	28 (87.5)	4 (12.5)
	P-Value	0.066			0.475	
Q8	Pain interference with work inside or outside home (BP)					
	Not At All	0 (0.0)	13 (52.0)	12 (48.0)	22 (88.0)	3 (12.0)
	A Little Bit	0 (0.0)	2 (9.5)	19 (90.5)	17 (81.0)	4 (19.0)
	Moderately	0 (0.0)	7 (38.9)	11 (61.1)	13 (72.2)	5 (27.8)
	Quite A Bit	2 (10.0)	7 (35.0)	11 (55.0)	20 (100.0)	0 (0.0)
	Extremely	0 (0.0)	6 (42.9)	8 (57.1)	10 (71.4)	4 (28.6)
	P-Value	0.024*			0.106	
Q9	Feel calm and peaceful (MH)					
	All of the Time	2 (8.3)	7 (29.2)	15 (62.5)	19 (79.2)	5 (20.8)
	Most of the Time	0 (0.0)	8 (44.4)	10 (55.6)	17 (94.4)	1 (5.6)
	A Good Bit of the time	0 (0.0)	5 (38.5)	8 (61.5)	10 (76.9)	3 (23.1)
	Some of the time	0 (0.0)	11 (42.3)	15 (57.7)	22 (84.6)	4 (15.4)
	A Little	0 (0.0)	2 (20.0)	8 (80.0)	7 (70.0)	3 (30.0)

Journal of Chemical Health Risks

www.jchr.org

JCHR (2024) 14(3), 565-578 | ISSN:2251-6727

	of the time					
	None of the Time	0 (0.0)	2 (28.6)	5 (71.4)	7 (100.0)	0 (0.0)
	P-Value	0.552			0.407	
Q10	Having a lot of energy (VT)					
	All of the Time	2 (13.3)	6 (40.0)	7 (46.7)	14 (93.3)	1 (6.7)
	Most of the Time	0 (0.0)	13 (43.3)	17 (56.7)	26 (86.7)	4 (13.3)
	A Good Bit of the time	0 (0.0)	7 (36.8)	12 (63.2)	12 (63.2)	7 (36.8)
	Some of the time	0 (0.0)	1 (12.5)	7 (87.5)	8 (100.0)	0 (0.0)
	A Little of the time	0 (0.0)	5 (33.3)	10 (66.7)	14 (93.3)	1 (6.7)
	None of the Time	0 (0.0)	3 (27.3)	8 (72.7)	8 (72.7)	3 (27.3)
	P-Value	0.136			0.059	
Q11	Feel downhearted and blue (MH)					
	All of the Time	0 (0.0)	6 (25.0)	18 (75.0)	17 (70.8)	7 (29.2)
	Most of the Time	0 (0.0)	6 (31.6)	13 (68.4)	18 (94.7)	1 (5.3)
	A Good Bit of the time	0 (0.0)	11 (40.7)	16 (59.3)	20 (74.1)	7 (25.9)
	Some of the	2 (11.1	10 (55.6)	6 (33.3)	17 (94.4)	1 (5.6)
	time	)				
	A Little of the time	0 (0.0)	0 (0.0)	2 (100.0)	2 (100.0)	0 (0.0)
	None of the Time	0 (0.0)	2 (25.0)	6 (75.0)	8 (100.0)	0 (0.0)
	P-Value	0.080			0.078	
Q12	Not careful in work or activities due to emotional problems (RE)					
	All of the Time	0 (0.0)	10 (37.0)	17 (63.0)	22 (81.5)	5 (18.5)
	Most of the Time	0 (0.0)	13 (48.1)	14 (51.9)	24 (88.9)	3 (11.1)
	A Good Bit of the time	0 (0.0)	3 (23.1)	10 (76.9)	11 (84.6)	2 (15.4)
	Some of the time	2 (16.7)	4 (33.3)	6 (50.0)	11 (91.7)	1 (8.3)
	A Little of the time	0 (0.0)	1 (20.0)	4 (80.0)	3 (60.0)	2 (40.0)
	None of the Time	0 (0.0)	4 (28.6)	10 (71.4)	11 (78.6)	3 (21.4)
	P-Value	0.050*			0.620	

*95% significance Level

(PF indicates physical functioning; RP, role limitations due to physical health; BP, bodily pain; GH, general health perception; SF, social functioning; RE, role limitations due to emotional problems; VT, vitality; and MH, mental health).

Journal of Chemical Health Risks
www.jchr.org
JCHR (2024) 14(3), 565-578 | ISSN:2251-6727

Table 2: Comparison of LIPID Vs Entire Parameters

Parameters	Mean	Standard Deviation	P-Value
BMI	36.504	6.196	0.000*
GSSG/GSH	2.865	1.681	0.000*
TBARS	1.901	0.913	0.000*
SOD	47.749	15.797	0.000*
CAT	39.081	26.398	0.000*
GPX	160.581	100.984	0.014*

*95% significance Level

Table 3: Comparison of Oxidative stress (TBARS, GSSG/GSH) and Antioxidant (SOD, CAT, GPX)

Parameters	Mean	Standard Deviation	P-Value
TBARS	1.901	0.913	0.000*
GSSG/GSH	2.865	1.681	0.000*
SOD	47.749	15.797	0.000*
CAT	39.081	26.398	0.000*
GPX	160.581	100.984	0.000*

*95% significance Level

Table 4: Correlation of oxidative stress (TBARS, GSSG/GSH) and Antioxidant (SOD, CAT, GPX)

Parameters	TBARS	GSSG / GSH	SOD	CAT	GPX
TBARS	-	-	-0.189	.306**	.239*
GSSG /GSH	-	-	-.478**	.601**	.465**
SOD	-0.189	-.478**	-	-.668**	-.551**
CAT	.306**	.601**	-.668**	-	.749**
GPX	.239*	.465**	-.551**	.749**	-

Pearson correlation sig (2-tailed) **Correlation significant at 0.01 level (2-tailed). *Correlation is significant 0.05 levels (2-tailed).

Table 5: Correlation of SBP and Lipid parameters

SL .No	Parameters	SBP	LIPID-TC	TG	HDL	LDL	VLDL	Ratio (TC/HDL)
1	SBP	-	.019	.023	-.134	.020	.065	.065
2	LIPID-TC	.019	-	.423**	.657**	.942**	.295**	.676**
3	TG	.023	.423**	-	.621**	.232*	.417**	.153
4	HDL	-.134	.657**	.621**	-	.552**	.041	.126
5	LDL	.020	.942**	.232*	.552**	-	.017	.623**
6.	VLDL	.065	.295**	.417**	.041	.017	-	.461**
7.	Ratio (TC/HDL)	.065	.676**	.153	.126	.623**	.461**	-

Pearson correlation sig (2-tailed) **Correlation significant at 0.01 level (2-tailed).
*Correlation is significant 0.05 levels (2-tailed).

Journal of Chemical Health Risks

www.jchr.org

JCHR (2024) 14(3), 565-578 | ISSN:2251-6727

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