Chapter 5

DISCUSSION

The finding of the present study has been illustrated in the earlier chapter 4. This chapter deals with detailed description of the finding and its criticism and comparison with other studies, (if available). The situational variations have also been pointed out with suitable justifications wherever felt necessary.

The aim of this study was assess the nutritional status of hemodialysis patients. This study was conducted in to two phase, Baseline and Follow-up. 150 patients diagnosed with end-stage renal failure (ESRD) on maintenance hemodialysis were enrolled. Data from patients who received hemodialysis treatment in Sanjay Gandhi Post Graduate Institute of Medical science, Lucknow, were taken for present study.

186 patients asked to participate, twenty seven patients did not complete the study and five others declined to participate and 4 died.

GENERAL INFORMATION:

Table 4.1.1 indicates the demographical characteristics 150 maintenance hemodialysis were selected for the study, 27.33 % patients were seen in age group of 50-60 years, 20% patients were seen in active age group of 20-30 years and same percentage was seen for 40-50 years, remaining 12 % patients were found above 60 years. 10 % patients were below the age of 20 years and around same percentage observed for 30-40 years. (Figure 4.1.1)

Majority of patients in this study were male 111 (74 %) and 39 (26%) were female (figure 4.1.2).
Table 4.1.2 is presented with the diagnosis of selected patients. It was observed most common diagnosis was end stage of renal disease with hypertensive 66(44%) followed by Acute on CRF 30 (20%) and diabetic kidney disease 54 (36%). (Figure 4.1.3).

The etiologies of end stage of renal disease. (ESRD) are many but diabetes mellitus is the foremost cause for the ESRD, Cano N (2002) also emphasized on nutritional status and outcome of the diabetic kidney disease. The prevalence of malnutrition is noticeably higher in diabetes patients undergoing dialysis than in non-diabetic patients undergoing dialysis. Jones CA (2005) also observed diabetes is the most common cause (in some populations) of end-stage renal disease (ESRD).

Distribution of the patients as per their dietary habits shows in table 4.1.3. So many study concluded that during dialysis 10-15 gm of protein loosed, during maintenance hemodialysis required high protein diet and 50% from high biological of protein, in present study vegetarian patients were higher 63 (42%) than non-vegetarian 52 (34.67%), for vegetarian patients it was very difficult to get the required protein intake with high biological value. 35 (23.33%) were vegetarian but they was taking egg only. (Figure 4.1.4)

Table 4.1.4 shows distribution hemodialysis patients according to duration of dialysis in month. More than half of the patients were taking dialysis last 2-4 month 77 (51.33%) followed by 4-6 months 13 (8.67%), 1-2 month 35 (23.33) and more than 6 month 25 (16.67). Schulman G (2004) studied the effect of hemodialysis (HD) duration on food intake and nutritional markers in patients with chronic kidney disease (CKD) and concluded that duration of dialysis is an important factor for nutritional status of the patients.

Table 4.1.5 shows distribution of the patients as per number of dialysis in a week, patients were classified in to three groups, twice, thrice and weekly 98(65.3%),
34(22.6%) and 18 (12 %) patients were taking dialysis respectively (Figure 4.1.6). The dialysis dose was used to determine the effectiveness of hemodialysis.

ANTHROPOMETRIC ASSESSMENT:

*Saxena A (2004)* observed in their study that anthropometric techniques are more appropriate for epidemiological, clinical or hospital settings. Table 4.2.1 showed the baseline and follow-up mean anthropometric variables mean dry weight, BMI mid upper arm circumference of patients was 56 Kg, 20.75 kg/m², 23.36 Cm respectively. No measure changes were seen in follow-up body weight and body mass index. Decreasing trend of mid upper arm circumference was present in follow-up targeted patients. *Kopple et al. (2000)* studied the relationship between the weight-for height and survival among 12,965 MHD patients. They found that MHD patients who weight more than normal had the lowest mortality rate. It was concluded that body weight-for-height is an independent predictor of high mortality in those patients who are in the lower 50th percentile for this measurement. It has been suggested that a BMI of 23.6-24 kg/m² is the best range for survival in MHD patients.

Table 4.2.2 shows distribution of the patients according to body mass index (BMI) in baseline and follow-up. The WHO regard BMI of less than 18.5 kg/m² as underweight and may indicate malnutrition, an eating disorder or other health problems, in present study 37(24.67%) patients were malnourished and out of these (6.0%) severe, 4.0 % moderate and 14.67% were mild malnourished in baseline. After dietary counseling number of patients were higher who belongs in normal BMI 122 (81.33 %) followed by, underweight 23 (15.33%) and overweight 5 (3.33%). *Port et al. (2002)* reported association between BMI and survival: patients with the lowest BMI had a 42% higher mortality risk than patients in the highest BMI and conclude higher BMI might in turn be an indication of better nutritional status, as biochemical markers of better nutrition co-aggregate with larger body mass. (Figure 4.2.1)
Table 4.2.3 shows association between baseline and follow-up body mass index. Significant association observed in baseline and follow-up body mass index as per P value (P = 0.001). In follow-up number of patients were increased who belong in normal body mass index. Overweight patients have an increase in adipose tissue and are therefore, less likely to suffer from energy deficits. Arguably for this reason, underweight patients on hemodialysis might be more likely to fall ill or tend to recover more slowly from illness than the normal or over weight patients (Fleischmann et al., 1999; Salahdeen, 2003), which is in agreement with our findings. (Figure 4.2.2)

Table 4.2.4 shows the effect of number dialysis on the changes in weight, after intervention weight was same for patients who taking dialysis is twice a week or thrice a week or weekly i.e. There is no significant effect of no. of dialysis on change in weight as p value is 0.93 (> 0.05). The finding is an agreement with the study of Moncef El M'Barki Kadiri (2011). Therefore, we can conclude that there is no association between no. of dialysis and BMI before counseling.

Table 4.2.5 shows effect of dialysis doses on Body Mass Index. Therefore, we can conclude that there is no association between no. of dialysis and BMI before counseling. For the follow up data, test is not applicable because 4 cells with expected counts less than 5. there was significant association found in baseline Body mass index. (Figure 4.2.3)

Table 4.2.6 shows the differences between baseline and follow-up weight and mid upper arm circumference (MUAC). There was no significant difference seen in baseline and follow-up weight. Highly significant difference observed in MUAC as per p value 0.00 (P <0.001). The finding are in conformity with the observation of Reema F (2007) observed significant (P <0.01) decrease in some anthropometric parameters (dry weight, body mass index, fat percentage, fat mass, triceps skinfold thickness, mid-arm circumference, mid-arm muscle circumference, and arm muscle area).
Table 4.2.7 shows effect of demographic variable on change in weight, BMI, MUAC after intervention. No significant effect of demographical variables seen on anthropometric parameters as weight, body mass index and mid upper arm circumference.

**BIOCHEMICAL ASSESSMENT**

Biochemical profile of the hemodialysis patients have been recorded in Table 4.3.1. Except hemoglobin, all mean biochemical variables of baseline patients were significantly higher compared to follow-up subjects for serum blood urea nitrogen (129±33.37 vs. 109.33±28.34 mg/dl), serum creatinine (11.66±2.76 vs. 9.05 ±1.26 mg/dl) serum sodium (134.75±6.11 vs. 134.69 ±6.25 mmol/l), serum potassium (4.78±0.85 vs. 4.89±0.83 mmol/l), serum albumin (3.387±0.51 vs. 3.16±0.60 g/dl), and serum total protein (6.74±0.73 vs. 6.39±0.76 g/dl). The mean hemoglobin was higher 8.79±1.65 gm/dl in follow-up than baseline hemoglobin (7.94±2.15 gm/dl). (Figure 4.3.1-4.3.9)

Table 4.3.2 shows association between baseline and follow-up biochemical variables as per tools. 80 % patients were having hemoglobin <10gm/dl and anemia was corrected in follow-up. Significant association found in between as per p value 0.015(<0.05). **Umair Ahmed Siddiqui (2007)** also reported that (89%) had hemoglobin <11 g/dl. (Figure 4.3.10)

Table 4.3.3 indicates majority of the patients had acceptable levels of serum sodium (67%) followed by hyponatremia 28.67% and sever hyponatremia. 1.33%. On the other hand, sever hyponatremia and hypernatremia were observed in follow-up patients and around 60.67 % patients had acceptable levels of serum sodium, 39.3 3% had moderate hyponatremia. Significant association was between baseline and follow-up serum sodium. (Figure 4.3.11)

Table 4.3.4 shows near about fifty percent patients in both group had normal serum potassium. Majority revealed hyperkalemia in baseline and follow-up (32% vs. 44.00%) compared to hypokalemia (13.33Vs 5.33%).
Significant association seen between baseline and follow up serum potassium as per P value. (P=0.016). (Figure 4.3.12)

Table 4.3.5 indicates hypoalbuminemia as the strongest predictor of not only malnutrition but also morbidity and mortality. Serum albumin is routinely available and is the most commonly used biochemical index having the power of predicting clinical outcomes. Hypoalbuminemia occurs in a large number of patients with end-stage renal disease on chronic hemodialysis and it is highly associated with increased mortality risk in this population.

Due to high incidence of PEM among our patients in S.G.P.G.I.M.S about, it is not surprising to find a high incidence of hypoalbuminemia among these patients. About fifty percent the patients (54%) had low serum albumin followed by normal serum albumin 46% which is similar to most reported studies (Lowrie & Lew, 1990; Rao et al., 2000; Kalantar-Zadeh et al., 2003). In other hand two thirds of the patients 69.33% in follow-up had hypoalbumiemia and 30.67% patients had normal albumin. (Figure 4.3.13-14)

The prevalence of malnutrition in patients of end stage renal disease on maintenance hemodialysis ranges from 10%–54%. In this population, protein energy malnutrition (PEM) is common. Mitch WE, (1993) and Barrett et al., 1997, in their studies Hypoalbuminemia is highly predictive of future mortality risk when present at the time of initiation of chronic dialysis as well as during the course of maintenance dialysis, hypoalbuminemia occurs in a large number of patients with end-stage renal disease on chronic hemodialysis and it is highly associated with increased mortality risk in this population. There was significant association was found in baseline and follow-up serum albumin.

In baseline percentage of patients were higher 84% who had normal total protein in comparison of follow-up 74.67%. Near about 16 % patients were seen in group of hypoproteinemia in baseline and number of patients was increased in follow-up 25%. Significant association was seen in between baseline and follow-up serum total protein as per p value 0.046(p<0.005). Hypoalbuminemia is common in hemodialysis patients and
predicts morbidity and mortality. Malnutrition and particularly inflammation play a major role in the development of hypoalbuminemia. Qureshi, AR (1998) found the evidence that acidosis contributes to the low level of serum albumin in dialysis patients. In present study there was no changes was seen in serum albumin and total protein after counseling.

Table 4.3.6 reveals there is no significant association seen between baselines and follow fasting and post prandial blood sugar in diabetic patients. (Figure 4.3.15-16)

Table 4.3.7 shows the effect of dialysis doses on baseline and follow-up serum albumin. There was no significant association was seen dialysis dosed and serum albumin. Nur Zakiah Mohd (2011) their study is in agreement with the present study. (Figure 4.3.17)

**Dietary Assessment**

Table 4.4.1 shows the difference of mean calories, protein, fats and carbohydrates between baselines and follow up. Base line mean calorie, protein, fat and carbohydrate intake was $1272 \pm 294.7$ kcal/day, $41.37 \pm 12.03$ gm/day, $30.5 \pm 12.42$ gm/day, $200.13 \pm 43.88$ gm/day respectively. After dietary counseling patient’s nutrients intake were increased, mean calorie, protein, fat and carbohydrate was higher $1654 \pm 239.6$ kcal/day, $62.55 \pm 10$, $46.37 \pm 8.24$ gm/day, $243.29 \pm 42.22$ gm/day in comparison of baseline. Significant differences observed between baseline and follow-up nutrients intake of the patients. It was statically highly significant.(P=0.01) findings from many studies that MHD patients have a high incidence of protein energy malnutrition underscores the importance of maintaining an adequate nutrient intake. Although there are numerous causes for malnutrition, decreased nutrient intake is probably the most important. Causes of poor nutrient intake include anorexia from uremia itself, the dialysis procedure, undercurrent illness, and academia; same finding was observed in Morais AAC (2005) study. (Figure 4.4.1-4.4.4)

Inadequate dietary intakes are a major determinant of malnutrition in hemodialysis (HD). Comparison between required and follow-up nutrient intake shows in table 4.2.2.
Generally, the majority of the patients did not adhere to their diet. It has been reported that in follow-up dietary intake were increased in comparison of baseline but not as per requirement because loss of appetite. Most patients in this study failed to attain this recommended energy intake. Highly significant differences seen between required and follow-up.

The data reflect a high incidence of protein energy malnutrition among patients and it’s even more than what it has been reported by similar Cross-sectional studies which suggest that up to two thirds of the patients on HD are malnourished (Pollock et al., 1996). It seems that the incidence of energy malnutrition is more severe than protein malnutrition, and this finding is an agreement with the epidemiological studies which suggest that low energy intake is probably more common and severe than low protein intake (Bansal et al., 1980; Blumenkrant et al., 1980.)

Acchiardo et al. (1983, 1990) showed in two different studies that protein intake of less than 1.2 g/kg/d is associated with lower serum albumin levels and higher morbidity. Several studies have indicated that inadequate dietary intake is the most frequent cause of malnutrition in MHD patients (Bossola et al., 2005). In a study designed to measure the actual dietary energy and protein intake in stable MHD patients, Bossola et al. (2005) found that the mean dietary energy and protein intakes were 24.9 ±10.1 kcal/kg/day and 0.64 ± .04 g pro/kg/day respectively.

According to the KDOQI guidelines, 70.2% of study subjects had energy and protein intakes that were lower than the recommended amount for MHD patients. Additionally, in a prospective study, analyzed possible correlations between food intake and nutritional status and found that Total EI was 20.7±6.7 kcal/kg/day and protein intake was 1.2 ± 0.6 g/kg/day. Earlier studies suggested that MHD patients have a habitual dietary intake that is lower than recommended; however, these studies were subject to several limitations. Morais et al. (2005) measured dietary intake by using a onetime dietary recall which is not very representative of a person's habitual dietary intake,
Additionally, previous studies have not followed subjects over time in a controlled environment. Poor validity of dietary assessment tools impacts the interpretation of health and diet studies.

Table 4.4.3 shows the relation between demographical variables and patient’s nutrients intake. Only gender wise correlation seen in calorie and carbohydrates as per p value = 0.006 and 0.003 respectively. It was also indicated that patients who was vegetarian but taking egg, significant correlation protein and fat intake as per p value = 0.019 and 0.039.

Table 4.4.4 shows correlation between knowledge and nutrients intake increase. All p values are greater than 0.05, there is no correlation was observed between daily dietary increase and knowledge score before and after counseling.

Table 4.5.1 shows distribution of baseline and follow-up patients as per their knowledge. Study suggests that patients on hemodialysis have poor protein knowledge as compared with other nutrients of interest for dialysis patients. Dietary counseling should be routinely used to educate patients regarding protein sources and the consequences of high serum phosphorus and to reinforce adherence. Park KA (2008) evaluated the usefulness of educational counseling in the control of hypoalbuminemia in dialysis patients. As a whole, they suggest that focused education programs are effective in enhancing knowledge about phosphate in the dialysis population, and the impact may be most marked in patients with poor baseline knowledge. Many studies about dietary management in dialysis patients enhance the importance of nutritional education to prevent malnutrition and to minimize complications of end-stage renal disease. (Figure 4.5.1)

European Best Practice Guidelines on nutrition in hemodialysis patients (2007) reported that dietary education improves phosphate control and that intensive counseling on the phosphate content of food reduces serum phosphate and calcium phosphate
product. However, there are no specific recommendations regarding how to implement an education plan for patients. (Figure 4.5.1)

Table 4.5.2 reveals the percentage of patients who giving correct answer regarding dialysis and diet. More than fifty percent (58.67%) patients in baseline were aware about dialysis. When dialysis required only (34.67% patients in baseline knew and after counseling 62% patients were aware about the requirement of dialysis.

Awareness about dietary principal in hemodialysis may play an important role for the improvement of nutritional status. In present study follow-up patients showed a better nutritional knowledge as compared with baseline patients, but nutritional knowledge regarding dietary principal in hemodialysis seemed poor.

Protein intake should be higher in maintenance hemodialysis in comparison of predialytyic patients so newly patients who was sifted for regular dialysis they were not aware about source of high protein.

Sodium restriction is common in dialysis and pre dialysis patients, so in baseline around sixty percent (59.33%) were knew the salty food items.

Poor knowledge seen regarding 24 hour fluid requirement and after counseling still they had a lot of confusion regarding fluid.

Potassium restriction is very important for dialysis patients. More than forty (44%) in baseline and 74% in follow-up patients knew the potassium rich items.

30.67% in baseline and 76.67% in follow-up patients were giving the correct answer regarding weight. Fifty percent of the patients aware about the meaning of maintenance dialysis in baseline number of patients were increased.

On the other hand more than forty percent in baseline patients knew that anemia will be corrected by taking iron rich diet as fruit and fruit juices and after dietary
counseling it was improved and they know anemia will be corrected by table and injections only.

Table 4.5.3 shows effect of pint and multimedia on their follow-up knowledge. Highly significant differences seen between baseline knowledge and intervention knowledge. More than fifty percent of the baseline patients were aware about the diet and dialysis therapy and it was increased 79% after counseling. Figure (4.5.2)

Table 4.5.4 revels the correlation between follow up nutrients intake and follow-up knowledge. There was no significant correlation seen between follow-up nutrients intake with follow-up knowledge. Dixon Thomas’s study concluded that as part of medication therapy management (MTM), patient counseling focusing on dialysis compliance, diet and medications are an effective way to improve health-related QoL and awareness in ESRD.