Chapter - II

Review of Literature
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This chapter attempts to give a review of literature on various aspects of end stage renal failure.

1. Prevalence and Incidence Statistics

Statistical information such as prevalence, incidence, deaths, and other data is provided by numerous studies and is subject to numerous estimates. Prevalence and incidence are different measures of a disease’s occurrence. The “Prevalence” of a condition means the number of people who currently have the condition, whereas “incidence” refers to the annual number of people who have a case of the condition. These two measures are very different. For example, there could be a chronic but high prevalence, because the prevalence is the cumulative sum of past incidence rates. A short duration curable condition can have a high incidence but low prevalence.

Epidemiology

The incidence rates of end-stage renal disease (ESRD) have increased steadily internationally since 1989. The United States has the highest incident rate of ESRD, followed by Japan. Japan has the highest prevalence per million population, with the United States taking second place.

Risk factors for developing Chronic Kidney Disease differ between races and countries. It would be interesting to know the incidence of CKD and its causes in India, which is a densely populated country with low income, different food, cultural traditions, and lifestyle habits. In contrast to high income countries, patients with ESRD have to pay for dialysis and transplantation themselves. The currently reported incidence of Chronic Renal
Failure in India is based on extrapolated data from U.S. As yet, no large scale population studies are available. There are two studies

i) A population screening in New Delhi, ii) A second prospective study that involved 48 hospitals. In the population screening 4712 subjects participated in a blood biochemistry test. Mean age was 42.38±12.54 years, 56.16% were male. Thirty-seven were found to have chronic renal failure (prevalence rate of 0.78%). If these data are applied to India's 1 billion populations there are 7.85 million CRF patients in India. Aetio logically, diabetes (41%), hypertension (22%), chronic glomerular nephritis (16%), chronic interstitial disease (5.4%), ischaemic nephropathy (5.4%), and obstructive uropathy (2.7%), miscellaneous (2.7%) and unknown cause (5.4%) constituted the spectrum.

The second study was more representative, as 48 centres were distributed all over India. Data were based on prospective investigations conducted over a period of 1 (33 hospitals) to 3 months (15 hospitals) comprising 4145 CKD patients. It showed the following aetiological pattern: diabetes (29.7%), chronic glomerulonephritis (19.3%), hypertension (14%), chronic interstitial disease and vesico-ureteral reflux (12.6%), obstruction and calculus (9.3%), ADPKD and Alport Syndrome (8.4%), undiagnosed (6.2%). This study shows that the prevalence of CRF in India is 0.8%. If we combine the two, diabetes has emerged as the most frequent cause (30–40%) followed by hypertension (14–22%), CGN (16–20%), CIN (5.4–12.7%), heredofamilial disease (8.4%), obstruction including calculus (2.9%). The two studies, which are different in some ways, perhaps explain the wide range in incidence, suggesting regional influences

**Incidence of End-Stage Renal Failure**

Approximately 30% of patients with diabetic nephropathy eventually progress to end-stage renal failure and the rest usually die from cardiovascular
disease before reaching end stage. All develop microalbuminuria and, subsequently, proteinuria. Therefore, albuminuria is an important risk factor in these patients, and all diabetic patients should have a microalbuminuria assessment yearly. Indeed, albuminuria is strongly associated with progression of kidney disease, in addition to prediction of cardiovascular events not only in diabetic patients, but also in the general community. Thus, the combination of diabetes, hypertension, and chronic kidney disease is now the most common cause of end stage kidney failure worldwide.

The incidence of patients with end-stage renal disease being treated by renal replacement therapy varies enormously depending on the level of affluence of the country. The highly developed countries such as North America, Europe and Japan, have the highest incident rates of treated end-stage renal failure, whereas the emerging countries have very low incident rates. There are now over 1 million dialysis patients worldwide, with an incidence of about a quarter of a million new patients each year. The annual incidence of new cases of end-stage renal failure in Hong Kong from their renal registry data demonstrates the worldwide trend of progressively increasing numbers. In 1996, there were 100 patients/million population beginning dialysis in Hong Kong. In the year 2000, this increased 122 patients, and in 2003, 140 patients/million population began treatment for end-stage renal failure. Similarly, the rates have been increasing in the United States, and with increasing prevalence, it is predicted that by 2010, there will be almost 700,000 dialysis patients in the United States, costing about US$30 million a year for their dialysis. Obviously, treatment of such an ever-increasing burden of end stage kidney failure can not be afforded, even in the wealthiest of countries.

The exact number of patients with ESRD in the developing world is not known due to the lack of appropriate renal registries, though one or two
individuals (Rajesh Parwa, Lucknow) have collected the prevalence on the regional basis. So the wholestic numbers of ESRD cases are not available.

1. According to Mittal (1997:763-70) the pattern of chronic renal failure in India does not differ greatly from that of developed countries. However, it carries a poorer prognosis due to late referral and limited availability and affordability of renal replacement therapy in India.

2. According to the Diabetes Atlas 2006 (2007:217-230) published by the International Diabetes Federation, the number of diabetics in India currently around 40.9 million is expected to rise to 69.9 million by 2025 unless urgent preventive measures are practiced. Changes in lifestyles and urbanization resulted in obesity, hypertension and diabetes, which are associated with increased risk of Chronic Kidney Disease. The data gathered from National Chronic Kidney Disease (CKD) Registry, revealed that a whopping 96% of patients battling kidney disease had developed cardiovascular problems towards the end stage of the disease.

3. According to Hakki Arikan (2005), the reported annual incidence of patients with ESRD varies widely, from as low as 4 pmp in Bolivia to as high as 254 pmp in Puerto Rico. Incidence rates of 52 pmp and 200 pmp were reported in Turkey and Egypt, respectively. In the rest of the world, the estimated incidence of ESRD of 100 pmp, approximately 100,000 patients develop ESRD each year. The reasons for such wide variations are likely to be differential racial factors, environmental conditions, the criteria used for diagnosis, and the availability of sophisticated dialysis programs. The number of patients accepted by dialysis programs is about 80 pmp in Egypt, 20 pmp in Malaysia 3 to 5 pmp in India and China.

4. A study entitled “Screening and Early Valuation of Kidney Disease” (SEEK) which was started in 2006 by a group of nephrologists, primarily
initiated by nephrologists from Brigham & Women's Hospital & Harvard Medical School, USA, and several other Indian nephrologists. The SEEK study data has been presented at the Annual Conference of the Indian Society of Nephrology for the last 2 years. At the last presentation, approximately 6,000 adult subjects from 21 centers from 53 community camps has been screened.

5. The study titled “The incidence of end-stage renal disease in India: A population – based study” was conducted by PGI demonstrates that 44 percent of ESRD cases were a result of diabetic nephropathy. A total of 346 new ESRD patients were diagnosed during the study period (2002-2005) and the incidence was found to be 232 per one million people annually.

6. A study namely “The Economics of Dialysis in India” by Umesh Khanna, 2009. The exact burden of CKD in India still remains undefined with only limited data from the three population based studies addressing this issue. It is hoped that the CKD registry, recently established by the Indian Society of Nephrology, may provide useful epidemiological data in future. In the prevention study done in Chennai, the prevalence at the community level is 8600 per million population (pmp) in the study group and 13900 pmp in the control group. The second study based in Delhi (Agarwal SK, 2005) revealed a prevalence of CKD at 7852. The third study from Bhopal revealed an incidence of 151 pmp suffering from end stage renal disease (ESRD).

To conclude, the review in this section covered the studies on prevalence and incidence of renal disease. The study shows that chronic renal failure in India is identified in higher level and need for studying the prevalence of renal failure is justified.
2. Risk Factors in End Stage Renal Disease

In a study of any physical disorder it is necessary to know the factors which are responsible for the progression of the disease (or) disorder or detoriation of physical health. In general they are divided into two. They are Modifiable risk factor,

Non - modifiable risk factors. Modifiable risk factors are the following:

1. Sedentary life
2. Dietary habits
3. Personal habits like, smoking, alcohol, use of tobacco
4. Physical exercise
5. Stress management
6. Obesity.

In Non modifiable risk factors the following factors are covered:

1. Age
2. Heredity
3. Gender.

1. "Tobacco usage may increase risk of nephropathy and death", according to Stegmayr (1990:121-4). He suggested that Insulin Dependent Diabetic patients should avoid tobacco usage and current smokers should give up the habit in order to reduce the risk of diabetic nephropathy and early death.

2. "A study about the risk of kidney failure associated with the use of acetaminophen  aspirin, and NSAID" (non steroidal anti-inflammatory drugs) was carried out by Pernager et.al (1994:1675-9). People who take analgesic drugs frequently may be at increased risk of end-stage renal disease, but the extent of this risk remains unclear. Approximately 8-10 percent of the overall incidence of End Stage Renal Disease was attributable to acetaminophen use.
They have revealed that people who often take acetaminophen (or) NSAID’S have an increased risk of End Stage Renal Disease, but not those who often take aspirin.

3. There is study on “Hypocalcemia (Low serum calcium Level) morbidity and mortality in end-stage renal disease” by Foley et.al (1996:386-93). They have stated that hypocalcaemia and hyperphosphatemia with secondary parathyroidism are characteristic of end-stage renal disease. Although calcium level critically affects almost all cellular processes, the impact of chronic hypocalcaemia and other abnormalities of calcium - phosphate homeostasis on the prognosis of End Stage Disease patients are unknown. They have revealed that chronic hypocalcaemia, a very common reversible feature of chronic uremia, is independently associated with morbidity and mortality in End Stage Renal Disease patients.

4. In a study on “Family history of end-stage renal disease among incident dialysis patients” by Freedman et.al (1997:1942 -5), the genetic risk factors for the occurrence of renal failure were analyzed by them. They have concluded that a large proportion of incident of end stage renal disease cases have close relatives with end stage renal disease in whom preventative actions might be direct. Genetic analysis in multiply-affected families may identify the inherited factors contributing to progressive renal failure.

5. In the study on “Risk of End Stage Renal Disease” led by Johns, Hopkins et.al (1997:17), they have identified that diabetic men are 13 times more likely to develop End Stage Renal Disease than non – diabetic men. Results of this study also show that diabetic men are 4 times more likely as non-diabetic to develop ESRD attributed to non-diabetic disorder such as high blood pressure or kidney infection.
6. A prospective cohort study conducted by Brancati et al. (1997:2069-74) concluded that Diabetes Mellitus is a strong independent risk factor for End Stage Renal Disease, even for End Stage Renal Disease which ascribed to cause other than diabetes. Improvements in the prevention and control of diabetes should produce substantial reductions in End Stage Renal Disease incidence.

7. A retrospective multicentre European case-control study (2000:12 -26) has shown that smoking is an independent risk factor for end stage renal failure, in patients with inflammatory and non inflammatory renal disease.

8. A population based case-control study namely “The risk of end stage renal disease associated with alcohol consumption” was conducted by Perneger et al. (1999:1275-81). They have concluded that consumption of more than two alcoholic drinks per day, on an average was associated with an increased risk of kidney failure in the general population. A lower intake of alcohol did not appear to be harmful.

9. “Diabetes Mellitus and Hypertension Key Risk Factors for Kidney Disease”, by Lea et al. (2002:7-15) shows that the incidence of end-stage renal disease in the US is rising at an alarming rate, with the largest increase among African-American population. The key risk factors for kidney disease are hypertension and diabetes. Approximately 30-40 percent of all patients with diabetes will develop nephropathy and many will progress to End Stage Renal Disease, necessitating dialysis or kidney transplantation.

10. According to Locatelli et al. (2007:11:7) the incidence and prevalence of renal replacement therapy is increasing worldwide. Besides being a large and growing clinical problem, chronic kidney disease is of an economic and organizational concern, since Renal Replacement Therapy consumes a
considerable proportion of health care resources. In this context, any medical intervention that may prevent the progression of chronic kidney disease towards end-stage renal disease is extremely important. Several interventions to delay the progressive loss of renal function and/or to prevent the development of cardiovascular disease are now available. These include low-protein diets; correction of calcium phosphate disorders and anemia; blood pressure and proteinuria control; and smoking cessation. Intervention in the conservative phase of chronic kidney disease is likely to be more effective if performed as early as possible in the course of the disease, since it has been widely demonstrated that early and regular nephrology specialist care is associated with decreased morbidity and mortality.

11. Another study in risk factors namely, “Is obesity a major cause of chronic kidney disease?” carried out by John et.al (2004:41-54) has revealed that obesity is also a major risk factor for chronic kidney disease via hypertension and diabetes (type 2). In addition to reducing weight, controlling blood pressure, and correcting metabolic abnormalities (hyperglycemia, hyperlipidemia) are other preventive measures to protect the kidneys from further damage.

12. One more study on “Association between smoking and chronic renal failure in a nationwide population based case control study” led by Elisabeth (2004:2178-2185) has assessed that heavy smoking was linked to a significant increase in chronic renal failure risk. Based on their findings, the researchers have estimated that cigarette smoking causes nearly 9 percent of cases of chronic renal failure risk for both men and women. Cigarette smoking is significant but preventable risk factors for kidney disease. When other risk factors are present, quitting smoking may be an effective way to reduce the risk of chronic renal failure and subsequent End Stage Renal Disease.
The review in this section covered the studies on factors which are responsible for the progression of the renal disease. The major factors identified are high blood pressure, chronic kidney disease, kidney infection, obesity, Hypocalcaemia (Low serum calcium level) morbidity and mortality. Further, the reviews covered relationship between renal disease and personal habit like smoking, alcohol and tobacco consumption which leads to risk of diabetic nephropathy and early death.


3. Treatment aspects in End Stage Renal Disease
1. A study on “Hemodialysis in the diabetic patient with end stage renal disease” by Leehey et.al (1994:547-53) has shown that diabetes mellitus is the most common cause of end-stage renal disease in the US and the percentage of ESRD patients with diabetes is increasing yearly. One - year survival in such patients is poorer than in those with other etiologies of ESRD but has improved from 64 percent to 74 percent over the past decade. However, over all five year survival on dialysis is still less than 20% in this population. It is controversial whether hemodialysis or peritoneal dialysis (CAPD, CCPD) is the best choice. Its advantages are its ready availability and convenience for patients, who are frequently in capacititated by blindness, cerebro vascular disease, and/or amputations. However, patients may tolerate dialytic ultrafiltration poorly due to autonomic neuropathy. Maintenance of vascular access is difficult, which may contribute to inadequate dialysis in some patients. Cardiovascular disease remains the most common cause of death. Management of coronary artery disease is difficult because of the high prevalence of silent ischemia. Control of blood pressure is of paramount importance in preventing cardiovascular complications. Improved survival in diabetics who were dialyzed in a more
intensive than usual fashion has been reported. In addition, much of the
difference in survival rates between diabetic patients and non diabetic patients
can be accounted for by the poorer nutritional status in the former group. Thus
attention to the dose of dialysis administered and assurance of adequate
nutrition should result in improved survival of the diabetic patient on
hemodialysis.

2. There is one more study titled “Use of home automated intermittent
peritoneal dialysis in the treatment of end stage renal failure” by Li et.al
(1994:353-8). They have reported retrospective analysis of 16 uremic patients
who were treated with home automated Intermittent Peritoneal Dialysis (IPD)
from 1988 -1993. The reason for home automated IPD were: old age, poor
eyesight, low intelligence or poor dexterity, family or patient request, and old
stroke. It took an average of 8.8 sessions to train the helper. They have
concluded that home automated IPD can be an alternative for some patients in
whom other modes of dialysis are difficult.

3. A comparative study on “CAPD, an acceptable form of therapy in
elderly ESRD patients” was done by Baek, et.al (1997:158-61). According to
the study rapid growth in the number of dialysis patients over the age of 65 is
occurring coincidently with the overall aging of the general population. Elderly
patients are often poor and physically incapacitated, needing family or social
support. These patients may also be susceptible to malnutrition and have
multiple complicating medical disorders in addition to end-stage renal disease
(ESRD). Thus the selection of an appropriate dialysis modality is particularly
critical in elderly patients. Continuous Ambulatory Peritoneal Dialysis offers
many advantages to elderly patients, including hemodialysis stability, steady
state chemistry and no need to create a vascular access. They have concluded
that it is an acceptable form of therapy for the elderly patients, particularly if a
helper can participate.
4. A study on "Factors affecting the use of peritoneal dialysis (PD) among the ESRD population in India (a single center study) by Mahajan, et.al (2004:538-41) concluded that peritoneal dialysis is an under used modality of Renal Replacement Therapy at their institute. The patients who are taken up for Peritoneal Dialysis at their institute were elderly and have a higher incidence of other co morbid conditions, such as diabetes mellitus and coronary artery disease. Also, most patients who switch to peritoneal dialysis do so due to there unsuitability for HD rather than by their own choice. The factors contributing to this low rate of use of peritoneal dialysis are ignorance of peritoneal dialysis, increased cost of therapy, low enthusiasm toward domiciliary therapy, and lack of adequate infrastructure for peritoneal dialysis at their institute. Effective pre dialysis counseling reduction in the cost of therapy and development of an adequate infrastructure can increase the rate of use of peritoneal dialysis.

5. Diabetic nephropathy, prevention and early referral by Pylypchuk et.al (2000:636-42) highlighted that diabetes is the most common cause of end-stage-renal failure. Diabetic nephropathy, in both type 1 and type 2 diabetes, usually progress through 5 stages. Treatment and prevention strategies depend on the stage of disease. Primary prevention includes addressing hyperglycemia, hypertension and smoking. Secondary prevention adds angiotension-converting enzyme inhibitors. Cholesterol lowering and perhaps restrictions on dietary protein. Tertiary care including dialysis or transplantation is generally managed by nephrologists, but family physicians continue to play an important role in the care for these patients.

The review in this section has covered the studies on various treatment aspects for ESRD (End-Stage Renal Disease) like Hemodialysis, Peritoneal Dialysis, Continuous Ambulatory Peritoneal Dialysis, home automated intermittent peritoneal dialysis and nephropathy. These above studies also covered the treatment for renal disease at various stages.
4. Economic Evaluation in End Stage Renal Disease

There is varied limitation in the economic evaluation in end stage renal disease. Economy in the cost of treatment which is a deciding factor in the line of treatment. This is more so in patients with renal failure due to diabetes, because the patient has to necessarily choose between dialysis in general or kidney transplantation when necessary. There are 10 studies which have considered the “Economic Evaluation in End Stage Renal Disease Patients”.

1. In a study on “A cost effective analysis of the treatment of end stage renal failure” carried out by Croxson et.al (1990:171-4) an economic evaluation of continuous ambulatory peritoneal dialysis(CAPD),home hemodialysis,Incentre hemodialysis and transplantation was carried out using cost effectiveness analysis to evaluate the cost per life year saved. The present value of cost per year life saved (expressed in 1988$NZ) was $35,270 for ‘In centre dialysis’, it was $28,175 for home hemodialysis, and $25,395 for CAPD at Auckland Hospital and $18,463 for transplantation. This apparent ranking of the cost effectiveness of the different modalities cannot, however, be used to support a decrease in hemodialysis in favour of an increase in transplants and CAPD until marginal cost factors have been studied. It must also be recognized that social and medical characteristics define which treatments are appropriate for any patient so that the different modalities are not perfect substitutes for each other.

2. “Cost effectiveness studies of renal transplantation” evaluated by Karlberg et.al (1995:611-22) analyzes opportunity costs for the treatment of end-stage renal disease. Kidney transplantation remains the most cost-effective treatment for uremia and is one of the most cost-effective technologies in health care. Improved survival of grafts and increased numbers of transplants have the potential to reduce costs for dialysis program. Among patients on dialysis, a more common use of chronic ambulatory peritoneal dialysis instead
of institution-based hemodialysis would greatly increase cost utility and further reduce the program cost of renal replacement therapy.

3. An analysis of "Economic evaluation of end-stage renal disease treatment" by de Wit GA et al (1998:215-32) concluded that hemodialysis is the least cost-effective treatment, while transplantation and Continuous Ambulatory Peritoneal Dialysis were the most cost effective treatment.

4. In a study titled "Economic evaluation and end-stage renal disease: from basic to bedside", there is a comparative analysis of alternative health care interventions with reference to End Stage Renal Disease by Mannas et al. (2000:12-28). Here, the economic evaluation has been done in terms of the relative costs (resource use) and effectiveness (health effects), and the article shows how the basic principles of economics can be applied to health care through the use of economic evaluation. Using a simple framework, selected therapies for patients with end-stage renal disease are categorized to highlight therapies that are very efficient, encourage their use and to draw attention to therapies in current use that are less effective and more expensive (i.e. less efficient) than alternative therapy.

5. A Study on "Morbidity and cost implications of inadequate hemodialysis" by Ashwini (2001:1223-1231), in America on hemodialysis patients has established short life spans, frequent hospitalization and aggregate medical inpatient expenditure of $4 million per year. Dose of dialysis, as quantified by the parameter Kt/V, corresponds strongly with survival and is estimated to be inadequate (Kt/V<1.2) in one fourth of patients. However, little is known about the mortality and cost implications of inadequate dialysis. They sought to determine the independent relationship between dose of dialysis and 1. number of hospitalizations, 2. hospital days, and 3. medicare in patient's reimbursements. The study concluded that inadequate dialysis dose is
independently associated with increased hospitalizations, hospital days, and medicare inpatient expenditure. Improving dialysis adequacy may both improve patient morbidity and lessen health care costs.

6. A study namely “Economic evaluation of kidney transplantation versus hemodialysis in patients with end stage renal disease in Hungery” by Kaloz.Jarya et.al. (2001:188-93) has established that kidney transplantation is generally acknowledged as the more clinically effective and more cost effective option in managing patients with end stage renal disease compared with dialysis. This study concluded that compared with hemodialysis, kidney transplantation provides greater survival benefits to patients with end stage renal disease at less cost.

7. Another study titled “An economic evaluation for early versus late referral of patients with progressive renal insufficiency” by Laughlin et.al (2001:1122-8) has found that patients with progressive renal insufficiency who start renal replacement therapy within four months of seeing a nephrologist (late referral) have increased morbidity, mortality and health care costs. They have made an economic evaluation of early versus late referral to a multidisciplinary clinic for patients with progressive renal insufficiency. The result of the study proves that early referral of patients with progressive renal insufficiency to a multidisciplinary clinic appears cost effective.

8. One more study on “Prevalence and socio-economic aspects of chronic kidney disease” by Bommer (2002:8-12) explains that End Stage Renal Disease is the great economic burden and one that will increase as the incidence and prevalence of the disease increases so that the prevention and early treatment of hypertension and diabetes will have the greatest impact on the future prevalence of End Stage Renal Disease and the costs associated with its treatment.
9. Saieh - Andoine (1990:199 -201) have analyzed “The management of end stage renal disease in underdeveloped countries as a moral and an economic problem”. According to him there are major problems in providing care for patients with end stage renal failure in underdeveloped countries. Continuous ambulatory peritoneal dialysis has not been encouraged due to the socio-economic and hygienic conditions of the population but isolated intermittent dialysis has been provided. Transplantation has been restricted due to the shortage of cadaver kidneys but a number of patients maintained on hospital intermittent chronic peritoneal dialysis have been transplanted successfully. They believe that underdeveloped countries should develop clear programmes for the treatment of chronic renal failure and in addition initiate screening for renal disease in the population so that early detection of renal disease, for instance in relation to urinary tract infection, can prevent progression to renal failure.

The review in this section which covered the studies such as the economic aspects of the renal failure patients, early detection reduces the treatment cost and infection, improve patient morbidity and lessen health care costs and programmes for the treatment of chronic renal failure. Further, the review covers the studies related to the early treatment of hypertension and diabetes, treatment through various therapies which are more effective and less expensive, and also cost effectiveness of the different modalities. It is clear that; hemodialysis is the least cost-effective treatment. The above studies covered the cost analysis on various treatment methods for renal failure patients.

5. Dietary aspect and End Stage Renal Disease

There is some discussion on dietary aspects in end stage renal disease in literary review. In the management of patients with end-stage renal disease, dietetics is of great value when renal function is impaired. Dietary intervention
in end-stage renal disease has an important role in promoting the general well-being of the patient. By monitoring protein intake and controlling fluid, sodium, potassium, and phosphate intake surely plasma urea and electrolyte level can be maintained within normal limits, thus reducing the symptoms. Patients should not, however, have to comply with severely restricted diets, e.g. very low-protein diet, which may minimize changes in plasma urea concentration but lead to severe muscle wasting. The nutritional status of the patient must be considered and adequate energy, mineral and vitamins provided. Levels of each nutrient need to be individually adjusted according to the progression of illness, the type of treatment being used, and the patient's response to treatment. In general basic therapy objectives are as follows:

1. Prevent protein catabolism and minimize uremic toxicity
2. Avoid dehydration or over hydration
3. Carefully correct acidosis
4. Correct electrolyte depletion and avoid excess
5. Maintain optimal nutritional status
6. Retard progression of renal failure, thus postponing the ultimate necessity of dialysis
7. Maintain appetite and stimulate morale and a sense of well-being
8. Control fluid and electrolyte losses from vomiting and diarrhoea.
9. Control complications such as hypertension, bone pain, and central nervous system abnormalities.

1. A research study conducted by Aillo Klahar et.al (1994:877-884) has analyzed and concluded that among patients with moderate renal insufficiency, the slower decline in renal function that started four months after the introduction of a low-protein diet suggests a small benefit of this dietary intervention. Among patients with more severe renal insufficiency, a very-low-protein, as compared with a low-protein diet, did not significantly slow the progression of renal disease.
2. In the study “Protein restriction for diabetic renal disease” by Waugh et.al (2000: CD002181) analyzed whether protein restriction slows or prevents progression of diabetic nephropathy towards renal failure. They have identified, that a low protein intake would slow the progression of nephropathy affecting the non-insulin dependent diabetic population.

3. Another research study carried out by Denis Fouque et.al (2000:1986-992) “on dietary protein intake”, found that reducing protein intake in patients with chronic renal failure reduces the occurrence of renal death by about 40 percent as compared with larger or unrestricted protein intake. The optimal level of protein intake cannot be confirmed from these studies.

4. A study on “Nutrition therapy for diabetic nephropathy” done by Franz et.al (2003: 412-7). Human observational studies report no association between protein intakes less than 20% of energy intake and the development of renal disease. With protein intakes greater than 20% of energy intake, there is an association between protein with increased albumin excretion rate. Once albuminuria is present, intervention studies suggest a beneficial effect on renal function with a reduction of protein to 0.8 to1.0 gram/kg/day with microalbuminuria and to 0.8 gram/kg/day with macroalbuminuria. There is no strong evidence to suggest benefit from vegetable or plant protein over animal protein, but there is evidence for benefit on renal function, glucose, lipids, and blood pressure from weight-maintaining diet meeting guidelines for a healthy diet.

In conclusion, the review in this section covered the dietary aspects like low protein intake which would slow the progression of renal failure and optimum level of protein intake is 0.6gm/kg body weight.
6. Psychosocial support in End-Stage Renal Disease

Second type of literature on end-stage renal failure relates to psychosocial support for patients. Supportive care was defined in 1990 by the World Health Organization as the active total care of patients whose disease is not responsive to curative treatment. The impact of psychosocial factors on the outcome of patients with ESRD has been receiving more attention in recent times.

Social support for a patient ultimately thins down to two aspects. One is economic support which has been already discussed in the earlier part of this chapter. The second pertains to the moral support which he (or) she receives from the people around them. Here the five “C”, namely Care, Consideration, Consolation, Compromise and Consultation are the only source of strengthening his mind in the acceptance of the health problem and the treatment. Several studies are available to highlight these aspects of psychosocial support.

1. “Nancy & et.al (1997: 282) in their study namely “Fulfilling the promise: Linking Rehabilitation Interventions with ESRD patients outcomes” have analyzed the effect of rehabilitation efforts. It is clear from the study that for the care of patients with End Stage Renal Disease physical functioning as well as their mental health and emotional well being can be significantly improved as a result of rehabilitation efforts. Improved physical functioning and mental health are likely to be linked with broader health care system goals, especially the potential for lowered patient morbidity and mortality, lower need for patient’s institutionalization/custodialcare,and higher rates of patients gainful employment/productive activity. Based on the available evidence it can be concluded that rehabilitation interventions that are sensible, safe and reasonably low-cost should be made as widely available as possible to End Stage Renal failure patients.
2. Higher levels of social support improve global immune functioning, as evinced by a fourfold relative risk reduction in susceptibility to experimental rhinovirus inoculation (Cohen et al. 1997). Similarly, several studies in oncology have shown that low levels of social support are associated with altered cytokine function (Esterling et al. 1996, Ltgendorf et al. 2002). Another potential pathway involves stress. Specifically, chronic stress appears to lead to chronic inflammation, particularly inability to suppress interleukin (Miller et al. 2002), and recent data have shown that an increase in IL-6 levels from the 25th to 75th percentile is associated with a substantial increase in the odds of incident coronary disease (Pradhan et al. 2002), a finding confirmed in other populations (Ridker et al. 2000, Lindmark et al. 2001). Social interactions also may reduce the risk of dementia, and there is burgeoning interest in the field of social neuroscience, with a particular focus on the manner in which social networks integrate individuals into communities or provide mental stimulation via social complexity (Cacioppo et al. 2000).

3. A study namely “Assessment and treatment on depression in chronic dialysis patients” by Fredric& et.al (2000:1911-1913) points out that there is a progressive increase in both the incidence and prevalence with End Stage Renal Disease throughout the world. This study hopes that if the personnel (Nurses, Physicians, Dietitians, Nephrology trainees, Social workers) caring for patients with End Stage Renal Disease in the dialysis centers are made increasingly aware of the possible treatment options available for patients with clinical depression, effective treatment strategies can be devised and at least some of the suffering, morbidity and mortality of the patient can be diminished.

4. “Psychosocial variables, quality of life, and religious belief in ESRD patients treated with hemodialysis” have been analyzed by Samir& et.al (2002:1013-1022). According to them religious beliefs are related to perception of depression, illness effects, social support, and quality of life independently
of medical aspects of illness. Religious beliefs may act as a coping mechanism for patients with End Stage Renal Disease.

5. A study namely “Patient’s satisfaction with care and behavioral compliance in end-stage renal disease patients treated with hemodialysis” by Kovac et.al (2002:1236-44). They have found a relationship between patient satisfaction with the care their nephrologist and attendance at dialysis sessions. Patients who had a poor perception of satisfaction with their nephrologist had poorer attendance at dialysis sessions. There was no relationship between behavioral compliance and patient perception of ancillary hemodialysis staffs. In conclusion they say that a nephrologist have a crucial role in patient compliance. These results suggest interventions that improved patients perception of physical support may improve patient’s adjustment and possibility of survival.

6. There is a study on “Depression levels before and after transplantation” by Akman et.al (2004:111-113). According to their study, depression is a frequent problem among end-stage renal disease and it is closely associated with their physical well-being. The depression stage of the renal transplant recipients was significantly lower than that of hemodialysis patients with chronic allograft rejection. The presence of depression was not related to age or gender. Married patients showed a lower percentage of depression. They have concluded that the return to hemodialysis, especially after a short duration of graft function, is associated with depression. The lower percentage of depression among married patients may be due to the psychosocial support of the spouses. Therefore single persons and transplant failure patients who return to dialysis therapy need greater social and psychologic support. Placing greater number of patients on transplant waiting lists decreases depression and may provide a higher quality of life with better outcome during dialysis therapy.
7. A study titled “Counseling should be offered to people with end-stage renal failure” was carried out by Kelly and Tibbles (2004:31-33). It indicates that having a counselor as a member of the multi-professional team has made a positive contribution to the way in which people with end stage renal failure manage their illness. This study shows how families can be supportive when someone close to them develop renal failure. The finding of this study suggested that those who received a period of short-term counseling were able to cope more effectively with their illness and lifestyle changes, and felt less stress. This point to the value and necessity of having someone with requisite skills, to offer people a place to talk about often difficult and painful emotions.

8. Another study was on “The psychosocial impact of Renal Transplantation on living related donors and recipients” by Ozcurmex et.al (2004:110-114). The main issues were psychiatric morbidity and beliefs where preoperative information was inadequate. Overall, the vast majority of donors and recipients reported that they had a positive transplantation experience. Only a small proportion of the subjects developed psychosocial morbidity or were dissatisfied with their quality of life. These results are preliminary, but it appears that better psychological preparation for the transplantation process and close psychiatric follow-up would reduce negative outcomes.

9. One more study is on “Supportive care for the renal patients” assessed by Jeremy et.al (2004:1357-1360). A number of barriers to good supportive care have been highlighted in this study. They are lack of common language between professionals and inter-professional liaison, language, cultural and spiritual barriers between patients and support team, lack of education and training of paramedical team, fear of ‘getting it wrong’, poor interface with primary care, cognitive impairment in patients which come under personal barriers. The environmental barriers cover, lack of privacy, space and intimacy, lack of time (to develop relationship, communication, follow-up, on going
support), work load for staff (Number of patients), lack of long-term relationship with patient when hospitalized as in-patient. Good practice in supportive care given in this study are: regular multi disciplinary meeting including Counsellors, Psychologists, Palliative care doctors, Joint renal palliative care clinics, Joint education and meetings with community services.

10. The impact of social support on End-Stage Renal Disease was analyzed by Samir et.al (2005:98) Social support is a concept recognizing patient’s access to varying degree of network through which they can receive aid, and in which they engage in interactions. Social support can be obtained from family, friends, co-workers, spiritual advisors, health care personnel, or members of one’s own community or neighborhood. Several studies have demonstrated that social support is associated with improved outcomes and improved survival in several chronic illness, including cancer, and ESRD. The mechanism by which social support exerts salutary effects are unknown, but practical aid in achieving compliance, better access to health care, improved psychosocial and nutritional status and immune function, and decreased level of stress may all play key roles.

11. Mukadder Mollaoglu (2006) in her study titled “Perceived Social Support, Anxiety, and Self-Care among Patients Receiving Hemodialysis” focused on Hemodialysis therapy requires patients to undergo major lifestyle changes. Patients with increased perceived social support and decreased anxiety are more likely to enhance self-care. The author adopted descriptive-correlational study design was used to analyze the baseline data of a group of hemodialysis patients (n=140). Three instruments were used: the Exercise of Self-Care Agency Scale (ESCA), the Hamilton Anxiety Rating Scale (HAM-A), and the Multidimensional Scale of Perceived Social Support (MSPSS). Descriptive, bivariate, and multivariate analyses were completed. The analysis result shows that social support and anxiety are significant predictors of self-
care after controlling for the effect of time on dialysis. Results also indicated that patients who perceived higher levels of social support and lower levels of anxiety were more likely to have a higher level of self-care. The author finally concluded that interventions to increase hemodialysis patients’ perceived social support and decreased anxiety may contribute to an enhanced self-care ability and positive health outcome, and may subsequently improve self-care and the psychosocial adjustment to hemodialysis.

12. The study conducted by Melissa S.Y. Thong et al. (2007) aimed to investigate the association between social support and survival for patients on dialysis in Netherlands. They prepared the Social Support List (SSL) and measured two aspects of social support: interaction and discrepancy. Cox regression analysis was used to estimate all-cause mortality risk from baseline till censor date. The results of the study show that perceiving a discrepancy between expected and received social support was associated with increased mortality: social companionship, daily emotional support, and total support. Social support (interaction) was not associated with survival, neither in the whole sample nor when stratified by therapy modality. The study finally concluded that these results point to the importance of psychosocial risk factors for mortality in patients on dialysis.

The review in this section covers the studies on impact of psychosocial factors on the outcome of patients with ESRD (End-Stage Renal Disease). The studies covered the psychosocial variables like perception of depression, mental illness effects, emotional well being, support by others and medical aspects of illness. Further, the studies covered the need of social support from family, friends, co-workers, spiritual advisors, health care personnel, or members of one’s community or neighborhood for renal patients. Finally, the studies related to quality of life of the renal patients.
7. Health Education in End Stage Renal Disease

The patient health education is a very important factor in treating the disease (or) disorder which comes under the non drug therapy. This can be provided by the health care team members (Physician, Dietitian, Health care educator, Nurse) and medical social worker. Once the patient and their relatives, know about the disease and management of the condition, it is easy for them to manage. Education programme provides the details about disease condition, preventing the complications, information on how to carry out the treatment provided by the physician, need to follow the proper dietary schedule, the importance of regular follow-up, and the benefits from proper planned physical exercise.

1. A study carried out on "End stage renal disease in minorities" by Cruz et.al (1991:309-12), has projected that the proportion of Black Americans, American Indians, Asian Americans, and Hispanic Americans entering the ESRD program will continue to increase. Despite the increase in the average age of the ESRD population, the minorities entering the ESRD program are much younger. The major risk factors of ESRD like hypertension, diabetes, and chronic glomerulonephritis are affecting these minorities at a higher rate and in varying combinations. Among these risk factors diabetes and hypertension are treatable, and adequate control can prevent progression of renal failure. However, with minority groups, it is difficult to fully implement the measure necessary to achieve this control. Out - reach programs are necessary not only to provide medical treatment but to include instruction in socio economic and education strategies. Programs that will seek out these patients and treat them, should also educate them about their diet, about the detrimental effect of alcohol and smoking, and about the danger of substance abuse. Ultimately, these programs may be much cheaper than supporting a rapidly increasing ESRD program.
2. "Collaborative end-of-life decision making in end stage renal disease" by Loftin et.al (1998:615-7,597) has dealt with patients newly diagnosed with end stage renal disease who are faced with many treatment decisions. The decision making process should follow some well defined steps. The nephrology team can lead the patient and family through this process providing timely, realistic information to help them to make the best decisions. End of life decision making should be a part of initial long-term care planning done with every patient and family.

3. According to Thanasa.et.al (1999:28-31) diabetic nephropathy leads to chronic renal failure in 30-40% of diabetic patients. By offering primary health care, educating the patients with diabetic nephropathy about factors which influence their renal function, it is possible to delay the renal deterioration and therefore the start of renal replacement therapy. They have suggested that the nephrology nurse is capable of making a difference by offering advanced care and being the patient's teacher and supporter.

4. A study on "Diabetic nephropathy" carried out by Boner et.al (1999:489-96) have mentioned that renal involvement is one of the major micro vascular complications of both type 1 and type 2 diabetes mellitus. Moreover, diabetic nephropathy is the major cause of end stage renal failure in most western nations and is associated with increased morbidity and mortality as compared to other causes of renal disease. The result provided by them is that patients with diabetes should thus be screened regularly for the appearance of any of the risk factors for renal or other complications. Ancillary therapeutic measures include hyperlipidemia, low-protein and the cessation of smoking.

The review in this section covered the studies on patient health education in treating the renal disease. The reviews covered the various awareness education programmes which provide the details about disease
condition, preventing the complications, to carry out the treatment by the physician, proper dietary schedule, and the importance of follow-up and physical exercise.

Review of literature on various aspects of end-stage renal disease has covered medical and non-medical aspects. While medical aspects relate to the physicians and the type of treatment, proper economic, moral and mental support for the patient has emerged as the most important aspect in the process of treatment and recovery. Hence the present study has taken up the need for social support in the treatment of end stage renal disease.