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REVIEW ARTICLE

Effect of Multidimensional Educational Interventions Among Dialysis Patients

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Abstract:

Patient education is associated with better patient outcomes and supported by international guidelines and organizations like KDIGO, DOQI, CDC, DA vita that provide essential resources for patient information across the spectrum of kidney disease but a range of barriers prevent widespread implementation of comprehensive education for people with progressive kidney disease. It is not only of prime importance to have an adequate number of nephrologists only but also of equal importance to have a multidisciplinary team of renal dietician, renal nurses, social worker, clinical psychologist and pharmacist to improve patient's knowledge about disease management and treatment options.

This review paper aims at reviewing the effects of various educational interventions among maintenance hemodialysis patients. There are substantial systematic reviews and narrative reviews on the effect of predialysis education, however evidence on the effectiveness of education intervention among end stage renal failure patients on maintenance dialysis needs compilation and extensive research of its effect on various patient outcomes. This review aims to compile evidence on effective components of dialysis education programs on patient related outcomes. PubMed Medline, Cochrane Library with the main search terms of "hemodialysis", "maintenance dialysis", "multidisciplinary", "interdisciplinary", "education", "information", and "decision" were performed.

Keywords: Multidimensional, Interventions, KDIGO, DOQI, CDC, DA.

1. INTRODUCTION

Burden of End stage renal failure is rising universally and in India is associated with premature deaths, morbidity, higher hospitalization frequency and increase in health care expenditure. These indicates itself the need for a strong quality improvement initiative and education through interdisciplinary clinics is one such solution to improvement [1]. Extensive research and improved patient outcomes on the effectiveness of predialysis education among pre ESRD patients have been explored and found to be effective however the group with end stage failure remain neglected and under researched. Patients knowledge regarding their disease management improves with increased frequency of contact with nephrologist or as a result of worsening of condition they tend to seek information [2]. This is also similarly seen among the Indian population and health care system. An informed patient and a prepared proactive team is the key towards achieving better patient outcomes and amongst the dialysis patients a multidisciplinary proactive team can play a crucial role in educating patients towards better patient outcomes. Patient provider and system factors could contribute as barriers to patient education. Poor understanding of the condition limited health literacy, readiness to learn, access to information, time constraint, communication challenge, and lack of interdisciplinary care models [3].

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To improve adherence, patients must have knowledge of their disease condition through which they can have their questions, concerns and needs addressed and can also be taught on self-care management by a multidisciplinary approach. The multidisciplinary approach can be delivered through a team or a nurse in a resource constraint setting.

2. Education Interventions and Patient Outcomes

2.1. Effectiveness of Nutritional Intervention and Fluid Restriction on Patient Outcomes

Malnutrition is common among ckd patients and highly prevalent (25-50%) among dialysis patients [4 - 7] and is associated with morbidity and mortality [8 - 12].

Adequate protein and calorie, safe levels of sodium, potassium, phosphorous and fluid intake are important for the wellbeing of dialysis patients. Nutritional intervention that is tailored specifically considering barriers can result in improved albumin levels even among patients with high c reactive proteins. These barriers could be lack of knowledge, poor appetite, depression, inadequate dialysis or support to cook [13]. A nurse led intervention educating the patients on hyperphosphetemia their symptoms, use of phosphate binder with their benefits for improving health related quality of life had improved albumin and reduced hyphosphetemia [14].

Reduced interdialytic weight gain, improved adherence, however no improvement of mean blood pressure was seen upon teaching patients with weekly reinforcement about diet, fluids and control of weight gain [15], Similarly a nurse working on a protocol and administering patient education on disease management showed improved hemoglobin and albumin level of patients [16]. Since renal nurses at the dialysis unit have a long term relationship with the patients educating patients through them would be an ideal reinforcement and channel of communication. However, this may become a challenge in a low resources setting like India where there is a shortage of nurses or inadequate nurse patient ratio.

Nutritional status of dialysis patients receiving nutritional educational program has shown to be as effective as oral supplementation to prevent and treat malnutrition among dialysis patients [17].

Public marketing campaign, media messages, listing of phosphorus content on food labels are opportunities in public health to improve hyperphosphetemia [18]: An educational intervention is as effective as Oral supplementation to prevent malnutrition and treatment of malnutrition. Improved creatinine, protein serum values, and other biochemical parameters were the markers of effectiveness [19]. A nurse administered protocol, training received through case based training, guided reading, and theoretical input can show significant improvement in patient education [20].

Significant number of educational training on improving phosphate and calcium levels have proven to be effective [21, 23]. Reduced interdialytic weight gain, reduction in blood pressure and improvement in serum creatinine level [24]. However, a systematic review on efficacy of dietary interventions showed that nutritional therapies for controlling blood pressure are still questionable and further research is needed and the best nutritional therapy to control blood pressure needs to be researched further for evidence [25].

Creating consistent interactive communication, using talking control technique, emphasizing positive action, acknowledging typical food pattern, focusing on single goal than multiple goals can promote adherence to nutritional advice given in a nutritional program to dialysis patients [26].

2.2. Exercise Counselling and Patient Outcomes

Several studies have used aerobic exercise, resistance exercise or combination of both and yoga based exercises among dialysis patients. Amongst the studies done on dialysis patients, Afshar *et al.* used a combination approach of exercise (aerobic and resistance) resulting in reduction of CRP and creatinine [27]. Akiba *et al.* (exercise training with usual care) resulted in the reduction of VO₂ max ($P < 0.05$) and VO₂AT [28]. Baria *et al.* (aerobic exercise at center and home) resulted in reduction of visceral fat and waist circumference constituting the abdominal distribution of fat decreased with improvement in leg lean mass [29]. Cheema *et al.* (resistance training) resulted in increase in muscle strength [30] Chen *et al.* (intradialytic low- intensity strength training) improved lower body strength [31]. Dong (resistance training plus nutrition) increased the weight and strength however no difference in body mass was seen [32] Yurtkuran (yoga-based exercises with usual care) resulted in improvement in pain, fatigue, strength, creatinine and cholesterol [33] as shown in Table 1. Van Vilsteren (resistance and aerobic during HD) improved muscle strength of the lower extremity and quality of life [34].

Exercise can improve many indicators of physical functioning, such as fitness, muscle mass, physical performance,

and self-reported physical functioning. Fewer data are available to address cardiovascular indices. However, preliminary evidence suggests that exercise can enhance the management of hypertension, reduce inflammation, and improve endothelial function [35].

Table 1. Exercise counselling and patient outcomes.

STUDY	N (SAMPLE SIZE)	EDUCATION MODULE THEME	RCT /OBSERVATIONAL	STUDY DURATION	SETTING	OUTCOME MEASURES AND RESULT
Effects of aerobic exercise and resistance training on lipid profiles and inflammation status in patients on maintenance hemodialysis. Afshar <i>et al.</i> (2010)	21 males maintenance HD > 3 months; age > 20 years	Aerobic and resistance training	RCT	8 weeks	HD unit in Tehran	Blood lipids and inflammation status Blood chemistry (urea, creatinine, lipids, CRP), Kt/V and anthropometric measure in HD Result: CRP and creatinine reduction in aerobic exercise (P = 0.005) and resistance (P = 0.036), no effect on weight, urea, lipids or Kt/V
Effects of Recombinant Human Erythropoietin and Exercise Training on Exercise Capacity in Hemodialysis Patients (Akiba <i>et al.</i> 1995)	12 HD patients with low physical function and activity levels	Exercise training & usual care	RCT	12 weeks	Tokyo, HDU	Aerobic capacity Result: VO ₂ max (P < 0.05) and VO ₂ AT (P < 0.05) were decreased among controls and unchanged among intervention group
Effects of intradialytic cycling compared with pedometer on physical function in chronic outpatient hemodialysis: A prospective randomized trial (Clara Bohm <i>et al.</i> 2014)	60 Patients Ergometer group cycled for 24 weeks. Pedometer participants followed a home-based walking program for 24 weeks	intradialytic low-intensity, strength training & stretching	RCT	24 weeks	HDU and home setting	Primary outcome: aerobic capacity [VO ₂ peak and 6-minute walk (6MW)] Secondary outcome: Secondary outcomes included lower extremity strength, flexibility, physical activity (accelerometer) and health-related quality of life. Result: SS testing in the ergometer group improved from 10.2 (SD 3.4) to 11.4 (SD 2.5) cycles from baseline to 24 weeks (P < 0.005). Similarly, in the pedometer group, SS cycles improved from 10.1 (SD 3.3) to 12.2 (SD 3.5) (P < 0.005) No significant changes in secondary outcome
The effect of resistance exercise to augment long-term benefits of intradialytic oral nutritional supplementation in chronic hemodialysis patients. Dong J <i>et al.</i> 2011	32 patients on HD	Resistance training plus nutrition and only nutrition in the control group	Interventional study	6 months	HDU	Body composition, muscle strength, Biochemical parameters, recall dietary Result: No difference in lean body mass. Weight and strength increased in intervention group
A modified yoga-based exercise program in hemodialysis patients: A randomized controlled study (Yurtkuran M 2007)	37 Patients on HD	yoga-based exercises versus usual care	RCT	12 weeks	HDU	Pain, fatigue, sleep, grip strength, biochemical variables Result: Improvement in pain -37%, fatigue -55%, sleep disturbance -25%, strength +15%, Ht +13%, creatinine -14%, cholesterol -15%

2.3. Medication Counselling and Patient Outcomes

Pharmacist-provided counseling have significantly improved the knowledge attitude and practice among patients [36] similarly satvik *et al.*, showed improved knowledge assessment scores at the end of a 8 week trained pharmacist patient training program [37] forgetfulness, lack of knowledge, inconvenience and scheduling problems are the main reasons for non-adherence therefore counselling aiming at educating patients must incorporate ways to remind to take their medications and helping patients with lower education levels to understand the importance of medication compliance and strategies to be compliant [38]. Active participation of pharmacists in the management of anemia in hemodialysis patients has therapeutic and pharmacoeconomic impact [39].

Face to face training and pamphlet training are equally effective in improving knowledge and adherence to treatment including pharmaceutical regimen, however, face to face training were more effective over latter [40] hypertensive patients need patient education for better retention of knowledge and improving their adherence, this can be similarly attributed to all patients for improved adherence and retention of knowledge [41]. Pharmaceutical Services Division, Ministry of Health Malaysia has developed the Renal Medication Therapy Adherence Clinic (MTAC) which was managed by pharmacists as one of the strategies in optimizing patients' knowledge by assessing potential barriers to medication knowledge and implementing comprehensive strategies to increase adherence [42].

3. Quality of Life and Self-Care Management

Self-care management includes diet care, vascular access and ability to perform activities of daily living among dialysis patients. It is a complicated characteristic of individuals that enables them to perform some actions for identified and specific needs [43]. Inability to perform activities of daily living may be contributed to weakness, fatigue or depression among dialysis patients. Sathvik *et al* saw that the quality of life of hemodialysis patients was significantly impaired in comparison to healthy individuals of the general population and renal transplant patients particularly with respect to the physical, psychological, and social relationship domains [44]. Research on nutrition interventions and exercise have been effective in improving muscle mass, and strength. Self-care management program implementation and education focusing on disease knowledge, storage and adherence of medication, diet instructions, exercise modalities, emotion sharing and discussion of problem during and after dialysis was found to be effective to improve quality of life among dialysis patients [45]. Priscila Silveira Duarte approach using cognitive behavior therapy showed to be effective in the treatment of depression and increase in quality of life score in patients undergoing hemodialysis [46].

4. RESULTS

Empowerment, self-care self-efficacy and depression levels improved among patients receiving empowerment program using by identifying problem areas and exploring emotions associated with self-care management developing goals and strategies to overcome and implementation of behavioral change plans. Face to face self-care education training had better influence on quality of life among dialysis patients.

CONCLUSION

Individual discipline has proven educational interventions to be effective among dialysis patients to improve quality of life, self-care management, knowledge, biochemical parameters and therapeutic adherence. There for a multidisciplinary approach covering dietary, nursing, primary physician, physical therapist and counsellor using coordinated strategies than working in silos in educating dialysis patients can aim and prove to improve the patient's outcomes to larger extents. The best proven practices and principles can be incorporated in the module and delivered to patient. It is of foremost importance to use coordinated strategies in educating patients in improving patient outcomes among dialysis patients.

CONSENT FOR PUBLICATION

Not applicable.

CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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