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The viability of hemodialysis as a treatment option for renal failure in a developing economy*

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Summary

The viability of hemodialysis as a treatment option for renal failure in a developing economy like Nigeria was assessed in this study to determine whether committing huge capital in establishing such centres all over the country is justifiable. A total of 158 patients dialysed at the Owena Dialysis Centre over a period of 3 years (January 1991 – December 1993) were studied. There were 112 males and 46 females, ranging in age between 15 and 81 years. 17 of patients had acute renal failure (ARF), while 141 had chronic renal failure (CRF). During the period of study, a total of 1,452 dialysis sessions were carried out ranging between 8 and 77 sessions per month (mean 40 sessions/month). Dialysis sessions ranged between 1 and 101 sessions per patient. A progressive increase in the number of dialysis sessions between 1991 and 1993 was noted, and new patients who required dialysis were being seen at a rate of between 1 and 10 per month. 112 patients (70.8%) could afford dialysis for less than one month while only 3 (1.9%) could afford to continue dialysis for over 12 months. All cases of ARF (except one) recovered normal renal function after dialysis, while 116 CRF patients were discharged home after less than 10 sessions of dialysis due to financial constraints. The study shows that hemodialysis is a relevant treatment option for renal failure even in a developing economy like Nigeria subject to adequate health planning. The major limitations to its profitable utilization under the present health care dispensations are highlighted.

Keywords: *Viability, hemodialysis, renal failure, developing economy*

Résumé

La fiabilité de l'hémodialyse comme traitement optionnel du mauvais fonctionnement des reins dans un pays à économie en voie de développement tel que le Nigeria a été considérée dans cette étude pour déterminer si dépenser des sommes massives pour établir ces centres dans tout le pays est justifiable. Un total de 158 patients dialysés à 'Owena Dialysis centre' pendant 3 ans (Janvier 1991 – Décembre 1993) ont été étudiés. Il y avait 112 hommes et 46 femmes, âgés de 15 à 81 ans. 17 patients souffraient d'un mauvais fonctionnement de rein très sévère (ART), pendant que 141 souffraient d'un mauvais fonctionnement chronique (CRF). Pendant la période d'étude, un total de 1452 dialyses ont été réalisées par mois. Les sessions de dialyse ont varié de 8 à 77 sessions par mois (moyenne 40 sessions/mois). Les sessions de dialyse allaient de 1 à 101 par patient. Une augmentation progressive du nombre de

sessions de dialyse entre 1991 et 1993 a été faite, soit environ 8 à 77 sessions par mois (moyenne 40 sessions/mois). Les sessions de dialyse allaient de 1 à 101 par patient, et les nouveaux malades dont le traitement demandait une dialyse étaient consultés à un taux entre 1 à 10 par mois. 112 patients (70,8%) pouvaient s'acquiescer du prix de la dialyse pour moins d'un mois alors que 3 (1,9%) pouvaient aller jusqu'à 12 mois. Tous les cas de ARF (à l'exception d'un) retrouvaient le bon fonctionnement rénal après moins de 10 jours de dialyse à cause des contraintes financières. L'étude montre que l'hémodialyse est une option de traitement du dysfonctionnement rénal, même dans une économie en voie de développement tel que le Nigeria, si elle est correctement planifiée. Les limitations majeures de son utilisation profitable sous les présentes conditions de santé primaires sont illustrées.

Introduction

Hemodialysis is a complex, demanding and expensive treatment modality for renal failure. Its integration into a national health care programme requires adequate budgeting in view of the high costs of dialysis materials. In addition, for its successful running, there must be well-trained, highly motivated and dedicated staff, with proper infrastructural supportive facilities in place [1].

In recent years, many hemodialysis units have been springing up in Nigeria in spite of the huge capital outlay involved. However a number of problems have been identified in a recent article which indicated that the operation of these units may be less than rewarding [2].

The dialysis unit of the University College Hospital, Ibadan (The Owena Dialysis Centre) is one of the largest and well-manned dialysis centres in Nigeria [2]. A lot of effort has been put into its operation to ensure uninterrupted service to patients since its inception in 1990. It is therefore a very appropriate centre for collecting information for the evaluation and assessment of hemodialysis utilisation in Nigeria.

The following study was therefore carried out to assess the viability of this procedure as a treatment option for renal failure in a developing economy like Nigeria, and to assess whether committing huge amounts in establishing such centres all over the country is justifiable.

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first session of dialysis), and could therefore be classified as being non-dialysis dependent. Apart from this group, 8 patients among the 141 chronic renal failure patients were found to be relatively stable and uraemic symptom free for a variable period of between 2 and 3 months after their last dialysis and discharged for follow-up. These patients were also classified with the ARF cases as non-dialysis dependent in all. 86 patients (all chronic renal failure) received a short temporary Respite with significant reduction in uraemic parameters (being able to afford dialysis for not more than three sessions only) following which they soon became symptomatic and deteriorated.

Table 1b: Affordability – based on the number of dialysis sessions the patient could afford (CRF patients only: n = 141)

	N	%
Initial 3 dialysis sessions only	86	61
4 – 20 dialysis sessions	44	31
>20 dialysis sessions	11	8
	141	100

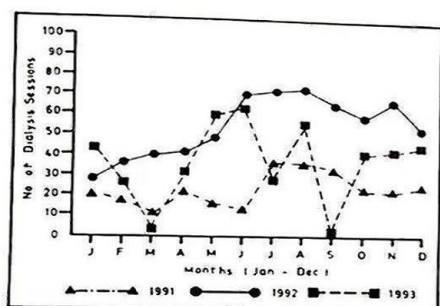


FIG 2 YEARLY MONTH BY MONTH DIALYSIS SESSIONS

Discussion

This study has revealed that with adequate planning hemodialysis has a place in the treatment of renal failure in a developing economy like Nigeria. However, there are several major limitations to its profitable utilisation. With chronic renal failure presenting as end stage renal failure (ESRF) in our hospitals with an incidence of between 2 and 10% of hospital admissions [4] the need to offer a treatment option to these patients becomes imperative. The huge cost of establishing a functional hemodialysis unit, the seeming reluctance of governments to commit such capital into this venture, and the fact that hemodialysis for ESRF is an indefinite procedure (save for the possibility of a renal transplant programme along the line) are factors that have contributed to the protracted delay in starting off, or even considering hemodialysis treatment as being viable in developing countries [1].

The Owena Dialysis Centre took off in 1990 with five Centry-2 Cobe Machines (which soon

increased to ten) and a few trained personnel [2]. The centre soon became very busy as patients started to show up on referral from practically all over the country, and more staff got trained. It became obvious that this facility is a much needed therapeutic measure for the ever increasing number of CRF and ARF patients showing up in our tertiary health institutions as our figures show (Fig. 2). Kennedy in his review of the problems of ESRD in developing countries noted that the availability of facilities for ESRD treatment has the tendency to draw attention to the large number of patients requiring these facilities in developing nations [1]. However, following the functional take-off of hemodialysis in our centre with the subsequent establishment of other centres across the country, our experience soon showed that there are some notable limitations to its profitable utilisation both to the patient as well as to the Institution.

One of the major problems observed was the distance of many of the patients' homes from the dialysis centre. This posed several problems for the patients, such as high transportation costs, the inconveniences of frequent travellings by a chronically ill patient, serious work disruption and family life distabilisation. These factors make regular maintenance dialysis difficult for such few patients that can afford it. The result is that these patients tend to opt for inadequate frequency of dialysis. From this study we found that all the patients who had fairly prolonged dialysis sessions (more than 20 sessions, or dialysis for more than 3 months) were coming for their dialysis once or twice per week, or in some cases, only once in ten days. This is certainly an inadequate dialysis schedule, which could not result in a good quality of life following a treatment, which is undoubtedly costly [8].

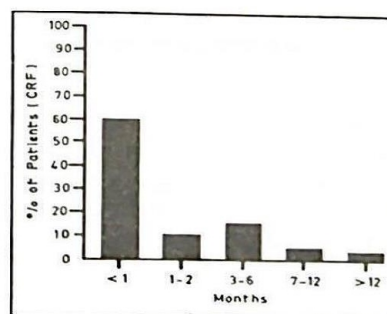


FIG 3 LENGTH OF TIME ON DIALYSIS (in months)

Affordability: Another major factor, even as observed in earlier reports, that limits the profitable utilisation of this facility by patients with ESRF is financial constraint [1,5,6,7]. It became obvious from this study that majority of our patients are too poor to sustain prolonged dialysis. About 60% of our chronic renal failure patients had their dialysis terminated within one month, (Fig. 3) for financial reasons, whilst as high as

Table 1a: Sessions of dialysis in all patients

Number of sessions	1-3	4-6	7-10	11-20	21-40	41-60	>60	Total
Number of Patients:-CRF	86	16	14	14	2	6	3	141
ARF	14	3	-	-	-	-	-	17

Patients and methods

All patients dialysed at the Owena Dialysis Centre over a period of 3 years (January 1991 - December 1993) were studied. All patients were accepted for dialysis upon the diagnosis of renal failure (acute or chronic) and referral to the dialysis centre. Dialysis was routinely performed using the Centry -2 Cobe Machine and the Cobe Hollow fibre dialyzer, or equivalent brands. The indications for dialysis were clinical features of severe uraemia including nausea, vomiting, hiccups and deteriorating level of consciousness, as well as markedly deranged biochemical parameters marked by a blood creatinine level greater than 8 mg/dl, with or without hyperkalemia.

Access routes used in all the cases during this period were either the femoral vein or a forearm arterio-venous fistula. Patients were accepted for dialysis after relevant fees had been paid. These include dialysis and laboratory screening fees for Hepatitis B and human immunodeficiency virus. (In this centre patients are normally required to pay for three dialysis sessions at a time to ensure at least three consecutive dialyses). About 65.2% of the patients were domiciled within Ibadan, while 34.8% were domiciled outside Ibadan, and from various other states to have their dialysis at the Owena Dialysis Center. For the assessment of the outcome of dialysis, patients were classified into three categories: Non-dialysis dependent, Dialysis dependent, or 'Temporary respite', depending on whether patients subsequently recovered complete or partial renal function without the need for prolonged dialysis (usually in cases of acute or some cases of acute on chronic preterminal renal failure), or were evidently dependent on continued dialysis with only a temporary respite from minimal affordable (1-3) sessions of dialysis, respectively. The dialysers and bloodlines were also routinely cleansed and sterilised for reuse [2] for a maximum of three dialysis sessions.

Results

A total of 158 patients were dialysed for varying numbers of sessions during the period of study. The patients comprised of 112 males and 46 females, ranging in age between 15 and 81 years. 17 patients had acute renal failure (ARF) based on a short history of oliguria and biochemical features of azotemia and normal ultrasound renal sizes, following a positive history of any of the known causes of ARF in this environment [3]. 141 patients were diagnosed as chronic renal failure (CRF) based on some or all of the following criteria: a

past history of chronic renal disease or hypertension, clinical and biochemical evidence of advanced uraemia, with or without an ultrasound evidence of bilateral small kidneys.

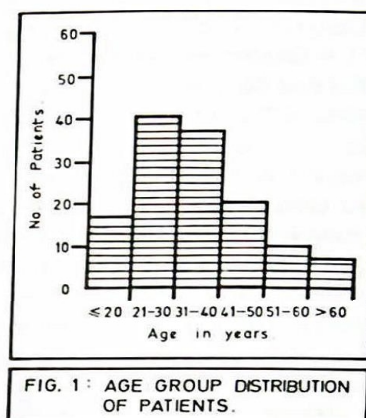


FIG. 1: AGE GROUP DISTRIBUTION OF PATIENTS.

One of the cases of ARF died during the first dialysis session due to very late presentation. Between January 1991 and December 1993, there was a total of 1,452 dialysis sessions undertaken at the Centre, with a range of between 8 and 77 sessions per month (mean of 40 sessions/month). In between patients, dialysis sessions ranged from a minimum of one (1) and a maximum of 101 sessions. It was also observed that the number of dialysis sessions steadily increased between 1991 and 1993 (Fig. 2). However, in 1993, despite a very high number in the first month of the year, the figures dropped sharply to almost nil on two occasions in March and September. These months coincided with periods of national industrial unrest and strikes by hospital workers when patients could not be admitted.

New patients reported at the dialysis centre at an average rate of 6 new patients per month (range: between 1 and 10 new patients per month) during this study period. When the length of time on dialysis by the patients was reviewed, it was found that 112 (70.8%) of all the patients remained on dialysis for less than 1 month, 20 (12.7%) for between 3 and 6 months, 8 (5.1%) for between 7 and 12 months, while only 3 (1.9%) remained on dialysis for over 12 months.

Outcome of the dialysis

All the cases of acute renal failure recovered normal renal function without any relapse subsequent to their being dialysed (apart from the one that died during the

61% (86 out of 141 CRF patients, Table 1a) were only able to afford not more than three dialysis sessions. This is a big problem, considering the fact that majority of these patients are young and in their productive years (Fig. 1). This strongly calls for an upward review of Government attention to health care policy, as it is clear that life support machinery could not be of much benefit without government subsidy [1,9].

Another problem being encountered is that posed by difficulty in securing easy vascular access routes for the procedure. At present we routinely utilise the femoral vein for hemodialysis in our centre. This is due to its relative ease of cannulation and the cheaper cost of the femoral vascular catheter compared to the subclavian catheter [2]. However this is a rather painful procedure and even after measures have been taken to reduce pain by administration of local anaesthesia many of the patients still feel apprehensive and dread coming for another dialysis session. In addition to this is the problem of early fibrosis of tissue around the vein, which makes access difficult or even impossible. Arterio-venous fistula is the ideal access route for maintenance hemodialysis. The notable infrequency of its usage in our centre is not deliberate but due to the high cost of creating one for the patient. Most of our patients therefore often find it difficult to accommodate its cost combined with the cost of hemodialysis within their meagre resources [2]. Hospital - based hemodialysis treatment for chronic renal failure in this environment is at present an indefinite programme. The goal should be to focus on a definite endpoint - either a home hemodialysis programme and/or renal transplantation. The situation where the patient seems to be coming for an apparently unending therapeutic procedure which does not result in the so much anticipated "cure" that is naturally expected after expending such a huge amount on hospital bills only leads to frustration and a feeling of hopelessness on the part of the patient, and disappointment on the part of the relations [1,8].

Utility in acute renal failure (Arf): It is quite obvious from the result of this study that the utilisation of hemodialysis in our setting is most rewarding in the management of cases of acute renal failure. All the cases that were classified as 'non-dialysis dependent' came under the diagnosis of ARF and acute chronic renal failure. In fact, 16 out of the 17 cases that presented with ARF regained normal renal function with minimal number of dialysis sessions. It has been well reported that the overall mortality of ARF is still relatively high in our environment, [3,10] but there is no doubt that the availability of hemodialysis should appreciably reduce the mortality if patients could be identified early for treatment.

Conclusion

This study has shown clearly from the above observations that hemodialysis is a viable treatment

modality for renal failure in a developing economy like Nigeria, but that for a profitable utilisation, especially towards future health care planning, it is suggested that a focused programme should be developed now, with more institutionalised dialysis centres being established closer to the patients' domiciliary areas, and the Renal Transplantation Programme pursued vigorously to take off soon so as to take care of the patients on prolonged dialysis before they run out of funds. The home dialysis scheme may also be encouraged for those who can afford it, especially where it is difficult to find a kidney donor for them.

There is no doubt, that Government subsidy would be very essential in all aspects of long-term renal care, and a proper health insurance policy would help in this regard.

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References

1. Kennedy AC. The problem of endstage renal diseases in developing countries. Proceedings 8th International Congress of Nephrology. Athens, 1981; 385-389.
2. Arije A, Kadiri S, Akinkugbe OO. and Osobamiro O. Hemodialysis in Ibadan, A preliminary report on the first 100 dialysis. Afr J Med med Sci 1995; 24; 255-259.
3. Kadiri S., Ogunlesi A., Osinfade K and Akinkugbe O.O. The causes and course of acute tubular necrosis in Nigerians. Afr J Med med Sci. 1992; 21:91-96.
4. Akinsola A and Odesanmi WO. Diseases causing endstage renal failure in Nigeria. Afr J Med med Sci 1989; 18: 131-137.
5. Card WI and Mourney GH. What is the monetary value of human life? British Med Journal 1977; 2: 1627-1629.
6. Friedman EA and Delano BG. Can the world afford uraemia therapy? Proceedings of the 8th International Congress of Nephrology, Athens 1981: 577-583.
7. Laing W Renal Failure; a priority in health? Office of Health Economics, London 1978; No.62
8. Gutman RA, Stead WW. and Robinson RR. Physical activity and employment status of patients on maintenance haemodialysis. New England Journal of Medicine 1981; 304: 309-313.
9. Relman AS and Rennie D. Treatment of endstage renal disease: free but not equal. New England Journal of Medicine 1980; 303: 996-998.
10. Adu D, Anim. Addo Y, Foli YK, Yeboah ED., Quartey JKM and Riberiro B.F. Acute Renal failure in tropical Africa. Br Med J 1976; 1: 890-892.