

Dialysis Outcomes Among Elderly Populations in Asian Countries

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The inevitable reality of today is that the world population is aging, and the elderly (above 65 years) are more prevalent among the dialysis population worldwide. **Objectives:** The purpose of this review is to do a literature search on issues related to dialysis in the elderly Asian population, such as vascular access outcomes, complication rates, and survival data by modality on hemodialysis (HD) and peritoneal dialysis (PD). **Methods:** A literature search on key topic areas was done on articles published in English between January 1, 2005 and December 31, 2015. **Results:** Although incidences of elderly dialysis patients are increasing in Asia, we found that large-scale data is lacking. Further research is needed to assess dialysis outcomes among the elderly. Available studies suggest acceptable outcomes in vascular access, primary and secondary patency rates, and similar intervention rates compared to non-elderly. Survival data suggests superior outcomes in HD in elderly. Due to significant differences in dialysis practices in Asia, a proper comparison is difficult. **Conclusion:** Age alone is not a contraindication for dialysis.

Key words: Dialysis, Survival, Vascular Surgical Procedures, Asia, Aged

Introduction

Large studies on the prevalence of chronic kidney disease (CKD) have been conducted in Asia [1-10]. The prevalence of CKD has been estimated to be 13% in a large sample of 13,295 Chinese adults [1]. This is consistent with the findings from another cohort of 574,024 Japanese adults, where the same prevalence of CKD was reported [3].

New clinical studies suggest that a strikingly large percentage of patients who have acute kidney injury do not recover full renal function or require permanent renal replacement therapy, having an important impact on the epidemiology of CKD and end-stage renal disease (ESRD) [11, 12].

The major causes of ESRD have shifted towards diabetes, hypertension, and peripheral vascular diseases. In recent reports coming from Asia, these conditions now account for about 40–

50% of all cases with ESRD, as well as established causes of CKD [13-15].

Among the dialysis population worldwide, elderly people (aged 65+) are becoming more prevalent. Although dialysis is considered to be life-prolonging treatment, the issue has been raised on balancing benefit and burden as well as the importance of providing patient-centered holistic approach for the elderly [16-18].

Asia is considered to be the most densely populated region of the world. It comprises about 30% of the world's land area and 60% of the world's population (3.6 billion people)[1, 19]. Correspondingly, the aging population seems to be more prevalent in Asia as well [20].

The purpose of this review was to do a literature search of existing data on issues related to dialysis among the elderly population of Asia, including vascular access outcomes, complication rates, and survival data by modality — hemodialysis (HD) and peritoneal dialysis (PD).

Materials and Methods

A literature search on key topic areas — vascular access outcomes, complications rates, and survival on dialysis — was conducted on articles published in English between January 1, 2005 and December 31, 2015. A critical analysis and comparison was performed on the articles included in the literature search as well as on international data regarding the topics of interest. Relevant evidence on existing guidelines was reviewed.

Results

1. Vascular access

A Canadian study on a large, multi-ethnic population compared arteriovenous fistula outcomes (AVF) among patients <65 years old (65- group) to those ≥65 years old (65+ group) [21]. With radiocephalic and brachiocephalic AVF, survival and use of interventions were similar among the young and old dialysis patients. However, patients in the 65+ group had an increased risk of fistula failure due to age (relative risk, RR 1.7; $p=0.05$), despite greater use of upper arm AVF. Multivariate analysis yielded the following variables significant for AVF loss: male sex hazard ratio (HR) 0.63 (95% confidence interval, CI 0.44–0.91), coronary artery disease HR 2.1 (95% CI 1.5–3.0), and Caucasian

ethnicity HR 0.63 (95% CI 0.44–0.91).

McGrogan et al. conducted meta-analysis on articles published before December 31, 2014 regarding AVF outcomes among the elderly. Of 199 relevant articles reviewed, 15 were deemed eligible for the meta-analysis. The pooled 12-month primary and secondary AVF patency rates were 53.6% (95% CI, 47.3-59.9) and 71.6% (95% CI, 59.2-82.7), respectively. Comparison of radiocephalic versus brachiocephalic AVF patency rates demonstrated that radiocephalic AVFs have inferior primary (odds ratio, OR, 0.72; 95% CI, 0.55-0.93; $p=0.01$) and secondary (OR, 0.76; 95% CI, 0.58-1.00; $p=0.05$) patency rates. This meta-analysis confirmed that adequate 12-month primary and secondary AVF patency rates can be achieved in elderly patients. Compared with radiocephalic AVFs, brachiocephalic AVFs have superior primary and secondary patency rates at 12 months.

Studies in Asian countries have addressed this issue as well. In a study by CJ Renaud et al., fistula patency and maturation were retrospectively compared among ESRD patients aged <65 to ESRD patients ≥65 years at a single center in Singapore. They analyzed 280 primary fistulas (59% radiocephalic, 33% brachiocephalic, and 8% brachiobasilic) in this cohort consisting of 31.8% aged ≥65 years; 50% Chinese and 39% Malay; 42% women; and 70% diabetic. One and two year primary and secondary patency were comparable in patients aged <65 and ≥65 years: 41.3% vs 36.7% and 28.7% vs 24.4% ($p=0.547$) and 57.7% vs 56.8% and 47.1% vs 47.2% ($p=0.99$). On multivariate analysis, only the following factors affected fistula survival: non-Chinese HR 0.622 (95% CI, 0.43-1.00), dialysis initiation with tunneled catheters HR 0.549 (95% CI, 0.297-0.841), and surgical/endovascular intervention HR 2.503 (95% CI, 1.695-3.697). Nonmaturation and intervention rates were also similar at 56.7% versus 61.8% at 3 months, 34% versus 32.2% at 6 months, 0.31 versus 0.36 per access year ($p>0.05$).

Population characteristics and risk factors for AVF loss are presented in Table 1 [21-26].

2. Intervention rate

In a Canadian study by Lok et al., no differences were found in the rate of intervention (average number of events per access year) between the 65+ group and the 65- group. The overall rates of total procedures, angioplasty, thrombolysis, and revisions per access-year were 0.52, 0.31, 0.02, and 0.28.

In a study by CJ Renaud et al., a total of 126 procedures

Table 1. Risk factors for AVF loss in multiethnic populations

Study	Study design	Population characteristics / % among elderly/	Risk factors of AVF loss	Hazard ratio
Lok CE et al.	Retrospective, single center / Canada	Southeast Asian 18.9, South Asian 7.1, Other 0.5	male sex	HR 0.63 (95% CI 0.44–0.91)
			coronary artery disease	HR 2.1 (95% CI 1.5–3.0)
			Caucasian ethnicity	HR 0.63 (95% CI 0.44–0.91)
Renaud CJ et al.	Retrospective, single center /Singapore	Chinese 53.9 Malay 34.8	non-Chinese	0.622 (95% CI, 0.43-1.00)
			dialysis initiation with tunneled catheters	0.549 (95% CI, 0.297-0.841)
			surgical/endovascular interventions	2.503 (95% CI, 1.695-3.697)

were performed: 83 in the 65- group and 43 in the 65+ group. Interventions per access year was 0.40 overall, and 0.34 in the 65- group versus 0.36 in the 65+ group ($p=0.512$).

In Japanese study by K Hayakawa et al., patients were divided in 2 groups: those with successful, permanent HD vascular access and those who required vascular access revision. They concluded that age was a factor for the successful maintenance of the initial permanent HD vascular access. Other factors included gender and diabetes mellitus. However, those factors were not related to the successful maintenance of revised vascular access [22-24].

3. Survival on dialysis and choice of modality

Several studies have previously compared survival among the elderly on HD to those on PD, demonstrating superior outcomes with HD.

Data is scarce in Asian region. A large, Korean nationwide study analyzed 11,301 patients (6,138 men) aged ≥ 65 years who had initiated dialysis between 2005 to 2008 and had followed up (median: 37.8 months; range: 3–84 months). Baseline demographics, co-morbidities and mortality data were

obtained using a database from the Health Insurance Review and Assessment Service. This study aimed to assess the survival rate and elucidate predictors for all-cause mortality.

In the intention-to-treat analysis, survival was better for HD patients than for PD patients at all points along the follow-up period (5-year survival rates: 39.3% in the HD patients vs. 30.5% in the PD patients) ($p<0.001$). The difference in survival rates remained after an adjusted trend analysis (5-year survival rates; 39.6% in the HD patients vs 28.3% in the PD patients).

Survival and relative mortality hazard for HD and PD patients in Taiwan was studied based on the Taiwan Renal Registry data. In a single-center study by T Jeloka, patients were divided into two groups based on the modality of dialysis and age — elderly (65–70 years) and very elderly (>70 years) [25]. Baseline data and survival were then compared between groups. The mean age of the study population was 71.8 ± 6 years with 73.8% males and 71.4% with diabetes. Median overall survival of the patients was 26.6 months. Median survival of elderly dialysis patients was 26.5 months and of very elderly dialysis patients was 30.1 months ($p=0.9$). Median survival of HD and PD patients was also similar at 30.1 and 25.2 months, respectively.

Table 2. Survival on dialysis by modality

Study	Study design	Number of patients	Age cut-off for subgroup analysis	Survival %/ at 1 year	
				HD	PD
Lee S et al.	Nationwide / Republic of Korea	11301	Above 65	78.6	76.9
Huang CC et al.	Registry / Taiwan	48629	Above 55	66.9	48.4
Jeloka T et al.	Single-center study /India/	272	Above 65	81.3	77.4

Multivariate analysis showed diabetes as the only determining factor affecting survival ($p=0.01$). They concluded that there is no difference between the survival of elderly and older patients and no difference between elderly HD and PD patients. Authors mentioned that there is a big variability within the region on dialysis practice patterns and that their data was compatible with international data [26-27]. Table 2 summarizes the study findings.

Discussion

1. Vascular access

Vascular access has always been the primary determinant of success in HD. Debate has existed over the validity of the "Fistula first" initiative among the elderly, as high prevalence of peripheral vascular disease, diabetes, and heart failure would seemingly complicate fistula maturation, malfunction, stenosis and thrombosis. The Dialysis Outcomes and Practice Patterns Study (DOPPS), a large study with a group of elderly patients, revealed differences in practice among countries [22]. Although this study contributed greatly to the development of practice, the study included only Japan from the Asian region.

In comparison with previous studies (Lok) and meta-analyses (McGrogan), primary and secondary patency rates were lower the first year versus the second year (36.7% versus 53.6%, 56.8% versus 71.6%) [21, 28]. Rates of failure to mature were higher in the first year as well, at 61.8% versus 49% [21]. Authors attributed lower rates of failure to mature to more aggressive vascular access surveillance and intervention strategy, which included mandatory access flow monitoring and a multidisciplinary team with a vascular access coordinator. They also used a six month cut-off to define failure to mature.

Prevalence of diabetes is higher (70%), replicating the rising trend in prevalence of diabetes in general population of the region [29]. The use of radiocephalic fistula in elderly was more common in former study (60.7%) [30]. Studies outside the Asian region revealed the overall superiority of upper arm AVF over lower arm AVF, a difference also true for diabetic patients [23]. In a Chinese study which included patients with radiocephalic AVF, age alone did not influence outcomes, but a combination of diabetes mellitus and old age were considered to be complicating factors [24]. Both the use of lower arm AVF and the combination of diabetes mellitus and age could affect fistula

outcomes, but there is a lack of data to conclusively support this claim. It should also be noted that ethnicity played a role in AVF survival [Table 1].

2. Intervention rates

There is no uniform data on Asian countries regarding intervention rates. DOPPS, a large scale, controlled trial on the dialysis population, included only Japan to represent all of Asia [30]. Our review revealed a significant gap in the literature regarding access complication rates among the elderly in the Asian region. Only two, single center studies from Singapore and Japan were included in our review. These studies suggest that the "Fistula First" initiative, recommended by Kidney Disease Outcomes Quality Initiative guidelines, is a viable option among the elderly population [32]. Large scale, multi-center studies are needed in order to determine optimal access choice, reasons of failure to mature, and complication rates among the elderly.

Elderly dialysis patients with permanent vascular access were more likely to have higher rates of fistula failure to mature, but with salvage therapy, secondary failure rates were comparable to the non-elderly. Intervention rates were also similar in the elderly and the non-elderly [30]. This indicates that the "Fistula First" approach is an acceptable and cost-effective approach for elderly patients on dialysis.

3. Survival on dialysis and choice of modality

Due to high costs of treatment and continuous need, dialysis practice patterns in developing countries are hugely driven by financial constraints. In developing countries, there is a substantial degree of variability in HD frequency, duration, and technology [33]. Practice patterns in developed countries like Japan, Korea, Singapore, Hong Kong and Taiwan are similar to those in other Western developed countries.

In recent years, there has been a great interest in regular, twice a week dialysis. In an observational study from Taiwan, authors demonstrated superior outcomes with twice weekly HD over an 18-month follow-up period [34]. In addition, PD is not available as a cost-effective option in all Asian countries, making comparison by modalities difficult [35].

The three studies included in our review have agreed on superior outcomes with HD among elderly Asian populations.

In conclusion, although there is an increase in elderly dialysis patients, large scale data in Asia is lacking. Further

research is needed to assess dialysis outcomes among the elderly population. Age alone is not a contraindication for dialysis.

Conflict of Interest

The authors state no conflict of interest.

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