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Association of socioeconomic status with peritonitis technique survival (catheter failure) in patients with continuous ambulatory peritoneal dialysis

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Abstract

Background: Approximately 11% of the US population is affected by CKD (US Renal Data System, 2007). Of those with CKD, 1% progress to kidney failure which is treated only by dialysis or transplant. In 2003, 453,000 Americans required dialysis or transplantation. This is projected to increase to 651,000 by 2010. Expenditures related to renal replacement therapy account for 16.5% of Medicare spending. This is twice the amount spent just 10 years ago.

Aim and objectives: To check the association of socioeconomic status with peritonitis technique survival.

Materials and methods: A sample size of 155 produces a two-sided 90% confidence interval with a width equal to 0.200 when the sample correlation is 0.500. Hence a total of one hundred (155) patients on CAPD and APD will be recruited**.**

Results: Majority of subjects 82 (52.9%) were in the score 3 (upper middle) socio-economic status group and 73 (47.1%) of the subjects were score 2 (high) socio-economic status group. Majority of subjects 78 (50.3%) were hyper tension, diabetes mellitus and end stage renal disease, 64 (41.3%) of the subjects were hyper tension, and end stage renal disease, 13 (8.4%) of the subject were diabetes mellitus and end stage renal disease.

Conclusion: significantly higher risk of treatment failure in low-income patients than high-income patients, the reinforcement of healthy policies in such population is additionally beneficial. National expenditure on health and medical insurance should be improved, especially for the patients with low individual incomes and the medical insurance policies for low-income patients should be improved.

Keywords: Peritoneal dialysis, hemodialysis, exit-site infections (ESI), tunnel infections, catheter failure

Introduction

The prevalence of renal disease is increasing worldwide and especially in developing countries. Worldwide estimates are that chronic kidney disease affects over 50 million people. Around 1 million currently receiving renal replacement therapy such as peritoneal dialysis, hemodialysis or renal transplant [1]. In the United States (US) the prevalence of renal disease is disproportionately high in African American and Hispanic population groups [2]. currently estimates are that approximately 11% of the US population is affected by CKD (US Renal Data System, 2007). Of those with CKD, 1% progress to kidney failure which is treated only by dialysis or transplant. In 2003, 453,000 Americans required dialysis or transplantation. This is projected to increase to 651,000 by 2010. Expenditures related to renal replacement therapy account for 16.5% of Medicare spending [3]. this is twice the amount spent just 10 years ago. Total expenditures for care of Medicare patients with CKD amount to almost 24% of Medicare costs (US Renal Data System, 2004) [4] Primary PD catheter failure is defined as the removal of PD catheter when the PD catheter never functioned due to any catheter-related problem. When the catheter functioned for some time and later became dysfunctional due to a catheter-related complication (infectious and/or non-infectious) and subsequently removed, it was referred to as Secondary PD catheter failure [5] Hence, PD catheter failure will be defined as removal of the dysfunctional PD catheter due to any catheter-related complication. The catheter-related complications will be divided into infectious and non-infectious groups. PD catheter infectious group will include exit-site infections (ESI), tunnel infections (TI) and peritonitis associated with ESI and/or TI. The non-infectious complications included intra-luminal/ extra-luminal obstruction, catheter mal-positioning, catheter migration, omental wrap around the catheter, catheter leakage and catheter extrusion. Removal of functioning PD catheter was designated to one of the censoring events [6]. The causes for functioning PD catheter removal formed a whole spectrum of events including relapsing/ refractory/ fungal peritonitis, poor solute clearance on PD, idiopathic chronic abdominal

pain, modality change to hemodialysis for any major surgery, prolonged hospitalization, and social issues like lack of family support, physical handicap, job demands, patient preference and non- adherence to treatment [7]. So, the aim of the present study was to evaluate the association of socioeconomic status with catheter failure in patients with peritoneal dialysis.

Materials and methods

This study will focus on association of catheter failure, with socioeconomic status. The study will be longitudinal. Each patient will be followed up for 2 year**.** The study will be conducted in the Peritoneal Dialysis Unit, Department of Nephrology, SGPGIMS, Lucknow, U. P. Number of episodes of peritonitis, blood samples, peritoneal fluid, dietary recall and anthropometry will be the tools for research. Patients will be grouped based on socioeconomic score. The income according to the income tax returns will used to classify the subjects. A sample size of 155 produces a two-sided 90% confidence interval with a width equal to 0.200 when the sample correlation is 0.500. Hence a total of one hundred (155) patients on CAPD and APD will be recruited.

Inclusion criteria

- Patients who will be on CAPD and APD
- Patients who give written consent to participate in the study.

Exclusion criteria

- Patients who do not give consent to participate in the study.
- Patients with malignancy.

Statistical analysis

Descriptive and inferential statistics will be use to analyse the data. Mean standard deviation, students' t test and correlation analysis will be done using SPSS for windows. Kaplan Meier curve will be used for overall catheter survival probability.

Results

Majority of subjects 96 (61.9%) were male and 59 (38.1%) were female. Majority of subjects 83 (53.5%) were in the age group 41-60 years, 45 (29.0%) were in the age group >60years, 27 (17.4%) were in the age group <40 years.

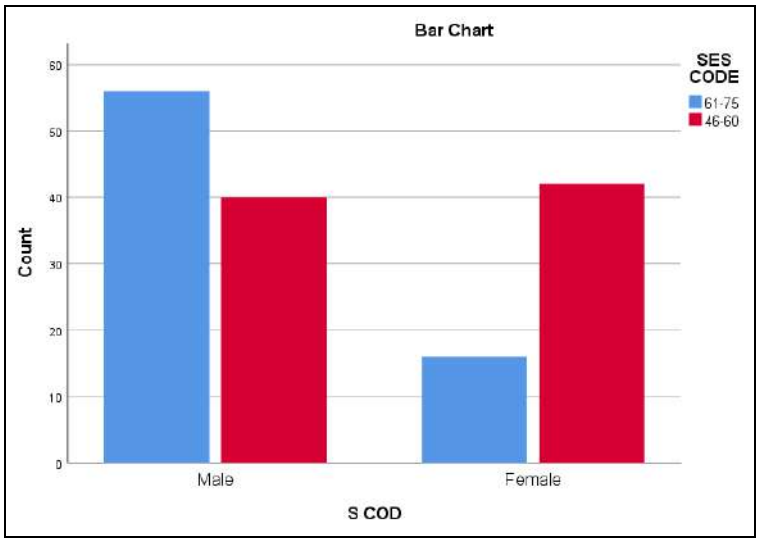

Fig 1: Bar chart showing the distribution of the subject regarding to their gender with SES score

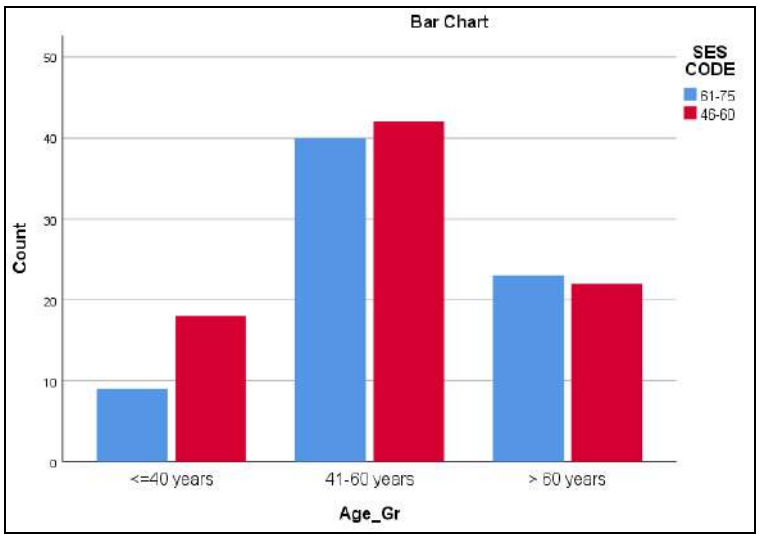

Fig 2: Bar chart showing the distribution of the subject regarding to their age in years with SES score

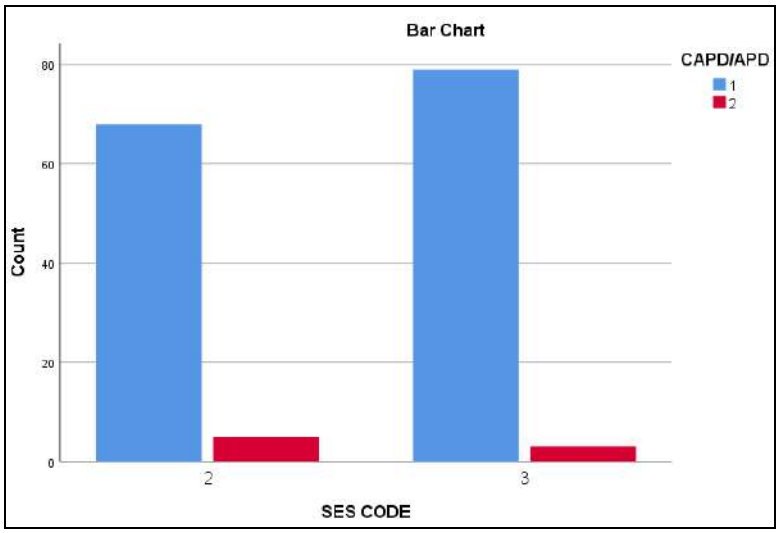

Fig 3: Bar chart showing the distribution of the subject regarding to their socio-economic status with score

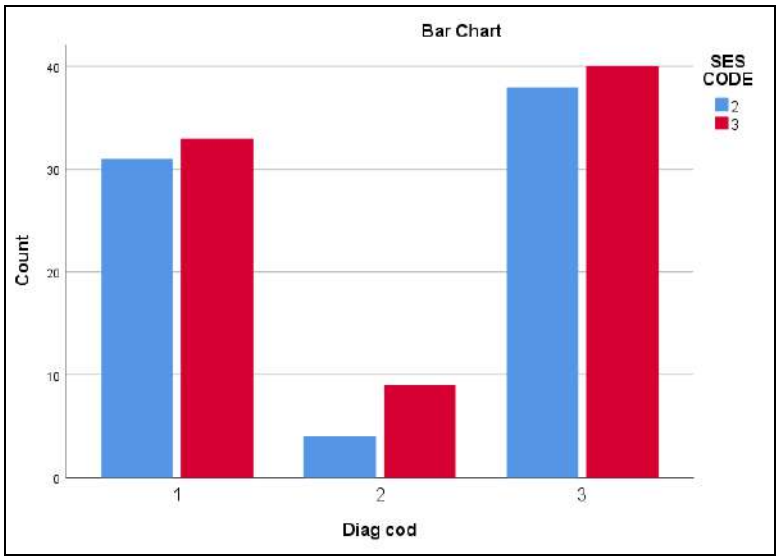

Fig 4: Bar chart showing the distribution of the subject regarding to their diagnosis criteria with SES score

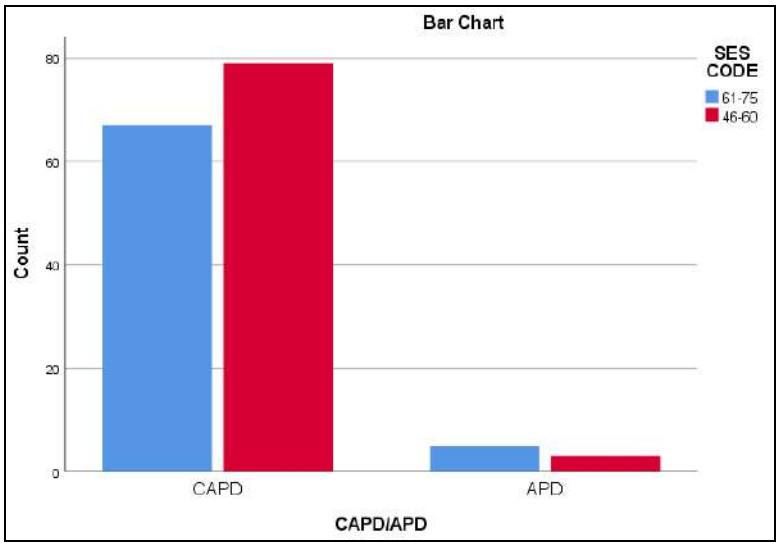

Fig 5: Bar chart showing the distribution of the subject regarding to their CAPD/APD with SES score

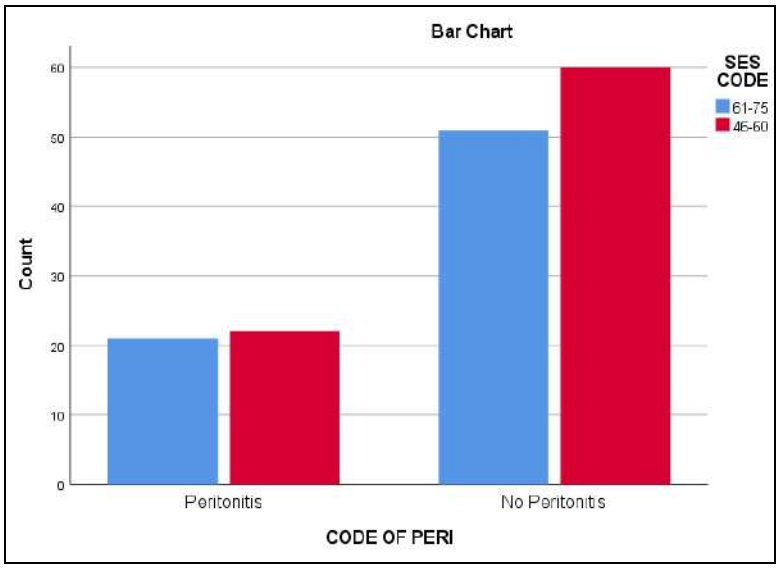

Fig 6: Bar chart showing the distribution of the subject regarding to their peritonitis or no peritonitis

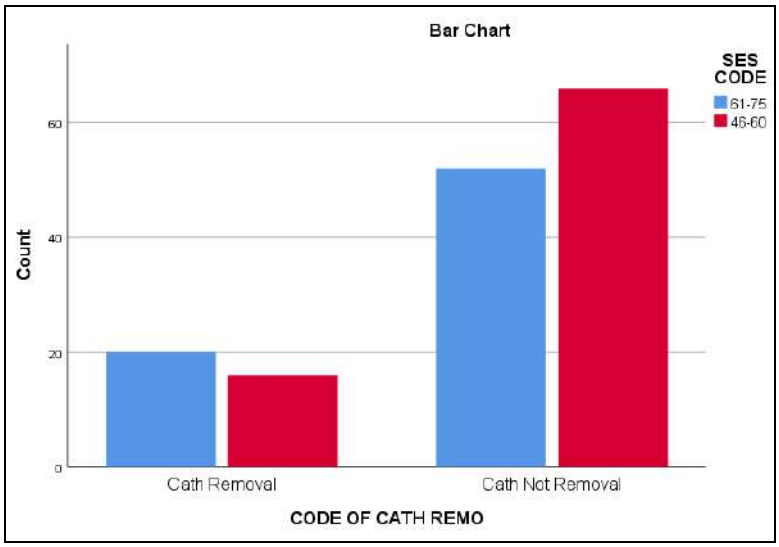

Fig 7 Bar chart showing the distribution of the subject regarding to their catheter removal or not removal

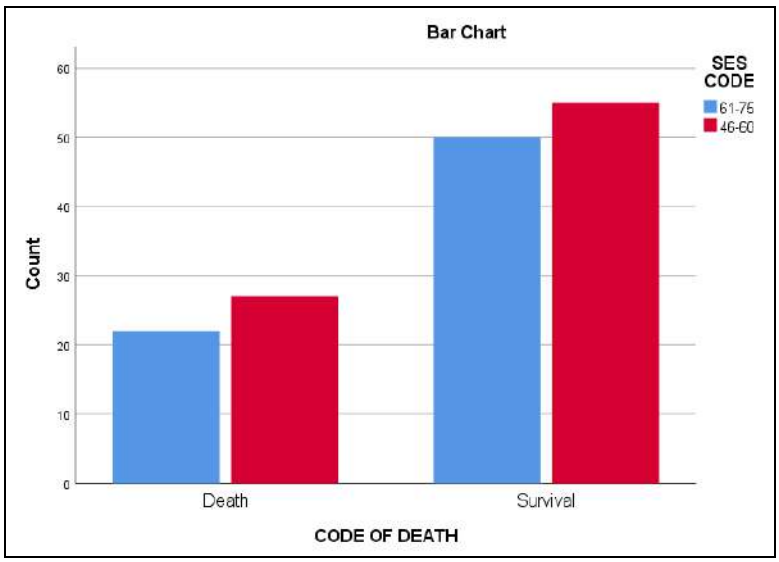

Fig 8: Bar chart showing the distribution of the subject regarding to their death and survival

Table 1: association of socioeconomic status with technique survival (catheter failure)

SES CODE	Total N	N of Events	Censored	
			N	Percent
2	73	20	53	72.6%
3	82	16	66	80.5%
Overall	155	36	119	76.7%

Table 2: Means and Medians for Survival Time

Ses Code	Mean[a]				Chi Square	df	P-value
	Estimate	Std. Error	95% Confidence Interval				
			Lower Bound	Upper Bound			
2	713.435	42.333	630.462	796.408	1.044	1	.307
3	760.687	40.483	681.340	840.034			
Overall	738.949	29.330	681.463	796.434			

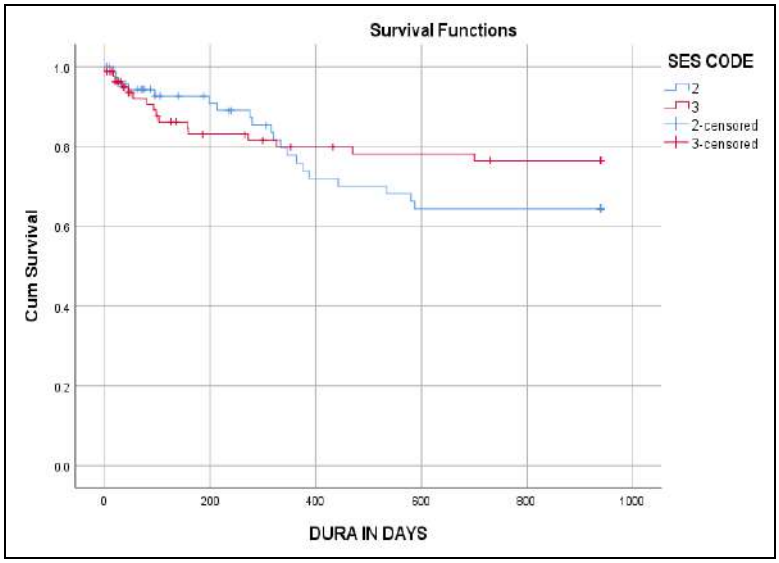

Fig 9: Line chart showing the test of equality of survival distributions for the different levels of SES code

Majority of subjects 82 (52.9%) were in the score 3 (upper middle) socio-economic status group and 73 (47.1%) of the subjects were score 2 (high) socio-economic status group. Majority of subjects 78 (50.3%) were hyper tension, diabetes mellitus and end stage renal disease, 64 (41.3%) of the subjects were hyper tension, and end stage renal disease, 13 (8.4%) of the subject were diabetes mellitus and end stage renal disease. Majority of subjects 147 (94.8%) were continuous ambulatory peritoneal dialysis (CAPD) and 8 (5.2%) of the subjects were automated peritoneal dialysis (APD).

Majority of subjects 112(72.1%) were no peritonitis and 43 (27.9%) of the subjects were peritonitis**.** Majority of subjects 119 (76.8%) were no catheter removal 36 (23.2%) of the subjects were catheter removal. Majority of subjects 105 (67.7%) were no death 50 (32.3%) subjects were death. (Fig. 1-8)

The table shows SES code wise categorization, 73 patients belongs to high socioeconomic group out of 73 subjects, 20 patients (27.4%) had developed peritonitis, and 52 patients (72.6%) had not developed peritonitis. 82 patients belongs to upper middle class group, out of 82 patients, 16 patients (19.5%). had developed peritonitis, and 66 patients (80.5%) had not developed peritonitis The average mean value for technique survival of high socio-economic group is 713.435, standard error is 42.333. The average means value for technique survival of upper middle socio-economic group is 760.687, standard error is 40.483. The chi square value is 1.044, and P value is .307. The association was assessed at 0.05 level of significance. There is no significant association between socioeconomic statuses with technical survival. (Table-1, 2 and fig. 9)

Discussion

The key finding of this study is that low individual income could be a significant risk factor for initial peritonitis and treatment failure. And living in developed regions may be a significant risk factor for initial peritonitis. To our knowledge, this can be the primary study to guage the roles of SES variables on initial peritonitis and its outcomes in PD patients, using propensity score matching analysis. However, after propensity score matching for statistically significant bio clinical factors, the web effect of individual income on initial peritonitis still remained statistically significant. There may are other confounders of peritonitis risk that we failed to take under consideration in our study. Second, as shown in our previous paper, the proportion of individual income used for medical expenses within the low income group was significantly over the proportion within the median- and high-income groups [8] According to data from the globe Health Organization (WHO) website [9] the typical total expenditure on health as a percentage of gross

domestic product (GDP) in China from 2009 to 2011 was 5.1%, which was very cheap percentage among China, the us (17.7%), Brazil (8.9%), and Portugal (10.6%).

Therefore, individual income plays a very important role in medical expenditures in China. This could be a possible explanation for the difference in our findings compared with research findings within the U.S., Brazil, and Portugal [10-15] which have reported no relationship between income and initial peritonitis. We also found low individual income to be a risk factor for the treatment failure of PD after the initial incidence of peritonitis, compared with the high-income group. This result could probably be ascribed to the delay in referrals to nephrologists when symptoms of peritonitis developed in low-income patients. Our analysis failed to find any correlation between education level and therefore the onset of initial peritonitis or its outcome. This result's according to an analysis of a regional ESRD registry within the us, in which 1,595 new PD patients were observed over 2 years [16] but is contrary to recently published data from Brazil and Canada [17-20] One possible explanation is that our selected centers had highly professional PD doctors and nurses and well-established training programs. Patients and their homecare helpers often were trained simultaneously, which probably led to stronger family support [21] whether better compliance among Asian individuals [22-24] plays a task during this phenomenon is unclear.

To the most effective of our knowledge, our study, which examined an outsized cohort of adult PD patients in China, is that the first study to investigate the link between SES and initial peritonitis using propensity score matching analysis. There have been 563 outcome events, accounting for 25.9% of the full episodes, which allowed us to make a regression model containing SES and some recognized confounders to explore the predictive ability of SES. The demographic characteristics and therefore the distribution of causative organisms are typical of these previously reported, supporting the generalizability of our findings to other PD cohorts elsewhere.

Conclusion

This study demonstrates that low level of individual income could even be a risk factor for the onset of peritonitis and for treatment failure in PD patients, as our study found a significantly higher risk of treatment failure in low-income patients than high-income patients, the reinforcement of healthy policies in such population is additionally beneficial. National expenditure on health and medical insurance should be improved, especially for the patients with low individual incomes and the medical insurance policies for low-income patients should be improved.

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