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Analysis Of Risk Factors And Outcome In Peritoneal Dialysis Patients With Early-Onset Peritonitis: A Single Center Retrospective Analysis

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Objectives : Peritonitis is a major cause of withdrawal of patients from Peritoneal Dialysis modality. Therefore, preventing the development of peritonitis through identification of the risk factors associated with Early-Onset Peritonitis is crucial. This study investigated the risk factors associated with early-onset peritonitis and their influence on patients' technique survival and mortality in the largest renal center in the Philippines.
Methods : This is a retrospective cohort study of 552 newly initiated peritoneal dialysis patients in a tertiary renal center from January 1, 2019 to December 31, 2021. Patients were divided into Peritonitis-free (n=251), Early-onset peritonitis (<6 months, n=136) and Late-onset peritonitis (> 6 months, n=165) groups. Logistic regression was used to analyze risk factors associated with Early-onset peritonitis. Cox proportional hazard model was used to determine the effect of early-onset peritonitis on clinical outcomes.
Results : Of 552 peritoneal dialysis patients, 24.6% developed Early-onset peritonitis. Mean serum albumin is significantly lower in patients with Early-onset peritonitis (3.16 ± 0.51 g/dL) among the three groups. Higher BMI [HR of 1.07(95% CI 1.02 to 1.14)] and a shorter time-to-first-peritonitis [HR of 0.97 (95% CI 0.96 to 0.98)] cause significant risk to technique failure. Shorter time-to-first peritonitis (HR=.95, 95% CI 0.91 to 0.99) and higher Charlson Comorbidity Index score (HR=1.31, 95% CI 1.03 to 1.66) are significantly associated with mortality. Early-onset peritonitis had a lower cure rate (44.9% vs 68.5%), higher recurrence and relapse rate (30.1% vs 9.1%), higher rate of transferring to hemodialysis (25% vs 22.4%) and higher mortality (58.5% vs 34%) compared with Late-onset peritonitis.
Conclusions : Early-onset peritonitis was strongly associated with poor clinical outcomes. Early identification of the risk factors associated with peritonitis is crucial to reduce complications and reduce withdrawal of patients from peritoneal dialysis modality.

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Table 1. Baseline characteristics of the Study Population

Variables	Peritonitis-free (n)	EOP(n)	LOP (n)	P value bet EOP and LOP	P value
Age (years)	46.2 ± 14.1	47.4 ± 12.9	45.5 ± 13.5	0.229	0.499
Sex					
Male	147 (58.6)	64 (47.1)	87 (52.7)	0.328	0.088
Female	104 (41.4)	72 (52.9)	78 (47.3)		
Civil status					
Single	97 (38.6)	47 (34.6)	68 (41.2)	0.654	0.603
Married	137 (54.6)	80 (58.8)	89 (53.9)		
Separated	2 (0.8)	3 (2.2)	3 (1.8)		
Window	15 (6)	6 (4.4)	5 (3)		
Z package status					
Inactive	130 (51.8)	85 (62.5)	106 (64.2)	0.755	0.021
Active	121 (48.2)	51 (37.5)	59 (35.8)		
Smoking					
Non smoker	210 (83.7)	110 (80.9)	140 (84.8)	0.362	0.644
Smoker	41 (16.3)	26 (19.1)	25 (15.2)		
Drinking					
Non drinker	166 (66.1)	105 (77.2)	112 (67.9)	0.073	0.069
Drinker	85 (33.9)	31 (22.8)	53 (32.1)		
Comorbidities					
Diabetes	68 (27.1)	39 (28.7)	45 (27.3)	0.554	0.609
Hypertension	104 (41.4)	82 (60.3)	70 (42.4)	0.002	0.001
Cardiovascular disease	41 (16.3)	30 (22.1)	28 (17)	0.266	0.348
Cerebral disease	2 (0.8)	1 (0.7)	4 (2.4)	0.255	0.284
Others	10 (4)	1 (0.7)	8 (4.8)	0.399	0.181
Charlson Comorbidity Index score	3.4 ± 4.2	3.2 ± 1.5	3.2 ± 1.4	0.790	0.751
Body mass index (kg/m)	21.5 ± 1.9	21.7 ± 2.4	21.6 ± 2.1	0.710	0.511
Primary renal disease					
HPN	67 (26.7)	41 (30.1)	48 (29.1)	0.436	0.908
DKD	70 (27.9)	37 (27.2)	43 (26.1)		
CGN	106 (42.2)	54 (39.7)	69 (41.8)		
ADPKP	2 (0.8)	2 (1.5)	0 (0)		
Urate	4 (1.6)	1 (0.7)	4 (2.4)		
Lupus	1 (0.4)	0 (0)	1 (0.6)		
OU	1 (0.4)	1 (0.7)	0 (0)		
Total					
Peritonitis Episode	**251**	**136**	**165**		
0	251 (100)	0 (0.0)	0 (0.0)	0.068	0.000
1	0 (0.0)	52 (38.2)	85 (51.5)		
2	0 (0.0)	35 (25.7)	35 (21.2)		
≥3	0 (0.0)	49 (36.0)	45 (27.3)		
Albumin at PDCI	3.43 ± 0.61	3.16 ± 0.51	3.75 ± 2.74	0.0139	0.005

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Table 3) Cox proportional-hazards model for technique failure and patient mortality

Treatment Failure	Univariate Cox Regression Analysis			Multivariate Cox Regression Analysis		
Variable	**HR**	**95% CI**	**P value**	**HR**	**95% CI**	**P value**
Time to first peritonitis	0.97	0.96 to 0.98	0.0001	0.96	0.95 to 0.98	0.0001
Status						
EOP	1.79	1.42 to 2.27	0.0001	0.91	0.64 to 1.29	0.5963
LOP		Reference			Reference	
Age (years)	1.04	0.999 to 1.02	0.1008	0.998	0.99 to 1.01	0.7069
Sex						
Male	1.2	0.95 to 1.52	0.1211	1.09	0.83 to 1.43	0.5421
Female		Reference			Reference	
Smoking						
Non smoker		Reference			Reference	
Smoker	1.21	0.89 to 1.65	0.2303	1.18	0.81 to 1.72	0.3976
Drinking						
Non drinker		Reference			Reference	
Drinker	1.04	0.80 to 1.35	0.769	0.92	0.67 to 1.27	0.6245
Charlson Comorbidity Index score	1.08	0.999 to 1.18	0.0518	1.09	0.97 to 1.21	0.147
Body mass index (kg/m)	1.07	1.02 to 1.14	0.0133	1.05	0.99 to 1.11	0.1247
Albumin PDCI	0.91	0.76 to 1.08	0.2647	0.998	0.93 to 1.08	0.9563

Among EOP and LOP patients only

Patient Mortality	Univariate Cox Regression Analysis			Multivariate Cox Regression Analysis		
Variable	**HR**	**95% CI**	**P value**	**HR**	**95% CI**	**P value**
Time to first peritonitis	0.96	0.93 to 0.99	0.002	0.95	0.91 to 0.99	0.0268
Status						
EOP	1.63	0.96 to 2.79	0.0716	0.66	0.28 to 1.56	0.3455
LOP		Reference			Reference	
Age (years)	1.02	1.00 to 1.04	0.0449	0.997	0.97 to 1.03	0.86
Sex						
Male	1.11	0.65 to 1.88	0.7083	1.06	0.57 to 1.96	0.851
Female		Reference			Reference	
Smoking						
Non smoker		Reference			Reference	
Smoker	0.81	0.37 to 1.79	0.6032	0.74	0.29 to 1.91	0.7443
Drinking						
Non drinker		Reference			Reference	
Drinker	0.86	0.47 to 1.58	0.6312	0.99	0.46 to 2.16	0.9887
Charlson Comorbidity Index score	1.35	1.16 to 1.57	0.0001	1.31	1.03 to 1.66	0.0267
Body mass index (kg/m)	1.17	1.04 to 1.31	0.0095	1.13	0.99 to 1.27	0.0613
Albumin PDCI	0.46	0.29 to 0.72	0.0006	0.62	0.36 to 1.06	0.0801

Among EOP and LOP patients only