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Retrospective Study

Effect of Caregiver Educational Level among Peritoneal Dialysis Patients on Peritonitis Rate

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Abstract

Background: Peritoneal dialysis (PD)-related peritonitis is a major complication among children receiving PD. It leads to hospitalization, increased costs, and adverse long-term outcomes.

Objective: To evaluate the effect of caregiver educational level on the incidence of peritonitis in pediatric PD patients.

Methods: A retrospective study was conducted at King Saud Medical City, Riyadh, Saudi Arabia, including children younger than 14 years on PD between January 2020 and December 2023. Data were collected from a structured questionnaire and electronic records. Peritonitis episodes were compared across caregiver education levels using descriptive statistics, Kruskal-Wallis, and logistic regression analysis.

Results: A total of 41 children were included (61% males). Caregiver education distribution was: 9.8% illiterate, 17.1% primary, 4.9% secondary, 34.1% high school, and 34.1% university. Peritonitis incidence ranged from 0 to 10 episodes per case per year, with a median of 0.5. Children with university-educated caregivers had the lowest peritonitis rates, while those with secondary-educated caregivers showed the highest. Differences were not statistically significant.

Conclusion: Caregiver education may influence peritonitis risk in pediatric PD patients, with lower education levels showing higher rates. Larger studies are needed to confirm these findings.

More Information

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Introduction

Peritonitis remains the most important complication of peritoneal dialysis (PD) [1] and is a leading cause of hospitalization, catheter loss, technique failure, and mortality among PD patients [2-5]. Improvements in PD technique, such as the introduction of plastic bags [6], have contributed to declining peritonitis rates in recent decades. The risk factors include recent GIT invasive intervention, exit-site and/or tunnel infections [7-13], constipation, depression, hypokalemia, hypoalbuminemia, prior hemodialysis, and living far away from the peritoneal dialysis clinic [14-16].

According to the 2022 International Society for Peritoneal Dialysis (ISPD) guidelines, peritonitis is diagnosed when at least two of the following are present: (1) clinical features consistent with peritonitis, such as abdominal pain and/or cloudy effluent; (2) dialysis effluent white cell count >100/μL (after ≥2 h dwell) with >50% polymorphonuclear leukocytes; (3) positive effluent culture [17].

This study was conducted at King Saud Medical City, Riyadh, Saudi Arabia, to assess whether caregiver educational level influences peritonitis incidence among pediatric PD patients.

Methods

Study design

A retrospective study including chronic PD patients younger than 14 years followed at King Saud Medical City between January 2020 and December 2023.

Inclusion criteria: Pediatric patients on PD for ≥3 months.

Data collection

The program consists of two parts:

Program part one: Prepare the tools of the program (questionnaires), then start data collection that includes: socio-economic data and family educational level. It was collected through person-to-person interviews during regular outpatient clinic visits.

Program part two: Date of diagnosis and organisms that were detected, data collection through electronic file and hospital program (Table 1).

Ethical approval for this study was obtained from the Institutional Review Board (IRB) of King Saud Medical City, Riyadh, Saudi Arabia (IRB Registration No. H-01-R-053; IORG #: IORG0010374; Proposal Reference No. H1RI-20-Dec 23-02).

Statistical analysis

We used qualitative and quantitative variables.

Qualitative variables will present as happen or no, and quantitative variables will present as mean and standard deviations, with a level of significance of p - value at $p = 0.05$, with a 95% confidence level.

The chi-square test will be used for qualitative variables, and for quantitative variables, the Kruskal-Wallis test will be used.

Table 1: Structured questionnaire (Part 1).

Name		**Age**	
Gender	Male	Female	
Primary diagnosis			
Inherited disease	Acquired disease	Unknown	
Family educational level			
Illiterate	Primary education	Secondary education	University education
Type of teaching			
Theory	Practice	Both	
Hours of caregiver teaching from the PD company			
None	Less than 10 hours	10-20 hours	More than 20 hours
Paternal occupational status			
Private work	Do not work	Employee	Retired
Maternal occupational status			
Private work	Do not work	Employee	Retired
Income status			
<3000 SR	3000-5000 SR	5000-10000 SR	> 10000
Number of family members			
Duration of disease			
Cause of peritonitis			
Low medical supply	Teaching insufficient	Other (mention)	
Part 2: Rate of peritonitis			
How many times			
Diagnosed based on			
Proper management			

Data analysis

The data were collected, reviewed, and then fed to Statistical Package for Social Sciences version 26 (Released 2019, Armonk, NY: IBM Corp). All statistical methods used were two-tailed with an alpha level of 0.05, considering significance if the p value is less than or equal to 0.05. Descriptive analysis for categorical data was done using frequencies and percentages, whereas numerical data were presented as mean with standard deviation. The peritonitis incidence rate per case per year was presented as a range with a median due to its skewed distribution. The crude peritonitis frequency was graphed. Cross tabulation for assessing Peritonitis incidence per case per year by study, PD cases, caregivers' educational level, using Kruskal-Wallis and exact probability tests for significance. Simple logistic regression was used to assess the relative frequency of peritonitis by caregiver's education level based on the odds ratio and its 95% confidence interval.

Results

A total of 41 chronic PD patients, younger than 14 years, were included; 25 (61%) were males, and 16 (39%) were females. Considering the caregiver's education level, 14 (34.1%) had a university level of education, 14 (34.1%) had a high school level of education, and 13 (31.8%) had a secondary level of education. As for the duration of dialysis, it was 1-2 years among 19 (46.3%) children, 3-5 years among 15 (36.6%) PD cases, and for more than 5 years among 2 (4.9%) cases. The mean PD duration was 2.7 ± 1.8 years.

The crude peritonitis frequency was reported among study peritoneal dialysis patients. In general, 17 (41.5%) of the study PD cases had no peritonitis, 7 (17.1%) had peritonitis once, 6 (14.6%) for 2 times, and 11 (26.9%) had peritonitis 3 times or more. The overall peritonitis incidence ranged from 0 to 10 times per case per year, with a median incidence of 0.5 times per case per year (1 time per case per 2 years) (Figure 1, Table 2)).

Peritonitis incidence per case per year by study, PD cases caregivers' educational level. The incidence of peritonitis was

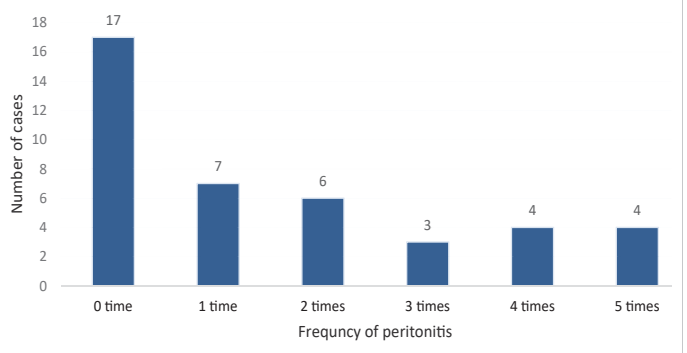

Figure 1: The crude peritonitis frequency reported among study peritoneal dialysis patients, King Saud Medical City ($n = 41$).

Table 2: Bio-demographic characteristics of study peritoneal dialysis patients, King Saud Medical City (n = 41).

Bio-demographic data	No	%
Gender		
Male	25	61.0%
Female	16	39.0%
Caregiver educational level		
Illiterate	4	9.8%
Primary education	7	17.1%
Secondary education	2	4.9%
High school education	14	34.1%
University education	14	34.1%
Duration of dialysis in years		
< 1 year	5	12.2%
1-2 years	19	46.3%
3-5 years	15	36.6%
> 5 years	2	4.9%
Mean ± SD	2.7 ± 1.8 years	

1.75 times per case per year among cases whose caregivers had a secondary level of education compared to 0.5 times per case per year for those whose caregivers had primary education, 0.41 times per case per year for those with their caregivers had high school level of education and none of cases with university educated caregivers with no statistical significance (p = 0.324) (Table 3).

Distribution of peritonitis rate by study, PD cases caregivers' educational level. All cases for secondary educated caregivers had peritonitis, versus 71.4% of those for primary educated caregivers, 64.3% for high school educated caregivers and 50% of illiterate caregivers, and 42.9% of university educated caregivers. The peritonitis rate was 3 times among primary educated caregiver cases, 2.5 times higher among high school educated caregiver cases compared to university educated caregiver cases, with no statistically significant difference (p = .459) (Table 4).

Discussion

This study evaluated the relationship between caregiver educational level and peritonitis incidence in pediatric PD patients. Although differences were not statistically significant, a trend was observed: children with caregivers having lower education levels tended to have higher peritonitis rates. This finding aligns with prior studies suggesting that caregiver knowledge and training impact PD outcomes.

Our results are consistent with Szeto and Li [1], who highlighted the role of patient and caregiver factors in peritonitis risk. Similarly, recent studies from Asia and the Middle East emphasize the importance of structured caregiver education in reducing infection rates. Conversely, some studies have found no strong association, suggesting that other variables such as socioeconomic status and healthcare access may play a greater role.

The strengths of this study include a focused pediatric cohort and standardized data collection. Limitations include the small sample size, retrospective design, and single-center setting. Larger, multicenter prospective studies are required to confirm the observed trends and to explore interventions that may reduce infection risk among children cared for by less-educated caregivers.

Table 3: Peritonitis incidence per case per year by study, PD cases caregivers' educational level.

Caregiver education	Peritonitis rate per year per case		p - value
	Range	Median	
Illiterate	0.0-2.5	0.40	0.324
Primary education	0.0-2.0	0.50	
Secondary education	1.5-2.0	1.75	
High school education	0.0-10	0.41	
University education	0.0-2.0	0.00	

P: Kruskal-Wallis test.

Table 4: Distribution of peritonitis rate by study, PD cases caregivers' educational level.

Educational level	Having peritonitis				p - value	OR (95% CI)
	Yes		No			
	No	%	No	%		
Illiterate	2	50.0%	2	50.0%	0.459	1.3 (0.14-12.3)
Primary education	5	71.4%	2	28.6%		3.3 (0.47-23.4)
Secondary education	2	100.0%	0	0.0%		1.3 (0.1-25.9)
High school education	9	64.3%	5	35.7%		2.4 (0.52-10.9)
University education	6	42.9%	8	57.1%		ref

P: Exact probability test; OR: Odds ratio;CI: Confidence interval

Conclusion

Caregiver educational level may influence the risk of peritonitis in pediatric PD patients, with lower education levels associated with a higher incidence. While findings were not statistically significant, they highlight the need for further research and for enhancing caregiver training programs.

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