

# Peritoneal Dialysis in India: Clinical Implications and Concerns

V. Daniel<sup>1</sup>, V. T. Kiran<sup>2\*</sup>

<sup>1</sup>Lecturer, Department of Allied Health Sciences, The Apollo University, Chittoor, Andhra Pradesh, India

<sup>2</sup>Assistant Professor, Department of Allied Health Sciences, The Apollo University, Chittoor, Andhra Pradesh, India

**Abstract:** Peritoneal dialysis is not that popular in India as compared to Hemodialysis due to several factors like economic constraints, cultural, social, medical, infrastructure and supplies-related factors. There is a significant increase in the number of chronic dialysis patients globally as well as in India. The search for the reasons for the low popularity of Peritoneal dialysis (PD) among ESRD patients in India can help to rectify the recent challenges faced by patients with PD and that may lead to more acceptance of PD among them.

**Keywords:** Burden of CKD, Chronic kidney disease, Complications of PD, End-stage renal disease, Peritoneal dialysis.

## 1. Introduction

Patients with Chronic Kidney Disease (CKD) stage five need to depend on any of the three options which is available for them, that is Haemodialysis (HD), Peritoneal dialysis (PD) or Renal transplantation to sustain their lives. PD is an effective renal replacement therapy for patients with End Stage Renal Disease (ESRD)/CKD stage five. In India, the acceptance and operation of PD have been met with a mix of enthusiasm and challenges. With this article, we tried to explore the clinical implications, benefits, and concerns associated with PD in India, supported by research and real-world data.

### A. Background of Peritoneal Dialysis

The peritoneal membrane is a semipermeable membrane which provides the lining of the abdominal cavity. PD uses this

semipermeable membrane to filter waste products and excess fluid from the human body when the kidney is not functioning properly. During PD, sterile dialysate solution is filled into the peritoneal cavity through a catheter. The main principles behind PD are diffusion, osmosis and convection. Waste products diffuse into the dialysate and the extra fluid present in the body will come to dialysate through osmotic ultrafiltration, which is then drained and replaced with fresh solution. There are two main types of PD: Continuous Ambulatory Peritoneal Dialysis (CAPD) and Automated Peritoneal Dialysis (APD) [1].

### 1) Growth and Acceptance of PD in India

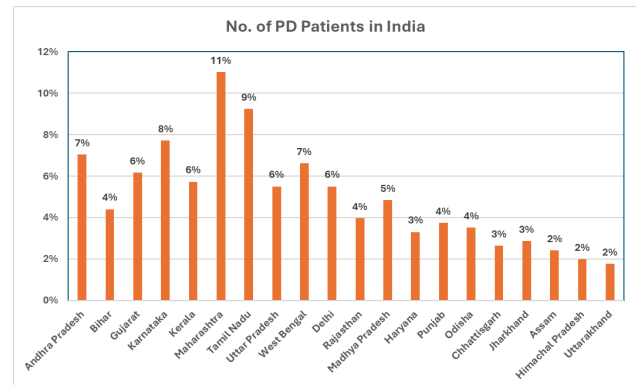


Fig. 1. Number of PD patients in India in percentage [2]-[4]

Table 1  
 Statistics of patients on PD in India [2]-[4]

State	Number of PD Patients	CAPD (%)	APD (%)	Average Age	Male (%)	Female (%)	Dialysis Centers	Key Challenges
Andhra Pradesh	3,200	70	30	49	58	42	60	Supply chain and access issues
Bihar	2,000	72	28	48	57	43	45	Infrastructure
Gujarat	2,800	74	26	49	59	41	60	Supply chain issues
Karnataka	3,500	70	30	52	58	42	75	Patient education
Kerala	2,600	68	32	47	56	44	55	Costs
Maharashtra	5,000	75	25	50	60	40	100	Access to supplies
Tamil Nadu	4,200	80	20	48	55	45	85	Training of healthcare workers
Uttar Pradesh	2,500	71	29	50	58	42	50	Infrastructure
West Bengal	3,000	78	22	47	57	43	65	Infrastructure
Delhi	2,500	76	24	51	61	39	55	Costs
Rajasthan	1,800	73	27	50	57	43	40	Training and access
Madhya Pradesh	2,200	69	31	48	56	44	45	Infrastructure and training
Haryana	1,500	72	28	49	59	41	35	Supply chain and costs
Punjab	1,700	70	30	51	58	42	38	Access to supplies
Odisha	1,600	74	26	49	56	44	40	Infrastructure and education
Chhattisgarh	1,200	68	32	50	55	45	30	Costs and training
Jharkhand	1,300	70	30	50	57	43	32	Infrastructure
Assam	1,100	75	25	49	54	46	28	Access to healthcare
Himachal Pradesh	900	73	27	48	58	42	25	Supply chain
Uttarakhand	800	72	28	49	57	43	20	Infrastructure and costs

\*Corresponding author: kiranvktadakkal@gmail.com

*Total Patients:* Approximately 175,000 patients are undergoing dialysis in India, with a significant portion using PD. Nearly 45400 patients depend on PD (See table 1).

The growth of PD in India has been gradual. Despite its benefits, several factors have hindered its widespread adoption. According to Jha and Chugh (2003), dialysis in developing countries like India faces significant obstacles, including economic constraints, limited healthcare infrastructure, and a lack of trained professionals [5].

### *B. Advantages of Peritoneal Dialysis*

Peritoneal dialysis (PD) offers significant benefits over hemodialysis (HD) by allowing greater flexibility for patients to perform dialysis at home, thereby reducing the need for frequent hospital visits and enabling them to maintain a more normal lifestyle. One of the major advantages of PD is the preservation of residual renal function, which is crucial for better overall health outcomes [2], [4], [5].

PD is gentler on the cardiovascular system due to its continuous treatment nature and imposes fewer dietary and fluid restrictions, enhancing the quality of life for patients. However, the cost of PD equipment and ongoing supplies can be prohibitive, particularly given the lack of widespread health insurance coverage. Government initiatives like the Pradhan Mantri National Dialysis Program (PMNDP) aim to subsidize these costs and make dialysis more accessible [5], [7].

Inadequate healthcare infrastructure, especially in rural areas, poses a significant challenge to the availability of PD. Efforts to improve infrastructure and provide training to healthcare professionals are essential for expanding PD services [6], [8].

### *C. Clinical Concerns*

Peritonitis, an infection of the peritoneal cavity, is a significant risk associated with peritoneal dialysis (PD), necessitating rigorous adherence to aseptic techniques to minimize this risk. Studies emphasize the importance of proper patient education and training to prevent infections [7], [9]. Catheter-related complications, such as blockages or dislodgements, can complicate PD management, making regular monitoring and timely interventions essential. Research suggests that enhanced training for healthcare providers can reduce the incidence of these complications [5], [10]. Additionally, not all patients are suitable candidates for PD due to factors like previous abdominal surgeries, hernias, or significant obesity, highlighting the importance of proper patient selection [6], [8]. Technological advancements, such as remote monitoring systems and automated PD machines, offer new opportunities to improve patient care by enhancing the convenience and safety of PD [5], [7]. Ongoing research in the field aims to develop better dialysate solutions, improve catheter designs, and create more efficient PD systems, addressing clinical challenges and enhancing the efficacy of PD [6], [8].

### *D. Challenges in India for Peritoneal Dialysis Growth*

The growth of peritoneal dialysis (PD) in India faces several significant challenges, detailed in various research articles and

studies. The cost of treatment is one of the challenges facing India. In the long term, PD can be cost-effective but initial setup costs and ongoing expenses for dialysate and supplies can be excessive. Lack of widespread insurance coverage is an issue and limited government support for PD compared to HD is also a reason for the slow acceptance of PD among the ESRD population [5].

Infrastructure and supply chain issues are also a concern regarding PD acceptance among the ESRD population. A steady supply of PD fluids and equipment across diverse and often remote regions in India is challenging. In rural areas of India, the infrastructure is not well-equipped to support PD. Lack of PD-trained healthcare professionals and facilities to provide the necessary support and training for patients affects the growth of PD in India. Comprehensive education programs are needed to inform patients about the benefits and practical aspects of PD [2]-[4]. Cultural and social factors also may have an effect on PD acceptance among the ESRD population. Cultural attitudes may act as a barrier to home-based therapies. In most of the cases, family members are the caregivers and the additional burden of the management of PD may be overwhelming if multiple members are working in the family.

### *E. Medical Complications and Risks*

Peritoneal dialysis (PD) poses medical complications and risks, notably the high risk of peritonitis, an infection of the peritoneal cavity [10]. Additionally, complications arising from comorbid conditions require integrated care approaches, which may not be consistently available across all healthcare settings. Patient suitability is another critical factor, making thorough medical assessments and follow-ups essential for successful outcomes [6]. Cultural and social barriers further hinder PD adoption, as many patients and their families prefer hemodialysis (HD) due to a lack of awareness about the benefits and procedures of PD.

## **2. Conclusion**

Peritoneal dialysis presents a promising alternative to hemodialysis for patients with ESRD in India. While it offers significant clinical benefits and improves patients' quality of life, several challenges need to be addressed to enhance its adoption. Economic constraints, healthcare infrastructure, risk of infections, and patient suitability are key concerns that require concerted efforts from policymakers, healthcare providers, and industry stakeholders. Technological advancements and government initiatives can play a crucial role in overcoming these barriers and promoting the growth of PD in India. Addressing these challenges requires a concerted effort from policymakers, healthcare providers, and industry stakeholders. Enhancing healthcare infrastructure, improving insurance coverage, and providing extensive training and education are crucial steps towards promoting the growth of PD in India.

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