

## Rapid Communication

# The Effect of Cooling Dialysate in Reducing Intradialytic Hypotension

Sahar Essa Alramadhan<sup>1\*</sup>, Bidour Ayoub Alkhudher<sup>2</sup>, Tahani Mohammad Al-Enazi<sup>3</sup>, Reem Dhafer Hassan Alshehri<sup>4</sup>, Jamilah Saad Ali Alqahtani<sup>5</sup>, Bodour Khaled Al Sayed<sup>6</sup>, Wadha Sanad Aldhafeeri<sup>7</sup>, Fatimah Essa Al Ramadan<sup>8</sup>, Matashish Fahad Mohamed<sup>9</sup>, Zainab Essa Al Ramadan<sup>10</sup>, Abdullah Musawa Haddai<sup>11</sup>, Ali Qassem Essa Sabey<sup>12</sup>

<sup>1</sup>Senior Specialist King Saud Medical City, Riyadh, Saudi Arabia

<sup>2</sup>Senior Specialist, Community Health Nursing, Dammam Medical Complex, Saudi Arabia

<sup>3</sup>Senior Specialist-Medical and Surgical Nursing, Security Forces Hospital, Riyadh, Saudi Arabia

<sup>4</sup>Nursing Specialist, C2 Riyadh - Nursing Community Health PHCC (Education Department), Saudi Arabia

<sup>5</sup>Senior Specialist Nursing, PCT Director at Health Studies Center, Khamis Mushait, Saudi Arabia

<sup>6</sup>Acting Head Nurse, King Abdullah Bin Abdulaziz University Hospital, Riyadh, Saudi Arabia

<sup>7</sup>Renal Dialysis Unit Head Nurse, King Salman Hospital, Riyadh, Saudi Arabia

<sup>8</sup>Senior Ward Clerk, King Fahad Medical City, Riyadh, Saudi Arabia

<sup>9</sup>Master of Nursing Education, King Salman Hospital, Riyadh, Saudi Arabia

<sup>10</sup>Senior Nursing Staff, First Health Cluster, Riyadh, Saudi Arabia

<sup>11</sup>Senior Nursing Staff in ER, Attwal General Hospital, Jazan, Saudi Arabia

<sup>12</sup>Master in Nursing Education, Head of Clinical Nursing Affairs Department in King Salman Hospital, Saudi Arabia

**\*Corresponding author:** Sahar Essa Alramadhan, Senior Specialist, King Saud Medical City, Riyadh, Saudi Arabia

**Received:** October 06, 2022; **Accepted:** November 02, 2022; **Published:** November 09, 2022

## Introduction

Intradialytic hypotension is a major problem among patients on chronic hemodialysis. It decreases their quality of life and is a major risk factor for mortality [1,2]. In the 1970s and 1980s, cooled dialysate began to elicit interest as an approach for ameliorating incidents of Intradialytic Hypotension (IDH) [3]. Back then, as is the case even today, intradialytic hypotension was one of the most common complications experienced by persons who were undergoing chronic hemodialysis. The objective of cooled dialysate was to incite peripheral vasoconstriction and thus counter the likelihood of IDH [2,3]. Today, the use of cooled dialysate is common practice in up to 70% of patients on chronic hemodialysis [1]. Notwithstanding the efficacy of this approach, as proven by countless researches, there is a reliance on small sample size. Effectively, large studies with extensive follow-

## Abstract

Cooled dialysate incites peripheral vasoconstriction and thus counter Intradialytic Hypotension (IDH). Currently, up to 70 percent of IDH patients rely on cooled dialysate to ameliorate symptoms ranging from anxiety, restlessness, dizziness, muscle cramps, vomiting, nausea and abdominal discomfort. Presently, there is a plethora of research highlighting the effectiveness of cooled dialysate in ameliorating IDH. However, many of these studies have inherent weakness and thus may not be used to underline that cooled dialysate is indeed worthwhile. For example, the studies only relied on small samples. Further, the studies were conducted over fairly short periods of time. Consequently, to conclusively underpin the efficacy of cooled dialysate, it is necessary to undertake more in-depth research. The following document discusses the critical aspects of cooled dialysate.

**Keywords:** Intradialytic hypotension; Cooling dialysate; Chronic hemodialysis; Mean arterial pressure (MAP); Systolic blood pressure

up periods on the patient on chronic hemodialysis are necessary. A discussion of this important aspect of cooled dialysate informs the following research.

## Background

IDH is occasioned by a decline in the Mean Arterial Pressure (MAP) by 10 mmHg or a decline in systolic blood pressure, thus occasioning symptoms including anxiety, restlessness, dizziness, muscle cramps, vomiting, nausea and abdominal discomfort. Further, Intradialytic hypotension is associated with other debilitating symptoms. The symptoms include vascular access thrombosis, cardiovascular events, increased loss of renal function, and underdialysis [1,2]. While defining IDH can be difficult, most of its definitions are based on four proponents, including (1) medical intervention effected when a patient is undergoing dialysis intending to restore their blood volume, (2) patient-reported interdialytic symptoms, (3) interdialytic

blood pressure decline, and (4) occurrences where the patient blood pressure is below a certain nadir/ threshold [1, 4]. In about 10 to 12% of treatments of a patient on chronic hemodialysis, IDH tends to occur. Age and comorbidity appear to be risk factors associated with IDH [1]. Intradialytic hypotension remains a highly critical problem among patients undergoing dialysis. As highlighted prior, potential preventive approaches such as limiting dietary sodium intake and cooling dialysate are commonly used to ease IDH.

## A Discussion of the Effect of Cooling Dialysate in Reducing IDH

Analysis shows that the number of randomized clinical trials investigating the benefits of cooling dialysate are immense. Most of these researches investigate the short-term effects of cooling dialysate on IDH and conclude that it is indeed efficacious [2]. Notwithstanding, many of these researches only examine a small number of study participants. Effectively, it cannot be concluded that the long-term effects of cooling dialysate on IDH will be as effective. Additionally, a plethora of researches define IDH differently. Further, these studies utilize models of cooling dialysate that have varying temperatures. Based on this prelude, making a generalized conclusion on the efficacy of cooling dialysate on IDH is questionable. Thus, while many of these researches show that cooling dialysate on IDH has a positive effect, there are many inconsistencies in these researches.

However, a few studies on the efficacy of cooling dialysate on IDH that engage a huge sample size were based on observation and were conducted over a relatively long period. One of the most recent researches was conducted between 2011 and 2013 [2]. In this study, the patients were treated with cooled dialysate. Other critical aspects of the study included using applicable antihypertensive drugs, maximizing diuretics use among patients, consuming salt and fluid, and educating the staff, among other factors. This study's results underlined that cooled dialysate procured positive results on IDH [2]. Notwithstanding, adherence to orders was shown to be minimal, plus patients were intolerant to cooled dialysate, especially during the winter months. In another extensive observational research involving hundreds of study participants in which the efficacy of cooled dialysate was determined, it was shown that the approach had

a lot of credibility [2]. Nonetheless, there were many other aspects of the research, such as the use of different methods commonly effected to counter IDH. Effectively, the results obtained in the research could have been caused by other factors and thus, confounding the utility of cooled dialysate in the above research would be erroneous. Aside from these, many of these researches were conducted more than five years ago, and thus their findings may not be plausible today. In the end, analysis shows that there is currently no recent research conducted over a long period of time that conclusively underpins that cooled dialysate is the best tool for countering IDH. Moving into the future, there is a need to standardize the effect of cooling dialysate.

## Conclusion

In summary, while cooled dialysate is the most common approach for helping to treat patients on chronic hemodialysis dealing with IDH, there is a lack of extensive and conclusive long-term studies on its efficacy. Intradialytic hypotension is a major problem affecting patients on chronic hemodialysis. It occasions both mild and enervating symptoms; common mild symptoms of IDH include anxiety, restlessness, dizziness, muscle cramps, vomiting, nausea, and abdominal discomfort. Some serious systems caused by intradialytic hypotension include vascular access thrombosis, cardiovascular events, increased loss of renal function, and underdialysis. Most randomized clinical trials and long-term researches show that cooled dialysate is efficacious in tackling IDH. There is, however, a need to conduct more long-term research on the effect of cooled dialysate.

## References

1. Sars B, van der Sande FM, Kooman JP. Intradialytic hypotension: Mechanisms and outcome. *Blood Purification*. 2020; 49: 158–67.
2. Larkin JW, Reviriego-Mendoza MM, Usvyat LA, Kotanko P, Maddux FW. To cool, or too cool: Is reducing dialysate temperature the optimal approach to preventing intradialytic hypotension? *Seminars in Dialysis*. 2017; 30: 501–8.
3. Vareesangthip K, Davenport A. Reducing the risk of intradialytic hypotension by altering the composition of the dialysate. *Hemodialysis International*. 2020; 24: 276–81.
4. Kanbay M, Ertuglu LA, Afsar B, Ozdogan E, Siriopol D, Covic A, et al. An update review of intradialytic hypotension: concept, risk factors, clinical implications and management. *Clinical Kidney Journal*. 2020; 13: 981–93.