

# Dopamine Adjustment Difficulties in Special Pathophysiological Conditions

Majid Malaki

Dear Sir,

Dopamine is a commonly used drug but its biology and cellular action is not well known, its bizarre actions in neonates back to different pattern of receptors on vascular and metabolic excretion rate especially in preterm babies.<sup>[1]</sup> Dopamine's physiological action is dose dependent and give maximum diuresis and natriuresis at the dose of 2 micrograms/kg/min compared to 4 micrograms/kg/min in neonates.<sup>[2]</sup> Such physiological properties back to immature norepinephrine stores that halt inotropic effects and longer elimination half time related to age that accentuate side effects of dopamine such as tachycardia.<sup>[3]</sup> Such side effects may accentuate in renal and hepatic deficiency because of lower clearance of dopamine and risk of toxicities in usual doses administration.<sup>[4]</sup> The other challenging factor for easy administration of dopamine is various inter individual pharmacokinetics property of dopamine especially in seriously ill patients.<sup>[5]</sup> Cochran study in small sample of selected asphyxiated neonate cases showed low dose dopamine as low as 2.5 micrograms/kg/min cannot decrease mortality and morbidity compared to placebo<sup>[6]</sup> and doses as low as 7 micrograms/kg/min make pulmonary vasoconstriction in critically ill case and infusion rate of 5 micrograms/kg/min cannot bring target hemodynamic indices in a great proportion of patients (9 of 25) inspite of tachycardia occurred in them as a side effect without increase in stroke volume and modest reduction in systemic vascular resistance.<sup>[7-8]</sup> Dopamine, efficacy, decrement during lactic acidosis is another challenge in spite of the plasma norepinephrine level was elevated dramatically during severe lactic acid acidosis in compared to normal acidosis.<sup>[9]</sup>

## CONCLUSION

Insipite of widespread dopamine use in neonates, its clinical effect in lower age group and critically ill is unreliable and depends on known and unknown

factors that make difficult monitoring of its efficacy. The doses as low as 2.5 micrograms/kg/min is not different with placebo in mortality and morbidity, the values of 5 was ineffective in large portion of cases and values higher 7 can lead to pulmonary vasoconstriction or toxicity.

## REFERENCES

1. Seri I, Tulassay T, Kizel J, Machay T, Csömör S. Cardiovascular response to dopamine in hypotensive preterm neonates with severe hyaline membrane disease. *Eur J Pediatr*. 1984;142(1):3-9. doi: 10.1007/BF00442581, PMID 6714257.
2. Seri I, Rudas G, Bors ZS, Kanyicska B, Tulassay T. Effects of low-dose dopamine infusion on cardiovascular and renal functions, cerebral blood flow, and plasma catecholamine levels in sick preterm neonates. *Pediatr Res*. 1993;34(6):742-9. doi: 10.1203/00006450-199312000-00009, PMID 8108186.
3. Bhatt-Mehta V, Nahata MC. Dopamine and dobutamine in pediatric therapy. *Pharmacotherapy*. 1989;9(5):303-14. doi: 10.1002/j.1875-9114.1989.tb04142.x, PMID 2682552.
4. Zaritsky A, Lotze A, Stull R, Goldstein DS. Steady-state dopamine clearance in critically ill infants and children. *Crit Care Med*. 1988;16(3):217-20. doi: 10.1097/00003246-198803000-00002, PMID 3342635.
5. Bhatt-Mehta V, Nahata MC, McClead RE, Menke JA. Dopamine pharmacokinetics in critically ill newborn infants. *Eur J Clin Pharmacol*. 1991;40(6):593-7. doi: 10.1007/BF00279976, PMID 1884740.
6. Hunt R, Osborn DA. Dopamine for prevention of morbidity and mortality in term newborn infants with suspected perinatal asphyxia. *Cochrane Database Syst Rev*. 2002;3(3):CD003484. doi: 10.1002/14651858.CD003484, PMID 12137696.
7. Booker PD, Evans C, Franks R. Comparison of the haemodynamic effects of dopamine and dobutamine in young children undergoing cardiac surgery. *Br J Anaesth*. 1995;74(4):419-23. doi: 10.1093/bja/74.4.419, PMID 7734262.
8. Tarr TJ, Moore NA, Frazer RS, Shearer ES, Desmond MJ. Haemodynamic effects and comparison of enoximone, dobutamine and dopamine following mitral valve surgery. *Eur J Anaesthesiol Suppl*. 1993;8:15-24. PMID 8223351.
9. Kosugi I, Tajimi K. Effects of dopamine and dobutamine on hemodynamics and plasma catecholamine levels during severe lactic acid acidosis. *Circ Shock*. 1985;17(2):95-102. PMID 4053301.

Majid Malaki

Department of Pediatric Nephrology,  
NICU ward of Mardom Hospital, Tehran,  
IRAN.

## Correspondence

Majid Malaki

Assistant Professor, Department of  
Pediatric Nephrology, NICU ward of  
Mardom Hospital, Tehran, IRAN.

Email: madjidmalaki@gmail.com

## History

- Submission Date: 07-01-2022;
- Review completed: 28-02-2022;
- Accepted Date: 08-03-2022.

DOI : 10.5530/ijcep.2022.9.1.12

## Article Available online

<http://www.ijcep.org/v9/i1>

## Copyright

© 2022 The Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International license.

**Cite this article:** Malaki M. Dopamine Adjustment Difficulties in Special Pathophysiological Conditions. *Int J Clin Exp Physiol*. 2022;9(1):55.