

# **Commonly Used Iv Fluids in Children Undergoing Dental Treatment Under General Anesthesia**

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## **ABSTRACT**

### **INTRODUCTION**

The treatment for the pediatric patients is a challenging situation for the dental practitioner. The administration of different fluid rates in children varies on the imperviousness and amount of dehydration. In case of pediatric patients who are already dehydrated and require resuscitation, a compound of Ringer's lactate (LR) measuring 20 ml/kg should be immediately administered intravenously. The ultimate aim of intravenous fluids in the body is to restore an adequate vascular fluid volume enabling for cardiovascular stability as the basic component, organ perfusion to the maximum extent and adequate oxygenation to the various tissues of the body. AIM- This study aims to evaluate the commonly used IV fluids in children during the course of general anesthesia.

### **MATERIALS AND METHOD**

It is a retrospective study, done in private dental college and hospitals, Chennai. Patients records were reviewed and the data of 300 patients between September 2020 and February 2021 were analysed. Total sample data was 166 and was minimised by inclusion of available data. Collected data were analysed using SPSS statistical software.

## RESULTS AND DISCUSSION

Among a total of 167 students, 51.2% were females and the rest of about 48.08% were males. The maximum was opted by DNS as 57.23% followed by 29.52% for normal saline (NS), and 12.65% for Ringer Lactate (RL). On the other hand, only 0.60% opted for the others. With the maximum obtained by DNS (Dextrose Normal Saline), which has the efficacy to maintain the body fluids.

## CONCLUSION

The Dextrose normal saline is selected maximum for the clinical purpose in the pediatric patients who undergo treatment under General anesthesia. It maintains normal body fluid balance as compared to other intravenous fluids.

Keywords- Ringer Lactate, Normal Saline, Dextrose normal saline, intravenous fluids

## INTRODUCTION

The treatment for the paediatric patients is a challenging situation for the dental practitioner. Most of the children are often anxious and their level of cooperation tends to be limited for a surgical process(1). Therefore, clinical measurements that determine the treatment courses and dental surgery often cannot be executed without the aid of general anesthesia (2).

Various Perioperative fluid association and management done in case of children with different surgical complications has been the focus of interest. As per the status of the paediatric patient, kind of orientation and the postoperative scenario in case of perioperative fluids proper medical prescription should be provided for both volume and consumption(3). The normal amount of water present in a newborn constitutes about 75-80% which gradually decreases at an inappropriately fixed rate as fat and muscle content increases with age of an infant to the adult generation constituting approximately to 60%. The amount of extracellular fluid which is present in the body accounts for 45% of the total body weight in the neonates group and 30% by the age of 1 year in the children, compared with 20% in the majority of adults (4). A diligent fluid management is necessary for pediatric patients and infants for the reason of a thin margin for error.

Under normal conditions, the amount of water required to metabolize is 1 mL for a 1 kcal, by considering the main insensible water losses for the body which takes place across the skin and in the main respiratory tract, in addition to the urinary water loss(5). Thus, in the major cases of an awake child, two equivalent components like calorie and water consumption are considered on

the weight-based rule for the hourly consumption of water in adults(6). This is named as the “4/2/1 rule” for maintenance of fluid therapy in the body of children(7). Historically, the most adapted and widely used intraoperative practice in the clinic are to administer IV fluids with proper deligency to meet the basic maintenance requirements of the body and to counteract the preoperative deficits followed by ongoing losses which have been incurred during the course of surgical procedure in children thereby providing basic cardiovascular stability(8).

The rate of intravenous fluid administered in children varies on the rapidity of dehydration(9). For the cases of a dehydrated paediatric patient who requires proper resuscitation, a compound of Ringer’s lactate (LR) 20 ml/kg is administered immediately intravenously(10). The ultimate aim of intravenous fluid is the restoration of an adequate vascular fluid volume which is essential for cardiovascular stability, organ perfusion and adequate oxygenation to the tissues.

There are various types of IV fluids available and selecting the appropriate can be beneficial. The main aim of this study was to evaluate the commonly used IV fluids for children undergoing dental treatment under General anesthesia.

## **MATERIALS AND METHODS**

The following study was retrospective study and was conducted in a private dental college setup (Saveetha Dental College), Chennai, India. Ethical approval for the study was obtained from the Institutional review board members prior to the progress of this original study.

Data was collected from the records of the children less than 20 years of age who were treated under general anesthesia during dental treatment between September 2020 and February 2021. A total of 166 children who were treated under general anesthesia were included in the study. Data was collected under the parameters of age, gender and type of IV used during the course of treatment for the children under general anaesthesia. The collected data was divided into 4 groups as 0-5, 6-10, 11-15 and 16-20 years and was analysed using SPSS statistical software.

## **RESULTS**

The demographic details of 166 children included for analysis are tabulated in Table 1. Among which 85(40.79%) were female, while 8(59.21%) were male. 145(87.35%) were 0-5 years old, 5(3.01%) were 6 to 10 years old, 7(4.22%) were 11-15 years old and 9(5.42%) were 16-20 years old with a mean age of 1.28 (  $\pm 0.783$ ).

Figure 1 demonstrates the commonly used intravenous fluid during the course of treatment under general anesthesia. 57.23% was opted by dextrose normal saline (DNS), followed by 29.52% for normal saline (NS), and 12.65% for Ringer Lactate (RL). On the other hand, only 0.60% opted for the others.

## **DISCUSSION**

Various previous literature suggested the ratios for various intravenous fluids used during the course of dental treatment. Dextrose 5% in water is consumed abundantly, followed by Lactated Ringers which is similar to blood plasma concentration. 0.9% Normal saline

is the most commonly used for the patient under general anaesthesia. In this study the most commonly used intravenous fluid compared by this literature had the same sequence, that is Dextrose Normal Saline, Ringer Lactate and Normal Saline.

While determining the amount of essential or non-essential colloid fluids to be administered for the pediatric patient, the various type of fluid deficit and limitations like fluid loss or plasma loss and the immediate effect that these new fluids used may have an effect on coagulation cascade, intravascular volume, microcirculation and allergic needs should be considered. During surgeries in children the first administered are crystalloids which helps to maintain the absolute or relative blood volume deficit(11). In case of operating room setting, most clinically used intravenous fluids by anaesthesiologists now are either Normal Saline or Ringer Lactate for maintenance of adequate fluid in the body. Various advantages of such fluids include difficulty on coagulation, low cost, no risk to the body of major anaphylactic reaction and no risk of transmission of any known or unknown infectious agents to the body.

The various treatment recommendations for the pediatric patients are mostly based on parameters of proper assessment of dehydration severity in the body. Severity of dehydration can be monitored by various vital signs and physical examination. A JAMA study conducted a long time back reveals three ways of clinical signs. These clinically signs are day to day used in recognizing 5% or greater dehydration in patients' bodies, which has delayed capillary and venous refill, abnormal skin turgor, and respiratory pattern.

During this process of dental treatment dehydration is a common occurrence in children. The clinical features of dehydration are numerous, some include the manifestation of extracellular volume loss from the entire body. Clinical signs of the dehydration process involve reduced sensitivity as well as specificity to estimate the degree. In female patients, the condition for hypovolemia has the maximum occurrence. This can be acknowledged through the study, where the female patients are more involved undergoing dental treatment. Monitoring is essential for these patients' safety adjusting with the rate of rehydration.

In the year 2018, the American Academy of Pediatrics had published a key action statement that states, “children between the age of twenty-eight days to eighteen years of age requiring maintenance intravascular fluids should receive isotonic solutions with appropriate potassium chloride and dextrose”, as reflected in the present study.

This is probably the most significant and first study of its kind to be reported with the data of commonly used IV fluids in children during dental procedure in Chennai, and the findings may be used for further studies.

More studies with larger sample size should be conducted to evaluate the usage of commonly used IV fluids in children under dental procedure and also to estimate the ratio of administration.

The potential limitations of the present study is that it includes a very small sample size and the outcome depends on the socio-economic status of patients also including the general public who visited the hospital.

Our team has extensive knowledge and research experience that has translate into high quality publications(12–24) (25–31)

## CONCLUSION

Within the limits of the study, commonly used Intravenous fluids administration during the course of dental procedures for pediatric patients are efficient in maintaining the fluid balance in the body. DNS are the most widely used fluids with 57.23% and maximum for upper arch 48.8%. The body fluid balance can be adequately maintained by various crystalloids. More research is required in this arena to formulate a better outcome for the analysis.

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## CONFLICT OF INTEREST

The authors declare that there were no conflicts of interest in the present study.

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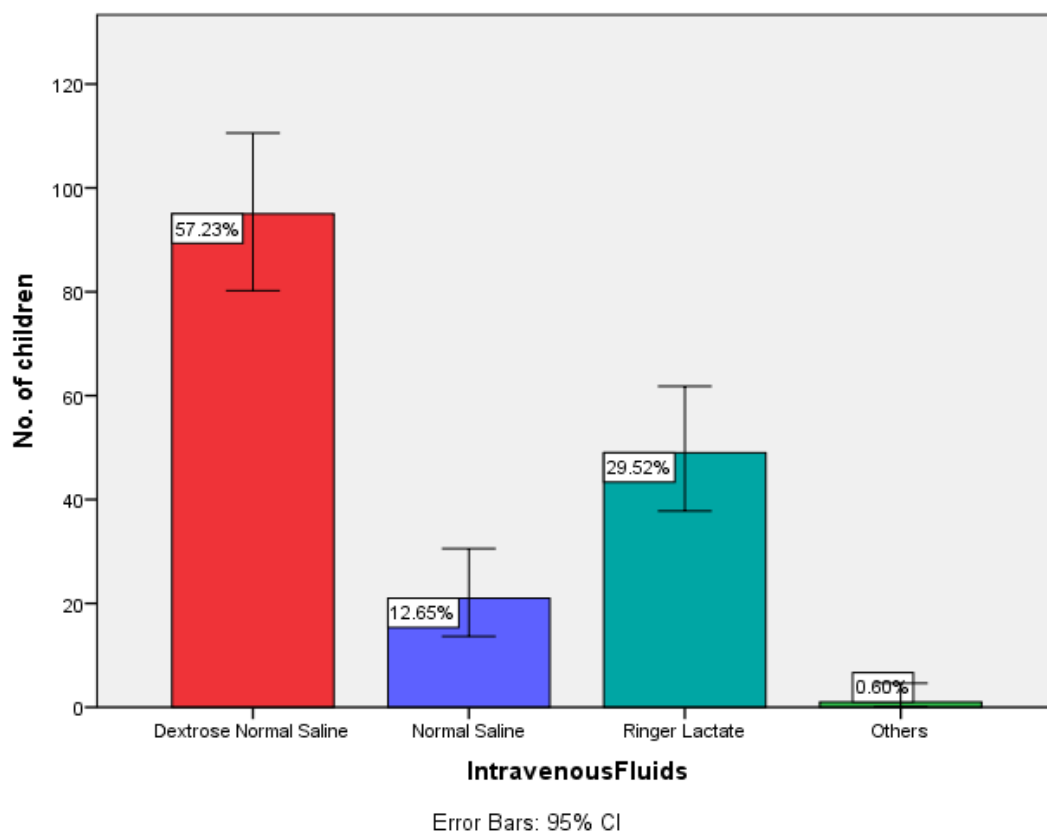


Figure 1: Illustration of Intravenous Fluids (Dextrose normal saline, Normal saline, Ringer Lactate, others). 57.23% was opted by DNS, 12.65% was constituted by NS, RL constituting 29.52% and others for 0.60%.

Age	Gender - Female	Gender- Male	Total
0-5	80	65	145
6-10	3	2	5
11-15	2	5	7
16-20	0	9	9
Total	85	81	166

Table 1: Demographic details of the children