

ORIGINAL ARTICLE

A prospective, cross-sectional survey of pre-operative fasting of pediatric surgical patients in a university hospital

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ABSTRACT

Background: Fasting of children before anesthesia is mandatory but blighted with logistical issues. There may be inadvertent prolonged fasting due to lack of individualized fasting plans for children coming for surgeries. We aimed to have a survey of state of preoperative fasting in our pediatric patients.

Methodology: A questionnaire based, prospective, cross-sectional survey was conducted in our Department for one month. A total of 102 children, up to age of 16 scheduled for pediatric surgery were included in the data collection. The questionnaires were to be filled either by anesthesia consultant or trainees. The information related to duration of fasting and any extra oral hydration, was attained from patients' parents/guardians. The duration of fasting was then compared with the recommended one.

Results: In this study only 4% of children could be labelled as having the optimum fasting. Based on the current guidelines, in 96% of children, the guidelines were not followed.

Conclusion: Pediatric patients are being subjected to prolonged durations of fasting prior to anesthesia and surgery against the accepted norms and the guidelines.

Key words: Fasting, Duration; Hydration; Pediatric

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INTRODUCTION

Fasting in children is a pre-requisite before anesthesia. To comply with optimum pre-anesthetic fasting in pediatric age group is a big challenge.¹ Fasting duration is decided keeping the age and demands of children.^{1,2,3} However, it has been commonly observed that children are kept hungry, thirsty for periods which are often longer than the recommended ones.^{1,2,3}

One has to weigh the risk of aspiration at the cost of dehydration, hypoglycaemia, anxiety and crying due to excessive fasting durations.² Unpredictable situations, changes in list order and queue jumping due to emergency cases further compound the dilemma. The available literature suggests that the utility of six hours fasting in pediatric population is not conclusively proven.³ There

are studies which suggest that there is no increased risk of aspiration even if total fasting has been for only two or three hours.^{3,4}

We follow international guidelines^{3, 23,25-28} which are taken as standard. Based upon previous departmental guidelines, booklets from other hospitals and anecdotal experience, our department has determined that the gold standard or standard practice of fasting was minimum six hours after solid foods, milk and greasy meals and a four hour fasting requirement for juices and syrupy fluids. The minimum fasting duration for clear liquids is two hours.

The objective of this survey was to measure and document the actual fasting times of children coming for anesthesia in our department and then compare the results with gold standards of this practice internationally.

METHODOLOGY

This prospective, cross-sectional survey was conducted on children enlisted for anesthesia for pediatric surgery at Aga Khan University Hospital Karachi, Pakistan. A questionnaire was designed with both English and University approved Urdu translation. A consent form in English and Urdu was used for patients and/or guardians. The study was formally approved by the Institutional Ethical Review Committee. Mode of sampling was consecutive non-purposive sampling method. The survey was scheduled to be conducted over a one month period. The sample size was calculated from the mean average, derived of anesthetic surgeries conducted over the past seven years in our hospital. Hospital network based software 'SAHL' was used to record the total number of patients during this period. The total elective cases since 2006 were found to be 7511 over 84 months; thus, giving a sample size of 90 as reflective of our typical monthly case load. Since the survey was planned for one month this number of cases was chosen. The inclusion criteria were as follows: neonates, infants and children up to an age of 16 years, scheduled for elective surgery. The patients outside this age group and coming for emergency surgery were excluded. The questionnaires were to be filled either by an anesthesia consultant or a trainee. The process entailed interviewing prospective patients/patient's guardians in the reception area before the anesthesia. They were asked about their fasting duration; and any hydration through an extra oral route. The actual duration of fasting was compared against the recommended one and results were collated. Demographic data was obtained from the confidential folder. Results were collated using SPSS vs.19 (SPSS Inc. Chicago, IL).

RESULTS

A total of 102 responses were evaluated. The median age of the children was 24 (IQR= 28) months [Range: 2 to 120 months]. There were 90 patients of 102, who were eligible for solid intake. The fasting timing of these children was evaluated and the median solid fasting time was 12.0 (IQR =7) hours [range 6-48 hour]. Out of 90 cases, 4 (4.4%) children fasted solids up to 6 hrs, 34 (37.8%) fasted from 6 hrs to 10 hours and 52 (57.8%) had fasted more than 10 hrs (Table 1). Most of the children were fasted for more than 6 to 10 hrs, and more than 10 hrs in <3 yrs age groups.

The median fasting duration for juices/syrupy liquids was 8 hrs [range 4-24 hrs] (IQR =5). There were only 2 (2.9%) children who fasted sugary liquids up to 4 hrs, 12 (17.1%) children had fasted for 4 - 6 hrs and 56 (80%) fasted >6 hrs (Table 2).

Out of 102 responses, 98 children (96.1%) had taken clear liquids for a variable period of time. The median fasting time for clear liquids was 9 hrs (IQR=5) [range: 1 - 48 hrs]. Out of 98 children, 2 (2.9%) had fasted for clear liquids up to the recommended fasting time (2 hrs), while 14 (14.3%) had fasted for 2 - 6 hrs and 82 (83.7%) for >6 hrs.

Four children had intravenous hydration. 2 of these were under 22 months and had no solids for the last 48 hrs, and two were < 8 months and had no liquids for 8 hrs.

In this survey only 4% of children had had the optimum fasting ($p < 0.002$) (Table 4).

Table 1: Fasting of Solids by children (with respect to age groups, n=90)

Hours since last solid	Age Groups (Years)			Total n=90
	≤ 1Years n=20	>1 to 3 Years n=44	>3Years n=26	
Up to 6h	0(0%)	0(0%)	4(15.4%)	4(4.4%)
>6 to 10h	8(40%)	16(36.4%)	10(38.5%)	34(37.8%)
>10hours	12(60%)	28(63.6%)	12(46.2%)	52(57.8%)

Total cases 102; 12 children had not weaned to solids so they were excluded.

Table 2: Fasting of sugary and syrupy liquids and semi solids by children (with respect to age groups, n=70)

Hours since last	Age Groups (Years)			Total n=70
	≤ 1Yrs n=26	1 - 3 Yrs n=30	>3 Yrs n=14	
Up to 4h	2(7.7%)	0(0%)	0(0%)	2(2.9%)
>4 to 6h	8(30.8%)	4(13.3%)	0(0%)	12(17.1%)
>6h	16(61.5%)	26(86.7%)	14(100%)	56(80%)

Total cases 102; 70 children were reportedly able to tolerate semi solids and 32 were not

Table 3: Fasting of clear liquids by the children with respect to age groups (n=98)

Hours since last clear liquids	Age Groups (Years)			Total n=98
	≤ 1Years n=28	1 to 3 Years n=44	>3Years n=26	
Up to 2h	2(7.1%)	0(0%)	0(0%)	2(2.9%)
>2 to 6h	2(7.1%)	6(13.6%)	6(23.1%)	14(14.3%)
>6h	24(85.7%)	38(86.4%)	20(76.9%)	82(83.7%)

Total cases 102; 98 children were reportedly able to take liquid and 4 were not taken liquid

Table 4: Optimum fasting. Data given as N (%).

Age Groups (Years)	Optimum fasting		P-value
	Achieved	Not achieved	
≤ 1	0	30 (100)	<0.002
>1 to 3	0	46 (100)	
>3	4 (15.4)	22 (84.6)	
Total	4 (3.9)	98 (96.1)	

DISCUSSION

An overwhelming majority of our patients were fasting considerably longer than the recommended duration of fasting for anesthesia and surgery. The proportion of children who have inordinate or suboptimal fasting was very high i.e. 96% of the surveyed children. The only group of children which complied favorably with optimum guidelines was aged above 36 months.

More than half of the children had fasted for more than ten hours. While this was somewhat understandable (given the logistical issues) but not justifiable i.e. 83.7% of the children were still fasting for more than six hours for clear liquids. The recommended suggestion for that is two hours.

In Pakistan, perioperative hydration and fasting before anesthesia is sparsely probed topic.^{6,7} There is scarce literature on fasting in children undergoing surgery relevant specifically to Pakistan. One of the studies done at major teaching hospitals of Karachi displayed that Day case Surgery was the majority and preferred mode of surgery in pediatric age group. Nearly 8% of children undergoing such surgeries had issues with 'feeding within the first 24 hours' and nearly 14% children had vomiting (more than two episodes with 24 hours) post operatively.⁷ In light of these previous findings and our own survey; it can be extrapolated that children coming for anesthesia and surgeries are at very high risk for iatrogenic dehydration and associated complications e.g. renal failure, mental state changes, collapse, tachycardia,

starvation etc.

In another study from Pakistan done in the early nineties, the mean fasting period in children was found to be 10.87 hours \pm 2.68 hours.⁶ This study showed that the mean pre-anesthetic glucose levels were 4.8 ± 0.8 mmols/L. The glucose level though found to be within normal range but was only marginally normal and the most probable etiology would have been the prolonged fasting duration. Clearly the fasting durations (in that study) were much longer than the recommended periods. Our survey has found that the fasting durations are still very high, something which has unfortunately not changed in a long time.

As a result of this study we were able to have a snapshot of the actual prevalent status of pre-operative fasting in children. Interestingly the findings are very identical from published audits and audits¹⁰⁻¹³ from many other countries with similar socio economic conditions. The condition is not limited to developing countries; children have been found to be fasting for very long periods before surgeries, even in developed western countries.¹⁴ Several audits,¹⁰⁻¹³ which looked at actual fasting times in children's hospitals, found that children had inadvertently fasted for unacceptably prolonged periods.

It is worth adding that this is an on-going problem in Anesthesia departments in many parts of the world¹⁴. There are multiple factors involved and some studies have suggested continuous programs as the tangible solution to this recurring problem. In this respect our findings are not vastly different from earlier studies in other countries with similar backgrounds or in developed countries.

At our institution we observe the old principle of 2:4:6, which inadvertently leads to prolonged fasting. Surveys and regional audits¹²⁻¹⁴ have shown that the tricky balance between recommended fasting durations (2:4:6) and risk of pulmonary aspirations has inadvertently made people err on the side of caution. This would explain why despite reasonable evidence, anesthesiologists still demand 2:4:6 rules for fasting in children. Although, the classical dogma of at least six hour full fasting is increasingly

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being challenged.^{1,3,7,15,16} This has been so because of observations made of residual gastric volume. Intake of clear fluids up to two hours prior to surgery does not negatively impact gastric residual volume of the gastric Ph.^{15,16} This findings underpins the new drive to stop the conventional six hour fasting.⁴

In our survey nearly 12% of the children were found to have on-going intravenous hydration. While IV hydration is better than nothing, but it carries the risk of: hyponatremia⁵, over hydration and electrolyte imbalances.^{8,9,10} Another area for future research which has been highlighted is, parents' perceptions about fasting for their children. It has been observed in studies that parental educational was an important factor in prolonged fasting in children.^{17,18}

Other benefits of saving children from inadvertent prolonged fasting was protection from hypotension at induction and administration of dextrose containing fluids.¹⁸ Children are also found to be less irritable after anesthesia if they had oral liquids up to two hours before induction.^{20,21}

One of the potential limitations of this survey was selection of a period of one month for carrying out this survey. We chose this sample size because this was a number very

close to an estimated average for our monthly pediatric cases for the past six years. Due to logistical constraints we could not collect data from patients coming to remote anesthesia locations in the hospital premises e.g. MRI and radiology suite.

Evidently the situation is less than ideal but we will endeavor to improve this with multidisciplinary cooperation. It is hoped that with better coordination and shared consensus among teams, things will change for good.

CONCLUSION

Pediatric patients are being subjected to inappropriately prolonged durations of fasting prior to anesthesia despite presence of departmental guidelines. Medical and nursing staff need to be continuously educated regarding adherence to an optimum period of fasting for the child's age.

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