Dosing Ability of Indian Parents for Liquid Medication

Most drugs administered to children are available in a liquid formulation. Studies done elsewhere have addressed various factors that influence the dosing abilities of parents [1-4]. In view of the paucity of Indian data, we planned this study to primarily assess the dosing ability of Indian parents across a set of dosing devices and also to assess the effect of parental educational status on dosing ability.

This was a cross-sectional hospital based study where parents with the youngest child aged less than 5 years were observed for dosing errors. The study was approved by the Ethics board of the institution.

A convenience sample of 310 eligible parents who visited the pediatric outpatient of KVG Medical College Hospital between May and June 2010 were included after obtaining informed consent. The parents were divided into two groups based on the educational status: those with primary education or no schooling (Group-1, *n*=166), and those with high-school education and beyond (Group-2, *n*=152). We observed the dosing accuracy of parents for three devices used to administer liquid medication: a dosing cup with etched markings, a 1mL medicine dropper and a 5mL syringe.

The subjects were asked verbally to take 5mL of a suspension in pre-weighed dosing cups. The net-weight of the medicine was calculated. The magnitude of error was obtained by the difference between the net-weight of the syrup measured and the reference weight. The reference weight was the average weight of 5mL of the suspension measured by investigators six times using a pipette. The weighing instrument used was a digital balance graduated to weigh between 0.001-220 grams. A similar procedure was followed to measure the error with the syringe and the medicine dropper. The order of the dosing device used was randomized.

Dosing error was categorized into: no-error (0-20% deviation from the reference dose), small-error (20-40% deviation), and large-error (>40% deviation) [1,4,5]. The data were analyzed using SPSS 11.5. The associations between the predictor variables (dosing device type and educational status) and the outcome variable (dosing accuracy) were assessed using chi-square test.

Of the 330 parents approached, 318 parents consented and were enrolled. Dosing accuracy for each type of instrument categorized by level of error is shown in ***Table* I**. The dosing device type significantly influenced the errors ($P<0.001$). The dosing ability of parents was worst with the dropper. Among the errors, under-dosing was overall more common than overdosing. The lower educational level of parents was significantly associated with dosing errors for each of the three devices used. The percentages of errors were: 34.2% in Group-1 vs.14.5% in Group-2 for cup ($P<0.001$); 29.6% in Group-1 vs.19.3% in Group-2 for syringe ($P=0.032$) and 50% in group-1 vs.33.1% in group-2 for dropper ($P=0.002$).

We found that the dosing ability of Indian parents was poorer than their US counterparts for droppers and syringes but better for cups [1]. Lower parental education was associated with poor dosing ability, as has been reported earlier [2]. Our findings prompt for further research on strategies to improve dosing ability of Indian parents for liquid medications.

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TABLE I DOSING ERRORS BY INSTRUMENT

Parameter		Dosing cup	Syringe	Dropper
Mean dose, mL (SD)		4.9 (1.0)	4.3 (1.0)	0.56 (0.37)
No error†‡	Higher dose *n* (%)	150 (47.1)	75 (23.6)	44 (13.8)
	Lower dose *n* (%)	92 (28.9)	166 (52.2)	143 (44.9)
Small dosing error†‡	Overdose *n* (%)	23 (7.2)	0	3 (0.9)
	Under-dose *n* (%)	26 (8.1)	41 (12.9)	21 (6.6)
Large dosing error†‡	Overdose *n* (%)	4 (1.3)	0	1 (0.3)
	Under-dose *n* (%)	23 (7.2)	36 (11.3)	106 (33.3)

The parent was asked to measure 5mL with dosing cup and syringe; 1mL with the dropper; † No error: up to 20% deviation from recommended dose; small error: 20-40% deviation; large error: more than 40% deviation from recommended dose; ‡ P<0.001 for comparison of dosing error categories between device types.

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Neonatal Screening for Hemoglobinopathies

A pilot study was undertaken to develop a feasible neonatal screening strategy for hemoglobinopathies. Isoelectric focusing using dried blood spots samples as a primary screening technique was standardized for the first time in India. The screened positives were confirmed by high performance liquid chromatography followed by parental screening, confirmation, and education.

Key words: *Hemoglobinopathy, India, Isoelectric focusing, Neonatal screening, Prevention*.

Hemoglobinopathies cause high degree of morbidity and mortality in India [1], there is an urgent need to detect the disorders as soon as possible after birth. We conducted a pilot study aiming to develop a feasible neonatal screening strategy. Following informed consent from parents, dried blood spot (DBS) samples were collected from 207 inborn babies within day 3-7 of life, over a period of two months. Primary screening by isoelectric focusing (IEF) (Perkin Elmer, Finland) [2] was done within 7 days of sample collection. Results were interpreted using ISOSCAN software (Perkin Elmer, Finland). The screened positive babies were recalled for confirmation by high-performance liquid chromatography (HPLC) (Biorad Laboratories)