

Stool Color Card as a Screening Tool for Biliary Atresia

The article by Redkar, *et al.* [1], published in *Indian Pediatrics*, reiterates importance of early (<60 days) Kasai's portoenterostomy (KP) for biliary atresia (BA) for improved survival and jaundice-free status 1-year after KP. Long term sequel of BA include liver failure, need for liver transplantation and death.

Diagnosis of BA is time-critical and dependent on identification of prolonged neonatal jaundice and pale clay-colored stool. Identification of stool color may suffer from subjective reporting [2]; an objective method of assessment by using a stool color card (SCC) (**Web Fig. 1**) may prove beneficial [2-4]. Although anecdotal, in our experience, parents often report color of their infant's stool as 'normal'. In a Dutch study, neither parents ($n=100$) nor clinicians ($n=83$) could reliably recognize discolored infant stools, and following implementation of SCC, recognition of discoloured stool by parents improved from 66 to 87% [2].

Since 2004, a national screening program in Taiwan has been using SCC for early detection of BA [4]. Introduction of the SCC was followed by a decrease in the median age at first admission from 47 days (1996-2003) to 43 days (2004-2008), and an improvement in rates of KP being performed within first 60 days (68.9% to 73.6%) [4]. A recent 14-year Taiwanese nationwide cohort study highlighted that following the implementation of SCC, 89% of total BA cases ($n=513$) underwent early KP, which led to significant reduction in hospitalization rate by 2 years (6.0-6.9/case to 4.9-5.3/case), reduction in mortality (26.2% to 15.9%); although the liver transplantation rate remained similar (approximately 30%) [3]. In a Chinese study with 92.5% response, parents recorded their infant's stool color using a SCC for 4 months; pale stool was identified in 24 infants and BA was diagnosed in 2/24 before 2 months of age despite no overt clinical jaundice [5]. A 20-year large-scale American study concluded that screening with SCC is an effective strategy associated with lower costs and better outcomes for BA [6].

Existing evidence supports the use of a SCC for early diagnosis of BA. It is likely to be equally effective in the context of developing countries where logistics for conducting blood investigations for infants with prolonged neonatal jaundice (mostly well and breastfed) may not be logical, feasible and prove financially challenging. Further expertise and equipment for pediatric abdominal ultrasound scans may not be available in smaller centers, and using a SCC will be a cost-effective measure in raising suspicion of BA early, thereby facilitating time-critical referral to specialist centers.

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Stool Chart




Prolonged jaundice = jaundice persisting beyond 2 weeks of age in term babies & 3 weeks in pre-term babies


- Persistently yellow urine staining the nappy can be a sign of liver disease
- Persistently pale coloured stools may indicate liver disease
- All babies with pale stools and yellow urine should be referred to a paediatrician for investigation
- All babies with prolonged jaundice should have a split bilirubin test

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Stool Chart



Healthy Stools

A healthy baby's stools can be any of these colours. Do not worry about green stools. Breast fed babies often pass watery stools. A sudden change to frequent watery stools of any colour may mean the baby is unwell.

- Breast-fed babies – often the stool colour is daffodil yellow
- Bottle-fed babies – often the stool colour is English mustard yellow

H1	Healthy Stools
H2	
H3	
H4	
H5	

Suspect Stools

In babies with liver disease the stools may be one of the colours below. Do not worry about one or two stools that look unusual. Don't forget to look at the urine colour – in a new born baby it should be colourless.

Any baby with stools the colour below – whatever the age, should be investigated for liver disease. For more information go to yellowalert.org

Suspect Stools	S1
	S2
	S3
	S4

Note: Digital printing or photocopying of these colours will alter them. Use only items supplied by CLDF.

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WEB FIG. 1 Stool Color Chart by Children's Liver Disease Foundation (Reproduced with permission from Children's Liver Disease Foundation).