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].

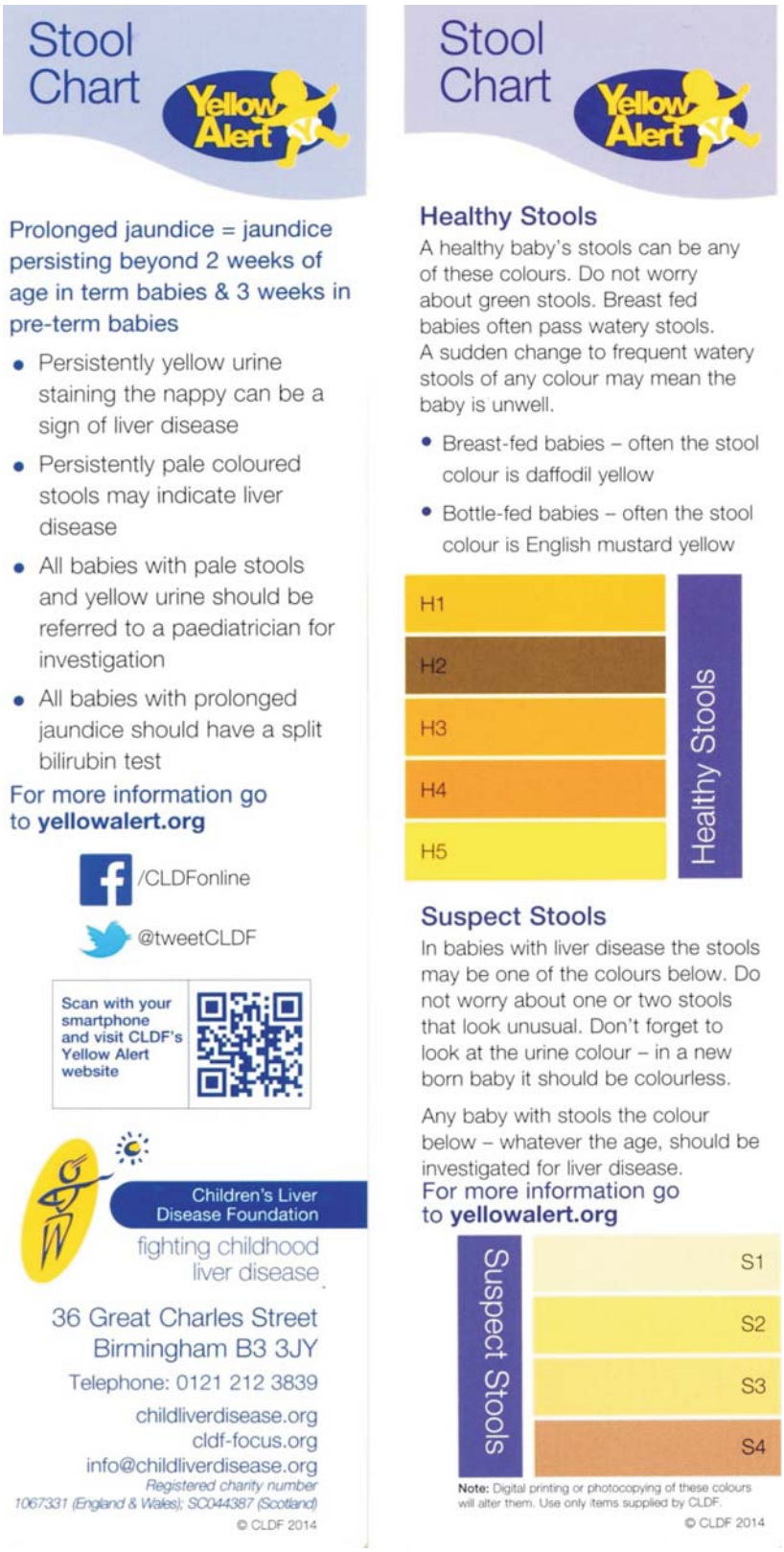
Existing evidence supports the use of a SCC for early diagnosis of BA. It is likely to be equally effective in the context of developing countries where logistics for conducting blood investigations for infants with prolonged neonatal jaundice (mostly well and breastfed) may not be logical, feasible 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.

Acknowledgements: Children's Liver Disease Foundation for allowing the use of the Stool Color Card.

Siba Prosad Paul[1] and Jagrati Chopra[2]
[1]Torbay Hospital, Department of Pediatrics, Torquay, and
[2]Medical School, University of Bristol, Bristol; UK.
[1]siba@doctors.org.uk

References

1. Redkar R, Karkera PJ, Raj V, Bangar A, Hathiramani V, Krishna J. Outcome of billary atresia after Kasai's Portoenterostomy. A 15-year experience. Indian Pediatr. 2017;54:291-4.
2. Witt M, Lindeboom J, Wijnja C, Kesler A, Keyzer-Dekker CM, Verkade HJ, *et al*. Early detection of neonatal cholestasis: Inadequate assessment of stool color by parents and primary healthcare doctors. Eur J Pediatr Surg. 2016;26:67-73.
3. Lee M, Chen SC, Yang HY, Huang JH, Yeung CY, Lee HC. Infant stool color card screening helps reduce the hospitalization rate and mortality of biliary atresia: A 14-year nationwide cohort study in Taiwan. Medicine (Baltimore). 2016;95:e3166
4. Tseng JJ, Lai MS, Lin MC, Fu YC. Stool color card screening for biliary atresia. Pediatrics. 2011;128:e1209-15.
5. Kong YY, Zhao JQ, Wang J, Qiu L, Yang HH, Diao M, *et al*. Modified stool color card with digital images was efficient and feasible for early detection of biliary atresia-a pilot study in Beijingh, China. World J Pediatr. 2016;12:415-420.
6. Mogul D, Zhou M, Intihar P, Schwarz K, Frick K. Cost-effective analysis of screening for biliary atresia with the stool color card. J Pediatr Gastroenterol Nutr. 2015;60: 91-8.



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