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Screening newborns for congenital heart disease using echocardiography at high altitude in China

Li J.(1), Qi H.(2), Xie S.(1), Li J.(1), Dai T.(2), Chen H.(2)
Capital Institute of Pediatrics,Beijing,China(1); Women's and children's hospital of Qinghai province Qinghai,China(2)

Introduction: Screening newborns for complex congenital heart disease (CHD) relies widely on pulse oximetry and clinical examination. However, this screening method is not applicable to those living at high altitude, because of variedly decreased arterial saturations at different altitudes in different ethnics. Furthermore, altitude hypoxia induces pulmonary hypertension that is main morbidity in children with simple CHD with left to right shunt. We aimed to screen newborns for CHD using echocardiography at high altitude.

Methods: Echocardiography was performed in consecutive asymptomatic 645 newborns (aged 3 to 5 days; 286 girls and 359 boys; 158 Han, 419 Hui and 62 Tibetan) born in the Women's and Children's Hospital in Xi Ning (2,260 meter), Qinghai province between March 2015 and April 2016. Demographic data was obtained.

Results: Parents of the 645 newborns resided at altitudes from 1800 to 4080 meters (median 2260m). Among them, 600 were born at ≥ 37 gestational weeks, and 45 born during 30 to 36 weeks. CHD was diagnosed in 171 (78 girls and 93 boys; 46 Han, 104 Hui and 14 Tibetan), making the prevalence of 26.5%. Among them, 123 had secundum atrial septal defect, 14 had ventricular septal defect and 56 had patent ductus arteriosus. No correlation between the prevalence of CHD and ethnics (p=0.27) or altitudes (p=0.88). Additional 456 babies had patent foramen ovale. There was no complex CHD. One month follow up was made in 92 out of 645 babies. Among them, patent ductus arteriosus (n=16) was closed in all. Secundum atrial septal defect (n=23) and ventricular septal defect (n=3) remained unchanged in size except for one spontaneous closure in each type of the CHD. Patent foramen ovale (n=74) remained open except 3.

Conclusions: The prevalence of simple CHD with left to right shunt CHD is substantial, without complex CHD. Screening newborns for CHD using echocardiography has important implications at high altitude. Follow-up remains challenging due to the poor socio-economical conditions, and must be reinforced in order to provide early repair and prevent from significant pulmonary hypertension.