

# WORLD CONGRESS ON RHEUMATIC HEART DISEASE

2-4 November 2023 • Abu Dhabi



**Submission Id:** 321

**Title:** ECHOCARDIOGRAPHY SCREENING FOR DIAGNOSIS OF RHEUMATIC HEART DISEASE BY NURSES: A DIAGNOSTIC ACCURACY STUDY IN NEPAL

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**Background & Aims:** Background

The prevalence of Rheumatic heart disease (RHD) is still high in Nepal, with most cases being latent. Echocardiographic screening for detection of latent RHD is advocated in RHD endemic areas like Nepal. Task shifting by engaging trained non-experts in RHD screening programs is showing promising results worldwide. However, no study has explored this possibility in Nepal. The objectives of this study were to provide a brief training on RHD focused echocardiography to nurses, engage them in echocardiography screening of school children and assess their diagnostic accuracy for diagnosis and risk stratification of RHD.

**Methods:** This study consisted of four phases - Training, testing, screening and assessment. At first four nurses were given a six weeks training in RHD focused echocardiography (one week theory, one week practical, four weeks of field screening experience in schools under supervision of experts). They were then tested in a small sample of 100 conveniently selected children aged 6-16 years with (n=36) or without (n=64) RHD. They underwent echo screening by the trained nurses. The nurses were blinded to RHD status of the study participants. They were also blinded to each other's echocardiographic findings during the testing period. The nurses used portable echocardiography device for screening, simplified 2012 world heart federation echo criteria for diagnosis of RHD and simplified echocardiographic score criteria for classifying RHD risk category. For assessment of the diagnostic accuracy Sensitivity and Specificity, areas under the curve, and inter-rater reliability index were calculated.

**Results:** The nurses-led echo screening using a simplified approach had reasonable sensitivity and specificity for RHD diagnosis. Compared with the reference approach (screening by Cardiologist), more than 90% of the participants were correctly classified by the nurses. The sensitivity and specificity for diagnosis of any RHD (Definite or borderline) were 87.5% and 95.3% respectively among all the nurses and the inter-rater agreement (Cohen's Kappa) was reasonable ( $k=0.84$ ,  $P<0.05$ ). The Area under the curve (AUC) varied between 0.90 and 0.95.

For Borderline RHD the sensitivity and specificity were 47.9% and 95.7% respectively with inter-rater agreement of ( $k=0.48$ ,  $P<0.05$ ). Likewise, for Definite RHD the sensitivity and specificity were 89.6% and 95.4% ( $k=0.84$ ,  $P<0.05$ ). The sensitivity and specificity for diagnostic accuracy of nurses in stratifying RHD risk category was 84.1% and 71.4% ( $k=0.56$ ,  $P<0.05$ ) for high risk, 50.0% and 93.1% ( $k=0.47$ ,  $P<0.05$ ) for low risk, and 46.4 % and 83.6% ( $k=0.29$ ,  $P<0.05$ ) for intermediate risk. We also compared the time taken for screening by the nurses and cardiologist. There was significant mean time difference of 01:31(min:sec) (CI 01:06-01:55) ( $P<0.05$ ) observed in diagnosing RHD positive cases between cardiologist and nurses. Whereas in diagnosing RHD negative cases (n=64) the mean time difference of 00:32 (CI 00:17-00:47) ( $P<0.05$ ) was observed.

**Conclusions:** The nurses given a brief training are capable to be engaged in echocardiography screening for RHD programs with reasonable diagnostic accuracy. These findings can be used to inform future training protocols, which could lead to improved screening performance.