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Performance of Indigenously build Artificial Intelligence/Machine Learning Algorithm in Reporting Mammography: Experience From a Developing Country

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PURPOSE

Healthcare systems in developing countries are heterogenous in their capabilities and delivery structure. Artificial Intelligence (AI)/Machine Learning (ML) systems from developed countries are often very expensive and not adaptible to local practices. Breast cancer screening programs are not well established in developing countries with significant variation in the competency of radiologists in interpreting mammography studies. In this study we assess the performance of an indigenously built AI/ML application in reporting mammography studies in a developing country.

METHOD AND MATERIALS

Mammography images from a tertiary referral centre and a teleradiology unit catering to numerous institutes were collated between Jan 2019 to Feb 2020. Both CR and DR mammography images were available. Images were divided into training and testing datasets and training dataset was annotated by a team of senior radiologists. AI/ML system was trained to highlight any abnormal finding (both benign and malignant). Cases from the testing dataset were reported by four radiologists and assessed againt the AI/ML generated report. Any discrepancy between radiologist and AI report was then reported by a panel of senior radiologist and consenus opinion was generated.

RESULTS

A total of 18908 examinations were included, training set consisted of 9960 studies (53%). Of the testing set, randomly selected 3042 (23% were CR) cases were reported by 4 radiologists. The accuracy of the AI/ML system was 95% in differentiating normal from abnormal study. The sensitivity was 98% and specificity 94%. The most common false positive finding was that of a benign appearing axillary lymph node (58 studies). Common false negative findings included micro-calcification (9), dense tissue (7) and presence of multiple lesions (6), wherein some were picked and some were not highlighted. There was no significant difference between the performance of AI/ML on CR or DR datasets.

CONCLUSION

The indigenously built AI/ML algorithm has promising results with high sensitivity and specificity in a large dataset.

CLINICAL RELEVANCE/APPLICATION

AI/ML mammography reporting performance may vary from one geography to other due to difference in disease pattern or technology. An indigeneously built AI/ML system in a developing country can perform well and could offer the best solution in view of costs and heterogeneous nature of healthcare system.