

Evaluation of digital infra-red thermal imaging as an adjunctive screening method for breast carcinoma: A pilot study.

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Abstract

Background: Early screening plays a pivotal role in management of breast cancer. Given the socio-economic situation in India, there is a strong felt need for a screening tool which reaches the masses rather than waiting for the masses to reach tertiary centers to be screened. Digital infra-red thermal imaging (DITI) or breast thermography as a screening test offers this possibility and needs to be carefully assessed in Indian scenario. Methods: The study involved 1008 female patients of age 20-60 years that had not been diagnosed of cancer of breast earlier. All the subjects in this population were screened for both the breasts using DITI. Based on the measured temperature gradients (ΔT) in thermograms, the subjects were classified in one of the three groups, normal ($\Delta T \leq 2.5$), abnormal ($\Delta T > 2.5, < 3$) and potentially having breast cancer ($\Delta T \geq 3$). All those having ($\Delta T > 2.5$) underwent triple assessment that consisted of clinical examination, radiological and histopathological examination. Those with normal thermograms were subjected to only clinical examination. Results: Forty nine female breasts had thermograms with temperature gradients exceeding 2.5 and were subjected to triple assessment. Forty one of these which had $\Delta T \geq 3$ were proven to be having cancer of breast and were offered suitable treatment. Eight thermograms had temperature gradients exceeding 2.5 but less than 3. Most of these were lactating mothers or had fibrocystic breast diseases. **As a screening modality, DITI showed sensitivity of 97.6%, specificity of 99.17%, positive predictive value 83.67% and negative predictive value 99.89%.**

Conclusion: Based on the results of this study involving 1008 subjects for screening of breast cancer, thermography turns out to be a very useful tool for screening. Because it is non-contact, pain-free, radiation free and comparatively portable it can be used in as a proactive technique for detection of breast carcinoma.

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KEYWORDS: Breast cancer; Digital infrared thermal imaging (DITI); Mammography; Screening; Thermography

PMID:25448668 [PubMed - as supplied by publisher]