

Evaluating the Disproportionate Rate of Metastasis and Mortality by Age in Patients with Breast Cancer in India and the United States Through a Comparative Study

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Key Areas of Research/ Expertise/ Skills

Breast Cancer Research, Epidemiological Research Study, Clinical Data Analysis

Key Collaborations in St. Johns academy

Cancer Registry, St John's Medical College Hospital, Bangalore

Impact of research

Our study is pivoting the direction of breast cancer screening by equally focusing on younger and older populations. Currently, the recommended age for mammogram screening is 40 years, at which women have the option to get mammograms if they choose to. At 45 years of age, mammogram screening is highly recommended. These guidelines, however, places minimal emphasis on the younger populace. We aim to change that. Our goal is to make changes in healthcare policies to emphasize early detection in younger women by promoting early screening. Our initial efforts have included producing breast self-exam cards for both women and men, which we have produced in 22 languages so far. These cards have already helped us identify lumps in the breasts of local women, whom we have directed to appropriate healthcare, follow-ups, and counseling with treatment aid for the underprivileged. These efforts are especially focused in communities in India, where earlier detection is less common due to taboo surrounding issues regarding the breast. Overall, BCH has promoted early detection globally as we continue to save more lives to breast cancer with our services - all free of cost.

Facilities/ infrastructure for Research

Web and computer-based Data collection, analysis and reporting tools for the clinical data research along with collaboration tools for communication and information sharing.

Collaboration within St. Johns

Dr Rakesh S. Ramesh, in-charge of Cancer Registry, St John's Medical College Hospital, Bangalore

Funding Source

Breast Cancer Hub Corporation

Background

Breast cancer is the most common kind of cancer in the world, with a jarring ~2.3 million new cases and ~690,000 deaths in 2020. The death rate, however, varies by country^[1]. Compared to the United States (USA), the death rate is significantly higher in India. In India, late detection is more common and occurs for many reasons: taboo and cultural stigma surrounding issues related to the breast, lack of healthcare accessibility in rural areas, and lack of effort towards Breast Cancer screening irrespective of socio-economic condition and education. Furthermore, the misconception that men cannot get breast cancer amplifies the scenario.

Aims and Objectives

We aim to compare and analyze clinical data from breast cancer patients in both India and the USA in order to understand the factors that cause metastasis. We also hope to understand why we see younger women developing metastatic breast cancer. Additionally, we hope to deduce whether the BRCA mutation and various receptor statuses (ex. Triple negative) favor certain ethnicities or age groups.

Ultimately, we strive to prevent more lives being lost to breast cancer.

Methods and Materials

We are sending out a survey to breast cancer patients in both India and the USA. This survey includes questions about age at diagnosis, stage at diagnosis, current stage, grade of the tumor, receptor expression, lifestyle, etc.

We are also using excel spreadsheets to visualize and analyze patterns in the data. For simple categorization and enumeration, we are using excel's inherent ability to calculate statistical values (i.e., mean, median, mode, standard deviation, ratios, and count). We are also running multi-dimensional regression analysis to obtain the R square, adjusted r square, and p-value. These statistics as well as the identification of dependent and independent variables will help us obtain reliable inferences.

We are also collaborating with the Metastatic Breast Cancer Project (MBC). They have sent out a survey to breast cancer patients in the USA and the BCH Research Team is analyzing this data according to the methods listed above.

Results

Cohort - The Metastatic Breast Cancer Project (MBC)

Proportion of Women with Metastatic Breast Cancer by Age in the United States

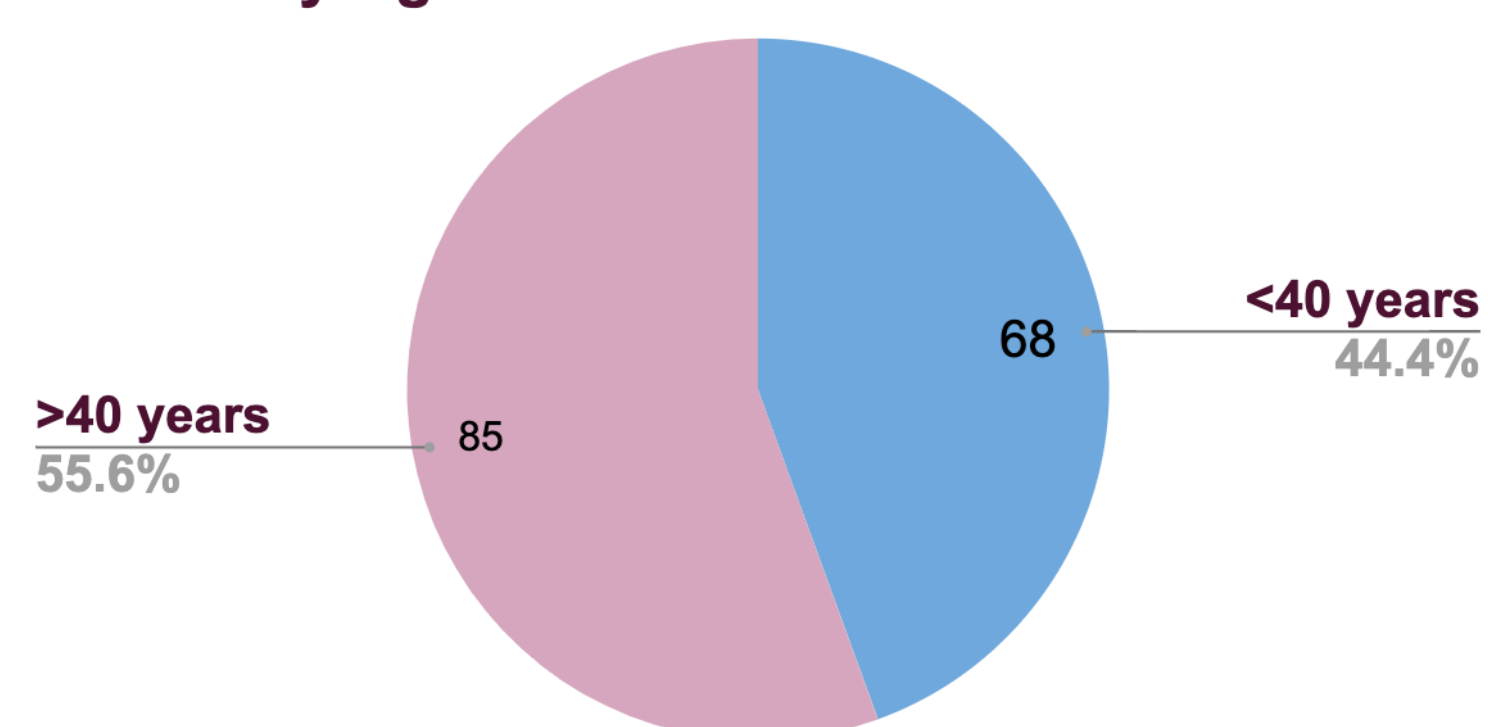


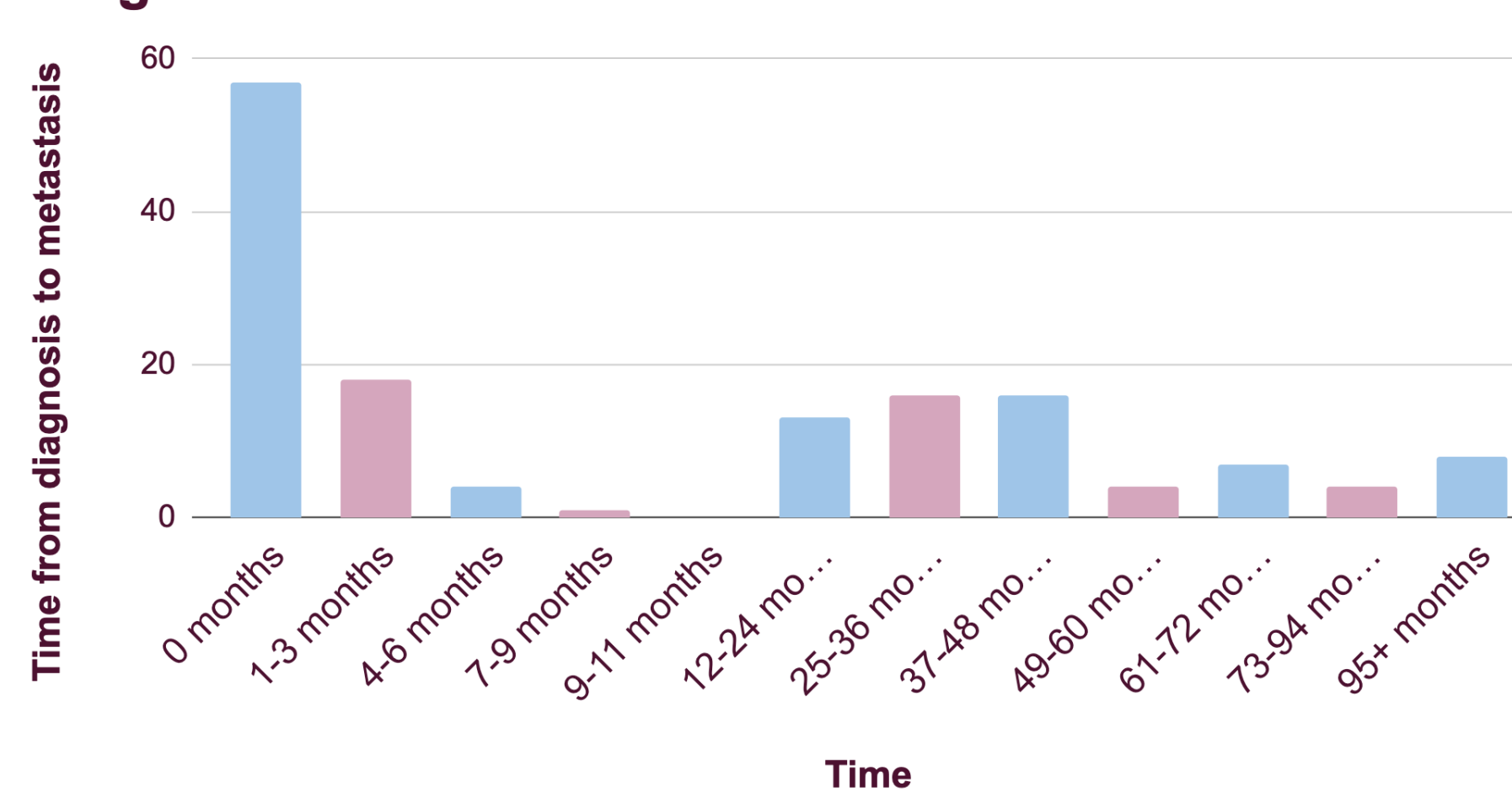
Figure 1. Plot of the proportion of women who developed metastatic breast cancer by age (N=153).

Contact

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Plot of Time from Initial Diagnosis to Metastatic Diagnosis

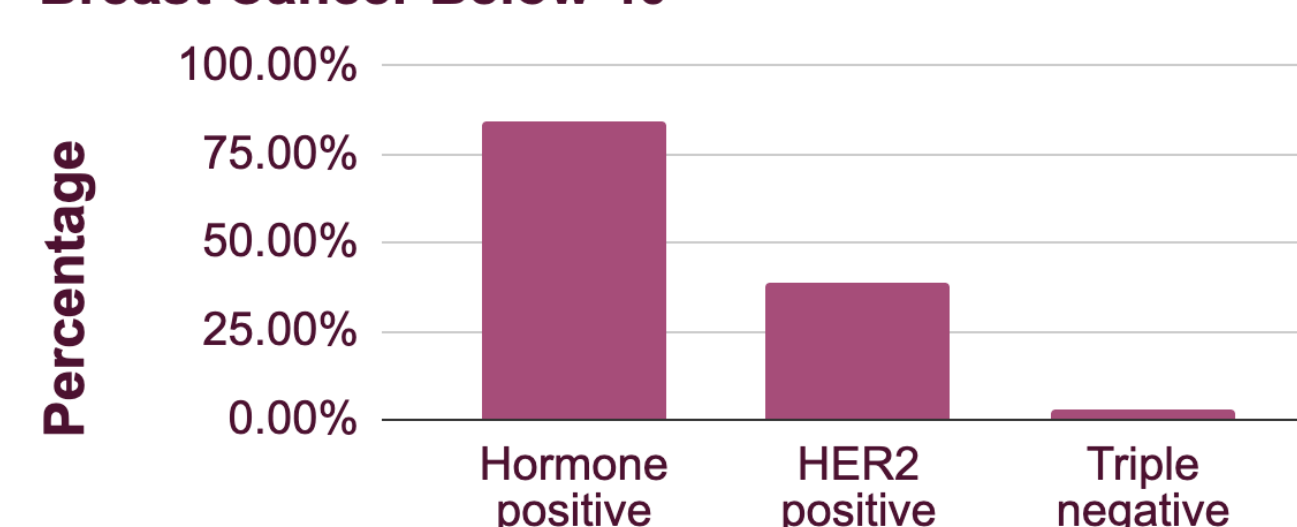
Cohort - The Metastatic Breast Cancer Project (MBC)



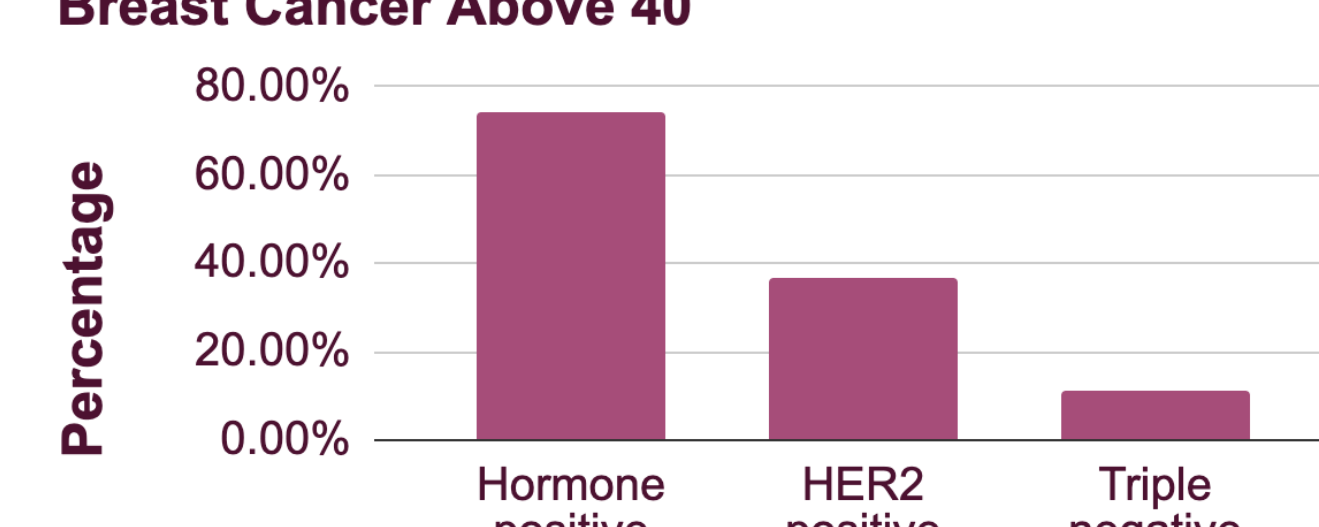
The median time to metastasis for women with breast cancer is 34.57 months.

Figure 2. Plot of time from diagnosis to metastasis (N=153). In women below 40 years and above 40 years, the average time for metastasis is 34.57 months (std dev. 56.07) and 19.10 months (std dev. 26.22) respectively.

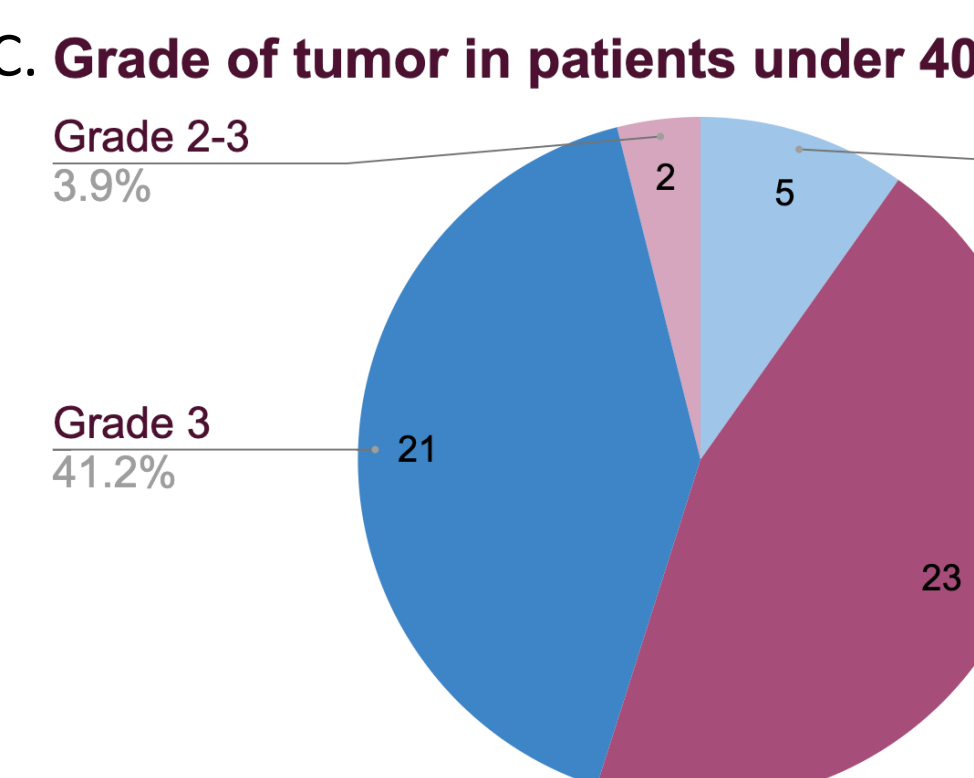
A. Receptor Status Among Women with Metastatic Breast Cancer Below 40



B. Receptor Status Among Women with Metastatic Breast Cancer Above 40



C. Grade of tumor in patients under 40



D. Grade of tumor in patients above 40

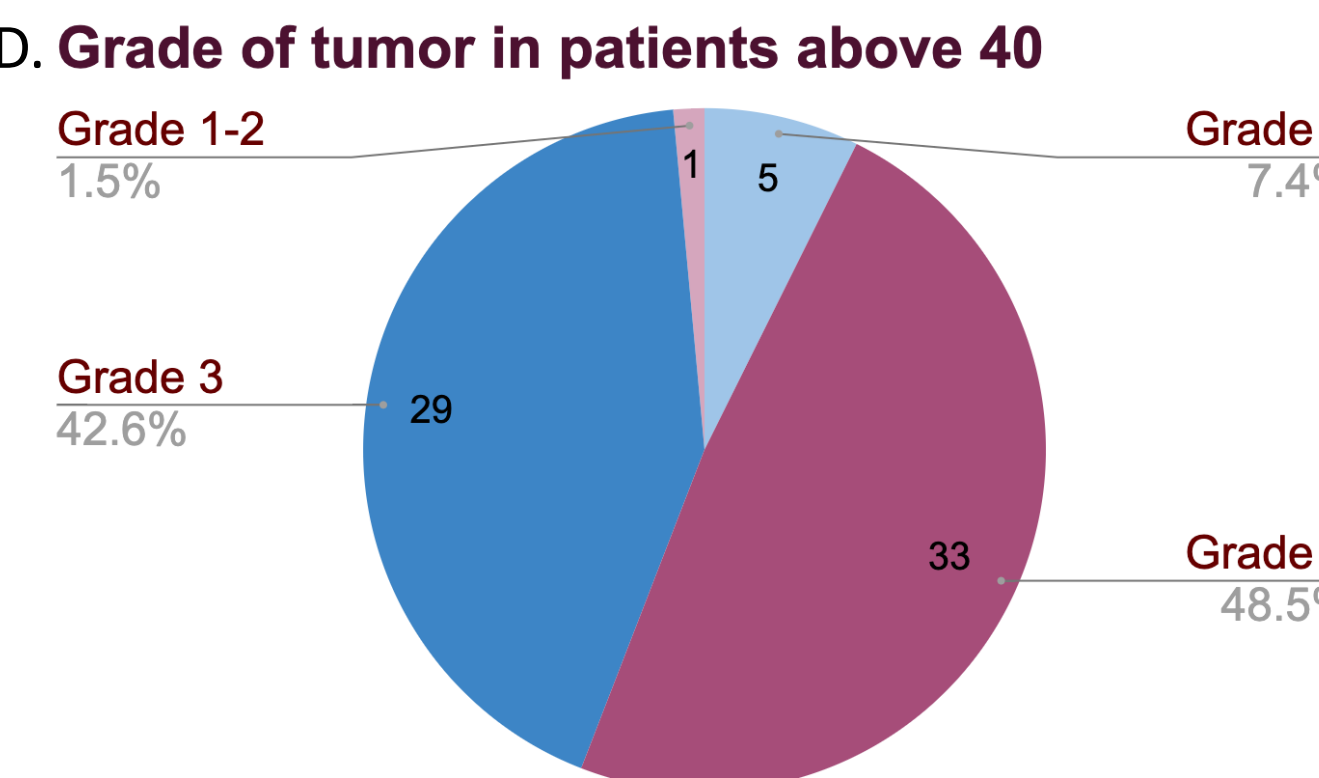
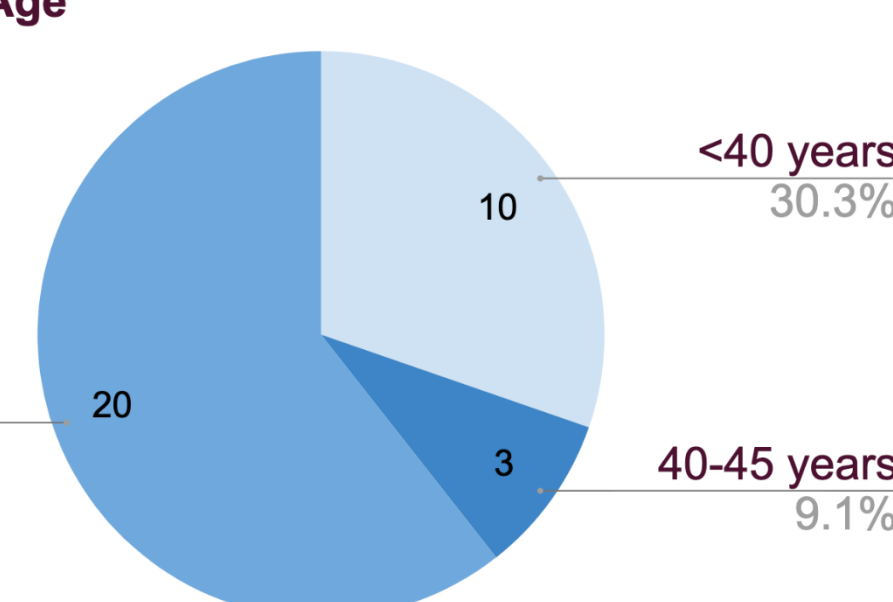
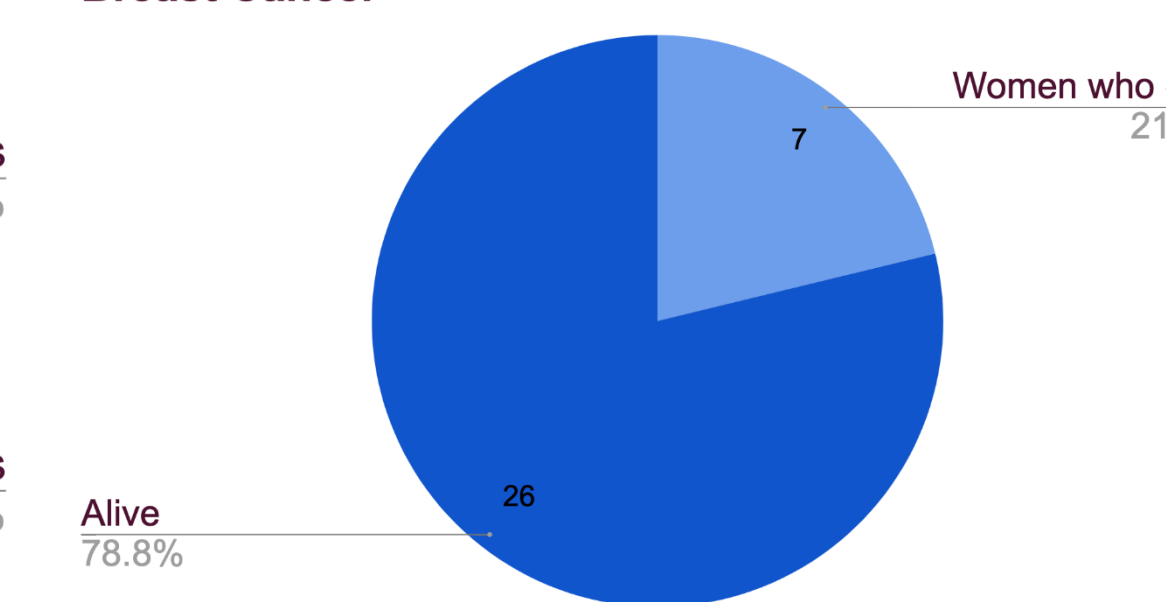


Figure 3. (a) Plot of receptor status among women with metastatic breast cancer (N=39). (b) Plot of receptor status among women with metastatic breast cancer (N=39). (c) Plot of grade of tumor in patients below 40 with metastatic breast cancer (N=40). (d) Plot of grade of tumor in patients above 40 with metastatic breast cancer (N=68). Hormone positive is ER+, PR+, and ER+ and PR+.

A. Proportion of Women with Metastatic Breast Cancer in India by Age



C. Proportion of Women Who Have Lost Their Lives to Breast Cancer



B. Proportion of Women with Metastatic Breast Cancer in India by Stage Detected

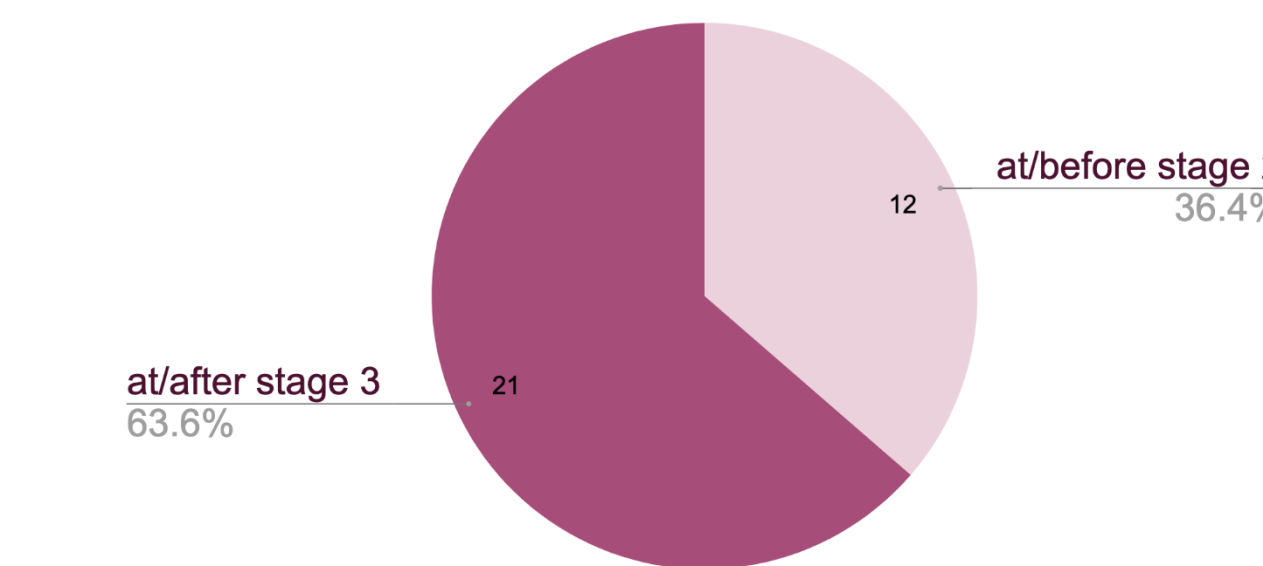


Figure 4. (a) Plot of proportion of women with metastatic breast cancer in India by age. (b) Plot of proportion of women with metastatic breast cancer in India by Stage detected. (c) Plot of proportion of women who lost their lives to breast cancer.

Cohort – Breast Cancer Hub (BCH) interview of patients
Our preliminary analysis of breast cancer patients in India (n=33 of which n=29 are from urban India & n=2 from rural India) shows that 30.3% of women are less than 40 years, 9.09% are between 40-45 years, and 60.6% are above 45 years of age. We report only 36.36% being detected at an earlier stage – most women are detected at Stage 2 and very rarely Stage 0 or 1. The remaining 63.63% of women were detected late—at Stage 3 or 4. From this group, 21.21% of women died between 2018-2020.

Discussion

We are observing a trend of an increase in breast cancer in younger women with predominantly more aggressive grades of tumors. Sadly, our research has also shown that there is a high death rate among Indian women with breast cancer. Our interactions with local Indian communities have also shown us that women are not aware of their own family history, screening methods, and other determining factors. Thus, we report that taboo and ignorance is the leading cause of death to breast cancer in India.

Furthermore, a huge population of India is stricken by poverty and are subject to daily wage-earning, leaving little room for doctors' visits and early screening. This leads us to believe that women who have breast cancer are likely to be identified at later stages (stages 3 or 4). Sadly, late detection often increases the death rates. At Breast Cancer Hub, we have made breast self-exam cards in local Indian languages which we are distributing, thus promoting early detection. Therefore, our efforts are concentrated on introducing affordable screening methods to the local Indian population. Through our intervention, we have worked directly with communities and directed suspicious cases towards affordable healthcare options with optimal follow-ups, patient counseling, support, and treatment aid for underprivileged sectors as needed.

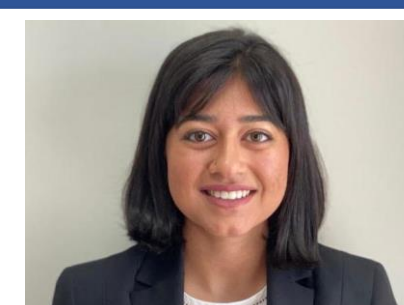
Conclusions

Our study has shown us that a disproportionate number of young women have metastatic breast cancer, likely resulting from inadequate access or lack of response to treatment. Clearly, there is a need for more awareness around early detection. By studying diverse cohorts, expanding the volume of patient data, and identifying the challenges that individuals face when accessing treatment, we hope to promote early screening in younger populations in both India and the USA.

Acknowledgements

We would like to thank The Metastatic Breast Cancer Project (MBC) organization for providing the raw data of Breast Cancer Patients in the USA and we are thankful to patients in India for giving the consent to be interviewed by Breast Cancer Hub (BCH)

Team



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References: [1] Sung et al., 2021. Global Cancer Statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. <https://doi.org/10.3322/caac.21660>

[2] Breast Cancer Hub: <https://www.breastcancerhub.org/research>

Ethics Committee Approval: IRB USA #20204167, IEC India #1/34/2021 (St John's Medical College Hospital)