

Breast cancer: Past, present and future prospects

Dr. Julie Decock
HBKU-QBRI

Cancer has been and continues to be a major health burden worldwide as the human population is aging and lifestyle is changing. For a long time, cancer was regarded as a disease of the modern age since there are only few archaeological records describing cancer in comparison to other diseases. The first records documenting cancer date back to 1600 years BC, in which the Egyptian physician-architect Imhotep describes 8 patients with bulging tumors of the breast. The oldest evidence of breast cancer can also be traced back to ancient Egypt where the 4200-year-old remains of an adult woman show bone damage typically found when breast cancer spreads throughout the bones and other organs of the body. The term cancer was coined by Hippocrates in 460 BC, when he used the Greek word for crab 'Karkinos' because the growth pattern of tumors reminded him of the legs of a crab. Hippocrates was also the first person to believe that cancer was a disease of bodily fluids caused by an excess of black bile. A balance of the 4 bodily fluids: blood, phlegm, yellow bile and black bile, was long thought to be necessary for good health. Over the centuries, many theories around the cause of breast cancer were formulated; from body fluid imbalance to divine punishment, exposure to air, tight-fitting clothing, repressed or over-indulged sexual activity, physical injuries, and even simply fear of breast cancer. It took until the 19th century for cancer to be reported as a disease of living cells.

Breast cancer statistics
With the era of the modern age, smoking, obesity, poor diet and physical inactivity are fueling the risk to develop cancer. Cancer affects people all over the world with approximately 14 million new cases and 8 million cancer-related deaths in 2012. The world health organization reported in 2014 that the number of newly diagnosed cancer patients globally is expected to increase by 70% over the next 2 decades.

Breast cancer affects 2 out of 5 women diagnosed with cancer, making it the most common cancer among women. With 15% it is currently responsible for the highest number of cancer-related deaths, closely followed by lung cancer with 14%. However, that does not mean that every woman diagnosed with breast cancer will die from the disease. If 36 out of 100 women with cancer have breast cancer, less than half of them (15 out of 36) will succumb to the disease. Interestingly, in the Middle East and North Africa (MENA) region, including Qatar, almost half of all female cancer patients are suffering



from breast cancer resulting in 23% of cancer-related deaths. Breast cancer has been around for centuries and is still dominating the lives of many women today. Therefore, it is very important to understand how cancer develops and progresses, and how we can improve early detection and eradication of the disease.

Breast cancer diagnosis and treatment
Treatment options for breast cancer today fortunately look very different from what was available in ancient times. Standard treatment today consists out of radiation, chemotherapy and hormonal treatment whereas until well into the 18th century bloodletting and complete removal of the breasts without anesthesia was the norm. Once a woman is diagnosed with breast cancer, a number of clinical characteristics and tumor features guide the physician to determine the best treatment strategy for the particular patient. Basic information on the size of the tumor, the appearance of the tumor cells, the presence of tumor cells in lymph nodes (often a first sign of the disease travelling through the body), expression of hormone and growth receptors is commonly used to determine the risk of the disease to spread throughout the body (metastasis) and to assess whether a patient should receive a combination of surgery, radiation, chemotherapy and hormone therapy. Nevertheless, despite this information some patients might develop tumors in other parts of the body and others might not respond to the selected treatment(s) as expected. With the advent of rapidly growing technological advances in the field of chemistry and engineering, several genomic assays for early-stage breast cancer have been developed, the best-known ones being Mammamprint and Oncotype DX. The Mammamprint test looks at 70 genes and is used to identify patients with low risk of metastasis for whom the potential benefits of chemotherapy might not outweigh the potential side effects. The Oncotype DX test is a genomic test (21 genes) for specifically early stage hormone receptor positive breast cancer that can predict the risk of metastasis, as well as determine whether the patient will benefit from chemotherapy in addition to surgery and hormonal therapy. Treatment of breast tumors that do not express hormone receptors is already limited to surgery and chemotherapy and radiation. Up until a decade ago, treatment strategies for breast cancer were limited to combinations of various chemotherapeutic

drugs in addition to radiation and hormonal treatment. In the early 2000s, immunotherapy opened a new era of precision medicine for cancer. Named the scientific breakthrough of 2003, cancer immunotherapy has greatly changed the way we treat cancer patients nowadays. Cancer immunotherapy exploits the patient's own immune system to recognize and target tumor cells as foreign. Different approaches can be used to restore or enhance the immune response against tumors. Just to name a few: specific drugs can be used to remove the naturally occurring brakes on the immune response, a patient's immune cells can be re-educated to recognize and kill tumor cells, and certain tumor-specific molecules that are made harmless can be administered to initiate an immune response similar to what happens during vaccination to prevent infection. Due to the great success stories using immunotherapy in different cancer types, several of these drugs have been approved by the FDA. The posterchild for cancer immunotherapy success is metastatic melanoma (a type of skin cancer) where the treatment doubled the number of patients that are alive 5-years after starting the treatment. This result together with many other studies in different cancers, has geared the future of cancer treatment towards immunotherapy. More recently, breast cancer has become the subject of multiple clinical trials using immune-based interventions and results are expected in the next few years.

Breast cancer awareness
The majority of breast cancer deaths are related to metastasis, the spread of the disease throughout the body. Therefore, it is very important to detect a breast tumor in an early stage when it is confined to the local breast tissue and treatment is the most successful. Efficient early detection programs should include information on breast cancer awareness, self-examination and clinical breast exams. Educating women from an early age will help to overcome the myths and taboos around cancer. An enormous amount of effort is put into breast cancer awareness campaigns all over the world. October has been nominated breast cancer awareness month worldwide and pink ribbons can be found everywhere. In Qatar, numerous non-profit organizations, universities, research institutes and hospitals will hold breast cancer awareness activities throughout the month. Within Hamad Bin Khalifa University (HBKU), Qatar Biomedical Research Institute (QBRI) will have a breast cancer awareness booth in various locations across Doha and will hold several public seminars on the history of breast cancer care and research.

Breast cancer research at QBRI
The Cancer center at QBRI is driving cutting-edge research to increase our understanding of the molecular mechanisms involved in cancer and to develop novel treatment modalities and strategies. A major focus of the center is cancer immunology and immunotherapy. One line of research focuses on the role of specific immune

cells that inhibit the ability of the immune system to attack and eradicate tumor cells and how we can manipulate their presence and function to improve treatment outcome. A second line of research studies the expression and function of specific proteins in triple negative breast cancer with the aim to develop new treatments targeting these proteins specifically on tumor cells using the natural anti-tumor activity of the immune system. A third line of research explores the variation of cells within a breast tumor and how these different cells contribute to the disease aggressiveness and treatment response. A fourth line of research investigates why the natural killer cells of the immune system that are responsible to recognize any abnormal cell sometimes do not function well, and how we can enable their activity. The Qatar Biomedical Research Institute is an important member of the Qatar Cancer Research Partnership that is tasked to report to the national Cancer Committee on the achievements of all stakeholders in Qatar and their research progress in alignment with the Qatar National Cancer Research Strategy. It is QBRI's mission to strive for delivery of cutting-edge, technologically-advanced and high quality research that will benefit patients in the long run but will also help to position Qatar on the world map of cancer research.

Dr. Julie Decock (pictured) is a scientist at the Cancer Research Center, Qatar Biomedical Research Institute (QBRI) and an adjunct assistant professor at Hamad Bin Khalifa University (HBKU).

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Labour reforms the antidote to India's perpetual job crisis

Amit Kapoor
IANS



The lack of jobs is beginning to haunt the Modi government. The Reserve Bank of India's recent Consumer Confidence Survey shows that public perception is also beginning to take account of the fact that there are no jobs available in the economy. According to the survey, 43.7 percent of respondents felt that the employment situation had worsened as compared to 31.9 percent a year ago.

The official unemployment numbers, which hover at around five per cent, will never reflect the true picture since in a developing economy, where poverty is high and unemployment benefits are virtually non-existent, no one can afford to remain out of the workforce for long. They usually find employment doing odd jobs or in the agricultural sector.

However, job creation numbers do give a clearer picture. According to the Labour Bureau, the Indian economy was generating around 900,000 jobs in 2010 and 2011. Since then, the jobs created in the economy have consistently fallen, reaching around 135,000 in 2015 as opposed to the need for an annual generation of over 11,000,000 jobs. The situation has not improved since.

However, this is not a recent phenomenon. The Indian economy has never been good at creating jobs. As per popular estimates, including those of the RBI, India's employment elasticity, which is a measure

of the percentage in employment for a one percent change in economic growth, has been around 0.2 in the post-reform period. This implies that as the real GDP rises by 10 percent, employment will merely rise by two percent. To put things in perspective, International Labour Organisation (ILO) estimates Brazil's employment elasticity to be an impressive 0.9.

This long-term trend shows that there is a structural reason behind this problem. When an economy transitions from agricultural-led to a modern one, it undergoes three key transformations: Movement of labour out of agriculture into industry and then services, shift of workers from informal into the formal sector and finally a rapid pace of urbanisation as more industries are set up in the rural areas around cities. India has missed the bus on all three of these fronts. Industrial development never took place in India and the economy became service-led right away. Employment in industry and services remains predominantly informal. Consequently, the pace of urbanisation has slowed in India.

Moreover, whatever industrial development has taken place in India has been either capital-intensive or skilled labour-intensive. India's labour-capital ratio in a vast majority of industries has been lower than other countries at similar levels of development. The very opposite is needed for job creation in a developing economy. But why has the pace of development been so skewed for India? What is so different about India that made it deviate from the historical trend of structural transformation for economies around the world?

India's notoriously rigid labour laws are the leading cause behind these anomalies. Labour falls under the concurrent list of the constitution, which implies that both the Centre and the states can form laws on it and neither has been miserly about this. When combined, each state ends up with over 200 different labour laws. These disincorporate firms from growing beyond a point. For instance, the Trade Unions Act of

1926 requires firms with seven or more workers to form trade unions. The Factories Act of 1948 mandates manufacturing units with 10 or more workers to have several working hour limits and work place conditions that become stricter with more workers.

The most burdensome of all is the Industrial Disputes Act (IDA) of 1947, which covers all industrial disputes and makes it almost impossible for firms with 100 or more workers to fire anyone. Establishments require permission from the labour department to lay anyone off and such permissions are rarely given even if the firm is unprofitable. Therefore, firms with six or less employees have the most labour flexibility.

As expansion of firms comes with high legislative costs in India, it is rational for them to remain small. This is why 84 per cent of manufacturing employment is restricted to micro and small enterprises in stark contrast with other developing countries (46 per cent for South Korea and Thailand, 27 per cent for Malaysia and 25 per cent for China).

India's labour laws have inhibited the growth of manufacturing firms, which lose out on the gains they could have made from economies of scale and innovation. Due to these reasons India has not been able to undergo industrial development and is finding it difficult to gain from the rise in labour costs in China. India could have been the next manufacturing hub after China but since there is a sheer lack of capability, countries like Bangladesh and Vietnam have been thriving in labour-intensive sectors like textiles.

Labour reforms are, therefore, the antidote to India's perpetual job crisis — but this is politically sensitive topic. The Modi government is in a unique position of being capable enough of pushing through such bold reforms since it has the numbers needed for this. However, considering how most of its attempts at reform have failed, this will be the farthest thing on the government's mind. A piecemeal attempt at labour reform with the Small Factories Bill, which aims to exempt factories with 40 workers from 14 labour laws, will be in limbo for the last two years.

However, on a positive note, some state governments are beginning to allow larger firms to retrench workers without seeking permission with their own amendments to IDA. Hopefully, it will not be too late before India manages to extricate itself from this mess of its own creation.