Current Status of Cancer Burden: Global and Indian Scenario

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Today, cancer is a common household word, with each of us closely associated with at least one near and dear one, a family member or a friend, a neighbor or a colleague, diagnosed with cancer. In India, there is also a perception that cancer incidence is on the increase; and a hope that perhaps with the advances in technology, cancer is diagnosed more frequently, maybe a change in our attitude and approach, the myths associated with cancer are vanishing and we are more open to accepting cancer diagnosis and discussing cancer more openly. The first issue of our journal 'Biomedical Research Journal', we were fortunate to receive excellent articles from our colleagues, and coincidentally the focus of the articles was 'Cancer'. With the recent release in December 2013, of the latest data on cancer incidence, mortality and prevalence worldwide, by the International Agency for Research on Cancer (IARC), the specialized cancer agency of the World Health Organization, our editorial in this issue reflects a brief synopsis of some of the critical figures of cancers, globally and of relevance to our country.

IARC has published updated estimates for 28 types of cancer in 184 countries, giving a comprehensive overview of the global cancer burden in the Globocan 2012 report. We present a bird's eye view focusing on cancer statistics reported by IARC, globally and in India, to highlight the cancer burden as incidence, mortality and five-year prevalence. Thus, in 2012 IARC figures for global cancer burden estimates were 14.1 million new cases (with the 2008 estimates being 12.7 million new cases), 8.2 million cancer deaths, and five-year prevalence of 32.6 million cancers in individuals above the age of 15 years. Globocan 2012 estimates indicate a substantive increase to 19.3 million new cancer cases by 2025. It comes as no surprise that 57% (8 million) new cancer cases, 65% (5.3 million) cancer deaths, and 48% (15.6 million) five-year prevalence of cancer cases, occurred in the less developed regions of the world, a similar scenario in India.

On the Indian scene, 1.1 million new cancer cases were estimated, indicating India as a single country (of the 184 countries) contributing to 7.8% of the global cancer burden; mortality figures were 682830, contributing to 8.33% of global cancer deaths; and the five year prevalence was 1.8 million individuals with cancer corresponding to 5.52% of global prevalence.

Globally, the five most common cancers considered in both sexes were cancers of the lung (1,824,701; 13%), breast (1,676,633;

11.9%), colorectum (1,360,602; 9.7%), prostate (1,111,689; 7.9%), and cervix uteri (527,624; 3.7%), comprising 46.2% of the 28 cancers reported. Further, deaths due to these five cancers were 3,378,622. The estimated five most common cancers in men were cancers of lung (16.7%), prostate (15%), colorectum (10%), stomach (8.5%) and liver (7.5%) amounting to a total of 4,285,250 cancers, and death due to these cancers as 2,769,670. In women, the five most common cancers were cancers of breast (25.2%), colorectum (9.2%), lung (8.8%), cervix uteri (7.9%), and corpus uteri (4.8%) with a total of 3,721,266 cases. Death due to these cancers were 1,675,069. And the five year prevalence figures were 11.236 million.

On the Indian scene, the five most common cancers in both sexes were cancers of the breast (144,937; 14.3%), cervix uteri (122,844; 12.1%), lip-oral (77,003; 7.6), lung (70,275; 6.9%) and colorectum (64,332; 6.3%), comprising 47.2% of the 28 cancers reported. Further, death due to these five cancers are 302,124. The five most common cancers in men were cancers of lung (11.3%), lip-oral (11.3%), stomach (9.1%), colorectum (7.7%), and oro-pharynx (6.6%) resulting in 219,608 cancers; death due to these cancers were 180,670, with five-year prevalence as 235,840. The five most common cancers in women were cancers of breast (27%), cervix uteri (22.9%), colorectum (5.1%), ovary (5.0%) and lip-oral cavity (4.3%) with a total of 345,191 cancers; death due to these were amounted to 193,664, with the five-year prevalence as 833,106.

The take home message from the data on cancer incidence, mortality, and five-year prevalence should take into account the following:

Both globally and on the Indian scene, breast scene is dismal with more than 20% increase in breast cancer since 2008 with 1.7 million new cases diagnosed in women in 2012; and there were 6.3 million women alive with breast cancer in the previous five years. Breast cancer is also the most common cause of cancer deaths among women (521,817 deaths in 2012) and the most frequently diagnosed cancer among women in 140 of 184 countries worldwide. It now represents one in four of all cancers in women. For the first time, breast cancer is the leading cancer in Indian women and cause of cancer death, surpassing cervix uteri cancer, despite cervical cancer considered more common in rural India, and almost 80–85% of India is rural India.

Cervical cancer is the third most common cancer affecting women worldwide, the most common cancer in women in several less developed countries, and now the second most common cancer in India. Almost 70% of the global burden of cervical cancer is in areas with lower levels of development, and more than one fifth of all new cases are diagnosed in India. Low-tech and inexpensive screening tools, and the HPV DNA PCR testing available in several developed countries and low resource countries as well should be useful. Cervical cytology (Papanicolaou test or pap) has traditionally been the primary screening method for cervical cancer. However, the sensitivity of the test in several low resource

countries is rather poor (28–52%), and high risk HPV types are proven etiologic agents of cervical cancer. Cervical cancer screening would significantly reduce the burden of the disease and deaths associated with it. Recently, on Mar 12, 2014, US-FDA committee members recommended that detection of high-risk HPV, including genotyping for genotypes 16 and 18, be the first-line primary screening test for cervical cancer. Besides, the availability of prophylactic vaccines against the high risk HPV16/18 accounting for 70% cervical cancer across the world, may be the beginning of the end of cervical cancer. The need of the hour is to implement well planned and systematic cervical cancer screening programs and prophylactic HPV vaccination.

In males, the focus for reducing incidence, downgrading and treatment is most needed for lung cancer, a cancer due to the tobacco smoking habits highly prevalent worldwide. The cancer can be unequivocally combatted by change in lifestyle. Another tobacco associated cancer in India is oral cancer. However, all tobacco habitués do not show progression to the cancer, and hence an important risk often not taken into account is the genomic constitution of an individual developing the cancers. Attention needs to be focused on stomach and colorectal cancers as well.

The global focus to combat cancer needs to be on cancer awareness, early detection, diagnosis, and availability and affordability of treatment in all cancers.

In the current issue, we bring forth articles on the new international multidisciplinary histological classification of lung adenocarcinomas, with Dr. Adusumilli and colleagues from Memorial Sloan-Kettering Cancer Center, New York, USA. The classification with additional prognostic factors such as nuclear grade, cribiform pattern, immune and molecular markers enabled stratification of the risk of recurrence, adds value to clinical management of the patients. Ease of implementation on the Indian scene and validity for Indian patients is discussed by the authors.

Dr. Partha Basu and his team at Chittaranjan National Cancer Institute, Kolkata, India, elaborated on screening cervical cancers using aided visual inspection, recommended for limited resource countries, highlighting the advantages and hence the feasibility of use in several countries. Besides, the authors advocate "screen and treat" approach of practical value, although the article does point out the disadvantages of low specificity and sub-optimal positive predictive value of the test. Perhaps a thought from the editors, why short change the women in low resource setting and instead provide them access to HPV detection and genotyping, a highly specific and sensitive test for primary screening of cervical cancer, via availability, affordability and subsidy through health systems in corporates, non-government organizations and government-based subsidy. Is it fair to lose women productivity and life because of cervical cancer in the 21st century?

We have Dr. Pritha Ray and her colleagues from Advanced Centre for Treatment, Research and Education in Cancer, Navi

Mumbai, India, and Tata Memorial Hospital, Mumbai, India, with an article on ovarian cancer, a heterogenous disease, and fourth most common cancer in India. The authors review and detail the cancer stages, and indicate the possible use of biomarkers including CA-125, useful in differential diagnosis and follow up, but not an effective marker for early-stage ovarian cancer due to its unacceptable low sensitivity and specificity. Ovarian cancer usually has a relatively poor prognosis. It is disproportionately deadly because it lacks early detection or screening tests, implying that most cases are not diagnosed until they have reached advanced stages. Possible molecular markers include micro-RNAs, methylation markers, and ultrasonography and computed sonography may facilitate early diagnosis. Current studies on proteomics mark the beginning of a paradigm shift towards individually tailored therapy. The authors expand on current treatment for the cancer. The need for better targeted therapy and newer imaging modalities are seen as possible solutions for management of ovarian cancer patients.

The article by Dr. Narendra Joshi, ACTREC, Navi Mumbai, India, focused on 'single nucleotide polymorphisms (SNPs) in human health and disease', is indeed very apt in the current context. An amazing aspect of the human genome is the minimal variation in the DNA sequence in the genome of different individuals. Of the 3.2 billion bases, roughly 99.9% are identical between two individuals. It is the variation in the remaining tiny fraction of the genome, 0.1%, that makes a person unique. This small amount of variation determines critical attributes of the individual in developing cancer and response to treatment. Besides the well-known lifestyle risk factors such as tobacco, alcohol, infectious agents - HPV, HBV, as mentioned earlier a very critical risk factor is the genomic constitution of an individual. We have all amply observed individuals who drink alcohol and smoke cigarettes live to the ripe age of 90 years without getting liver or lung cancer; whereas, some individuals who smoke and drink the same amount get liver/lung cancer at age 60 years or earlier; and still interesting is the development of cancer at age 55 years in individuals without either of the habits. Additionally, response to chemotherapy for almost every cancer is not identical, with one individual responding to chemotherapy, with shrinking of the cancer; whereas, another comparable individual's identical cancer shows no change after the same treatment. Thus, progression to cancer with/without risk factor, and response to treatment, is dependent on the genomic constitution of an individual. Dr. Joshi takes us through understanding the genomic variants as SNPs, and its implications and role in cancer development. The SNPs may play a role in the different responses to treatment observed in cancer patients. The author emphasizes the importance of single nucleotide polymorphisms in health and human diseases, including cancer. Thus, SNPs may be promising potential tools to better cancer diagnosis and treatment planning. SNP data may reveal markers for predisposition to cancer.

The genome of each individual contains its own pattern of SNPs. Thus, each individual has his or her own SNP profile. When scientists look at all the patterns from a large group of individuals, they can organize them into groups. Armed with data from the SNP Map, cancer research groups are focusing on correlations between SNPs and precancerous conditions, SNPs and drug resistance in chemotherapy, SNPs and cancer susceptibility, and SNPs and drug responses.

Genetic variation in the human genome is an emerging resource for studying cancer, a complex set of diseases characterized by both environmental and genetic contributions.

The final original research article from Dr. Anjali Karande, Indian Institute of Science, Bangalore, India, focusses on GnRH receptors in breast cancer. The authors have investigated the GnRH receptors on breast cancer cell line and demonstrated that GNRH analogue inhibits proliferation of the cancer cell line, via inhibition of processes that trigger cAMP formation. The translation of cancer research from bench to bedside may ultimately unravel the mysteries of human cancers and lead us to better patient management.

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