**Title: Indian scenario of Total Knee replacement**

India currently harbors population in excess of 1.2 billion. According to the population census 2011, there are nearly 104 million elderly persons in India; 53 million females and 51 million males comprise the breakup of the census. In the last decade (2001-2011), the elderly population has shot up to 36 %. The growth of elderly population is due to increased longevity of life, improved medical facilities and reduction in fertility rates

Old age is bound to confront all except the ones who shall die younger. Human body consists of various organ systems which usually work in harmony. When one system fails, the others take the slack allowing the time to regain the balance. However in old age there is sequential failure of systems before recovery is achieved. This cumulative albeit gradual breakdown is termed as frailty. The cut off for old age is clearly defined (age >65 years) however the onset of incumbency of frailty has no predefined rules. The transformation from fit to frail is insipid, unwelcomed and demands social and economic dependence by the younger generation.

However there is a constant decline in the trend of joint family cohabitation and rise in the number of nuclear family; especially in the urban set up in India. In nuclear family setup, the old usually feel physically and psychologically insecure. Gauging from this trend, everyone is making efforts to remain healthy and active when they cross the wrong side of 60’s.Gone are days when the term “elderly” was synonymous with “dependent”. Frailty is not an implicit part of ageing and is considered an independent event.

Prerequisites for social independence for elderly involve retaining and maintaining physical and mental well being. Ability to move in and out of the house for professional and vocational activities is an essential mandate. Degenerative osteoarthritis, especially of the knee joint is linked to the old age. There is unequivocal evidence regarding contribution of arthritis towards functional disability which hampers the social independence. Degenerative osteoarthritis leads to loss of movement, stiffness and painful movements. These symptoms are insidious in onset and gradually hamper the personal autonomy of the individuals. Verbugge1 has defined the disablement model as the main pathway for development of disability. The pathway follows the course through **pathology** (osteoarthritis) leading to **functional impairment** which involves decreased range of motion, decreased muscle strength, gait alteration and joint stiffness.

The functional impairment leads to **functional limitations** entailing the restriction in performing routine physical tasks pertaining to occupation and vocation such as climbing stairs, going out to market for grocery shopping etc. The functional limitation final paves the way for **disability** involving difficulty in doing activities of daily living, personal care, hygiene, socializing, child care etc. Disability is set when the social and cultural activities take a back seat and the individual prefers to stay at home. It is at this stage that social and economic “dependence” sets in. The disability is followed by hospitalization, inability to live alone and eventually incriminates to death.

Covinsky 2 reported that arthritis is a contributory cause in 75% of individuals with ADL (activities of daily living) disability. A 10 year follow up study by Health and retirement department3 calculated odds ratios for those with arthritis only and those without arthritis and at least one other condition compared to those with no arthritis or other conditions. The adjusted odds ratios for those with arthritis and those with at least one other condition were 1.91(1.59-2.44) and 1.74 (1.46-2.08) respectively. Verbrugge1 reported that approximately 43.7% of the population in United States of America has arthritis.

Such common occurrence misdirects the individual to accept this condition as a fateful event. Their future energy and planning involves adjusting to the condition rather than tackling it. Acceptance and adjustment without obtaining appropriate medical advices is a common foil for progression of disease. Orthopedic opinion is usually sought after advanced osteoarthritis has set in.

It is established in literature beyond doubt that total knee arthroplasty (TKA) is the gold standard of treatment in advanced osteoarthritis. Acceptance for arthroplasty as a procedure for the management of degenerative osteoarthritis across the world has taken grip for last five decades. International survey was done in 2011 on total knee arthroplasty by Kurtz et al 3. Census was obtained from 18 countries with a total population of 755 million. They reported 1,324,000 knee replacements are conducted annually. More than 6 lakh total knee arthroplasty are performed annually in United States of America and the demand is projected to increase by 673% by 2030.4 USA stands on top in the international registry in terms of knee arthroplasty / lakh population (234 TKA / lakh population)3. Frost and Sullivan5 reported arthroplasty market growth at compound annual growth of 26.7% from 2010 - 2017.

Although the data on the international forum seems exciting, the Indian scenario is uninspiring to say the least. Roughly 70000 joint replacement surgeries were performed in India in 2011 but there is no exact data. Indian Society of Hip and Knee Surgeons (ISHKS) was established in 2005 with national joint registry as one of its goals6. Currently only 42 orthopaedic surgeons are regularly giving their inputs to the national joint registry. Although the data is not comprehensive, it still indicates that Indian market on knee arthroplasty has not been able to keep pace with International markets.

The implant for TKA comes at a cost. The national health spending by the government of USA in 2009 was roughly 2.5 trillion dollars ( 17.3 % of GDP), and is expected to rise to 4.5 trillion dollars ( 19.6% of GDP) in 2019. The estimated population of USA is 320 million. Hence the average per capita expenditure by the government is **14000 dollars per year**. This stands in stark contrast to the Indian health policy. The health expenditure by the government was 1.15% of GDP (roughly 350 US dollars) and is expected to increase to 2.5% in 2025. As the current national population is beyond 1.2 billion, the per capita health expenditure by the government becomes roughly **290** **dollars per year**. With insufficient public sector spending on health care and limited popularity of health insurance system, an individual has to purchase the implant from his pocket to undergo the surgery. The national government recently fixed the price range of knee implants from Rs 54,000 to Rs 1.14 lakh rupees. Although the initiative was a welcome move, yet the cost is still beyond reach for the common masses across the country. With average per capita income in India being 616 US dollars (roughly 43000 rupees), knee replacement seems more a luxury than a necessity for the common masses.

It is indeed unfortunate to realize the plight of elderly individuals suffering from degenerative osteoarthritis. Lack of awareness, acceptance of the condition as a fateful happening, inadequate funding from the government and lack of personal fund to sponsor necessary treatment all contribute together towards the current state of affairs. We hope that the future holds a bright promise and the issue of degenerative osteoarthritis is given the justice it deserves.

References

1. Verbrugge LM, Jette AM. The disablement process. Soc Sci Med. 1994 Jan;38(1):1-14. PubMed PMID: 8146699
2. Covinsky K. Aging, arthritis, and disability. Arthritis Rheum. 2006 Apr 15;55(2):175-6. PubMed PMID: 16583390.
3. Song J, Chang RW, Dunlop DD. Population Impact of Arthritis on Disability in Older Adults. Arthritis & Rheumatism (Arthritis Care & Research). Apr 15; 2006 55(2):248–55. [PubMed:  
   16583415]
4. Kurtz SM, Ong KL, Lau E, Widmer M, Maravic M, Gómez-Barrena E, de Pina Mde F, Manno V, Torre M, Walter WL, de Steiger R, Geesink RG, Peltola M, Röder C.International survey of primary and revision total knee replacement. Int Orthop. 2011 Dec;35(12):1783-9. doi: 10.1007/s00264-011-1235-5. Epub 2011 Mar 15. PubMed PMID: 21404023; PubMed Central PMCID: PMC3224613
5. Kurtz S, Ong K, Lau E, Mowat F, Halpern M. Projections of primary and revision hip and knee arthroplasty in the United States from 2005 to 2030. J Bone Joint Surg Am. 2007 Apr;89(4):780-5. PubMed PMID: 17403800
6. Available from :<http://www.researchandmarkets.com/> reports/ 1877536/ overview \_ of\_orthopedic\_joint\_replacement\_  
   market.pdf
7. Pachore JA, Vaidya SV, Thakkar CJ, Bhalodia HK, Wakankar HM. ISHKS jointregistry: A preliminary report. Indian J Orthop. 2013 Sep;47(5):505-9. doi:10.4103/0019-5413.118208. PubMed PMID: 24133312; PubMed Central PMCID:PMC3796925