Increase in Aging Population and Age-related Pathologies: Herbal Solutions (focus on Ashwagandha)

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Human life expectancy has improved significantly over the last 3-4 decades resulting in a remarkable concerning trend of increase in ageing population in most developed countries. The global aged population is currently at its highest level in human history and expected to grow rapidly in next decades due to decrease in birth rate. It is predicted that the combined senior and geriatric population will reach 2.1 billion by 2050. Such changes in population demographics have raised several challenges and alerts for health care systems. There is increasing and urging need to find **NEW** (**N**atural **E**conomic & **W**ellfare) therapeutic solutions to old age pathologies and sustain (**QOL**) **Q**uality **O**f **L**ife especially at later years of life.

Over last ten years, we started with screening of disease therapeutic and health promoting natural compounds from several herbs by recruiting experimental strengths in biotechnology and molecular biology. Our first focus was on Ashwagandha (*Withania somnifera*), a popular herb used in traditional Indian home remedies over thousands of years. We identified anticancer activity in the leaves of Ashwagandha and demonstrated its mechanism of action by multiple experimental and bioinformatics approaches. We reported that the anticancer ingredients of Ashwagandha may be recruited for treatment of complicated cancers that do not respond to conventional drugs such as telomerase inhibitors. Furthermore, we found that the low doses of active ingredients possess anti-stress properties that could be recruited for old age associated brain dysfunctions. In view of these findings, we initiated to develop technologies to obtain Active Ingredients Enriched (AIE=i) Ashwagandha by manipulating its growth conditions. We demonstrated (i) field raised i-Ashwagandha leaves with high proportion of active withanolides as compared to the roots, (ii) cultivation conditions to improve the leaf yield in field, (iii) hydroponic cultivation and iv) extraction method to obtain enriched bioactives for use in disease therapeutics and health care.

Keywords- Aging population, QOL, Natural solutions, Herbs, Ashwagandha

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