

entrusted with the responsibility for development, organizing rituals and controlling entry into the forest. The degraded areas and gullies of the grove should be immediately restored or regenerated with native plant species instead of planting exotic species. Steps must be taken to increase awareness among the nearby village communities regarding the importance of conservation of sacred groves. Presently, there is no legislation regarding conservation of sacred groves in Sikkim. Thus a sacred grove conservation programme may

be initiated, taking local administrative bodies, NGOs, etc. into confidence.

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## Transforming ‘traditional anecdotes’ to ‘evidence-based medicine’ and its relation to diabetes

The article by Tiwari<sup>1</sup> is a timely compilation which may open up new vistas in realizing the therapeutic potential of Ayurveda in the treatment of diabetes and other chronic diseases. Diabetes mellitus is considered as a metabolic, inflammatory and vascular disease, whose pathogenesis originates from multiple cellular alterations and gene–environment interactions. It is interesting to note that Ayurveda recognizes Vata–Vridhi (oxidative stress) as the cause of majority of diseases. Extensive research directed to better understanding of the pathogenesis of diabetes now points out that oxidative stress could be the common denominator linking various molecular disorders of diabetes<sup>2</sup>. The theoretical importance of oxidative stress in diabetes is highlighted by its potential double impact on metabolic dysfunction on the one hand, and the vascular system on the other. Thus, pancreatic  $\beta$ -cells producing insulin as well as its target adipose or muscle cells can be negatively affected, as can blood elements and various cell types in the large and small blood vessels implicated in diabetic complications. The importance of oxidative stress is also supported by various recent findings in which most of the existing classes of anti-diabetic and anti-hypertensive agents produce beneficial effects partly by correcting oxidation-related modifications.

By nature, plants make more antioxidants to protect themselves from ultraviolet light from the sun and environmental stress. Therefore, there is also logic in that medicinal plants have strong Vata-Nasak (antioxidant) properties that should be exploited by research to treat multifactorial diseases like diabetes. The fact that a number of tissues are susceptible to oxidative stress

in diabetes, the most susceptible being the pancreatic  $\beta$ -cells, suggests that intervention against oxidative stress could be a powerful therapeutic approach in both prevention and treatment of diabetes and other chronic diseases. The idea that medicinal plants with antioxidant properties may also prevent the disease is conceivable, because many of the oxidative reactions and abnormalities can already be evidenced in prediabetic states, long before diabetes is detected.

Recent molecular investigations all over the world highlight the power of herbs. These investigations also create much hope in transforming ‘traditional anecdotes’ to ‘evidence-based medicine’. For example, curcumin, the product of turmeric has been extensively studied recently<sup>3</sup>, and is shown to exhibit intracellular molecular actions which modulate specific cell-surface receptors, nuclear receptors, ion channels, transporters, etc. These mechanistic studies position curcumin to become a new ‘lead’ or ‘chemical entity’ in prevention and treatment of certain cancers, Alzheimer’s, Parkinson’s, diabetes, atherosclerosis, cystic fibrosis and many other chronic diseases. While the popular prescription drug ‘aricept’ has been shown to offer no real benefit to Alzheimer’s patients, a recent study<sup>4</sup> found that turmeric holds the potential to fight against Alzheimer’s disease. In this study, turmeric not only inhibited accumulation of beta amyloid, a protein in the brains of Alzheimer’s patients, but also broke up the existing plaques.

There has not been a serious institutional effort to test ayurvedic treatment leads in early human trials. Large pharmaceutical companies have little commercial or professional incentive to test low-cost, non-proprietary treatments. However, a para-

digm shift in this direction is underway in India through the diabetes herbal project of CSIR, under the New Millennium Indian Technology Leadership Initiative, whose results are expected to move herbal medicine into the mainstream.

The transformation of digitalis from a folk medicine, foxglove to a modern drug, digoxin, illustrates principles of modern pharmacology that allow development of safe and effective drugs from nature. In her book *Regulating Bioprospecting*, Gehl Sampath has recently voiced her concern that ‘developing nations are not mining their green gold’. There is no doubt that India’s biodiversity offers greatest bioprospecting opportunity, but we have to address the important issues of standardization, effectiveness and safety with regard to traditional medicine. In treating diseases like diabetes, we need to have collaborations between conventional and traditional care providers to improve results and help reform the health sector in developing nations.

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