

Towards health for all: cost-effective and innovative treatment of diabetes shows the pathway

P. C. Kesavan* and M. S. Swaminathan

While the M.S. Swaminathan Research Foundation (MSSRF) has been developing and refining eco-friendly and socially inclusive strategies to achieve a 'zero hunger' India, the 'Voluntary Health Service' (VHS) in the neighbourhood of MSSRF has been focusing on providing quality health care to patients who are too poor to get medical treatment as those with adequate means. On the food front, it is remarkable that India has implemented the 'Right to Food Act 2012' with homegrown food through scientific endeavours and accomplishments. The situation with health care and medical treatment is quite different with the drugs developed by multinational companies, their undesirable side-effects as well as their cost beyond the means of millions of Indians. Under these circumstances, particularly with regard to the treatment and management of both type-1 and type-2 diabetes, the TAG-VHS Chennai, has already made remarkable progress. Towards the goal of successful treatment and sustainable management of diabetes, the TAG-VHS has introduced cost-effective integrative system of medicines (ayurveda, dynamic acupuncture mediated metaphysical energy-healing therapies and limited use of relatively safer allopathic drugs). The validation of the effectiveness of various combinations and modalities of the systems of medicine is based on the 'treatment outcome' without adverse side effects. The limitations of randomized clinical trials are discussed with examples and scientific references. Even though TAG-VHS employs cost-effective treatment schedules, there is still the need for necessary financial base. In order to create this financial support base, it has also innovated a scheme called the 'Grand Health Insurance' (GHE) that is a revolutionary, completely transparent and inclusive health ensuring model where the affordable persons pay 1% of their total income per annum which automatically covers Health Insurance of 1–2 persons for 1 year. This paper discusses how the cost-effective, harmful side-effects-free integrative systems of medicine coupled with GHE would provide a sustainable path to achieve the goal of 'health for all'.

Keywords: Adverse side effects, anti-diabetic drugs, cost-effective treatment, diabetes type-1 and 2, grand health insurance model, health for all, TAG-voluntary health service.

From food for all to health for all

WE at the M.S. Swaminathan Research Foundation (MSSRF) have been developing eco-friendly and socially-inclusive strategies to achieve a 'Zero Hunger' India. So far, the implementation of the 'Right to Food Act 2012' with home-grown food is a vastly satisfying achievement in the backdrop of the fact that until 1967 India had the global image of a 'begging bowl'. Further, the concept of 'evergreen revolution'¹ (proposed and

defined by MSS) to achieve productivity in perpetuity without causing ecological and social harm effectively fights both the famines of food and rural livelihoods through eco-friendly agriculture and ecotechnologies-driven on-farm and non-farm livelihoods with market orientation.

Just about a kilometre away towards the north of the MSSRF, is a hospital called the 'Voluntary Health Service (VHS)' that receives and treats patients coming from the poor and lower middle class sections. VHS was set-up in 1958 by the late Krishnaswami Srinivas Sanjivi, an eminent physician, for whom providing quality health service to poor patients was the essence of life. He shunned the idea of using his medical knowledge and

P. C. Kesavan and M. S. Swaminathan are in the M.S. Swaminathan Research Foundation, Taramani, Chennai 600 113, India.

*For correspondence. (e-mail: pkesavan@mssrf.res.in)

expertise to fleece patients and build an empire of his own. VHS is an antithesis of corporate hospitals. A great tradition set by the late Sanjivi is that poverty of patients should in no way diminish the quality of treatment protocols and medicines given to them. Safe and cost-effective medicines on the principle of 'integrative medical treatment' are used.

With regard to initiating action towards the goal of 'health for all', the VHS has been playing a crucial role since July 1958. It became a physical entity in October 1961, when the first Prime Minister of independent India Pandit Jawaharlal Nehru, laid the corner stone for the first block of buildings in the 25 acres of land in Adyar sanctioned by the Tamil Nadu Government. The Medical Centre was fully equipped and staffed by July 1963 when the first patient was admitted.

VHS is financially sustained through recurring grants from the central and state governments and donations from various sources from time to time. It has never been easy for non-governmental organizations to get adequate sums of money to run the programmes whether medical, educational or sustainable developmental. The Chairmen/Heads of these organizations are required to cultivate philanthropists and be constantly on the job to sustain operations. The late Sanjivi was no exception and his constant preoccupation was to approach donors for his cause. An interesting anecdote during one of his donation-seeking missions is elegantly described by Gita Gopalakrishnan. She describes how one of the city's leading industrialists had refused Sanjivi a donation to VHS just about a week before the Kanchi Sankarachariar (Sri Chandrasekhandra Swami) was to come to Madras. So, when the saint came to Chennai, the same industrialist spent thousands of rupees in performing the 'pada puja' of the guru. Then Sanjivi sought audience with Sankarachariar and told him that in his opinion, money for the hospital for the poor was far better than 'pada puja' on him. The learned saint wholeheartedly agreed and instructed the industrialist to donate double the amount to VHS!

Today the VHS Medical Centre is a tertiary teaching, 405-bed hospital with state-of-the-art facilities, ranging from general surgery and medicine to neurosurgery, nephrology, etc. Chennai's most outstanding specialists in various branches of medicine and surgery serve VHS in an honorary capacity. About 70% of the patients with monthly income below a certain limit are treated free of cost, which includes free diet and medicines.

Diabetes treatment at VHS

It was already evident in the 1960s that diabetes type-2 was rapidly increasing, especially in the growing urban areas of India. Naturally, VHS under the dynamic leadership of Sanjivi could not have been a mute spectator. This

briefly explains the VHS entrusting its Diabetes Department to C. V. Krishnaswami in 1967. With profound gratitude in his heart, he acknowledges his being beholden to the late Sanjivi to have given him the necessary platform and facilities to serve the people and community in sickness and health.

Incidentally, it should be mentioned that the World Health Organization (WHO) started popularizing the slogan 'health for all' in the 1970s, about 10 years after VHS had already put it in practice.

TAG-VHS Diabetes Research Centre

The task of extending treatment for diabetes type-1 and diabetes type-2 patients from poor and low-income groups is immense in view of cost of medicines and daily dietary requirements. Hence, the director of the TAG-VHS diabetes centre could not have been routinely following the treatment modalities provided by various other hospitals largely treating patients from affluent sections of the society. The compulsion, therefore, for TAG-VHS was to select appropriate and cost-effective medicines and make the choice of medicines and treatment modalities that are effectively alternate to the conventional allopathic system. Moreover, it had been evident for over three decades that the allopathic, anti-glycaemic drugs were not a boon, since they adversely affected several vital organs such as kidney, heart, etc. TAG-VHS was particular that diabetic patients receiving treatment should not only have sustainable control of blood sugar, but also should not develop undesirable complications owing to damage to vital organs (e.g. kidney, heart, etc.). Hence, the director of TAG-VHS periodically scrutinized scientific papers that were published in the area of diabetic medicines, their adverse health effects, if any, etc., and also contributed articles to peer-reviewed journals on the 'treatment outcome' as well as 'the adverse side effects', if any. TAG-VHS also undertook the social responsibility of putting in public domain, the list of anti-glycaemic drugs which were known to exert undesirable damage to various organs. For instance, the paper entitled 'A randomized trial of Rosiglitazone (RSG) therapy in patients with inadequately controlled insulin-treated type-2 diabetes' by Raskin² concluded that the addition of RSG resulted in significant improvement in glycaemic control and was well tolerated. The drug developer would have been quite pleased with the outcome of the randomized trial, and due promotion of the drug with diabetologists would have substantially increased profits. The diabetic type-2 patients were, however, increasingly dying of heart failures. This went on for more than a decade, despite a noteworthy article 'The rise and fall of rosiglitazone' in 2010 by Nissen³. This paper clearly established that the significant increase in heart failure events was caused by RSG in type-2 diabetic patients. The randomized clinical

trial helped in boosting the profits of the drug company, but between 2001 and until its ban a few years ago, many diabetic patients put on this drug died of heart failures. Further, it is in public domain that in 2015, the editor of *The Lancet*, brought out a massive research fraud that was ruining the field of medical clinical research and treatment⁴. It is also in public domain that several drugs with severe side effects and organ failures are promoted and administered with impunity. While these cases were not strongly resisted against and use of these medicines not avoided by several hospitals and medical doctors, TAG-VHS has been totally avoiding these medicines and putting the facts about these in public domain. The case studies and data maintained at TAG-VHS reveal how a large number of patients who had unfortunately been put on these drugs by various other diabetic centres, were subsequently rescued and treated with a combination of indigenous and innovative systems of medicines in an integrated therapeutic approach. A large number of diabetic patients dissatisfied with the treatment provided by various diabetic centres in the city often shift to TAG-VHS. Various complications resulting from treatment mostly based on insulin and antiglycaemic drugs are remedied with the TAG-VHS approach of integrated system of medicines and treatment modalities. The system of maintenance of electronic record by TAG-VHS is quite impressive.

In 2008, The National Heart, Lung and Blood Institute, USA, which sponsored a comparative study⁵ called 'ACCORD' (Action to Control Cardiovascular Risk in Diabetes) to understand the link between heart attacks and 'tight' control of diabetes, came up with the finding that rigorous control of diabetes did not reduce heart attack risk, but actually increased mortality. Curiously this study was stopped midway! Studies in the Intensive Care Units (ICU) also revealed that lowering the blood sugars to normal levels increased mortality. A guest editorial⁶ elegantly narrates the tale of diabetes 1 and 2. In the field of diabetes, the author has been cautioning about the limitations of oral drug therapy and the pitfalls of linear diabetology based on purely a glucocentric approach, little realizing that human body physiology is non-linear, and non-uniform and cannot be successfully treated by rigid protocols of various international professional bodies (ADA, IDF or WHO) which are all controlled by outside interests not excluding the political ones as well.

The strong motivation for fundamental change in treatment modalities for diabetes is based on the knowledge and experience that the present clinical research is based on 'Reductionist random controlled clinical trials and their twisted and "controlled" end points with lopsided interpretations have not controlled the diabetes, but have additionally caused serious damage to the various vital organs'. Surely, there is need for greater understanding of probable advantages of several other basically dif-

ferent systems of treatment⁶. Indeed, the time has come to go back to our roots in healthcare and medical treatment. Time has also come to admit that major drug discoveries and associated medical technologies to cure the diabetes type-2 during the 20th century have all been largely failures. Non-insulin dependent diabetes mellitus (type-2) accounts for about 63,000 deaths annually in the USA that has a population of about 314 million people. Writing on '*Diabetes Mellitus in the Third Millennium – Quo vadis Domini?*' Krishnaswami⁷ writes: 'The discovery of insulin in 1921, oral hypoglycaemic drugs over 50 years ago, and the progress in DNA recombinant technology leading to the production of human insulin in 1984, were landmarks of the last century of the second millennium. Insulin pumps, oral, trans dermal and trans nasal insulin therapy, biostator and Islet cell transplantations are all failures of that century.' Similarly, diabetes research – particularly in the type-1 diabetes mellitus (DM) – in the last century had centered around genes, HLA, autoimmunity and immune-suppression and in type-2 DM, around insulin-resistance and insulin-sensitizers. The author⁷ goes on to emphasize, 'The beginning of the new millennium is the best time to comprehensively reassess and review all these approaches that have been conducted so far, conduct an honest audit of these and to start the process of revamping research in the epidemiology, etiopathogenesis and management options in both type-1 and 2 diabetes. New approaches based on these findings are imperative if new discoveries are to be made in the containment and eradication of diabetes mellitus'.

Caution in dependence on impaired glucose tolerance test

A popular article in *The Hindu*⁸, points out that the 'Pre-diabetic' state of impaired glucose tolerance (IGT) test was diagnosed in a fairly high percentage of persons (~25%) in a study conducted by the VHS Diabetes Department at the IIT Madras Campus. The study also showed that after a one-year follow-up of the IIT cases, with monthly counselling by VHS doctors on diet, exercises and lifestyle modifications, 64.3% of these cases reverted to normal without resorting to any drug therapy and 30.2% remained *status quo*, while 5.5% of them progressed to a frank diabetic state. The question arising from these studies is whether drug intervention is *prima facie* justified keeping in view that only 5.5% developed full diabetes without any oral hypoglycaemic drugs. Linked with this dilemma is the finding that rezulin or triglitazone (an oral hypoglycaemic drug that was withdrawn in 2000) causes irreversible liver damage in an unacceptably large number of people treated with this drug. An unethical role of the drug company in playing down the potentially fatal risks associated with Triglitzazone

during its approval process by the US FDA is widely known. Rosiglitazone, a modified form of Triglutazone, was then introduced and many diabetic centres administered this drug even to marginally diabetic persons. CVK is against putting the borderline IGT patients on anti-glycaemic drugs such as Rosiglitazone and subject them to greater risk of damage to hepatic cellular functions, possibly irreversibly. These views and practices at TAG-VHS are echoed in a recent article, 'The war on drugs has failed: doctors should lead calls for drug policy reform' as stated in a recent issue of *British Medical Journal*⁹.

On girls 'dying of diabetes-1': not those registered with TAG-VHS

Edwin Gale¹⁰ wrote that children afflicted with diabetes type-1 in parts of sub-Saharan Africa, and in parts of India die because of their inability to access insulin. Their poverty-stricken parents have had to make a hard choice between insulin for the diabetic child and starvation for the rest. He goes on to say that poor countries typically lack effective health networks. Distribution of insulin is often irregular, and retailers add their own profit margin or divert the subsidized insulin into more lucrative private sector. Further, syringes and needles must also be paid for, as must tests for glucose in blood and urine. Therefore, he recommends Metformin, despite its risks to treat diabetes than the more expensive Pioglitazone and Rosiglitazone.

Gale's note drew attention of the Director, TAG-VHS particularly because he had referred to a report¹¹ that the diabetic girls in India are dying due to lack of access to insulin. The author, Krishnaswami¹², recalls Gale's visit in 1994 to Chennai (then Madras) and spending about a week at the VHS Diabetes Department and witnessing first hand the Department's unique lifetime comprehensive medical services offered to more than 400 children (since then the number has grown to 600) and adolescents with type-1 diabetes. Further, he emphasized that girls with diabetes type-1 in this region of India thrive very well and many of them have grown up, got married and have delivered healthy babies safely. Importantly, in all those stages of their lives they have received unflinching support, both economic and emotional, from the juvenile diabetes programmes of the VHS diabetes department, and these programmes are liberally sponsored and sustained by munificent and philanthropic donors and friends. With combination of authority and emotion, Krishnaswami¹² concludes, 'The Voluntary Health Services is one of the leading medical institutions in the non-governmental sector in South India, where our diabetes department's juvenile diabetes care, rehabilitation and research programmes have been ongoing for the past 39 years'. Gale was magnanimous to accept the comments respectfully in his reply¹³ with the following words: 'Finally, I would like

to put on record my very sincere respect and admiration for the work done for children with diabetes at the Voluntary Health Services Hospital in Chennai. I had the privilege of visiting this department in 1994, and was enormously impressed with the dedication and professional excellence with which comprehensive free medicare services are offered to children with diabetes with the philanthropic support acknowledged by Krishnaswami.'

With regard to The Royal College of Physicians of Edinburgh (RCPE, UK) consensus statement on diabetes¹⁴ the Director TAG-VHS raises two points, one regarding the statins in diabetics and the other regarding the lack of mention about bigunides – phenformin and metformin. So far as statins are concerned, the point made is that long-term usage of statins in diabetics worsen the carbohydrate tolerance and increase the anti-diabetic drug load, including the usage of Thiozolidinediones, increased cardiovascular morbidity and mortality^{4,14}. The UK Prospective Diabetes Study (UKPDS)¹⁴ confirms that Metformin induces complication in overweight patients with type-2 diabetes and renal impairment.

Reductionist vis-à-vis systems approach

Before dealing with innovative and integrated treatment modalities, it should be emphasized that randomized clinical trials often undertaken by drug developers are fraught with numerous inadequacies and these also allow manipulations to highlight only their positive aspects and not the negative impacts. These are evident from the fact that Metformin, Rosiglitazone, etc., had been initially cleared, and then after several years, their adverse effects came to be known. In general, it appears that many of the chemically synthesized drugs are not in harmony with the whole body; in other words, they might solve a certain problem with regard to a defective organ or metabolism, but they do also cause various other complications. Therefore, the final declaration could be that 'the disease was cured but the patient died'. On the other hand, there have been no reports that indigenous systems of medicine such as ayurveda, homeopathy and siddha have caused any identifiable injury to organs of the patients over several centuries of history of their use.

A word of caution is absolutely necessary about the 'randomized clinical trials' which are carried out to test a single drug for its therapeutic success. We have discussed how the randomized trials have been used to project mainly the positive aspect, while masking the dreadful adverse effects on various vital organs. During the past few decades, there have been many international scandals about unethical practices such as subjecting the patients and even healthy volunteers to test 'new' drugs of which a few have been suspected to exert harmful health effects. Under these circumstances, herbal medicines, indigenous systems of medicines which are administered based on 'treatment outcome' over thousands of years are much

safer. Ayurveda, in particular, has been receiving wider attention in recent years.

The different modalities of treatment of diabetes being studied and promoted by TAG-VHS are based on the 'treatment outcomes'. These are both complementary and integrative. These include authentic ayurveda, high quality homeopathy, ancient South Indian siddha system and an innovative energy medicine. It is known that ayurveda is part of *Atharvana veda* and it is wrong to call it alternative medicine. In fact, Krishnaswami¹⁵ questions, 'how can a healing science thousands of years old, well proven and totally ours be an alternative? It should be the first line of treatment'. 'Health for all' in India cannot be achieved with large-scale dependence on western drugs alone.

The year 2016 has been particularly notable for TAG-VHS with Krishnaswami and his co-researchers having published two significant papers on the tremendous healing powers of metaphysical energy. Metaphysical energy is cosmic energy. The question is: how to harness it. TAG-VHS has developed what is termed as Dynamic Acupuncture-Mediated Metaphysical (DAMM) therapy that involves transferring healing energy from the environment (cosmos) to the patient, by an experienced acupuncturist. Krishnaswami *et al.*¹⁶ have demonstrated 75–100% improvement in the clinical condition of diabetes type-2 induced cranial nerve palsies with special reference to Bell's Palsy. The authors conclude that DAMM therapy in all the seven cases of facial palsy has led to virtually 100% recovery within a short span (1–7 days). They go on, 'Till date, we have seen no validation of case(s) in the medical literature, using this type of drug-free treatment with such dramatic results in a variety of cranial nerve palsies, associated with diabetes. This should make the medical fraternity to wake up to the intricacies and possible mechanisms of cell injury in the human body (in this case neurons) and the healing/curing mechanisms that are available and needing deeper probe and research.'

In yet another recent paper, Krishnaswami *et al.*¹⁷ have shown the effectiveness of DAMM therapy on fasting C-peptide response, and its clinical impact on type-1 diabetics. This study involved 15 cases. Following DAMM therapy, 6 of the 15 have shown significant improvement in fasting C-peptide levels. They also observed that most diabetics receiving DAMM therapy have experienced hypoglycaemic response necessitating insulin reduction by various amounts. Implications of DAMM for achieving the goal of 'health for all' need to be discussed from mechanistic point of view.

Krishnaswami⁶ states that the novel metaphysical energy therapy under study for the past 3 years at TAG-VHS not only improves clinical condition and quality of life of type-1 DM patients, but also reduces the cost of treatment and hence the economic burden.

Besides DAMM, the other major innovation and development of TAG-VHS research centre is the development

and installation of a unique and customized Electronic Medical Record System that has proven to be a boon in treating patients in correct non-linear fashion and avoiding adverse drug reactions and interactions⁶.

Integrative system of medicines and their validation

The conventional modern medicine simplifies the complexity of human organism in its good health, as well as diseased state by a reductionist approach. Treatments based on this approach have not been found to be cost-effective, and without undesirable adverse side-effects. Moreover, these were also not efficient in sustainable disease management. In recent years, many research articles emphasizing on the need to make a 'paradigm shift' from 'reductionistic' to 'holistic approach' have been published. These are referred to by Jayasundar¹⁸ and are not therefore repeated here. Taking the specific case of ayurveda, the author points out that an open-minded dialogue between the cell-centric systems biology and organisms-centric ayurveda can open new and exciting vistas for research beneficial to both science and clinical practice. The modern medicine assumes that a reductionistic approach at the molecular level could help in understanding the cause of diseases, and the mechanisms of action of the therapeutic drugs thereof. Over the years, this reductionistic approach has not been found efficient in realizing the treatment goals of cost effectiveness and freedom from the risk of adverse side effects. On the other hand, ayurveda inherently has a systems approach to health and disease. Jayasundar¹⁸ explains that ayurveda through its theoretical framework of *vata*, *pitta* and *kapha* provides a systems approach for understanding the human system as a networked functional entity. On the other hand, in an excellent editorial on 'ayurvedic biology', Valiathan¹⁹ cites the recent research based on reductionistic approach to identify genetic markers to differentiate the three '*prakritis*' – '*vata*', '*pitta*' and '*kapha*'. He also refers to Rotti *et al.*²⁰ to suggest that the genomic basis of *prakriti* is supported by an epigenetic study based on DNA methylation for differentiating the three *prakritis*. What, should be noted however, is that epigenetic action invariably involves environmental and dietary influences necessitating a 'holistic' approach both in diagnosis and treatment (see figure 4 of the reference number 18). This is exactly what ayurveda does. The western clinical medicine is said to have entered an era of systemic approach²¹. In this context, ayurveda is quite relevant. The reductionistic research in Ayurvedic biology might throw some light, but it will essentially remain as blind individuals describing an elephant based on the 'touch and feel' of a part of the whole. The need of the hour is to go beyond the molecular and cellular-centric approach to higher level systems biology. The current thinking in radiobiological research is also to shift the focus from

Table 1. Envisaged premium categories and the economics of the grand health insurance plan (GHE)

Category	Monthly income	Monthly premium	Annual premium	Annual premium (100,000 persons) (crores)
Premium 'A'	300,000	3000	36,000	360
Premium 'B'	180,000	1800	21,600	216
Premium 'C'	90,000	900	10,800	108
Premium 'D'	30,000	300	3600	36
Free/grand subsidized group (E) (SG)	15,000	150	1800	18
Free/grand group (F) (NG)		30	360	3.60
Total annual premium collection	741.60			

Premium at 1% of the annual income above certain income levels. All values in Indian Rupees (INR).

Note: For the people in the 'E' and 'F' categories, the total premium for 100,000 persons each amounting to 21.6 crores could be sustainably waived as the annual premium of Rs 720 crores would be sufficient. In simple terms, the annual premium of Rs 720 crores paid by the persons in categories A to D can provide full health cover for the other 200,000 persons (E and F categories) free of cost.

molecular and cellular-centric approaches to systems biology. Even if only one cell is irradiated, the neighbouring cells respond ('bystander effects') through inter-cellular communication.

What has been aforementioned is mechanistically relevant to DAMM therapy reported by Krishnaswami *et al.*¹⁶. The old-fashioned randomized clinical trials that are subservient to 'treatment outcome' will serve little purpose. The question before us is how to apply the system biology in the case of diabetic patients afflicted with Bell's Palsy and how the Metaphysical Energy (DAMM) therapy heals.

As for the systems biology approach in ayurveda, Jayasundar¹⁸ describes what is called *Tridosha* consisting of *vata*, *pitta* and *kapha* to represent the functions such as movement, metabolic transformation and growth as well as support respectively. The author points out, for example, that movement exists at the level of cell (cell motility), organ (pumping of heart), entire system (walking) and mind (movement of thoughts). At this point of time, we are not certain that a reductionist approach, although scientifically quite interesting, would ever enable a thorough understanding of the human system and its diseases. What is however of interest is, that the western system of modern medicine is increasingly tilting towards a systems approach²¹.

From the foregoing, it is clear that randomized clinical trials based on reductionist approach with regard to an integrated system of medicine is neither useful nor feasible in hospitals providing healthcare to the poor.

Crux of the problem – achieving and sustaining the goal of health for all

The 'Goal of health for all' with special reference to treatment of diabetes obviously requires cost-effective safe systems of medicines and financial resources to treat the poor and those coming from low income groups.

Going beyond the realm of diabetes treatment the TAG-VHS, Krishnaswamy *et al.*²² have proposed a 'Grand Health Insurance (GHI) model' with a view to extend health care for all at affordable rates, or free of charge for the huge bottom layers of our population, totalling nearly 700 to 800 millions. As already mentioned, the corporate sectors are ruling the roost and making the public believe that corporate (high-end-tech and expensive) health-care is better than governmental efforts in its general (public) hospitals. The private-public partnership often turns out to serve the purpose of 'public money for private gains'. Under these circumstances, the GHE is a revolutionary, completely transparent and inclusive health ensuring model where affordable persons pay 1% of their total income/annum and this automatically covers the health insurance of 1–2 persons of their choice for 1 year. It also takes in its fold centuries-old ancient Indian wisdom enshrined in the health and healing model of ayurveda as well as authentic homeopathy and the various forms of energy therapies. Table 1 is a simplified version of the data presented in figures and tables by Krishnaswamy *et al.*²².

Broad conclusions

The efforts being made by TAG-VHS substantially consist of social and financial dimensions of sustainable approach towards achieving the goal of 'health for all' with particular reference to cost-effective treatment of patients from economically weaker sections of the society. The integrative system of medicine consists of indigenous medicines practised over several centuries and the use of energy from cosmic and terrestrial sources. The present emphasis needs to be on the 'treatment outcome' and then the understanding of the mechanisms of action of these various systems of medicine. It has been pointed out that randomized clinical trials have in the past been associated with inadequacies leading to deleterious consequences to

the patients. Moreover, randomized clinical trials are at best limited to a single drug at a given point of time and the design of the trial would be far too complicated when it is applied to an integrated system of medicine. For India to become a really developed country, the twin goals of 'food for all' and the 'health for all' need not only to be integrated, but also assigned top priority in the national policy planning and implementation.

1. Swaminathan, M. S., *From Green to Evergreen Revolution: Indian Agriculture: Performance and Emerging Challenges*, Academic Foundation, New Delhi 2010, p. 410.
2. Raskin, P. *et al.*, A randomized trial of Rosiglitazone (RSG) therapy in patients with inadequately controlled insulin-treated Type 2 Diabetes. *Diabetes Care*, 2001, **24**, 1226–1232.
3. Nissen, S. E., The rise and fall of rosiglitazone. *Eur. Heart J.*, 2010, **31**, 773–776.
4. Anon., *Lancet*, Editorial, Strengthening the credibility of clinical research, 2010, **375**, 1225; www.thelancet.com/vol375, 10 April 2010.
5. Action to Control Cardiovascular Risk in Diabetes (ACCORD) Trial, National Heart, Lung and Blood Institute, 2008, US Department of Health, Human Services.
6. Krishnaswami, C. V., The tale of two diseases – Type 1 and type-2 diabetes mellitus. *Curr. Sci.*, 2016, **110**(9), 1599–1600.
7. Krishnaswami, C. V., Diabetes mellitus in the third millennium – Quo Vadis Domini? In *Future of Health Care (How to Restore Wholeness)* (eds Abraham, J., Ramakrishnan, M. and Krishnaswami, C. V.), Proc. Public Symp., Tamil Nadu Chapter of National Academy of Sciences, Chennai, India, 2000.
8. Krishnaswami, C. V., The wonder drug that was not. *The Hindu*, 5 July 2001.
9. *The British Medical Journal*, 'The war on drugs has failed: doctors should lead calls for drug policy reform, 14 November 2016; doi: <https://doi.org/10.1136/bmj.i6067>.
10. Gale, E. A., Dying of diabetes. *The Lancet*, 2006, **368**, 1626–1628.
11. Pendsey, S., Where are all the girls with diabetes? *Diabetes Voice*, 1998, **11**, 4–5.
12. Krishnaswami, C. V., Dying of diabetes. *The Lancet*, 2007, **369**, 461.
13. Gale, E. A., Author's Reply. *The Lancet*, 2007, **369**, 461.
14. Krishnaswami, C. V., The RCPE UK Consensus Statement on Diabetes opens up more questions. *J.R. College Physicians Edinb.*, 2010, **40**, 283–286; doi:10.4997/JRCPE2010.321.
15. Krishnaswami, C. V., *The Hindu*, 12 April 2012.
16. Krishnaswami, C. V., Ramesh, C., Sampooram, B., Ganesan, A. and Rajan, V., Metaphysical energy therapy in the treatment of cranial nerve palsies with special reference to Bell's palsy. *J. Biosci. Med.*, 2016, **4**, 77–84.
17. Krishnaswami, C. V. *et al.*, Fasting C-peptide response, and its clinical impact in type I diabetes to a novel metaphysical energy healing therapy-preliminary experience and observations. *J. Diabetes Mellitus*, 2016, **6**, 90–99.
18. Jayasundar, R., If systems approach is the way forward, what can the ayurvedic theory of tridosha teach us? *Curr. Sci.*, 2017, **112**, 1127–1133.
19. Valiathan, M. S., Ayurvedic biology. *Curr. Sci.*, 2016, **110**, 2043–2044.
20. Rotti, H. and 23 others, DNA methylation analysis of phenotype specific stratified Indian population. *J. Translational Med.*, 2015, **13**, 151; doi:10.1186/s12967-015-0506-0.
21. Ayers, D. and Day, P. J., Systems medicine: The application of systems biology approaches for modern medical research and drug development. *Mol. Biol. Intl.*, 2015, **2015**, 1–8.
22. Krishnaswami, C. V., Sampooram, B., Ramesh, C., Venkatesan, P., Grand Health Insurance – for sustainable health security, improving health and life expectancy – for people of India. *Anusandhan*, 2017, **VI**(XI), 1109–1117.

ACKNOWLEDGEMENTS. We thank Ms Sharmila Babu for typing and assistance in the preparation of the manuscript and Ms Y. Ramalakshmi of the TAG-VHS for making necessary material available.

Received 15 February 2017; revised accepted 11 April 2017

doi: 10.18520/cs/v112/i12/2379-2385