



Figure 1. Sodium antimony gluconate sensitivity of Indian *Leishmania donovani* isolates assayed as amastigotes in J774 macrophages.

the *in vitro* *L. donovani*/macrophage system¹¹. Mouse peritoneal macrophages were used in these studies. Similarly, human macrophages from transformed peripheral blood monocytes have been infected with amastigotes *in vitro* and were used for study of drug action in *L. tropica*¹². We used J774 macrophage cell line with phagocytic properties¹³, which gives high infection rates as peritoneal and blood macrophages and continuous replication of the amastigotes, intracellularly. Early experiments showed that the

ratio of inoculum of amastigotes to macrophages affected the activity level of the drug. With a low amastigote inoculum, the infection rate declined after the third day. In view of these results, drug studies were carried out using infection ratios of ten amastigotes to one macrophage. Studies have also shown that SAG was partly effective only at very high concentrations of 5000–10,000 mg/l (ref. 14). 1, 3, 9, 27, 81 mg Sb^v/l was used by Neal and Croft¹¹. Our aim was to check whether there was a correlation with clinical response when isolates were assayed for drug sensitivity as intracellular amastigotes. We selected the range of 12.5 to 50 µg SAG/ml. We believe that our model of using intracellular infections arising from promastigotes adapting to conditions for axenization of *L. amazonensis*, is useful in revealing differences in the drug sensitivity of *L. donovani* isolates from Indian patients with kala azar who were responsive or unresponsive to a full course of SAG treatment. When the axenic amastigotes were allowed to differentiate into promastigotes within the drug-containing medium, we again observed that the growth of promastigotes is according to drug sensitivity/resistance as when they were amastigotes within macrophages. We therefore observed a correlation between clinical response and SAG sensitivity *in vitro*, thus establishing parasite resistance to the drug. Most importantly, these isolates are now available for pursuing further work on drug resistance mechanisms.

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‘Complementary’ and ‘mainstream’ medicine: friend or foe?

Pal¹ has addressed an issue that is of greater significance than his brief on complementary and alternative medicine.

The West belatedly realized that many people used non-allopathic therapies. Logically, ayurveda may have to be considered as mainstream in India because it had been there for centuries before allopathy came along². Western systems patronizingly define complementary and

alternative medicine as ‘therapies generally not taught nor practised in regular hospitals, lacking evidence of effectiveness and generally not reimbursable by third-party payer’³.

Ayurveda emphasizes that lifestyle measures are integral to comprehensive management⁴. Homeopathy also seeks to allow the body’s own systems to correct imbalances. There should be no contro-

versy in applying these principles to preserve health and to treat diseases.

The biopsychosocial model, which integrates biological, psychological and social components of treatment process, has been described in mainstream journals and textbooks^{5,6}. Medical care-seeking behaviour is being studied, to improve patient compliance with treatment. Physicians should be conversant

with these aspects because chronic non-communicable diseases are becoming more common. Rather than being autocratic father figures, doctors must play the role of health facilitators.

Societies have illness-related practices and beliefs⁶. There is a medical culture system, analogous to a religious or a political system. The medical culture determines the way a person is recognized to be ill, the way one presents illness to others, and the way illness is dealt with. Conceptually, the process by which health and disease are perceived and the socio-cultural aspects involved can be considered as: identification of clinical changes, perceiving these changes as being significant, deciding to treat or not to treat, choosing sources of treatment and acting on the choice of treatment. We seem to lay importance on subjective well-being rather than on physiological measurements by tests⁷.

Viewed broadly, health and healthy lifestyle depend on what is perceived as the most acceptable way of life. It is essentially a decision to which doctors make small, if any, contribution⁶.

In India and many other developing countries, the bottleneck in health care is not lack of evidence that interventions are good (e.g. exercise is necessary for health, immunization prevents infectious diseases), and that lifestyle habits are bad (e.g. smoking is harmful). The bottleneck is in implementation.

In a comprehensive Indian study on the rural private practitioner (*sic*) of medicine (of which there may be 1,000,000), Rohde and Viswanathan⁴ present sobering facts. Throughout their studies allopathic medicines were used the most, 'regardless of training or of other medical systems utilized by the practitioners'. Nearly 90% prescribed allopathic medicines at some time in their practice⁴. The biographical profile of a rural practitioner is illuminating: about half had not attended school beyond the secondary level; 15–20% did not even complete high school. Nearly 68% of the active practitioners had no medical qualifications whatsoever. Of those who were totally untrained in any form of medicine, 76% were practising allopathy.

Other studies have also shown that among practitioners of the private Indian system of medicine, 'their current practice and their professional education were at considerable variance'. Ultimately people did not seem concerned about the

medical system, so long 'as cure is quick and the practitioner is kind'⁴.

On a more focused scale, we searched our computerized database⁸ for individuals with diabetes mellitus, who were using only non-allopathic drugs. We selected patients with diabetes who (a) had known duration of diabetes mellitus for one year or more, (b) had body mass index recorded, and (c) had at least fasting plasma glucose value recorded. We compared their biographical, clinical and basic biochemical profile with those who were using other treatments (tablets, insulin, combination or none; Table 1).

Individuals who used only non-allopathic medicine to control diabetes (*n*: 120) were (a) likely to have the disease for less than five years (44.16%; *n*: 53), (b) likely to be normal weight (60.0%; *n*: 72), (c) as likely as others to get a complete lipid profile done (30.8%; *n*: 37), being aware of other risk factors in diabetes⁹, and (d) were more likely to do regular physical exercise (45.8%; *n*: 55). However, they were least likely to have blood glucose levels in the ideal

target range (> 126 mg/dl, 85.6%; *n*: 55), second only to those who claimed that they were not taking any treatment at all (86.49%; *n*: 269).

A recent study reported the use of complementary and alternative medicine (specifically ayurveda, homeopathy, siddha, Tibetan and Chinese systems) in persons with rheumatoid arthritis, who attended an allopathic hospital by choice³. Rheumatoid arthritis is a long-standing painful joint disease. Among 114 persons, more than 40% (*n*: 46) had used alternative systems of medicine at some point of the disease. Unlike individuals with diabetes, most of those with rheumatoid arthritis first approached an allopathic physician, and the use of alternative medicines increased with longer duration of the disease. There was no significant influence of income on the form of treatment. This shows that individuals consciously chose a particular system of medicine: where treatment for rheumatoid arthritis was ineffective, due to a variety of reasons (insufficient knowledge of the doctors, poor response to the drug or

Table 1. Persons with diabetes using different forms of treatment[†] (Endocrine and Diabetes Centre, Visakhapatnam)

	D + E* (<i>n</i> : 289) (%)	OHA** (<i>n</i> : 4199) (%)	Insulin + OHA (<i>n</i> : 401) (%)	Insulin (<i>n</i> : 180) (%)	Others (<i>n</i> : 120) (%)	No Rx*** (<i>n</i> : 311) (%)
Duration DM (years)						
1–4.9	181 (62.6)	1500 (35.7)	79 (19.7)	31 (17.22)	53 (44.2)	201 (64.6)
5–9.9	70 (24.2)	1351 (32.2)	107 (26.7)	42 (28.3)	37 (30.8)	77 (24.8)
10–19.9	30 (10.4)	1156 (27.5)	162 (40.4)	80 (44.4)	28 (23.3)	30 (9.7)
≥ 20	8 (2.8)	192 (4.6)	53 (13.2)	27 (15)	2 (1.7)	3 (1)
Pl glucose + lipid profile (both done)	87 (30.1)	1097 (26.1)	102 (25.4)	53 (29.4)	37 (30.8)	71 (22.8)
Body mass index						
19–25	145 (50.2)	2165 (51.6)	218 (54.4)	85 (47.2)	72 (60)	161 (51.8)
Fasting pl glucose (mg/dl)						
≤ 109	50 (17.3)	509 (12.1)	61 (15.2)	25 (13.9)	3 (2.5)	21 (6.75)
109–126	52 (18)	407 (9.7)	33 (8.2)	14 (7.8)	14 (11.7)	21 (6.75)
> 126	187 (64.7)	3283 (78.2)	307 (76.6)	141 (78.3)	103 (85.8)	269 (86.5)
Exercise [†]	159 (55)	1802 (42.9)	113 (28.2)	54 (30)	55 (45.8)	107 (34.4)

[†]Data obtained from our prospective computerized database on diabetes and other endocrine diseases⁸.

*Diet and exercise; **Oral hypoglycemic agents; ***No treatment at all; *n*, Number of individuals in each group.

inexorable progression of the disease), and that more people looked at alternatives. In contrast, where effective though inconvenient treatment in allopathy was available for diabetes, more gravitated away from complementary systems.

Currently, it does not seem imperative that we begin to compare the efficacy of allopathy with other forms of treatment. There is now enough evidence that pancreatic beta-cell function declines over time¹⁰. Instead, what we can and should do is leverage the strengths of persons likely to use only non-allopathic drugs. These individuals have positive features such as being likely to be of normal weight, aware of other risk factors, and doing regular physical exercise. We could reinforce these aspects and add drugs to improve glycemic control.

The main concerns with complementary medicine are efficacy, drug interaction and adverse effects³. There is a strong belief, bordering on myth, that complementary system has no adverse

actions; this belief does not appear to be based on rigorous widespread evaluation, 'in the context of modern information'².

More important than the system is the end result. People must be able to make decisions based on evidence. Ayurveda or homeopathy must have as scientific an evidence as allopathy. Health and well-being deserve the best. Science should help to differentiate the better from the best.

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