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A context of diabetes, exercise physiology, ethnobiology of traditional medicine, surveillance of viral infections and academic rendering of histopharmacology

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Over the last three decades, there has been a well-marked decrease in the incidence of significant complications in diabetic patients. This welcome trend is the result of integrated disease management involving a team-based approach, patient education in disease care and clinical decision-making support, along with informed patient self-management of risk factors. Unfortunately, in actual terms this drop in incidence rates is offset by the explosive increase in prevalence of diabetes mellitus worldwide (as well as the happier circumstance that diabetic patients are living longer). As a result, the diabetic disease burden is, in effect, not lightened but dispersed wider.

Diabetic retinopathy is the fifth commonest cause of blindness today, and is responsible for a disproportionately larger quantum of associated morbidity. Diabetic patients are 25 times more likely to develop vision problems than non-diabetics. From an economics perspective, the outlay on a patient with diabetic eye disease is twice that of a patient with diabetes alone. The WHO estimates that, globally, 90% of this visual impairment could have been avoided¹.

Diabetic retinopathy develops in nearly all patients with type 1 disease and in 77% of those with type 2 disease of two decades' duration². It is responsible for 4.7% of the 37 million cases of blindness worldwide¹. In a study conducted at Parirenyatwa Hospital out-patient clinic in Harare, Zimbabwe, by Machingura PI *et al.* on prevalence and risk factors associated with retinopathy in diabetic patients, the prevalence of diabetic retinopathy was found to be 28.4%³. The study, presented in this issue, evaluated various demographic and clinical parameters: longer duration of diabetes mellitus and lower serum creatinine emerged as significant independent risk factors for diabetic retinopathy.

A more common complication of this dysmetabolic scourge is diabetic neuropathy, occurring in about 60–70% of patients. Distal symmetric polyneuropathy is the most prevalent type and affects the longest axons in the extremities first, advancing proximally in a glove and stocking pattern. Diabetic neuropathy accounts for

more than 60% of non-traumatic lower-limb amputations. In mid-2016, 'Diabetes UK' revealed the shocking data that there are 20 amputations for diabetes in England alone, every day⁴. If the figures are lower for developing countries, this reflects a deplorable lack of access to surgical care. The profoundly depleting impact on healthcare resources and overall productivity is immense, but the cost in terms of human suffering is beyond measure. In a study on the electrophysiological parameters of the sural nerve in normal and type 2 diabetic subjects by Owolambi *et al.* it was shown that significant impairment of sural nerve conduction parameters may occur in subclinical asymptomatic type 2 diabetes mellitus patients as compared to apparently healthy subjects⁵. This study from Nigeria assessed nerve conduction status in type 2 diabetic subjects using an electromyograph rather than the conventional questionnaire-based screening instrument. Sural nerve distal latencies were significantly lower in matched healthy subjects while sural nerve conduction velocities and amplitudes were significantly higher in the type 2 diabetic patients group. The diagnostic yield in asymptomatic patients justifies the additional outlay in setting up and provisioning screening protocols for individuals at risk. This has great prospective implications with respect to early detection and timely management of diabetic polyneuropathy, and will help avert or limit the attendant morbidity and subsequent privation of ambulatory independence.

On the subject of ambulation, it is illuminating to look at human locomotion in terms of energy expenditure. Walking as a means of forward self-powered progression is a universal automatic phenomenon and rarely do we need to consider non-physiological variations except as aberrations. Walking on a treadmill in a gym

or a travelator at the airport is non-physiological only in the learning phase where maintenance of balance despite incongruent visual cues is paramount; however, this activity too soon becomes a learned routine automatism. We do not consider sideways or backwards walking as normal as these activities are performed by humans only in short bursts of a few steps at a time, usually as maneuvering tactics in some field sports or in avoidance of obstacles in day-to-day movement. However, there are situations when even these aberrant patterns of ambulation are purposive and sustained. Whether it is skiers side-stepping up a piste, a sportsman running backwards to intercept a ball, or Yann Martel's protagonist Tomás who walks through life backwards as a protest against fate⁶, it is interesting to consider the kinesthetics, ergonomics and energy cost involved.

Oyeyemi *et al.*⁷ in a multi-parametric evaluation of these aberrant patterns of walking found that sideways walking evoked significantly increased cardiovascular responses (implying higher energy expenditure) compared to forward and backward walking. The difference between forward and backward walking was not as pronounced. They hypothesized that sideways walking was more strenuous because of the perpendicular plane of motion and the static muscle work (as sideways walking involves stops and starts and greater need for maintenance of balance). Indeed, the quantification of energy expenditure that accompanies novel methods of walking is of value to exercise planners and physiotherapists as this is a form of exercise that needs no special training, yet exercises novel groups of muscles and therefore can be profitably built into a physical fitness regimen. This is not new; Oriental cultures have long known of the fitness benefit of walking backwards or sideways, as it employs different sets of

muscles and has beneficial effects on posture and tone in contrary muscle groups. In addition, posture and muscle dystonia induced backache improve, and local muscle spasm is resolved. Aberrant walking patterns have formed part of traditional Chinese and Japanese training regimens for the martial arts as well as for stylistic dance for centuries.

Traditional herbal medicine too is in danger of extinction, crushed under the bulldozer of big label pharmaceutical corporations. Though still practiced in parts of the world where it is the people's first recourse to healthcare, the village healer's craft is increasingly being perceived as old-fashioned and unscientific. While modern health care facilities are at the spearhead of developmental programs throughout the world, there is undeniable value and scientific basis, both largely unidentified, for the more traditional healthcare systems. Unfortunately, as these methods are validated by time-long usage only and not backed by hard science and governmental funding there is a real risk of their falling out of use and favor. There should be a worldwide campaign to categorize and preserve this ethno-botanical wealth of knowledge. Although there continues to be heightened awareness in the trend of global extinction of species (including plants that have actual or potential pharmacological benefits for humanity), there is a less publicized dwindling and slow extinction of traditional knowledge of the use of these plants in traditional patterns of healthcare. From the purely selfish viewpoint of pharmacological benefit to our species, the loss of knowledge regarding the medical benefits of a plant species is almost as impoverishing as extinction of the species itself.

Whereas the ethno-botany of the developed world is largely artificial with propagation of imported ornamental plants and decorative cultivars, the developing

world still has repositories of indigenous plant species. Unfortunately, as concretization seeps across the surface of the world, these too are at threat of extinction, even before identification. In an ethno-pharmacological survey conducted by Tchuengem *et al.*⁸ traditional healers of the Baham province in West Cameroon were interviewed to collect information on plants used by for the treatment of fungal infections. The extracts from these medicinal plants were then assessed in vitro for antifungal and antioxidant potential by broth micro-dilution and free-radical scavenging assay, respectively. Extracts from *Kotschya strigosa* and *Eryngium foetidum* were found to possess potent antifungal activity against *Cryptococcus neoformans* while *Eugenia gilgii* extract had the highest free radical scavenging capacity. The "Hauts-Plateaux" of Cameroon has a subtropical climate with a wealth of unique and varied botanical diversity. Here too, the forest is being degraded and converted to farmland, and healers need to forage far and wide in search of medicinal plants. There are sacred forests and there is a secrecy among herbal healers about these and other matters, as this esoteric knowledge is seen to need protection for economic or xenophobic reasons. Fortunately, the need for capturing and preserving this untapped wealth of knowledge in Cameroon⁹, as in other biodiversity hotspots the world over, is well recognized. Therefore, the survey checklist published in this issue of AMBR will go a long way in categorizing and evaluating these herbal resources and provide a basis for future studies.

The seroprevalence of Hepatitis B virus infection and human Immunodeficiency virus infection are high in Africa, and the inter-relation between the two is yet unclear. Given the epidemiological overlap, clinico-pathologic similarities as well as the co-morbidities, co-infection is a

confounding possibility. Moreover, poor compliance with lamivudine-based antiretroviral therapy for HIV could promote development of HBV resistance to antiviral drugs¹⁰.

In a study on seroprevalence of hepatitis B virus and human immunodeficiency virus infection among university students in Zaria, Nigeria, Isa *et al* found that, 9.2% tested positive For HBsAg while 7.3%, 36.4% and 94.5% were positive for HBeAg, anti-HBe and anti-HBc respectively¹¹. Seroprevalence of HIV infection was 2.8%. One (0.2%) of the students was infected with both HBV and HIV. The research group exhaustively examined demographics as well as lifestyle habits, behavior and choices in their subjects. They noted a significant association between age, gender, and family history of HBV infection, and seroprevalence of HBsAg, while for HIV, only menial work was significantly associated with the infection. Close contact among family members appeared to be a predisposing factor for these viral infections. Over half the students were ignorant of HBV and some of these (0.67%) were infectious. HBsAg endemicity was high (according to the WHO classification); however, the seroprevalence of HIV and its co-infection rate with HBV were very low. The authors note that this encouraging outcome indicates the efficacy of the campaign on HIV, and recommend a similar thrust against Hepatitis B.

In an opinion paper that rounds off this issue's array of scientific work, we are graphically informed of the need to maintain a sense of scale when sketching through an eyepiece¹². Tarnus E *et al.*¹² from La Réunion Island, France, have an ingenious tip for dropping a marker of magnitude, almost literally, into a student's sketched rendering of a histological slide. Indeed, maintaining a sense of scale, both literal and figurative, is imperative in all academic endeavor.

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