The Antiseptic

Estd.1904

Indexed in IndMED

A MONTHLY JOURNAL OF MEDICINE AND SURGERY

Email: admin@theantiseptic.in www. theantiseptic.in

Vol. 116 • No. 6 JUNE 2019 ISSN 0003-5998 • ₹ 100

The Pathophysiology of Acute Stroke

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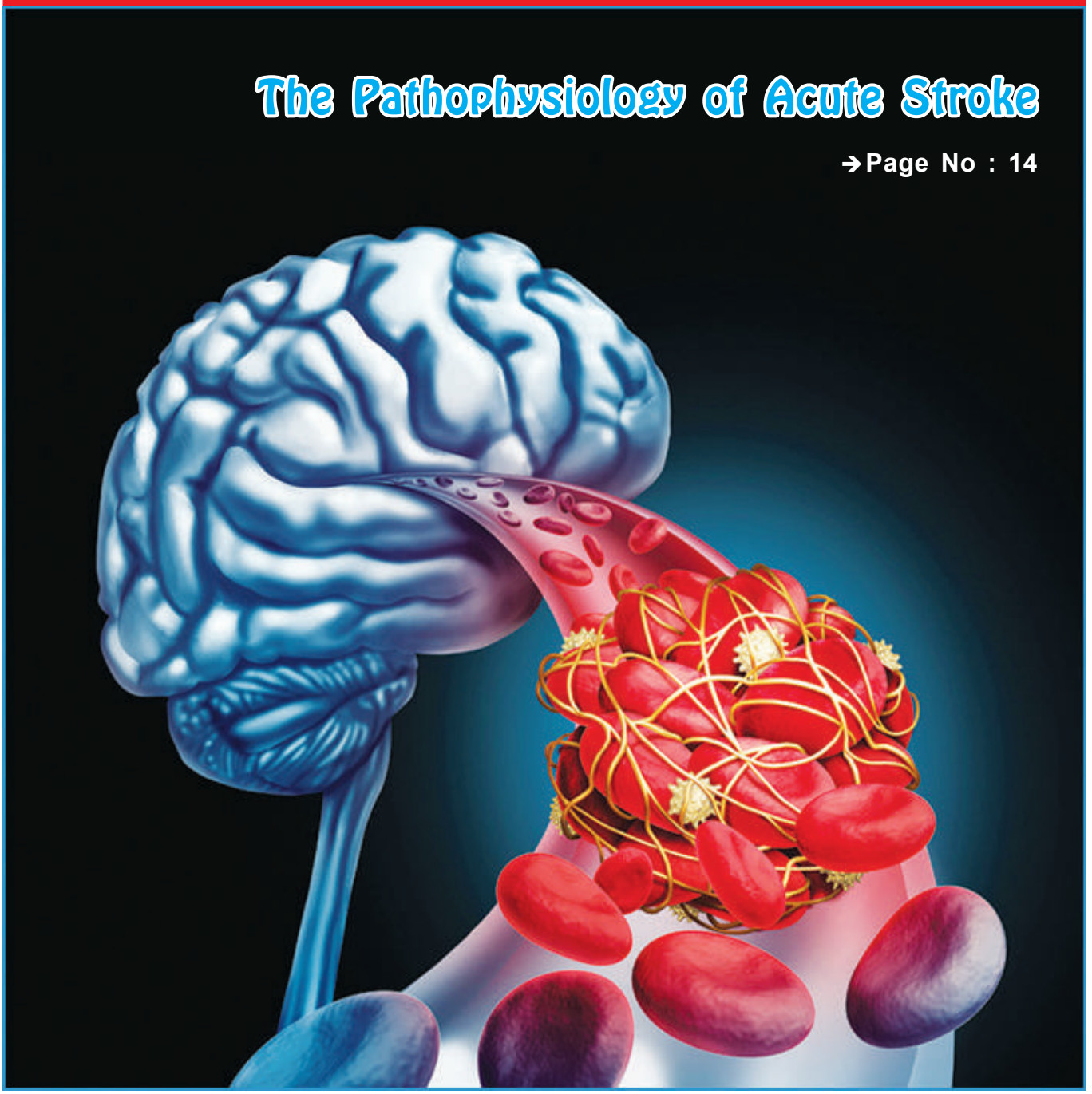

Nutraceuticals and clinical implications

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The history of Western medicine describes the use of a number of remedies using nutraceuticals, such as herbs, animal parts, and materials from natural sources until last century. Today most prescription drugs contain one active ingredient or one molecular entity, with most of the molecular entities being small molecule organic compounds. Many currently used pharmaceutical agents were first isolated from natural sources after the identification of active ingredients. Examples include aspirin from willow tree bark, digitalis from the foxglove plant, morphine from opium poppies, streptomycin from soil microbes, and daunorubicin from Streptomyces, as well as many others. Although nutraceuticals remain a source of single molecule active ingredients, it is more likely that a combination of molecules within these naturally occurring agents act in synergy if they do indeed have beneficial properties for human health.

In 1999, the FDA authorized the use of food labels stating that soy protein was associated with reduction of risk of coronary artery disease. Several studies investigated a daily intake of 25 g of soy protein, which resulted in clinically demonstrable reductions in levels of total cholesterol and LDL cholesterol. With soy intake, LDL cholesterol was less susceptible to oxidation in comparison with consumption of soy-free diets. In contrast to dietary soy protein, purified isoflavones in pill form do not have this extent of salutary effects on lipoproteins. Hormonal effects of isoflavones include (1) decreased serum endogenous estrone and estradiol, (2) reduction of luteal phase progesterone, (3) increased length of the menstrual cycle, and (4) suppression of gonadotropin surges.

Plant sterols have a chemical structure similar to cholesterol and can be isolated from various vegetable oils, seeds, nuts, and fruits. Once absorbed, phytosterols circulate in lipoproteins and then may be used as precursors for steroid hormones because they accumulate in the liver, adrenal glands, ovaries, and testes. Plant sterols have been credited with cholesterol lowering, particularly in children with heterozygous familial hypercholesterolemia and in management of atherosclerosis. Phytosterols also increase de novo hepatic cholesterol synthesis and secretion, decrease hepatic and lipoprotein lipase activities, and increase serum lecithin: cholesterol acyltransferase activity.

Preparations and extracts from the berries of saw palmetto (Serenoa repens) have been used to alleviate symptoms in patients with benign prostatic hypertrophy. Glutamine is the most abundant amino acid in the body that is incorporated into protein. It is used by rapidly dividing cells (enterocytes and leukocytes). Glutamine supports nucleotide biosynthesis and provides high energy during periods of stress. It is generally considered nonessential but becomes conditionally essential during stress and in the presence of gastrointestinal tract disease. It functions not only as a nontoxic nitrogen donor but also as an important glucose precursor in the tricarboxylic acid cycle and stimulates muscle glycogen storage and gluconeogenesis. During times of stress, glutamine is provided by free intracellular stores, muscle catabolism, and glutamine synthesis. High rates of glutamine utilization by immune system cells furnish sufficient intracellular biosynthetic intermediates for nucleotide and protein synthesis. During strenuous exercise, serum glutamine levels decrease, and this situation is purported to contribute to the subsequent relative immune suppression and risk of infection.

Taurine is considered a conditionally essential amino acid, primarily because of its necessity in low-birth-weight newborns. Levels of taurine are reduced in patients with trauma-induced injuries and patients receiving parenteral nutrition, which typically lacks taurine in the amino acid solution. In both children and adults, taurine functions as a modulator of intracellular osmolarity (cell volume regulation) and, possibly, as a neuroactive amino acid. Whether this neuronal effect is on glial cell tonicity, which then affects neuronal cells or whether taurine is directly inhibitory to neuronal tissue is unclear. In the renal medulla, taurine participates in an adaptive mechanism to modulate intracellular osmolarity in the face of rapid and large changes in the interstitial fluids bathing the tubular cells. A similar function seems to be subserved

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Specially Contributed to "The Antiseptic"
Vol. 116 No. 6 & P : 07 - 08

in the brain of adults as well as neonates. No clear evidence of severe toxicity has been associated with oral intake of taurine.

Glucosamine and chondroitin is an integral part of glycosaminoglycans and consists of repeating disaccharide units of an acidic sugar and an amino sugar. Either glucosamine or galactosamine can act as the amino sugar. Glucosamine stimulates production of proteoglycans, which are the ground substance of articular cartilage, as well hyaluronic acid, which is responsible for the lubricating and shock absorbing properties of synovial fluid.

Potential mechanisms of action of omega 3 fatty acid are related to (1) direct effects on myocardial tissue to stabilize membranes and prolong the relative refractory period (2) diversion of intermediaries away from pro inflammatory prostaglandins (3) alteration of metabolism of lipoproteins and (4) modulation of metabolism of nitric oxide.

Despite the lack of scientific evidence for or against the use of these products, they continue to be widely ingested throughout the world.

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Epilepsy is the second most common neurological disorder, affecting almost 50 million people worldwide. Antiepileptic drug (AED) therapy aims to achieve a balance between the prevention of seizure episodes, and the reduction of side-effects of AEDs to tolerable levels; to improve the patient's quality of life, provide cost-effective care and ensure patient satisfaction. Good adherence to treatment and proper health education are fundamental to the successful management of epilepsy.

Recent studies have shown that up to 70% newly diagnosed patients with epilepsy can be successfully trated (i.e. be seizure-free for several years) with antiepileptic drugs. After 2-5 years of successful treatment, drugs can be withdrawn in about 70% of children and about 60% of adults without relapse. Poor adherence to prescribed medication is considered the main cause of therapeutic failure in epilepsy patients.

Approximately 85% of people afflicted with epilepsy live in developing countries. In a resource limited setting like India and with pre-existing heavy chronic disease burden, successful treatment outcomes are essential to reduce morbidity and mortality, improve the quality of life, enhance earning capacity, reduce hospitalizations due to disease of its complications and reduce societal and public health costs. Since medication non-adherence is the main cause for therapeutic failure in epilepsy, it is essential to assess the factors that influence adherence in common clinical settings in India. Clinicians and policymakers can then address these factors, while working in concert with patients, for better individual and overall treatment outcomes.

Aims and objectives

To assess the level of medication adherence amongst epilepsy patients enrolled in the study.

To assess the factors affecting medication adherence in epilepsy patients.

To assess the quality of life of the study participants.

To study the perceptions held by the study participants about the illness.

This study is a step towards bridging the vast knowledge gap regarding medication non-adherence in chronic diseases, and to our knowledge, is the first study of its kind in the current setting.

As medication non-adherence is the most common reason for failing AED therapy, addressing the factors affecting adherence will lead to positive treatment outcomes. Our study finds that ensuring that the antiepileptic drugs remain available in the public sector, and/or making them more affordable in the private sector, are the main interventions likely to improve patients adherence to therapy in clinical settings like ours.

Journal of The Association of Physicians of India