

Neurotransmitters Receptor Subtypes Functional Regulation and Diseases: Antidiabetic and Antiepileptic Properties of Herbal Medicines

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Abstract

The recent developments in neurobiology have rendered new prominence and potential to study about the structure and function of brain and related disorders. Brain neurotransmitters and their receptors play an important role in regulating various cellular activities of the organism. The consequence of neurotransmitter receptor function can influence the regulation of metabolic manifestations in hypothyroidism, hypertension, diabetes and cell proliferation directly by central nervous system function or through the hypothalamic-pituitary-end organ axis. Neurotransmitters like acetylcholine, γ -amino butyric acid, dopamine, serotonin, norepinephrine, glutamate acting through their receptor subtypes play an important role in pancreatic regeneration, hepatic cell proliferation, hyperglycaemia, hypoglycaemia, alcoholism, epilepsy, hypoxia, herbal medicine on diseases and aging. Anti-diabetic property of *Aegle marmelose* and *Costus pictus* leaf extracts and anti-epileptic property of the leaf extracts of *Bacopa monnieri* showed their regulatory role through the muscarinic and glutamate receptors. GABA and 5-HT act as co-mitogen through GABA_B and 5-HT₂ receptors respectively while GABA acts as an inhibitory signal through GABA_A receptor during *in vitro* hepatocyte proliferation. Studies on neurotransmitter receptor subtypes functional interaction and gene expression differences of these receptor subtypes mediated through respective second messengers like IP3, cAMP, cGMP and Ca²⁺ showed therapeutic application for glucose homeostasis, insulin secretion, pancreatic regeneration, hypoxia and epilepsy. Long term, low dose somatotropin and insulin treatment showed significant rejuvenation of the brain activity as a function of age. Thus studies on neurotransmitters and their receptor subtypes involvement in various brain disorders and peripheral diseases showed that the balance of neurotransmitters functional regulation is critical in the occurrence and therapeutic management of these diseases. Also, this will have importance in an intellectual and a healthy life.

Key Words: neurotransmitters, herbal medicine, hypothalamic-pituitary-end organ axis, pancreatic regeneration.