Current Medication Trends and Global Impact on Neurodegenerative Disorders

Abstract

Neurodegenerative disorders are the medical condition characterized by destruction in neuronal cells, abruption of neuronal activity and distinct involvement of the functional movement. The main neuronal disorders like Parkinson and Alzheimer disease are caused by environmental and genetic influences associated with accumulation of abnormal protein aggregation, which leads to inflammation as well as oxidative stress in the central nervous system. The AYUSH medication system considerably accepted by health-care professionals played a critical role since a decade to manage the elevated factors and continuously improving lifestyle for good survival of the patients. In which allopathic and ayurvedic medications have been precisely introduced for the management of disorders and regain of neuronal function. Unani and Siddha medicines have been widely used since ancient time and found as significantly relieving the sign and symptoms of neurodegenerative disorders, while yoga plays a perfect role for the management of these disorders. Regular yoga practice may relax the mind and calms the brain; reduces headache, fatigue and cures insomnia; increases blood circulation and maintain proper supply of oxygen to the lungs and detoxifies the internal organs. Thus, yoga plays a promising role in the improvement of mental health, releases stress, oxygen to the lungs and detoxifies the internal organs. Thus, yoga plays a promising role in the improvement of mental health, releases stress, fatigue, depression and tension and also stimulating blood circulation in the brain. Finally it was concluded that, the AYUSH medication system highly accepted for relieving the neuronal complications and managing all elevated parameters in patients suffering from neuronal disorders.

Keywords: Neurodegenerative disorders; Parkinson; Alzheimer; Depression; AYUSH medication system

Abbreviations

AD: Alzheimer’s Disease; AChE: Acetyl Cholinesterase; ALS: Amyotrophic Lateral Sclerosis; ATP: Adenosine Triphosphate; AYUSH: Ayurveda Yoga Unani Siddha Homoeopathy; BChE: Butyrylcholinesterase; BBB: Blood Brain Barrier; CNS: Central Nervous System; NDDs: Neurodegenerative Disorders; PD: Parkinson’s Disease; HD: Huntington’s Disease; MS: Multiple Sclerosis; RRMS: Relapsing Remitting Multiple Sclerosis; SPMS: Secondary Progressive Multiple Sclerosis; PPRM: Primary Progressive Multiple Sclerosis; PRMS: Progressive Relapsing Multiple Sclerosis; ROS: Reactive Oxidative Stress; TCA: Tricarboxylic Acid; ETC: Electron Transport Chain; NMDA: N-Methyl-D-Aspartate; MAOB: Monoamine Oxidase B; NSAID: Non Steroidal Anti-inflammatory Drug; MRI: Magnetic Resonance Imaging

Introduction

Neurodegenerative diseases are the brain disorders with selective loss of neuronal activity, degeneration of neuronal cells and distinct involvement of the functional systems as defined in clinical presentation [1]. The most common disorders of nervous system caused by environmental and genetic influences are Parkinson’s disease and Alzheimer’s disease, which have been recognized by accumulation of abnormal protein aggregate leads to inflammation and oxidative stress in the central nervous system [2,3]. The biological mechanisms associated with neurodegenerative disorders are oxidative stress, aggregates of proteins in neurons, depletion or inadequate synthesis of neurotransmitters, degradation of neurotransmitters in the synaptic cleft due to the higher activity of enzymes, abnormal ubiquitination, mitochondrial dysfunction, and excitotoxicity of neurons as well as disarrangement or damages of the Blood Brain Barrier (BBB) [4]. The human ailments associated with neurodegenerative disorders are given as follows:

Alzheimer’s disease

One of the most common neurodegenerative disorders is Alzheimer’s disease (AD), which shows loss of memory, alterations in mood and behavior, often accompany most frequent cause of dementia, disorientation and aphasia. The hippocampus and cerebral cortex are preferentially and severely affected in AD [5]. Pathologically, senile or neuritic plaques (composed of amyloid-β with peptide aggregates) and neurofibrillary tangles (filamentous bundles comprised of hyper phosphorylated tau proteins) are the main characteristic lesions in affected tissues. Tau protein is normally involved in nutrient transport along neuronal axons [6]. The prevalence of AD in the people age of ≥85 years is about 30% and the incidence rates rising upon 6-8% per year. It was also observed that the onset is rarely raises about 0.5% per year for the age group of 55-70 year population; except in familial cases, which comprises roughly 5-10% [7].

Parkinson’s disease

The second most common neurodegenerative disorders is Parkinson’s disease (PD), associated with movement disorder like tremors, rigidity, bradykinesia and postural instability in both rest as well as working situations [8]. The mechanisms involved in PD are loss of dopamine-producing neurons of the mid-brain substantia nigra, abnormal protein aggregation with deficient clearance of aggregates, impaired mitochondrial function, oxidative stress, inflammation, necrosis and accelerated apoptosis [9]. Other pathologic condition like intracellular deposits of aggregated i.e. α synuclein, ubiquitin have found in many surviving neuronal populations [10,11]. The prevalence of PD may reach 2% in persons aged ≥65 years which relatively rare with age ≥50 years and rise sharply throughout the eighth decade of life. The epidemiologic surveys, mainly in

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Relapsing-Remitting MS (RRMS): It is a rare form of multiple sclerosis. Around 85% of people with RRMS are initially diagnosed with RRMS. The RRMS suffered from temporary periods called relapses, flare-up or exacerbations, when new symptoms appear [20].

Primary-Progressive MS (PPMS): It is uncommon but the incidence is about 10% of people with MS and characterized by slowly worsening symptoms from the beginning with no remissions [20].

Progressive-Relapsing MS (PRMS): It is a rare form of MS only 5% people fall in this category with acute relapses without remissions, and characterized by a steadily worsening disease state from the beginning with or without recovery [20].

Current Scenario of the human population suffered by neurodegenerative disorders in India and worldwide as per global survey report (UN news center, The Times of India news on World Alzheimer’s day and Parkinson’s news today detained in 2017) are given as follows;

- **Alzheimer:** Incidence in India is 1.6 millions, while global incidence is 24 millions;
- **Parkinsonism:** Incidence in India is 7-8 millions, while global incidence is 7-10 millions;
- **Dementia:** Incidence in India is 4 millions, while global incidence is 50 millions

Symptoms

The symptoms shown in neurodegeneration diseases are loss of memory, bradykinesia, muscular rigidity, rest tremor, postural & pace impairment [22]. Olfactory dysfunction, cognitive impairment, psychiatric symptoms, sleep disorders, autonomic dysfunction, pain, and fatigue [23,24]. Other symptoms like constipation, depression, mood disorders are the characteristic of this premotor or prodromal phase of the disease [25].

Pathophysiology

The common pathological features of the neurodegenerative disorders are aggregation of mutated or misfolded proteins, gliosis, atrophy and neuronal cell loss. In AD, neuronal cell death is associated with the deposition of extracellular amyloid plaques, consisting of amyloid β peptides and intracellular neurofibrillary tangles. In PD, loss of dopaminergic neurons within the substantia nigra with associated lewy bodies, cytoplasmic aggregates made up predominantly of alpha-synuclein. In HD, predominant atrophy of the striatum, cortex and caudate is particularly affected with significant loss of medium spiny neurons but fewer loss of glial cells. In ALS, neuronal cell death preceded by cellular shrinkage, axonal swelling and mutations in the gene superoxide dismutase involved in the regulation of free radical formation.

Although the proteins affected in AD, PD, HD, and ALS are different, there are several common mechanisms, including the formation of oligomeric protein aggregates and increased oxidative stress, ultimately lead to neuronal cell death. The pathways and overarching functional groups in this model are highly related and can have overlapping or interacting components which can collectively modulate neurodegenerative processes (Figure 1) [26,27].

Etiology

Neurodegenerative disorders are characterized by progressive...
dysfunction of specific characteristic of neurons and neuronal defeats associated with extra and intra cellular accumulation of misfolded proteins. The main critical processes for abnormal protein dynamics is due to the deficiency of ubiquitin-proteosome-autophagy system, oxidative stress, free radical formation, mitochondrial dysfunction and impaired bioenergetics (Figure 2). The second most process involves in dysfunction of neurotrophins is ‘neuronal inflammation which disrupts the neuronal Golgi apparatus and axonal transport [28].

The interrelated mechanisms leads to programmed cell death are explained as follow;

1. **Protein aggregation:** It plays a variety of pathological characteristic involving in neurodegenerative disorders due to abnormal interactions between intra and extra cellular deposition of self-aggregating misfolded proteins with formation of high-ordered insoluble fibrils [29-34]. The basic neurodegenerative process is the formation of several gene-gene complex and gene-environmental interaction with mutation in the genes encoding protein constituents [35]. Whereas the disintegration of neuronal networks depend on dysfunction and death of neuronal as well as glial cells, which caused by abnormal protein-protein interactions with its lesion that result from the production of vicious circles (Figure 3) [36,37]. Abnormal interaction between normal, highly soluble brain proteins alters their characteristics, properties and misfolding gradually converts them into insoluble polymers with the aggregates adopting either highly ordered (cross-pleated sheet structures) or disordered (amorphous) forms [38-40].

2. **Protein misfolding:** Protein aggregation resembling inappropriate folding or misfolding protein leads to structural and functional changes of a normal protein, inducing the formation of protein aggregates through different supramolecular organizations (Figure 4). Abnormal proteins resulting the production errors inherited or acquired amino acid substitutions often cannot fold correctly and will be trapped in misfolded conformations. The pathogenic pathways involve membrane permeabilization through a channel mechanism or hydrophobic interaction of prefibrillar oligomers with different cellular targets [41,42].

3. **Mitochondrial dysfunction and ROS:** Mitochondrial dysfunction and oxidative stress play an important role for the development of more common neurodegenerative disorders. The loss of mitochondrial function is associated with an increase in the production of reactive oxygen intermediates and a number of human diseases [43]. Mitochondria use metabolic intermediates generated during the Tricarboxylic Acid (TCA) cycle to produce Adenosine Triphosphate (ATP) during oxidative phosphorylation. Electrons are occasionally captured by oxygen to produce superoxide anion radicals (O\(^{-2}\)) during the ETC (electron transport chain). These superoxide radicals are converted in to hydrogen peroxide in the mitochondria through the action of manganese superoxide dismutase. The inhibition of ETC proteins can cause a subsequent increase in ROS resulting in decrease in the mitochondrial membrane potential, loss of ATP, energy collapse and subsequent cell death [44,45].

**Diagnosis**

The different types of neuropsychological diagnostic tests are commonly used in clinical evaluation of brain disorders described in Table 1 [46].

**Treatment of neurodegeneration**

Management through ‘AYUSH’ medication system: The treatment goals for the management of neurodegenerative diseases are to first relieve the symptoms, prevent complications, and interruption with neurons destruction. To control neurodegenerative diseases, must treat the symptoms that disturbing the neuronal functions. Currently a novelistic medication system such as Allopath, Yoga (naturopathy), Unani, Siddha and Herbals (AYUSH) is considered cumulative therapies for the complete prevention of neurodegeneration [47]. This alternative medication system consist of currently available treatment incorporated with medicinal plants possessing active...
Yoga system of management

Yoga is an ancient discipline which encompasses various practices such as physical posture (asanas), breathing practices (pranayama), meditation, and relaxation techniques. It is deeply rooted in spiritual and philosophical traditions, and its benefits are widely recognized across different cultures and communities.

### Table 1: Details of clinical diagnosis used for estimation of brain disorders.

| S.No | Test                                | Description                              |
|------|-------------------------------------|------------------------------------------|
| 1    | Screening measures                  | • Addenbrooke’s cognitive examination (ace-r)  
|      |                                     | • Frontal assessment battery (fab)        |
| 2    | Tests of premorbid functions        | • National adult reading test            |
|      |                                     | • Wechsler test of adult reading         |
| 3    | Tests of intelligence/general ability| • Wechsler adult intelligence scale (waiss-iii & iv) |
| 4    | Tests of memory functions           | • Wechsler memory scale (wms-iii and iv)  
|      |                                     | • Adult memory and information processing battery |
|      |                                     | • Rivermead behavioral memory test       |
|      |                                     | • Doors and people test                  |
|      |                                     | • Rey osterreth complex figure           |
|      |                                     | • Recognition memory test (words and faces)                  |
|      |                                     | • List learning tests (rey auditory verbal learning and california verbal learning test) |
|      |                                     | • Autobiographical memory interview     |

### Table 2: List of selected Ayurvedic (herbal) medicines for the treatment of NDDs [49-51].

| S. No | Botanical name           | Family       | Part used | Dose   | References |
|-------|--------------------------|--------------|-----------|--------|------------|
| 1     | Ashwagandha              | Solanaceae   | Root      | 500 mg/kg | [49]       |
| 2     | Turmeric                 | Zingiberaceae| Root      | 100 mg/kg | [49]       |
| 3     | Brahmi                   | Scrophulariaceae | Root | 200-400 mg/kg | [49]       |
| 4     | Shankhpushpi             | Convulvulaceae | Root | 25-75 mg/kg | [50]       |
| 5     | Gokhru                   | Apiaceae     | Root      | 350-400 mg/kg | [50]       |
| 6     | Jyotishmati              | Celastraceae | Root      | 400 mg/kg | [50]       |
| 7     | Jatamansi                | Caprifoliaceae | Root | 400 mg/kg | [50]       |
| 8     | Guggulu                  | Crassulaceae | Root      | 100-300 mg/kg | [50]       |
| 9     | Gingko                   | Ginkgoaceae  | Root      | 120 mg/kg  | [51]       |
| 10    | Lemon balm               | Lamiaeae     | Root      | 25-75 mg/kg | [51]       |
| 11    | Gokhru                   | Apiaceae     | Root      | 100-300 mg/kg | [51]       |
| 12    | Yuan Zhi                 | Polygala     | Root      | 100-200 mg/kg | [51]       |

chemical constituent and other systems traditionally used as folk medicine that developed over generations within various societies before the era of modern medicine (Table 2) [48].

Yoga asanas are referred as poses in yoga. These particular postures help in improving the blood circulation to the vital organs like brain and prevent various types of illness to the human body. In which meditation is the most important facts about yoga and controlled breathing helps in better functioning of the brain. Researchers have observed that 20 minutes of yoga a day will improve speed and accuracy of working memory. Yoga benefits on brain are immense and the following asanas practiced on a daily basis will help in proper functioning of the brain [55].

1. Padmasana (Lotus pose)
2. Vajrasana (Diamond pose)
3. Ardha Matsyendrasana (Half spinal twist pose)
4. Paschimottanasana (Seated forward bend)
5. Halasana (Plow pose)
6. Mayurasana (Peacock pose)
7. Sirsasana (Headstand pose)
8. Shavasana (Corpse pose)
9. Sarvangasana (Bridge-bandha pose)
10. Uttanasana (Standing forward bend)
11. Vrikshasana (Tree pose)
12. Shashankasana (Hare pose)

**Padmasana:** Lotus is considered as a symbol of purity, enlightenment and detachment. Padmasana (lotus pose) is a meditative pose that works best when done in the morning with or without an empty stomach. Hold this intermediate level Hatha-Yoga poses for 10-15 minutes.
pose (Padmasana) for at least 1-5 minutes [56].

**Source:** https://www.sarvyoga.com/wp-content/uploads/2015/08/padmasana-step.jpg

**Benefits:** Padmasana relaxes the mind and calms the brain; awakens the chakras in the body and increases consciousness.

**Vajrasana:** Diamond pose is a kneeling exercise, usually accompanied by breathing aerobics. Practicing the Vajrasana facilitates the body to develop into as strong as a diamond. Only Vajrasana have to be practiced after a meal for at least 5-10 minutes disparate other yogasanas.

**Source:** http://selfhealingonline.com/wp-content/uploads/2016/09/1-vajrasana-1.png

**Benefits:** Vajrasana aids proper digestion and with regular practice it eliminates constipation and combats acidity. The pose helps the body to relax and increases blood circulation and also improves the flexibility of the lower body and tones the muscles.

**Ardha Matsyendrasana:** The Half lord of the fishes pose is named after the sage Matsyendranath i.e. half spinal twist with numerous variations. Practice this asana either early in the morning on an empty stomach or 4-6 hours after a meal in the evening for at least 30-60 seconds.

**Source:** https://i.pinimg.com/736x/d8/20/d3/d820d32f42443e1760d4ac96a7dabf9--yoga-for-beginners-twist.jpg

**Benefits:** Ardha Matsyendrasana relieves stiffness in the back and improves digestion. This pose increases the supply of oxygen to the lungs and detoxifies the internal organs and also purifies the blood which improves its circulation.

**Paschimottanasana:** The Seated forward bend is a classic Hatha-Yoga pose and very simple in performing Paschimottanasana. This asana gives the body a good stretch and concentrates on the back. Practice this pose in the morning on an empty stomach and clean bowels, also do it in the evening after 4-6 hours from the last meal. During practice, hold this basic Hatha-Yoga pose for 30-60 seconds.

**Source:** http://www.itsgoa.com/wp-content/uploads/2016/06/paschimottanasana.jpg

**Benefits:** Paschimottanasana relieves mild depression and stress, gives a good stretch to shoulders, and activates the neurons. This asana reduces headache, fatigue; cures insomnia and maintain high blood pressure.

**Halasana:** The Plow pose uncovers the hidden capabilities of the body. The plow is a farming instrument used in many Asian countries that churns the soil in preparation for sowing seeds. Practice the pose in the morning on an empty stomach or in the evening with a gap of 4-6 hours from the last meal and hold the pose for 30-60 seconds during practice.

**Source:** http://4.bp.blogspot.com/-Q5MPUF0J6hY/Ux3Xr0HlKSI/AAAAAAAADwk/1Z1cn5Zl1hRs/s1600/Halasana.jpg

**Benefits:** This pose releases the strain in the back and enhances the posture to reduce stress and calms the brain.

**Mayurasana:** The Peacock pose resembles a peacock when it walks around with its feathers down. It is best to practice this pose in the morning on an empty stomach as the body has the energy generated from digesting the meal of the previous night and hold this pose for 30-60 seconds during practice.

**Source:** http://www.holistic-online.com/Yoga/images/yp_peacock.GIF

**Benefits:** Mayurasana improves concentration and coordination between the mind and the body.

**Sirsasana:** The headstand is the king of all yoga poses. It requires complete inversion of the body and good upper body strength. Sirsasana needs a series of preparatory exercises over a period to do the asana. At some stage in practicing this asana. It is necessary that the stomach is empty and bowels clean to. Better try to hold the pose for at least 1-5 minutes.
Sirsasana: This yoga asana helps greatly in releasing stress, strain, and anxiety. The upward facing head pose aligns the body and头脑. It helps to calm the mind and provides a sense of peace. It is also beneficial in improving concentration and memory. The practice becomes more effective when performed with a focused mind. Better try to practice this asana for at least 5-10 minutes.

Shavasana: The corpse pose is a simple and relaxing pose. It helps to relax the entire body and mind. It is particularly beneficial for those dealing with stress, anxiety, and insomnia. The pose is also helpful in reducing fatigue and improving overall well-being. Better try to practice this asana for at least 10-15 minutes.

Sarvangasana: This yoga asana is a great opener for the shoulders and upper back. It helps to strengthen the spine, improve flexibility, and stimulate the thyroid gland. The practice becomes more effective when performed with a focused mind. Better try to practice this asana for at least 5-10 minutes.

Uttanasana: This yoga asana is great for stretching the hamstrings and opening the chest. It helps to improve flexibility and balance. The practice becomes more effective when performed with a focused mind. Better try to practice this asana for at least 5-10 minutes.

Vrikshasana: This yoga asana is great for improving balance and focus. It helps to calm the mind and reduce stress. The practice becomes more effective when performed with a focused mind. Better try to practice this asana for at least 5-10 minutes.

Unani medication system

In Unani system of medicine, the use of natural sources is continued at an appropriate quantity for influencing the properties of medicine (Table 3). The common differences of unani medication system surrounded by other medication systems are drugs name, doses, prescription pattern and uses in comparison to Ayurveda & Siddha medication systems [63].
Siddha medication system

It is one of the oldest medication systems of south India, where the use of herbal medicines is arranged for the alleviation of any type of ailments in human being (Table 4). Currently, this medication system proves a rapid improvement over meticulous disease with negligible side effects.

Allopathic medication system

It is one of the most advanced systems of medical practice with modern medicine, which takes care of a disease using chemicals, produces different effects during treatment. Some appropriate and common medicines or chemical agents who exploit to resolve these complications are given in Table 5.

Discussion

The special collection showcase of this review article facilitates the impact on understanding the mechanisms of neurodegenerative disorders. The present article spans different diseases, from commonest disorders such as Parkinson’s and Alzheimer’s disease to rare neurological disorders. AYUSH system is a reputed medication system for its various pharmacological effects favorable for human health [69]. Besides the potent neuroprotective potential, a number of studies described the significant therapeutic effect of the herbal plant against numerous CNS disorders. Biological effects of herbal plants have been generally attributed to the major protective effect science ancient time. The neuroprotective effect of the plant has been suggested from the findings that have dissimilar mechanisms, most of which have referred to positive influences on oxidative stress and other assessment parameters [70]. The modulatory role of alternative medication processes would not only lead to the discovery of novel neuroprotective goal to treat CNS disorders but also help to understand complex pathophysiology of neurodegenerative diseases [71].

There are various allopathic drugs available in the global market used for the management of neurodegenerative disorders and might be reliable for modification in neuronal function. Meanwhile the patients have little compliance against these drugs after prolong exposures like insomnia, dizziness, confusion, loss of concentration etc. [72]. A critical diagnosis is essential for preparation of goals to care and management of neuronal patients. The current review converses the overall symptoms, pathophysiology, cellular mechanism behind it, worldwide affected population, complication in management of neurodegenerative disorders and approaches for the most excellent and preferable treatment medication systems i.e. AYUSH for the maintenance of these worsen condition in human population [73].

The researchers facing serious challenges in drug discovery

### Table 3: List of appropriate Unani medicines used for the treatment of NDDs [64].

| S. No. | Medicine | Unani name     | Dose       |
|--------|----------|----------------|------------|
| 1      | Juglans regia | Akhrot         | 500-1000 mg |
| 2      | Withania somnifera | Asand       | 500-1000 mg |
| 3      | Cantella Asiatica | Barhami booti | 250-700 mg  |
| 4      | Boswellia serrata | Kundur      | 200 mg     |
| 5      | Vitis Vinifera | Maviz munaqqa | 100-300 mg |
| 6      | Glycyrrhiza glabra | Asluusus   | 100-500 mg |
| 7      | Foeniculum vulgure | Badiyan    | 50-200 mg  |
| 8      | Adiantum capillus | Parshiyawhn | 125-500 mg |
| 9      | Ficus carica | Injeer zarda  | 250 mg     |
| 10     | Cassia Aungustifolia | Sana Makki | 12-58 mg   |
| 11     | Pyrethrum indicum | Bozidan    | 150 mg     |
| 12     | Cholicicum Luteum | Suranjan   | 2000-3000 mg |

### Table 4: List of appropriate Siddha medicines used for the treatment of NDDs [65].

| S. No. | Medicine    | Siddha name     | Dose       |
|--------|-------------|-----------------|------------|
| 1      | Oryza sativa | paddy rice      | 200 mg     |
| 2      | Alternenthera sessilia | Ponnanganni | 250-500 mg/kg |
| 3      | Azardiracta indica | Vembu       | 30-60 mg   |
| 4      | Aloe vera L | Katrzhai        | 125 mg     |
| 5      | Solanum nigrum | manathakkali keerai | 2000-3000 mg |
| 6      | Withania somnifera | Amukara     | 500 mg     |
| 7      | Eclipta prostrata | Kaiyan      | 500 mg/kg  |
| 8      | Terminalia chebula | Kadukkai-gall nut | 550 mg |
| 9      | Strychnos potatorum | Kottai      | 100-200 mg/kg |
| 10     | Centella asiatica | Vallari     | 125 mg/kg  |
| 11     | Ocimum sanctum | Thulasi       | 50 mg/kg   |
| 12     | Amaranthus gangeticusj | sirukerra  | 7-30 mg/kg |

### Table 5: List of Allopathic medicines used for the treatment of NDDs [66-68].

| S. No. | Drug name | Mode of action | Dose | Rout | Reference |
|--------|-----------|----------------|------|------|-----------|
| 1      | Remacemide | NMDA receptor Antagonist | 300-600 mg/kg | i. p. | [66]     |
| 2      | Alaptid | Melanotropinhibiting factor(MIF)-1 analog | 5-20 mg/kg | s.c. | [66]     |
| 3      | Selegiline | MAO B inhibitor | 5-12 mg/kg | oral | [66]     |
| 4      | Ampakines | AMPA receptor Modulator | 0.1-30 mg/kg | i. p. | [66]     |
| 5      | Donepezil | Inhibits acetylcholin-esterase | 5-23 mg/kg | i. p. | [67]     |
| 6      | Rivastigmine | Selective inhibitor of brain ACHE and BCHE | 1.5-12 mg/kg | oral | [67]     |
| 7      | Galantamine | Enhances central cholinergic function and likely inhibits ACHE. | 40 mg/kg | oral | [67]     |
| 8      | Tacrine | Cholinesterase inhibitors | 10-40 mg/kg | oral | [67]     |
| 9      | Memantine | N-Methyl-D-Aspartate Antagonist | 5-20 mg/kg | oral | [67]     |
| 10     | Amantadine | Antagonism at muscarinic andN-methyl-D-aspartate (NMDA) receptors | 100-200 mg/kg | oral | [68]     |
| 11     | Zonisamide | Inhibits MAO-B,Blocks voltage-dependent Na+ channels and T-type Ca2+ channels | 30 mg/kg | i.p. | [68]     |
| 12     | Levodopa | MAO-B inhibitors,block a major pathway in dopamine metabolism and thus increase the duration of action of dopamine. | 30 mg/kg | oral | [68]     |
process for neurodegenerative diseases, which becoming extremely expensive and critically incompetent. Approaches based on reverse pharmacology also offer efficient development proposal for new formulations based on herbal products and treatment novel goal. The Ayurvedic system of medicine with Yoga has acquired increasing recognition in recent years with help of nutritious, standard diet and effective treatment approaches [74].

Early development of Ayurvedic herbal supplements which prescribed from centuries for neurodegenerative diseases (including dementias) was agreed only by Western countries health care professional as mechanistic studies on AD; however, these mechanistic points of studies addressed to the same mechanisms by the Ayurvedic therapies (for example, increase in nerve growth factors, neurotrophic factors, reduction in inflammation and oxidative damage), providing strong support in favor of herbal therapy for NDDs. It was well known that, the authoritative basic knowledge of Ayurveda together with combinatorial sciences continuously improving the ease with Ayurvedic formulations, which can be used in drug discovery agencies and drug development process, providing new functional leads for NDDs and other age associated neurodegenerative diseases [75].

Conclusion

The various areas of study of Yoga practices were reviewed in the present article indicated physiological benefits and its effect on nervous system, immune system, circulatory system, respiratory system, digestive system and endocrine system. Improvement in antioxidant property through Yoga system are extremely utilizes in prevention of neurodegenerative disorders, cardiovascular disorders, psychosomatic disorders, analgesic effect, numerous benefits of Yoga on female population and role of Yoga on rehabilitation. Finally it was observed from the published report that the Yoga can be adopted by a large healthy and diseased population. A significant diagnostic evaluation is essential for best possible care and management of neurodegenerative patients. The current review discuss the most excellent treatment medication systems i.e. “AYUSH” for the management of neurodegenerative condition on the basis of enormous published research proposal. Furthermore peaceful investigation and prevention on neurodegenerations are requiring for management of these challenging task to improvement of patient’s life.

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