A Study on the Effectiveness of *Gotukola* (*Centella asiatica*) *Capsules* with Cow's Milk in Increasing Selected Cognitive Abilities in an Adult Population

Dr Vajira Perera Satharasinghe Seneviratne

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Institute of Indigenous Medicine

University of Colombo

Rajagiriya

Sri Lanka

ABSTRACT

Ayurveda literally means the "science of life" and is one of the most ancient systems of healthcare in the world. In original scriptures, eight main divisions could be seen and *Rasayana Thantra* is one of the eight branches of *Ayurveda. Charaka* and *Susrutha Samhitas,* which are major textual references in *Ayurveda,* describe that any person who undergo *Rasayana* therapy will attain longevity, memory, intelligence, freedom from diseases, youthfulness, and clear complexion. A comprehensive review of *Ayurveda* literature shows a profound description of intellect promoting medicines and their mode of action. In *Charaka Samhita,* a separate group of drugs are defined for intellect promotion. These are designated as *Medhya Rasayana,* which produces *Medhya* effect (intelligence promoting). According to the main Ayurvedic classics, a group of four medicinal plants and their botanical identity are as follows; *Mandukaparni (Centella asiatica Linn.), Yastimadhu (Glycirrhiza glabra Linn), Guduchi (Tinospora cordifolia Willd)* and *Shankapushpi (Convolvulus pleuricaulis Choisy.). Centella asiatica Linn* (CA) is known as *Gotukola* in Sri Lanka. *Charaka Samhitha,* one of the oldest classics (1500 BC), included a separate chapter for *Medhya Rasayana* whilst *Centella asiatica* is described in *Prajasthapana Mahakashaya, Vayastspana Mahakashaya and Tiktha skandha. Sushruta Samhitha,* (1000 BC) another major classic, also describes it as a medicine and a wholesome vegetable as well. *Astanga Hradaya* (7th Century) and large number of *Nighantus* written in the ancient and medieval period further describe its medicinal values in a broader perspective. Although, *Gotukola* products are widely available in global market as a cognitive booster, evidence based information with scientific validity is very limited.

Aims and objectives: Hence, the major objectives of this study were: standardizing *Gotukola* powder, and to study the effectiveness of Gotukola powder with cow's milk in increasing selected cognitive abilities in an adult population. This study also aimed to study its safety. **Materials and methods-** Standardised *Gotukola* powder capsules were used in this study to assess the effects on cognitive abilities in healthy adults. The raw materials of Gotukola were thoroughly cleaned, grinded and passed through the mesh (No 180 and 80 sieves, respectively). Then, this fine powder that was obtained, was filled into capsules without any exipients or preservatives at a GMP certified pharmaceutical premises under stringent hygienical conditions. The raw materials and the finished product was screened for physical identity, phytochemical analysis and TLC as per the standard methods. A total number of 60 healthy volunteers of either sex were recruited for this study. All subjects were screened for medical health issues to assure their health status. Based on the research design, the study was conducted up to 12 weeks. After being randomly selected, the participants were divided into two groups (each group n= 30). Then, one group of participants received *Gotukola* capsules once a day whilst the other group received *Gotukola* capsules (same dose) *with* cow's milk, as the vehicle, for a period of 12 weeks. All participants were assessed at baseline for selected cognitive abilities and again at the end of the 12th week. Further, selected haematological and biochemical parameters were measured, in the same manner. One-month follow-up was conducted too. Investigators at site, as per the good clinical practices (GCP) guidelines, maintained source documents.Effects of the study were evaluated by a standard clinical assessment tool, Montreal Cognitive Assessment (MOCA), which was translated and validated into Sinhala. **Results and Discussion:** In the findings, foreign matter was not more than two percent. Total moisture content, total

ash, and acid insoluble ash were respectively in the ranges of 8.9 %, 16.4 %, and 3.6%. In TLC fingerprints, it was observed bands at Rf ≈ 0.4 and 0.3 which were corresponding to that of reference markers of authenticated standard sample of *Centella asiatica*. The values were within the range of standard reference. Hence, the finished product was suitable for clinical use. The anthropometric studies had shown that there was an increase in body weight where the mean body weight of 51.90 – 52.37 kg after the treatment over the test group. Thus, mean difference of 0.06 kg was noted which was found statistically significant. Among the psychometric studies, immediate memory, naming skills, attention, verbal fluency, abstraction, delayed recall and orientation were specially studied to see the changes in cognitive functioning of the participants. The results showed statistically significant improvements in terms of increases in immediate memory, naming skills, attention, verbal fluency, delayed recall and orientation. The immediate memory score increased from a mean of 2.93 to 3.00 after the treatment (mean difference0.07, $p< 0.05$). Out of the laboratory haematological parameters, the mild increase in the mean haemoglobin percentage was noted and found to be significant statistically in the test group. The mean haemoglobin percentage increased from 12.03 – 12.44 gm % ($p< 0.05$). A significant decrease in total cholesterol was also noted and found to be significant statistically in the test group. The mean total cholesterol percentage decreased from 189.54 to 181.63 ($p < 0.05$). The changes in the fasting blood sugar, serum creatinine and blood urea levels were noted insignificant. **Conclusion:** *Centella asiatica* is one of the potential *Medhya Rasayana* medicines identified in ancient Ayurveda texts. The improvement of these anthropometric parameters may be taken as a reflexion of improved nutritional status of these subjects. These findings substantiate the improvement in body weight that may be taken as a

reflection of improved nutritional status. Though it was a preliminary work with certain limitations, it has indicated many new bases of information that may be taken as possible leads in area of research in improving selected cognitive abilities. The test drug *Gotukola* has shown to improve selected cognitive abilities in an adult population. It has hence shown to improve the quality of life. Hence, it can be concluded that the *Medhya Rasayana* drug *Gotukola* with cow's milk could be used as an effective medication in healthy adults with considerable advantage because of its nutraceutical properties. Its baseline and follow up haematological analysis revealed that it could be administered safely to healthy adults but further control studies are needed to confirm its long-term toxicity in human. Thus, the present study opens up newer dimensions for future research and management of selected cognitive abilities improvement.

Keywords - *Centella asiatica,* memory, cognitive abilities, *Medhya Rasayana*