Pharmacology

64
Cognitive enhancing effect of standardized root extract of *Clitoria ternatea* L. on scopolamine induced amnesic rats

V. Kumar[1], N. Ahamed[1], Peter J. Houghton[2] and Pulok K. Mukherjee[1]

[1]School of Natural Product Studies, Jadavpur University, Department of Pharmaceutical Technology, Jadavpur University, Kolkata 700032, India and [2]Pharmaceutical Sciences Research Division, King's College London, Pharmaceutical Sciences Research Division, King's College London, Franklin-Wilkins Building, 150 Stamford Street, London SE1 9 NH, UK. E-mail: kumarvju@yahoo.com

Objectives *Clitoria ternatea* L. (Fabaceae), commonly called Shankapushpi, is used traditionally for different ailments. Roots, seeds and leaves of *C. ternatea* are commonly used in the Ayurvedic system of medicine. Extracts of this plant have been used as an ingredient in 'Medhya Rasayana' as a rejuvenating recipe used for treatment of neurological disorders and considered as wholesome for intellect (Howes & Houghton 2003). Evidence from animal and human studies indicates that learning and memory can be modified by drugs affecting central cholinergic function. Muscarinic antagonists, such as scopolamine, have been shown to impair memory. The aim of this study was to determine the effect of standardized root extract of *C. ternatea* on cognitive dysfunction induced by scopolamine.

Methods *C. ternatea* root extract was standardized with High Performance Thin Layer Chromatography technique using taraxerol marker compound. Passive avoidance paradigm and elevated plus maze were employed to evaluate learning and cognitive parameters (Mukherjee et al 2007). Cognitive dysfunction was induced by administering scopolamine hydrobromide (1 mg/kg) 60 min before the first trial in extract-treated as well as vehicle-treated control groups. In this experiment, rats were treated with standardized extract (150 and 300 mg/kg) and physostigmine (0.25 mg/kg) for 7 days before scopolamine administration.

Results The quantity of taraxerol (R_f – 0.53) was found to be 1.24% w/w in hydroalcoholic extract of *C. ternatea* root. The effect of standardized extract on passive avoidance step through behaviour is shown in Table 1. Treatment with scopalamine significantly shortened the latency time in the retention trial. Administrations of *C. ternatea* extract for 7 days significantly ($P < 0.001$, $P < 0.01$) increased the step through latency time compared with the scopolamine-treated group. Physostigmine increases the step through latency shortened by scopolamine. Transfer latency (TL) of first day reflected learning behavior of animals whereas TL of second day reflected retention of memory. *C. ternatea* extract significantly ($P < 0.001$, $P < 0.05$) decreased TL on first day as well as on second day, indicating significant improvement of learning and memory. Scopolamine injected before training increased TL. Physostigmine protected the rats from scopolamine impairment in learning and memory.

Conclusions The results of the present investigation indicate the cognitive enhancing activity of *C. ternatea* root extract and also support the reports from ancient Ayurvedic literature that *C. ternatea* possesses memory-enhancing properties.

Table 1 Anti-amnesic effect of *C. ternatea* on scopolamine induced cognitive impairment in rats

Treatment	Step through latency seconds ± SEM (% control)
Control (vehicle)	173.81 ± 12.9 (100%)
Scopolamine (1 mg/kg)	28.93 ± 3.1 (16.6%)
Physostigmine (0.25 mg/kg) + Scopolamine	82.61 ± 6.41* (47.5%)
C. ternatea 150 mg/kg + Scopolamine	78.76 ± 7.91* (45.3%)
C. ternatea 300 mg/kg + Scopolamine	109.35 ± 11.62** (62.9%)

**$P < 0.001$, *$P < 0.01$, compared with scopolamine-treated group.

Howes, M. R., Houghton, P. J. (2003) *Pharmacol. Biochem. Behav*. **75**: 513–527
Mukherjee, P. K., et al (2007) *Behav. Brain Res*. **178**: 221–228

65
Potential for high cumulative steroid doses in atopic children

A. C. Snaith[1], J. H. Metussin[1], C. R. Simpson[2], S. A. Ross[1] and J. S. McLay[1]

[1]Department of Medicine and Therapeutics, University of Aberdeen, Polwarth Building, Foresterhill, Aberdeen, AB25 2ZD and [2]Department of General Practice and Primary Care, University of Aberdeen, Westburn Road, Aberdeen, AB25 2AY, UK. E-mail: u03acm3@abdn.ac.uk

Objectives Global estimates of the prevalence of asthma and allergic disease in children report high rates for the UK relative to other countries worldwide. In 2004, 39% of children (aged 2–15 years) in England were diagnosed with asthma, allergic rhinitis or atopic dermatitis, with 2% diagnosed with all three conditions (Gupta & Strachan 2004). Current UK guidelines advocate the use of steroids as a suitable treatment in children with any one of these conditions; however, evidence suggests that those children with all three conditions are at increased risk of being exposed to high cumulative doses of steroids (Ekins-Daukes et al 2002). The aim of this study was to investigate the extent of chronic co-prescribing of inhaled (ICS), nasal (NCS) and topical (TCS) corticosteroid preparations to children in primary care with any one, or a combination of, these conditions.

Methods Data was collected over a 1-year period from 304 general practices (n = 345 221 children aged 0–16 years) participating in the Scottish Programme for Improving Clinical Effectiveness (SPICE). Children prescribed inhaled, nasal and topical corticosteroids were identified and categorised according to the combination of treatments received.

Results Of the total cohort of 345, 221 children, 10.9% were prescribed TCS, 5.5% ICS and 1.9% NCS (1.9% children received repeat prescriptions for TCS, 4.6% ICS and 0.7% NCS). Table 1 reports the rate per 1000 children on repeat ICS, who were also co-prescribed a repeat prescription for a further corticosteroid preparation. Four hundred and twenty (2.6%) of the cohort receiving a repeat prescription of inhaled corticosteroid (15 993 children) were also repeat prescribed NCS. Seven out of the 420 children (1.7%) were aged 0–4 years, 191 (45.5%) 5–11 years and 222 (52.9%) 12–16 years.

Conclusion Atopic children are potentially exposed to high cumulative doses of steroids through co-prescribing of different steroid preparations. This study reports that the age group most likely to be prescribed >1 corticosteroid preparation, and therefore at most risk of high cumulative doses, are adolescents aged 12–16 years. Pharmacists, as potential gatekeepers to ensure appropriate prescribing, should be aware that some children may be receiving high doses of steroids.

Table 1 Rate/1000 children on corticosteroids also co-prescribed TCS and/or NCS

	No.	Rate/1000 children on any corticosteroid	Rate/1000 children on ICS
Acute or repeat prescription of corticosteroid	58609	—	—
Repeat prescription ICS	15993	270	—
Repeat prescription (ICS + TCS)	923	16	58
Repeat prescription (ICS + NCS)	420	7.2	26
Repeat prescription (ICS + TCS + NCS)	70	1.2	4

Ekins-Daukes, S., et al (2002) *Br. Med. J*. **324**: 1374
Gupta, R., Strachan, D. (2004) *Health of children and young people*. Office of National Statistics