INTRODUCTION

Samanea saman Merr., and Prosopis cineraria Druce., are medicinal plants of Pakistan and India belong to the family Mimosaceae1. Samanea saman Merr., is a folk remedy for colds, diarrhoea, headache, intestinal ailments, and stomach ache2. Leaves are used in diarrheain3. Inner bark decoction is used for the treatment of colds and diarrheain3. Seeds of Samanea saman Merr., are chewed for sore throat4,5. Antifungal6 and antioxidant7 activities are reported from Samanea saman Merr. Leaves possess antiemic8, antibacterial9 and insecticidal10 activities. Bark possesses hepatoprotective activity11. Pods possess antibacterial and antifungal activity12. Alkaloids, glycosides and terpenes are reported from Samanea saman Merr.13. Leaves contain flavonoids, glycosides, saponins, steroids, tannins, and terpenoids14. Pods indicated the presence of alkaloids, flavonoids, saponins, steroids and tannins15.

The leaves of Prosopis cineraria Druce., are used in cataract, dyspepsia, earache and toothache. The stem bark possesses abortifacient and laxative properties. It is used to treat anxiety, asthma, bronchitis, fever, dysentery, dyspepsia15 and rheumatism16. Flowers are used as an anti-diabetic agent and to prevent abortion17. Root is antisynergistic18. Prosopis cineraria Druce., possesses antitumor activity19. Antibacterial18, anthelmintic20, antiinfective21, antioxidant, hypoglycemic and hypolipidemic activities22 are reported from stem bark. Literature survey of Prosopis cineraria Druce., revealed the presence of alkaloids23, fatty acids24, glycosides and sterols25 whereas glucosides are reported from flowers and flavonoids from seeds16.

The tail immersion test is used for evaluating central antinociceptive effect by responding to the pain stimuli conducting through neuronal pathways26. The purpose of the present study is to investigate analgesic activity of the leaves (methanol extracts) of Samanea saman Merr., and Prosopis cineraria Druce., in Swiss albino mice using tail immersion test. The stem bark27 and roots27 of Prosopis cineraria Druce., are reported to possess analgesic activity. The analgesic potential of leaves (aqueous extract) by acetic acid induced writhing test has already studied28. Here we evaluate methanol extract by using tail immersion test to further confirm its central analgesic effect. The analgesic effect of Samanea saman Merr., is reported first time.

MATERIALS AND METHODS

Plant Sample Collection and Identification

Leaves of Samanea saman Merr., and Prosopis cineraria Druce., were collected in summer 2012 from Karachi, Pakistan and compared with already deposited voucher specimen of Samanea saman Merr., (K-97-13) and Prosopis cineraria Druce.,(K-97-05).

Plant Extraction

Leaves of Samanea saman Merr., and Prosopis cineraria Druce., were dried under shade and soaked in methanol for a week. The extracts were filtered then concentrated using rotary evaporator at 40°C.

Animals

Male Swiss albino mice (17–23 g) were obtained from the Animal house of Aga Khan University and hospital, Karachi, Pakistan. During the aclimatisation period (1 week), the animals were supplied with a standard commercial diet and water ad libitum and kept in room temperature. The experimental procedures were carried out in accordance with the ethical guidelines for investigations of experimental pain in conscious animals given by Zimmermann (1983)29. All mice were equally divided into four groups of seven mice each and transferred into different cages with their identification mark. The first group received subcutaneous 0.9% saline, second group received pethidine (50mg/kg i.p.) as standard analgesic drug whereas remaining two groups treated with methanol extracts of leaves of Samanea saman Merr., and Prosopis cineraria Druce., (100 mg/kg i.p. each).

Acute Systemic Toxicity Test

The acute systemic toxicity of methanol extracts of leaves of Samanea saman Merr., and Prosopis cineraria Druce., in Swiss albino mice suggested that 100mg/kg body weight of each extract is safe for intraperitoneal administration30.

Analgesic Activity

The central analgesic activity of Samanea saman Merr., and Prosopis cineraria Druce., were evaluated by tail immersion test. This test was performed according to the technique of Janssen et al., (1963)31 which later on adapted by Ramabadran et al., (1989)32. The lower two-third of the tail was marked and immersed in a water bath having temperature of 55±0.5°C. The time in seconds until the tail was withdrawn from the water was defined as the reaction time. The reaction time was measured.
RESULTS AND DISCUSSION

The methanol extracts of *Samanea saman* Merr., and *Prosopis cineraria* Druce., inhibited tail flick response at 0.5hr in mice. This tail flick latency delay was increased in linear fashion till 1hr and then decreased (table). The inhibitory effects of the extract became pronounced between 0.5 and 2 hr post-dosing and reached a maximum of 28.69 sec and 30.2 sec (p < 0.05) in case of *Samanea saman* Merr., and *Prosopis cineraria* Druce., respectively. In case of pethidine tail flick latency delay was increased till 1hr and afterward decreases. The leaves extract of *Samanea saman* Merr., and *Prosopis cineraria* Druce., in a dose of 100 mg/kg showed anti-nociceptive activity when compared with pethidine (figure).

The tail immersion test is used for evaluating centrally acting analgesics and is more sensitive to opioid receptor agonists. This test consists of a thermal stimulus and increase in the reaction time is used for evaluating central antinociceptive activity. The tail flick response is believed to be a spinally mediated reflex. So, it differentiates between central and peripheral analgesics. Opioid agents exhibit their analgesic effects both via supraspinal (μ, κ, δ), σ), and spinal (μ, κ, δ) receptors. Pethidine produces analgesia by stimulating μ(δ), delta(δ) and kappa(κ) opioid receptors present in spinal cord and brain stem. As this test model is for evaluating centrally acting analgesic effect so, it may be said that the methanol extracts of leaves of *Samanea saman* Merr., and *Prosopis cineraria* Druce., possess central analgesic effect. However, more centrally acting analgesic models are further needed to confirm this effect. One possible reason of this central analgesic effect may be the presence of alkaloids and terpenes already reported in leaves of *Samanea saman* Merr., and *Prosopis cineraria* Druce. The present investigation suggested the central analgesic effects of leaves of *Samanea saman* Merr., and *Prosopis cineraria* Druce., however, further studies are required to obtain effective compound(s) from the methanolic extracts of the leaves of *Samanea saman* Merr., and *Prosopis cineraria* Druce., and clarify the possible mechanism of action. The exact mechanism and the bioactive principles responsible for these actions remain to be explained.