Effects of *Pluchea lanceolata* Root Extract on Cisplatin--induced Nausea and Vomiting in Rat Pica Model

NAVEEN GOYAL*, SURENDRRA KR. SHARMA

*For author affiliations, see end of text.
Received June 12, 2012; Revised September 27, 2012; Accepted November 8, 2012

This paper is available online at http://ijpt.tums.ac.ir

**ABSTRACT**

Cisplatin is an effective chemotherapeutics against a wide range of cancers. However, it causes significant nausea and vomiting which limit its usefulness. In the present study, the effects of methanolic root extract of *Pluchea lanceolata* (DC.) C. B. Clarke, asteraceae (*MPL*) was investigated against cisplatin-induced nausea using a rat pica model. In rat pica model, rats react to cisplatin (emetic/nausea stimuli), with altered feeding habits, manifested by increased consumption of kaolin. The pica in rats was measured to quantify cisplatin-induced nausea, and to evaluate the protective effect of pretreatment with *MPL* given orally. Cisplatin at 3 mg/kg (i.p.) induced significant pica indicated by reduced food intake and increased kaolin consumption, suggesting the presence of nausea/emesis. Cisplatin-induced pica decreased significantly when animals were pretreated with *MPL* at doses of 400 mg/kg p.o. (*p* < 0.05). *MPL* pretreatment decreased cisplatin-induced kaolin intake in the rat model of simulated nausea, suggesting that *MPL* and/or its active constituent(s) may play a therapeutic role as protective against chemotherapy-induced emesis.

**Keywords:** Cisplatin, Pica, *Pluchea lanceolata*, Asteraceae

Chemotherapy regimens for the treatment of cancer are unfortunately better known for their toxicity than for their efficacy. Although some of the toxic effects may typically subside, only to recur and reach a second peak at approximately 48 to 72 hours after receipt of the agent, nausea and emesis caused by chemotherapy, which are generally self-limited and seldom life-threatening [1]. It has been commonly reported by as ‘acute’, and emesis occurring more than 24 hours later has been termed ‘delayed’. The incidence of ‘anticipatory emesis’, used to treat cancer [2]. The severity and pattern of a third emetic syndrome, has decreased in recent years. Chemotherapy-induced emesis depend on the specific agents used, the dose, and the regimen. Cisplatin (cis-diaminedichloroplatinum), a platinum-containing anticancer drug, is one of the most commonly used in the treatment of a variety of solid tumors [1] and is associated with profound nausea and vomiting [3].

In the absence of effective antiemetic prophylaxis, negatively affect a patient's functional, nutritional, and psychological, social, physical and economical quality of life. It can virtually all patients receiving cisplatin will have nausea.
of life. The pathophysiology of these symptoms has been partly attributed to oxidant injury to the intestinal epithelium [8,9]. The mucosal injury results in excessive serotonin release from the enterochromaffin cells that could mediate the gastrointestinal adverse effects of chemotherapy and radiotherapy [10-14]. Since cisplatin-induced nausea and vomiting remain among the most feared adverse events associated with chemotherapy, herbal medicines may be of value in their treatment. To measure kaolin and food intake, the remaining kaolin and food from the day prior were collected including that spilled outside the containers. The collected kaolin and food were dried for 72 h to obtain dry weight (g).

**Statistical analysis**

The statistical significance of differences among values of individual parameters was evaluated by using the Student’s t test. All the values are expressed as mean ± SD. The significance was set at p < 0.05.

**RESULTS**

The shade dried roots of the plant *Pluchea lanceolata* (DC.) C. B. Clarke, asteraceae, was collected from waste land of Dist. Hisar and Sirsa, Haryana, India, in October 2009 and authenticated by Rawal Jambheshwar University of Science and Technology, Hisar, Haryana, India. The plant material was further size reduced and petroleum ether using a Soxhlet apparatus. The defatted material was air-dried, then extracted with 70% methanol using a Soxhlet apparatus. The extract was concentrated on water bath and filtered through Whatman No. 1 filter paper. The filtered extract was dried to constant weight on a water bath. To measure kaolin and food intake, the remaining kaolin and food from the day prior were collected including that spilled outside the containers. The collected kaolin and food were dried for 72 h to obtain dry weight (g).

**Statistical analysis**

The statistical significance of differences among values of individual parameters was evaluated by using the Student’s t test. All the values are expressed as mean ± SD. The significance was set at p < 0.05.

**RESULTS**

The shade dried roots of the plant *Pluchea lanceolata* (DC.) C. B. Clarke, asteraceae, was collected from waste land of Dist. Hisar and Sirsa, Haryana, India, in October 2009 and authenticated by Rawal Jambheshwar University of Science and Technology, Hisar, Haryana, India. The plant material was further size reduced and petroleum ether using a Soxhlet apparatus. The defatted material was air-dried, then extracted with 70% methanol using a Soxhlet apparatus. The extract was concentrated on water bath and filtered through Whatman No. 1 filter paper. The filtered extract was dried to constant weight on a water bath. To measure kaolin and food intake, the remaining kaolin and food from the day prior were collected including that spilled outside the containers. The collected kaolin and food were dried for 72 h to obtain dry weight (g).

**Statistical analysis**

The statistical significance of differences among values of individual parameters was evaluated by using the Student’s t test. All the values are expressed as mean ± SD. The significance was set at p < 0.05.

**RESULTS**

The shade dried roots of the plant *Pluchea lanceolata* (DC.) C. B. Clarke, asteraceae, was collected from waste land of Dist. Hisar and Sirsa, Haryana, India, in October 2009 and authenticated by Rawal Jambheshwar University of Science and Technology, Hisar, Haryana, India. The plant material was further size reduced and petroleum ether using a Soxhlet apparatus. The defatted material was air-dried, then extracted with 70% methanol using a Soxhlet apparatus. The extract was concentrated on water bath and filtered through Whatman No. 1 filter paper. The filtered extract was dried to constant weight on a water bath. To measure kaolin and food intake, the remaining kaolin and food from the day prior were collected including that spilled outside the containers. The collected kaolin and food were dried for 72 h to obtain dry weight (g).
Pluchea Lanceolata and cisplatin-induced nausea/vomiting

Published online: January 31, 2013

DISCUSSION

The present study inferred that methanolic extract from Pluchea lanceolata attenuated kaolin intake (pica) and cisplatin-induced nausea/vomiting. Pluchea lanceolata and cisplatin-induced nausea/vomiting.

Fig 1. Effect of cisplatin (3 mg/kg) and cisplatin plus MPL (200 and 400 mg/kg) on kaolin intake. Values are expressed as mean ± SD. *p < 0.05 with respect to normal, **p < 0.05 with respect to control.

Fig 2. Effect of cisplatin (3 mg/kg) and cisplatin plus MPL (200 and 400 mg/kg) on reduced food intake (% baseline) induced by cisplatin in rats. Values are expressed as mean ± SD. *p < 0.05 with respect to normal, **p < 0.05 with respect to control.
these facts, the present investigation was done to evaluate the efficacy of Pluchea lanceolata, in cisplatin-induced pica. In vitro antioxidant activity of methanolic root extract of Pluchea lanceolata was already determined by DPPH free radical scavenging assay and hydrogen peroxide scavenging activity [26,27]. The results showed that MPL at dose of 200 mg/kg and 400 mg/kg reduced cisplatin-induced pica. This suggests that cisplatin-induced pica (nausea) could be treated with MPL. Although low doses of MPL caused reduced pica in cisplatin-treated rats, the improvement was still less as compared to normal kaolin intake.

These findings support the notion that herbal medications, such as MPL, could be an effective and inexpensive alternative for preventing chemotherapy-induced emesis without troublesome side effects.

Further, earlier studies also showed that herbal antioxidants may have a role in attenuating cisplatin-induced nausea and vomiting [28]. However, it is important to examine the interaction between the herbal extract and cisplatin, which could either hamper or augment the anticancer actions of cisplatin. As cisplatin acts by oxidative stress in tumor cells and treatment with antioxidants could detoxify ROS, the herb may prevent oxidative injury to tumor cells and sensitize the tumor cells to the anticancer effects of chemotherapy [29].

We conclude that herbal antioxidants potentially represent a new class of low-cost antiemetic agents for the treatment of chemotherapy-induced nausea/vomiting. Additional studies are required to further investigate the antiemetic actions of such herbal medications and the effects of interaction with the chemotherapeutic agents.

REFERENCES


5. Goyal and Sharma.
Pluchea Lanceolata and cisplatin-induced nausea/vomiting

Published online: January 31, 2013

Naveen Goyal, Roorkee College of Pharmacy, Roorkee-247667, Haridwar, Uttarakhand, India. E-mail: hsrmaveen@yahoo.co.in

Surendra Kr. Sharma, Department of Pharmaceutical Sciences, Guru Jambheshwar University of Science and Technology, Hisar-125001, Haryana, India.

(Corresponding author)