Antisecretory activity of methanol and chloroform extracts from aerial parts and flowers of *Phytolacca icosandra* L.

Actividad antisecretora de los extractos metanólico y clorofórmico de las partes aéreas y flores de *Phytolacca icosandra* L.

Antisecretory activity of methanol and chloroform extracts from aerial parts and flowers of *Phytolacca icosandra* L.

Actividad antisecretora de los extractos metanólico y clorofórmico de las partes aéreas y flores de *Phytolacca icosandra* L.

Santos-López Jorge Arturo¹, Villagómez-Ibarra José Roberto¹, López-Ramírez Alejandro¹, Montiel-Jarillo Gabriela¹, Bautista-Ávila Mirandeli², Gayosso-de Lucio Juan A.² and Velázquez-González Claudia²*

¹Universidad Autónoma del Estado de Hidalgo, Instituto de Ciencias Básicas e Ingeniería, Carretera Pachuca-Tulancingo km 4.5, Municipio de Mineral de la Reforma, Hidalgo, México.

²Universidad Autónoma del Estado de Hidalgo, Instituto de Ciencias de la Salud, Carretera Pachuca-San Juan Tilcuautla S/N, Municipio de San Agustín Tlaxiaca, Hidalgo, México.

*Corresponding author: Tel. 01(771)7172000, Ext. 5106 y 5113, Fax: 01(771) 7172 000 Ext. 5111. E-mail address: cvg09@yahoo.com (Dra. Claudia Velázquez).

ABSTRACT. The aerial parts of *Phytolacca icosandra* L., (*Phytolaccaceae*), have been traditionally used as folk medicine in Mexico to treat diarrhoea and to lose weight. The aim of the study was assess the antisecretory activity of *P. icosandra* using inhibition of intestinal secretion caused by castor oil model in rats. The air-dried leaves and flowers were ground and extracted by maceration at room temperature with methanol and chloroform (500 mL × two times). After filtration the solvent was evaporated in vacuum to yield crude extract. The antisecretory effect was studied on intestinal secretion indirectly by measuring the fluid accumulation in the intestine following castor oil oral administration in rats (n= 5 per group). Rats were treated by intragastric route with the extracts, (300 mg/kg in 1mL of a Tween 80 1% solution in water) or vehicle (Tween 80 1% solution in water). Loperamide (2.5 mg/kg) was used as antisecretory drug. After one hour, the animals were sacrificed using ethyl ether and the intestinal loops were removed, the antisecretory activity of the extracts were measured as the fluid secretion in the loops and expressed in percent of inhibition. The obtained extracts showed antisecretory activity, chloroform extract of aerial parts with 89.16 %, flowers 58.3 % and methanol extract of flowers showed 75 % and leaves 41.66 % of inhibition of intestinal secretion. The results of the present study lend some support to the anecdotal report for the traditional use of *Phytolacca icosandra* L. in the control of diarrhea.

RESUMEN. Las partes aéreas de *Phytolacca icosandra* L., (*Phytolaccaceae*), han sido usadas tradicionalmente en la medicina popular mexicana para tratar diarrea y como auxiliar para perder peso. El estudio tuvo como objetivo determinar la actividad antisecretora de *P. icosandra* usando el modelo de acumulación de fluido intestinal en ratas. Las hojas y flores secas y molidas fueron extraídas por maceración a temperatura ambiente con metanol y cloroformo.
El disolvente fue evaporado con vacío para obtener el extracto crudo. El efecto antisecretor fue estudiado indirectamente sobre la secreción intestinal midiendo la acumulación de fluido en el intestino después de la administración oral del aceite de ricino en ratas (n = 5 por grupo). Las ratas fueron tratadas por vía intragástrica con los extractos, (300 mg/kg disueltos en 1mL de la solución de Tween 80 al 1 % en agua) o el vehículo (solución de Tween 80 al 1 % en agua). Se utilizó Loperamida (2.5 mg/kg) como fármaco antisecretor control. Después de una hora, los animales fueron sacrificados usando éter etílico y se removió el intestino delgado, la actividad antisecretora de los extractos fue medida en base a la secreción acumulada en las asas y expresada en porcentaje de inhibición. Los extractos obtenidos mostraron actividad antisecretora, el extracto clorofórmico de las partes aéreas y de las flores mostró 89.16 % y 58.3 % de inhibición, respectivamente el extracto metanólico de las flores y hojas demostró un 75 % y 41.66 % de inhibición, respectivamente. Los resultados del presente estudio proporcionan un soporte sobre el uso tradicional de Phytolacca icosandra L. en el control de la diarrea.

Keywords: Phytolacca icosandra L.; antisecretory activity; diarrhoea.

Palabras clave: Phytolacca icosandra L.; actividad antisecretora; diarrea.

INTRODUCTION

The diarrheal diseases are still a public health problem that generally affects developing countries, mainly children minors of 5 years old and elderly, is estimated that every year around 1.5 million children dies at worldwide by this cause. In Mexico is the second place of mortality in children, increasing the morbidity in a 20 % in seasons of heat.

Diarrhea is a symptom of gastrointestinal infection which can be caused by several bacteria, virus and parasites, the infection is propagated by contamination of water and food from person-to-person by poor hygiene. It affect all the races, sexes, ages and regions around the world. Besides the great lose of water by the diarrheal evacuations, patients, generally young, lose dangerous amounts of important salts, electrolytes and other nutrients,\(^1\) diarrhea can be defined by the percentage of water in feces, when presents more of 85 % of water, there are some drugs used to treat diarrhea, nevertheless loperamidine together with neomycin sulphate, are the most used medicines for the treatment of this symptom.\(^2\)

In many countries around the word, the use of medicinal plants to treat several illness is a knowledge which is transmitted orally, it is considerate that 64 % at 80 % of people around of world use medicinal plants to solve their problems of health, in developed countries it begin to be an alternative therapy.\(^3\)

Mexico has a great vegetal biodiversity, is important to notice that in Mexico the plants used to treat gastrointestinal illness occupied the first place in use and there are only a few studies pharmacological and phytochemical which lend a support it.\(^4\)

Phytolacca icosandra (Phytolaccaceae) is commonly called “jaboncillo”, is a grass of 1 -3 m of height. The stem is frequently pink or red, hollow and angular. Flowers are white greenish or pink intense, in long cases at the end of the branches. They develop blackish purples fruits.\(^5\) It has many applications in the Mexican traditional medicine and in the customs of many regions from Mexico, this plant has laxative effect (fruits), analgesic (leaves and stems) and is used for the treatment of diarrhoea, to lose weight and to treat vomit (root), it has been reported that can be very dangerous because mature leaves, fruits and root are poisonous.
MATERIALS AND METHODS

Plant material
Plant material was obtained in the community of Macheros, municipality of El Capulín, State of Mexico June, 2009.

Extraction
The dried and powdered aerial parts (40 g) were macerated with methanol and chloroform (500 ml) at room temperature for a week (x 3 times), the filtrate was evaporated to dryness under reduced pressure to afford the yield of crude extracts, were 11.02 g and 6.8 g methanol extract of flowers and leaves, respectively 1.97 g 0.97 g of chloroform extract of flowers and leaves, respectively; 27.55, 17.01, 4.89, 2.42 % (% w/w), respectively. The extracts were dissolved in 1 % v/v aqueous solutions of Tween 80 and intragastric administrated for the experiments.

Animals
Albino Wistar rats (100-150 g) were facilitated from bioterium of Universidad Autónoma del Estado de Hidalgo. The animals were maintained under standard conditions of humidity, temperature and fed with a standard diet and water *ad libitum*. The animals were fasted 18 h prior to the experiments.

Intestinal fluid accumulation caused by castor oil test in rats
The rats were divided in six groups of five rats each, the positive control received loperamide (2,5 mg/Kg) whereas the negative control received 1 % of Tween 80 in water 1 mL, intragastic. The methanol and chloroform extracts of the aerial parts and flowers (300 mg/Kg) were administered by the same route. After 30 minutes, the rats were anaesthetized with ethyl ether to proceed to realize the surgery, which consisted of made a suture in the cecum to obtain intestinal accumulation; rats were administered with 1 ml of castor oil. Passed 60 minutes the animals were sacrificed, gastrointestinal tract was removed and intestinal content was measure, the results are expressed as a percentage of intestinal fluid accumulation inhibition.\(^5^,\(^7^\)

Statistical analysis
Results were expressed as mean ± S.E.M. values were evaluated by Student’s *t*-test. Statistical significance was accepted at *P*< 0.05.

RESULTS AND DISCUSSION
*Phytolacca icosandra* L. is used to treat diarrhoea in Mexico, from this study we tested the antisecretory effects of methanol and chloroform extracts from their leaves and flowers. The results of the intestinal inhibition on the fluid accumulation model indicate chloroform extract of leaves showed the best antisecretory activity, because inhibited the accumulation of intestinal fluid in 83.33 % as shown in the table 1. Followed by methanol extract of the flowers with 79.16 % of inhibition, is important to notice that all the extracts showed antisecretory activity upper to loperamide 43.33 % of inhibition.
We found that chloroform and methanol extracts of the aerial parts of the *Phytolacca icosandra* L. (flowers and leaves) present antisecretory activity in the animals upper to loperamide (43.33 %). Methanol extract of the flowers showed better antisecretory activity than chloroform extract (79.16 and 55.83 % of inhibition respectively), chloroform extract of leaves showed better antisecretory activity than all the other extracts (83.33 %). Intestinal hypersecretion is a common cause of dehydration, which causes often death in some patients children principally. Is important to found antisecretory compounds which can serve to treat dehydration, and medicinal plants used to treat gastrointestinal disorders are a potential source to obtain compounds with therapeutic utility. Previous studies have reported antidiarrhoeal compounds isolated of medicinal plants which includes flavonoids, terpenes, alkaloids, cumarins, saponins and tannins, phytochemical analysis revealed the presence of flavonoids and tannins principally in *P. icosandra*.

**CONCLUSIONS**

The results of the present study lend some support to the anecdotal report for the traditional use of *Phytolacca icosandra* L. in the control of diarrhea. Therefore will be necessary the application of chromatographic techniques to allow isolate active compounds of *P. icosandra*.

**ACKNOWLEDGMENTS**

Mr Alfredo Velázquez and Ms María González to provide the plant material.

**REFERENCES**

1. Behrma R, Kliegman R, Jenson H. Nelson Tratado de Pediatría, 17"ma edición, España:
3. WHO. http://www.who.int/topics/diarrhoea/en/
6. fichas/ficha.htm