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SANTONIN CONTENT OF *ARTEMISIA* SAMPLES OF PARACHINAR AREA OF PAKISTAN: A SIMPLIFIED PROCEDURE FOR ITS DETERMINATION

Yusuf Ahmad, S. Khaqan Hasan and (Miss) Nuzhat K. Sherwani

PCSIR Laboratories, Karachi 39, Pakistan

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Six samples of *Artemisia* plants have been collected from Parachinar area of Pakistan, and their santonin contents have been determined by a simple procedure developed by us. Santonin content of these sample varied in the range of 1.27 to 2.75%.

INTRODUCTION

Artemisia (family-Compositae is a large genus of small herbs [1] and its thirty six species are found in Pakistan [2]. Among these species, *A. maritima* Linn. contains santonin, a potent anthelmintic drug [2-4] and is found in Kurram Valley, Gilgit Agency, Kaghan Valley, Chitral, Dir, Swat, Khyber Agency, Indus Kohistan, Waziristan and large barren areas of Baluchistan [2,3]. *Artemisia maritima* from Kurram Valley is specially rich in santonin content and is mainly used for extraction of santonin by Kurram Chemical Company (Rawalpindi, Pakistan), one of the largest manufacturers of santonin in the world [5]. The santonin content in various species of *Artemisia* varies considerably. Besides santonin there are other interesting compounds which also need investigation.

The city of Parachinar is situated in Kurram Valley and the *Artemisia* plants for the following study were collected from Parachinar and neighbouring villages on Parachinar-Burki Road. Santonin content of plants is highest in September [1,3,4] therefore, *Artemisia* samples were collected on the morning of September 9, 1981.

The reported methods for determination of santonin in *Artemisia* herb appear to be tedious and involve gravimetric determination by precipitation with barium hydroxide [6,7] and chromatography [8], or colorimetric [9] methods. A very simple procedure has been developed by us for gravimetric determination of santonin in the dried herb. In contrast to the procedures developed earlier, santonin was isolated and purified by a very simplified procedure described below. It has given us a quick and easy method (with commonly available apparatus) for the determination and comparison of the santonin content of the samples of the same or different species of *Artemisia* collected from different parts of the country.

Table 1 shows the santonin content of various samples, collected from Parachinar area. The santonin content of these samples varied in the range of 1.27 to 2.75% and was highest in the samples from outskirts (Militia Garden) of Parachinar and Lalmi village. These results appear to confirm another report [3] which mentioned santonin content in the samples of this area also in the range of 1.5-2.5%.

Table 1. Santonin content of the samples from Parachinar area.

S. No.	Area of Collection	Yield (mg)	Santonin (%w/w)
1.	Militia Garden (Parachinar)	410	2.73
2.	Karakhela	193	1.28
3.	Kachkina	190	1.27
4.	Sahra Kili	240	1.60
5.	Lalmi	413	2.75
6.	Burki	340	2.26

EXPERIMENTAL

The collected aerial parts of the herb were dried in shade and stems were removed and discarded. Thus dried *Artemisia* herb (15 g) packed in a thimble was extracted for two days with benzene (400 ml) in a soxhlet apparatus. Evaporation of the extract gave a dark green residue which was dissolved in a minimum quantity of 95% ethanol (about 10 ml). Water (50 ml) and charcoal (0.5 g) were

added to this solution and the suspension refluxed for ½ hour. It was then filtered, and the filtrate was extracted with chloroform (3x33 ml). Evaporation of the dried (Na_2SO_4) chloroform extract gave a residue which on crystallisation from 95% ethanol afforded santonin (I.R. spectrum identical with pure standard sample of (–) α-santonin). Yields from various samples are reported in Table 1.

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