

ALKALOIDAL COMPOSITION OF OPIUM OBTAINED WITH SUCCESSIVE LANCINGS

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(Received July, 14, 1967; revised November 6, 1967)

Opium from various lancings and the capsules after each lancing were analysed for alkaloidal content. Morphine and codeine content is maximum in the third lancing opium, whereas narcotine and papaverine is maximum in the seventh and fifth lancing opium, respectively. In case of capsules, the individual alkaloidal content is maximum after second or third lancing.

Introduction

Opium is the dried latex of the unripe capsules of *Papaver somniferum* L. For the extraction of morphine, codeine etc. on industrial scale, it is important to know how many lancings are necessary and also the maturity of the plant and the capsule at which the alkaloidal content is maximum.

Poethke and Arnold¹ and Wegner² have determined the morphine content in different parts of the poppy plant in relation to growth. Kleinschmidt³ and Aksanowski *et al.*⁴ have determined the amount of various alkaloids in various parts of 2-12 week old plants. The United Nations Narcotics Laboratory⁵ has done complete analysis of opium samples from different opium-growing regions of the world with the object of tracing the source at the centres of illegal consumption in order to put a curb on the illicit traffic of crude opium. Zaman⁶ has reported the morphine content of opium after various lancings of poppy capsules, but no work was done on capsules. In the present work, opium obtained from various lancings and the capsules after each lancing, were analysed for alkaloids only.

Botanical Description

Papaver somniferum Linn. belongs to the family Papaveraceae. This is an annual plant and bears showy flowers with white to purple petals, often with a deep purple inner base of petals. There are more than a dozen established varieties of this species in the Indo-Pakistan sub-continent.⁷ The hybrid forms often show fringed petals.

Methods of Sampling

The samples were obtained from the plants grown in the experimental farms of the Medicinal Plant Branch of the Forest Institute, Peshawar.

They were young plants before flowering (8-week old), plants with young fruits (9-week old), and developed and unripened capsules before and after lancing. In another series, morphologically similar capsules were vertically lanced in the afternoon with one incision for about 8 successive days. The latex was collected the following morning by scraping and the contents of each lancing were subjected to chemical studies. After about eighth lancing the quantity of latex was so small, that economically it was not feasible for collection.

Procedure

The methods of unified analysis of opium for alkaloids by United Nations Narcotics Board were followed. In the case of poppy capsules the fresh material (about 200 g) was crushed with sodium carbonate (about 20 g), allowed to stand for 1 hr and percolated with 95% alcohol 300 ml each time). Four percolations, each after 24 hr, were sufficient. The solvent was removed from the combined percolate under reduced pressure. The residue was treated with glacial acetic acid, and processed and analysed according to the unified analysis of opium. Experiments were carried out in duplicate and average of the results taken.

Discussion

Crude Opium.—It is evident from Table 2 that the morphine content is maximum at the third lancing. Afterwards it decreases and shows an appreciable fall at the seventh lancing. The maximum morphine content of 15% in the first lancing opium grown at Abbottabad was reported by Zaman.⁶ The high alkaloidal content may be due to soil and climatic factors and the methods of analysis (British Pharmacopoeia method was followed).

The codeine content is maximum (5.08%) at the third lancing after which it decreases till

3.45% at the eighth lancing. Though the narcotone content is maximum at the seventh lancing, the amount obtained from the fourth, fifth, sixth and eighth lancing is also quite high. Papaverine content remains nearly constant up to the third lancing and reaches maximum at the fifth. Minor phenolic alkaloids show a gradual increase reaching maximum at the seventh lancing. The amount of unknown bases is maximum at the third lancing and then decreases till negligible at the seventh. Thebaine content gradually increases, reaching 5.49% at the eighth lancing.

In summary, the morphine and codeine content reaches maximum at the third lancing, narcotone and papaverine at the fifth to seventh lancing, and the baine shows a gradual increase.

United Nations Narcotics Board has reported very high morphine content in opium from

Yugoslavia (20.33%), Greece (19.07%), Vietnam (17.17%) and Turkey (16.10%), compared to which Pakistan opium is much inferior. There is a need for improving its quality in order to make its industrial exploitation more economical.

Capsules.—In capsules the alkaloidal content comes to nil after the third lancing. The individual alkaloids, i.e. morphine, codeine, thebaine, narcotone and papaverine, show a maximum either after the second or the third lancing.

One hundred fresh poppy capsules (85% moisture content) gave 6 g fresh opium (50% moisture content) at first lancing and almost the same amount continued up to fourth lancing. As such the amount of morphine from opium will be much more than that obtained from unlanced poppy capsules. It is clear from Tables 2 and 3 that

TABLE 1.—ALKALOIDAL CONTENT (%) OF THE PLANT AT TWO STAGES OF ITS GROWTH.

Sample	Thebaine	Papaverine	Narcotone	Minor phenolic	Codeine+ cryptopine	Morphine
Young plant before flowering (8-week old)	0.0076	0.021	0.12	0.0014	nil	nil
Young plant with young fruits (9-week old)	0.049	0.023	0.031	0.009	0.009	0.036

TABLE 2.—ALKALOIDAL CONTENT (%) OF OPIUM OBTAINED FROM VARIOUS LANCINGS IN UNRIPENED CAPSULES.

Lancing	Thebaine	Unknown base	Papaverine	Narcotone	Minor phenolic	Codeine+ cryptopine	Morphine
1st	1.07	0.287	2.19	2.23	0.752	2.81	7.10
2nd	1.53	0.311	2.70	5.00	0.283	4.40	7.80
3rd	1.40	0.512	2.25	7.18	0.72	5.08	8.55
4th	1.30	0.432	2.71	7.82	1.008	5.00	6.43
5th	2.22	0.445	3.45	8.23	1.35	4.81	8.31
6th	2.49	0.311	2.98	1.03	1.29	4.45	7.60
7th	3.97	nil	2.00	8.53	1.78	4.00	4.34
8th	5.49	nil	0.61	7.96	0.82	3.45	nil

TABLE 3.—LEFT OVER ALKALOIDAL CONTENT (%) IN POPPY CAPSULES AFTER VARIOUS LANCINGS.

Sample	Thebaine	Papaverine	Narcotone	Codeine+ cryptopine	Morphine
Unlanced	0.027	0.046	0.153	0.036	0.20
Once lanced	0.086	0.046	0.194	0.116	0.296
Twice lanced	0.025	0.056	0.173	0.117	0.337
Thrice lanced	0.015	0.014	0.074	nil	0.06

morphine is obtained up to eighth lancing whereas it comes to nil in capsules after third lancing.

Young plants do not contain any morphine or codeine, although some narcotine and papaverine is present.

These investigations show that the use of unlanced poppy capsules for the isolation of alkaloids is uneconomical.

Acknowledgement.—The authors wish to express their thanks to Dr. S.A. Warsi, Director, North Regional Laboratories, Peshawar and Mr. M.I.R. Khan, Director, Pakistan Forest Research Institute, Peshawar, for their keen interest and encouragement throughout the work. The help rendered by M. Gharibullah in preparing the samples is also acknowledged.

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