

PHARMACOLOGICAL STUDIES ON EMBLICA OFFICINALIS

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INTRODUCTION

Avicenna (Sheikh Bu Ali Sina, 980-1037 A.D.) was the author of the 'Canon of Medicine' (Al-Qanoon) Fig. 1. In his tract on cardiac drugs he has listed 64 drugs which he used for the treatment of cardiac diseases (1). A possibility of errors of interpretation exists around the research on such drugs mentioned in old treatise. Research problems pertaining to these drugs can be resolved by applying the modern scientific principles. Attempts have been made to investigate some of the drugs mentioned by Avicenna (2,3,4). This paper deals with one such drug namely Emblica officinalis.

The fruit pulp of Emblica officinalis (English: Embelic Myrobalans; Hindi: Amla/Amalaki mentioned hereafter as myrobalans) is one of the important drugs used in the Indian systems of medicine. It is used both as a medicine for some diseases and as a tonic to build up lost vitality and vigor 5. In Unani (Graeco-Arab) system of medicine, it is described as a tonic for heart and brain. Being a rich source of vitamin C it has been successfully used to treat human scurvy (6). Barring the discovery of ascorbic acid and presence of large amount of tannins, there does not seem to have any detailed work done. Therefore, the fruit pulp was subjected to chemical and pharmacological investigations. In order to do this, various claims of the practitioners of the indigenous system of medicine had to be kept in mind in order to devise suitable experiments to their validities. For example, Chavanaprash, a preparation containing mainly myrobalans is extensively used in India for chest diseases and for lowered vitality. It was not difficult to devise a test for at least one of these claims, namely, treatment of cough (7). Screening for anti-bacterial and anti-fungal activity showed mild anti-bacterial activity (8). The active principle appeared to be present in a fairly concentrated form in a fraction which was prepared by treating 80% alcoholic extract of myrobalans with HCL and extracting with ether. This semi-pure fraction inhibited the growth of Micrococcus pyogens var. aureus, Salmonella, typhosa and paratyphi at a concentration of 0.21 mg/ml and that of M. Pyogens var albus, S. Schottmuelleri and S. Dysenterics at a concentration of 0.42 mg/ml when tested by agarstreak method.

During the general pharmacological screening of the 80% alcoholic extract of myrobalans for various pharmacodynamic actions, a cardiotoxic activity was observed. This property did not appear to be a true cardiotoxic activity but was more like the actions of adrenaline (9). A pure crystalline material was isolated from the alcoholic extract which was a neutral non-nitrogenous substance with significant pharmacological actions. This active principle was designated as 'phyllemblin'.

AVICENNA: (Arabic: Ibn-e-Sina) was called the "Prince of Physicians". Born near Bukhara, 980, at Hamadan, Persia, 1007. Arab philosopher and physician, considered by some scholars to have been the greatest produced by the culture of the eastern Arab world. He displayed (c 997) his medical proficiency while still a youth, by curing a Persian ruler of a critical illness, and was thereafter variously physician and adviser to rulers at Khiva (c 1004) and Hamadan (until 1007).

He was the author of more than 100 works, of which his Canon of Medicine (Qanoon) is unquestionably the most important, and was widely translated in Europe during the Middle Ages.

Acute Toxicity

Phyllemblin was well tolerated by mice in doses upto 100 mg/kg when given intraperitoneally in mice and upto 500 mg/kg when given orally. At doses above 500 mg/kg animals appeared drowsy and dull soon after the injection and were active again after 1-3 hours.

DISCUSSION

Expectorant activity of the 80% alcoholic extract of the fruit pulp of *Emb/ica officina/is* was studied by the technique proposed by Boyd and Perry (10) which is fairly simple and reproducible. Of the several fractions studied, only 80% alcoholic extract showed activity. Phyllemblin was not active. Gallic acid, tannins and ascorbic acid present in the extract were also tested and found inactive. An attempt was made to study the mode of action. The alcoholic extract was effective orally, intraperitoneally, intravenously and even in atropinized animals. This is unlike ammonium chloride, which is known to act as a reflex stimulating agent of bronchial secretion through the irritation of the gastric mucosa and is inactive when given parenterally. Since the action of the extract was not blocked by cholinergic blocking agents, it was inferred that like eucalyptol (Boyd and Pearson¹³ it directly stimulated the bronchial glands.

The pharmacodynamic actions of phyllemblin (a white crystalline compound, m.p. 161-3°C isolated from 80% alcoholic extract) can be grouped into two classes (i) direct action on various systems, (ii) potentiation- of the actions of adrenaline. Of the direct effect, mention may be made of the mild stimulation of isolated heart of frog and rabbit, short rise in cat's blood pressure, contraction of the nictitating membrane, reduction in the outflow of the perfused isolated hind limb of rat and ear of rabbit, increase in cardiac outflow of frog heart and antispasmodic action on intestinal smooth muscle. Of the indirect action, potentiation of the action of adrenaline on the blood pressure of cat, isolated frog heart, nictitating membrane of cat, rabbit, intestine and seminal vesicles of rat.

Phyllemblin resembles adrenaline in its direct effects, but it does not resemble in other details. For example, per se it does not elevate the blood pressure, does not contract the seminal vesicle and does not elevate the blood glucose level. It resembles ephedrine in its ability to potentiate adrenaline. But differs from ephedrine in some respects; for example, it does not show tachyphylaxia. It stimulates the heart, produces coronary dilation and peripheral vasoconstriction. Therefore, its action is adrenergic but it is neither completely like adrenaline nor like ephedrine.

The antispasmodic activity and adrenergic potentiating activity is comparable in many ways to rutin and other flavanoid compounds. However, it was found that phyllemblin had no effect on capillary permeability. It has been argued that rutin exerts its adrenergic potentiating activity mainly due to its antioxidant property.

CONCLUSIONS

Fruit pulp of *Emblica officinalis* is a rich source of vitamin C and provides vitamin C in most stable form. Its bio-availability in cases of pulmonary tuberculosis is much better than synthetic vitamin C. It possesses powerful expectorant activity by directly stimulating the mucous cell of the bronchial tree. In addition the extract has mild antibacterial activity.

Phyllembin, an active principle isolated from the 80% alcoholic extract of *Emblica officinalis* acts on cardiovascular and other systems partly like adrenaline and partly like ephedrine. The investigations support the use of this drug by Avicenna (Sheikh Bu Ali Sina) in the treatment of cardiovascular diseases and its present use in cardiovascular and chest diseases in the Indian systems of medicine.