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## Review Article

### LUK (*LACCIFER LACCA*) AN IMPORTANT BUT LESS INVESTIGATED UNANI DRUG: OVERVIEW

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#### ABSTRACT

Luk (*Laccifer lacca*) is one of the most valuable gifts of Nature to man. It is also unique material in as much as it is the only resin of animal origin, being actually the secretion of a tiny insect, *Laccifer lacca*. Almost all physicians mentioned the medicinal properties and its therapeutic uses in their books and treatise, so many studies conducted for anti-obesity, anti-hyperlipidemic effect. But most of its action still not scientific validated. This drug is famous among unani practitioner as an anti-obesity agent and for its well-known effect on the hepatobiliary system also. So many Unani compound drugs formulations are available in the market and having chief ingredients as Luk and widely used in liver disorders and obesity. Apart of its medicinal use it is also used in various industries in wood finishing, printing ink, electrical industry, cosmetic and printing industry etc.

**Keywords:** Luk, *Laccifer lacca*, Anti-obesity, Unani drug, Hepatobilliary system.

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#### INTRODUCTION

The word Lac is the English version of Persian and Hindi words that means “hundred thousand,” indicating the large number of minute insects required to produce lac. In fact, about 17,000-90,000 insects are needed to produce one pound of shellac. Lac is the resinous secretion of the tiny insect,<sup>1</sup> a species of scale insect.<sup>1</sup> Belong to Genus *Laccifer*, family *Lacciferidae*, order *Hemiptera*.<sup>2</sup> The lac insects yields resin, lac dye and lac wax. Application of these products has been changing with time. Lac resin, dye etc. still find extensive use in other systems of medicine.<sup>3</sup> But earlier in unani medicine there are few misconceptions about the origin and source of Luk. Paulas said luk is the botanical resin and resemble with “Murmuki”, and its smell is good. Few told it “Kaharbah”, Descroides mentioned it as “Qaiqahan”. According to some Unani physician Lac falls on the plant of grape and accumulates as gum, some described it as dew falls on trees and accumulates as gum. In fact Luk is found on 40-45 different trees in India<sup>2, 3</sup>. Lac (Stick Lac) comprised of a natural raw material with exceptional environmentally compatible properties, which is biodegradable and generally recognized as physiologically safe. Lac is an ingredient having multiple industrial applications, shellac that is the final product after processing is widely used in confectionary, Gramophone industry, electrical industry, food products, pharmaceuticals, cosmetics, paints, nail polishes, varnishes (Lac). It is deposited on the twigs and young branches of several varieties of soapberry and acacia trees. It is harvested mainly for the production of shellac and lac dye.<sup>1</sup> The minute red coloured larvae of the insect settle on young succulent shoots of the host plant in myriads, drive their long proboscis into the bark and draw their nutriment from the sap. They secrete a thick resinous fluid which envelopes their body; and the secretions from individual insects coalesce and form a hard continuous encrustation over the twigs. After the completion of the life cycle, and just about the time the larvae of the next generation begin to emerge, the twigs are harvested and the encrustations scraped off, dried and processed to yield the Lac of commerce. The commonest and most widely occurring species of lac insect in India is<sup>1</sup> Kerr, which produces the bulk of commercial lac<sup>4,2</sup>. Interest in lac outside India dates back to the beginning of the nineteenth century perhaps a little earlier, when lac dye began to attract attention as an alternative or

adjunct to cochineal. India held a virtual monopoly of lac and till about 1950, accounted for nearly 85% of the world's production of stick lac.<sup>2</sup>

### VERNACULARS<sup>2</sup>

Arabic:	Luk, Laak
Bengali:	Gala, Laha
English:	Lac, Shell Lac
Gujarati:	Lakah, Lak
Hindi:	Lakh, Lahi, Laka
Marathi:	Lakh
Mal:	Lakhsha, Ambaloo
Persian:	Lak, Laag
Sanskrit:	Lakhsha, Lajha, Deept, Kusharanga
Tamil:	Komburki, Komburruk, Kombarakku
Telegu:	Kommolakka, Commolekka, Lakhsha, Lacca <sup>2, 4, 6, 7, 8, 9</sup>

### Habitat and Distribution

India possessed 89% of lac production and ranked the first in the world, Thailand ranked the second and China ranked the third<sup>10</sup> In India it is produced chiefly in the provinces of Orissa and Bihar, the centers of manufacture of shellac being Mizapar and Calcutta<sup>11</sup>. Lac is deposited on the twigs and young branches of several varieties of soapberry and acacia trees and particularly on the sacred fig, in India, Thailand, Burma, and elsewhere in Southeast Asia<sup>1,2</sup> Lac is abundantly found in Bengal, Assam, Burma, North West provinces and the central provinces, Punjab, Chennai and Mumbai. In India the best lac is come from Assam. In Bengal Lac is gathered twice a year viz. from mid of October to the end of the January, and from mid of the May to mid of July<sup>2, 6, 11, 8</sup> Shelf life of luk consider as 10 years<sup>2</sup>.

The commonest and most widely occurring species of lac insect in India is “1”. 14 species of the genus Laccifer have been recorded in India.<sup>2</sup>

S. No.	Species	Host Plants	Area
1.	<i>L. albizziae</i>	<i>Croton candatus</i> Geiseler	Darjeeling
2.	<i>L. ambigua</i>	-	Jhansi
3.	<i>L. chinensis</i>	<i>Cajanus cajan</i>	Assam
4.	<i>L. embrachiata</i>	<i>Ficus elastica</i> Roxb.	Bangalore
5.	<i>L. communis</i>	<i>Ficus mysorensis</i>	Mysore
6.	<i>L. fici</i>	<i>Ficus religiosa</i> Linn. & <i>Butea monosperma</i>	Monghyre, Coimbatore
7.	<i>L. indicola</i>	<i>Zizyphus mauritiana</i>	Bihar
8.	<i>L. jhansiensis</i>	<i>Zizyphus mauritiana</i>	Jhansi
9.	<i>L. kydia</i>	<i>Kydia calycina</i>	Assam
10.	<i>L. lacca</i> Kerr.	A number of host plant	All over India
11.	<i>L. longispina</i>	<i>Cajanus cajan</i>	Assam
12.	<i>L. mysorensis</i>	<i>Shorea talura</i>	Mysore
13.	<i>L. nagoliensis</i>	<i>Schleichera oleosa</i>	Bangalore
14.	<i>L. pusana</i>	<i>Butea monosperma</i>	Pusa

### UNANI DESCRIPTION / MAHIYAT

According to some experts specially Paulos, it is a fragrant gum of herb resembling Myrrh. Some people have mistakenly described it as yellow amber. Some others state that yellow amber is nothing but lac. As a matter of fact lac is similar in properties to yellow amber in many respects<sup>12</sup>. Rofas said that in its book *Kitab-ul-Mukhtarat-Fit-Tib*, luk is an aromatic gum of plant origin similar as murmuki. Few people consider luk as “Quharbah” because of the similarity in the properties<sup>13</sup>. Al-Harwi also described it as gum in his book *Bahr-ul-Jawahar*. These statements clears that early Unani physicians especially Arabs had little knowledge about lac source and thought it to be a plant secretion or exudates. The misunderstanding arose due to fact that lac did not grow on these area. But they all were well acquainted with its medicinal values. Unani physicians of later age especially of Indian subcontinent correct the misunderstanding of ancient

Greco-Roman and Arabs scholars and describe Lac correctly, they mentioned it an animal origin drugs and named as “Luk” which is obtained from small insect which survive and flourish on tree leaves especially Peepal, Ber, Hitta, Pakhri <sup>2</sup>. It is reddish, and looks like Toot surkh in colour, some of its are lemon-orangish in color, fragrant and tasteless and Light in weight <sup>9, 12, 7</sup>

### **ETHNOBOTANICAL DESCRIPTION**

Lac is a resinous substance usually of a reddish or dark brown colour with a disagreeable smell and easily breakable, deposited on the twigs of trees such as Banyan, Croton, Acacia and Peepal, by a small insect called the *Carteria lacca*. The insects attack the young branches of the trees and fix themselves to the branches; the female insect after oviposition is effected dies, giving out from her body a reddish liquid which solidifies and forms a crust about an inch thick round the branch attacked; others again affirm that the sting of the insect affects the sap or gum of the trees, which forms the lac <sup>6</sup>. The deposited material is the excreta of the insect <sup>14</sup>. Lac is known in Europe as Stick lac, Seed lac, Shell lac and Lump lac<sup>2 11, 8</sup>

### **FORMATION**

The lac insects are orange-red in colour and about 0.5mm long; the females are wingless, but the males have membranous wings and soon after pairing with the female, they die. The fecundated females in large numbers, becomes permanently attached to the twigs by their proboscides; they rapidly increases in size and secrete resinous matter from glands found on all parts of their bodies. Larvae, in large numbers about 1000, develop inside the body of each female insect and the abundant resinous secretion of the closely packed insects coalesces to form a continuous mass surrounding the twigs to a thickness of about 7mm, and embedding the insects. The larvae escape from the body of the dead parent and swarm over the branches; many are carried by the breeze or by animal agencies (bees, birds, squirrels, etc) to other plants. Artificial infection of tress is accomplished by removing twigs with gravid female sand attaching them to suitable trees <sup>11</sup>

### **Temperament/Mizaj**

#### **Hot 2 and dryness 3**

Unani physicians give different opinion about the degree of the temperament, Hakeem and Lubhaya mentioned the temperament i.e. hotness in the second degree and dryness in first degree. While Ibne Sina mentioned its dryness in second degree. Momin, Ghani, Antaki, Husaini, Hakeem, and Kareem thought its dryness in third degree. Ibn-e-baitar told its temperament hot and dry in 3 degree. Processed laac (Luk-e-maghsool) is hot and dry in first degree <sup>2</sup>

### **Processing of lac:**

Processing of crude drugs is done since ages in Unani system of medicine for various purposes like to increase the potency, to decrease the toxicity, to maximize its penetration and absorption, to free it from unnecessary bulk and other unwanted parts of the plants. Similarly in this case Lac is processed for mainly two reasons firstly to remove impurity i.e., unwanted insect parts and other contamination and to increase its penetration power <sup>15</sup>. This claim of unani system is supported by the study carried out by Aisha et al<sup>22</sup> and Ghufran et al<sup>16</sup> that they found processed drug gave better results. The chemical and biological changes occurring in the drugs need further more extensive study to strengthen their claim. Physicians described various method of the processing of lac in their book but most common method is described here.

### **Method of Purification:**

In this method crude lac is cleaned by crushing and handpicking for big impurities like branches, leaves etc. Two drugs, roots of Izkhar (*Cymbopogon citrates*) and roots of Rewand chini (*Rheum emodi*) are taken half the weight of lac. Their decoction is prepared according to method described in unani literature i.e. taking weight of drug and water in ratio 1:16 and boiling it until it reduce to one forth in volume. The decoction is sieved by sieve no 80 and allowed to cool. Lac is triturated in a mortar containing this decoction for about 6 hours and then sieved through muslin cloth. Lac that remained unfiltered was again subjected to trituration with above prepared decoction. This process is continued till whole lac is filtered. The decoction is then made to stand whole night in refrigerator. The sedimented lac at the bottom is then separated out by decanting the supernatant decoction. Obtained lac is spread in the tray and shade. This purified lac is called Luk-e-Maghsool and this purified lac used in medicine.<sup>3, 16, 9, 15</sup>

### **Action in Unani system of medicine.**

Jaali ( Deterjent), Muhallil (Resolvent), Munaqqi-e-Ikhlal, Habis, Muqawwi-e-Jigar-wa-Meda (Hepatic And Gastro Tonic), Daf-e-Nafsuddam (Anti-Haemoptysis), Muhazzil (Anti-Obesity) , Qabiz (Astringent) <sup>9, 2, 15,12, 17</sup> Daf-e-Fasad-e-Balgham, Khoon wa Safra <sup>18</sup>, Mukawwi-e-Jigar (Liver tonic), Mufattit-e-Sudad (De-Obstruent), Muhallil-e-Auram (Anti-Inflammatory), Muniqqi-e-Akhlal-e-Barada, <sup>3,19</sup> Hakeem), Muqawwi-e-Bah (Sexualimprover), Mumassik (Avaricious), Daf-e-Sar'a (Anti-Epileptic), Mudir-e-haiz (Emmenogauge), Muqawwi-e-Basarat (Tonic For Eye vision) <sup>20,2</sup>, Khan), Mujaffif-e-Ratoobat (Dessicative), Munaffis (Expectorant and Brochodilator)<sup>7</sup>

### Therapeutic Uses

Khafqaan (Palpitation), Yarqaan (Jaundice), Istisqaa (Ascites), Azm-e-Jigar (Hepatomegaly), Waja-ul-Kabid (Hepatalgia) <sup>3,16,21</sup>, Falij (Paralysis), Qai-ud-dam (Hemetemesis), Surfa (Dry Cough), Rabu (Asthma), Sudad-e-jigar (Liver Obstruction), Zof'e Gurda (Weak Kidney) <sup>21, 9, 19, 2,7</sup>, Dubaila (Abscess), Bassor (Boils), Zarba'h wa-Sakta (Injury And Trauma), Karm-e-shikam (Helmentiasis), Juzaam (Leprosy) <sup>18</sup> Waja-e-Zuhar (Backache), Surat-e-anzaal (Premature Ejaculation<sup>2</sup> , Si'l (Tuberculosis) <sup>7</sup>, Zof-E-Bah <sup>20</sup>

### Ethanobotanical uses:

Hematemesis, Dental Carries and Teeth Diseases, Chronic Fever, Lumbago, Mayalgia, Epilepsy, Hysteria, Local Stimulant <sup>6</sup>, Mehawer (Preparing Cleansing Washes) <sup>8</sup>

### Non-medicinal uses:

Lac is chiefly used for making French polishes, varnishes and lacquers. It is an important ingredient of cements such as sealing wax and cements for ringing microscopical preparations <sup>11</sup>

### Muzir (Adverse effect)

Unani medicine also has the adverse effect in the human body. Antaki, Momin, Noor Kareem and Hakeem told that luk has the adverse effect for spleen and the weak persons while Ghani and Attar said in their book it has adverse effects on the head.

### Musleh (Corrective Agent)

Its musleh or corrective mentioned in the classical literature is Mastagi (*Pistasia lenticus*) <sup>16, 2, 22, 9, 19, 23</sup>.

### Miqdar-e-Khorak (Dose)

According to the Ghani the dose of Luk is 4gram while Noor Kareem, Nooruddin mentioned its Dose is 3.5-4.5 grams in Makhzanul Advia and Alfazul advia respectively.

### Phytochemistry

Lac is a mixture of several substances, of which resin is the main constituent. Lac contains about 6% of wax, 6.5% of red water-soluble coloring matter, laccaic acid, 70-85% of resin and a few insect remains, vegetable debris, etc. The resin, composed of two parts, a hard and a soft fraction, is formed from hydroxyl fatty acids and sesquiterpenes <sup>24, 14, 11</sup>, Glutene (5.5%) and extraneous substances (6.5%). Other constituents of Lac are sugar, protein and volatile oil present in traces. Lac also contains water soluble red dye and alkali and spirit soluble yellow dye, erythrolaccin, lac resin (mol. wt. 1000), acid value (59-97), hydroxyl value (255-280), Aleuric acid; trihydroxy palmitic acid (C<sub>16</sub>H<sub>32</sub>O<sub>5</sub>) is the major constituent. Several isomers of aleuritic acid are present. Shellolic acid of 10% two isomers of dihydroshellic acid and isomers of the next higher homologue of dihydroshellic acid have been isolated. Other constituents present in Lac are Kerolic acid (C<sub>16</sub>H<sub>32</sub>O<sub>6</sub>) and Butolic acid (C<sub>15</sub>H<sub>30</sub>O<sub>3</sub>). The resin can be fraction into soft and hard components by exhaustion with water. The former constituent 30% is of the original resin and brown in color. Both soft and hard resins can be fraction by successive extraction with organic solvent. One fraction of soft resin contains free fatty acid and neutral material including the yellow dye, erythrolaccin. The second fraction possibly comprises interesters of equivalent amounts of aleuritic acid, isomers of aleuritic acid and laccollic lactone. Mono and dihydroxy palmiticacids butolic acids, a liquid lactonic acid and two solid acids have been identified in the soft resin. The largest fraction 50% is of hard resin consist of mono basic interester C<sub>32</sub>H<sub>54</sub>O<sub>4</sub>, which on saponifications yields equimolar proportion of aleuritic acid and latic lactone. Second largest fraction 25% is composed of interester lactones of equivalent amounts of aleuric acid, lacolic lactone and kerrolic acid. The wax present in stick lac is usually obtained as a byproduct. The analytical constants of the wax fall within the following ranges: M.P. 72°-80° C, acid value 12.0-24.3, Sap.

Value 79-126, esters (Ceryllignocerate, ceryl, cerolate, laceryl lacceroal, ceryl aleuritate) acids (Lacceroic cerrotic) 10-14, alcohol (neoceryl, lacceryl) hydrocarbons (Pentacosane, heptacosane) 2-6 and resin 2-4% <sup>2</sup>.

### **Substituents and adulterants:**

**Colophony** – is sometimes added to shellac, chiefly with the object of lowering the melting point; the amount found in the adulterated samples vary from 2-20%.

**Bleached shellac**- is made by dissolving shellac in alkali, usually solution of sodium carbonate and bleaching with sodium hypochlorite.

**Buttan lac**-consist of rounded masses flattened on one side, prepared by dropping portions of molten lac into a flat surface.

**Garnet lac**- consist of broken sheets having a deep reddish colour.Both these forms are made from seed lac<sup>11</sup>

**Dewaxed lac:** wax has been removed from the lac and this type of lac forms clear solution with spirit and used in pharmaceutical industry for coating tablets and furniture polishing <sup>25</sup>

### **Compound formulations of luk:**

Safoof-e-Muhazzil, Dwaul Luk, Dwaul Zarishk, , And Qurse Luk, Safoof-E-Luk, Majoon Dabidulward, Majoon-E-Gul ,Qurs-E-Reward Etc. <sup>26, 27 28</sup>

### **Pharmacological researches:**

Anti-fertility activity of Luk as a single drug; was tested by <sup>29</sup> Result shows Luk interfere with normal ovulation by disrupting the estrus cycle and prolonging the diestrus phase. It has also hinders the implantation and exhibits teratogenic effect possibly by virtue of its estrogenic effect. <sup>30</sup> tested the Luk for its effects on diet induced hyperlipidemia in albino rats and it was found significant. An indigenous preparation (AYUSH-47) having <sup>1</sup> as one of the ingredients in combination with *Saraca indica*, *Areca catechu*, gold and sugar has claimed to exhibit anti-implantation effect in rabbits <sup>31,32</sup> also conducted a Clinical study on hyperlipidemia, luk was administered in a dose of 3grams twice a day for 3 months. Results shows fall in the serum cholesterol, serum triglycerides and total lipids at a rate of 23%, 38% and 12% respectively. And no side- effect of the drugs was observed. Another clinical study was conducted by <sup>33</sup> on hyperlipidemia. Luk-E-Maghsool was given in a dose of 3-5 gm twice daily for 60 days. Results shows body weight and skin fold thickness reduced in 40% case, and also decreases serum cholesterol and serum triglycerides. The effect of drug is probably due to *munaqqi-e-akhlat-e-barida*, *muhallil* and *mudir* effects.

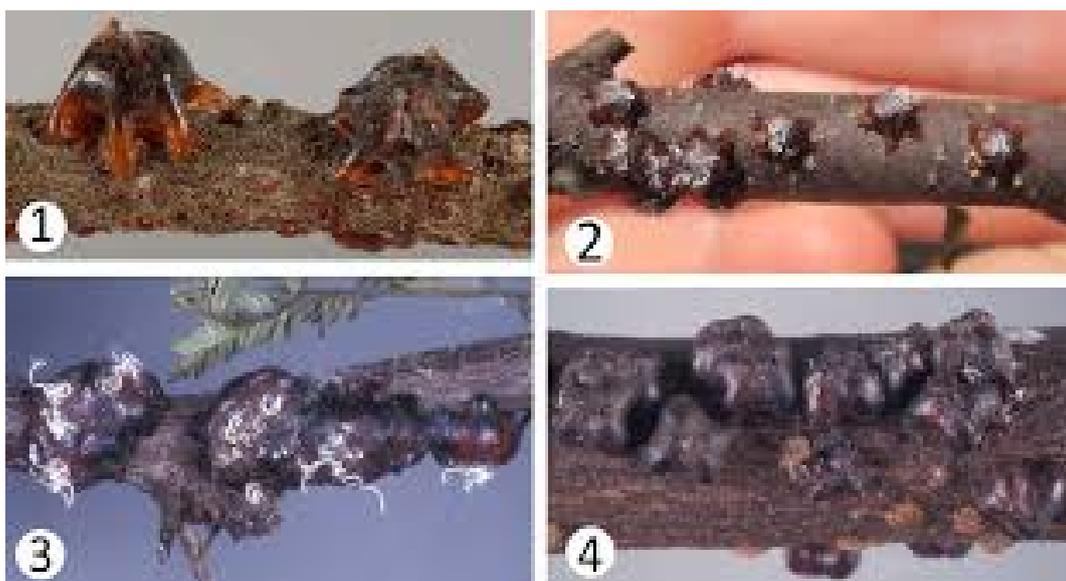
### **CONCLUSION:**

Luk is one of the important drug used in the unani system of medicine and in others system too. And well known for the anti-obesity agents as well in liver disorder. Although incidence of non-alcoholic liver disease (NAFLD) is rapidly increasing and it is graded in I, II and III and its affects the liver texture and even complicated as cirrhosis. As we discussed earlier Luk is good hepatoprotective, anti-hyperlipidemic well known anti-obesity drug, but still not evaluated for the much biological activity even not for the hepatoprotective or antihepatitis activity. While so many liver compound preparations available in the market such as *dawa'ul luk*, *qurs-e-luk*, *safoof-e-luk*, *dawa-ul-zarisk*, *Majoon-e-Gul*, *Qurs-e-Reward* etc and widely used in acute and chronic hepatic disorders. Although *Safoof-e-luk*, *Majoon-e-Gul* and *Qurs-e-reward* evaluated experimentally and proved that not only decrease the fatty changes but also improved the functioning of liver and showed the protective, curative and regenerative effects<sup>34</sup>. Therefore more filtered studies on Luk are needed to validate its unani action other than anti-obesity action and justify its rational use for range of those ailments for which it is already being used in Unani and other Complementary and alternative system of medicines since ages.

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