

A Study on Guggulu with special reference to Analgesic Effect

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ABSTRACT : Ayurvedic drugs containing Guggulu are predominantly used in *Vataja disorders*, where pain is the foremost symptom. Hence it was thought that *Guggulu* might be having analgesic effect. This research paper deals with various experiments on 20 albino rats to ascertain analgesic effect of Guggulu.

Key words : Ayurvedic drug, Ashuddha Guggulu, Shuddha Guggulu, Vataharana, Vedanaharana, Analgesic activity.

INTRODUCTION

*Guggulu*¹ preparations are mainly used in *Vata Vyadhies* like *Amavata*², *Vata Rakta* etc. where pain is the dominating symptom. In *Ayurveda*, *Vata dosha* is considered responsible for producing pain. There are two ways through which vitiation of *Vata Dosha* occurs, one by the *Dhatukshaya* and another by *Awarana* (obstruction in *Srotasa*, passage or channel). The *Guggulu* is used mostly in *Vata Vyadhi*. The reason behind it lies on the part of the chemical constituents of *Guggulu* and its *Rasa*⁴, *Guna*⁵, *Virya* and *Vipaka* which play an important role for overcoming the ailments. *Guggulu* removes the factor of *Dhatukshaya* by its *Madhura*, *Katu*, *Tikta*, *Kashaya Rasa* and *Picchila*, *Snigdha Gunas*. It is also effective by removing the obstruction in *Srotasa* due to its *Lekhana* property (of old *Guggulu*) in case of the disorder caused by *Margawarana*. Therefore considering this fact, some experiments were carried out on albino rats to evaluate the analgesic effect of *Guggulu*, for this purpose certain drugs were selected, which were supposed to have analgesic action, for administration in albino rats. Thus distilled water, *Shodhita Guggulu*, *Nirgundi Shodhita Guggulu*, combinations of *Guggulu* with *Kupilu*, *Vatsanabha* and *Bhallataka* were used in therapeutic doses, whereas *Disprin*⁶ was taken as a control drug. *Nirgundi Shodhita Guggulu* was taken due to the fact that *Nirgundi* being a *Vatahara* and *Vedana Shamaka* drug would exhibit analgesic effect. Other drugs of combination like *Kupilu*, *Vatsanabha* and *Bhallataka* are also having *Vatahara* effect and *Vata* is considered responsible to produce pain, hence the drugs which are capable to alleviate *Vata dosha* were taken into consideration for analgesic effect. Since *Guggulu* is also *Vata-Kaphahara* drug, so its combination with other

Vatahara drugs was made just to enhance or potentiate its *Vatahara* effect ultimately causing analgesic effect. In this experiment the albino rats were tested for analgesic effect through Analgesiometer⁷ by tail flickering test after administering orally the drugs.

MATERIALS AND METHOD

(A) Test drugs groups and their doses :

- (i) Distilled water *Shodhita Guggulu*:
25 mg/100 gm body weight of rat
- (ii) *Nirgundi Shodhita Guggulu*:
25 mg/100 gm body weight of rat
- (iii) *Shuddha Guggulu* + *Shuddha Kupilu*:
25+2 mg/100 gm body weight of rat
- (iv) *Shuddha Guggulu* + *Shuddha Bhallataka*:
25+2 mg/100 gm body weight of rat
- (v) *Shuddha Guggulu* + *Shuddha Vatsanabha*:
25+2 mg/100 gm body weight of rat
- (vi) *Disprin*
25 mg/100 gm body weight of rat

(B) Equipments required : Rat cages, Analgesiometers, syringe (5 ml), rubber tube, beaker, mortar and pestle etc.

(C) Experimental animals : Ten albino rats of each sex i.e. male (10) and female (10), having approximate body weight between 100-150 gm.

All rats were divided into four groups; each consisted of five rats already well marked, to differentiate from each other. They were acclimatized for seven days then observed for analgesic effect of each drug one by one separately after administering the drug orally with the help of a syringe and rubber tube in appropriate dose. For this purpose at first all the albino rats were tested individually for their initial threshold of

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pain tolerance through an analgesiometer by keeping tail of the rat on its wire mode for this specific purpose and well regulated electric current was allowed to pass through this wire, so that its temperature starts to increase. In addition there is also such an arrangement in the analgesiometer through continuous water supply around the area of wire which controls the temperature. Now at the point, when the rat flicks its tail, current is stopped and this much time duration, taken by the rat to flick its tail, is recorded by a stop-watch. This duration comes in few seconds. In this way initial time period is noted down for each and every rat individually then after the solution water *Shodhita Guggulu* in appropriate dose was administered to the albino rats. One hour after the administration of drug, the rats were tested for their pain

tolerance time through the same test i.e. tail flicking test and the reading was noted down. Likewise after another more one hour, reading was again taken to find out the difference that whether the pain tolerating time remains the same, increases or decreases. If the latent period is increased then it is presumed that the drug is having analgesic effect.

In the same manner readings for other drugs are also taken to determine their analgesic effect.

OBSERVATIONS & RESULT

The detail observations of analgesic activity of various groups of test drugs along with control group are given in Table No. 1 - 6 as follows.

TABLE NO. 1 : ANALGESIC EFFECT OF DISTILLED WATER SHODHITA GUGGULU :

Sr. No.	Albino Rat	Time (in seconds)		
		Initial	After 1 hr.	After 2 hrs.
1.	Male	2.2	2.0	2.2
2.	Male	2.4	2.4	2.1
3.	Male	2.3	2.3	2.1
4.	Male	2.2	2.2	2.0
5.	Male	2.1	2.2	2.0
6.	Male	2.0	2.0	2.2
7.	Male	2.4	2.2	2.3
8.	Male	2.3	2.0	2.1
9.	Male	2.1	2.1	2.1
10.	Male	2.0	2.2	2.0
11.	Female	2.2	2.1	2.2
12.	Female	2.4	2.3	2.3
13.	Female	2.2	2.2	2.1
14.	Female	2.2	2.0	2.2
15.	Female	2.5	2.3	2.1
16.	Female	2.1	2.0	2.2
17.	Female	2.1	2.0	2.1
18.	Female	2.2	2.1	2.1
19.	Female	2.3	2.2	2.4
20.	Female	2.0	2.0	2.0

TABLE NO. 2 : ANALGESIC EFFECT OF NIRGUNDI SHODHITA GUGGULU :

Sr. No.	Albino Rat	Time (in seconds)		
		Initial	After 1 hr.	After 2 hrs.
1.	Male	4.2	4.0	4.2
2.	Male	4.2	4.2	4.2
3.	Male	4.1	4.0	4.1
4.	Male	4.2	4.2	4.2
5.	Male	4.1	4.2	4.0
6.	Male	4.0	4.0	4.2
7.	Male	4.4	4.2	4.3
8.	Male	4.3	4.0	4.1
9.	Male	4.1	4.1	4.1
10.	Male	4.0	4.2	4.2
11.	Female	4.2	4.1	4.2

12.	Female	4.4	4.3	4.3
13.	Female	4.2	4.2	4.1
14.	Female	4.2	4.0	4.0
15.	Female	4.5	4.2	4.3
16.	Female	4.1	4.0	4.2
17.	Female	4.1	4.0	4.1
18.	Female	4.2	4.1	4.1
19.	Female	4.3	4.0	4.1
20.	Female	4.0	4.1	4.1

TABLE NO. 3 : ANALGESIC EFFECT OF S. GUGGULU AND S. KUPILU :

Sr. No.	Albino Rat	Time (in seconds)		
		Initial	After 1 hr.	After 2 hrs.
1.	Male	3.3	3.1	3.0
2.	Male	3.3	3.2	3.0
3.	Male	3.2	3.1	3.1
4.	Male	3.1	3.0	3.1
5.	Male	3.1	3.0	3.2
6.	Male	3.5	3.3	3.2
7.	Male	3.2	3.0	3.0
8.	Male	3.2	3.2	3.1
9.	Male	3.4	3.3	3.3
10.	Male	3.2	3.1	3.1
11.	Female	3.2	3.1	3.2
12.	Female	3.0	3.2	3.0
13.	Female	3.1	3.1	3.0
14.	Female	3.3	3.0	3.1
15.	Female	3.4	3.2	3.3
16.	Female	3.1	3.2	3.0
17.	Female	3.0	3.0	3.1
18.	Female	3.4	3.2	3.0
19.	Female	3.3	3.3	3.1
20.	Female	3.5	3.0	3.2

TABLE NO. 4 : ANALGESIC EFFECT OF S. GUGGULU AND S. BHALLATAKA :

Sr. No.	Albino Rat	Time (in seconds)		
		Initial	After 1 hr.	After 2 hrs.
1.	Male	2.0	2.1	2.0
2.	Male	2.3	2.0	2.2
3.	Male	2.1	2.0	2.1
4.	Male	2.2	2.1	2.1
5.	Male	2.5	2.3	2.1
6.	Male	2.2	2.0	2.0
7.	Male	2.2	2.2	2.1
8.	Male	2.2	2.1	2.2
9.	Male	2.2	2.3	2.0
10.	Male	2.4	2.1	2.0
11.	Female	2.2	2.1	2.2
12.	Female	2.0	2.1	2.2
13.	Female	2.3	2.0	2.1
14.	Female	2.0	2.0	2.1
15.	Female	2.1	2.0	2.2
16.	Female	2.2	2.2	2.0
17.	Female	2.3	2.3	2.1
18.	Female	2.4	2.2	2.4
19.	Female	2.2	2.0	2.1
20.	Female	2.1	2.3	2.1

TABLE NO. 5 : ANALGESIC EFFECT OF S. GUGGULU AND S. VATSANABHA :

Sr. No.	Albino Rat	Time (in seconds)		
		Initial	After 1 hr.	After 2 hrs.
1.	Male	4.2	4.0	4.2
2.	Male	4.3	4.2	4.0
3.	Male	4.1	4.0	4.1
4.	Male	4.2	4.0	4.1
5.	Male	4.5	4.4	4.2
6.	Male	4.4	4.2	4.4
7.	Male	4.2	4.2	4.0
8.	Male	4.3	4.0	4.1
9.	Male	4.1	4.1	4.0
10.	Male	4.0	4.2	4.2
11.	Female	4.3	4.3	4.1
12.	Female	4.2	4.2	4.0
13.	Female	4.5	4.0	4.1
14.	Female	4.2	4.0	4.0
15.	Female	4.0	4.0	4.2
16.	Female	4.3	4.3	4.1
17.	Female	4.4	4.2	4.4
18.	Female	4.0	4.1	4.0
19.	Female	4.5	4.2	4.4
20.	Female	4.0	4.1	4.0

TABLE NO. 6 : ANALGESIC EFFECT OF DISPRIN :

Sr. No.	Albino Rat	Time (in seconds)		
		Initial	After 1 hr.	After 2 hrs.
1.	Male	3.2	3.6	3.8
2.	Male	3.4	5.6	5.9
3.	Male	4.8	6.2	4.5
4.	Male	4.8	6.2	6.4
5.	Male	4.1	5.0	5.2
6.	Male	4.0	5.0	6.0
7.	Male	4.4	6.2	6.4
8.	Male	5.3	5.8	6.2
9.	Male	4.2	5.2	5.4
10.	Male	4.6	5.0	5.1
11.	Female	8.0	8.2	9.2
12.	Female	6.2	6.8	7.0
13.	Female	4.2	5.0	6.4
14.	Female	5.4	5.9	6.6
15.	Female	5.5	6.9	7.0
16.	Female	4.1	5.2	6.0
17.	Female	6.1	4.0	4.8
18.	Female	2.4	4.0	5.8
19.	Female	2.9	3.2	4.1
20.	Female	4.0	4.8	5.2

TABLE No. 7 : EFFCT OF TEST DRUGS ON TAIL FLICK RESPONCE IN RATS :

Groups	Tail flick response at various time intervals (Sec.)			
	After 1 hour	Paired 't'	After 2 hours	Paired 't'
Water control	- 0.050 ± 0.03	1.670	- 0.070 ± 0.03	2.333
Nirgundi Shodhita Guggulu	- 0.085 ± 0.03	2.833	- 0.045 ± 0.028	1.607
Shodhita Guggulu + Shodhita Kupilu	- 0.115 ± 0.03	3.709	- 0.13 ± 0.28	4.642
Shodhita Guggulu + Shodhita Bhallataka	- 0.140 ± 0.05	2.592	- 0.080 ± 0.036	20.222
Shodhita Guggulu + Shodhita Vatsanabha	- 0.090 ± 0.03	3.00	- 0.115 ± 0.033	3.484
Reference Standard - Disprin	0.094 ± 0.12	0.766	1.52 ± 0.15***	10.13

Data: Mean ± SEM *** p<0.001 (Paired & Unpaired)

DISCUSSION

In ayurvedic system of medicine 'Guggulu' have special importance especially for the nervine rheumatic diseases. These preparations constitute Guggulu, a gum resin obtained from the plant of *Balsamodendron mukul*, as an active constituent. They are of five varieties out of which yellow Guggulu or Kanak Guggulu is commonly used for the preparations meant for human consumption, both new as well as old Guggulu are used in the manufacturing of medicines for different type of rheumatic troubles. Recent investigations have revealed that Guggulu play an important role in the cure of obesity and leprosy also. The list of traditional uses for Guggulu is extensive. It has been indicated for healing bone fracture to inflammation, arthritis, cardiovascular conditions, obesity, and lipid disorders. Several other external and internal uses for Guggulu have been described in folklore and ethno-medicine as well. Although, several therapeutic uses were indicated for Guggulu, the Indian gum resin was mainly used for treating arthritis and related conditions for centuries. Research regarding usage of Guggulu as a hypolipidemic agent did not begin until 1964. It is said that Satyavati and Dwarakanath were inspired to investigate Guggulu's lipid-lowering properties based on the strong analogy between the ancient concept of Medoroga in the Sushruta Samhita (600 B.C.) and the modern concept of the pathogenesis of atherosclerosis and its fatal complications. Preclinical and clinical studies were conducted over a period of two years to investigate Guggulu's lipid-lowering properties. The following results were reported: (1) In cholesterol-induced hyperlipidemic rabbits, an aqueous extract of crude gum Guggulu significantly lowered the serum cholesterol, phospholipids as well as protected against atherosclerosis (at the fatty streak stage); (2) The gum resin reduced the body-weight of animals; (3) Significant reductions in serum cholesterol levels were observed in obese and hypercholesterolemic patients using crude gum Guggulu.

Guggulu, extracted in Ethylacetate contains mainly following two separate parts; the insoluble part is carbohydrate gum which is discarded for medicinal use because of its toxic properties. The second soluble portion is resin part that has proven medicinal values. Resinous part has three kinds of substances - acidic, basic and neutral as follows -

- ◆ Acidic 4% - this part has anti-inflammatory property.
- ◆ Basic 0.3% - this part doesn't have any medicinal value.
- ◆ Neutral 95% - Neutral fraction is further subdivided into two parts. First the Ketonic fraction is a complex

mixture of steroids like Z-Guggulusteron and E-Guggulusteron. The second one is Non-Ketonic part. Both parts are hypolipidemic i.e. with lipid lowering activity.

The need for Guggulu Shodhana :

There are two objectives to purify a natural herb. First is to remove the external and internal impurities. The second reason is to increase the medicinal value. External impurities are in the form of dust, dry leaves and other foreign materials present in Guggulu. After purification, the herb becomes safer and more effective for use. Sometimes additional medicinal values are also instilled in the formulation.

Guggulu extract is produced after two types of purification.

- ◆ General Purification
- ◆ Specific Purification.

General Purification of Guggulu :

General purification is carried out by keeping the Guggulu in hot water overnight. The quantity of water is four times the weight of Guggulu. Next morning, it is heated very lightly. When the quantity of water remains half, the mixture is filtered with a cotton cloth or a mesh. Usually iron pan is used to purify Guggulu and the environment should be dry and sunny. For industrial purpose, it is dried in dryer and there is possibility of loss of volatile elements. Steam jacketed drying pans are standard for commercial purpose. Though it takes longer to dry Guggulu but the temperature is controlled around 50-60 degree centigrade.

Specific Purification :

Specific Purification of Guggulu increases the medicinal properties and helps in modifying the pharmacological actions. The same Guggulu is processed with different herbs (<http://www.holistic-herbalist.com/guggulipid.html>) and it is made active biologically in a differential way. Some of the verses mentioned in classics are summarized here -

- ◆ **Specificity of action:** Guggulu is boiled with decoctions of herbs for a particular disease and then filtered. This renders specificity of action in *C. mukul*. (Bharat Bhaishajya Ratnakara, Vol. 2-1320).
- ◆ **Increasing Vitiated mucus-digestive and mobile property :** Cow's urine or decoction of Triphala or triple myrobalans is used (Ras Chandanshu).

