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Triphala Guggulu: A Pharmaceutical and Analytical Study

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Abstract-

Herbal Formulation (HF) are very individualized and specified in terms of organic media (juices/decoction of herbs), quantum of heat exposed to them in manufacturing processes. In fact, these preparatory procedures of these HF are responsible for good medicinal characters of *Ayurvedic* compounds which work as disease pacifier. Guggulu described having Anti-inflammatory property in various classical texts. Guggulu is the integral part of the trial drug Triphala guggulu taken in the present study. Several methods of their preparation are told in classics. But it was felt that best suitable method is used for the preparation of Triphala Guggulu has been taken into consideration.The present study has been undertaken to Triphala Guggulu is mentioned in Sharangdhara Samhita and Bhesajyratnawali as a formulation which is indicated in Shotha. Thus, this article takes the approach of reviewing the experimental research work done on Triphala Guggulu as well as covers the pharmacological action of its ingredients.

Keywords- Ayurveda, Guggulu, Triphala Guggulu, Pharmaceutical and Analytical Study.

Introduction-

Ayurveda is one of the oldest systems of medicine, practiced in Indian Sub-Continent since thousand years with medicines of *herbal, mineral, metal, animal origin*, after its due pharmaceutical processing which convert and potentiates these raw substances in the form of therapeutic remedies. Presently nanotechnology is a spoken subject and new concept for the scientific world. It became an integral part of the day. Every field of science and human life is influenced with this. [1] Herbs are the oldest treating materials and making these preparations very fine, is one of the earliest approaches of using nano-particles for curing the disease. HF is the need of time to restore to health in a cost-effective and efficient way. Inflammation is defined as the local response of living

mammalian tissues to injury due to any agent. It is a body defence reaction in order to eliminate or limit the spread of injurious agents as well as to remove the consequent necrosed cells and tissues. Inflammation is described as Shotha in Ayurvedic parlance.[2] The accumulation of doshas between twak and mamsa produced different types of swellings called Shotha. Shotha means any inflammatory or non-inflammatory swelling produced in the body due to any internal factor or external injury. It is defined as mahagadha in Ayurvedic classics.[3]

In modern science many formulation and drugs are available as anti-inflammatory commonly known as NSAIDs, but there is enough evidence of the adverse effect of these such as Gastric irritation, peptic ulceration, Chronic renal failure, Mental confusion, Seizure precipitation, Haemolytic anaemia and much more. Thus there is the necessity of still better, cost effective anti-inflammatory drugs which will possibly reduce dose required without any adverse effect. Inflammation is described as disease in Ayurveda and in Modern Science; it is a sign or symptom. Drugs, given for this, are harmful to high extent because these can cause other diseases like acidity, ulcer etc. but in Ayurvedic concepts, Anti-inflammatory drugs are considered as Vedanasthapana.[4] Guggulu comes under this.

Guggulu described having Anti-inflammatory property in various classical texts. Guggulu is the integral part of the trial drug Triphala guggulu taken in the present study. Several methods of their preparation are told in classics. But it was felt that best suitable method is used for the preparation of Triphala Guggulu has been taken into consideration.

Aims and Objectives:

- To review Ayurvedic literature pertaining to “Triphala guggulu on Inflammation”.
- To review Ayurvedic literature regarding different methods of preparation of Triphala guggulu.
- Comparative Pharmaceutico-analytical study of Triphala guggulu.

Drug Review-

Ingredients & proportion of drugs of Triphala guggulu [5,6]

S.no.	Ingredient	Botanical name	Part used	Proportion	Ayurvedic Properties
1.	Haritaki	*Terminalia chebula* Retz.	Fruit	1 part	Rasa-Pancharasa (Lavan varjit) Guna- laghu, Ruksh Virya- Ushna Vipaka- Madhur Doshkarma- Tridoshhar Specially Vaathar
2.	Vibhitaki	*Terminalia bellirica* Roxb.	Fruit	1 part	Rasa- Kashaya Guna- laghu, Ruksh Virya- Ushna

					Vipaka- Madhur Doshkarma- Tridoshhar Specially Kaphahar
3.	Amalaki	*Emblica officinalis* Gaertn.	Fruit	1 part	Rasa- Pancharasa (Lavan varjit) Guna- laghu, Ruksh,sheet Virya- Sheeta Vipaka- Madhur Doshkarma- Specially Pittahar
4.	Pippali	*Piper longum* Linn.	Fruit	1 part	Rasa- Katu Guna- Laghu,Snigdha,Tikshna Virya- Anushansheeta Vipaka- Madhur Doshkarma- Kapha-Vatahar
5.	Guggulu	*Commiphora mukul* (Arnott) Bhandari	Gum resin	5 part	Rasa- Katu,Tikta Guna- Laghu,Ruksha,Tikshna Virya-Ushna Vipaka- Katu Doshkarma- Kapha-Vatahar

Preparation of Triphala guggulu:

Drug is of prime importance as far as the treatment of the disease is concerned. Ayurvedic classics are such treasures, in which huge collection of Drugs can be found. Chatushpadas are required for the successful treatment of the diseases. 'Drug' is one of those four factors. It is mandatory for Bhishaja to acquire wholesome knowledge of Drug to treat disease successfully.

In Vedas it is mentioned that, human observed animals using some specific Drugs when they meet with some unhealthy conditions. With the help of such observations, he developed the knowledge of 'Aushadhi Dravyas'. According to Acharya Charaka, in this Universe there will be hardly any Dravya which is without medicinal properties, if the knowledge of 'Dravyagunashastra' is acquired properly.

In this study, One Drug formulation which are said to be effective on all types of Shotha according to Ayurvedic classics, was selected. Aim was to study the efficacy of the formulation on all the typical manifestations of Shotha, as well as, to study the effect of these formulations on biochemical parameters which are routinely done for the evaluation of disease inflammation.[7]

Contents of Triphala Guggulu:

S. No.	Drug Name	Botanical Name	Family	Parts used	Quantity
1	Haritaki	*Terminalia chebula*	Combretaceae	Fruit	34.98 gram (3Tola)
2	Amalki	*Emblica officinalis*	Euphorbiaceae	Fruit	34.98 gram (3Tola)
3	Vibhitaki	*Terminalia belerica*	Combretaceae	Pericarp	34.98 gram (3Tola)
4	Pippali	*Piper longum*	Piperaceae	Fruit	46.64 gram (4Tola)
5	Guggulu	*Commiphora mukul*	Burseraceae	Gum resin	233.2gram (20 Tola)

Shuddha Guggulu is added with fine powder of another ingredients (Triphala, Pippali) and ghee are added and pounded in khalva yantra to get the consistency of vati. Then prepare a vati of size approx 500 mg (3ratti-546mg).

PHARMACEUTICAL STUDY:

Three batches of each *Triphala Shodhita Guggulu* and *Gomutra Shodhita Guggulu* were prepared with the same process. Results of successive batches of *Shodhita Guggulu* are summarized in the table below:

Table 2.4: Results of successive batches of *Shodhita Guggulu*

Batch	Yield (*Shuddha Guggulu* Obtained)	Residue	Gain(↑)/ Loss (↓)	% Gain/Loss
TSTG 1	1270	190	270↑	27↑
TSTG 2	1020	250	20↑	02↑
TSTG 3	1250	170	250↑	25↑
GSTG 1	880	170	120↓	12↓
GSTG 2	940	170	60↓	06↓
GSTG 3	960	170	40↓	04↓

Keys: ↑ = Gain ↓ = Loss

Likewise three batches of each *Triphala Shodhita Triphala Guggulu vati* and *Gomutra Shodhita Triphala Guggulu vati* were prepared Results of successive batches of *Vati* preparation of *Shuddha Guggulu* are summarized in the table 2.5 below.

Table 2.5: **Results of successive batches of *Vati* preparation**

Batch	*Triphala Guggulu* (in gm)	*Vati* Obtained (in Gram)	Loss (in gm)	%Loss
TSG 1	1270	1200	70	5.5
TSG 2	1020	910	110	10.78
TSG 3	1250	1150	100	10
GSG 1	880	800	80	9.09
GSG 2	940	850	90	9.57
GSG 3	960	880	80	8.33

Table 2.6 - Approximate ratio of extracted part from *Ashuddha guggulu* and deposited part of *Shodhana media*

	Media: *Triphala Kwatha* (4 Litre)			**Media: *Gomutra* (4 Litre)**		
	Yield (in gm)	**Ext. Part (in gm)**	**Deposited Part (in gm)**	**Yield (in gm)**	**Ext. Part (in gm)**	**Deposited Part (in gm)**
Batch 1	1270	793.20	476.80	880	747.20	132.80
Batch 2	1020	640.80	379.20	940	722.24	217.76
Batch 3	1250	707.32	542.68	960	717.00	243.00

The above table shows the extracted part of *guggulu* from *Ashuddha guggulu* and deposited part of *shodhana* media into the *shuddha guggulu*. The deposited part of *shodhana* media was calculated with the help of total solid content of the media in each batch. If residual part of *Shodhana* media subtracted from the yield it will provide us the extracted part from *ashuddha guggulu*.

From the above table we can conclude that the deposited part in *gomutra* media is remarkably less than that of *triphala kwatha* media, henceforth when *Shodhana* of *Guggulu* is done in *triphala kwatha* there is a net gain and contrary when *shodhana* is done in *gomutra* there is a net loss. This may be the reason that almost all of the pharmaceutical companies for professional purpose prefer *triphala kwatha* as a *shodhana* media.

For the better understanding the data can also be presented in following way:

Table: 2.7: Percentage of extracted part from *guggulu*

Batch	TSTG	GSTG
1st	79.32%	74.72%
2nd	64.08%	72.20%
3rd	70.70%	71.70%

The above table shows the extracted part from *ashuddha guggulu* in different batches of TSTG and GSTG. Extracted part from *ashuddha guggulu* in three batches of TSTG was found 79.32%, 64.08%, 70.70% respectively and in three batches of GSTG, it was found 74.72%, 72.20, 71.70% respectively.

Table: 2.8 - Percentage of *guggulu* and residual part of *Shodhana* media in final product

Batch	TSTG		GSTG	
	Part of *Guggulu* %	Part of *Triphala Kwatha* %	Part of *Guggulu* %	Part of *Gomutra* %
1st	62.45	37.55	84.91	15.09
2nd	62.82	37.18	76.83	23.17
3rd	56.58	43.42	74.69	23.31

From the table - 2.6, we can calculate the percentage of different fractions of *Guggulu* and *shodhana* media in final product i.e.

Triphala guggulu:

The above table (2.8) shows that in final product of three TSTG batches part came from *guggulu* was found 62.45%, 62.82%, 56.58% respectively and part contributed by *Triphala kwatha* was 37.55%, 37.18%, 43.42% respectively. In final product of three GSTG batches part came from *guggulu* was found 84.91%, 76.83%, 74.69% respectively and part contributed by *Gomutra* was 15.09%, 23.17%, 23.31% respectively.

ALYTICAL STUDY:

The data obtained from the analysis of different samples i.e. *Shodhana* media, raw *guggulu* and different samples of *Shodhita guggulu* are being presented in this section. The analytical data of *Shodhana* media i.e. *Triphala Kwatha* an *Gomutra* has been presented in table-1 and 2 respectively.

Table 3.1: Analytical Data of *Triphala Kwatha*

	pH	Total Solid Content	Specific Gravity	Reaction with Litmus Paper
BATCH 1	3.4	11.92%	1.0434	ACIDIC
BATCH 2	4.0	9.48%	1.065	ACIDIC
BATCH 3	4.0	11.32%	1.0482	ACIDIC

Above table shows that pH of *Triphala Kwatha* was around 4 and reaction was acidic with litmus paper, simultaneously Total Solid Contents was found to be around 10%.

Table 3.2: Analytical Data of *Gomutra*

	pH	Total Solid Content	Specific Gravity	Reaction with Litmus Paper
BATCH 1	4.5	3.32%	1.018	AMPHOTERIC
BATCH 2	7-8	5.44%	1.021	ALKALINE
BATCH 3	6.0	6.08%	1.027	AMPHOTERIC

Table shows that pH of *Gomutra* was variable and interestingly the reaction with litmus paper was found Amphoteric in two samples. The total solid content was found to vary between 3.3 to 6.0%. This total solid content of both the *Shodhana* media plays a great role in the yield. The result of analysis of raw *guggulu* sample has been presented in table 3.3.

Table 3.3: The analytical data of Raw *Guggulu*

Parameter	Raw *Guggulu*
Loss on drying	8.16%w/w
Total ash	11.845% w/w
Acid insoluble ash	6.15% w/w
Volatile oil content	0.8% v/w
Methanol soluble extractive	46.12% w/w
Water soluble extractive	38.35% w/w

As described earlier that three batches each of Triphala Shodhita Guggulu and Gomutra Shodhita Guggulu were prepared and analyzed. The analytical data has been shown in table – 3.4 & 3.5.

Table 3.4: The data of three different batches of TSTG

Parameter	TSTG –1	TSTG – 2	TSTG – 3	Average
Loss on drying	8.34%w/w	9.99% w/w	9.435% w/w	9.25% w/w
Total ash	7.915% w/w	6.925% w/w	5.79% w/w	6.816% w/w
Acid insoluble ash	1.45% w/w	1.22% w/w	1.28% w/w	1.31% w/w
Volatile oil content	0.2% v/w	0.5% v/w	0.4% v/w	0.36% v/w
Methanol soluble Extractive	36.41% w/w	33.10% w/w	33.72% w/w	34.41% w/w
Water soluble Extractive	65.39% w/w	41.10% w/w	42.89% w/w	49.79% w/w

The above table shows that loss on drying and total ash content of the samples varies from 8.3% to 9.9% and 5.7% to 7.9% respectively. There is not much variation in methanol soluble extractive of the samples (33.1% to 36.4%), but the samples vary considerably in their volatile oil content (0.2% to 0.5%) and water soluble extractive (41.1% to 65.3%). The difference in the total soluble content of *Triphala kwatha* (9.4% to 11.9%) may be responsible for the variation in water soluble extractive values of the samples.

Table 3.5: The data of three different batches of GSG

Parameter	GSG –1	GSG – 2	GSG – 3	Average
Loss on drying	8.67%w/w	8.965% w/w	9.125% w/w	8.921% w/w
Total ash	14.16% w/w	14.635% w/w	16.05% w/w	14.948% w/w
Acid insoluble ash	1.035% w/w	1.405% w/w	2.56% w/w	1.667% w/w
Volatile oil content	0.5% v/w	0.66% v/w	0.4% v/w	0.51% v/w
Methanol soluble Extractive	30.10% w/w	31.80% w/w	32.66% w/w	31.52% w/w
Water soluble Extractive	51.60% w/w	44.90% w/w	42.03% w/w	46.17% w/w

Table 3.5 showing the analytical data of three different batches of *Gomutra Shodhita Guggulu* samples reveal that there is no much variation in the loss on drying (8.6% to 9.1%), total ash (14.1% to 16.0%) and methanol soluble extractive values (30.1% to 32.6%) of the samples. But water soluble extractive values (42.0% to 51.6%) and volatile oil content (0.4% to 0.6%) of the samples varies considerably.

Table 8.6: The data of disintegration time of different samples of *vati*

Batch	Time taken for disintegration	Weight of *Vati* (in Grams)
Batch 1	>1 hour	0.526
Batch 2	50 minutes	0.542
Batch 3	40 minutes	0.546

Interestingly it was found that the disintegration time for Third Batch of *vati* was comparatively very much less i.e. 40 min. than first Batch. As the disintegration time is a big problem with *guggulu vati* it can be minimized by using *Gomutra shodhana* media.

Initially, we planned to study the effect of specific inert disintegrating agents described in modern pharmaceutics. We chosen the Micro-crystallinecellulose- P30 as an disintegrator for the *guggulu vati* as per the opinion of pharmaceutical consultant we have performed this study in 10,15,20 percent ratio but this integrating agent was not found satisfactory. It didn't show any disintegrating capacity when mixed with *Guggulu*, unfortunately due to stipulated time period of study we cannot planned to study the effect of other disintegrating agents in the disintegration of *Triphala guggulu vati*.

Table 8.7: The data of weight variation test of different samples of *vati*

Parameters	Batch 1 (in Gram)	Batch 2 (in Gram)	Batch 3 (in Gram)
Wt. of 20 *Vati*	10.52	10.84	10.92
Average wt.	0.526	0.542	0.546
Highest wt.	0.548	0.565	0.571
Lowest wt.	0.513	0.537	0.531

As it is seen from the above table, that all the samples prepared, have been passed in the weight variation test.

Table 8.8: The data of hardness test of different samples of *vati*

Parameters	Batch 1 (Kg/cm^2)	Batch 2 (Kg/cm^2)	Batch 3 (Kg/cm^2)
Most Hard	11.00	9.00	8.00
Least Hard	7.00	6.50	5.00
Average Hardness	7.95	8.00	6.40

The above table shows the hardness of *Triphala Guggulu vati* in different batches. Hardness was determined by Monsanto's Hardness Tester.

U.V. SPECTROPHOTOMETRIC STUDY

As mentioned in the materials and methods, the uv spectra of all the methanol extract of all the samples after suitable dilution was recorded by scanning them between 200 – 400nm. The spectra of raw *guggulu Triphala shodhita guggulu* and *Gomutra shodhita guggulu* as well as their comparison had been presented in **Fig. 1, 2, 3 and 4** respectively. As could be seen from the figures both raw *guggulu* and *Gomutra shodhita guggulu* have similar absorption pattern and give absorption peaks at wavelength 232 and 324nm. The intensity of absorption at 232nm is almost same but that of the peak at 324nm is comparatively more in raw *guggulu*. The uv absorption pattern of *Triphala Shodhita guggulu* is quite different than the other two samples. It shows an absorption peak at 223nm. The comparative UV spectra of the three samples (**Fig. 4**) clearly shows difference in absorption pattern in *Triphala Shodhita Guggulu* and *Gomutra Shodhita Guggulu* indicating difference in their chemical composition and suggesting that two *shodhana* media may change the chemical nature of *shodhita guggulu*.

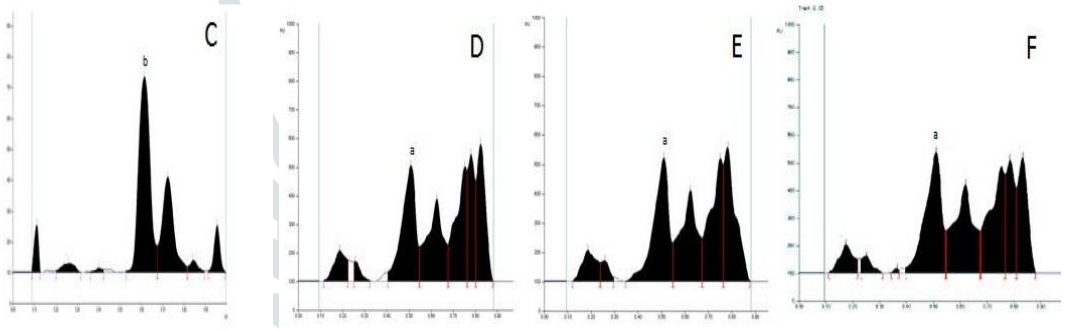

Fig-1, 2, 3,4

THIN LAYER CHROMATOGRAPHY

The presence of markers i.e. gallic acid, piperine and guggulsterone E and Z was confirmed using TLC, where pre -coated silica gel 60 F254 TLC plates (Merck, Germany) were used as stationary phase. The mobile phase used for gallic acid was toluene: ethyl acetate: formic acid (4:4.5:1 v/v/v), for berberine mobile phase was benzene: ethyl acetate: diethyl ether (6:3:1 v/v/v) and in case of guggulsterone E and Z, the plate was developed using petroleum ether: ethyl acetate (6:2) as mobile phase**.** T.L.C. of the methanol soluble extract and volatile of the samples were carried out by using different conditions with an aim to develop suitable chromatographic conditions and also to compare the chromatographic pattern of the samples.

From the evolved chromatographs, number of the spots obtained and their Rf values were noted. The chromatographs have been presented in **Fig. 5 & 6**.

Fig. 5: The comparative T.L.C. of methanol extract of the samples under long wave uv, shows six fluorescent spots at Rf 0.06, 0.15, 0.20, 0.26, 0.38 and 0.66 in all the samples. The chromatograph shows similar pattern in raw *guggulu*, *triphala shodhita guggulu* and *gomutra shodhita guggulu*.

Fig. 6: The comparative T.L.C. pattern of the volatile oil of the samples under long wave uv, has been presented in fig. 6. Both the *shodhita guggulu* samples show considerable difference from raw *guggulu*. Number of fluorescent spots present in raw *guggulu*, are absent in *shodhita guggulu*.

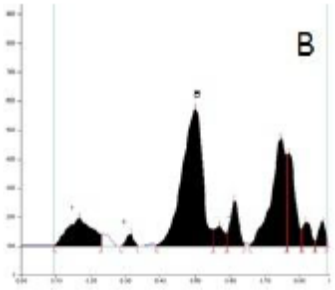

Fig.6

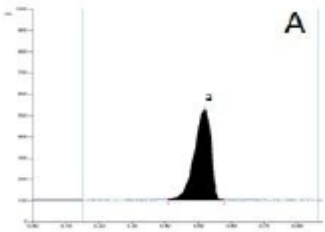

Fig.7

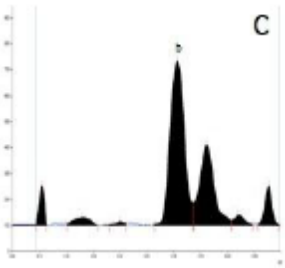

Fig.8

The same after spraying with Anisaldehyde Sulphuric acid spray reagent followed by heating at 1100C for 10 min. shows number of the spots in all the three samples, but the pattern is quite different. Number of spots present in raw guggulu are not present in shodhita guggulu, indicating removal of certain chemical substances during *Shodhana* process.

The comparative T.L.C. pattern of volatile oil shown in the **Fig. 7** Raw guggulu shows 11 spots at Rf 0.16, 0.23, 0.30, 0.38, 0.45, 0.57, 0.62, 0.71, 0.78, 0.85 and 0.93 whereas the both the *shodhita guggulu* show only 6 to 7 spots. There is difference in the pattern of two *shodhita guggulu* samples. The spots at Rf 0.45 and 0.85 are present in Triphala shodhita guggulu (and also in raw guggulu), but absent in Gomutra shodhita guggulu.

Fig. 8: The comparative T.L.C. pattern of the methanol extract of the samples obtained after spraying with Vanillin Sulphuric acid spray reagent also shows difference between raw guggulu and shodhita guggulu as well as among two shodhita guggulu samples. The raw guggulu shows eight spots at Rf 0.23, 0.35, 0.47, 0.52, 0.62, 0.70, 0.76 and 0.97. The spot at Rf 0.62 is present in both raw guggulu and gomutra shodhita guggulu, but absent in triphala shodhita guggulu, whereas the spot at Rf 0.52 and 0.97 is present in both raw guggulu and triphala shodhita guggulu but absent in gomutra shodhita guggulu.

T.L.C. patterns of samples support the findings of UV spectra. The analytical data suggest that the chemical composition of *shodhita guggulu* is affected by the media used for *shodhana* purposes.

DISCUSSION & CONCLUSION:

DISCUSSION & CONCLUSION ON PHARMACEUTICAL STUDY

♦ Preparation of Triphala Kwatha: Three different batches of Triphala kwatha was prepared for the shodhana of guggulu. The quantity of Triphala Yavakuta powder was taken equal to the quantity of Ashuddha guggulu i.e. for 1 kg of Ashuddha guggulu 1 kg of Triphala Yavakuta powder was taken. In each batch, 16 times of water was added to Triphala Yavakuta powder and was kept soaked for overnight. On next day it was heated on Madhyamagni to reduce it up to 1/4th quantity. 16 times water was taken for the better preparation of kwatha, in order to extract the maximum water-soluble parts from Triphala Yavakuta powder. Soaking of Triphala Yavakuta in water overnight results in the good preparation of kwatha because after this, Yavakuta powder of Triphala was softened, which facilitated better extraction. This water containing Triphala Yavakuta boils at 980C and about 6 hrs are required to reduce it up to 1/4th. Color of prepared Triphala kwatha was dark greenish brown. The color of kwatha may represent the quality of prepared kwatha, darker greenish brown color is the characteristic of better kwatha preparation, and On the contrary lighter color signifies the lower extraction of water soluble part from Triphala Yavakuta powder. Similarly taste of kwatha can also provide the quality of preparation; more kashaya taste represents the better preparation of kwatha.

♦ Guggulu Shodhana in Triphala Kwatha: Three successive batches of Triphala Shodhita Guggulu were prepared. In each batch 1 kg of Ashuddha guggulu and 4 litre of Triphala kwatha were taken for the shodhana of guggulu. There is no reference found that how much quantity of Triphala kwatha should be taken for the shodhana of guggulu.

For the present study, common process of guggulu shodhana, which is in practice at commercial level, was adopted, instead of pottali shodhana method as per the opinion of the experts of subject. There are a lot of problem with pottali shodhana method, first of all the problem is with the quantity of shodhana media as mentioned that make the pottali of Ashuddha guggulu and immersed completely in to liquid, then heat it. Water-soluble part of guggulu passes from pottali to the liquid, but side by side because of evaporation, quantity of liquid media gradually decreases. As a result one stage will come when pottali will not be remained immersed completely in to the liquid, so more shodhana media or water will be needed for the complete dipping of pottali into the liquid. Because of this phenomenon any standard quantity of shodhana media cannot be standardized for the shodhana process. Climatic conditions also affect the evaporation of any liquid so again it becomes difficult to brought out any kind of similarity in quantity of shodhana media.

Finally all liquid soluble part passed from pottali to liquid media then continuous heating of this guggulu containing liquid will give the ghana of shuddha guggulu. By this pottali shodhana method shodhana of guggulu cannot be performed on large scale and the quantity of shodhana media cannot be standardized. Another method is that in which guggulu dissolved in liquid media then filtered it. For the evaporation of the filtrate, it is exposed

to the sunlight, when it gets dried pound it with little ghrita, it is called shuddha guggulu. Here the problem is the time taken for the shodhana process, which is very much. One, and insoluble gum fraction which is toxic and the other soluble with hypolipidaemic and anti-inflammatory properties. Our procedure of shodhana of guggulu therefore appears to be a sensible way of purifying guggulu, because in the process toxic insoluble part is removed only soluble part of guggulu is taken.

By taking above object in view, process of shodhana of guggulu modified in such a way so as to with minimum effort large quantity of guggulu can be purified with minimum loss, according to the experts of subject. In the method of the present study, we are taking only liquid soluble part of guggulu. First we are dissolving the Ashuddha guggulu in shodhana media then little heat was given. After some time, the solution was filtered with the help of clean cotton cloth. The residue in cotton cloth was discarded and filtrate i.e. guggulu solution in media, which is the soluble part of guggulu was taken. The residue in cotton cloth was found after filtration 190g, 250g, 180g in respective three batches. It suggests that normally about 170g – 200g of residual part is remained in cotton cloth after filtration of solution of 1kg Ashuddha guggulu in 4ltr of shodhana media. Madhyamagni was given for this guggulu solution with the device of LPG stove (keep the knob on sim). Temperature was found around 620 – 700C inside the vessel during whole process. Temperature was recorded by mercuric thermometer. Stirring should be continued during whole process to check the burning and sticking of guggulu to the vessel. The total heating duration was found about 17 – 18 hrs in each batches by different devices for Triphala kwatha shodhana method. About 6 – 7 hrs of heat was given on gas stove, 4 – 4.30 hrs of heat on hot water bath and about 6 – 7 hrs in hot air oven.

Guggulu was found very sticky during handling so Ghrita smeared utensils and hands should be used to minimize the loss. After this it should be pounded well with little amount of ghrita. This pounding gives the homogenous soft mass of guggulu. Net gain was found in each batch i.e. 27%, 2% and 25% in first, second and third batch respectively. Residual part was found more after filtration in cotton cloth in 2nd batch i.e. 250gm, which results in low percentage gain in this batch. It may be because of that part of Ashuddha guggulu of this batch was containing more major impurities or water insoluble part. The colour of shuddha guggulu was found dark black in each batch.

DISCUSSION ON THE CONCEPT OF SHODHANA:

Literally, Shodhana is a procedure of elimination of Doshas in a drug. The term Dosha indicates not only impurities but also all that which makes the drug unsuitable for further process or therapeutic use. It can be deduced as - it is physic-chemical and therapeutic transformation of a substance making it feasible for the next process (Marana) or directly for therapeutic use. There are two methods for Guggulu Shodhana shows that gomutra shodhita guggulu is better than Triphala shodhit guggulu because of its dosha removal property. So, the adopted method may be considered as easy, convenient and standard method.

When it attains that consistency in which vati can be made, taken out from oven and pounded well with little amount of Ghrita in Udukhala yantara. Shuddha guggulu was found 880g, 940g and 960g i.e. 12%, 06% and 04% loss was observed in respective three batches. The colour of shuddha guggulu was found in each batch dark brown. But when the other ingredients like triphala churna and Pippali churna are mixed, it becomes black in colour.

DISCUSSION & CONCLUSION ON ALYTICAL STUDY:

The analytical values of three batches of Triphala kwatha show that total solid content of Triphala kwatha was found around 10-12% and total solid content of Gomutra was found around 4-6%. Suggesting that more total solid contents of Triphala kwatha, results increase in yield of Triphala Shodhita Guggulu. The analytical value of raw guggulu show that for the routine sample of raw guggulu value the volatile oil content should be around 0.8% v/w, methanol soluble extract should be around 46% w/w, water soluble extract should be around 38% w/w (Table 3.3). Analytical values of Triphala Shodhita Guggulu should be around for volatile oil 0.4% v/w, methanol soluble extract should be around 34% and water soluble extract should be around 49.79% (Table 3.4). Analytical values of Gomutra Shodhita Guggulu suggesting that the volatile oil content should be around 0.5%, methanol soluble extract should be around 32% and water soluble extract should be around 46% (Table 3.5) T.L.C. study shows that some of spots, which were present in raw guggulu were not present in shodhita guggulu. Suggesting that during the process of shodhana some chemical constituents from raw guggulu were discarded. The T.L.C. patterns of the samples support the findings of U.V. spectra.

The analytical data suggest that the chemical composition of Shodhita guggulu is affected by the media used for shodhana purpose. All analytical parameters can be taken as the primary parameters to assess the quality of routine raw, Triphala shodhita and Gomutra Shodhita Guggulu. All the relevant data and results have been also discussed in analytical chapter of this study.

Probable Mode of Action:

The disease Shotharoga originates due to consumption of Vata Pitta Kapha vriddhikara ahara, vihara and manasa nidana. These factors deranged different dushyas in the body, especially at the level of Tvak-mans-vasa-lasika, which results in production of injury to the dhatus it leads to Utsedha (increase in skin level) in Shotha.

As guggulu are having all pharmacodynamic properties against the Kapha and Meda due to rasa katu-tikta, guna ruksha-laghu-tikshna-sukshma etc., virya ushna and vipaka katu, due to its properties it is pittavardhaka in nature.

First of all by the virtue of its properties guggulu enhance the level of agni (metabolic activity) in the body, which digest the produced Ama. Due to the Ama pachana, associated symptom of Shotharoga like Utsedha,

Alasya, Atinidra, Tandra, Shrama, Daurbalya, etc. subsides. Further, after the pachana of Amadosha it turns to the increased Ama mans dhatu and produces shodhana in the body, which lead to the upshamana of Shotharoga.

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