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PHARMACEUTICO-ANALYTICAL AND ANTIMICROBIAL ACTIVITY OF *SWAYAMBHU GUGGULU* W.S.R. TO URINARY TRACT INFECTION

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ABSTRACT

Swayambhu Guggulu is an *ayurvedic* herbo mineral formulation & as per the classical texts, the ingredients of this formulation contains *krimighna* (Anti-microbial) property. Urinary tract infection is more common in *Prameha* (Diabetes mellitus). As per the *Bhavaprakash* text, *Swayambhu Guggulu* is indicated in *Prameha.* Due to the presence of *Krimighn*a property in the ingredients, this medicine may treat the Urinary tract infections in *Prameha*. Hence, to find the alternative medicine, *Swayambhu Guggulu* was prepared in accordance with description of *Bhavaprakash. Swayambhu Guggulu* was investigated physicochemical analysis with the help of pH, moisture content, ash value, water soluble extract etc. the findings of the results were close to its standard value & have shown the purity of the medicine. *Swayambhu Guggulu* was screened for in-vitro anti microbial study against *Escherichia coli, Pseudomonas aeruginosa & Candida Albicans* strain using Agar well diffusion method. *Swayambhu Guggulu* extracts exhibited Anti micro property against selected strains.

Keywords: *Swayambhu Guggulu*, Diabetes mellitus, Urinary tract Infection (UTI), Physico chemical analysis, *krimighna*(Anti microbial activity), *Escherichia coli, Pseudomonas aeruginosa & Candida Albicans strain.*

INTRODUCTION: The incidence of urinary tract infections (UTIs) is common in both diabetic and non diabetic patients. Though, the evidence suggested that the incidence of UTI in diabetes patients is four times higher than non diabetes patients. It has been reported that occurrence of UTI in diabetic patients is more in people with low socio economic status and the resistance pattern of antibiotic agents against organisms isolated in diabetic patients[1]. Certain renal tract infections including emphysematous poly nephritis, cystitis, perinephric abscess and candidiasis shows close association with diabetes mellitus. Many different microorganisms can infect urinary tract in diabetes mellitus patients. But the most common agents of bacteria are gram negative bacilli – *Escherichia coli* causes approximately 90 % of acute UTI in diabetes mellitus patients without urologic abnormalities or calculi. Diabetes mellitus patients with in dwelling catheters may have fungal infections by *candida* which may lead to chronic infection with severe renal damage[2]. The overuse of antibiotics clearly drives the evolution of resistance. Besides this, pathogens are developing resistance to many antibiotics[3].

Thus in this condition, there is a need to find alternative medicinal compounds against these pathogens for diabetes mellitus patients. In *Rasaashastra* science, many formulations have been mentioned which has better action against these infections. Of which *Swayambhu Guggulu* is one of the considerable herbo mineral formulation mentioned in *Bhavaprakash* text[4]. *Swayambhu Guggulu* is especially claimed for disease like *Shwitra,Pandu, Udar rog & Prameha*. The ingredients of *Swayambhu Guggulu* (Table no) like *Bakuchi*[5], *Shilajatu*[6], *Guggulu*[7], *Loha*

bhasma[8], *Vibhitaki*[9], *Mundi*[10], *Haritaki*[11], *Karanja*[12], *Khadir*[13],*Trivritta*[14], *Danti*[15], *Musta*[16], *Vidang*[17], *Haridra*[18], *Kutaj twak*[19], *Nimb*[20] are said to useful in curing the microbial infection as they contain *krimighna* (Anti microbial) property. The present study was reported that, this *krimighna* property was seen on selected micro organisms strain.

OBJECTIVES:

- Preparation of *Swayambhu Guggulu* by classical method.
- Physico chemical analysis of *Swayambhu Guggulu*.
- To evaluate the anti microbial action of *Swayambhu Guggulu* on selected microbial strains which causes UTI infection in diabetes mellitus patients. In this matter strains like *Escherichia coli, Pseudomonas aeurogenosa* & *Candida albicans* strain were selected for in-vitro study.

MATERIALS & METHODS:

Source of Data:

Source of drug: all the materials were procured from recognized source and authenticated by Dep**artme**nt of *Rasashastra*- BK & *Dravyaguna* of shri JGCHS AMC Ghataprabha, Karnataka.

Pharmaceutical source: preparation of *Swayambhu Guggulu* was carried out in teaching pharmacy of shri JGCHS AMC Ghataprabha, Karnataka.

Analytical source: Physico chemical analysis were carried out at Sheetal Analytical laboratory, Janapath,Sadashiv peth, Lokamanya nagar, Pune-411030. Organoleptic characteristics were recorded along with evaluation of parameters like pH[21], moisture content, Water soluble extracts, Alcohol soluble extracts[22], Ash value, Acid insoluble ash, Water soluble ash[23], Solubility in water[24], Hardness, Friability[25], Disintegration time[26] & Chemical test[27].

In vitro Anti Microbial study Sources: UTI causing bacteria cultures of Escherichia coli, *Pseudomonas aeruginosa & Candida Albicans* were obtained from the lab Sheetal Analytical laboratory, Janapath,Sadashiv peth, Lokamanya nagar, Pune-411030. In vitro study was carried out by Agar well diffusion method[28].

Table no 1: Ingradients of *Swayambhu Guggulu*

Sl no	Name of ingredients	Parts used	Ratio	Qty.
1	*Bakuchi (Psoralea corylifolia)*	Seed	10 part	100
2	*Shilajatu (Mineral Pitch)*	Purified	5 part	100
3	*Guggulu(Commiphora mukul)*	Resin	5 part	200
4	*Suvarna makshika bhasma(Copper pyrate)*	*Bhasma*	3 part	60
5	*Loha bhasma (Iron)*	*Bhasma*	2 part	40
6	*Mundi (Saphaeranthus indicus linn)*	Fruit	2 part	40
7	*Amalaki (Embelica officinalis)*	Fruit	1 part	20gm
8	*Vibhitaki (Terminalia bellirica)*	Fruit	1 part	20gm
9	*Haritaki (Terminalia Chebula)*	Fruit	1 part	20gm
10	*Karanj (Pogamia pinnata)*	Twak	1 part	20gm
11	*Khadir (Acacia catechu)*	Twak	1 part	20gm
12	*Guduchi (Tinospora cordifolia)*	Stem	1 part	20gm
13	*Trivritta (Operculina turpenthum)*	Root bark	1 part	20gm
14	*Danti (Baliospermum montannum Muell)*	Root	1 part	20gm
15	*Musta (Cyperus rotundus linn)*	Tuberous root	1 part	20gm
16	*Vidang (Embelica ribes)*	Dried Fruit	1 part	20gm
17	*Haridra (Curcuma long)*	Tuberous root	1 part	20gm
18	*Kutaj (Holerrhena antidysenterica linn.)*	Bark	1 part	20gm

19	*Nimb (Azadhirachta indica)*	Bark	1 part	20gm
20	*Madhu* (Honey)		Q.S.	100gm

Pharmaceutical process:

a. Preparation of purified Guggulu: Raw *guggul*u 300gm was taken and prepared small pieces. *Pottali* was prepared with this raw *guggulu*. Then it was subjected to *swedan karma* in *dholayantra* in the presence of 4parts (1200ml) of *Godugdha* (cows milk). *Mandagni* was used for boiling. *Swedan karma* was continued until all the *guggulu* passes in to the *godugdha* through the cotton cloth (*Pottali*). Obtained liquid was filtered through cotton cloth & allowed to stand for some time. Residue portion in the *pottali* was discarded. Liquid portion was boiled again the stainless steel vessel, till it forms a semi solid mass. This was taken in to steel tray & dried in sunlight. Then dried mass was taken to an iron mortar and ground with small amount of ghee till it becomes waxy substances[29].

b. Preparation of *churna*: the plant drugs were collected in fine powder form.

c. Preparation of *Swayambhu Guggulu:* to this purified *guggulu*, added the above all ingredients one by one & mixed homogeneously. Then this mixture was shifted to *khalwa yantra* (mortar pestle). Then added the *madhu* & pounded well[30]. Then prepared 231 mg pills were dried in a shade & stored in airtight container (Table no 2).

Agar well Diffusion method: For this purpose, *Swayambhu Guggulu* (1gm) added to the water (50ml) & diluted up to 100%. Then this solution was filtered & taken 1 ml (10%, 20%, 30% & 40%) of the solution. Then 0.01micro ml dilutions were introduced in to the well plate. Then, agar plates were incubated under suitable condition for 3 days. The SG solution diffused in the Agar medium & inhibited the growth of the selected microbial strains. The diameter of the inhibition zone was measured in millimeter.

OBSERVATION & RESULTS:

Table no 2: Organoleptic analysis of *Swayambhu Guggulu*:

Sl No	Organoleptic analysis	Results
1	Color	brownish color
2	Odor	pungent
3	Taste	Pungent
4	Consistency	Solid rounded tablet
5	Total Weight before preparation	900gm
6	Weight obtained after preparation	860gm
7	Average weight	231 mg

Table no 3: Physico Chemical analysis of *Swayambhu Guggulu*:

Sl No	Name of the Test	Results obtained (%)
1	pH 1%	5.26
2	Moisture content at 110^0c	8.20 %
3	Ash value	17.46 %
4	Acid insoluble ash	17.46 %
5	Water soluble ash	85.39 %
6	Solubility in water	41.47 %
7	Water soluble extracts	34.08 %
8	Alcohol soluble extracts	6.41 %

Table no 4: Quantitative test of *Swayambhu Guggulu*:

Sl No	Name of the Test	Results obtained
1	Hardness	<2.0 kg/cm^2
2	Friability	0.001 %
3	Disintegration time	21 min 55 sec

Table no 5: Chemical test of *Swayambhu Guggulu*:

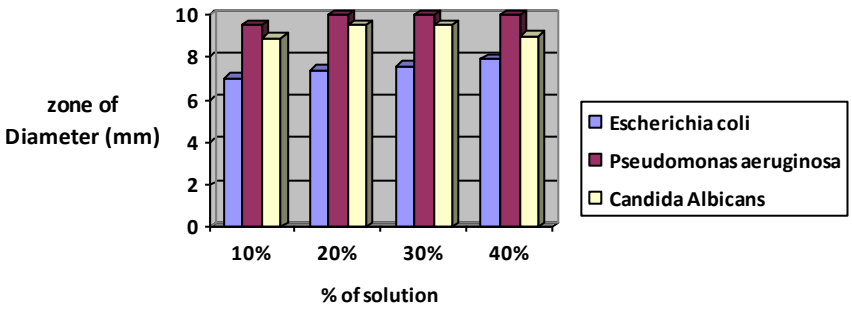
Sl No	**Name of the Test**	**Results obtained**
1	Fe (Iron)	1.43 %
2	Copper	70.00 ppm

Table no 6: Standard value of Zone of Inhibition (mm)

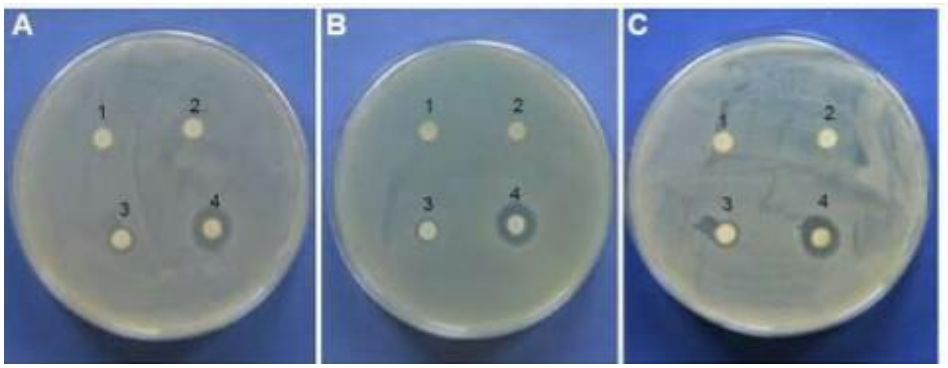
Sl no	**PATHOGENS**	**Standard drug**		
		Ciprofloxacin	**Gentamicin**	**Amphotericin B**
1	*Escherichia coli*	20 mm	-----	-----
2	*Pseudomonas aeruginosa*	-----	12mm	-----
3	*Candida Albicans*	-----	-----	16mm

Table no 7: Zone of Inhibition of *Swayambhu Guggulu*.

Sl No	**Parameters**	**Results of *Swayambhu Guggulu***					
		Zone of Inhibition (mm)				**Mean**	**Dilution (µml)**
1	*Escherichia coli*	7.0	7.4	7.6	7.9	7.4	0.01
2	*Pseudomonas aeruginosa*	9.5	10	10	10	9.8	0.01
3	*Candida Albicans*	8.9	9.5	9.5	9.0	9.2	0.01



Graph 1: Showing the effect of Swayambhu Guggulu on microbial strains.



Figures 1: *Swayambhu Guggulu* extracts showed anti microbial activity against the

Escherichia coli (A), *Pseudomonas aeruginosa* (B) & *Candida Albicans* (C).

DISCUSSION:

Pharmaceutical study: In the present work, standard preparation of *Swayambhu Guggulu* was prepared & analyzed with physico chemical parameters. Standards were determined for this preparation as per Indian pharmacopoeia. The color of sample was brownish, pungent taste, characteristic pungent odor (Table no 2).

Analytical study: pH was found 5.26; shown acidic nature of the formulation. Moisture Content was found 8.20%; indicates minimum level & prevents degradation of the formulation. This shows medicine can be stored for longer duration. Ash value was found 17.46 %; this shows low contamination. Water soluble ash was found 85.39 %; this shows the presence of more active principle. Acid insoluble ash was 17.46; shows less adherent dirt and sand particles. Solubility in water was 41.47 %, shows that medicine has good solubility in water. Alcohol soluble extract valu**e** was 6.41 % & water soluble extractive value was 34.08 %**;** both values indicates, medicines plays major role in the metabolism (Table no 3). Hardness was <2.0kg/cm^2; this indicates preapared tablet was not brittle in nature & suggested suitability. Friability was found 0.001%; indicated acceptable form of medicine. Disintegration time was 21 min. 55sec; this was noticed within accepted limits ((Table no 4). In chemical analysis, Iron was found in 1.43 % & Copper was 70.00 ppm (Table no 5). The presences of minerals are due to the content of *Shilajatu, Loha bhasma & Suvarna makshik bhasma.*

Anti microbial study: In this study, Table no 7 (Figure 1) records that *Swayambhu Guggulu* possess the significant activity against all tested microbial strains. Among the results, *Swayambhu Guggulu* extracts exhibited measurable zone of inhibition of 9.8 mm (Mean value) against *Pseudomonas aeruginosa* strain & showed activity (9.2 mm) against *Candida Albicans* as well as shown in the Graph 1 & Figure 1. Anti microbial activity against the selected strains with respect to standard drugs, the Ciprofloxacin, Gentamicin & Amphotericin B have highest anti microbial activity as shown in table no 6. But their continuous use produces adverse side effects and causes antibiotic resistance in the bacteria. In this condition, *Swayambhu Guggulu* can be used as substitute to treat Urinary tract Infection in Diabetes Mellitus.

CONCLUSION:

- The data obtained from Physico chemical analysis of *Swayambhu Guggulu* can be considered as reference for its standardization.
- Ingredients of *Swayambhu Guggulu* plays vital role in potentiating the medicinal properties by its krimighna property.
- Inhibition Zone of *Swayambhu Guggulu* extracts showed effect of Anti Microbial activity against *Pseudomonas aeruginosa* , *Candida Albicans* strain & *Escherichia coli,*
- Clinical study of *Swayambhu Guggulu* can be carried out for its Anti Microbial activity on Urinary tract Infection in Diabetes Mellitus patients.

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Raw Ingredients of *Swayambhu Guggulu*

Bakuchi beeja

Shilajatu

Guggulu

Suvarna makshik bhasma

Loha bhasma

Mundi

Amaladki Fruit

Vibhitaki Fruit

Haritaki fruit

Karanja

Khadir twak

Guduchi

Trivritta

Danti

Musta

Vidang

Haridra

Kutaj

Nimb

Preparation of *Swayambhu Guggulu*

Preparation *Guggulu Shodhana*

Purified *Guggulu*

Mixture of Ingredients

Prepared *Swayambhu Guggulu*

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