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Comparative Clinical efficacy of *Jambu* (*Eugenia jambolana* Lam.) and *Kshudra jambu* (*Syzygium caryophyllatum* (L.) Alston.) in *Youvana pidaka*

Research Article

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Abstract

Aims: To compare the clinical efficacy of mature leaf of *Jambu* (*Eugenia jambolana* Lam.) and *Kshudra Jambu* (*Syzygium caryophyllatum* (L.) Alston.) in the disease *Youvana pidaka* (Acne vulgaris like skin manifestation).Introduction: *Jambu* is said to be two varieties *Raja* and *Kshudra* based on overall morphology.These two are said to have same properties, are substituted by each other and their leaf are used for the management of *Youvana pidaka* in folklore practice.Methods: 30 subjects having signs and symptoms of *Youvana pidaka* were divided into two groups of 15 each. Group A was administered *Jambu patra churna* (leaf powder) orally and *lepa*(face pack*)* externally once a day and Group B was administered *Kshudra Jambu patra churna* orally and *lepa* externally once a day, for a duration of 28 days. Results were assessed using objective parameters like global acne grading scale, extent of lesion, size of *pidaka* (lesion), healing of *pidaka,* number of comedones, papule, pustules and nodules, and subjective parameters like itching and *srava* (discharge) of *pidaka.* Results were interpreted using suitable statistical tests. Important observation: *Jambu* and *Kshudra Jambu* showed highly significant improvement in parameters like GAGS score, number of comedones, size of *pidaka,* and extent of lesion. *Kshudra Jambu* was slightly more effective in action than *Jambu*, but it was statistically insignificant. Results: *Jambu* and *Kshudra Jambu* are almost equally effective in the management of *Youvana pidaka,* but *Kshudra Jambu* has a slightly higher efficacy.

Key Words: *Jambu, Kshudra jambu, Syzygium, Youvana pidaka,* Acne, Folklore.

Introduction

A famous poet *Kalidasa* in his work *Mangalastaka* quoted the names of 10 trees hoping that the evergreen and ever flowering garden full of fruits yielding trees will be the harbor for the well being of the world. One among these 10 evergreen trees is *Jambu* (1). *Jambu* is one of the keystone species which is well-known for its anti-diabetic potential. Jambu is said to be of different varieties like *Raja, maha, Kshudra, Kaka, Jala* and *Bhumi Jambu* (2) *Raja* means *Shresta* or superior or having bigger fruit and *Kshudra* means smaller or inferior or having smaller fruit (3). Both these *Jambu bheda* is said to have same properties, but *Raja Jambu* is said to be *Shresta*(best) among other varieties. (2)

The source of *Jambu* is *Eugenia jambolana* Lam., and *Syzygium caryophyllatum* L.Alston is considered as source of *Kshudra Jambu*, which is also used as a substitute of *Jambu* (4) . In folklore medicine the mature leaf of *Jambu* and *Kshudra Jambu* is used externally and orally for the management of pimples. (5) (6)

Pimples or Acne is a very common skin condition mostly occurring in adolescent years, which has a prevalence rate of 76 %. (7) This skin condition is self limiting, but if untreated, it leads to permanent scarring of face and impact the psychological wellbeing of an individual. Acne can be correlated to *Youvana pidaka* in Ayurveda, which is a *Kshudra roga* (a disease with less *dosha* vitiation). (8) Since both *Jambu bhedha* (*Jambu* varieties) are said to have same properties and are used successfully in the management of Acne, the present research is undertaken to compare their efficacy.

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Figure 1: Leaf of *Jambu*

Figure 2: Leaf of *Kshudra Jambu*

Table No 1: Brief review of *Jambu* and *Kshudra Jambu* (9) (2) (10) (11) (12) (13)

***Dravya*'s**	***Jambu***	***Kshudra Jambu***
Botanical name	*Eugenia jambolana* Lam	*Syzygium caryophyllatum* L.Alston.
Family	Myrtaceae	Myrtaceae
Synonyms	*Nellanja chada* (bluish green leaf), *Surabhi* (aromatic leaf), *Maha skanda* (large trunk), *Kumarika* (fruits liked by children), *Jambava*(fruit of *Jambu)*	*Hruswa phala* (smaller size fruits), *Bhumi Jambu* (occur in low altitude regions), *Pika bhaksha* (fruits eaten by koels), *Bramareshta* (flowers liked by honeybee's).
Rasa panchaka	*Rasa-Kashaya, Amla, Madhura* *Guna- Ruksha* *Vipaka- Katu* *Veerya - Sheeta (Ushna* according to *Raja nighantu),* *Dosha haratva: Kapha pitta hara* and *Vata kara*	*Rasa-Kashaya, Madhura, Tikta* *Guna-guru* *Vipaka- Katu* *Veerya- Sheeta* *Dosha haratva- Kapha pitta hara.*
Karma	*Stambhana, Twak doshahara, Daha prasamana, Deepana, Pachana, Kantha gharshana, Mala shodhaka* (bark) and *hrudya.*	Same as *Jambu*
Safety aspect	*Tambuli* is prepared out of the tender leaves in Western Ghats of Karnataka without any toxic reactions. *Jambu* leaf and bark (70% methanolic extract) acute oral toxicity study was done on mice. The LD50 of leaf was found to be 3,873 mg/kg and bark was >5000mg/kg. (14) (15)	In Karnataka, mainly in the Western Ghats, *Kshudra Jambu* tender leaf is made into *chutney* and *Tambuli* for dysentery, without any toxic reactions. (16)*Kshudra Jambu* tender leaf was found to exhibit no toxic effects above 5000mg/kg in Wistar albino rats. (17)

***Youvana pidaka(Mukhadushika):* (18) (19) (20) (21)**

- ***Nidana:*** Excess consumption of *katu, madhura, guru, snigdha, mamsa (meat), dugdha varga*(milk and milk products) *ahara. Vega dharana* (suppressing natural urges), *tarunya* (teen age), *vasantha-greeshma-sharat rutu* and *shukra dhatu mala*.
- ***Location:*** Occurs in the first layer of *Twacha Avabhasini,* particularly on face, neck and back.
- ***Lakshana:*** A condition in which *Shalmali kantaka* (thorns of shalmali tree) like *Pidaka* appear on the face of *Yuva* (16-34years) which is hard in consistency, associated with pain and is filled with *medha* is called as *Youvana pidaka*.
- ***Dosha:*** *Kapha, vata, rakta-* initially *kaphadika samsarga* and in later stages it may undergo *paka* with *pittadika samsarga.*
- ***Dushya:*** *Rasa, Rakta, Mamsa, Medha, shukra.*
- ***Srotas:*** *Rasavaha, Raktavaha, Mamasavaha, Medavaha, Swedavaha, sukravaha.*
- ***Sroto dusti:*** *Sangha, Atipravruthi*
- ***Chiktsa:*** *Siravyadha, Pralepa, Abhyanga, vamana karma, virechana karma, nasya karma* and using *shamana dravya* which do *rakta prasadhana, varnya, vrana ropana* and *tridosha shamana.*
- **Acne vulgaris (Modern correlation of *Youvana pidaka*):** A Common skin condition wherein hair follicles develop horny plugs (comedoes) later leading to inflammation leading to tissue destruction and scaring.

Materials and methods

Method of collection of data

A special case Performa was prepared which included the details of history taking, physical signs and symptoms as mentioned in Ayurveda classical texts, allied science literatures and laboratory investigations related to it.

Subjects presenting with *Pratyatma Lakshana* (cardinal features) of *Youvana Pidakaa* were screened for the study at OPD of SDM college of Ayurveda and hospital, Udupi.

Inclusion criteria

30 Subjects between the age group of 16 to 34 years of either sex with cardinal features of *Youvana Pidaka* who have give consent for undergoing the current clinical study were included.

Exclusion criteria

Subjects with any other systemic illness undergoing treatment which might interfere with the current intervention were excluded.

Investigations

Hematological investigation like Hb %, TC, DC, ESR, CBC was conducted if necessary.

Treatment given: (22) (23)

- **Group A**- *Jambu* mature leaf *churna* was given 6 gm twice a day with hot water and *lepa* of *Jambu* mature leaf *churna* was told to be applied with water once a day during day time.

- **Group B-** *Kshudra Jambu* mature leaf *churna* was given 6 gm twice a day with hot water and *lepa* of *Kshudra Jambu* mature leaf *churna* was told to be applied with water once a day during day time.

Duration of treatment: 28 days

***Pathya* during the treatment**

To avoid oily, spicy food, sour foods, non-vegetarian food, curd, too much sweet food, bakery food, banana, milk and milk products, *Ratri jagarana* (being awake at night), *Diwa swapna* (sleeping during day time) and alcohol consumption.

- **Follow up:** Every 7 days during the treatment and 30 days after the stoppage of treatment.
- **Total duration of the study:** 58 days
- **Assessment criteria:** Based on objective and subjective parameters, the assessment was done before and after treatment as follows:

Itching of pidaka

No itching	0
Mild or occasional, not disturbing routine activity	1
Continuous itching disturbing routine activity and not disturbing sleep	2
Continous itching with disturbed sleep	3

Global acne grading scale (GAGS) approved by WHO: (24)

Table 2: GAGS scoring system

Location	Factor
Forehead	2
Right cheek	2
Left cheek	2
Chin	1
Nose	1
Chest and upper back	3

No lesion=0, comedone=1, papules=2, pustules=3, and nodules=4.

The score for each area (local score) is calculated using the formula: Local score=factor* grade

The global score is sum of total scores and acne severity was graded using the global score.

A score of 1-18 is considered mild; 19-30 moderate; 31- severe; and more than 39, very severe

Extent of lesion (in %)

Table 3: Extent of lesion grading

Extent of lesion	Involvement of face index
Clean face	0
10% of face involvement	1
One quarter of face involvement	2
Half of face involvement	3
Three quarter of face involvement	4
Face fully covered by lesions	5

Size of *pidaka* (in mm)

A test area having maximum lesion was selected in each subject using a cardboard having 5cm of inner circle. The largest lesion in that area was taken for measuring the size of *pidaka* in mm before and after treatment. (24)

Number of *Pidaka*

Each lesion type i.e.; comedoes, papule, pustule or nodule was counted separately and noted down before and after treatment.

Hardness of *pidaka*	
Absence of hardness; soft lesion	0
Firmness felt on palpation	1
Very hard in consistency	2
Swelling of *pidaka*	
No swelling, no redness	0
Swelling with pinkish discoloration	1
Red, swollen lesion	2
Srava* of *pidaka	
No discharge	0
Moisture on skin lesion	1
Weeping from skin lesion	2
Weeping from skin lesion followed by crusting	3
Healing of *pidaka*	
Without scar	0
With minimal scar	1
No healing	2
Tenderness of *pidaka*	
No tenderness	0
Patient tells it is painfull	1
Wince his/her face on touch	2
Not allows touching the face	3

Statistical test applied

Unpaired-t test and paired-t test for numeric data. Wilcoxon sign rank test and Mann Whitney test used for non-parametric data analysis.

Observation and Results

Among 30 subjects included in the study, majority of them i.e. 43.3% belonged to the age group 21-25, 80.7% were female, 33.3% complained surging of Acne during the Menstural cycles, 63.3% consumed *katu rasa pradhana ahara*, 50% subjects had oily type of skin and 23% had combined type of skin. The observation done by subjects during the course of treatment is as in table 4. The effect of *Jambu* and *Kshudra Jambu* mature leaf within the groups after treatment is as in table 5,6 and in figures 3,4,5,6,7 and 8. The comparative effect of *Jambu* and *Kshudra Jambu* between the groups is as in table 7. The effect of two drugs after 30 days of stoppage of treatment is as in table 8.

Table 4: Observation by patients in two groups during treatment

Observation	Group A	Group B
Kantha garshana	Present while swallowing *churna*	Present while swallowing *churna*
Tan reduction	Present	Present
Loose and easy passage of stools	Present	present

Table 5: Effect of *Jambu* on different parameters of *Youvana pidaka*

Parameter		Mean	S.D	S.E.M	T value	P value	Interpretation
Global acne grading score	Before treatment	91.73	36.769	9.494	5.112	0.000	Highly significant
	After treatment	10.26					
No.of. comedones	Before treatment	23.60	7.825	2.020	6.599	0.000	Highly significant
	After treatment	10.26					
No.of papules	Before treatment	9.867	3.654	0.943	4.169	0.001	Significant
	After treatment	5.933					
No.of. pustules	Before treatment	2.8667	2.404	0.620	2.040	0.61	Insignificant
	After treatment	1.600					
No.of nodules	Before treatment	0.200	0.560	0.144	1.382	0.189	Insignificant
	After treatment	0.000					
Size of pidaka	Before treatment	2.8667	1.2666	0.620	2.040	0.61	Insignificant
	After treatment	1.600					
Extent of lesion	Before treatment	63.933	14.633	3.778	9.793	0.000	Highly significant
	After treatment	26.933					

Parameter	Z value	P value	Interpretation
Tenderness of pidaka	2.449	0.014	Significant
Hardness of pidaka	1.879	0.058	Insignificant
Swelling of pidaka	2.530	0.011	Significant
Srava of pidaka	2.887	0.004	Significant
Healing of pidaka	3.051	0.002	Significant
Itching of pidaka	2.0	0.046	Significant

Table 6: Effect of *Kshudra Jambu* on different parameters of *Youvana pidaka*

Parameter		Mean	S.D	S.E.M	T value	P value	Interpretation
Global acne grading score	Before treatment	106.20	38.706	9.994	6.151	0.000	Highly Significant
	After treatment	44.73					
No.of. comedones	Before treatment	31.800	16.352	4.222	3.995	0.001	Highly Significant
	After treatment	14.933					
No.of papules	Before treatment	8.333	4.511	1.164	4.350	0.01	Significant
	After treatment	3.266					
No.of. pustules	Before treatment	2.600	2.631	0.679	3.042	0.009	Significant
	After treatment	0.533					
No.of nodules	Before treatment	0.00	0.00	0.00	-	-	Not obtained
	After treatment	0.00					
Size of pidaka	Before treatment	2.33	0.986	0.254	5.501	0.000	Highly significant
	After treatment	0.93					
Extent of lesion	Before treatment	42.400	10.105	2.609	5.800	0.000	Highly significant
	After treatment	27.266					

Parameter	Z value	P value	Interpretation
Tenderness of pidaka	2.714	0.007	Significant
Hardness of pidaka	2.887	0.004	Significant
Swelling of pidaka	3.162	0.002	Significant
Srava of pidaka	2.271	0.023	Significant
Healing of pidaka	2.879	0.004	Significant
Itching of pidaka	2.646	0.008	Significant

Table 7: Effect of *Jambu*(Group A) and *Kshudra Jambu*(Group B) on *Youvana pidaka* between the groups

Parameter	Group	Difference in mean	S.D	S.E.M	T	P	Interpretation
Global acne grading score	A	48.533	36.769	9.493	0.938	0.356	Insignificant
	B	61.466	38.705	9.993			
No.of comedones	A	13.333	7.825	2.02	0.755	0.457	Insignificant
	B	16.866	16.352	4.22			

No.of. papules	A	3.933	3.654	0.943	0.756	0.456	Insignificant
	B	5.066	4.511	1.164			
No.of pustules	A	1.266	2.404	0.620	0.869	0.392	Insignificant
	B	2.066	2.631	0.679			
No.of nodules	A	0.200	0.560	0.144	1.382	0.178	Insignificant
	B	0.000	0.000	0.000			
Extent of lesion	A	37.000	14.633	3.778	4.762	0.000	Highly significant
	B	15.133	10.105	2.609			
Size of pidaka	A	2.066	1.032	0.266	1.809	0.081	Insignificant
	B	1.400	0.985	0.254			

Parameter	Mean Rank		Sum of Rank		U value	Z value	P value	interpretation
	A	B	A	B				
Tenderness of pidaka	16.7	14.3	250	215	94	0.852	0.394	Insignificant
Hardness of pidaka	17.03	13.97	255	210	89	1.119	0.263	Insignificant
Swelling of pidaka	16.6	14.3	250	215	95	0.825	0.407	Insignificant
Srava of pidaka	14.40	16.60	216	249	96	0.760	0.447	Insignificant
Healing of pidaka	16.83	14.17	252	212	92	0.898	0.369	Insignificant
Itching of pidaka	17	14	255	210	90	1.117	0.264	Insignificant

Table 8: Follow-up effect of *Jambu* and *Kshudra Jambu* after 30 days of stoppage of treatment.

GROUP			Total
	Group A	Group B	
No recurrence	16.7%	26.7%	43.3%
Recurrence with less severity	13.3%	13.3%	26.7%
Recurrence when done Nidana sevana	20%	10.0%	30%
% of Total	50.0%	50.0%	100.0%

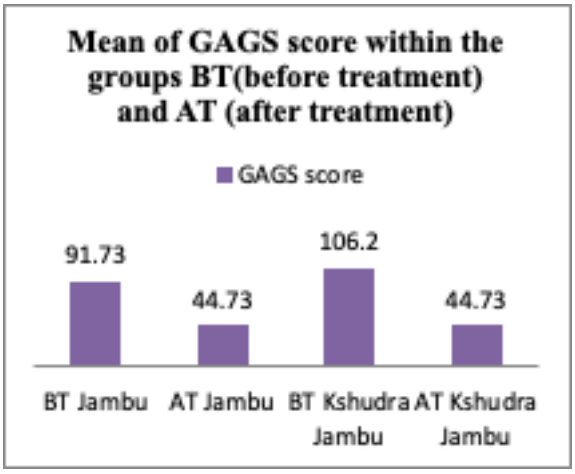

Figure 3: Mean of GAGS score

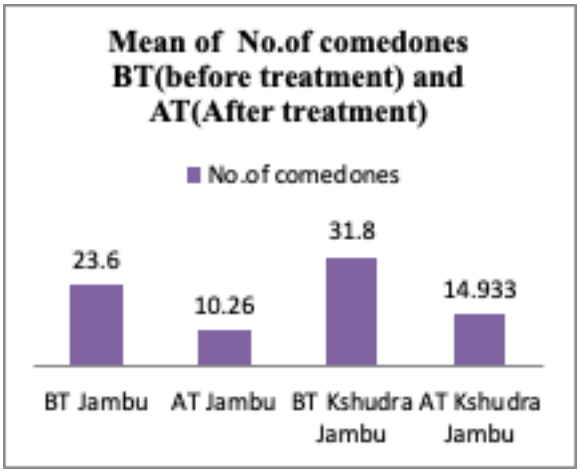

Figure 4: Mean of No. of comedones

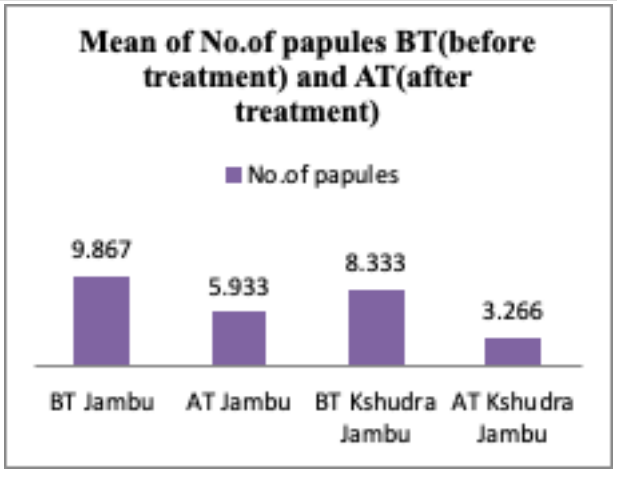

Figure 5: Mean of No. of Papules

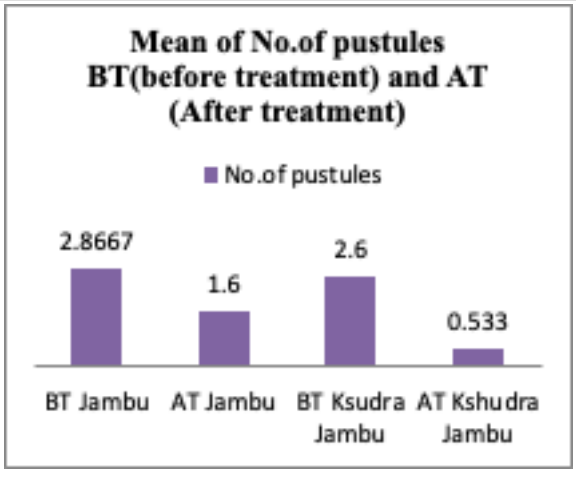

Figure 6: Mean of No. of Pustules

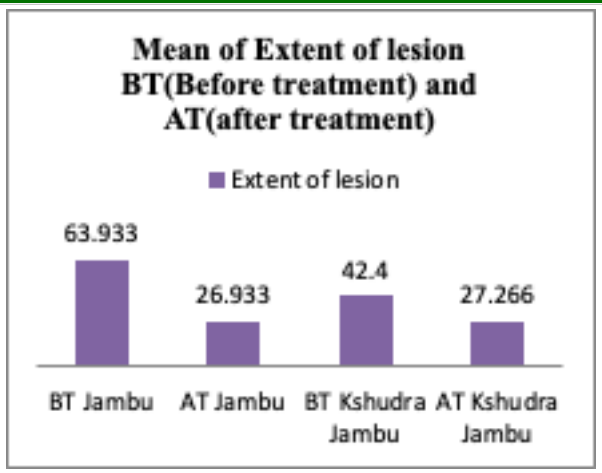

Figure 7: Mean of Extent of lesion

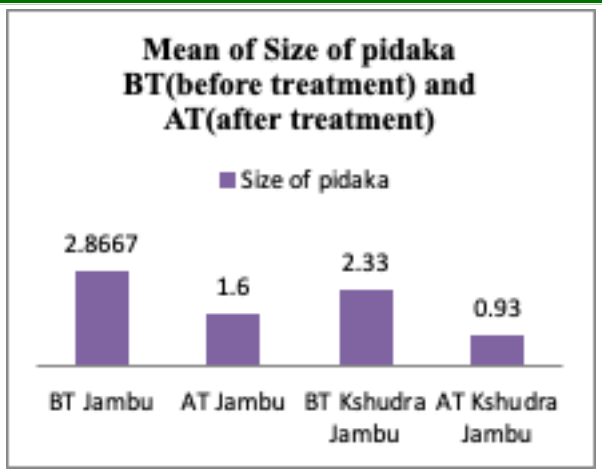

Figure 8: Mean of Size of Pidaka

Discussion

Majority of subjects belonged to the age group of 21-25 years and most of them were female, both of which cases have more hormonal variations due to *swabhava* of that age and monthly periods respectively. Majority of cases consumed *Katu rasa pradhana ahara*, which is the *nidana* of *Youvana pidaka* and which leads to *Vata pitta vrudhi* and *Rakta dusti*. Majority of subjects had oily and combined skin type; the oiliness in excess in these subjects might have blocked the sebaceous glands leading to hydrolysis of lipids by *P. acnes* bacterium, leading to inflammation and Acne.

Kanta garshana is one of the karma of both *Jambu bhedha*, which was appreciated by all subjects. Reduction in Tan or hyper pigmentation was observed by all subjects in both group, which implies the *Varnya* effect of *Jambu* and *Kshudra Jambu.*

Jambu and *Kshudra Jambu* are said to be *Stambana* in action, but all subjects taken for the study observed loose and easy passage of stools. *Jambu* and *Kshudra Jambu Pallava* (tender leaf) is mentioned by *Acharya*'s in the treatment of *Atisara* and *Jambu* and *Kshudra Jambu* mature leaf is indicated in yoga's for skin manifestations like *kukunaka* and *vyanga.* When some *Acharya*'s opined *Ushna veerya* of *Jambu* and *Kshudra Jambu*, it might be attributed to *Jambu Bhedha* mature leaf as *Mrudu Sramsrana* effect is required in skin manifestations like *Youvna pidaka* and may be due to this karma, the drug is successful in doing *Samprapthi vighatana* in *Youvana pidaka.*

Highly significant result was observed in GAGS score, number of comedones (non-inflammatory lesions of Acne which *are kaphavata pradhana pidaka*) and size of *pidaka* in both groups at the end of 28 days treatment, which shows both *Jambu Bhedha* reduced the overall severity of *Youvana pidaka* and did *tridosha shamana.* Group B was better that Group A but it was statistically insignificant. Papules are initial inflammatory lesion of Acne which has *pitta kapha pradhana rakta dusti.* Highly significant and significant improvement was observed in groups *A* and B respectively in reducing number of papules and Group B (60%) was slightly better than group A (39%), which was statistically insignificant with p value 0.456. Pustules are later inflammatory lesions of acne which have *pittavata pradhana rakta dusti*. Insignificant and significant results were obtained in Groups A and B respectively in reducing the number of pustules and group B (79%) was slightly more effective than Group A (41%), which was statistically insignificant with p value 0.392. Nodules are *Kapha pradhana kathina* (hard) *pidaka* in *Vrana avastha* of *Youvana pidaka.* Statistically insignificant result was found in group A in reducing the number of nodules and since the standard deviation was zero in group B as there were fewer subjects with nodules, the comparative effect in statistical terms was not possible.

Highly significant result was obtained in both groups in reducing the extent of lesion and Group A was better than Group B and the difference was statistically Highly significant with p value 0.000. Significant improvement was observed in group A and B in parameters of swelling, *srava*, healing and itching of *pidaka* and group B was slightly better than Group A except in *srava* of *pidaka*, but the difference was statistically insignificant.

26.7% of subjects in Group B and 16.7% of subjects in Group A had no reoccurrence of Acne after 30 days of stoppage of treatment. This implies that both *Jambu Bhedha* leaf prevented further *dosha* vitiation and kept the skin healthy.13.3% subjects each in Group A and B had reoccurrence of Acne with less severity. 20% of subjects in group A and 10% in group B had reoccurrence of Acne after *Nidana sevana.* This again proves that in any *Roga chikitsa, Nidana parivarjana* is a must.

The probable mode of action of two drugs in *Yovana pidaka* has been explained based on *rasa panchaka,* chemical constituents and pharmacological activity in Table No.8.

Table No 8: Probable mode of action of two drugs (25) (26) (27) (28) (29) (30) (31) (32) (33)

Property/ Activity of two drugs	***Jambu* and *Kshudra Jambu* effect in *Youvana Pidaka***
Kashaya rasa	*Kleda shoshana*, *Pidana* of *Pidaka* (containing *pooya*) in *paaka kaala*, *Meda Shoshana*, *Rakta prasadana*, *Vrana ropana*, *Twak prasadana* and *Pitta kapha shamana*.
Madhura rasa	*Rasa* and *rakta dhatu Balya karma*, *Vrana sandhana* and *Kapha pitta shamana*.
Guru guna	*Vata pitta shamana, Vrana avasada leading to softening of Vrana.*
Sheeta veerya	Reduction in *swedana from swedavaha srotas* and *pitta rakta shamana.*
Rakta doshahara karma	Removes *doshik* impurities in *Rakta dhatu*. of *Jambu bhedha* does
Vrana nashana karma	*Vrana ropana* during *vrana* stage (nodule, scarring) of *Youvana pidaka.*
Chemical constituents	Alkaloids, flavonoids, sterols, caumarins and β-caryophyllene are Anti-inflammatory in action.
Chemical constituents	Alkaloids, flavonoids and tannins are photo protective in action, which might have reduced hyper pigmentation in Acne.
Anti-bacterial activity	Reduces the bacterial load in Acne
Anti-oxidant activity	Preventes oxidative stress induced skin manifestations in Acne
Anti-inflammatory activity	Reduced the inflammation of pilo-sebeceous glands in Acne by blocking the pro-inflammatory cytokine IL-1 in earlier phase and epidermal growth factor-α cytokine in later phase
Tikta rasa in *Kshudra Jambu*	*Visha harana*, *Krimi harana*, kusta hara karma, *kleda meda* and *majja shoshana karma* and *Kapha pitta shamana*
Ruksha guna in *Jambu*	*Stambana of swedavaha srotos, pitta kapha shamana* and reduction in *Twak sneha*
Varnya karma of *Jambu* (proven by its use in *Vyanga*)	Might have brought back the normal color of skin in subjects
Jambu brings back the normalcy in HPO axis	Might have reduced the Acne caused by Hormonal imbalance.

Conclusion

Jambu mature leaf orally and externally was effective in bringing statistically Highly significant results in parameters like GAGS score, extent of lesion, size of *pidaka*, number of comedones and significant improvement in parameters like number of papules, swelling, *srava* and tenderness of *pidaka,* and insignificant improvement in parameters like number of pustules, nodules and hardness of *pidaka. Kshudra Jambu* mature leaf orally and externally was effective in bringing statistically Highly significant results in parameters like GAGS score, number of comedones, size of *pidaka* and extent of lesions, significant improvement in parameters like number of papules, hardness, tenderness, swelling, *srava* of *pidaka* and insignificant results in number of pustules.

When compared, except size of *pidaka,* extent of lesion and *srava* of *pidaka, Kshudra Jambu* showed slightly better action than *Jambu* in all parameters however the difference was not statistically significant. By virtue of *Rasa panchaka,* chemical constituents and through various pharmacological actions*, Jambu* and *Kshudra Jambu* brought about improvement in signs and symptoms of *Youvana pidaka* in the present clinical trial.

Hence in case of *Youvana pidaka, Jambu* and *Kshudra Jambu* mature leaf are equally effective in doing *samprapthi vighatana.*

Scope for further study

Comparative study between tender and mature leafs of *Jambu* and *Kshudra Jambu* can be studied pharmacologically and clinically. Using larger sample size, a comparative study using different parts of the same drug on a single disease can be conducted.

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