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Role of *Rohitakadi Vati* in *Yakrita Vikara* (Non-Alcoholic Fatty Liver Disease)

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ABSTRACT

Introduction- Our lifestyle choices play a major part in determining our liver health. Faulty diet and faulty lifestyles are the causes of vitiation of *three doshas* formed *apakva anna rasa* due to *Jatharagnimandhya*. Now Vitiation of *Kapha doshas* & deposition of *meda* in *Yakrita* that lead to *srotorodha* and create *Yakrita vikara*. The term non-alcoholic fatty liver diseases (NAFLD) refer to a broad spectrum of disorders characterized by fatty infiltration of liver >5%, Steatosis, Steatohepatitis and Cirrhosis. *Yakritvridhhi*, *Yakrit dalyudara*, *Yakritodra*, *Yakrita gata dosha*, *Yakrita vridhhi*, *Yakrita granthi* are different diseases found in ayurvedic literature based on its mass, architectures and morphology whereas *Kamala*, *Kumbhkamala*, *Panaki*, *Halimaka* are clinical features based on the function of Liver diseases.

Aims & Objectives- To provide the reliable, effective treatments which have minimal side effect and prevent steatosis.

Material & Methods- Total number of 30 patients were selected from O.P.D & I.P.D. of Kayachikitsa department of Rishikul campus, Uttarakhand Ayurved University, Haridwar on the basis of inclusion and exclusion criteria. The duration of treatment was 60 days with a follow up period of 15 days. Assessment was done at interval of 20 days on the basis of subjective parameters as well as objective parameters.

Discussion- The overall effect of *Rohitakadi vati* was better. *Rohitakadi vati* contents are *Rohitaka*, *Chitraka*, *Yavanika*, *Ikshuraka-beeja*, *Navsacara*, *Saindhav lavana* and *bhavana Dravya Karanja* and *Karvellaka*. *Rohitakadi vati* was very effective in managing the patients of *Yakrita vikara* (Non-alcoholic fatty liver disease) by breaking the pathogenesis due to properties of drugs *Deepana*, *Pachana*, *Yakrita-uttejaka*, *Shotha-hara*, *Anulomana*, *Vranaropaka* properties.

Conclusion- NAFLD is considered as *Yakrita Vikara*. The main aim of this study was to treat the patient of *Yakrit vikara* (NAFLD) with diet, lifestyle modifications and *Rohitakadi vati*.

Key Words *Yakrita vikara*, *NAFLD*, *Lifestyle*, *Srotorodha*, *Yakrita-uttejaka*

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INTRODUCTION

Our *Vedas* are the source of the development of Indian medicine and healthy living. *Ayurveda* is a *Sanskrit* word meaning *ayu* means life, *Veda*

means knowledge of life. *Ayurveda* maintain health by maintaining equilibrium with nature between individual body, mind, spirit. The liver, an important bodily organ, is located in the upper

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right abdominal quadrant. Although it has more than 500 different roles, it is now frequently observed that the majority of people suffer from fatty liver disease, which may be brought on by lifestyle choices, dietary irregularities, structural abnormalities, and metabolic disturbances. According to WHO, the number of chronic liver illnesses, including NAFLD, has steadily increased in recent years.

NAFLD is a risk factor for the metabolic syndrome¹. It also has other causes like visceral obesity, hypertension, dysglycemia and dyslipidemia. According to Ayurveda, NAFLD can also be referred to as obesity and the liver illness *Yakrita roga*.

A wide spectrum of disorders are included under the umbrella term "*Yakrita roga*". Its range from simple steatosis to liver cirrhosis and hepatomegaly.

According to American liver foundation, NAFLD prevalence is 30% . This disorder is more common in men and becomes more common with age. According to epidemiological research, the prevalence of NAFLD in the general Indian population ranges from 9 to 32%, with a higher incidence among patients who are overweight or obese and have diabetes or prediabetes².

In *Ayurveda* Liver plays many important role as *Chaya-Upachaya*, *Ranjana* of *Rasa Dhatu*, manufacturing essential compounds, storage detoxification to keep body healthy. In *Vedas*, "*Takima*" or '*Yakna*' is the name given to the liver³. Ancient literature contains a variety of synonyms for liver, including *Kalakhanda*,

Jyotisthana, *Yakritakhanda*, *Yakritapinda*, and *Raktashaya*.

Liver problems are described in vivid detail by *Ayurveda* in the chapter of *Kamala* and *Yakrita Roga* in many classical literature. These notions can be used to treat fatty liver as well. *Yakrita vridhhi* (*Hepatomegaly*), *Yakrita dalyudara*, *Yakritodara*, *Yakrita gata dosha*, *Yakrita kshya* , *Yakrita vidradhi*, *Yakrita granthi* are unlike diseases found in Ayurvedic literature. These disease are based on its mass, architectures and morphology. *Kamala*, *Kumbhkamala*, *Panaki*, *Halimaka*, *Alasa* are clinical features based on the function of liver diseases⁴. It is comparable to *Yakrita Roga*, which are diseases that present in the abdominal cavity and cause abdominal distension, according to ancient literature.

In this situation, *Agni* is crucial to the occurrence of disease. *Udara roga* has three primary causes: *Vishamashana*, *Mandagni*, and *Mala sanchaya*⁵. NAFLD is one of the leading causes of chronic liver disease and significant contributor to liver-related morbidity and mortality, NAFLD is quickly rising to the top of the list of causes worldwide. As a result, efficient treatments are required to prevent the progression of simple steatosis to chronic liver disease, especially in light of the fact that fatty liver disease is a reversible condition that, if not treated early, can result in fatal liver disease. The herbal medicine has taken great effects on the improvement of steatosis and inflammation for treating NAFLD⁶. It has been found out that these effects involved

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the multiple mechanisms underlying lipid metabolism and inflammation.

Ayurveda is a medical branch giving utmost preference in correcting pathological aspects of *Yakrita vikara*. While selecting the drug, Knowledge of causative factors is essential to understand the development of particular disease. The properties of drug should be opposite to disease as well as etiological factors (*Vyadhi-Hetu Pratidwandwi*) because the attributes of dosha resembles the etiological factors which vitiate the *Dosha*. *Yakrita vikara* (NAFLD) is *Pitta-Kapha tridoshaja vyadhi*, drug chosen for study is *Rohitakadi vati* described in *Bhaishajya ratnavali* which contain *Rohitaka*, *Chitraka*, *Yavanika*, *Ikshuraka-beeja*, *Navsadra*, *Saindhava lavana*, *Karanja*, *Karvellaka*.

The drug chosen for study was *Rohitakadi Vati* described in *Bhaishajya ratnavali* having *Rechana* (purgative), *Mutrala* (diuretics), *Vata-shamaka*, *Iekhana*, *Agnivardhaka*, *Ama*, *Medha*, *Kapha shamaka qualities* i.e preferable for hepato-biliary disorders⁷.

The assessment effect of *Rohitakadi vati* in the patients of Non-alcoholic fatty liver disease was the chief objective of study with provide effective treatment with minimal side effects.

AIMS & OBJECTIVES

- 1) To study the etiopathogenesis of *Yakrita vikara* (Non-alcoholic Fatty liver disease).
- 2) To study the efficacy of *Rohitakadi vati* in *Yakrita vikara* (Non-alcoholic fatty liver disease).

- 3) To study the adverse effect of drug if any, and providing effective treatment with minimal side effect.

MATERIALS & METHODS

Selection of patients

Patients with clinical features of the *Yakrita vikara* (Non-alcoholic fatty liver disease) attending the OPD of Kayachikitsa Department of "Rishikul Campus" Hospital, UAU Haridwar, will be selected randomly for this clinical study, irrespective of sex, religion, occupation etc. A detail proforma will be prepared on the basis of the Ayurvedic text and allied sciences. The patient fulfilling the inclusion and exclusion criteria will be registered on this proforma and scoring of the different clinical features will be done on the assessment criteria.

Type of study:

Method of treatment/ intervention

- **Study design-** Open Randomized sampling
- **Source of data-** 30 Patients of *Yakrita vikara* were selected for study from O.P.D. / I.P.D. unit of P.G department of Kayachikitsa, Uttarakhand Ayurveda University Rishikul Campus, Haridwar.
- **Sample size-** 30
- **Duration of study-** 60 days
- **Selection of drug-** *Rohitakadi Vati*
- **Dose** – 2 tablets (each 500mg) twice a day with Luke warm water

As seen in Table no. 1, all the ingredients of *Rohitakadi vati* are *Rohitaka*, *Chitraka*,

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Table 1 The ingredients of *Rohitakadi vati*⁸

S.no	Drug name	Latin name	Family	Part used	Part
1	<i>Rohitaka</i> ⁹	<i>Tecoma undulata</i>	Bignoniaceae	Bark	1
2	<i>Chitraka</i> ¹⁰	<i>Plumbago zeylanica</i>	Plumbaginaceae	Bark	1
3	<i>Yavanika</i> ¹¹	<i>Trachyspermum ammi</i>	Umbelliferaceae	Fruit	1
4	<i>Ikshuraka-beeja</i> ¹²	<i>Astercantha longifolia</i>	Astercanthaceae	Seed	1
5	<i>Navsacara</i> ¹³	<i>Ammonium chloride</i>		Powder	1/10
6	<i>Saindhava Lavana</i> ¹⁴	<i>Sodium chloride</i>		Salt	1/5
7	<i>Karanja</i> ¹⁵	<i>Pongamia pinnata</i>	Leguminosae	Leaf	
8	<i>Karvellaka</i> ¹⁶	<i>Momordica charantia</i>	Cucurbitaceae	Fruit	

Yavanika, *Ikshuraka-beeja*, *Navsacara*, *Saindhava lavana*, *Karanja*, *Karvellaka*. The raw materials 1 part of each *Rohitaka*, *Yavanika*, *Chitraka*, *Ikshuraka-beeja* (*Talmakhana*) are taken in Khalwa Yantra and powdered to all. 1/10 *Navsacara churna* and 1/5 *Saindhava Lavana* are added. For homogenous mixing, *Mardana* is carried out. To this mixture Q.S *Karanja patra swarasa* and *Karvellaka Swarasa* are added and *bhavana* is carried out for 3-3 day. The *Vati* was preserved in air-tight container.



Figure 1 Drug *Rohitakadi Vati* manufactured by Hans pharmacy

As per Figure 1, Raw materials used for this formulation were purchased from the market and authenticated in the Dravyaguna Department of Rishikul campus, UAU Haridwar. *The Vati* was then prepared in the pharmacy of Premnagar Ashram named as ‘‘Han’s pharmacy’’, Haridwar, Uttarakhand.

1) Inclusion Criteria:

- Age- 20-60

➤ Patients with clinical sign and symptom of *Yakrita Vikara* (Non-alcoholic fatty liver disease) are *Aruchi*, *Hrillasa*, *Avipaka*, *Daurbalya*, *Udara shoola*, *Asya- vairasya*, *Anaha*

➤ Having Fatty Liver Grade-1 and Grade-2 based on USG.

➤ Liver function test showing raised Alanine amino transferase more than its normal limits.

➤ Prediabetic patients

2. Exclusion Criteria:

➤ Age group <20 years and > 60 years

➤ Chronic Renal failure, Ischemic heart disease, Congestive cardiac failure, Liver cirrhosis, Acquired immune deficiency syndrome

➤ Pregnancy and Lactation

➤ Prolonged medication for various systemic disorders.

➤ Grade-3 Fatty Liver

➤ SGPT>100

3. CRITERIA FOR WITHDRAWAL :

➤ Personal matters.

➤ Inter- current illness.

➤ Aggravation of complaint.

➤ Leave against medical advice (LAMA)

4. CRITERIA FOR ASSESSMENT:

Assessment of the drug will be done on the basis of the Subjective and Objective will be done before and after the treatment.

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❖ **Subjective Criteria:** The patients will be enquired about their symptoms in the study like:

(C. Ch- 13/38)

- *Aruchi* (Loss of Appetite)
- *Hrillasa* (Nausea)
- *Avipaka* (Indigestion)
- *Daurbalya* (Weakness)
- *Udara Shoola* (Abdominal pain)
- *Asya-vairasya* (Altered taste in the mouth)
- *Anaha* (Flatulence).

❖ **Objective Criteria:** The Objective assessment will be done on the basis of changes in clinical findings, and following laboratory parameters.

- Serum Glutamic Pyruvic Transaminase (SGPT)
- Serum Glutamic Oxaloacetic Transaminase (SGOT)
- Alkaline Phosphatase
- Serum Bilirubin
- USG Abdomen

5. INVESTIGATIONS

- Hb%, TLC, DLC, ESR
- LFT
- Blood Sugar- Fasting and Post prandial

Table 2

Group	Total Registered Patients	Completed	Discontinued
<i>Rohitakadi vati</i>	30	30	0

As seen in Table no. 2, total 30 patients of *Yakrita vikara* were registered. Out of which total 30 patients had completed the trail for the period of 2 month, and no patients discontinued.

The table no. 3 shows that statistically highly significant result was found in subjective

- Serum cholesterol
- Serum Triglyceride
- USG Abdomen
- Blood urea
- Serum creatinine
- Urine- (Routine and Microscopic)

STATISTICAL ANALYSIS-

❖ On comparison of subjective criteria before and after treatment within a group Wilcoxon’s test and paired t-test was applied.

❖ To more specifically quantify the percentage of improvement in each patient, this was calculated using the formula $\frac{\text{TOTAL BT} - \text{TOTAL AT}}{\text{TOTAL AT}} \times 100$

BT

Following formula will be used to specifically quantify the percentage of improvement in each patient = $(\text{BT} - \text{AT}) * 100 / \text{BT}$.

Thus the obtained result was interpreted as:-

- P> 0.05 Insignificant
- P< 0.05 Significant
- P>0.01 Significant
- P< 0.001 Highly Significant

parameters like *Aruchi*, *Avipaka*, *Hrillasa*, *Daurbalya*, *Udara shoola*, *Anaha* as value of p<0.001 in each. Statistically significant result was found in parameter like *Asya-vairasya* as value of p= 0.016.

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As seen in Table no. 4, In objective parameters, statistically highly significant result was found in SGOT, SGPT, ALKALINE PHOSPHATSE,

SERUM BILIRUBIN (p<0.001). Statistically significant result was found in USG ABDOMEN (p=0.012).

Table 3 Assessment of Result of *Rohitakadi Vati* on Subjective Parameters

Parameters	Median		Mean		SD	SE	Wilcoxon Signed Rank	p-value	Result
	BT	AT	BT	AT					
<i>Aruchi</i>	1	0	1.33	0.083	0.44	0.09	-300	<0.001	Highly Significant
<i>Avipaka</i>	2	0	1.67	0.3	0.48	0.098	-325	<0.001	Highly Significant
<i>Hrillasa</i>	1	0	1.39	0.11	0.53	0.12	-190	<0.001	Highly Significant
<i>Daurbalya</i>	2	0.5	1.65	0.529	0.85	0.228	-136	<0.001	Highly Significant
<i>Udara shoola</i>	2	0	1.81	0.32	0.53	0.128	-276	<0.001	Highly Significant
<i>Asya-vairasya</i>	2	1	1.86	0.71	0.52	0.11	-28	0.016	Significant
<i>Anaha</i>	3	0	2.48	0.28	0.58	0.22	-378	<0.001	Highly Significant

Table 4 Assessment of Result of *Rohitakadi vati* on Objective parameters

Objective parameters		Mean	N	SD	SE	t-value	% Effect	p-value	Result
	AT	32.37	30	6.590	1.203				
SGPT	BT	53.79	30	16.410	2.996	7.258	35.65%	<0.001	Highly Significant
	AT	34.61	30	8.736	1.595				
AIKALINE PHOSPHATASE	BT	110.15	30	22.32	4.08	7.631	20.78%	<0.001	Highly Significant
	AT	87.26	30	13.74	2.51				
SERUM BILIRUBIN	BT	0.92	30	0.421	0.0769	7.547	30.02%	<0.001	Highly Significant
	AT	0.65	30	0.323	0.0590				
USG ABDOMEN	BT	1.067	30	0.407	0.0496	2.69	18.75%	=0.012	Significant
	AT	0.867	30	0.0743	0.0833				

As seen in Table no. 5, On assessment of percentage relief in subjective parameters, it was observed that patients got 93.8% relief in *Aruchi*, 80% relief in *Avipaka*, 87.2% relief in *Hrillasa*, 71.4% relief in *Daurbalya*, 82.5% relief in *Udara shoola*, 53.846% relief in *Asya-vairasya* and 88.7% got relief in *Anaha*.

Table 5 Percentage Effect of *Rohitakadi Vati* in Subjective Parameters

S.No.	PARAMETER	% EFFECT
1.	<i>Aruchi</i>	93.8%
2.	<i>Avipaka</i>	80%
3.	<i>Hrillasa</i>	87.2%
4.	<i>Daurbalya</i>	71.4%
5.	<i>Udara shoola</i>	82.5%
6.	<i>Asya-vairasya</i>	53.8%
7.	<i>Anaha</i>	88.7%

As per Table no. 6, On assessment of percentage relief in Objective parameters, it was observed that patients got 30.49% relief in SGOT, 35.65%

relief in SGPT, 30.02% relief in Serum Bilirubin, 20.78% relief in Alkaline phosphatase, 18.75% relief in USG Abdomen.

Table 6 Percentage Effect of *Rohitakadi Vati* In Objective Parameters

S.No.	PARAMETER	%EFFECT
1	SGOT	30.49%
2	SGPT	35.65%
3	ALKALINE PHOSPHATASE	20.78%
4	SERUM BILIRUBIN	30.02%
5	USG ABDOMEN	18.75%

As per Table no. 6, On assessment of percentage relief in Objective parameters, it was observed that patients got 30.49% relief in SGOT, 35.65% relief in SGPT, 30.02% relief in Serum Bilirubin, 20.78% relief in Alkaline phosphatase, 18.75% relief in USG Abdomen.

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Table 7 Assessment of Result of *Rohitakadi vati* on Biochemical parameters

BIOCHEMICAL PARAMETERS		Mean	N	SD	SE	t-value	P-value	Result
HB	BT	13.513	30	1.643	0.300	0.643	0.525	Non-significant
	AT	13.443	30	1.737	0.317			
TLC	BT	6493.237	30	1714.581	313.038	0.684	0.5	Non-significant
	AT	6461.897	30	1778.119	324.639			
Neutrophils	BT	54.297	30	6.318	1.154	0.523	0.605	Non-significant
	AT	53.973	30	6.571	1.200			
Eosinophils	BT	1.167	30	1.642	0.300	0	1	Non-significant
	AT	1.642	30	1.642	0.300			
Monocytes	BT	4.497	30	1.986	0.363	0.292	0.772	Non-significant
	AT	4.403	30	2.373	0.433			
Basophils	BT	0.231	30	0.377	0.0688	0.962	0.344	Non-significant
	AT	0.174	30	0.354	0.0646			
Lymphocytes	BT	32.953	30	7.147	1.305	1.796	0.083	Non-significant
	AT	31.883	30	7.673	1.401			
ESR	BT	13.33	30	6.728	1.228	0.504	0.618	Non-significant
	AT	13.13	30	6.569	1.119			

Table 8 Assessment of Result of *Rohitakadi vati* on Biochemical parameters

BIOCHEMICAL PARAMETERS		Mean	N	SD	SE	t-value	p-value	Result
Albumin	BT	4.190	30	0.571	0.104	3.29	0.003	Significant
	AT	3.812	30	0.611	0.111			
Globulin	BT	2.972	30	0.437	0.0798	2.32	0.028	Significant
	AT	2.792	30	0.633	0.116			
A/G Ratio	BT	1.429	30	0.251	0.0459	0.813	0.423	Non-significant
	AT	1.397	30	0.236	0.0431			
Blood urea	BT	24.511	30	8.615	1.573	3.28	0.003	Significant
	AT	22.985	30	8.549	1.561			
Serum creatinine	BT	0.892	30	0.229	0.0418	-0.5	0.621	Non-significant
	AT	0.905	30	0.195	0.0357			
Serum cholesterol	BT	189.8	30	28.9	5.28	2.938	0.006	Significant
	AT	177.6	30	31.6	5.78			
Serum Triglyceride	BT	169.689	30	50.49	9.22	3.067	0.005	Significant
	AT	157.463	30	46.83	8.55			
Fasting sugar	BT	88.15	30	6.50	1.18	2.407	0.023	Non-significant
	AT	86.63	30	5.56	1.015			
Post prandial sugar	BT	104.933	30	10.498	1.917	-1.370	0.181	Non-significant
	AT	106.28030	30	10.93	1.995			

As per Table no. 7, Table no. 8, In Biochemical parameters, statistically Significant result was found in Albumin, Globulin, Blood urea Serum cholesterol, Serum, bilirubin because $p > 0.01$ & < 0.05 . Other Hb, TLC, DLC, ESR, WBC, A/G Ratio, Serum creatinine, Blood sugar result was found Non-significant because $p > 0.05$.

Table 9 Estimation of Overall Response in 30 Patients of *Yakrita Vikara* (Non-alcoholic fatty liver disease)

Overall Effect	Frequency	Percentage (%)
Excellent (75-100%)	23	76.7%

Marked Improvement (50-74%)	7	23.3%
Mild Improvement (25-49%)	0	0.0%
No Change (<24%)	0	0.0%
TOTAL	30	100%

As seen in Table no. 9, In overall response, complete relief was found in 76.7%, Marked improvement in 23.3%.

Effect of treatment

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The assessment of Subjective parameters was done using **Wilcoxon Signed Rank test** while assessment of Objective parameters was done using **paired 't' test**.

While observing subjective and objective assessment following results are found:

Discussion of Effect of Therapy

In the present study, 30 patients of *Yakrita Vikara* (NAFLD) were registered and treated with *Rohitakadi Vati* 2 Tablets (500mg each) BD after a meal.

While observing subjective and objective assessment following was found.

Statistically highly significant result was found in subjective parameter *Aruchi*, *Avipaka*, *Hrillasa*, *Daurbalya*, *Udara shoola*, *Anaha* as value of $p < 0.001$. Because p value is less than 0.001.

Statistically significant result was found in subjective parameter *Asya-vairasya* as value of $p = 0.016$.

The percentage relief in all Subjective parameters were as follows:

93.8% *Aruchi*, 88.7% of *Anaha*, 87.2% of *Hrillasa*, 82.5% of *Udara shoola*, 80% of *Avipaka*, 71.4% of *Daurbalya* and 53.8% of *Asya-vairasya*.

The percentage relief in all Objective parameters:

- SGOT 30.49%, SGPT 35.65%, ALKALINE PHOSPHATASE 20.78%, SERUM BILIRUBIN 30.02%, USG ABDOMEN 18.75%.

- In Objective Parameters, statistically highly significant result were found in SGOT, SGPT,

Alkaline phosphatase, Serum bilirubin as value of $p < 0.001$.

- Statistically Significant result was found in USG Abdomen as value of $p = 0.012$.

- In Objective assessment the mean score of SGOT was 46.93 before treatment which got reduced to 32.37 after treatment which statistically showed highly significant result ($p < 0.001$).

- In Objective assessment the mean score of SGPT was 53.79 before treatment which got reduced to 34.61 after treatment which statistically showed highly significant result ($p < 0.001$).

- In Objective assessment the mean score of ALKALINE PHOSPHATASE was 110.15 before treatment which got reduced to 87.26 after treatment which statistically showed highly significant result ($p < 0.001$).

- In Objective assessment the mean score of SERUM BILIRUBIN was 0.92 before treatment which got reduced to 0.65 after treatment which statistically showed highly significant result ($p < 0.001$).

- In Objective assessment the mean score of USG ABDOMEN was 1.067 before treatment which got reduced to 0.867 after treatment which statistically showed significant result ($p = 0.012$)

Overall effect of therapy

- Overall response (*Ayurvedic* formulation) was **Excellent** improvement in **76.7%** patients, **Marked** improvement in **23.33%** patients and

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Mild improvement in 0% patients whereas 0% patients showed no improvement.

Follow up study

- Total 30 patients came for follow up. 12 patients complained of recurrence of symptoms after completion of trial. This gives a clear idea about the *Yapya* nature of the disease.

Probable Mode of Action of *Rohitakadi vati*

- According to *Acharya Kashyapa*, the aim of treatment is to steadily enhance the body's health, longevity, and illness. The following elements, including *Dushya, Desha, Bala, Kala, Agni, Prakriti, Vaya, Satva, Satmya, and Ahara avastha*, should be carefully considered before giving medication to any patient. Here, with this in mind, an attempt is made to describe the drug's most likely mode of action.

- *Rohitakadi vati* mentioned in *Bhaishajya Ratnavali* in *Yakrit-pleeha rogaadhikar prakrana*. *Rohitakadi vati* has possess following properties *Kapha-pitta shamaka, Vata-kapha shamaka, Shool-hara, Deepana, Anulomana, Shothhara, Yakrituttejaka, Yakritodara, Anulomana*. This is to be followed by modern parameters we can say that these drugs have Hepatoprotective, Anti-inflammatory, Carminative, Laxative, Anti-oxidant properties.

- *Rohitaka, Chitraka, Yavanika* have *Katu, Tikta, Kashaya rasa*. *Katu* improves the taste of person, detoxifies, kill germs and worms, strengthen and stabillise body, useful in fever, digestive, carminative. The bark of tree contain Tecomin, Betulinic acid, Tecomelloside. *Tikta*

rasa removes toxic effects, obesity, diabetes. They *anulomana of vata*. It purifies the liver and enables its to function. *Kashaya rasa* reduces *pitta and kapha dosha*. It heals wound faster. Betulinic acid present in the bark of *Rohitaka* treat indigestion and appetite¹⁷. Its *karma* and action are *Deepana, Anulomana, Kamala, treat Yakrita-pleeha vriddhi*.

- *Plumbago zeylanica* roots help in prevention of hepatic diseases and provide the pharmacological rationale for its extended folklore use in the treatment of liver disorders. The root of *Plumbago zeylanica*, a major source of plumbagin, has been used in traditional medicine since 750 BC as a hepato-protective, atherogenic and neuroprotective agent. Plumbagin act as radical scavenger and thereby preventing cell injury¹⁸.

- *Yavanika* consist of Thymol which act as carminative, Anti-microbial¹⁹ It improve metabolism and promote better liver function.

- *Ikshuraka-beeja* has *Madhura rasa*, they make a person strong and increase life. It pacifies *Pitta* and *Vata doshas*. They provide stability, flexibillity, strength and vitality to the body. Phytosterol lowers low density lipoprotein cholesterol, Aspartate amino transferase, Alanine amino transferase, Hepato-protective & Jaundice²⁰.

- *Sheeta virya* provides stability, Longevity, strength prevent discharges, Heaviness. It increases *kapha* and *vata*, mitigates *pitta*. *Ushna virya* helps in digestion and purgation.

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- *Saindhava lavana* has anti-oxidant, stabilising blood pressures. It controls weight by equalizing minerals and eliminating fat dead cells. It improve action like anti-obesity, anti-inflammatory²¹.
- *Bhavana* is a unique traditional method of transformation of raw material into the drug by levigation of drugs with juice etc. These methods add the unique capability of affecting the physiochemical and biological properties of drug. There are two drugs i.e. *Karanja, Karvellaka* used in this formation of *vati*.
- *Karanja* is *Tikta, Katu, Kashaya in rasa, laghu, tikshna guna, ushna virya, vipaka katu*. The pharmacological effects of *Karanja* are *Kapha-vatahara, Shotha-hara and Bhedana*. The oral administration of ethanolic extract of *Pongamia pinnata* show significant anti-lipid peroxidative effect and anti-lipid peroxidative effect and also enhance anti-oxidant defence system.
- *Karvellaka* is useful in treatment of hypercholesterolemia.
- *Navsacara* is *amla, lavana, evam ksharia*. *Nausadra* is said to be *Tridoshguna, Sukshma, Jataragni, Pita saraka*. *Nausacara* is one of the *rasadravyas* include under *sadharana rasa varga*. It possesses the properties like *deepana, kapha nissaraka, ruchya* and indicated *amlapitta, hrudya, daurbalya*.
- *Rohitka, Chitraka, Yavanika, Karanja, Karvellaka* have *Deepana, Pachana Karma* due to *Katu, Ushna, Tikshna property*. It helps in

improving *Mandagni and Aruchi*. *Deepana pachana* increase *Jatharagni* due to which there is less chance of *Avipaka* and reduce the symptoms like *Utklesha and Udara Gaurava*.

- *Rohitaka, Yavanika, Ikshuraka -beeja* are *Anulomana, Aampachana* drugs which help in digesting *Aam*. It also relieving in *Anaha, Aama* by alleviating *Srotorodha*. They also have *Yakrit-uttejaka property* which improve the function of liver (*Moola of Raktavaha srotasa*). Thus *Rasa-Raktavaha srotodushti* can be treated very well.
- *Rohitaka, Chitraka, Yavanika* have *lekhana, Vishaghna, Shoth-hara, Shool-hara, Vata vyadhi*. It decrease the Vitiation of *kapha*. Due to *Ushna, Tikshna property*, it help in *lekhana karma*.
- Due to *Ushna virya of Yavanika, Karvellaka* it does not allow *Vata prakopa*, so it relieves *Adhmana*

CONCLUSION

Based on the Conceptual study, Clinical observations and Discussions the following conclusions are drawn:-

- ❖ *Jatharagni* is the leader of all the factors concerned with digestion and metabolism in the living body.
- ❖ Treat *Yakrita roga* in the principle of *Udara roga*,
- ❖ Non-alcoholic fatty liver disease can be correlated as *Yakrita vikara*.

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- ❖ Non-alcoholic fatty liver disease can be correlated as *Pitta-kapha Pradhana Tridoshaja Vyadhi*.
- ❖ Contrary to previous belief that its increased incidence is found in elderly patients it has been studied that it is significantly prevalent in middle aged persons.
- ❖ High intake of tea and junk food, sedentary lifestyle, lack of exercise precipitate the disease.
- ❖ *Vishamashana*, sedentary lifestyle is most powerful factor for causing Non-alcoholic fatty liver disease .
- ❖ In *Rohitakadi Vati*, majority drugs have *Katu, Tikta, Kashaya rasa, Vipaka Katu, Ushna virya, Tridosha shamaka* properties and *Deepana, Pachana karma*.
- ❖ Overall effect of can be summarized as *Rechana* (purgative), *Mutrala* (diuretics), *Vata-shamaka, lekhana, Agnivardhaka, Ama, Medha, Kapha shamaka qualities*
- ❖ In this study, effect of *Rohitakadi vati* was recorded by using the classical symptoms of *Yakrita Vikara (Non-alcoholic fatty liver disease)*.
- ❖ In this study, 76.7 % of patients showed excellent result while 23.3% of patients showed marked improvement.
- ❖ Due to wider range of action, *Rohitakadi vati* has shown better results in relieving the symptoms of *Yakrita vikara*.
- ❖ During follow up of 15 days period it was found that there was relapse of few symptoms with less intensity.
- ❖ Moreover no side effects were observed in patients during and after the treatment, so it can be concluded that the patients of *Yakrita vikara* can be managed effectively by *Ayurveda* without fear of side effects as seen in *Yakrita vikara* (Non-alcoholic fatty liver disease).

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