

UNDERSTANDING THE ETIOPATHOLOGY AND SYMPTOMOLOGY OF NON
ALCOHOLIC FATTY LIVER DISEASE WSR YAKRITUDARAVishala Kala*¹, Dr. Abhishek Bhushan Sharma² and Dr. Kimmi Seth³¹MD Scholar 3rd Year, PG Dept. Kayachikitsa Patanjali Bhartiya Ayurvedigyan Evam Anusandhan Sansthan.²Asso. Prof. PG Dept. Kayachikitsa Patanjali Bhartiya Ayurvedigyan Evam Anusandhan Sansthan.³Asst. Prof. PG Dept. Kayachikitsa Patanjali Bhartiya Ayurvedigyan Evam Anusandhan Sansthan.

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ABSTRACT

Nonalcoholic fatty liver disease (NAFLD) is a global epidemic that ranges from isolated hepatic steatosis (nonalcoholic fatty liver [NAFL]) to steatosis plus inflammation (nonalcoholic steatohepatitis [NASH]) with or without fibrosis. In majority of patients, it is associated with metabolic risk factors as obesity, diabetes mellitus and dyslipidaemia. If remain untreated it may progress to advanced stages of hepatic fibrosis and cirrhosis, HCC, liver failure and then become the most common cause of death. In modern science there is no such effective treatment to cure NAFLD. Here we have tried to explain NAFLD as *Yakritudara*. Understanding the *nidana*, *samprapti* and *sampraptighataka* and *lakshana* of *Yakritudara* is the main aim of our study.

KEYWORDS: NAFLD, *Yakritudara*, *Nidana*, *Samprapti*, *Sampraptighataka***INTRODUCTION**

The Non-alcoholic fatty liver disease has emerged as the leading type of chronic liver disease worldwide. It is a clinical and pathological syndrome. Over the years, changing lifestyle and dietary habits in addition to the genetic predisposition has increased the occurrence of obesity & diabetes mellitus and their consequences including NAFLD.^[1] Non-alcoholic fatty liver disease (NAFLD) is a common condition characterized by excess of fat in liver which ranges from simple steatosis to steatohepatitis, cirrhosis and hepatocellular carcinoma (HCC) in the absence of excessive alcohol intake.^[2] NAFLD includes less significant forms of steatosis either alone (type 1 NAFLD) or with inflammation but no hepatocyte ballooning or fibrosis (type 2).

Epidemiology and risk factors

Prevalence of the disease is estimated to be around 9-32% in the general Indian population, with a higher incidence rate amongst obese and diabetic patients. NAFLD is more common in men.^[3] The current estimates are that the prevalence of NAFLD is approximately 20% in general population making it most common liver disease in United states.^[4] NAFLD is strongly associated with obesity, dyslipidaemia, insulin resistance and type 2 (non insulin dependent) diabetes mellitus.^[5] These are considered to be major risk factors associated with NAFLD. Other factors like Drugs, metabolic diseases, surgery, nutritional deficiencies are also associated.

Pathogenesis of NAFLD

Few theories have been proposed for pathogenesis of NAFLD. Currently **2-hit hypothesis** is being favored. Liver plays a central role in lipid metabolism, importing serum free fatty acids and manufacturing, storing and exporting lipids and lipoproteins.^[6] The leading proposal for the pathogenesis of NAFLD is a "2-hit" hypothesis.^[7] The first hit hepatic triglyceride accumulation or steatosis, increases the susceptibility of the liver to injury mediated secondary hit changes, such as inflammatory cytokines/adipokines, mitochondrial dysfunction and oxidative stress, which in turn promotes the development of steatohepatitis and fibrosis.^[8-9]

Clinical Features and diagnosis

NAFLD is usually asymptomatic, although fatigue and right upper quadrant abdominal discomfort may be reported.^[10] The diagnosis of NAFLD is usually suspected in individuals found with asymptomatic elevation of aminotransferases, radiological findings of fatty liver or unexplained persistent hepatomegaly.^[11] Currently there are no specific medications available to cure NAFLD, management only focus improving components of the metabolic syndrome, such as obesity, IR and dyslipidemia.

Ayurvedic approach

As per *ayurveda* it is very difficult to use distinctive nomenclature to denote the word Non Alcoholic Fatty Liver Disease, NAFLD is a lifestyle disorder, based on its *nidana*, *lakshana* and *samprapti* we have equated it with *Yakritudara*.

mRifRk% rRNksf.krte~A lq-“kk 4-24

Yakrita is a maternal organ in origin, it develops from the *sonita* (blood).^[12]

**jäogs}s(r;ksewya;d`rlyhgkukS jäokfgU;”p
/keU;% lq-“kk 9-12
“kksf.krogkuka lzksrlka ;d`Uewya lyhgk pAaA p-
fo 5-7**

Yakrita, Pleeha and Raktavahini is a *moola* of *rakta vaha srotasa*.^[13-14] *Yakrit* is a site of *Bhutagni, Ranjanka pita*. Hence, *yakrit* is a site of formation of *rakta dhatu* from *rasa dhatu*. The main function / feature of *raktavaha srotas* is to carry /circulate blood from heart to periphery and vice versa. Being site of *agni* it is another function is to maintain metabolism in the body it enables *dhatu* poshan.

Yakritudara Described in Samhitas

S.No	Samhitas	Description
1	Charak Samhita	Chikitsa Sthana - ch13 udarchikitsitam
2	Shushrut Samhita	Ch 7- Nidaana Sthana, Ch.14 Chikitsa sthana
3	Ashtanga Hridaya	Nidanasthana – Ch12, Chikitsa Sthana- ch15 udarchikitsitam
4	Ashtanga Samgraha	Chikitsa Sthana- ch12 udarchikitsitam
5	Chakradatta	CH 37- udara chikitsa, Ch38- Pleeha-yakritchikitsa
6	Madhav Nidana	Ch 35- Uadara nidanam
7	Bhel samhita	Chikitsa Sthana- ch13 udarchikitsa
8	BhavPrakash	Ch 41-Udara roga adhikara

Disease which manifest in *udara* (abdomen) is termed as *Udara*. *Udara rog* denotes the generalized distension of abdomen of varied etiology. It is among the *Ashtamahagada*^[15]

Yakritudara is a type of *Udar roga*.^[16]

Nidana%^[17-21]

Nidana acts as a key in the diagnosis as well as treatment. In NAFLD there is accumulation of fat in liver and metabolic disorders like obesity, DM, IR and dyslipidaemia are associated factors of NAFLD so we have considered *santarpanjanya vyadhi's* and *ahara-vihara* which causes *agnimandya, rasa, rakta* and *medo dushiti* as important factors in etiology of *yakritudara*.

Nidaana	Vihara
Aahara <i>Kapha-Vardhak</i> – “khersu ;qäk % fLu/kk k % dqoZrs “ys’e.klap;e~AA <i>Srotodushti karak</i> <i>Ras vaha</i> - ßxq#”khrefrLuX/kefreak=a le”urke~ <i>Rakta vaha</i> - fonkghU;éikukfu fLuX/kks’.kkfu nzokkf.k p <i>Medovaha</i> - esnksokfgfu nq’;fUr ok.:k”pkfrlsoukr~ <i>Singha, guru, picchil, madhura, sthira, manda, mridu</i> , food items, medyamans sevan, Varuni madhya sevan, Vidahi, Sigdha, ushana and drava food items,	<i>Avyayaama</i> <i>Diva swapnam</i> <i>Adhyashan</i> <i>Atichintan</i> <i>Bhajtaaatapcha anila</i> <i>Vyadhikarshanat</i> <i>Virekvamansneh vibhram`at</i> <i>Deshkalaritviparyad</i> <i>Vega dharana</i> <i>Aatap and anil sevan</i>
bananas, papaya, radish, jackfruit, sweetpotato, potato, onion, corn, arbi New rice, Basmati rice, pancakes, Maida (all purpose flour)Urad daal, Matar (pea), Chole (chick pea), Rajma (red kidney bean), Soy beans, Buffalo milk, Butter, cheese, Frozen yogurt, ice cream,Coconut,Cashew, peanuts,Beaf, buffalo meat, pork, lamb, coconut oil, soy oil, Artificial sweetners, Date sugar, jaggary, maple syrup, white sugar, sweets, chocolates, junk food	Lack of exercise Lack of physical activities Prolonged sitting working life style Irregular dietary habit Excessive sleeping hours

Samprapti

**“kksf.kra ok jlknH;ks foo`)a ra foo/kZ;sr~AA p-
fp-13- 34**

The process of manifestation of disease is called *Samprapti* (pathogenesis). It includes various stages as the disease progresses. *Acharya Charak* has narrated pathogenesis of *Yakritudara* very concisely in two ways. First is by doing strenuous activities after having meals like having a jerky ride, vigorous body movements, exhausting activities, excessive sexual intercourse, walking, vomiting and emaciation due to chronic disorder leads to the displacement of *Yakrita* (liver) from

its original place, causing *Yakritudara*. Second pathogenesis involves the increase of *Rasaadi dhatu's* which eventually increases *rakta dhatu* resulting in *Yakritudara*.^[22]

Non alcoholic fatty liver disease is characterized by Fat deposition in liver, we will consider the second pathogenesis of *Yakritudara* which is due to excessive *dhatu vridhhi*.

Sanchaya^[23] - *Snigdha, abhishyandi, guru, sheeta, kaphavardhakaahara* and *vidahkarak aahara* causes

vitiating of kapha. These *nidana* also causes *rasa dhatu* and *rakta dhatu dushiti*.

Prakopa^[23]- Continuous *Nidana sevana* increases *sanchit kapha* and *pitta*. In people with *santarpanjanya vyadhi* like *prameha* and *sthaulya*, kapha dosha is already presents in excess quantity, more of *nidana sevana* leads to excessive accumulation of *kapha dosha*. These acts as *nidanarthkara rogas* (disease which causes another disease) which may results in manifestation of *Yakritudara* (NAFLD). *Yakrit* is a *sthan* of *bhutagni* and *pitta*, vitiating *doshas* leads to *Agnimandya*. *Rasavaha*, *Raktavaha*, and *medovaha* srotas also gets vitiating. *Agnimandya* also leads to development of *sama pitta*.

Prasara^[23] - *Prakupit doshas* moves to different part of body with the help of *Vata dosha*.

Sthansanshraya^[23]- The provoked *Kapha* has an affinity towards *Meda* (*abadh*) due to their similar properties, so they combine with each other. *Samapitta* which gets vitiating further on consumption of *pitta vardhak nidana*. Increased *sama pitta* dosha also get bind with *rakta dosha* as they share common properties. This blending of dosha and *dushya* is known as *sthansanshraya*.

Vyakta^[23]- *Medadhatu* (*abadh*) vitiating by kapha dosha with the help of *rakta dhatu* circulates throughout the

body reaches *Yakrita* (liver) and gets accumulated in the liver. The accumulated *meda dhatu* is in *badha* form. Thus there is increase in both *badha* and *abadha Medadhatu* inside the body. *Yakrit* is also *sthan* of *agni*, accumulated *kapha* and *Medadhatu* due to their opposite properties will leads to *Agnimandya* and hence symptoms started appearing in this stage. Secondly, *Sama Pitta* dosha due to its *drava* and *sar guna* increases the quantity of *rakta dhatu*. *Yakrit* is site of *rakta* so the increase in its quantity will increases size of *yakrita*. Due to *Srotoavrodha* (blockage of channels) movement of *vayu* also gets restricted. As *udaroga* are *tridoshaja* in nature all *doshas* gets involved.

Bheda^[23]- If the disease is untreated then disease lands in next stage of *Bhedaavstha* in which many *updravas* (complication) arises. If in earlier stage *Yakritudara* is not treated it will eventually ends up in *jalodara* which is *asadhya* in nature. *Cirrhosis* and *HCC* are the complication which may arises when *NAFLD* is not treated.

SAMPRAPTI GHATAKA OF YAKRITUDARA (NAFLD)

Following are the body constituents that are mainly involved in the pathogenesis to precipitate the disease *Yakritudara*.

Samprapti Ghataka of Yakritudara are described as follow

Dosha:	Kapha: Bahu and Abaddha Pitta: Pachak pitta Vata: Apana and samana vayu
Dushya:	Rasa, Rakta, Meda,
Srotasa:	Rasavaha, Raktavaha, Medovaha
Sroto-dushiti	Sanga, Atipravritti
Agni	Vaishamya of all Agnis (Jathragni, Bhutagni and Dhatvagnimandya)
Adhithana	Yakrit
Ama:	Medodhatugata (Ama produced due to Jatharagnimandya and Dhatvagnimandya.)
Bhedavastha	Occurrence of Upadravas such as Jalodara
Sadhyaasadhya	Krichasadhya

Samprapti ghataka

Kapha

Kapha is seated in the *Rasa Dhatu*, *Mamsa Dhatu*, *Medodhatu*, *Majja Dhatu* and *Shukra Dhatu*.^[24] *Kapha dosha* has qualities like *guru* (heavy), *sheeta* (cool), *mridu* (soft), *snigdha* (unctuous), *madhura* (sweet), *sthira* (immobile), *picchila* (slimy).^[25] *Dosha* and *dushyas* are interrelated to each other and they vary with variation in each other, this is termed as '*Ashrayashrayi bhava*'.^[26] *Kaphadosha*, *Rasadhatu* and *Medadhatu* shares similar properties, *Kapha* is *Ashrayee* (resident) while *Dhatu's* (*Rasadhatu* and *Medadhatu*) is *Ahraya* (residence) on the basis of *siddhanta* of *Ashrayashrayeebhava* vitiating of kapha also leads to the vitiating of the above *Dushyas*. In this way, Vitiating of *Kapha* leads to vitiating of *rasa* and *medadhatu*. So with an increase in *Kapha*, *Rasa* and *Meda* will also increase and vice-versa.

Pitta- *Vidahi annapana* leads to vitiating of *pitta*, increased *pitta* due to its *drava*, *sara* and *usha* properties vitiates *rakta* and increases the quantity of *rakta* which eventually causes *Yakritudara*. In *Yakritudara* (NAFLD) there is increase in kapha dosha and accumulation of *Medadhatu* in *yakrita* due to its opposite properties hamper function of *pitta* causing *Agnimandya*. *Agnimandya* leads to formation of *sama pitta*, which gets more vitiating on having *Vidahi annapana* and symptoms of *pitta* occurs in body. *Pachak* is the one responsible for metabolism, vitiating of *pachak pitta* main feature of the disease thus hampering digestive functions of the body.

Vata- *Pitta* and *kapha* dosha cannot move by themselves, with the help of *vata* they get circulated inside the body.^[27] Due to *srotomargaavrodha* the movement of *vata* gets restricted.

Rasa

Rasa Dhatu is a *sthana* of *Kapha Dosha*.^[28] It plays parts in pathogenesis in two ways, first in the *Samprapti* of *Yakritudara* provoked *Kapha* has an affinity towards the *Rasadhatu*. Hence, increased *kapha dosha* will eventually leads to increase in *Rasa dhatu*, *ras dhatu* will increase *Rakta dhatu* according to *dhatuuttapatti karma*. Increased *rakta dhatu* when reaches *Yakrit* leads to *Yakrit Udara*. Second *kapha, rasa* and *meda* shares similar properties, with *smananya vridhi karanam* increase in *kapha* will lead to increase in the ther two. Increased *meda* gets circulated in body and gets deposited in *Yakrita*.

Rakta

Raktadhatu when gets increased in quantity reaches liver and increase its size causing *Yakritudara*.^[29] *Raktadhatu* gets increase by two ways, firstly increase in *rasa dhatu* will increase *raktadhatu* secondly *Pitita prakopaka Nidana* sevan leads to vitiation of *pitta*, increased *pitta* due to its *drava, sara* and *ushna* properties vitiates *rakta* and increases the quantity of *rakta dhatu*.

Meda dhatu- *Kapha* has same properties^[30] like *medadhatu*, as *medadhatu* is also *atisnigdha, guru, sthool, picchila*, and *saandra*. Excessive consumption of *kaphavardhak aahara* and *vihara* leads to increase in

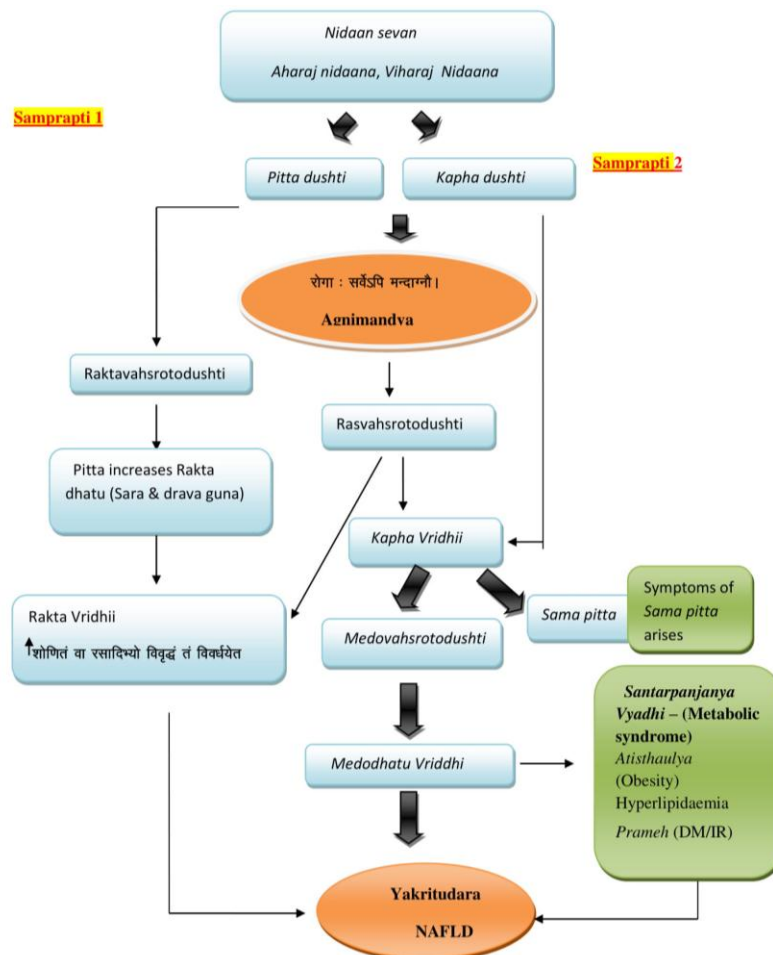
medadhatu, leading accumulation of *medadhatu* in *yakrit* thus resulting in *Yakritudara*.

Agnimandya

All the mechanisms of the body which are necessary for life totally depend upon the normal functioning of *Agni*. *Agni* is responsible for the life, color, strength, health, enthusiasm, plumpness, complexion, *ojas, tejas*, and its *prarna*. Extinction of the *jaathragni* lead to the death, its proper maintenance helps person to live a long healthy life and its impairment gives rise to various diseases.^[31] All the *acharyas* give the maximum attention on *Antaragni* or biofire.

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So vitiation of *agni* i.e impaired metabolism is the basic cause of any disease occurring in the body.^[32] The main causative factor *Yakritudara* (NAFLD) is *Agnimandya*. If *Agni* (*Jaatragni*) will not be good and potent it will cause *rasa, rakta* and *meda dhatvaagnimandya*, which further leads to the vitiation and increase of further *ras, rakta* and *Medodhatudhatu* resulting the *yakrituadara*. Thus we can say *agni* plays a major role in the pathology of NAFLD.



Varuni Madhya atisevan (alcohol consumption) can be the cause for the Alcoholic fatty liver disease.

Lakshana of Yakritudara^[33]

rL; :ikf.k & nkScZY;kjkspdkfoikdopksZew=xzgre% izos”kfiiklk³xeZnPNfnZewNkZ·xlkndkl”okle`nqTojkukgkfXuuk”kdk”;ZL;oSjL;ioZHksndks’Bokr”kwykf u] vfi pksnje:.ko.kZ foo.kZ ok uhygfjrgfjnzjkften~ Hkofr (,oeso ;d`nfi nf{k.kik”oZLFka dq;kZrAA p-fp-13-37

Lakshana	Ch.	Su.	A.S.	A.H.	M.Ni	Bv.Pr
<i>Daurbalya, Ksheena bala</i> (weakness)	+	+	-	-	+	+
<i>Arochaka</i> (Lack of appetite)	+	-	+	+	-	-
<i>Avipaka</i> (indigestion)	+	-	-	-	-	+
<i>Mutragrahatvam</i> (urinary incontinence)	+	-	-	-	-	+
<i>Tama pravesha</i> (stupor)	+	-	-	-	-	-
<i>Pippasa</i> (excessive thirst)	+	-	+	+	-	-
<i>Angamarda</i> (body ache)	+	-	-	-	-	+
<i>Moorcha</i> (Fainting)	+	-	+	+	-	+
<i>Anga sada</i> (Fatigue)	+	-	+	+	-	+
<i>Kasa</i> (cough)	+	-	+	+	-	+
<i>Swasha</i> (dyspnoea)	+	-	+	+	-	+
<i>Mridu jwara</i> (mild fever)	+	-	+	+	-	-
<i>Aanaha</i>	+	-	-	-	-	-
<i>Agninaasha, Mandaagni</i> (Decrease in digestive fire)	+	+	-	-	+	-
<i>Karshya</i> (loss of body weight)	+	-	-	-	-	-
<i>Aasya vairasya</i> (tastelessness)	+	-	+	+	-	-
<i>Parva bheda</i> (pain in joints)	+	-	-	-	-	-
<i>Koshta vaata shoolani</i> (pain in abdomen)	+	-	+	+	-	-
<i>Udaraarunvaranvivarna</i> (discoloration of abdomen)	+	-	+	+	-	-
<i>Neelharitharidra raji</i> (appearance of blue,yellow and green lines over abdomen)	+	-	+	+	-	-
<i>Pandu</i> (pallor)	-	+	-	-	+	-
<i>Dakshin aparshva parivridhhi</i> (enlargement of right side abdomen)	+	-	+	+	-	-
<i>Aadhmana</i> (flatulence)	-	-	+	+	-	-
<i>Chardi</i> (Vomitting)	-	-	+	+	-	-
<i>Daha</i> (Burning sensation)	-	-	+	+	-	-
<i>Moha</i> (delusion)	-	-	+	+	-	-
<i>Udavartam</i> (upward movement of vayu)	-	-	+	+	-	-
<i>Gurutvam</i> (feeling of heaviness)	-	-	+	+	-	-
<i>Kathinya</i> (hardness over abdomen)	-	-	+	+	-	-

Understanding the symptoms according to involved dosha and srotas-

<i>Arochaka, Gurutvam, Mandaagni, Kasa, Swas,Pandu, Aasya Vairasya,</i>	Kapha Dushti
<i>Daha, moha, murcha, tama, pipasa, mridujwara</i>	PittaDushti
<i>Daurbalya, Karshya, Koshta vaata shoolani, Aadhmana,anaha, Udavartam, Mutragrahatvam</i>	Vata Prakopa
<i>Arochaka, Gurutvam, Mandaagni, Kasa, Swas, Angamarda,Pandu, Aasya Vairasya, Tama, Jwara,Angsada,</i>	Rasavaha Srotodushti.
<i>Tama pravesha, Mridu jwara, Daha, Pipasa, Moha, Dakshin aparshva parivridhhi, Pandu,</i>	Raktavaha Srotodushti.
<i>Arochaka, Gurutvam, Mandaagni, Kasa, Swasa, Chardi, Kathinya</i>	Medovahasrotodushti.

NAFLD and Yakritudara shares same pathology as NAFLD is due to excessive accumulation of fat in liver, and in Yakritudara is also caused due to the increase in *dhatu's* (Meda dhatu) which gets accumulated in Yakrita (Liver). Diabetes mellitus, IR, Obesity and hyperlipidaemia are the associated factors responsible for

the pathology NAFLD while in Yakritudara *shaulya* and *prameha* also acts as *Nidaanarthkar rogas*. Right Abdominal discomfort, Fatigue are features shared by both NAFLD and Yakritudara. Therefore, we have tried to justify NAFLD as Yakritudara.

CONCLUSION

Hence we can conclude that *Kapha* and *sama pitta dushtikaraka nidana* plays vital role in pathogenesis (*samprapti*) of *Yakritudara*. Understanding *nidana* is necessary because *nidaana parivarjanam* is the first step of treatment, thus all the causative factors, associated and risk factors should be avoided or eliminated in order to manage the disease.^[34] *Chikitsa* means *vighatana* of *samprapti* i.e breakdown of pathology. The principle of treatment of any disease in general is induction of therapies opposite to the properties of the causative/ involved *doshas*, *dushyas*, and etiological factors involved in the pathogenesis of disease.^[35] Medadhatu accumulation in liver is the main concern of the NAFLD therefore the treatment should focus on correcting *Agnimandya*, *kapha* and *pitta shamak chikitsa* and *medohar chikitsa*. The study helps in better exploring the disease and its etiopathogenesis and better ways of its management.

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