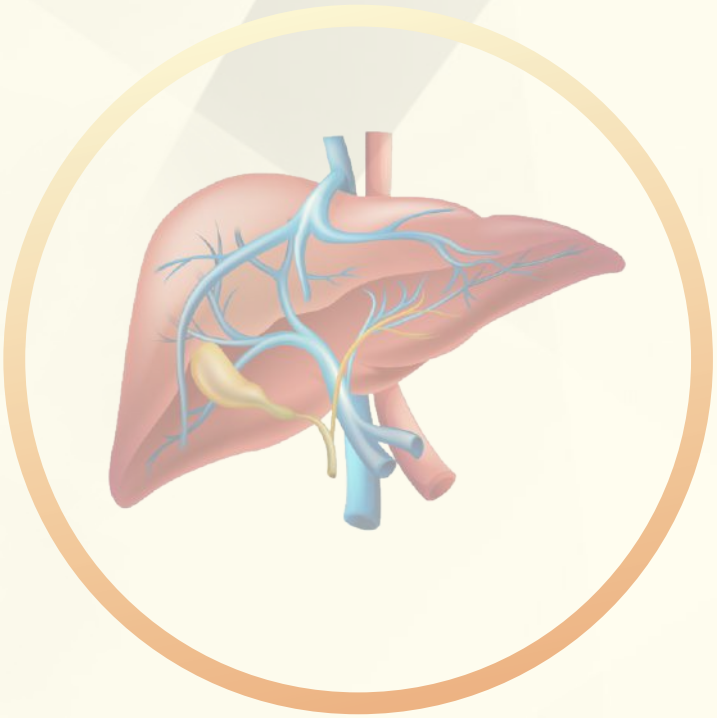
PREVENTION AND CONTROL OF NON-ALCOHOLIC FATTY LIVER DISEASE

TRAINING MODULE FOR MEDICAL OFFICERS



Directorate General of Health Services,
Ministry of Health and Family Welfare, GOI

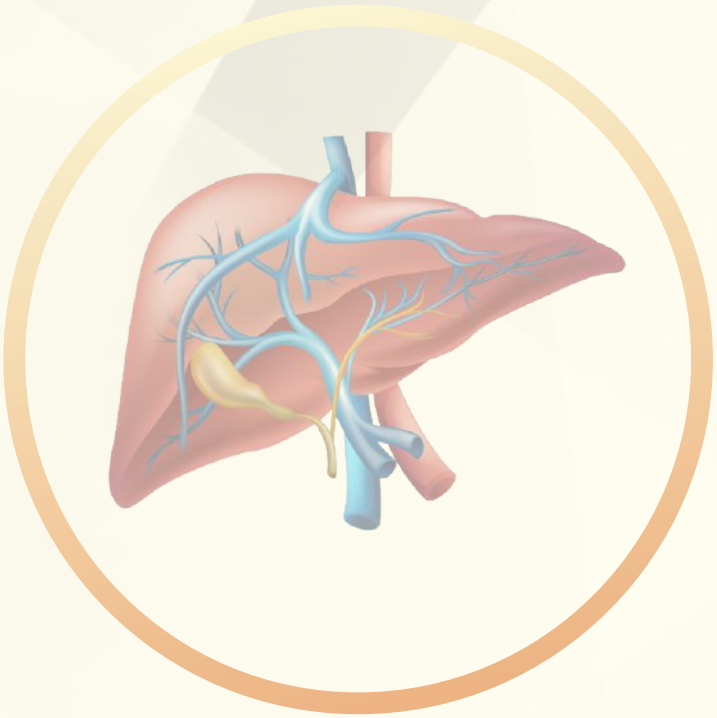
NATIONAL HEALTH MISSION
राष्ट्रीय स्वास्थ्य मिशन

सत्यमेव जयते

ilbs

PREVENTION AND CONTROL OF NON-ALCOHOLIC FATTY LIVER DISEASE

TRAINING MODULE FOR MEDICAL OFFICERS



Directorate General of Health Services,
Ministry of Health and Family Welfare, GOI

अपूर्व चन्द्रा, भा.प्र.से.
सचिव
APURVA CHANDRA, IAS
Secretary

सत्यमेव जयते

आज़ादी का अमृत महोत्सव

भारत सरकार
स्वास्थ्य एवं परिवार कल्याण विभाग
स्वास्थ्य एवं परिवार कल्याण मंत्रालय
Government of India
Department of Health and Family Welfare
Ministry of Health and Family Welfare

As we continue to address the growing burden of Non-Communicable Diseases (NCDs) in India, I am pleased to present the Training Module for Non-Alcoholic Fatty Liver Disease (NAFLD). NAFLD has emerged as a significant public health concern due to its strong association with metabolic conditions such as obesity, diabetes, and cardiovascular diseases, which are increasingly prevalent in our population.

In 2021, India became the first country to integrate NAFLD into its national NCD programme, marking a pioneering step in the global fight against liver disease and NCDs. The Government of India is committed to the prevention and control of NCDs, and this training module shall help develop capacities amongst the healthcare providers to comprehensively identify, manage, and prevent NAFLD, with a focus on promoting healthy lifestyles and early intervention.

I urge all stakeholders, including healthcare professionals, policy makers, and community health workers, to utilize these guidelines to improve the health outcomes of individuals at risk for or living with NAFLD. With our combined efforts, we can reduce the burden of liver disease and enhance the overall health of our nation.

I extend my heartfelt appreciation to ILBS and all the experts and contributors who have worked tirelessly to bring these guidelines to fruition. Together, let us continue to advance our efforts to build a healthier and more prosperous India.

Dated 26th September, 2024

(Apurva Chandra)

Room No. 156, A-Wing, Nirman Bhawan, New Delhi-110 011
Tele : (O) 011-23061863, 23063221, E-mail : secyhfw@nic.in

Punya Salila Srivastava
Officer on Special Duty

भारत सरकार
स्वास्थ्य एवं परिवार कल्याण मंत्रालय
निर्माण भवन, नई दिल्ली-110011
Government of India
Ministry of Health & Family Welfare
Nirman Bhavan, New Delhi-110011

Message

It is my pleasure to present the Training Module for Non-Alcoholic Fatty Liver Disease (NAFLD), a significant addition to our efforts to build capacities amongst Healthcare professionals to tackle the rising burden of non-communicable diseases (NCDs) in India. NAFLD, often linked to conditions such as obesity, type 2 diabetes, and hypertension, is becoming an increasingly common health issue, and addressing it is crucial for safeguarding the health of our population.

This training module offers clear strategies and practical methods for healthcare professionals to identify, manage, and prevent NAFLD at all levels of the healthcare system. By integrating NAFLD into the **National Programme for Prevention and Control of Non-communicable Diseases (NP-NCD)**, we ensure that the condition is given the attention it requires, especially in the context of India's unique healthcare needs. This comprehensive approach, focused on early detection and lifestyle modifications, can help reverse the progression of liver disease and improve overall health outcomes.

I commend the efforts of the Ministry, healthcare experts, and all those who have contributed to the development of this module. I urge healthcare providers to fully utilise this module and help implement these recommendations and to continue advocating for healthy lifestyle changes in their communities. Together, we can make significant strides in reducing the burden of NAFLD and improving the quality of life for millions of our citizens.

Punya Salila

(**Punya Salila Srivastava**)

प्रो.(डॉ.) अतुल गोयल
Prof. (Dr.) Atul Goel
MD (Med.)
स्वास्थ्य सेवा महानिदेशक
DIRECTOR GENERAL OF HEALTH SERVICES

सत्यमेव जयते

भारत सरकार
स्वास्थ्य एवं परिवार कल्याण मंत्रालय
स्वास्थ्य सेवा महानिदेशालय
Government of India
Ministry of Health & Family Welfare
Directorate General of Health Services

MESSAGE

As we continue to address the growing burden of non-communicable diseases (NCDs) in India, NAFLD is also associated with other metabolic conditions such as obesity, diabetes, hypertension and cardiovascular diseases, which are increasing in prevalence in our population. The effective management of NAFLD requires not only a sound understanding of the condition but also a capacity to implement evidence-based interventions at all levels of healthcare.

The Training Module for Non-Alcoholic Fatty Liver Disease (NAFLD), is developed to complement Operational Guidelines for NAFLD under the National Program for Prevention and Control of Non-Communicable Diseases. It will build capacity of healthcare professionals with knowledge and skills necessary to identify, manage, and prevent NAFLD, particularly at a primary care level. With strong focus on practical, real-world applications, the module will serve as a valuable resource for healthcare workers across the country.

The module covers a wide range of topics, including epidemiology, risk factor identification, screening, diagnostic protocols and standardized treatment guidelines for NAFLD. It also underscores the importance of early detection, patient education, lifestyle modification and integrated care strategies to improve health outcomes.

By utilizing these tools, Medical Officers and other healthcare providers will be prepared to address the complexities of NAFLD diagnosis and management within their practice settings and will be able to serve better in their critical role as the first point of contact for individuals at risk of or suffering from NAFLD. This module serves as a crucial resource for developing technical expertise required to implement best practices for prevention and control of NAFLD and preventing the progression of liver disease.

I would like to commend the efforts of all experts involved in the development of this training module. As we roll out this module, I request all healthcare providers and stakeholders to actively engage with the training, and use these tools and techniques to improve the outcomes for individuals with NAFLD.

Let's commit to reduce in the burden of the disease at both individual and community levels. Together, we must promote better health for all.

(Atul Goel)

Room No. 446-A, Nirman Bhawan, New Delhi-110108
Tel. No.: 011-23061063, 23061438, Fax No.: 011-23061924, email:dghs@nic.in

एल. एस. चाँगसन, भा.प्र.से.
अपर सचिव
L. S. Changsan, IAS
Additional Secretary

सत्यमेव जयते

आज़ादी का अमृत महोत्सव

भारत सरकार
स्वास्थ्य एवं परिवार कल्याण मंत्रालय
निर्माण भवन, नई दिल्ली - 110011
Government of India
Ministry of Health & Family Welfare
Nirman Bhawan, New Delhi - 110011

Message

As India continues to combat the rising burden of non-communicable diseases (NCDs), it is essential that on priority, we address conditions like Non-Alcoholic Fatty Liver Disease (NAFLD), which are closely linked to metabolic disorders such as obesity, diabetes, and cardiovascular diseases. NAFLD has rapidly become one of the most prevalent liver conditions in India, and its integration into the National Programme for Prevention and Control of Non-communicable Diseases (NP-NCD) is a critical step toward improving public health outcomes.

This Training Module for NAFLD are designed to provide healthcare workers at all levels with clear and practical tools for identifying, managing, and preventing NAFLD. By emphasizing early detection, risk stratification, and lifestyle interventions, the module will help ensure that patients receive timely care, preventing the progression of liver disease and associated complications.

Incorporating NAFLD management into the public health system also aligns with our broader goals of strengthening primary healthcare and enhancing our capacity to address metabolic disorders. With the appropriate use of non-invasive risk scores and a focus on lifestyle modifications, healthcare providers will be better equipped to manage this condition at the community level.

I commend the collective efforts of the healthcare experts and professionals who have contributed to the development of this document. Their work ensures that India remains at the forefront of tackling NCDs and improving population health. I encourage all health officials and workers to diligently implement the module for developing capacities, as together, we strive to reduce the burden of liver diseases and improve the quality of life for millions of people across the country.

(L. S. Changsan)

'A' Wing, Nirman Bhawan, New Delhi-110011
Tel. : 011-23061723, 23061773, e-mail : lschangsan@nic.in

लता गणपति, भा.प्र.से.
संयुक्त सचिव
Latha Ganapathy, IAS
Joint Secretary

सत्यमेव जयते

भारत सरकार
स्वास्थ्य एवं परिवार कल्याण मंत्रालय
निर्माण भवन, नई दिल्ली - 110011
Government of India
Ministry of Health & Family Welfare
Nirman Bhawan, New Delhi - 110011

MESSAGE

I am pleased to introduce the Training Module for Non-Alcoholic Fatty Liver Disease (NAFLD), a critical component of India's strategy to combat the increasing prevalence of non-communicable diseases (NCDs). As NAFLD continues to rise in parallel with metabolic disorders such as obesity and diabetes, it is essential that we adopt a comprehensive, preventive approach to mitigate its impact on public health.

This module shall go a long way in strengthening capacities to address challenges related to NAFLD and are a vital part of our broader strategic efforts to strengthen healthcare delivery, particularly at the primary care level. By equipping our frontline healthcare workers with the tools to identify high-risk individuals and promote early intervention, we can prevent the progression of NAFLD to more advanced stages, such as cirrhosis and liver cancer.

The emphasis on risk stratification and the use of non-invasive diagnostic tools, as outlined in these guidelines, will ensure more efficient resource allocation, allowing us to prioritize care for those most in need. At the same time, the guidelines advocate for lifestyle modifications - a key pillar of NAFLD management - highlighting the importance of balanced nutrition, regular physical activity, and weight management.

As part of our ongoing efforts under the National Programme for Prevention and Control of Non-communicable Diseases (NP-NCD), this module reflects our commitment to proactive, patient-centered healthcare planning and capacity building. I would like to extend my gratitude to the dedicated teams of experts who have contributed to this important work.

I encourage all stakeholders to actively implement this module, as we continue to work together to build a healthier future for our nation, reducing the burden of liver diseases and enhancing the overall quality of life for millions of individuals.

(Latha Ganapathy)

Room No. 145, 'A' Wing, Nirman Bhawan, New Delhi-110011
Tel. (O) : 011-23063809, E-mail : g.latha@nic.in

डॉ. एल. स्वास्तिचरण
Dr. L. Swasticharan
Additional Dy. Director General &
Director (EMR)

सत्यमेव जयते

भारत सरकार
स्वास्थ्य सेवा महानिदेशालय
निर्माण भवन, नई दिल्ली – 110 108
Government of India
Directorate General of Health Services
Nirman bhawan, New Delhi - 110 108
Telefax : 011-23063537
E-mail : drswasti@yahoo.com
swasticharan.l@nic.in

Acknowledgment

दिनांक / Dated 26/Sep/2024

It is with immense gratitude that I acknowledge the efforts of all those involved in the development of the Training Module for Non-Alcoholic Fatty Liver Disease (NAFLD), which is being released alongside the Operational Guidelines for NAFLD. This module will serve as a crucial resource for healthcare workers at all levels, empowering them with the knowledge and skills required to implement NAFLD management strategies effectively across the country under the National Program for Prevention and Control of Non-Communicable Diseases (NP-NCD).

The release of Training modules for NAFLD provides tools for delivering committed efforts toward implementing services for NAFLD under NP-NCD. For this, I would like to extend my heartfelt thanks to Prof. (Dr.) S.K. Sarin, Director, Institute of Liver and Biliary Sciences (ILBS) and his team from ILBS (Dr. BB Rewari and Dr Manya Prasad) for their invaluable contribution and visionary leadership in shaping this training module. Special acknowledgment goes to the ILBS team for its contributions to the layout and design of this guide.

I would like to express my sincere gratitude to Prof. (Dr.) Atul Goel, Director General of Health Services (DGHS) and Ms. L.S. Changsan, Additional Secretary, for their leadership in ensuring the highest quality and timely completion of this important document. I extend my gratitude to Ms. Latha Ganpathy, Joint Secretary for overseeing this process so diligently.

The hard work of the entire technical expert group members for NAFLD, who have contributed tirelessly to bring out these modules in record time, deserves special mention. Special gratitude to Dr Avinash Sunthlia, DADG (NCD) and Dr. Shweta Singh, NCD Management & Surveillance Officer, WHO India for providing their technical and public health expertise, their tireless efforts in bringing out the refined version of the document and remarkable coordination for the release.

I also extend sincere appreciation to my team, including Ms Sarita Nair, Deputy Secretary (NCD), Dr Rakesh Agarwal, ADG (NCD), Dr. Shikha Vardhan, ADG (NCD),Dr Sunny Swarnkar, DADG (NCD), Dr. Manoj Kumar Singh, AD (NCD) and consultants Dr. Roli Srivastav, Ms. Ritika Kumari, Mr. Naiyar Azam, Ms. Richa Bharti, Dr. Ankita Piplani, Dr. Shefali Sharma, and Dr. Athira Satisan for their coordinated efforts.

I would also like to extend my gratitude to each and every individual who has contributed to the conceptualization, writing, proofing, and printing of this Training Module for NAFLD. Your contributions will help build the capacity of healthcare professionals across the country and improve the management of NAFLD at the community level.

(Dr. L. Swasticharan)

कमरा नं. 743ए, ए–विंग, निर्माण भवन, नई दिल्ली–110011
Room No. 743A, A-Wing, Nirman Bhawan, New Delhi - 110011

List of Contributors

1	Dr. S.K Sarin	Director and Chancellor, Institute of Liver and Biliary Sciences (ILBS), New Delhi
2	Dr. L. Swasticharan	Addl. DDG (NCD) & Director EMR, Dte.GHS, MoHFW
3	Dr. Ramesh Agarwal	ADG (NCD), Dte.GHS, MoHFW
4	Dr. Shikha Vardhan	ADG (NCD), Dte.GHS, MoHFW
5	Dr. Sunny Swarnkar	DADG (NCD), Dte.GHS, MoHFW
6	Dr. Avinash Sunthlia	DADG (NCD), Dte.GHS, MoHFW
7	Dr. Umesh Kapil	Secretary, National Academy of Medical Sciences, New Delhi
8	Dr. Manoj Sharma	Professor, Hepatology, ILBS, New Delhi
9	Dr. BB Rewari	Visiting Professor & Public Health Specialist, Epidemiology, ILBS, New Delhi
10	Dr. A K Sood	Deputy Secretary, National Academy of Medical Sciences, New Delhi
11	Dr. Shweta Singh	NCD Management & Surveillance Officer, WHO India
12	Dr. Archana Ramalingam	Scientist-E, National Institute of Epidemiology, Chennai
13	Dr. Manya Prasad	Assoc. Professor, Clinical Research & Epidemiology, ILBS
14	Dr. Kanica Kaushal	Asst. Professor, Clinical Research & Epidemiology, ILBS
15	Dr. Tushar Prabhakar	Senior Resident, Clinical research and Epidemiology, Institute of Liver and Biliary Sciences, New Delhi

Contents

List of Abbreviations

AAM	Ayushman Arogya Mandir
ANM	Auxiliary Nurse Midwife
ASHA	Accredited Social Health Activist
BMI	Body Mass Index
CHC	Community Health Centre
DH	District Hospital
Dte.GHS	Directorate General Health Services
FIB-4 score	Fibrosis-4 score
HCC	Hepatocellular carcinoma
IEC	Information Education Communication
ILBS	Institute of Liver and Biliary Sciences
LFT	Liver Function Test
MPW (M/F)	Multipurpose Worker (Male/ Female)
NAFLD	Non-alcoholic Fatty Liver Disease
NASH	Non-alcoholic Steatohepatitis
NCD	Non-communicable Disease
NFS score	NAFLD Fibrosis Score
NHM	National Health Mission
NP-NCD	National Programme for Prevention and Control of Non-communicable Diseases
MoHFW	Ministry of Health and Family Welfare
PBS	Population-Based Screening
PHC	Primary Health Centre
SC	Subcentre
USG	Ultrasonography
VHSNC	Village Health Sanitation and Nutrition Committee

Module 1

I. Overview of the Non-Alcoholic Fatty Liver Diseases (NAFLD)

Learning Objectives:

At the end of this module, you will be able to answer the following questions:

1. What is the definition of the Non-Alcoholic Fatty Liver Disease (NAFLD)
2. What is the disease burden of NAFLD globally and in India
3. What is the Pathogenesis of NAFLD and how the disease progression happens
4. What is the need to focus on NAFLD in India

Non-Alcoholic Fatty Liver Disease (NAFLD) is the most common chronic liver disease globally, estimated to affect up to one-third of adults worldwide. In India, the estimated prevalence ranges from 9-53% [1, 2]. NAFLD is closely associated with obesity, type 2 diabetes mellitus, dyslipidemia, hypertension, coronary artery disease, metabolic syndrome, and several cancers. It predates many of these conditions and has a bi-directional link with them [3, 4]. Due to its widespread prevalence and the increased risk of developing liver cirrhosis and cancer, NAFLD has been identified as a disease requiring a robust primary care component for its prevention and control [1]. Evidence -based strategies for the prevention and control of NAFLD are crucial for effectively managing and educating patients with this condition.

Medical Officers have a key role in driving the continuum of prevention and care for NAFLD in the primary care setting. Thus, it is crucial to understand strategies for prevention and control of NAFLD in order to effectively manage and educate patients with this condition. This training module aims to provide basic knowledge and practical recommendations for NAFLD prevention and control at the community level.

1.1. Definition and Disease Burden

NAFLD is a liver disorder caused by the accumulation of excess fat in liver cells, not necessarily caused by significant alcohol consumption. It is normal for the liver to contain some fat. Typically, the liver contains some fat. However, if more than 5% of the liver's weight is fat, it is called a fatty liver (steatosis) [4]. NAFLD encompasses a

spectrum of conditions, ranging from simple fatty liver (NAFL or simple steatosis) to non-alcoholic steatohepatitis (NASH). In NAFL, hepatic steatosis is present without evidence of significant inflammation, whereas in NASH, hepatic steatosis is associated with hepatic inflammation[5-7].

NAFLD is strongly associated with rising rates of obesity and metabolic syndrome. The prevalence is increasing in developing countries due to changing dietary patterns and sedentary lifestyles. Cardiovascular disease is the most common cause of mortality in NAFLD, suggesting a close interlink with other non-communicable diseases (NCDs).

1.2. Pathogenesis and progression

The precise mechanisms underlying the development and progression of NAFLD are not yet fully understood. However, it is believed that multiple factors, including insulin resistance, oxidative stress, inflammation, and genetic susceptibility, play significant roles [5]. The progression of NAFLD involves the following stages:

1. **Simple Steatosis**: The initial stage is characterized by fat accumulation in liver cells without inflammation or liver cell damage, and individuals may remain asymptomatic.

2. **Non-Alcoholic Steatohepatitis (NASH)**: Fat accumulation triggers inflammation and liver cell injury. This inflammation can lead to the progression of NASH, involving liver cell damage, swelling, and potentially fibrosis (scarring).

3. **Liver Fibrosis and Cirrhosis**: In individuals with NASH, continued inflammation and liver cell damage can lead to liver fibrosis, characterized by the accumulation of scar tissue. Over time, advanced fibrosis can progress to cirrhosis, a severe stage associated with liver dysfunction and complications such as liver failure and hepatocellular carcinoma (Figure 1).

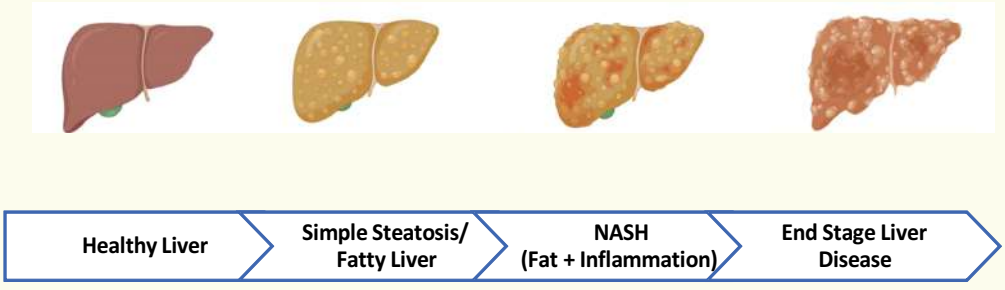


Fig. 1: Disease spectrum of NAFLD

1.3. Other Definitions associated with NAFLD

1.3.1. MAFLD (Metabolic Associated Fatty Liver Disease)

MAFLD is defined based on positive criteria rather than the exclusion of other causes of liver disease. The diagnosis of MAFLD requires evidence of hepatic steatosis (detected by imaging techniques, blood biomarkers, or liver histology) in addition to one of the following three criteria [4]:

1. Overweight/Obesity:
   Body Mass Index (BMI) $\geqslant$25 kg/m^2 in Caucasians or $\geqslant$23 kg/m^2 in Asians.
2. Type 2 Diabetes Mellitus (T2DM):
   Presence of T2DM as defined by widely accepted international criteria.
3. Metabolic Dysregulation:
   Presence of at least two metabolic risk abnormalities:

   . Waist circumference $\geqslant$102/88 cm in Caucasian men/women or $\geqslant$90/80 cm in Asian men/women.
   . Blood pressure $\geqslant$130/85 mmHg or specific drug treatment for hypertension.
   . Plasma triglycerides $\geqslant$150 mg/dL ($\geqslant$1.70 mmol/L) or specific drug treatment for elevated triglycerides.
   . Plasma HDL-cholesterol <40 mg/dL (<1.0 mmol/L) for men and <50 mg/dL (<1.3 mmol/L) for women or specific drug treatment for low HDL-cholesterol.
   . Prediabetes: fasting glucose levels 100 to 125 mg/dL (5.6 to 6.9 mmol/L), or 2-hour post-load glucose levels 140 to 199 mg/dL (7.8 to 11.0 mmol/L), or HbA1c 5.7% to 6.4% (39 to 47 mmol/mol).
   . Homeostasis model assessment of insulin resistance (HOMA-IR) score $\geqslant$2.5.
   . Plasma high-sensitivity C-reactive protein (hs-CRP) level >2 mg/L.

The term MAFLD reflects the hepatic manifestation of a multisystem disorder associated with metabolic dysfunction. Unlike the previous term NAFLD, MAFLD does not require the exclusion of significant alcohol intake or other liver diseases and is based on the presence of metabolic dysfunction.

1.3.2. MASLD (Metabolic Dysfunction-Associated Steatotic Liver Disease)

MASLD is defined by the presence of hepatic steatosis along with at least one cardiometabolic risk factor (CMRF) and no other discernible cause of steatosis. The term MASLD was chosen as an alternative to NAFLD as it provides an affirmative non-stigmatizing description of the condition rather than a diagnosis of exclusion. The inclusion of the term "metabolic" reflects the strong link between steatosis and metabolic dysfunction [5].

1.3.3. MetALD (Metabolic Dysfunction and Alcohol-Associated Liver Disease)

MetALD is a new category that describes individuals with metabolic dysfunction-associated steatotic liver disease who also consume greater amounts of alcohol (140-350 grams per week for females and 210-420 grams per week for males). This category acknowledges the coexistence of metabolic dysfunction and significant alcohol intake, which can impact the natural history and progression of liver disease [5].

However, the Indian National Association for the Study of the Liver, and South Asian Association for the Study of the Liver (INASL-SAASL) consensus recommends retaining the term NAFLD, emphasizing the need for a name that accurately reflects the disease's multifaceted nature and respects patient perspectives and cultural contexts [3].

1.4. Check your progress

a) Write the definition of Non-Alcoholic Fatty Liver Disease (NAFLD).

b) Explain the disease progression of NAFLD.

c) What is the need to focus on NAFLD?

Module 2

2. Risk factors and associated diseases

Learning Objectives:

At the end of this module, you will be able to answer the following questions:

1. What are the risk factors and diseases associated with NAFLD
2. How to identify the population at high risk for developing NAFLD
3. What are the comorbidities associated with NAFLD

2.1. Risk factors for NAFLD

Several factors contribute to the development of NAFLD. Understanding these risk factors helps identify individuals more susceptible to the disease and its progression (Figure 2 and Table 1).

NAFLD is strongly associated with the rising rates of obesity and metabolic syndrome. The prevalence is increasing in developing countries due to changing dietary patterns and sedentary lifestyles. Cardiovascular disease is the commonest cause of mortality in NAFLD, which suggests the lose interlink it has with other NCDs. Common risk factors include:

a) **Obesity**: Excess body weight, especially abdominal obesity, is a significant risk factor for NAFLD. The accumulation of fat around the abdomen contributes to insulin resistance and inflammation in the liver. NAFLD has been observed to occur in 60% to 90% of persons who are obese [6-8].

b) **Metabolic Syndrome**: Metabolic syndrome comprises a cluster of conditions, including abdominal obesity, high blood pressure, high blood sugar, and abnormal blood lipid levels. NAFLD is frequently observed in individuals with metabolic syndrome.

c) **Insulin Resistance and Type 2 Diabetes Mellitus**: Insulin resistance is closely associated with NAFLD. Individuals with type 2 diabetes mellitus are at an increased risk of developing NAFLD. NAFLD has been observed to occur in 40% to 80% of those with type 2 diabetes mellitus [6-8].

d) **Sedentary Lifestyle**: Lack of physical activity and a sedentary lifestyle are associated with development and progression of NAFLD (7). Regular aerobic exercise (e.g., walking, cycling, or swimming) and resistance training (e.g., weightlifting or bodyweight exercises) promotes weight loss, improves insulin sensitivity, and reduces liver fat accumulation.

e) **Dietary Factors**: High-calorie diets, mainly those high in unhealthy fats and added sugars, contribute to the development of NAFLD. For prevention, diets rich in fruits, vegetables, whole grains, and lean proteins are recommended.

f) **Other Risk Factors**: Age (middle-aged and older adults), gender (males have a higher risk), certain medications (e.g., corticosteroids, tamoxifen), and certain medical conditions (e.g., polycystic ovary syndrome, sleep apnea) are also associated with increased NAFLD risk [6].

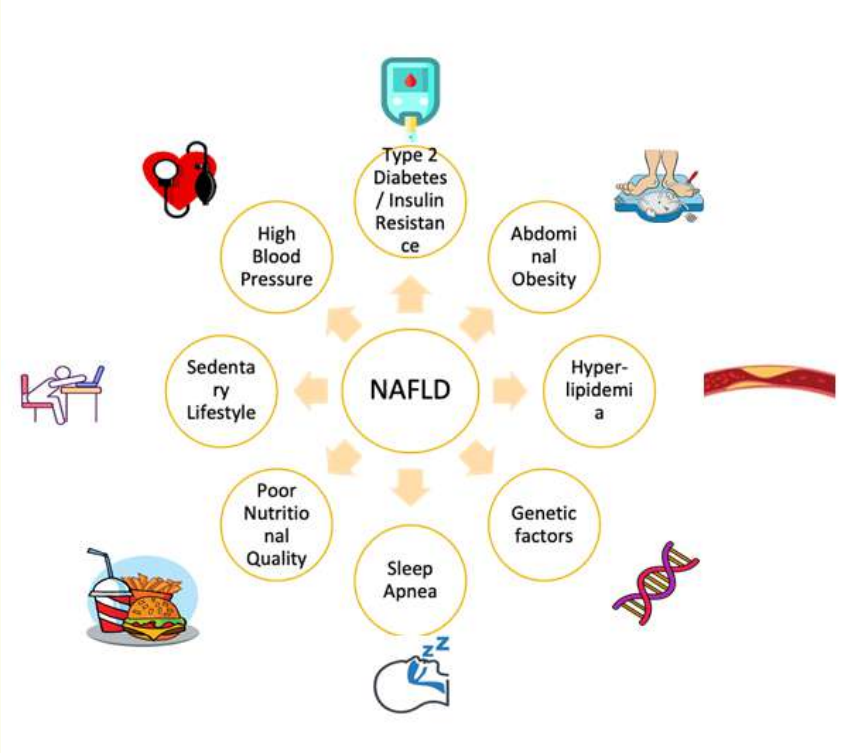


Figure 2: Risk Factors & Associated Diseases with NAFLD

2.2. Comorbidities associated with NAFLD

Comorbidities	NAFLD prevalence/ risk	Progression of Liver diseases/ complication	Progression of comorbidity from NAFLD
Obesity	60-90%	Strong risk	NA
Type 2 Diabetes Mellitus	70%	Strong risk	Strong risk
Metabolic Syndrome	53%	Strong risk	Strong risk
Obstructive sleep apnea	2-3 times risk	Moderate risk	-

Table 1. Bidirectional link of risk factors associated with NAFLD[7]

The bi-directional link between NAFLD and metabolic syndrome (table 1) lies in their mutual influence on each other's development and progression. NAFLD is closely associated with metabolic syndrome, which includes conditions like obesity, insulin resistance, high blood pressure and dyslipidemia. Metabolic syndrome promotes fat accumulation in the liver, leading to the development or worsening of NAFLD. Conversely, NAFLD exacerbates insulin resistance, increases inflammation, and contributes to atherogenic dyslipidemia, which in turn can aggravate the components of metabolic syndrome. This interrelationship creates a vicious cycle, where each condition fuels the progression of the other, complicating both diagnosis and management.

2.3. Population at Risk for NAFLD

Identifying individuals at high risk for NAFLD is crucial for early intervention and prevention. Here are some key points for identifying high-risk individuals:

i. **Obesity**: Assess body mass index (BMI) and waist circumference. Individuals with a BMI $\geqslant$ 23 kg/m^2 or waist circumference $\geqslant$ 90 cm in men and $\geqslant$ 80 cm in women are at higher risk.

ii. **Metabolic Syndrome and Insulin Resistance**: Evaluate for components of metabolic syndrome, including abdominal obesity, high blood pressure, high fasting blood glucose levels, dyslipidemia and females with PCOS.

iii. **Type 2 Diabetes**: Consider individuals with known diabetes or impaired glucose tolerance as high risk for NAFLD.

iv. **Family History**: Inquire about a family history of NAFLD and other metabolic syndrome components, especially in first-degree relatives.

v. **Medications and Medical Conditions**: Identify individuals taking linked to medications associated with NAFLD risk (e.g., corticosteroids) or medical conditions NAFLD (e.g., polycystic ovary syndrome, sleep apnea).

vi. **Other Risk Factors**: Take into account age (middle-aged and older adults), and gender (males have a higher risk), and lifestyle factors such as sedentary behavior unhealthy dietary patterns [6]. \Alcohol consumption, even at moderate levels, can exacerbate the progression of NAFLD by increasing liver inflammation and fat accumulation, complicating the management and outcome of the disease.

vii. **Hypertension**: Persons with hypertension may be considered at high risk for all components of metabolic syndrome.

2.4. Check your progress

a) Write the factors that contribute to the development of NAFLD.

b) How to identify the high-risk population for NAFLD?

c) How different comorbidities are linked with NAFLD?

Module 3

3. Operationalization of NAFLD

Learning Objectives:

At the end of this module, you will be able to answer the following questions:

1. What services for NAFLD are implemented at various healthcare levels
2. What are the roles and responsibilities of difference healthcare providers in delivering the NAFLD related services
3. How to monitor the implementation of NAFLD services at the healthcare levels
4. How to capacity build the healthcare providers in delivering the NAFLD related services

3.1. Services at different healthcare level

NAFLD is designed and included within the broad structure of NP-NCD at each level of health care delivery.

The key strategies include a continuum of prevention and care to address the spectrum of NAFLD at various levels of healthcare (Figure 3 and Table 2). For this 'bottom-up' approach is to be implemented. The first step begins at the community level, where health workers (ASHA) conduct risk assessments through the Community Based Assessment Checklist (CBAC) to identify individuals at an increased risk of having NAFLD[9,10].

Primary care providers (Medical Officers at the PHC level) will validate these risk assessments, administer appropriate therapy for risk factors, health promotion and prevention or facilitate referrals. Easy-to-use and inexpensive non-invasive tests, such as FiB-4 (Fibrosis-4 risk score for advanced liver fibrosis), have been included in the operational guidelines, offering the opportunity to reduce inappropriate referrals to specialists.

At the secondary care level, the diagnosis of NAFLD and risk stratification for advanced liver fibrosis, including the use of transient elastography, will guide further management and referral as per the NP-NCD guidelines.

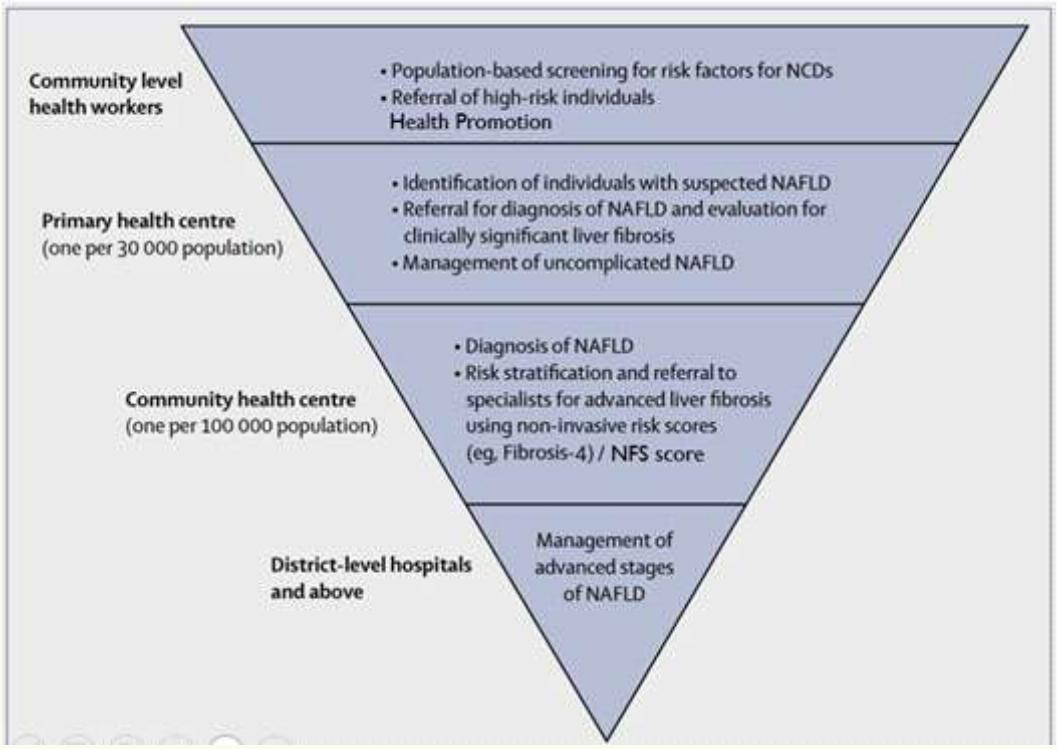


Fig. 3. Bottom-up approach for community-based risk stratification and management of NALFD[10]

3.2. Roles and Responsibilities of healthcare providers (Figure 3)

3.2.1. At the Community level: ASHA

Identifies and refers the following high-risk people using Community-Based Assessment Checklist (CBAC) in adults aged more than 30 years:

- Personal and family history of Diabetes, Hypertension, Coronary Heart Disease, liver diseases, gallstones and cancers

- Abdominal obesity assessment (waist circumference of >90 cm in adult men or >80 cm in adult women) or Body Mass Index (BMI) assessment (BMI $\geqslant$ 23 kg/m^2).

- Those individuals who have a history of diabetes and/or obesity are referred to subcentre /Ayushman Aarogya Mandir (AAM) by ASHA as NAFLD suspect.

3.2.2. At the Subcenter level: Multipurpose Worker (Female/Male) Community Health Officer (CHO)

- Validates all individuals referred by ASHA
- Further makes assessments for the following:.
- Abdominal obesity (waist circumference > 90 cm in men or > 80 cm in women)
- Overweight and obese (BMI $\geqslant$23 kg/m2)

. Personal or family history of hypertension, diabetes, heart disease, cancer, liver disease, gallstones
. Screening for diabetes, hypertension, cancers
. Pedal edema
· CHO to supervise the assessments and data for monitoring

3.2.3. At Primary care level (PHC) level: Medical Officer (MO)

· Medical officer will examine patients referred by ANM/ CHO
· High-risk individuals are to be identified by Medical Officers as those having:
. Abdominal Obesity (waist circumference of > 90 cm in men or > 80 cm in women)
. Overweight and obesity (BMI ⩾ 23kg/m2)
. Diabetes, Hypertension, Coronary Heart Disease, Dyslipidaemia, liver
. Any patient with abnormal LFT report or a report showing incidental detection of hepatic steatosis on ultrasound (USG), which is available to the should be further evaluated.

. Family history of Diabetes, Hypertension, Coronary Heart Disease, liver
· diseases, gallstones and cancers
Medical officers may undertake teleconsultation, if required.

3.2.4. At Community Health Centre (CHC) level: Medical Officer (MO)

At Community Health Centres, risk stratification for the presence of fibrosis may be carried out by running simple blood tests for high-risk individuals (diabetics, obese, referred from PHC for other causes).
Complete blood count and Liver Function tests are the blood investigations required to calculate non-invasive risk scores FIB-4 (Fibrosis-4) and NFS (NAFLD Fibrosis Scores)[11]. Calculate FIB-4/NFS score on the application. The non-invasive risk scores will guide further referral or management as per the following risk stratification algorithm (Figure 4):

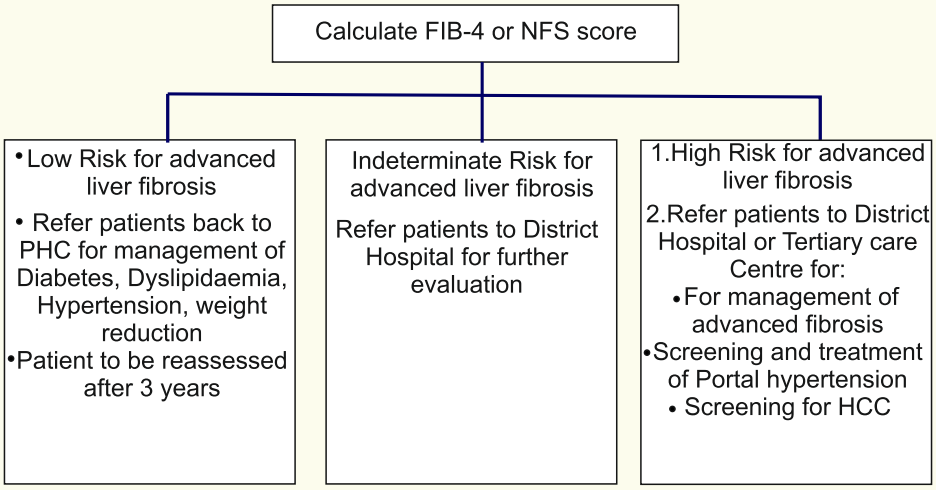


Fig. 4. Non-invasive risk scores and Risk stratification for management of patient

	Components	Cutoff
NAFLD Fibrosis score, NFS	Age, BMI, Type 2 Diabetes Mellitus, AST, ALT, PLT, Albumin	-1.455, 0.676
Fibrosis-4	AST, ALT, Age, Platelets	>2.67 high risk

Table 2: Cut-offs for various non-invasive risk scores for risk stratification of NAFLD[12]

The cut-offs presented in Table 2 for the NAFLD Fibrosis Score (NFS) and FIB-4 score represent thresholds used to assess the risk of advanced liver fibrosis. These scores are calculated based on a combination of clinical factors, such as age, liver enzymes (AST, ALT), platelet count, and BMI. The cut-offs help categorize patients into low, intermediate, or high risk for advanced liver fibrosis, guiding further management or referral for specialized care. For example, a FIB-4 score below 1.30 indicates a low risk, whereas a score above 2.67 suggests a high likelihood of advanced fibrosis. It is important to note that these cut-offs are based on global data and may require clinical adaptation when applied to specific populations, such as the Indian population, where metabolic risks may manifest at lower thresholds

3.2.5. At District Hospital (DH) level: Medical Officer (MO) .

Patients referred from CHC as having indeterminate risk for liver fibrosis may undergo ultrasound or transient elastography at the district hospital. Transient elastography (Fibroscan®) is envisaged to be made available at the level of district hospitals. Training on operating a Fibroscan® machine will be imparted to nursing staff involved in screening for liver fibrosis and steatosis using this technique.
Transient elastography may guide further management as depicted below.

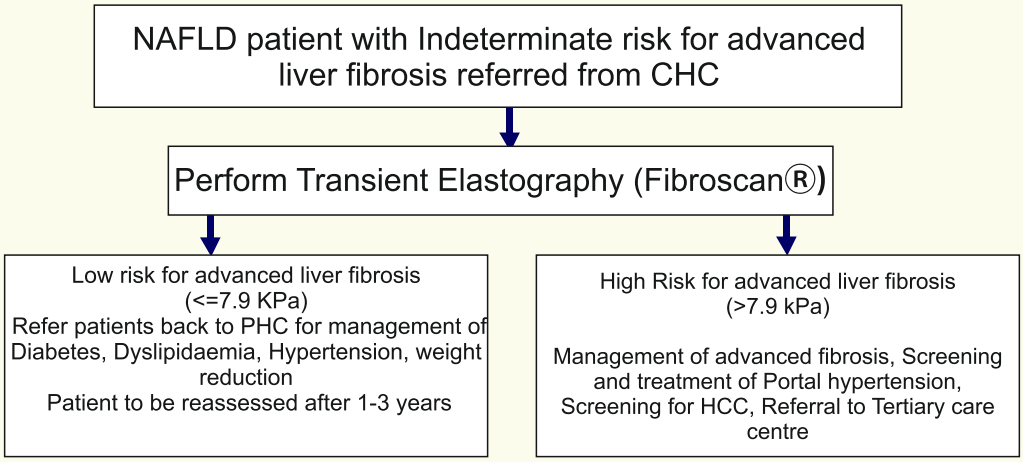


Fig. 5: Management Guidance through Transient Elastography

3.3. Monitoring and Evaluation under the NP-NCD programme

The routine monitoring mechanism, which is being adopted for NP-NCD, include the indicators for NAFLD. Therefore, the following formats for monthly reporting from the facilities at various levels have been modified to include components of NAFLD:

Sub centre	1	ANM screening register	CHO of SHC-HWC	PHC	Last day of the month
PHC (including urban PHC-HWC)	2 & 2A	PHC-HWC OPD register & compiled all Form-1	MO I/c PHC-HWC	CHC NCD Clinic	5th of every month
CHC/BPHC/SDH	3A	CHC NCD OPD register	MO I/c CHC NCD clinic	District NCD cell	7th of every month
	3B	Compiled all forms 1& 2	BPHC/SDH		
District Hospital	4	DH- NCD OPD Register	MO I/c District NCD clinic	District NCD cell	7th of every month
District NCD cell	5A	Form 5A Compiled all forms 3A & 4	District Nodal Officer (NCD)	State NCD Cell	10th of every month
State NCD cell	5B	Form 5B Compiled all forms 3B			
	6	Form 6 Compiled all forms 5A & 5B	State Nodal Officer (NCD)	National NCD cell	15th of every month

Table 3: Monthly reporting and compilation formats under the NP-NCD

3.4. Capacity Building

Capacity building needs to be done with a well-designed training plan and program for the identified health functionaries at identified levels of the healthcare delivery system. Proper training needs assessment will be carried out, and accordingly, a training plan, program, and calendar would be worked out

Level of Healthcare Delivery System	Type of health manpower	Training institutes to be involved
Master Trainers	Staff/Officers in National NCDC, NIHFW	DGHS, ILBS, NIHFW, NHSRC
Training of State Level Trainers	Medical Officers	DGHS, ILBS, NIHFW, NHSRC
Faculty of Central Government Institutes, Medical Colleges	Clinicians involved in the management of NAFLD	State level trainers
District hospital team including NCD Clinic	Doctors, nurses in DH and NCD including counselors	State level trainers
CHC NCD Clinic	Doctors, nurses in CHC and NCD NCD	District level trainers
PHC-HWC	MO and Staff Nurse	District level trainers
CHO and MPW (F/M)	ANM	District level trainers
Community- level	ASHA	District level trainers

Table 4: Capacity Building for NAFLD under NP-NCD

3.5. Check your progress

1. What is Bottom-up approach for community-based risk stratification and management of NAFLD?.
2. List the role & responsibilities of the Medical Officer of the Primary Health Centre for early diagnosis, prevention and control of NAFLD?

Module 4

4. Diagnosis and Management of NAFLD

Learning Objectives:

At the end of this module, you will be able to answer the following questions:

1. What are the methods used for screening and diagnosis of NAFLD
2. What are the strategies and modalities for management of NAFLD
3. Understanding the referral and follow-up mechanism for NAFLD

Early identification of NAFLD allows for appropriate interventions, lifestyle modifications, and follow-up to prevent disease progression and related complications. This section provides a summary of the various methods for screening and diagnosing NAFLD.

4.1. Screening and diagnosis under NP-NCD

Early screening and diagnosis of NAFLD is crucial for timely intervention and preventing disease progression[10]. The following methods are commonly used for screening and diagnosis of NAFLD:

4.1.1. Medical History and Physical Examination: Assessing risk factors and symptoms (if present) and conducting a physical examination can provide valuable information. Clinical assessment and physical examination can provide additional clues for NAFLD risk assessment. Consider the following:

a) **Symptoms**: Although most individuals with NAFLD may be asymptomatic, some nonspecific symptoms, such as fatigue, malaise, and right upper quadrant abdominal discomfort, may be present.

b) **Signs of Metabolic Syndrome**: Assess for signs of metabolic syndrome, including central obesity, elevated blood pressure, and insulin resistance (e.g., acanthosis nigricans, skin tags).

c) **Hepatomegaly**: Palpation of an enlarged liver during physical examination may suggest fatty liver disease. However, note that NAFLD can also be present with a normal liver size.

d) **Signs of Advanced Liver Disease**: In advanced stages of NAFLD, signs of chronic liver disease such as jaundice, ascites, spider angiomas, palmar erythema, and hepatosplenomegaly may be present.

4.1.2. Laboratory Tests:

a) **Liver Function Tests**: Evaluate liver enzyme levels, including alanine transaminase (ALT) and aspartate transaminase (AST). Evaluate liver enzyme levels, specifically alanine transaminase (ALT) and aspartate transaminase (AST). Elevated ALT and AST levels are indicative of liver inflammation or damage. The cut-off for concern is often ALT > 40 IU/L and AST > 35 IU/L, but reference ranges may vary slightly depending on the lab.

b) **Lipid Profile**: Measure total cholesterol levels, low-density lipoprotein (LDL) cholesterol, high-density lipoprotein (HDL) cholesterol, and triglycerides. Measure total cholesterol, low-density lipoprotein (LDL) cholesterol, high-density lipoprotein (HDL) cholesterol, and triglycerides

Total cholesterol:	Optimal < 200 mg/dL
LDL cholesterol:	Optimal < 100 mg/dL
HDL cholesterol:	> 40 mg/dL in men, > 50 mg/dL in women
Triglycerides:	Optimal < 150 mg/dL

a) Fasting Blood Glucose: Assess blood sugar levels to screen for diabetes or impaired glucose tolerance [6]. Assess blood sugar levels to screen for diabetes or impaired glucose tolerance.

- o Normal FBG: < 100 mg/d
- o Impaired FBG (prediabetes): 100–125 mg/dL
- o Diabetes: ⩾126 mg/dL.

4.1.3. Imaging Studies:

a) Ultrasonography: It is one of the diagnostic tool for diagnosing fatty liver.

b) Transient Elastography (Fibro Scan®): Measures liver stiffness to assess the degree of fibrosis or cirrhosis. It provides two measurements: the measure of fibrosis in kilopascals (kPa) and the measure of steatosis in terms of Controlled Attenuated Parameter (CAP). A cutoff of >7.9 kPa is considered indicative of significant fibrosis (F2 to F4) [12]. Controlled Attenuation Parameter (CAP) provides a measurement of liver steatosis. The following cut-offs are used for stratifying the grade of steatosis:

CAP score	Steatosis grade	Liver with fatty change
248 to 268 dB/m	S1	11% to 33%
268 to 280 dB/m	S2	34% to 66%
Higher than 280 dB/m	S3	67% or more

Table 5: CAP score for grading of Liver Steatosis

4.1.4. Other investigations in specialized settings:

a) **Magnetic Resonance Imaging (MRI), Magnetic Resonance Proton Density Fat Fraction (MRPDFF) and Magnetic Resonance Elastography (MRE)**: Advanced imaging techniques that can provide more accurate assessment of liver fat content, fibrosis, and inflammation.

b) **CT (Computed Tomography)** can be utilized for the quantification of liver fat content and assessment of liver morphology, providing detailed imaging to support the diagnosis and management of NAFLD.

c) **Liver Biopsy (In very selected cases)**: A liver biopsy may be recommended for patients with suspected advanced disease or when other diagnostic methods are inconclusive. It's important to note that liver biopsy is an invasive procedure associated with risks, and referral to a hepatologist is recommended after careful consideration of individual patient factors and clinical judgment.

d) **Fasting serum Insulin levels (to calculate HOMA-IR)**: HOMA IR is an estimation of insulin resistance. It can be calculated by the formula-Fasting glucose (mmol/L) x fasting insulin (mIU/L)/22.5. If more than 2.5, it indicates insulin resistance. Insulin resistance is a condition that affects liver and can lead to hyperglycaemia, Type 2 Diabetes, NAFLD etc

e) **Upper gastrointestinal endoscopy** to exclude portal hypertension

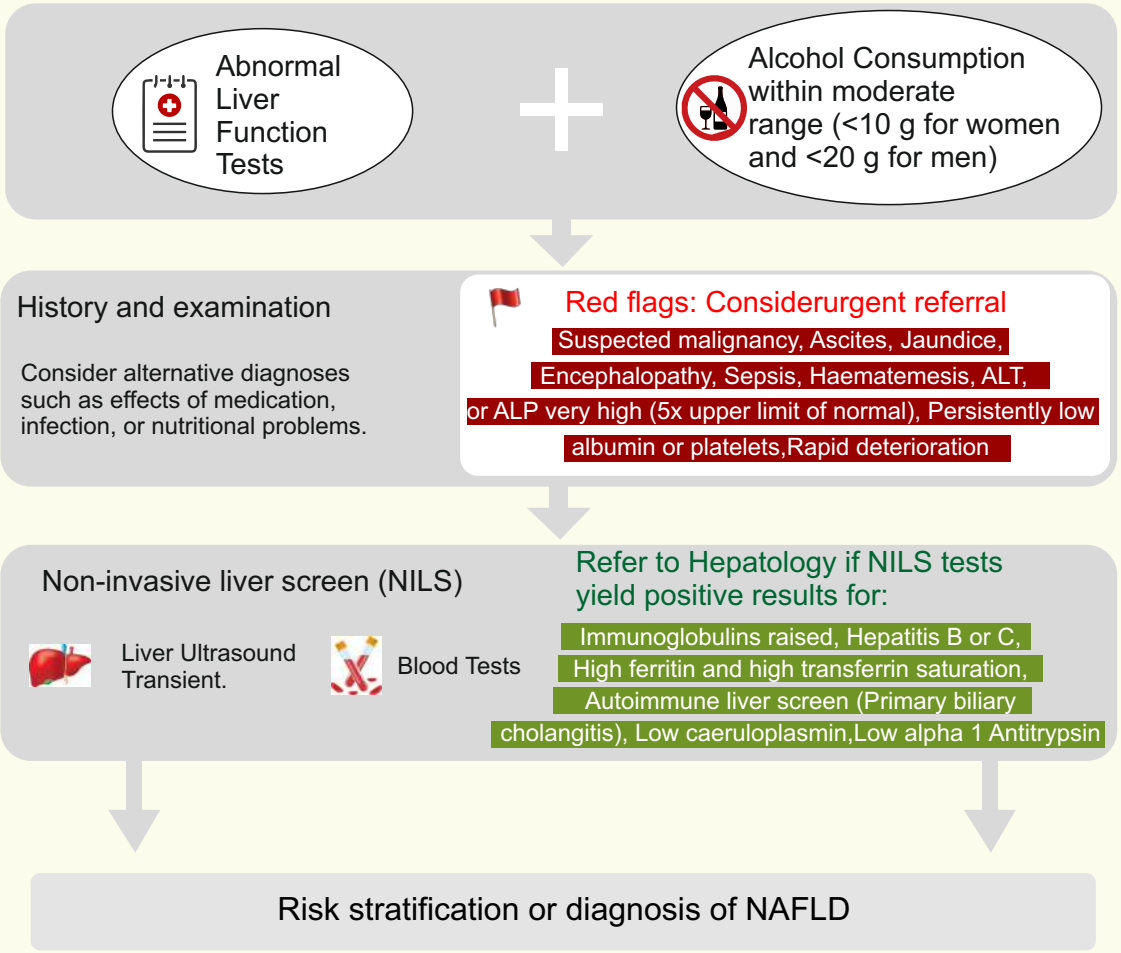


Fig 6: Flow diagram showing approach to diagnosis of NAFLD in asymptomatic adult patients

4.2. Management of NAFLD

Health Promotion and Lifestyle modifications for NAFLD are the mainstay of the prevention and management of NAFLD.

4.2.1. Lifestyle Modifications for NAFLD:

General Measures for all the patients: The following measures apply to all the patients with NAFLD.

a) Abstain from Alcohol: complete avoidance of alcohol intake is advisable

b) Immunizations: Vaccination for hepatitis B virus should be administered to patients.

c) Modify Risk Factors for Cardiovascular Disease: Patients with NAFLD are at increased risk for cardiovascular disease and often have multiple risk factors (e.g., hypertension, hyperlipidemia). The lifestyle interventions below should be advised to all patients [13].

4.2.2. Healthy Diet Recommendations: A healthy diet is crucial for NAFLD prevention and management. Here are some dietary recommendations:

a) Balanced Macronutrients:

i. Emphasize a well-balanced diet consisting of carbohydrates, proteins, and healthy fats.
ii. Opt for complex carbohydrates such as whole grains, legumes, and vegetables, while limiting refined carbohydrates such as white bread, pastries, and sugary cereals and sugary foods.

b) Healthy Fats:

i. Encourage the consumption of healthy fats like unsaturated fats found in nuts and seeds or ghee.
ii. Limit saturated fats found in red meat, full-fat dairy products, and fried foods.
iii. Avoid trans fats, commonly found in processed and fried foods.

c) Portion Control and Calorie Intake:

i. Promote portion control to avoid excessive calorie intake. Portion control involves managing the amount of food consumed in a meal to align with your nutritional and caloric needs, helping to prevent overeating and maintain a balanced diet. It includes understanding appropriate serving sizes and balancing food groups. Strategies such as mindful eating, using smaller plates, pre-portioning snacks, and checking nutrition labels can support better portion control. By practicing portion control, individuals can manage their calorie intake more effectively, contributing to better weight management and overall health without feeling deprived. A dietary recall notebook to be maintained wherever possible.

d) Increase Fibre Intake:

i. Encourage the consumption of high-fibre foods such as whole grains, fruits, vegetables, and legumes.
ii. Dietary fibre aids digestion, promotes satiety, and helps regulate blood sugar and cholesterol levels.

e) Limit Added Sugars and Sugary Beverages:

i. Advise individuals to limit their intake of added sugars found in sugary or aerated beverages, processed foods, desserts, and sweets.

f) Hydration:

I. Emphasize the importance of adequate hydration by consuming sufficient amounts of water throughout the day [14].

4.2.3. Weight Management: Weight management is a key component of NAFLD prevention and management. It has been observed to help in the regression of NAFLD, and weight loss may be beneficial in several ways:

a) **Reduced Fat Accumulation**: Weight loss helps reduce fat accumulation in the liver and improves liver function.

b) **Improved Insulin Sensitivity**: Weight loss and maintenance of a healthy weight can enhance insulin sensitivity, reducing the risk of insulin resistance and progression to NASH as well as diabetes.

c) **Overall Health Benefits**: Achieving and maintaining a healthy weight is associated with numerous health benefits, including reduced cardiovascular risk and improved metabolic health [15].

4.2.4. Regular Physical Activity and Exercise: Regular physical activity and exercise are essential for NAFLD prevention and management. Here are the benefits:

a) **Weight Loss and Maintenance**: Contributes to weight loss and weight maintenance. Target a 7-10% weight reduction in those with hepatic fibrosis, and 3-5% in those with lean/normal weight NASH.

b) **Improved Insulin Sensitivity**: Exercise enhances insulin sensitivity, reducing the risk of insulin resistance and NAFLD progression.

c) **Reduced Liver Fat**: Physical activity and exercise promote the utilization of stored fats, including liver fat, leading to a reduction in liver fat accumulation.

d) **Cardiovascular Health**: Exercise improves cardiovascular health, lowers blood pressure, and reduces the risk of comorbidities associated with NAFLD.

e) **Enhanced Metabolic Rate**: Regular physical activity boosts the metabolic rate, aiding in weight management and overall metabolic health.

Encourage individuals to engage in at least 150 minutes of moderate-intensity aerobic activity or 75 minutes of vigorous-intensity activity per week, in addition to muscle-strengthening exercises at least twice a week, which can be done at home using bodyweight exercises like squats, push-ups, lunges, or resistance band workouts. [16]

For lean individuals with NAFLD, lifestyle treatment focuses on maintaining current weight and adopting a nutrient-dense diet. Key recommendations include a balanced diet with complex carbohydrates, lean proteins, healthy fats, and reduced free sugars. Incorporate millets and high-fiber foods, and ensure adequate protein intake, especially in advanced stages like cirrhosis. Regular physical activity, including at least 150 minutes of moderate-intensity aerobic exercise per week and strength training twice a week, is essential. Additionally, minimize sedentary time and strictly avoid alcohol to prevent further liver damage. These modifications help manage NAFLD and prevent disease progression, supporting overall health and well-being.

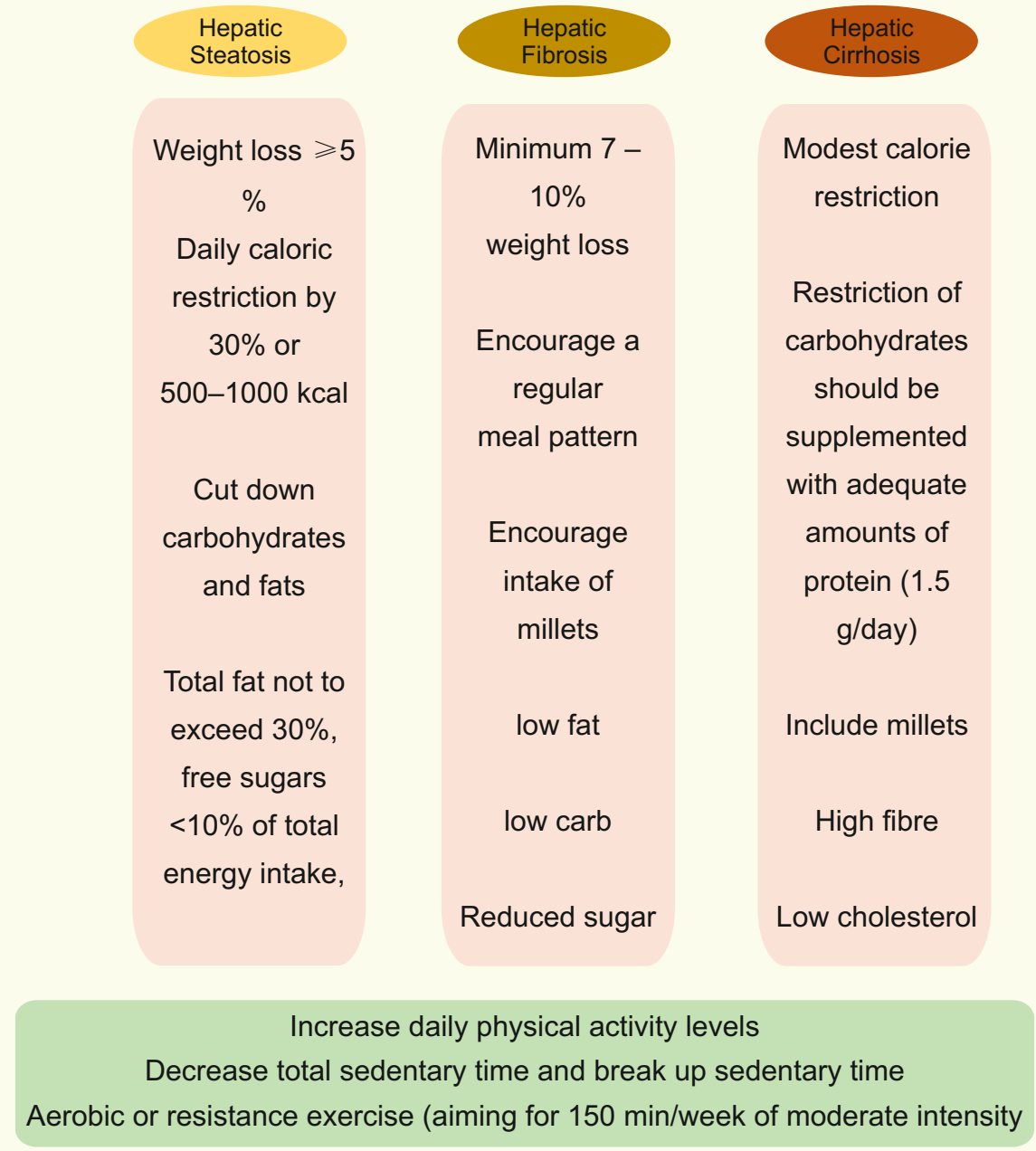


Fig 7: Summary of the lifestyle treatment options through the course of NAFLD

4.2.5. Pharmacologic Agents for Treatment of NAFLD: Currently, there is no specific medication approved for the treatment of NAFLD. Pharmacological interventions for NAFLD management are still under development, and no specific medication has been approved as a standard treatment. The treating hepatologist/physician may decide the treatment as per the standard pharmacological treatment.

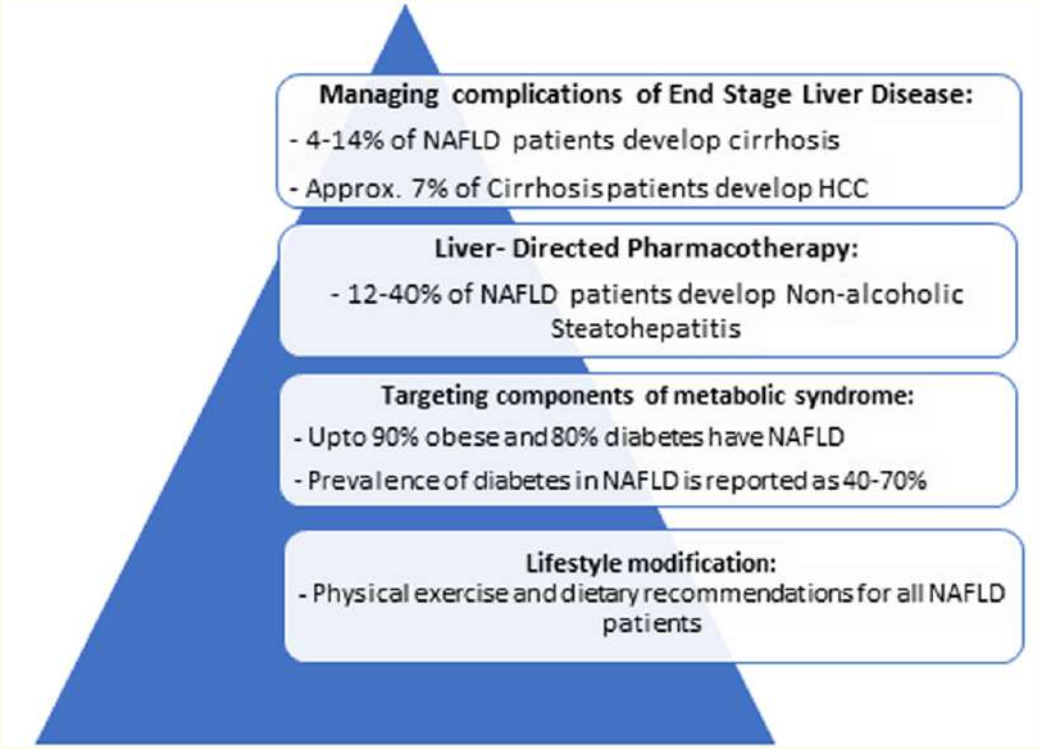


Fig 8: Management strategies in non-alcoholic fatty liver disease

4.3. Referral and Follow-up

NAFLD management benefits from a multidisciplinary approach involving various healthcare professionals. Collaboration with nutritionists, dieticians, endocrinologists, hepatologists, and other specialists is essential to provide comprehensive care. Referral to Specialized Services like Endocrinologists for managing comorbidities, such as diabetes and metabolic syndrome, Hepatologists/ gastroenterologists for management of complications, and consideration of additional treatment options in cases of advanced liver disease. Further to address risk factors like tobacco use and excessive alcohol consumption collaboration with healthcare professionals specialized in addiction medicine or smoking cessation programs to support patients in quitting tobacco use or reducing alcohol intake may be undertaken.

Regular follow-up is crucial for the management of NAFLD to assess treatment response, track disease progression, and prevent complications. Ongoing patient education and counselling are essential components of follow-up visits. The lifestyle factors including adherence to dietary modifications, physical activity levels, weight management, and alcohol consumption, is essential for long-term success. Regular assessments may be required to evaluate treatment response and disease progression.

Elevated liver enzymes like including alanine transaminase (ALT), aspartate transaminase (AST), and gamma-glutamyl transferase (GGT) may indicate ongoing liver inflammation or progression of the disease. Monitoring liver function helps to adjust treatment plans accordingly. Further, imaging modalities such as ultrasound or transient elastography (FibroScan®) may be used to assess liver fat content and fibrosis. These imaging studies can help evaluate treatment response, monitor disease progression, and determine the need for further interventions or specialized care.

The frequency of follow-up visits may vary based on individual patient characteristics and disease severity.

· For patients with simple steatosis without significant liver inflammation or fibrosis, annual follow-up visits may be appropriate. These visits can focus on monitoring lifestyle modifications, assessing metabolic risk factors, and providing guidance on weight management, physical activity, and dietary changes.
· Patients with NASH or evidence of significant fibrosis may require more frequent follow-up visits. Depending on the individual patient's risk factors and disease progression, follow-up visits every six months or even more frequently may be recommended. These visits can involve monitoring liver function tests, assessing disease progression, and considering interventions to slow or reverse liver fibrosis.
· The presence of associated conditions, such as obesity, diabetes, dyslipidemia, and metabolic syndrome, may necessitate more regular follow-up visits to optimize their management.
· The frequency of fibrosis assessment can vary depending on the patient's risk profile, disease severity, and available diagnostic tools.
· Non-invasive tests, such as transient elastography (FibroScan®) or blood-based biomarkers, can be used periodically to monitor liver fibrosis progression [15].

4.4. Check your progress

a) What are the diagnosing criteria for NAFLD?

b) Describe Lifestyle Modifications for NAFLD Prevention such as healthy diet recommendations, importance of weight management and regular physical activity and exercise.

c) Discuss Pharmacologic agents, patient education and counselling, multidisciplinary approach to NAFLD management monitoring and follow-up.

d) How can risk stratification for presence of fibrosis at Community Health Centres be done by the medical officer?

e) What is the frequency of follow up required in simple steatosis and NASH patients?

f) What advice you will give on physical activity and exercise for NAFLD prevention and management?

Module 5

5. Health Promotion Interventions for NAFLD

5.1. Patient Education and Counselling is crucial for the prevention and management of NAFLD. Reinforce the importance of lifestyle modifications, medication adherence (if applicable), and addressing any concerns or questions the patient may have. Provide additional IEC materials, resources, and support to empower patients in self-management and encourage their active involvement in their healthcare.

States would develop context specific strategies for lifestyle modification and for promoting healthy behaviours for primary prevention. Such strategies would need to be targeted at individuals, families, and communities. States should develop an Integrated health promotion strategy that envisages convergence, multitasking and pooling of resources from various programmes.

Healthcare providers can promote better understanding, motivation, and adherence to recommended lifestyle modifications.

1. **Education and Understanding**: Engaged patients have a better understanding of their condition, including its causes, risk factors, and treatment options. IEC material and patient brochures/ leaflets that promote healthy behaviours, exercise routines, dietary advice, avoiding substance abuse and compliance with treatment including through use of it would need to be developed. IEC leaflets would be distributed to those who are diagnosed with NAFLD to enable them to develop individual health plans (diet/exercise).

2. **Improved Communication**: Communication between healthcare providers and patients allows for open discussions, addressing concerns, and clarifying doubts, leading to better shared decision-making. Individual and family counselling will be needed for those who are started on treatment for compliance to treatment and for lifestyle modifications.

3. **IEC and Behaviour Change Communication**: Patient engagement is associated with long-term success in managing chronic conditions like NAFLD. It promotes sustained behaviour change, leading to improved health outcomes. Health talks may be held in the community to engage patients in healthy lifestyles.
IEC messages would aim at increasing awareness on risk factors of NAFLD, healthy lifestyle and benefits of screening. They would also focus on the benefits of improving lifestyle behaviours such as poor dietary habits and lack of exercise. The district NCD cell will collect information on locally available healthy foodstuffs that should be encouraged and use this in the development of messages for healthy lifestyles. States must also use MMUs to display audio visual messages related to prevention and health promotion.

4. **Wellness Activities**: States should make the effort to incorporate appropriate prevention and promotion strategies, including practice of Yoga and other wellness activities.

5. **Increasing Community Awareness**: For community level awareness raising, platforms such as meetings of Gram Sabha, SHGs, ULBs, VHSNCs, MAS, etc. would be used. The use of traditional media such as Kala Jathas, use of folk/local media, and flip charts, flash cards, IT and social media etc, would be promoted, Local folk media could also be used creatively to raise community awareness and mobilize for screening and ensuring treatment compliance, States could also consider dissemination of NAFLD related communication.

6. **Village Health and Nutrition Day**: Observing a fortnightly 'NAFLD day' can emphasize the importance of nutrition and exercise in the prevention of NAFLD and other NCDs. The detrimental effects of tobacco use and excessive alcohol consumption on liver health can also be highlighted. NAFLD day to include awareness programmes in primary schools and Anganwadi's to make children aware about risk of eating highly processed and packaged food and to highlight the importance of outdoor games and less screen time to avoid future NASH.

The interventions advocated under the programme are based on the strong principles of health promotion, early diagnosis, risk stratification, appropriate referral and prompt treatment.

5.2. Check your progress

a) How to engage community for increasing awareness regarding NAFLD?
b) What are the mechanisms for Behaviour Change Communication for NAFLD?

Further Reading

1. Sarin SK, Kumar M, Eslam M, et al.. Liver diseases in the Asia-Pacific region: a Lancet Gastroenterology & Hepatology Commission. Lancet Gastroenterol Hepatol 2020;5:167–228.

2. Duseja A, Singh SP, De A, et al.Indian National Association for Study of the Liver (INASL) Guidance Paper on Nomenclature, Diagnosis and Treatment of Nonalcoholic Fatty Liver Disease (NAFLD). J Clin Exp Hepatol. 2023 Mar-Apr;13(2):273-302.

3. Younossi Z, Stepanova M, Ong JP, et al.,.; Global Nonalcoholic Steatohepatitis Council. Nonalcoholic steatohepatitis is the fastest growing cause of hepatocellular carcinoma in liver transplant candidates. Clin Gastroenterol Hepatol.2019;17(4):748–755.e3. pii: S1542-3565(18)30611-6

4. Vajro P, Lenta S, Socha P, et al. Diagnosis of nonalcoholic fatty liver disease in children and adolescents: position paper of the ESPGHAN Hepatology Committee. J Pediatr Gastroenterol Nutr. 2012;54:700–13.

References

1. Lazarus JV, Mark HE, Anstee QM, et al.. Advancing the global public health agenda for NAFLD: a consensus statement. Nat Rev Gastroenterol Hepatol. 2022 Jan;19(1):60–78

2. Younossi ZM, Golabi P, Paik JM, Henry A, Van Dongen C, Henry L. The global epidemiology of nonalcoholic fatty liver disease (NAFLD) and nonalcoholic steatohepatitis (NASH): a systematic review. Hepatology. 2023 Apr 1;77(4):1335-1347.

3. Singh SP, Duseja A, Mahtab MA, Anirvan P, Acharya SK, Akbar SMF, et al. INASL-SAASL Consensus Statements on NAFLD Name Change to MAFLD. J Clin Exp Hepatol. 2023 May-Jun;13(3):518-522.

4. Eslam M, Newsome PN, Sarin SK, Anstee QM, Targher G, Romero-Gomez M, et al. A new definition for metabolic dysfunction-associated fatty liver disease: An international expert consensus statement. J Hepatol. 2020 Jul;73(1):202-209.

5. Rinella ME, Lazarus JV, Ratziu V, Francque SM, Sanyal AJ, Kanwal F,; NAFLD Nomenclature consensus group. A multisociety Delphi consensus statement on new fatty liver disease nomenclature. Hepatology. 2023 Dec 1;78(6):1966-1986.

6. Brunt EM, Wong VW, Nobili V, Day CP, Sookoian S, Maher JJ, et al. Nonalcoholic fatty liver disease. Nat Rev Dis Primers. 2015 Dec 17;1:15080.

7. Glass LM, Hunt CM, Fuchs M, Su GL. Comorbidities and Nonalcoholic Fatty Liver Disease: The Chicken, the Egg, or Both? Fed Pract. 2019 Feb;36(2):64-71.

8. Younossi Z, Stepanova M, Ong JP, Jacobson IM, Bugianesi E, Duseja A, et al.; Global Nonalcoholic Steatohepatitis Council. Nonalcoholic steatohepatitis is the fastest growing cause of hepatocellular carcinoma in liver transplant candidates. Clin Gastroenterol Hepatol.2019;17(4):748–755.e3. pii: S1542-3565(18)30611-6

9. Operational Guidelines of Non-Alcoholic Fatty Liver Disease (NAFLD) into NPCDCS. Available from: https://main.mohfw.gov.in/newshighlights-42 [Accessed 28th May 2023].

10. Sarin SK, Prasad M, Ramalingam A, Kapil U. Integration of public health measures for NAFLD into India's national programme for NCDs. Lancet Gastroenterol Hepatol. 2021 Oct;6(10):777–8.

11. Musso G, Gambino R, Cassader M, Pagano G. Meta-analysis: natural history of non-alcoholic fatty liver disease (NAFLD) and diagnostic accuracy of non-invasive tests for liver disease severity. Ann Med. 2011;43(8):617–49.

12. Wong VW, Vergniol J, Wong GL, Foucher J, Chan HL, Le Bail B, et al. Diagnosis of fibrosis and cirrhosis using liver stiffness measurement in nonalcoholic fatty liver disease. Hepatology. 2010 Feb;51(2):454-62.

13. Lonardo A, Bellentani S, Argo CK, Ballestri S, Byrne CD, Caldwell SH, Cortez-Pinto H, Grieco A, Machado MV, Miele L, Targher G. Epidemiological modifiers of non-alcoholic fatty liver disease: focus on high-risk groups. Dig Liver Dis. 2015;7:997–1006.

14. Yki-Jarvinen H. Non-alcoholic fatty liver disease as a cause and a consequence of metabolic syndrome. Lancet Diabetes Endocrinol. 2014;2:901–10.

15. Targher G, Bertolini L, Padovani R, Rodella S, Tessari R, Zenari L, Day C, Arcaro G. Prevalence of nonalcoholic fatty liver disease and its association with cardiovascular disease among type 2 diabetic patients. Diabetes Care. 2007;30:1212–8.

16. Ong JP, Elariny H, Collantes R, Younoszai A, Chandhoke V, Reines HD, et al. Predictors of nonalcoholic steatohepatitis and advanced fibrosis in morbidly obese patients. Obes Surg. 2005;15(3):310–5.

Annexure

Technical Expert Group (TEG) for NAFLD

1. Prof (Dr) Atul Goel, DGHS, MoHFW -The Chair
2. Prof (Dr) S.K. Sarin, Chancellor & Director, Institute of Liver & Biliary Sciences, New Delhi.
3. Dr L Swasticharan, Addl. DDG (NCD) & Director (EMR).Dte.GHS, MoHFW
4. Dr Vineet Ahuja, Professor, Department of Gastroenterology, AIIMS, New Delhi
5. Dr CE Eapen, HOD, Hepatology department, Christian Medical College, Vellore, Tamil Nadu
6. Dr Ashish Goel, Professor, Department of Hepatology, Christian Medical College, Vellore, Tamil Nadu
7. Dr Ajay Duseja, Professor, Department of Hepatology, PGIMER, Chandigarh
8. Dr Rakesh Aggarwal, Prof. & Director, JIPMER
9. Dr Shalimar, Prof. Gastroenterology and Human Nutrition, AIIMS New Delhi
10. Dr Rohit Gupta, Additional Professor & Head, Gastroenterology, AIIMS Rishikesh
11. Prof Radha Krishan Dhiman, Director, SGPGIMS
12. Prof. Amit Goel, Prof. & Head, Hepatology, SGPGIMS
13. Dr Tanmay Vajpai, Asst Professor Dept of Gastroenterology AIIMS Raipur
14. Dr Vaishali Bhardwaj, HOD, Department of Gastroenterology, RML Hospital, New Delhi
15. Dr Abhishek Kunwar, NPO-NCD, WHO India
16. Dr Avinash Sunthlia, DADG (NCD), Dte.GHS (Member Secretary)
17. Prof Ramesh Agarwal, ADG (NCD), Dte.GHS, MoHFW
18. Dr. Shikha Vardhan, ADG (NCD), Dte.GHS, MoHFW
19. Dr. Sunny Swarnkar, DADG (NCD), Dte. GHS

Directorate General of Health Services,
Ministry of Health and Family Welfare, GOI