

# ***Nonalcoholic Fatty Liver Disease in Children***

***N.Honar.MD.***

***Ped. Gastroenterology department***

***SUMS. Shiraz***

***IRAN***

- *North American Society of Pediatric Gastroenterology, Hepatology and Nutrition (NASPGHAN) 2016*
- *Uptodate*
- *...*

# **Uptodate**

- ***In July 2023***
- ***Metabolic dysfunction-associated steatotic liver disease (MASLD)***
- ***Severity from MASL to MASH***

# ***NAFLD***

- ***Highly prevalent liver disease in children***
- ***Global prevalence of 25%***
- ***The most common liver disease in children in the United States***
- ***Increased 3-fold from the late 1980s***
- ***One of the leading indications for liver transplantation in adults***

# ***NAFLD***

- ***Excessive fat accumulation in the liver***
- ***Diagnosis of exclusion***
  - ***genetic disorders***
  - ***metabolic disorders***
  - ***infections***
  - ***medications***
  - ***ethanol consumption***
  - ***malnutrition***

# ***NAFLD Activity Score (NAS)***

***0 : < 5% of hepatocytes***

***1 : 5%–33%***

***2 : 34%–66%***

***3 : >67%***

***- Imaging***

***-Histologic estimation***

# ***NAFLD Subgroups***

***? Benign process***

- ***NAFL***
- ***NASH***
- ***Fibrosis***
- ***Cirrhosis***

# ***Presentation***

- ***Often asymptomatic***
- ***Abdominal imaging***
- ***Biochemistries(LFT)***
- ***RUQ pain or nonspecific symptoms (minority)***
- ***Signs of ESLD : rare***



# ***Risk factors***

- ***Obese , overweight***
- ***Prediabetes , D.M***
- ***Hyperlipidemia***
- ***HTN***
- ***OSA***
- ***....***

# **SCREENING**

- **Before disease**
- **Effective treatment , particularly before advanced fibrosis**

# ***Screening***

- ***Beginning between ages 9 and 11 years***
- ***Younger patients with risk factors***
- ***Cirrhosis developing as early as eight years***
- ***Hepatic steatosis may occur in individuals without obesity.***

# ***Screening***

- ***The best screening test :ALT***
- ***30 mg/dL in children 1 to 12 years of age***
- ***24 mg/dL in those between 13 and 19 years***

## ***NASPGHAN***

- ***Interpretation of ALT :22 U/L for girls and 26 U/L for boys***

# ***Diagnosis of NAFLD***

- ***Two times the sex-specific ALT (ALT 50 for boys and 44 for girls)***
- ***Persistently (>3 months)***
- ***NAFLD***
- ***Other causes of chronic hepatitis***

# ***NASH***

- ***ALT 80 U/L or more***
- ***Higher AST and GGT***
- ***Hepatic steatosis with necroinflammation with or without fibrosis***
- ***Other causes of chronic hepatitis***

# ***Screening***

- ***Repeating ALT every 2 to 3 years if risk factors remain unchanged.***
- ***Repeating screening sooner if clinical risk factors of NAFLD increase in number or severity***

# ***Screening***

- ***Siblings and parents of children with NAFLD***
  - obesity***
  - insulin resistance***
  - pre diabetes, diabetes***
  - dyslipidemia***



# ***Ultrasonography***

- ***Poor for detection of steatosis in children***  
***-particularly in children with lower degrees of steatosis***
- ***Low sensitivity and specificity***
- ***Inaccurate for quantification of steatosis***
- ***Normal hepatic ultrasound cannot exclude the presence of NAFLD***
- ***Routine ultrasound is not recommended as a screening test.***

# ***Vibration-controlled transient elastography (FibroScan)***

- ***Severity of hepatic steatosis and fibrosis***
- ***Limited ability in early stages of the disease***

# ***MRI***

- ***Accurate for detection and quantification of hepatic steatosis in both adults and children***
- ***Not used widely for screening because of cost, lack of availability, and lack of validated cutoffs***

# ***CT scan***

- ***Often performed for other clinical indications***
- ***Specificity 88% to 95%***
- ***Concerns about radiation exposure***

**ALT is significantly less expensive compared  
to imaging.**

# ***Liver Biopsy***

- ***The current standard***
- ***Generally safe in children***
- ***Presence of NAFLD***
- ***Severity of NAFLD***
- ***Presence of NASH***
- ***Assessment of Fibrosis***
- ***Eliminate alternative and/or concurrent diagnoses***

***Higher ALT (>80 U/L), AST/ALT***

***>1, splenomegaly, , other diagnosis***

# ***Limitations of liver biopsy***

- ***Non uniformity of disease throughout the liver***
- ***Discussion of the benefits and risks***

***More severe or progressive disease***

***Differentiates other chronic liver diseases***

# ***Goals of Treatment***

- ***Regression of NAFLD***
- ***Resolution of NASH***



# ***Treatment***

## ***Lifestyle Modifications***

- ***Dietary improvements***

***Avoidance of sugar-sweetened beverages***

***Consumption of healthy, well balanced diet***

- ***Increasing physical activity***

***Moderate- to high-intensity exercise daily***

***Less than 2 hour/day of screen time***

# ***Treatment***

- ***In adult studies weight loss of >10% of baseline weight was associated with >90% resolution of NASH.***
- ***Exercise without decrease in ALT***

# ***Treatment***

- ***No currently available medications or supplements are recommended to treat NAFLD because none have been proven to benefit the majority of patients with NAFLD.***

# ***Treatment***

- ***Metformin***
- ***Vitamin D***
- ***Ursodeoxycholic acid***
- ***Fish oil***
- ***Probiotics***

# ***UPTODATE***

## ***Vitamin E***

- ***With steatosis alone (minimal inflammation)***  
***do not advise treatment***
- ***With biopsy-proven steatohepatitis (MASH) with or without fibrosis***  
***suggest a trial of vitamin E in conjunction with lifestyle changes (not improving with lifestyle intervention)***
- ***Discussion of the potential benefits and risks with the patient and family.***

# ***Treatment***

- ***Concerns about the safety of high dose vitamin E in adults***
  - increased mortality with vitamin E***
  - increased adverse cardiovascular events***
  - ***increased prostate cancer***
- ***Long-term safety of high-dose vitamin E in children with NAFLD/MASLD has not been established.***

# ***Vitamin E***

## ***Uptodate***

- ***Dose of 800 units daily (typically given as 400 units twice daily for children <18 years)***
- ***Monitoring for response (serial measurements of ALT every three months)***
- ***Evidence of response***
  - ***-significant, sustained decline in ALT (eg, at least a 50% decline in ALT during the first three to six months)***
- ***Vitamin E is continued for up to two years.***
- ***A repeat liver biopsy at the end of a two-year treatment for continuing the treatment long term.***

# ***Bariatric or Weight Loss Surgery***

- ***Not recommended as a specific therapy***
- ***May be considered for selected adolescents***
  - ***Non cirrhotic NAFLD***
  - ***BMI >35 kg/m<sup>2</sup>***
  - ***Other serious comorbidities (DM, severe sleep apnea)***



# ***UTODATE***

- ***An increased prevalence of chronic kidney disease in children and adults***
- ***Monitor blood pressure in children with NAFLD***
- ***Suggest annual screening with serum BUN and creatinine as well as urine albumin-to-creatinine ratio.***

# ***UTODATE***

- ***Risk of decreased BMD in children particularly with NASH***
- ***The degree of reduction is mild.***
- ***Do not recommend routine dual-energy x-ray absorptiometry screening for osteopenia.***

# ***Recommendation***

- ***Screen for diabetes at diagnosis and annually (or sooner) using FBS level or HbA1c level***
- ***Follow on a yearly basis at a minimum to monitor for progression of disease and provide treatment***
- ***More frequent visits as needed***
- ***Repeat liver biopsy if needed***

# ***Recommendation***

- ***Lifestyle***
- ***Quality of Life***
- ***Exposures to Liver Toxins***
- ***Prevention of Hepatitis A and B***
- ***Monitoring of Potentially Hepatotoxic Medications***
  - Baseline liver enzyme levels before starting***
  - baseline liver biopsy may be reasonable***

