Original Article

Prevalence of nonalcoholic fatty liver disease among overweight and obese children from a teaching institution of Jharkhand: A cross-sectional study

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Abstract

Background and Objectives: Childhood obesity has become an epidemic, and morbid obesity affects a significant portion of the population in India. The most prevalent type of chronic liver ailment in overweight and obese children worldwide is nonalcoholic fatty liver disease. This study is undertaken to assess the prevalence of NAFLD and associated risk factor among overweight and obese children. **Methods:** This cross-sectional study was carried out in 230 overweight and obese children aged 5–15 years, who visited the pediatric outpatient department of a tertiary care hospital in Jharkhand. Measurements included anthropometry, aspartate aminotransferase (AST), alanine aminotransferase (ALT), lipid profile and ultrasonography to diagnose NAFLD. The variables were compared between participants with and without NAFLD, and logistic regression analysis was performed. **Results:** The prevalence of NAFLD was 44% among overweight and obese children, while BMI, history of hypertension in family, gestational hypertension, exclusive breastfeed, serum cholesterol, triglyceride, LDL-C, ALT and AST were statistically associated with participants with NAFLD. On multiple logistic regression analysis serum cholesterol, triglyceride, LDL-C and ALT were independently associated with NAFLD with odds ratio (95% confidence interval) of 19 (1.3 – 279.1, *P* value = 0.03), 17 (1.6 – 200, *P* value = 0.02), 46 (3.9 – 541.7, *P* value = 0.002) and 161 (3.4 – 7524.6, *P* value = 0.01), respectively. **Conclusion:** An independent association was observed for serum cholesterol, triglyceride, LDL-C and ALT in overweight and obese children with NAFLD.

Keywords: Children, India, Jharkhand, nonalcoholic fatty liver disease (NAFLD), obesity, overweight

Introduction

Childhood obesity has become an epidemic, and morbid obesity affects a significant portion of the population in India. In the 21st century, childhood obesity is a critical public health issue, both nationally and globally.[1,2] India is grappling with the dual challenges of malnutrition, encompassing both under nutrition and over nutrition. In the modern age, sedentary lifestyles, largely due to increased screen time and gadget use, have heightened the risk of obesity.

The primary cause of childhood obesity frequently stems from an imbalance between excessive calorie intake and insufficient energy expenditure, compounded by a genetic predisposition for weight gain. Risk factors contributing to childhood obesity

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encompass genetics, environmental influences, social factors, and psychological factors.[3] Common health issues associated with childhood obesity, previously thought to be primarily adult conditions, include type 2 diabetes mellitus, hypertension, nonalcoholic fatty liver disease (NAFLD), obstructive sleep apnoea, and dyslipidemia.[4] The development and progression of NAFLD from simple fat accumulation to nonalcoholic steatohepatitis (NASH) are likely influenced by a combination of genetic and environmental factors. Several genes associated with fat synthesis and inflammation exhibit different expression in both adult and children which may contribute to its pathogenesis.[4]

The most prevalent type of chronic liver ailment in overweight and obese children worldwide is nonalcoholic fatty liver disease (NAFLD). NAFLD is defined by the excessive build-up of fat in the liver without a history of alcohol use and without known liver pathology. It has emerged as a significant complication of childhood obesity, along with conditions such as cardiovascular disease, hypertension, hyperlipidaemia, and type 2 diabetes.[5] NAFLD can progress through three stages of severity: steatosis, nonalcoholic steatohepatitis (NASH), and, eventually, liver cirrhosis. Steatosis is the initial stage where fat accumulation begins to become harmful to the liver. When this toxic fat buildup is accompanied by inflammation, it is referred to as NASH. The ultimate stage of NAFLD progression is liver cirrhosis, where liver damage triggers fibrosis, ultimately leading to liver failure.[6]"

"Many individuals with NAFLD do not exhibit noticeable symptoms during clinical evaluation, although some may experience fatigue, dyspepsia, a mild liver pain, or hepatosplenomegaly.[7,8] NAFLD not only affects children but also persists into adulthood, potentially leading to significant liver and other health complications.[9,10] To diagnose NAFLD, it is essential to exclude other potential causes of hepatic steatosis, making it a diagnosis of exclusion. The gold standard diagnostic method for NAFLD is hepatic biopsy which is an invasive procedure. However, this approach is often less practical and may be declined for children by their parents. Fortunately, noninvasive tests like ultrasonography are available, which can identify hepatic steatosis and aid in the diagnosis of NAFLD. Liver ultrasonography is an imaging method that allows visualization of fatty acid accumulation in the liver. Not only is it a noninvasive procedure but it is also cost-effective and facilitates the early detection of NAFLD.[6] In addition, other methods such as computed tomography, magnetic resonance imaging and magnetic resonance spectroscopy are highly sensitive for identifying liver fat accumulation. However, CT is rarely used in practice due to the associated radiation exposure risk.[11]"

Several studies[11,12] have been carried out in both India and abroad in the field, but they often focused on different age groups and populations. Previous research has yielded limited data and understanding of the subject. In Jharkhand, an eastern state with a low sociodemographic index and a significant tribal population, malnutrition has been a prevalent issue. The increasing prevalence of NAFLD among overweight and obese children is a topic that has received insufficient attention in this region. This motivated us to initiate this study from the ground up, aiming to provide a comprehensive understanding of the situation and draw definitive conclusions. Our study is centered on children aged 5 to 15 years within a tertiary care hospital in Jharkhand. The objectives are to assess the prevalence of NAFLD among overweight and obese children and to gain insights into clinical and biochemical factors, including age, gender, pubertal status, body mass index (BMI), transaminases, and lipid profiles. These insights will aid in the screening of overweight and obese children."

Material and Methods

An observational cross-sectional hospital-based study was conducted in overweight and obese children of age group 5–15 years who visited the Pediatric Out Patient Department (OPD) of All India Institute of Medical Sciences, Deoghar, during the study period from 20 June, 2023, to 20 December, 2023. All overweight or obese children (aged between 5 and 15 years old) were included in this study. Overweight and obese children with unstable vitals or previously diagnosed with comorbidities and those who did not given consent were excluded from study. All overweight or obese children with underlying chronic medical conditions including genetic syndromes, secondary obesity from endocrinopathies and other causes (except exogenous nutritional factor), familial or primary hypercholesterolaemia, inherited inborn error of metabolism, or any liver, kidney, respiratory, neurological, gastrointestinal, genitourinary and heart diseases, were excluded from this study.

Sample size was calculated to be 230 using the formula N = (Z1-/2) 2p (1-p)/d2, where Z1-/2 is the value of normal deviation at 95% confidence level, *P* was the proportion of NAFLD among overweight and obese children that occurs in obese and overweight children as based on previous study as 50 percentage with 15% relative precision, 95% confidence limits and 10% nonresponse rate.[13]

After ethical clearance (IEC Code 2023-220-EMP-03STS-2023-00192), included cases were approached and managed according to guideline recommended by Indian Academy of Paediatrics, European Society for paediatric endocrinology.[14,15]

Clinical and anthropometric measurements, body weight, height, BMI (body mass index) and WC (waist circumference), were recorded. Body weight was measured in kilograms up to 1 decimal place using a digital weighing scale, and height was measured up to 1 decimal place using a standard stadiometer. BMI was expressed in kg/m2 by dividing weight (in kilogram) and square of the height (in meter). WC was measured using a measuring tape, midway between the lowest ribs and the iliac crest, in the standing position.

Fasting venous blood sample of 2 ml was collected under aseptic condition after taking written informed consent, and the following biochemical parameters values were documented which includes fasting blood glucose, glycosylated haemoglobin (HbA1c), TG (triglyceride), total cholesterol, high density lipoprotein (HDL), low density lipoprotein (LDL), ALT (alanine transaminase) and AST (aspartate transaminase). The samples were processed in the central biochemistry laboratory using dry chemical calorimetric method in an automated equipment Vitros 5600. The LDL-C level was calculated by Fridewald formula for TG for concentration up to 250 mg/dl in the laboratory itself. For TG value greater than 250 mg/dl, it was directly assessed in VItros 5600. The reports were finally verified by our consultants. Liver ultrasonography was analysed by a paediatrician trained in paediatric ultrasonography. The fatty liver was determined according to the following radiologic parameters: parenchymal echogenicity of the liver, far gain attenuation in the right intercostal view at the posterior axilla line, gallbladder wall blurring in the right sagittal subcostal view, portal vein blurring in the right intercostal view at the anterior axilla line and hepatic vein blurring in the right intercostal view at the middle axilla line.[11]

Operational definition

1. NAFLD: Paediatric NAFLD is defined as chronic hepatic steatosis in children (18 years or younger), which is not secondary to genetic/metabolic disorders, infections, use of steatogenic medications, ethanol consumption, or malnutrition.[14]

Diagnosis of NAFLD: The diagnosis of NAFLD was based on ultrasonography (USG), performed using curvilinear probe (2-5 Hz) of Acuson S2000 (Siemens, Germany). Fatty liver was diagnosed and graded as grade I, grade II and grade III based on echogenicity visualization of vasculature, parenchyma and diaphragm.[11]

Overweight and obesity

Overweight is defined as a BMI exceeding 23 kg/m^2, and obesity is defined as a BMI exceeding 27 kg/m^2, as per the Indian cutoffs derived from the IAP 2015 charts[14] derived from backtracking of adult body mass index (BMI), Indian cutoffs are overweight is defined as BMI more than 23 kg/m^2 and obesity is defined as BMI more than 27 kg/m^2.

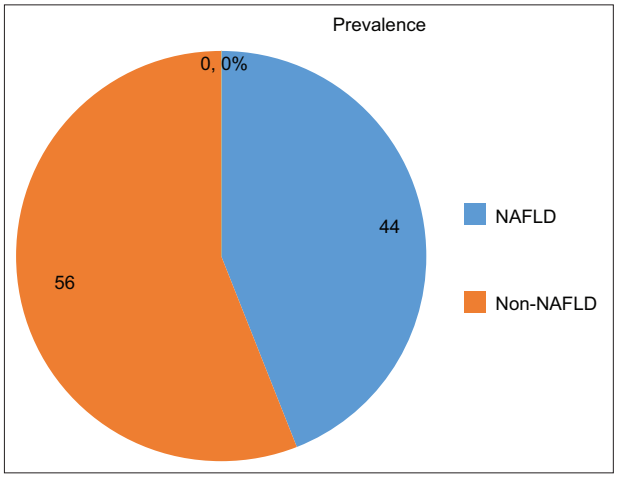

Figure 1: Prevalence of NAFLD

Data were entered in Microsoft excel and analysed using software SPSS version 24.0. Description of categorical study variables was calculated in percentage and that of continuous variable in mean and standard deviation. The proportion of NAFLD among overweight and obese children was calculated and reported with 95% confidence interval. Parametric analysis was performed using one-way analysis of variance (ANOVA) with Student's *t*-test. Multiple regression analysis was used to evaluate the independent predictor of NAFLD in these subjects. All test was two-tailed, and P value < 0.05 was considered statistically significant.

Observation and Result

A total of 230 children, aged 5 to 15 years, who were overweight and obese, participated in this study. The prevalence of NAFLD was 44%(103 out of 230) with confidence interval ranging between 34% and 48% (Figure 1). The mean age of participants in NAFLD and non-NAFLD group was 9.7 and 9.3 years, respectively. Out of all participants, 149 (64.7%) were male and 81 (35.3%) were female, with 67 (45%) males and 36 (44.4%) females belonging to the NAFLD group. Notably, the majority of the NAFLD group, comprising 177 (77%), were from lower and middle socioeconomic backgrounds. Within the NAFLD group, 66 (64%) of the children's fathers had received education up to a metric level, while 18 (17.4%) had completed education up to intermediate, and 19 (18.4%) of the children's fathers were graduates [Table 1].

A total of 38 (16.5%) children's mother had history of gestational diabetes and 30 (13%) had a history of gestational hypertension. In NAFLD group, 22 (57.9%) have history of gestational diabetes mellitus and 19 (63.3%) have a history of gestational hypertension. The mean difference between the group was significant with a P value and odds ratio of 0.03* and 2.4, respectively, for the determinant gestational hypertension. There was a history of 9 NICU admission, out of which 6 (66.7%) belongs to the NAFLD group. Upon analyzing data, 141 (61.3%) participants were exclusively breastfed, and of them, 85 (60.3%) participants were protected against NAFLD and 56 (39.7%) were categorized as NAFLD. The mean difference between both group for the determinant exclusive breast feeding was statically significant with a P value of 0.05*. A total of 72 (31.3%) participants out of 230 had the history of hypertension in family out of which 47 (65.3%) participants categorized into the NAFLD group and 25 (34.7%) participants without NAFLD. The mean difference was significant between the group with a P value of < 0.001* for presence of history of hypertension in family [Table 2].

Table 1: Sociodemographic parameters of the study participants (*n*=230)

Parameter	Total (*n*=230)	NAFLD (*n*=103) *n* (%)/Mean (SD)	Non-NAFLD (*n*=127) *n* (%)/Mean (SD)	Unadjusted OR (95% CI)	*P*
Gender					
Male	149	67 (45%)	82 (55%)	1.0 (0.6 – 1.8)	0.93
Female	81	36 (44.4%)	45 (55.6%)	Reference	--
Age		9.7 (2.3)	9.4 (2.5)		
5 – 9 years	111	43 (38.7%)	68 (61.3%)	Reference	--
10 – 15 years	119	60 (50.4%)	59 (49.6%)	1.6 (0.9 – 2.7)	0.07
Father education					
Below metric	148	66 (44.6%)	82 (55.4%)	(0.6 – 2.2)	0.70
Metric until intermediate	44	18 (40.9%)	26 (59.1%)	(0.4 – 3.3)	0.55
Graduate	38	19 (50%)	19 (50%)	Reference	---
Mother education					
Below metric	152	62 (40.7%)	90 (59.3%)	1.3 (0.6 – 2.7)	0.43
Metric until intermediate	41	19 (46.3%)	22 (53.7%)	1.0 (0.5 – 2.2)	0.90
Graduate	37	15 (40.5%)	22 (59.5%)	Reference	---
Socioeconomic status					
Upper	53	26 (46.2%)	27 (53.8%)	1.2 (0.4-3.7)	0.84
Middle	92	36 (39.1%)	56 (60.9%)	0.8 (0.5 – 1.6)	0.66
Lower	85	36 (42.4%)	49 (57.6%)	Reference	---

Table 2: Clinical parameters of the study participants (*n*=230)

Parameter	Total (*n*=230)	NAFLD (*n*=103) *n* (%)/Mean (SD)	Non-NAFLD (*n*=127) *n* (%)/Mean (SD)	Unadjusted OR (95% CI)	*P*
Gestational DM					
Present	38	22 (57.9%)	16 (42.1%)	1.8 (0.9 – 3.8)	0.07
Absent	192	81 (42.2%)	111 (57.8%)	Reference	
Hypertension in pregnancy					
Present	30	19 (63.3%)	11 (36.7%)	2.4 (1.0 – 5.2)	0.03*
Absent	200	84 (42.0%)	116 (58.0%)	Reference	
Low birth weight (<2.5 kg)					
Present	41	19 (46.3%)	22 (53.7%)	1.0 (0.5 – 2.1)	0.8
Absent	189	84 (44.4%)	105 (55.6%)	Reference	
H/o NICU admission					
Present	9	6 (66.7%)	3 (33.3%)	2.5 (0.6 – 10.5)	0.2
Absent	221	97 (43.9%)	124 (56.1%)	Reference	
H/o Exclusive breastfeeding					
Present	141	56 (39.7%)	85 (60.3%)	1.7 (1.0 – 2.9)	0.05*
Absent	89	47 (52.8%)	42 (47.2%)	Reference	
Obesity in family					
Present	75	36 (48%)	39 (52%)	1.2 (0.7 – 2.1)	0.50
Absent	155	67 (43.2%)	88 (56.8%)	Reference	
Hypertension in family					
Present	72	47 (65.3%)	25 (34.7%)	3.4 (1.9 – 6.1)	0.001*
Absent	158	56 (35.4%)	102 (64.6%)	Reference	
Diabetes in family					
Present	82	40 (48.8%)	42 (51.2%)	1.3 (0.7 – 2.2)	0.40
Absent	148	63 (42.6%)	85 (57.4%)	Reference	

The mean BMI in a NAFLD group was 27.4 (3.0) kg/m^2 and for those without NAFLD was 26.4 (2.1) kg/m^2. Furthermore, the mean WC was 80.5 (7.1) cm for NAFLD group, while the non-NAFLD group had a mean WC of 74.6 (8.5) cm. The mean differences between the group were significant for BMI with a *P* value of 0.009*. For rest of the sociodemographic, maternal risk factor and biochemical parameters, refer to Table 1.

With regard to lipid profile, the NAFLD group had a mean total cholesterol of 209.5 (28.1) mg/dl, triglyceride of 183.5 (25.9) mg/dl, HDL of 36.2 (6) mg/dl, and LDL of 145.1 (23.9) mg/dl. Comparatively, those without NAFLD had a mean total cholesterol of 116.3 (21) mg/dl, triglyceride of 113.3 (19) mg/dl, HDL of 36.6 (6) mg/dl, and LDL of 104.5 (15.3) mg/dl. Total cholesterol, triglyceride, LDL and VLDL showed significant statistical difference between the group with a *P* value of < 0.001* each [Table 3].

On coming to AST and ALT levels, children in the NAFLD group had a mean ALT and AST of 156.5 (74) U/L and

Table 3: Anthropometric and biochemical parameters of the study participants (*n*=230)

Parameter	Total (*n*=230)	NAFLD (*n*=103) *n* (%)/Mean (SD)	Non-NAFLD (*n*=127) *n* (%)/Mean (SD)	Unadjusted OR (95% CI)	*P*
BMI		27.4 (3.0)	26.4 (2.1)		
Overweight	140	53 (37.9%)	87 (62.1%)	Reference	0.009*
Obese	90	50 (55.6%)	40 (44.4%)	2.0 (1.2 – 3.5)	
Waist circumference		80.5 (7.2)	74.3 (8.5)		
Total cholesterol		209.5 (28.1)	116.1 (21)		
Normal	165	39 (23.6%)	126 (76.4%)	Reference	<0.001*
Abnormal	65	64 (98.5%)	1 (1.5%)	206 (27 – 1539)	
Serum triglyceride		183.5 (25.9)	113.3 (19)		
Normal	111	2 (1.8%)	109 (98.2%)	Reference	<0.001*
Abnormal	119	101 (84.9%)	18 (15.1%)	305 (69 – 1351)	
Serum LDL		145.1 (23.9)	104.5 (15.3)		
Normal	152	30 (19.7%)	122 (80.3%)	Reference	<0.001*
Abnormal	78	73 (93.6%)	5 (6.4%)	59 (22 – 159)	
Serum HDL		36.2 (6)	36.6 (6)		
Normal	71	28 (39.4%)	43 (60.6%)	Reference	0.277
Abnormal	159	75 (47.2%)	84 (52.8%)	1.4 (0.7 – 2.4)	
AST		126.8 (65)	32.7 (14)		
Normal	140	14 (10%)	126 (90%)	Reference	<0.001*
Abnormal	90	89 (98.9%)	1 (1.1%)	652 (137 – 3092)	
ALT		156.5 (74)	32.5 (13)		
Normal	134	9 (6.7%)	125 (93.3%)	Reference	<0.001*
Abnormal	96	94 (97.9%)	2 (2.1%)	801 (103 – 6202)	

126.8 (65) U/L, respectively. For the non-NAFLD group, the mean ALT was 32.5 (13.0) U/L and mean AST was 32.7 (14) U/L. The mean difference for both AST and ALT between the group was found to be statistically significant with a *P* value of 0.001* each [Table 3].

Out of 230 samples, 65 (28.2%) have deranged serum cholesterol level, and of them, 98.5% have NAFLD. Likewise, 119 (52.1%) children have deranged serum triglyceride level, and out of them, 84.9% have NAFLD. Similarly, children with deranged LDL level are 78 (33.9%) and 93.6% had NAFLD. 39.1% and 41.7% children have abnormal AST and ALT levels, respectively, and 98.9% and 97.9% out of them respectively developed NAFLD [Table 3].

From the above Tables 1, 2 and 3 the following parameter history of gestational hypertension, hypertension in family, exclusive breastfeeding, BMI, serum cholesterol, triglyceride, LDL, ALT and AST were found statistically significant and considered for multivariate logistic regression analysis.

From our study, Table 4 showing multivariate logistic regression analysis revealed that serum cholesterol, serum triglyceride, serum LDL and ALT was found to be independent predictor of NAFLD with an odds ratio of 19 (confidence interval 1.3 – 279.1, *P* value = 0.03) and 17 (confidence interval 1.6 – 200, *P* value = 0.02) and 46 (confidence interval 3.9 – 541.7, *P* value = 0.002) and 161 (confidence interval 3.4 – 7524.6, *P* value = 0.01), respectively. The individual with abnormal triglyceride level has 17 times more risk to develop NAFLD than the individual having normal triglyceride level; likewise, the individual with abnormal cholesterol level has 19 times more risk to develop NAFLD than individual with the normal cholesterol level. Similarly, the individual having abnormal LDL has 46 times more risk to develop NAFLD than individual with the normal LDL level. However, the presence of history of hypertension in family, BMI and HDL was not found to be an independent predictor for NAFLD during logistic regression analysis [refer to Table 4].

Discussion

Childhood obesity in the 21th era is a upturning health issue which gulp down the children and adolescent and predispose them to serious health crisis like NAFLD. The number of NAFLD cases which were diagnosed and managed by health system across the world were just tip of submerged iceberg, rest of the iceberg is still there to be taken care off. NAFLD is very underestimated health issue, and there is a need to consider this as a major health issue in coming times. In the modern era, with changing trends of lifestyle, eating habits, work style, increased screen time and gadget use have heightened the risk of metabolic disorders.[6]

In our study, we found the prevalence of NAFLD among overweight and obese individual to be 44%. In previous studies in overweight children and adolescents published by Meera Shaunak *et al.*,[3] the estimated prevalence of NAFLD was found to be 36.1% and study conducted by Thiagarajan S *et al.*,[13] focusing on the South Indian population was 51.3% which was similar to our result in the study.

Meanwhile, a study conducted in Kuala Lumpur Malaysia,[6] noted a prevalence of NAFLD at 62% among overweight and obese

Table 4: Association of various parameters with nonalcoholic fatty liver disease (NAFLD) by logistic regression analysis

Parameter	Adjusted odds ratio	95% CI		*P*#
		Lower	Upper	
BMI	1.9	0.3	13.1	0.50
Serum cholesterol	19	1.3	279.1	0.03*
Serum triglyceride	17	1.6	200.0	0.02*
Seum LDL	46	3.9	541.7	0.002*
ALT	161	3.4	7524.6	0.01*
AST	1.0	0.04	26.0	0.98
Hypertension in pregnancy	1.0	0.1	16.0	0.71
Hypertension in family	1.5	0.4	62.0	0.18
Exclusive breast feeding	1.9	0.4	26.1	0.26

#*P* value based on multivariate binary logistic regression, *statistically significant (*P*<0.05), CI-Confidence Interval

children. This could be due to differences in age group, ethnicity and races of the study participants.[14-17]

Our study found no gender predisposition to NAFLD which was consistent to the finding of study conducted by Jain V *et al*.[11] Age is not found to be contributor to NAFLD in our study which was similar to other studies.[12-17] BMI was significantly higher in the NAFLD group with *P* value of 0.009. The study conducted by Mohamed RZ *et al*.[6] and Jain V *et al*.[11] found similar positive association of BMI and waist circumference with NAFLD. However, on multivariate logistic regression analysis, this was not independent risk factor for NAFLD.

The present study indicated significantly higher mean total cholesterol, triglyceride, LDL in the NAFLD group when compared with the non-NAFLD group. This finding is consistent to the study conducted by different studies conducted by different part of world.[13-17] Serum cholesterol, serum triglyceride, serum LDL and ALT were found to be independent predictor of NAFLD among overweight and obese children.

There was significant higher values of ALT in NAFLD group as compared to the non-NAFLD group. Similar results were found in the study conducted by Jain V *et al*.[11] Liver enzymes were elevated in hepatic steatosis due to infiltration of adipocytes and inflammatory cytokines released in the response to infiltration.[14-17]

This study also showcases the utility of ultrasonography in diagnosing NAFLD. Though the gold standard for diagnosis of NAFLD is liver biopsy, ultrasonography is a very reliable tool in screening NAFLD in high risk population like overweight and obese children.

The strength of the present study was that a reasonably large number of children were evaluated clinically, biochemically and by USG. The limitations were that the diagnosis of NAFLD was not confirmed by more robust methods such as MRI or histology. Another limitation was our study was based on single-centre setting which might have acted as a bias. Our study population includes overweight and obese children of Jharkhand which majorly constituted by tribal population where parents were bit reluctant for detailed evaluation only on the basis that their child is overweight or obese.

What is already known

Until now, various studies has been conducted on NAFLD and all together they found ALT to be a major determinant that gets affected in NAFLD disease.

What this study adds?

The present study

- Adds up serum cholesterol, LDL-cholesterol and triglyceride to the previous list of determinant.
- This study also sheds light on gestational hypertension and history of hypertension in family played a significant association with NAFLD among obese children. Obese children who were exclusively breastfeed have significant association with protection from NAFLD.
- Ultrasonography can be used as reliable tool in resource limited healthcare setup.

Conclusions

The prevalence of NAFLD in overweight and obese children in our study was 44%. This is alarmingly high when compared to other metabolic diseases. This study sheds light on gestational hypertension, and a history of hypertension in family played a significant association NAFLD among overweight and obese children. On the other hand, obese children who were exclusively breastfeed have significant association with protection from NAFLD. High total cholesterol, LDL-cholesterol, triglyceride, LDL and ALT are the significant biochemical parameters associated with NAFLD. High BMI is positively associated with NAFLD. Ultrasonography can be used as reliable tool in resource limited healthcare setup. If there is a presence of any risk factor in overweight and obese children, evaluation for NAFLD must be done. Lipid profile, Liver function test and Ultrasonography together can be used to early pick out NAFLD cases and appropriate management need to be done. This can help us to prevent the progression of NAFLD whose end sequel is chronic liver disease.

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Conflicts of interest

There are no conflicts of interest.

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