



AN OBSERVATIONAL STUDY OF TYPE-2 DIABETES MELLITUS AND OBESITY IN CHILDREN UNDER THE AGE OF 14 IN TERTIARY CARE HOSPITALS.

¹Ms.Sakshi Sahebrao Ade, ²Mr. Mohd. Faizan Noor Mohd., ³Mr. Karan Amarlal Katariya, ⁴Mr. Vaibhav Prameshwar Paturkar, ⁵DR. Neha N. Rajpurohit

¹Student, ²Student, ³Student, ⁴Student, ⁵Professor (guide)

¹Vardhaman Collage of Pharmacy ,

²Vardhaman Collage of Pharmacy ,

³Vardhaman Collage of Pharmacy ,

⁴Vardhaman Collage of Pharmacy ,

⁵Vardhaman Collage of Pharmacy

Abstract

Overweight and obesity in children have become much more common in recent decades; now, one-third of children in the United States suffer from one of these conditions. Early childhood obesity raises the likelihood of obesity later in life. There is proof that family-based behavioral treatment is effective in helping people control their weight and achieve better health outcomes. There is evidence of health hazards associated with obesity, such as metabolic syndrome. In recent times, there has been a rise in the prevalence of type 2 diabetes (T2D) in young people, who are typically obese and have a family history of the disease. Obesity and type 2 diabetes in young people are linked to lower income and membership in ethnic minorities.

Since most young people with T2D do not attain ideal glycemic control, they are at an increased risk of developing health issues in the future. T2D and obesity The number of children and teenagers who are overweight or obese is still rising, and the yearly healthcare expenses associated with obesity for patients aged 6 to 17 have risen to \$127 million. These days, type 2 diabetes and impaired glucose tolerance are being identified in overweight children and adolescents. They also exhibit early indicators of the insulin resistance syndrome and cardiovascular risk. Youth cardiovascular risk and the onset of type 2 diabetes have been linked to a number of risk factors. These include increased body fat, particularly in the abdomen, insulin resistance, ethnicity (children of African American, Hispanic, and Native American descent are more at risk), and puberty onset. Although the exact mechanism by which these factors raise risk is unknown, their combined effects seem to be theresult.

INTRODUCTION

Diabetes



The metabolic condition known as type 2 diabetes mellitus (T2DM) is marked by peripheral lack of insulin and a beta cell's inability to adjust, which results in hyperglycemia. It was formerly thought to be an adult pathology, however it is becoming more common among kids. The risk factors are obesity, sedentary lifestyle, family history, and ethnicity are the same for children as they are for adults. Presentation and treatment, however, are different from those of adults with the illness. Any type of diabetes in children increases their risk of several problems. Preventing long-term consequences from type 2 diabetes in children and adolescents requires early identification, screening, and treatment of the condition [Lynn M. Frydrych].

Children with type 2 diabetes have a chronic illness that alters how their bodies use sugar, or glucose, as fuel. Sugar accumulation in the blood stream due to the condition can have major long-term effects if left untreated. Adults with type 2 diabetes are more likely to get it. It was formerly known as adult-onset diabetes. However, a greater percentage of younger people are developing type 2 diabetes as a result of the rising number of obese children. We have a lot of options for managing or preventing type 2 diabetes in child. Encourage child to keep a healthy weight, consume a balanced diet, and engage in lots of physical activity. When exercise and a healthy diet are insufficient to manage type 2 diabetes, insulin therapy or oral medication may be necessary. Tell youngsters to keep a healthy weight, consume a balanced diet, and engage in lots of bodily activity. Insulin therapy or oral medication may be required for managing type 2 diabetes if exercise and a healthy diet are insufficient.[Bjornstad, P., Laffelet.al]

It was uncommon to learn of a child suffering from type 2 diabetes years ago. Medical professionals once believed that children could only get type 1. For a long while, it was even referred to as juvenile diabetes which actually means Diabetes type 1 is a chronic illness also referred to as juvenile diabetes or insulin-dependent diabetes. The pancreas produces little or no insulin in this situation. The

hormone insulin is what the body uses to let glucose, or sugar, into cells so those cells can make energy. Not any longer. More than 208,000 people under the age of 20 have diabetes, according to the CDC. [Abdulkareem Jassem Al-Quwaidhi et.al]

Compared to type 1 diabetes, type 2 diabetes symptoms may manifest more slowly.

Many either don't have any symptoms at all or don't recognize them. However, your child might exhibit or be suffering some of the more overt typical symptoms listed below. If you see any of these in your child, it's crucial to consult with their doctor. [Fisher, D.P., Johnson et.al]

- Using there storm —more frequently, particularly at night.
- Being perpetually thirsty and unable to slake it is known as being thirsty.
- Exhausted feeling completely devoid of energy and weariness.
- Thinner seeming less bulky than normal or dropping weight naturally.
- Itching in the vagina or thrush
- Cut sand wounds that require more time to heal
- Vision is hazy [Davies, M.Jet.al]

Sugar Level In Body.



Normal:-70-100mg/dl

Fasting Blood Sugar Level:- 100-125mg/dl is Pre-diabetic. 126mg/dl and above is called as diabetes.

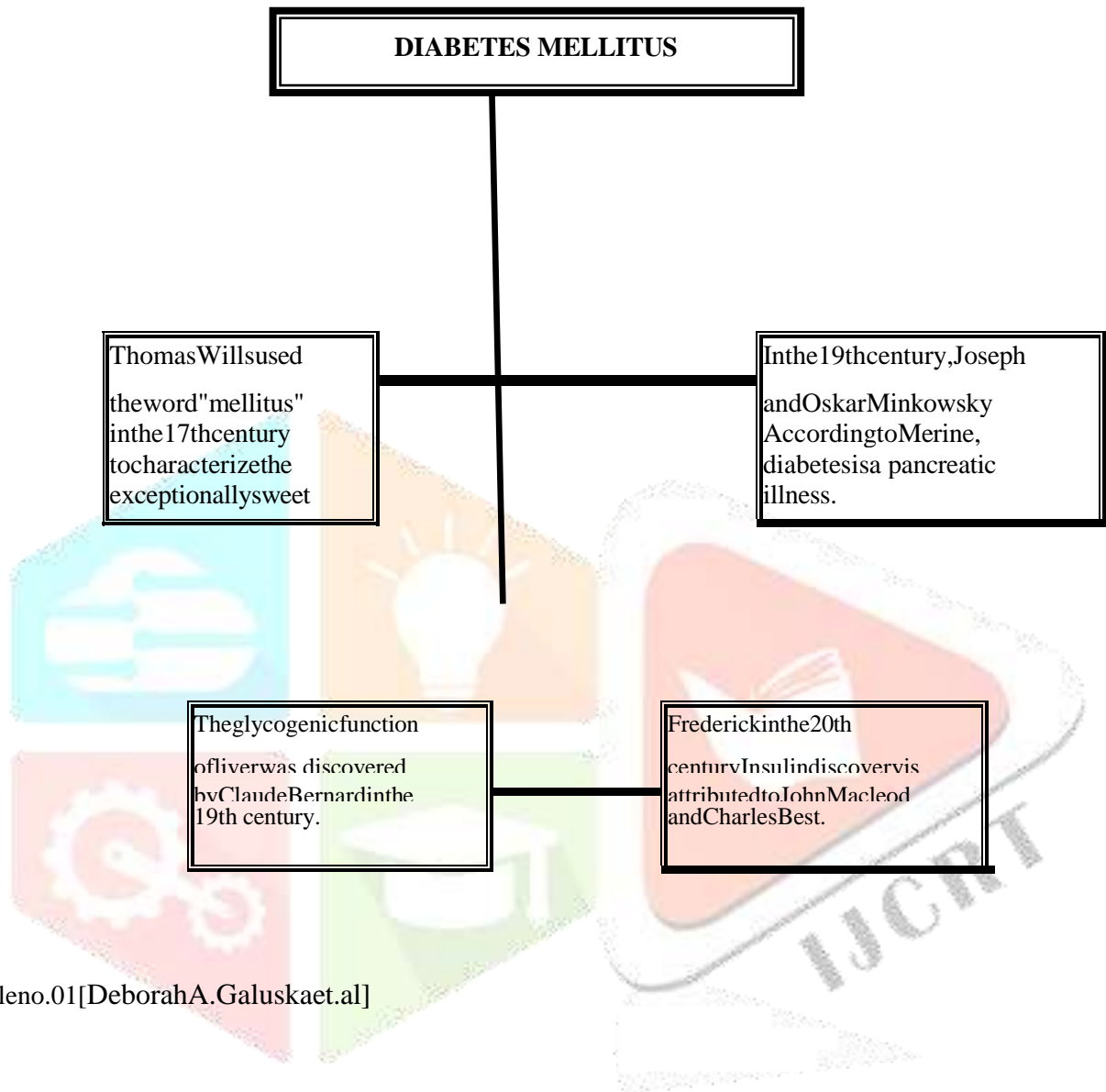
[Zheng, Y., Leyet.al]

Sign & Symptoms.

- Polyuria (more amount of urine secret)
- Polyphagia (increase in desire of eating)
- Polydipsia (increase in desire of drinking water.)
- Weight loss
- Nausea
- Fatigue

- Retionopathy (blindness) [Lingvay, I.,Sumithranet.al]

HISTORY OF DIABETES MELLITUS.

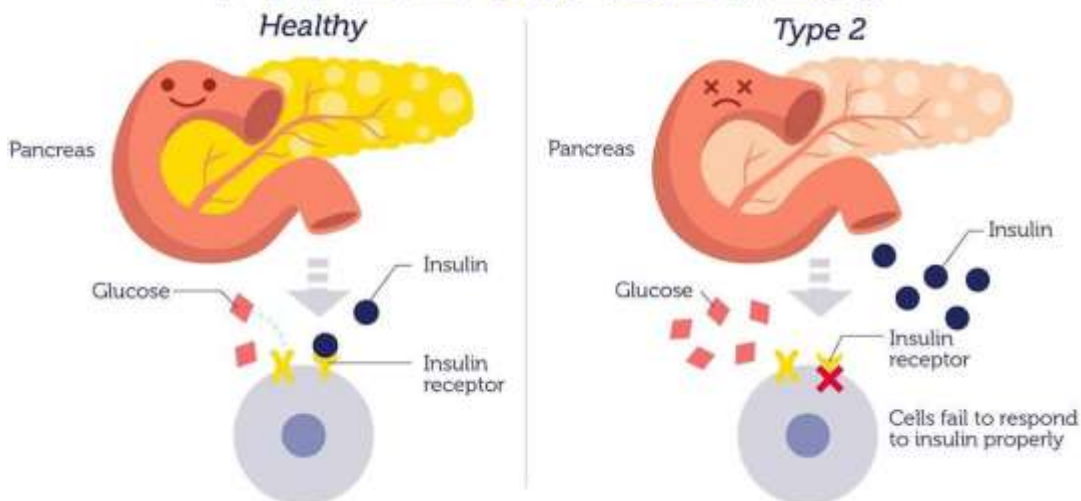


Tableno.01[DeborahA.Galuskaet.al]

Drugs use for the treatment of type 2 diabetes mellitus in children.

Oral Agent	Ref #	Age Range (yrs)	N	BMI	Dose Range	HbA1C Change	Study Conclusion	
Biguanides	Metformin (Glucophage®)	5	8-16	82	> 85 th % (28% were > 95 th %)	500mg QD – 1000mg BID	↓ 0.8%	Metformin was safe and effective for treating pediatric patients with type 2 diabetes.
		6	8-15	25	33.5 ± 9.6 kg/m ²	500mg QD – 1000mg BID	↓ 4.4%	Metformin monotherapy was effective but short lived. T2DM management is as complex in children as in adults.
		7	16.3 ± 2.5 (mean)	35	>50 th %	1000mg BID	↓ 1.4%	Metformin was safe and effective for pediatric T2DM.
Sulfonylurea	Glipizide	11	12-15	6	14.2 kg/m ² (mean)	2.5mg BID	Reduced	Role for glipizide in CF pts with IGT.
Biguanides / Sulfonylurea	Metformin / Glyburide (Glucovance®)	9	10-16	N/A	N/A	N/A	N/A	Glyburide and Metformin PKs comparable between children, adolescents, and adults.
		10	9-16	167	> 50 th %	623 (Metformin) / 3.1mg (Glyburide) (mean)	↓ 0.8%	No difference between metformin, glyburide, and combo. Safety equivalent to adults.
α-Glucosidase Inhibitors	Acarbose (Precose®)	12	5-16	65	N/A	50-300mg daily in 2, 3, or 6 divided doses	↓ 1.1%	Efficacy in ↓ing post-prandial BG, urine glucose excretion, and HbA1C. Tolerability/safety equivalent to adults.
		13	11-18	11	N/A	200-300mg qd in 3 divided doses	↓ 0.8%	Insulin doses lowered and HbA1C improved.
		14	7-15	9	N/A	150-200mg daily in 2 divided doses	↓ 1 – 2.3%	Insulin doses lowered and HbA1C improved. Acarbose safe and effective.
		15	13 ± 1 (median)	12	N/A	50mg TID	N/A	Decreases in fasting and postprandial BG. No change in insulin doses. Good tolerability.
		16	N/A	12	N/A	50mg TID	N/A	Therapeutic place in CF pts with IGT.
		17	4-25 Months	6	N/A	12.5-50mg at meals	N/A	Effective reducing PP hypoglycemia in children s/p Nissan fundoplication; well tolerated aside from flatulence.
Thiazolidine dione	Rosiglitazone (Avandia®)	18	9-19	5	32.2 ± 4.2 kg/m ²	4 mg BID	N/A	ALT/AST levels remained WNL in patients with PCOS

ARE YOU AT RISK OF TYPE 2 DIABETES?



Obesity



Obesity in Children

Childhood obesity is a complicated, chronic (long-term) illness that develops when a child weighs more than is appropriate for their age, height, and sex at birth. A kid who is two years of age or older and has a body mass index (BMI) at or over the 95th percentile for their age and sex is considered obese in childhood, according to medical definitions. Adult BMI factors are not the same for children. Because children's body compositions gradually alter as they get older, BMI is specific to both age and gender. Special growth charts are used by healthcare professionals to determine a child's healthy BMI. Obesity in children is a multifactorial health problem. Your child's doctor can suggest a comprehensive treatment plan to enhance physical health and overall wellbeing if your child's weight is endangering their health. [Mayer-Davis, E. et al.]

Nowadays children become more addicted with unhealthy, more spicy and various types of junk food. Also children become careless about their health and health problem, also less sleep, more stress, less physical activities are the main reasons for the obesity. In some cases it should be genetically also which means it can come from birth also. So taking a nutritive, healthy, and good meal is very important in today's generation. Gaining weight can be caused by many reasons. The majority of children become obese as a result of consuming progressively more energy (measured in kilojoules) from food and drink than their bodies require for development, play, and exercise. Body fat is created when energy is not used, and this can eventually cause your child to weigh more than is appropriate for their age. One of the biggest problems facing public health in the twenty-first century is childhood obesity. Globally, the issue is becoming more prevalent and is primarily affecting low- and middle-income nations in urban areas. The rate of rise in prevalence is concerning. Over 42 million children under the age of five are thought to be overweight worldwide in 2010. Of these, about 35 million reside in underdeveloped nations [T. Temelkova, T. Stefanov et al].

Infants and early children often react to hunger and fullness cues in order to limit the amount of calories they ingest beyond what their bodies require. None the less, dietary and lifestyle modifications during the past few decades have contributed to the growth in childhood obesity. There are many elements around children that encourage overindulgence in food and discourage physical activity. Foods with high fat and sugar content are frequently served in big portions. These elements may cause kids to

consume more calories than they require in order to feel satisfied. Ads on TV and other screens can influence people to make bad dietary choices. Advertising targeting children typically features food that is rich in fat, sugar, or salt content. [Lynn M. Frydrych,et al]

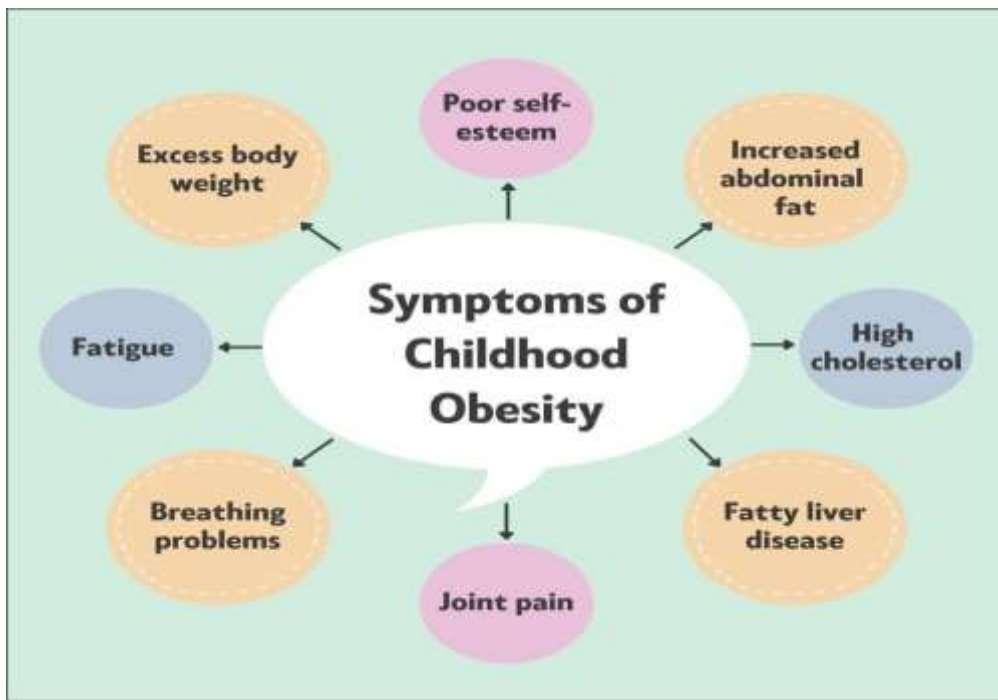
Screen time activities include things like texting, gaming, watching TV, and using the computer all need very little energy. They frequently replace regular, healthful activity. Children often have a craving for harmful snack foods that they see on TV. Obesity might also result from other environmental variables affecting the child. Children make food and exercise decisions influenced by their school environment, friends, and family. Food can be comforting to a youngster or utilized as a reward. The result of these ingrained behaviors is overeating. Later in life, many people find it difficult to stop these patterns. A child's risk of obesity can also be influenced by emotional issues, physical ailments, and genetics. A child's appetite can be increased by hormone imbalances, low thyroid function, and some medications, such as steroids or anti-seizure drugs. This raises their chance of becoming obese over time [Abbasi,A.,Juszczuk,et.al]

An eating disorder may result from an unhealthy obsession with food, weight, and body image. For teenage girls and young adult women who may be dissatisfied with their bodies, obesity and eating disorders frequently coexist at the same time.[Henning, R.J et.al]

History of Obesity

The origins of obesity date back at least 25000years.Duringthe17thcentury,obesity was associated with power, riches, and fertility, yet Hippocrates had previously identified obesity as a sickness in America.

Determine the causes of obesity by taking a history that includes in formation on weight loss in the past, motivation to change, and obstacles to losing weight, as well as lifestyle factors such as eating habits, physical activities, and physiological components. [Elizabeth R. Pulgaronetal]

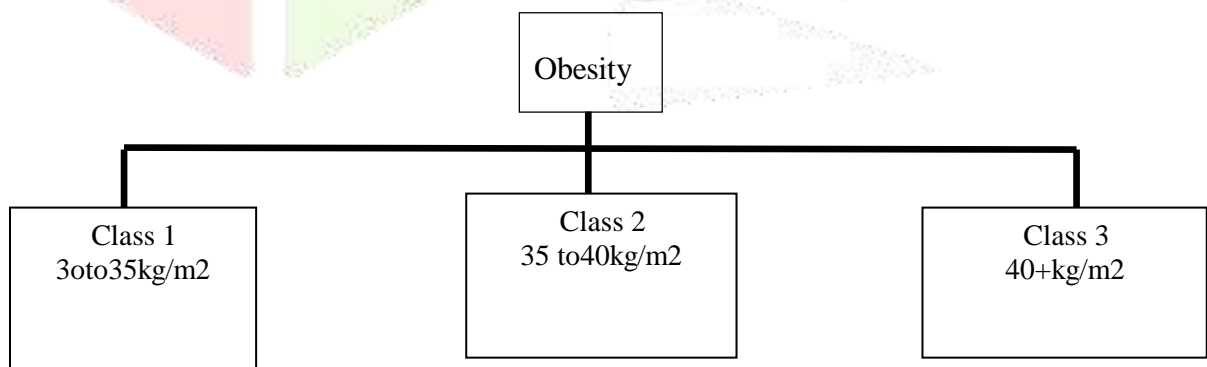


Sign & Symptoms:

Fatigue

- 1) Increased hunger
- 2) Snoring
- 3) Back pain knee pain
- 4) Constipation
- 5) Profuse Sweating
- 6) Swelling in body part [Mantovani,A.,Byrne, C.Detal]

Type of Obesity in Child



TableNo.02 [Elizabeth R.Pulgaronet al]

Drugs Used in Past (Year of Introduction)	Year of Discontinuation	Cause of Discontinuation
Thyroid hormone	Off label use till 1980s despite toxicity	Hyperthyroidism, cardiac arrhythmias, and sudden death
Dinitrophenol (introduction in 1930)	Banned by the FDA in 1938	Dermatitis, neuropathy, agranulocytosis, visual impairment, death
Amphetamine and its derivatives (1936)	Became a schedule II drug under the Controlled Substances Act in 1971	Addiction, hypertension, myocardial toxicity
Aminorex (1965 in Europe)	1968	Chronic pulmonary hypertension resulting in high mortality
Fenfluramine + phentermine (1992)	1997	Valvular heart disease
Phenylpropanolamine(available since 1970)	2000	Hemorrhagic stroke
Rimonabant(available in UK and other European countries since 2006 for long term treatment of obesity)	EMA withdrew marketing authorization in 2009 Failed to get US-FDA approval due to safety factors	Psychiatric disorders, depression and suicidal ideation
Sibutramine (popular antiobesity drug used since 1997)	2010	Increase in risk of major adverse cardiovascular events (a composite of non-fatal heart attack, non-fatal stroke, resuscitation after cardiac arrest and cardiovascular death)

Drugs use for the treatment of Obesity in children.

LITERATUREREVIEW

- Abdullah SAI-Goblan (2014)-** There is a substantial correlation between insulin resistance and diabetes and body mass index. The development of insulin resistance is associated with elevated levels of pro inflammatory indicators, glycerol, hormones, cytokines, non esterified fatty acids, and other chemicals in obese persons. The pathophysiology of diabetes is rooted in the impairment of the pancreatic β - islet cells, which results in an inability to regulate blood glucose levels. If insulin resistance coexists with the pancreatic β -islet cell failure, the development of diabetes becomes increasingly likely. The development and increasing prevalence of type 1 and type 2 diabetes are closely linked to weight increase and body mass. [Abdullah S Al-Goblan]
- Vivian C. Tuei (2010)-** Non-communicable diseases like diabetes mellitus are clearly contributing to the multiple burdens that the people of Sub-Saharan Africa (SSA) bear. While communicable diseases like the HIV/AIDS epidemic, malaria, and tuberculosis have continued to pose greater threats to the region's public health system, this is also the case. The most prevalent kind of diabetes, type 2 diabetes mellitus (T2DM), affects 90–95% of the population in this area and has an alarmingly high prevalence. Obesity, fast urbanization, physical inactivity, aging, changes in nutrition, and socioeconomic shifts are among its primary risk factors. Individuals in sub-Saharan Africa also exhibit signs of insulin resistance and β -cell malfunction [Vivian C. Tuei]
- Tamara S. Hannon, MD(2005)-** Up until recently, type 1a diabetes, which is immune-mediated, accounted for the bulk of diabetes mellitus cases in children and adolescents. Over the past 20 years, type 2 diabetes (T2DM) has become much more common in children and adolescents as a result of obesity. Insulin resistance—which is closely linked to obesity—combines with a relative insulin shortage to cause overt type 2 diabetes. Compared to adults who develop diabetes later in life, children and adolescents

with type 2 diabetes (T2DM) may experience the microvascular and macrovascular complications of the disease earlier. These complications include atherosclerotic cardiovascular disease, stroke, myocardial infarction, and sudden death; chronic renal failure and insufficiency; limb-threatening neuropathy and vasculopathy; and retinopathy that results in blindness.[Tamara S. Hannon, MD]

4. **Zobeida Cruz-Monserrate (2018)**- PDAC, or pancreatic ductal adenocarcinoma, is one of the deadliest cancers. The incidence and mortality rates in the general population are estimated to be eight cases per 100,000 person-years and seven deaths per 100,000 person-years globally, respectively, with a much higher rate in the United States than in other countries. In 2017, there were more than 50,000 new instances of this disease in the US. In fact, before 2030, it is anticipated that PDAC-related mortality will rise sharply overall to rank second among cancer-related causes of death. Given the ineffectiveness of current PDAC treatments, more work needs to be done to prevent this illness. [Zobeida Cruz-Monserrate]
5. **J. Clin. Med. (2014)**- Synopsis Normal metabolism depends on the insulin-like growth factor (IGF) system, which works in tandem with other hormone axis. Growth hormone (GH) secretion is decreased in obesity due to the hyperinsulinemia that accompanies peripheral insulin resistance, while total IGF-I levels remain largely unaltered because of enhanced hepatic GH sensitivity. Low levels of IGF-binding protein (IGFBP)-1 indicate the onset of type 2 diabetes some years later. IGFBP-1 levels are decreased in correlation with the rise in insulin levels in obesity. The IGF system phenotype in people with metabolic syndrome and type 2 diabetes mellitus is influenced by visceral adiposity, hepatic steatosis, and chronic inflammation. This includes abnormalities in the normal inverse relationship between IGFBP-1 and insulin, with IGFBP-1 concentrations that are either elevated or inappropriately normal.[J. Clin. Med.]
6. **Lynn MF Frydrych (2018)**- Type 2 diabetes mellitus (T2D) and obesity are worldwide pandemics. Since 1975, the prevalence of obesity has almost tripled globally, and since 1980, the prevalence of type 2 diabetes has nearly doubled. Both type 2 diabetes (T2D) and obesity are slow-moving, chronic illnesses that lead to cellular physiologic alterations prior to the manifestation of clinical signs and symptoms. Obesity and type 2 diabetes make a person physiologically fragile, more susceptible to infections, and more likely to die from sepsis. There would be significant benefits to society if these at-risk populations' morbidity and mortality rates were reduced. We think that immune system malfunction brought on by the persistent low-grade inflammation found in both diseases is the cause of the worsening outcomes seen in these patient populations. [Lynn M Frydrych]
7. **Malcolm S. Schwartz(2018)**- Type 2 diabetes mellitus is becoming more common in children and adolescents, with the highest incidence among those from racial and ethnic minority origins. This is due to the rising rates of childhood obesity. Physician awareness of risk factors and screening guidelines is crucial due to the substantial problems associated with type 2 diabetes mellitus. This knowledge enables early patient identification and treatment. Physicians should also be knowledgeable with the many treatment options that are accessible, such as typical pharmacologic therapeutic alternatives and diet and exercise-based weight control.[Malcolm S. Schwartz]
8. **Shazia Khan (2018)**- A serious problem for world health, obesity is becoming more common. Numerous comorbid conditions, including type 2 diabetes mellitus (T2DM), obstructive sleep apnea (OSA), and

cardiovascular diseases (CVD), are linked to obesity. One of the main causes of OSA is obesity. Additionally, hypoxic episodes reduce insulin sensitivity, and the sympathetic nervous system activates, releasing inflammatory markers linked to insulin resistance. As a result, OSA may hasten the onset of T2DM. Both situations can be improved with Continuous Positive Airway Pressure (CPAP), which also raises insulin sensitivity and improves glucose metabolism. CPAP also reduces hypoxic episodes. Strategies for losing weight are crucial for addressing T2DM, OSA, and other related co morbidities . [Shazia Khan]

9. **Francesco Orio(2016)**-It has been shown that PCOS involves not only symptoms connected to the reproductive system but also a complicated array of systemic symptoms. Obesity, metabolic syndrome, type 2 diabetes, and an elevated risk of cardiovascular disease have all been linked to it. The relationship between PCOS and the risk of cardiovascular disease has been the subject of numerous academic and clinical research; the association appears to be caused by hypertension, systemic inflammatory and coagulation abnormalities, as well as impaired lipid/glucose metabolism. Consequently, the purpose of this publication is to summarize the key data about PCOS and obesity/obesity-related diseases (risk factors for cardiovascular disease and glucose abnormalities).[Francesco Orio]
10. **José L. San Millán (2004)**- We examined the potential correlation between 15 genetic variations previously identified as influencing insulin resistance, obesity, and / or type 2 diabetes mellitus and polycystic ovarian syndrome (PCOS). The genes encoding for paraoxonase (three variants), plasma cell differentiation antigen glycoprotein, humans robin and SH3 domain containing 1, plasminogen activator inhibitor-1, peroxisomeproliferator-activatedreceptor- γ 2,proteintyrosinephosphatase1B(two variants), adiponectin (two variants), IGF1, IGF2, IGF1 receptor, and IGF2 receptor were genotyped in 72 PCOS patients and 42 healthy controls.[José L. San Millán]
11. **Elizabeth and Alan(2014)**- Overweight and obesity is increases in children day by day Being overweight in early childhood increases risk for later obesity. Family history is also one of the reason for Obesity in child. With Obesity there is also increasing incidenceoftype2diabetes mellitus in children, by which there are high risk for later health complication . [Elizabeth andAlan]
12. **Janelle, etal. (2018)**- Belowtheageof20 year shave the diagnosis of either type 1or type 2 diabetes. However the incidenceoftype2 diabetes has increases in youth. One study reported an annual adjusted increased incident of 4.8% between 2002 and 2012. One of the reason behind that is childhood obesity which also increase the risk of heart disease, vision diseases, and amputation will be.[Janelle, et al]
13. **Juliaetal.(2013)**- Obesity is a growing epidemic affecting all ages in both industrialized and developingcourtiers.Themostcommonsuggestedcauseofthisepidemicistheincreasing levels of urbanization and lifestyles change towards secondary life and adopting western dietary patterns.[Julia et al]
14. **Peteretal.(2018)**- Obesity and type 2 diabetes mellitus are global pandemic. By both Obesity and type 2 diabetes chronic diseases that develop gradually. Additionally bariatric surgery is currently the most successful treatment for obesity and is only weight loss method that also cause a sustained, substantialimprovementoftype2diabetes.[Peter etal.]

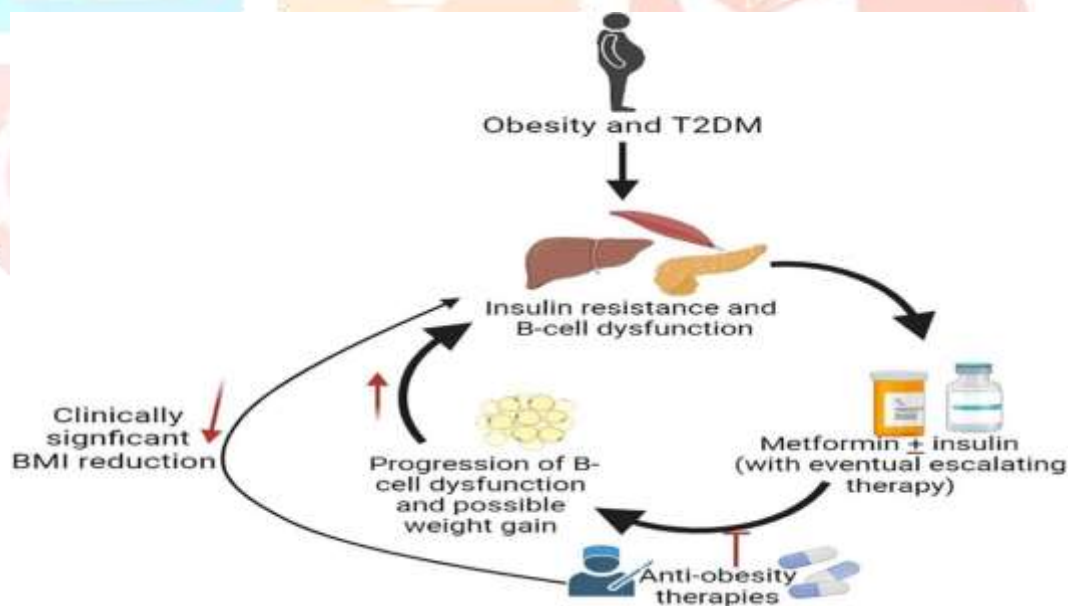
15. **Temelkova and Stefanov (2011)**- Obesity and type 2 diabetes mellitus are multi factorial health threats caused by a complex interplay between genetics predisposition and environment with dramatically increasing worldwide prevalence.[Temelkova and Stefanov et.al]

Scope of Study (Aims & objectives)

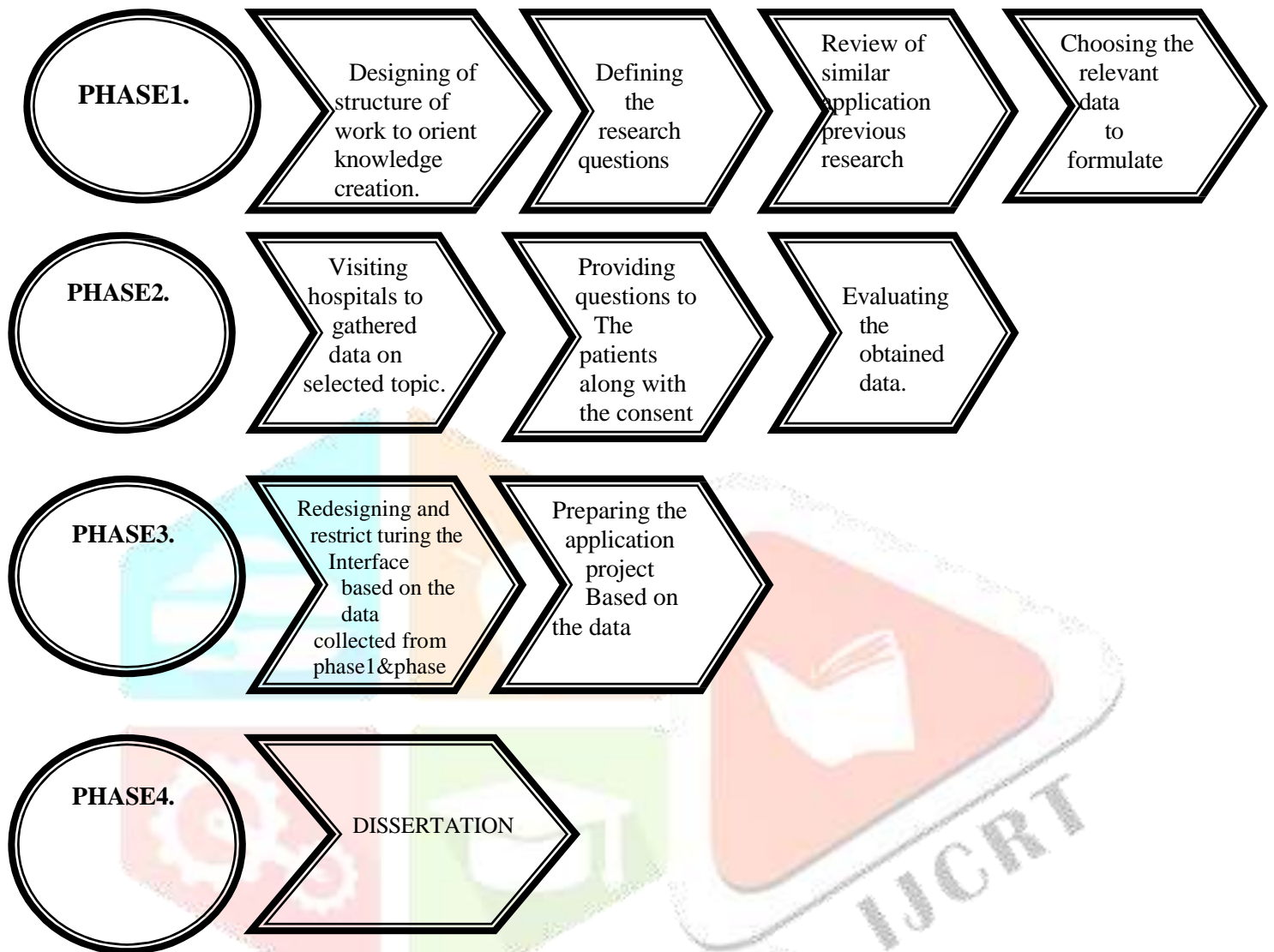
AIM :- To study and observe type 2 diabetes mellitus and obesity in children under the age of 14 year in tertiary care hospital.

OBJECTIVES

- 1) To identify the on. of patients with obesity & type 2 diabetes mellitus under the age of 14.
- 2) To detect the associated risk.
- 3) To study the drugs used for the treatment.
- 4) To monitor the adverse drug reaction
- 5) To identify the various way to prevent type 2 diabetes in children.
- 6) To find out the way to avoid the long term medication for child.
- 7) To understanding reason behind increasing type 2 diabetes and obesity in child.



- **Plan of work:**



Epidemiology

Type 2 Diabetes Mellitus in Child

The prevalence of type 2 diabetes per 1000 15–19-year-old North American Indians was 2.3 for Canadian Cree and Ojibwa Indians in Manitoba, 4.5 for all US American Indians, and 50.9 for Pima Indians. Adolescent Pima Indian incidence increased six times between 1967–1976 and 1987–1996. In Ohio, type 2 diabetes accounted for 33% of all incidences of diabetes among White and African American individuals between the ages of 10 and 19. In addition to having acanthosis nigricans, being from a minority population, being obese, having a family history of type 2 diabetes, and being more

likely to be girls than boys, youth with type 2 diabetes were often between the ages of 10 and 19. Glucose management was frequently inadequate at follow-up, and complications from diabetes could arise early.[Gungor, N., Thompson et.al]

Obesity in Children

Overweight children and adolescents and adult obesity have both significantly grown in India since 1980. A body mass index of 30 or more is considered obese in adults. Overweight in children and teenagers is defined as having a body mass index that is at or above the 95th percentile of a certain reference population for their age. In the years 2003–2004, over 17% of teens (aged 12–19) and 32.9% of adults aged 20–74 were overweight or obese. Adult women's obesity varies by age, sex, and race/ethnicity. Elevated bodyweight is linked to a higher risk of disability and an increased incidence of many illnesses such as nonalcoholic fatty liver disease, diabetes mellitus, and cardiovascular disease. [Serbis, A., Giapros et.al]

Methodology

The various child hospitals (Vitthal Hospital, Meerakrushna Clinic, Vatsally Hospital, Snoharnoha Hospital, More Hospital, Kataria Clinic, Lad Multispeciality Clinic, Upadhye Multispeciality Clinic, Rathod Multispeciality Clinic, Ingole Hospital) hosted this prospective questionnaire-based observational study over a six-month period. Patients other than type 2 diabetes mellitus and obesity in Children are excluded or not allowed to participate in the study. Only children with type 2 diabetes and obesity under the age of 14 were included. The patient's case records, reports, prescription, and interviews with medical professionals and patients provided the necessary and required data. A questionnaire comprising inquiries about the patients' current health and awareness of the medication's effects was given to each patient. Questionnaire provided to patients attested along with the concern.

STUDY TYPE

The study was Observational Prospective Study.

STUDY DURATION

The duration of the study was six months.

STUDY POPULATION

The target population of the study was Children patient under the age of 14, suffering from type 2 Diabetes mellitus and Obesity.

SAMPLE SIZE

22 Patients were taken under study.

DATA COLLECTION TOOL

A questionnaire prepared specifically for the study will be used to gather and document data. Patients will be given a questionnaire with multiple choice options, and the doctor will also receive a brief version of the questionnaire in order to gather pertinent data. Prescription drug data, copies of both in- and out-patient records, and medication history will all be collected. Information on the type of additional issues and diseases the patient is afflicted with is gathered in this data collection process. Things the patient should avoid, preferred medicine kinds, and other information were gathered. All that we do is counsel the patient and educate them about type 2 diabetes and obesity.

DATA OBSERVATION

A prospective observational study is a type of longitudinal research in which researchers track and monitor a group of children participants across time in order to collect data and document the evolution of outcomes. to watch patients' understanding, adherence to their prescribed medications, and drug intake. Additionally, the physician's treatment plan and assessment of the patient's condition. the sort of advice he gives the young patient to stay away from type 2 diabetes and obesity. Patients and physician were given the following sample questions

Questionnaire provided to patients

(TYPE-2 DIABETES MELLITUS IN CHILDREN)

Date:- _____

Name of the patient _____, Age of patient _____, Gender :- _____, Condition of disease _____

Survey Questions

1) Do the child have any vision problem because of diabetes?

Ans: Yes No

2) Have child ever been taken in hospital because of your abnormal blood sugar level?

Ans: Yes No

3) Do the child have loss feeling in hands or feet because of diabetes?

Ans: Yes No

4) Instead of diabetes is the child is suffering from any other health issue?

Ans: Yes No

5) Do the child feel any type of weakness because of type 2 diabetes?

Ans: Yes No

6) Do the child feel sleepy and inactive all the time?

Ans: Yes No

7) Do the child feel dizziness While doing any type of physical activity?

Ans: Yes No

8) Is the child's desire for eating food is increases without doing any thing?

Ans: Yes No

9) Do the child feel good and improvement in his/ her health condition after treatments?

Ans: Yes No

10) Which type of symptoms you experienced?

(OBESITYIN CHILDREN)

1) Is child suffering from any other health issue like blood pressure, diabetes and any respiratory related problems.

Ans: Yes No

2) Is child take any type of treatment and anti obesity medicines for losing weight ? Which?

Ans: Yes No

3) Is child feeling in active and losing interest from other activity?

Ans: Yes No

4) Is child feeling tired in very short time, while doing any physical activity?

Ans: Yes No

5) Is the child emotionally weak depressed unmotivated?

Ans: Yes No

6) Which type of diet is followed as daily routine?

7) Is your desire for eating food is increases without doing anything?

Ans: Yes No

8) Dose the child feel any type of memorizing problem?

Ans: Yes No

9) Dose the child feel any type of chest pain?

Ans: Yes No

10) Dose the child feel any type of difficulty in breathing or respiration?

Ans: Yes No

Questionnaire provided to Physician

(TYPE-2 DIABETES MELLITUS IN CHILDREN)

Date: _____

Name of the Physician:____ Name of Clinic :____ Experience:_____ Qualification:-

Survey Questions

1) Is type 2 diabetes mellitus is more common then type1 diabetes mellitus?

Ans: _____

2) What are the common reasons for type 2 diabetes mellitus in children?

Ans: _____

3) What are early signs observed in children in diabetes mellitus?

Ans: _____

4) How can diabetes be treated among the children?

Ans: _____

5) What are the risk factor associated with the medication taking for type 2 diabetes in children ?

Ans: _____

6) Is type 2 diabetes mellitus is genetically transmitted disorder?

Ans: _____

7) Can type 2 diabetes be prevented and how?

Ans: _____

8) What are the long term complication of uncontrolled type2 diabetes?

Ans: _____

9)What are some common medications that are used for treatment of type2 diabetes in children ?

Ans: _____

10)What is the importance of regular medical check-up for individuals with type 2 diabetes?

Ans: _____

11) Dose type 2 diabetes affects on the child mental health?

Ans: _____

12) The children who are suffering from type 2 diabetes, Are they normal with their physical actives?

Ans: _____

13) What are the method for diagnosis the diabetes in children?

Ans: _____

(OBESITY IN CHILDREN)

1) Is junk food is the main reason for obesity?

Ans: _____

2) Dose Obesity is affected on mental health of the child?

Ans: _____

3) What are the risk factor associated with the medication taking for losing weight?

Ans: _____

4) Dose Stress make child put on weight?

Ans: _____

5) What are some healthy ways to lose weight and keep it off?

Ans: _____

6) Dose sleeping cycle affect on obesity?

Ans: _____

7) What type of specific food that should be avoided?

Ans: _____

8) Which disease can because due to the obesity in child?

Ans: _____

9) Which type of treatment you recommend to children for obesity?

Ans: _____

10) Dose obesity affects on new born also?

Ans: _____



- **EXCLUSIONCRITERIA**

Patients other than type 2 diabetes mellitus and obesity in children are excluded or not allowed to participate in the study

- **INCLUSIONCRITERIA**

Only children with type 2 diabetes and obesity under the age of 14 were included

- **IMPLICATION OF THE STUDY**

Safety of the children with type 2 diabetes and obesity under the age of 14.

RESPOSES

1. **Physician Response (Type 2 Diabetes Mellitus in Children_**

<https://docs.google.com/forms/d/15xcrSoUEVOMr4q46HzKAYQMvhqq9JPHSKpQvjAMiliM/edit?usp=drivesdk>

2. **Physician Response (Obesity in Children)**

<https://docs.google.com/forms/d/1OVX15b76lksUJE1ciYTaeBZV-SsIkIzAf2epjQjL1a0/edit?usp=drivesdk>

3. **Patient Response (Type 2 Diabetes Mellitus in Children)**

<https://docs.google.com/forms/d/1suQWV3c878a05o-XSyG4GWCsEMK3jOOzCn7P5-bkvrA/edit?usp=drivesdk>

4. **Patient Response (Obesity in Children)**

<https://docs.google.com/forms/d/1Ok2SHvo9bfBmttKZspyzUY5acaTxaY6PUPM84az0QT0/edit?usp=drivesdk>

CONCLUSION

The cohort study collected data from 375 general practices using electronic health records from the Indian Clinical Practice Research Datalink, one of the biggest primary care data sets globally. The researchers looked at 369,362 children between the ages of 2 and 15's BMI readings, diabetes diagnosis records, and other information.

Researchers discovered that 654 children and teens were diagnosed with type 2 diabetes and 1,318 with type 1 diabetes after looking at data collected between 1994 and 2019. Three hundred and eighty-eight instances of type 2 diabetes were associated with children and teenagers who were obese.

The prevalence of childhood obesity is rising in India, particularly in urban regions and the higher socioeconomic strata. Recent research points to a connection between India's diabetes pandemic and childhood obesity. Asian-Indian kids and teenagers are more prone to having high body fat percentages and being overweight in the abdomen. Moreover, the fast urbanization and dietary shift in India have produced an obesogenic environment that kids are exposed to. Children who are obese are more likely to experience conditions like insulin resistance, metabolic syndrome, and subclinical inflammation, which are known to be precursors of diabetes and frequently follow their symptoms into adulthood. A survey of the literature indicates that additional longitudinal research is necessary to enhance our comprehension of the long-term effects of childhood obesity in India.

RESULTS

Studies have shown that different geographic areas have differing prevalence rates of obesity among kids and teenagers with type 2 diabetes mellitus. The three most prevalent clinical manifestations were polyuria, polydipsia, and acanthosis nigricans. Maternal gestational diabetes and a family history of T2D were the most often mentioned risk factors. Oral hypoglycemic medications were used to treat the majority of patients; other treatments included insulin, diet alone, or combination therapies.

In addition to raising the risk of chronic illnesses, obesity and diabetes also have a negative social and financial impact. Determining the true cause of obesity and developing practical strategies for reducing pediatric obesity and diabetes are very difficult tasks. Our recommendation is that the mechanism, prevention, diagnosis, and treatment of this grave illness should be the primary focus of both basic and clinical research.

Numerous interventions, such as dietary changes, increased physical activity, and behavioral alterations, have been proposed either independently or in combination to treat and prevent obesity in order to address the growing issue of diabetes and obesity prevalence in children.

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Links

1. <https://defimedia.info/sites/default/files/inline-images/151119-diabetes.jpg>
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