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The distribution and Global burden of Insulin Dependent Diabetes mellitus -A review

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Abstract: *Diabetes mellitus is a group of metabolic disorders of carbohydrate metabolism characterized by abnormal blood glucose levels.Diabetes is an important risk factor for cardiovascular disease and others long-term complications include kidney failure, nerve damage, and lower limb amputation due to impaired circulation.There are three types of diabetes as follows. Insulin dependent diabetes mellitus(IDDM)-Type 1 diabetes used to be called juvenile-onset diabetes. It is usually caused by an auto-immune reaction where the body's defense system attacks the cells that produce insulin. Its occurrence is not fully understood. People with type 1 diabetes produce very little or no insulin. This type usually develops in children or young adults. People with this form of diabetes need injections of insulin every day in order to control the levels of glucose in their blood and theyfail to survive due to the lack of insulin. This paper briefly focuses on the global burden of type 1, rural urban distribution, age specific distribution as well as increase in the incidences of type 1Diabetes.*

Keywords: *Type 1 diabetes, Incidence, Global burden, and prevalence*

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I. Introduction

There are many other forms of diabetics which exist including Type 2, gestational, various forms of MODY's. Non-Insulin dependent diabetes mellitus (MIDDM)-Type 2 diabetes is called ass non-insulin dependent diabetes or adult-onset diabetes. It is characterized by insulin resistance and relative insulin deficiency. The diagnosis of type 2 diabetes can occur at any age. It may remain undetected for many years and the diagnosis is often made when a complication appears or a routine blood or urine glucose test is done. It is often, associated with overweight or obesity, which itself can cause insulin resistance and lead to high blood glucose levels. People with type 2 diabetes can often initially manage their condition through exercise and diet. However, over time most people will require oral drugs and or insulin. Gestational diabetes (GDM) is a form of diabetes consisting of high blood glucose levels during pregnancy.GDM usually disappears after pregnancy but women with GDM and their children are at an increased risk of developing type 2 diabetes later in life.[2] Impaired Glucose tolerance- Impaired glucose tolerance (IGT) is an asymptomatic condition defined by elevated (though not diabetic) levels of blood glucose two hours after a 75g oral glucose challenge. Along with impaired fasting glucose (IFG), it is now recognized as being a stage in the transition from normality to diabetes. Not surprisingly, IGT shares many characteristics with type 2 diabetes, being associated with obesity, advancing age, insulin resistance and an insulin secretary defect.

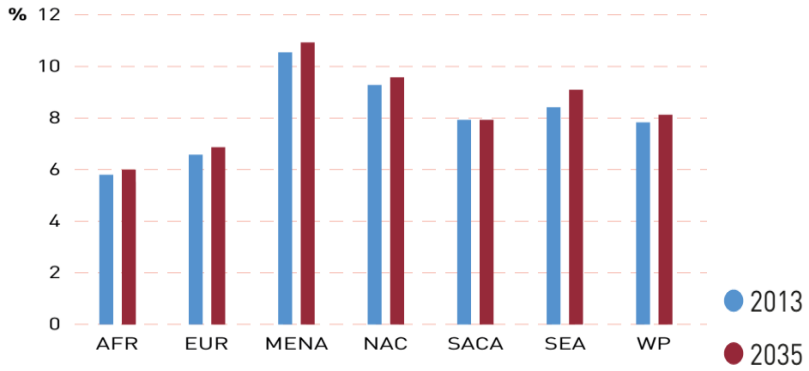
Other specific type of Diabetes

Maturity onset Diabetes mellitus-It represent rare cause of diabetes commonly misdiagnosed as type 1 and type 2 .Clinical characteristics of MODY include age of onset before 45 years, absence of beta cells autoimmunity and features of metabolic syndrome, sustained endogenous insulin production and strong family history .It is a form of diabetes that is caused by mutations in a number of different genes. MODY is a form of monogenic diabetes. Each different mutated gene causes a slightly different type of diabetes. The most common forms are *HNF1α*-MODY (MODY3) and GCK-MODY (MODY2), due to mutations in the *HNF1A* and *GCK* genes, respectively [3].Malnutrition related Diabetes-In tropical developing countries, young diabetes often present with a history of nutritional deficiency and a constellation of symptoms, signs, and metabolic characteristics which fail to meet the criteria used to classify the two main clinical sub classes of diabetes IDDM and NIDDM .The distinctive clinical features and course, the uncertain etiology and path physiology and the great number of such cases in some regions justified the creation of a new ,major clinical class of diabetes namely Malnutrition related Diabetes mellitus(MRDM)[4].

GLOBAL BURDEN OF DIABETES MILLITUS

The data was available for 219 countries and territories, grouped into the seven IDF Regions: Africa (AFR), europe (eUR), Middle east and north Africa (MenA), north America and caribbean (nAc), South and central America (SAcA), South-east Asia (SeA), and the Western Pacific (WP).There are number of studies which are describing the possible cases and distribution of Diabetes.Around 382 million people worldwide, or 8.3% of adults, are estimated to have diabetes.If these trends continue, by 2035, some 592 million people, or one adult in 10, will have diabetes.[1] This equates to approximately three new cases every 10 seconds or almost 10 million per year. The largest increases will take place in the regions where developing economies are predominant. This has been attributed to rapid cultural and social changes: ageing populations, increasing urbanisation, dietary changes, reduced physical activity and unhealthy behaviour. Fig 1 indicates the global burden of diabetes.

Figure i) Prevalence of Diabetes (%) 20-79 years of age by IDF Region 2013 & 2035

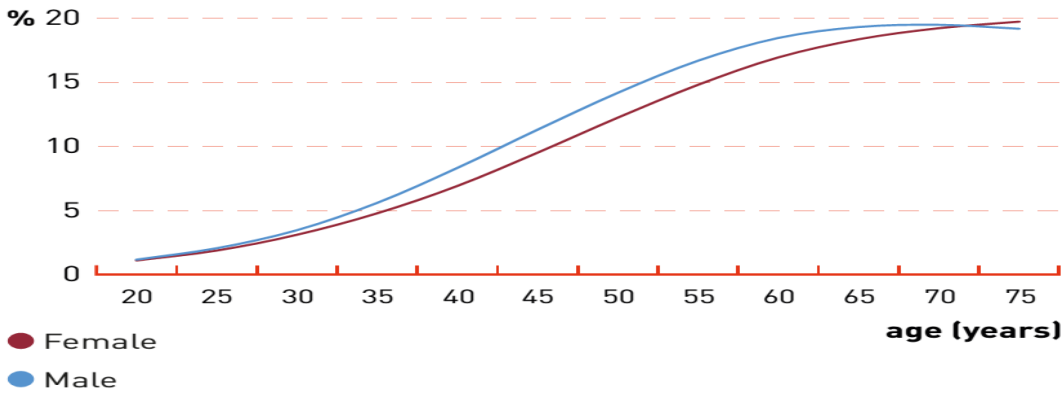


Source: IDF, Sixth Edition

Age & Sex Distribution

Almost half of all adults with diabetes are between the ages of 40 and 59 years. More than 80% of the 184 million people with diabetes in this age group live in low- and middle-income countries as only 20% of global health expenditure on the disease was made in these countries. The disparities in the world's response to the epidemic are huge. Each Region is highly diverse in socioeconomic and geographical terms and in diabetes prevalence, related deaths, and health expenditure. The majority of the people with diabetes livesin economically less-developed regions of the world. Even in Africa, the Region with the lowest prevalence, it is estimated that around 522,600 people died due to diabetes in 2013.The Middle east and north Africa Region has the highest, at 10.9%. MenA is followed closely by the 9.6% rate found in the North America and Caribbean Region while 8.2% of adults in the South and Central America Region have diabetes.

Figure ii) Prevalence (%) of people of Diabetes by age and sex,2013



Source: International Diabetes federation ,Sixth Edition

[1]Projections are based on the changes in the predicted population and urbanization changes available from the UN Population Division. It does not include any predictions for changes in obesity or other risk factors. The projections are therefore quite conservative

Older people with diabetes have an increased rate of diabetes-related complications, and are much more likely to present with co morbid conditions. These include physical disability, cognitive dysfunction, falls and fractures, depression, pressure ulcers, impaired vision and hearing, and unrecognised and under-treated pain.As far as gender difference is concerned, there were about 14 million more men than women with diabetes (198 million men vs184 million women) in 2013.

Urban/rural distribution

Massive rural-to-urban migration continues to affect communities throughout the developing world. Large numbers of rural people attempt to escape abject poverty, many also fleeing from the dangers of armed conflict, by moving to cities in search of safety and a better quality of life, as well as closer proximity to healthcare services. There are more people with diabetes living in urban (246 million) than in rural (136 million) areas although the numbers for rural areas are on the increase. In low- and middle-income countries, the number of people with diabetes in urban areas is 181 million, while 122 million live in rural areas. The increase in the number of rural areas is attributed to low awareness of diabetes and access to healthcare or non-existent in many rural areas [2].

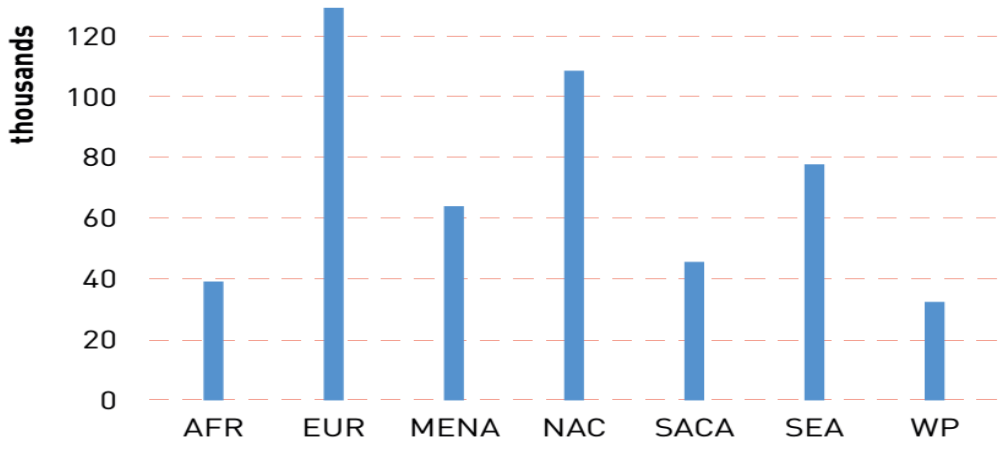
GLOBAL BUDEN OF TYPE 1 DIABETES

Regional trends

It is estimated that annually approximately 76,000 children aged under15 years develop type 1 diabetes worldwide. Of the estimated total of approximately 480,000 prevalent cases of type 1 diabetes in childhood, almost a quarter come from the South-East Asian (SEA) Region, and more than a fifth from the European (EUR) Region where reliable and up-to-date estimates of incidence were available for the majority of countries.Only some 6% of children with type 1 diabetes come from Western Pacific (WP) region, despite it having the largest childhood population[8].

An estimated 24% of all children with type 1 diabetes live in the European region, where the most reliable and up-to-date estimates of the burden of diabetes are available. Two large international collaborative projects, the Diabetes Mondiale study (DiaMond) and the Europe and Diabetes study (EURODIAB)[2] have been instrumental in monitoring developments in the incidence of type 1 diabetes in children, providing us with some of the best evidence on trends and prevalence for any region.As per the Sixth edition of Diabetes Atlas (2013), an estimated 490,100 children below the age of 15 years are living with type 1 diabetes. Type 1 diabetes is increasing steeply in some central and eastern European countries, where the disease remains less common than in other regions.Europe is followed closely by South- East Asia, with 23% of the world's young people with type 1 diabetes, and North America and the Caribbean, with 19%. However, the lack of data in other parts of the world makes it difficult to estimate the true burden. In sub-Saharan Africa and many low-resource countries, diagnosis may be missed and children may be dying from a lack of insulin before they are identified.

Figure iii) Estimated number of prevalent cases of Type 1 Diabetes in Children by Region(2013)



[2] Two international collaborative projects, the Diabetes Mondiale study (DiaMond) and the Europe and Diabetes study (EURODIAB) began in the 1980s and have been monitoring trends in incidence through the establishment of population based regional or national registries using standardized definitions, data collection forms and methods for validation

Data Source:IDF;Diabetes Atlas 6th edition, AFR-African, EUR-European, MENA-Middle East and North Africa region, NAC- North America and Caribbean,SACA-South and Central America,SEA-South East Asia,WP-Western Pacific.

Incidence rate

It has been estimated that increase in the incidence of type 1 diabetes is 3% per year. The cause of this rise is unknown, although it may be linked to a number of factors. Studies have found associations with older mothers, early exposure to dietary components, such as cow's milk, and a reduction in the frequency of early infections. Many of these factors can be linked to socioeconomic development and changes in environments. However, there are important geographic differences in the trends, which may reflect underlying differences in ethnicity, exposure to potential risk factors and the capacity of health systems to identify and record people diagnosed with type 1 diabetes [1].

Age-specific incidence

The incidence of type 1 diabetes reaches a peak at puberty, and declines rapidly thereafter. Classification of diabetes becomes more problematic in older age groups, and there are therefore no accurate estimates of incidence over the age of 40 years.

Table i) Global Prevalence and Incidence rate of Type 1 Diabetes(2010 and 2013)

	2010	2013
Total Child Population(0-14 years, billions)	1.9	1.9
Type 1 Diabetes in children(0-14 years)		
No. Of children with type 1 Diabetes(thousands)	479.6	497.1
No. Of newly diagnosed cases per year(thousands)	75.8	79.1
Annual increase in incidence(%)	3	3

Source [1] [2]

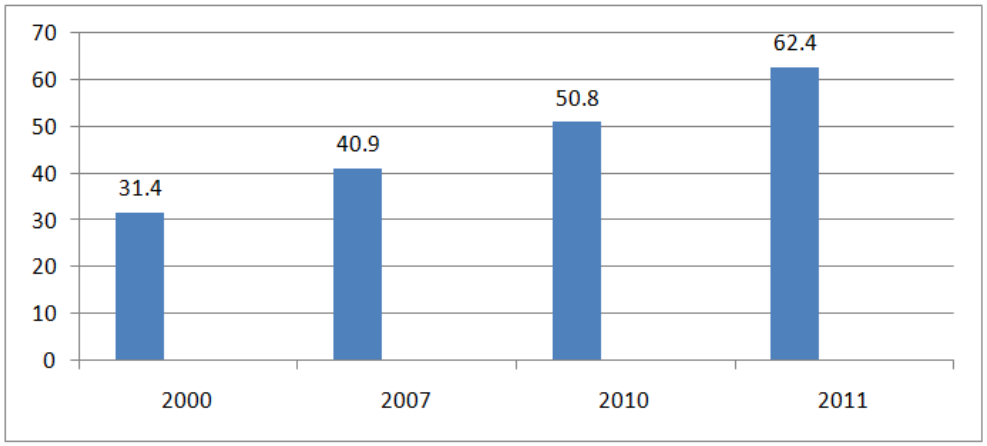
Sex

An international survey of sex ratios in children presenting under the age of 15 years noted a minor male excess in Europe and populations of European origin, while a female excess was noted in populations of African or Asian origin. High incidence populations are characterised by male excess and low incidence populations by female excess.In contrast, clear male preponderance has emerged from most studies of patients with type 1 diabetes diagnosed at 15–40 years.

DIABETES SITUATION IN INDIA

The health care and societal burden of diabetes is alarming in many Asian countries. Rapid rates of urbanization, modernization, readily available fast foods and sedentary habits have altered the lifestyle of the population, more so among the youth. The health consequences are devastating in Asian populations due to a strong genetic predisposition to metabolic diseases like diabetes and CVD. Current lifestyle parameters perhaps accelerate the clinical expression of the disease at a very young age itself[9]

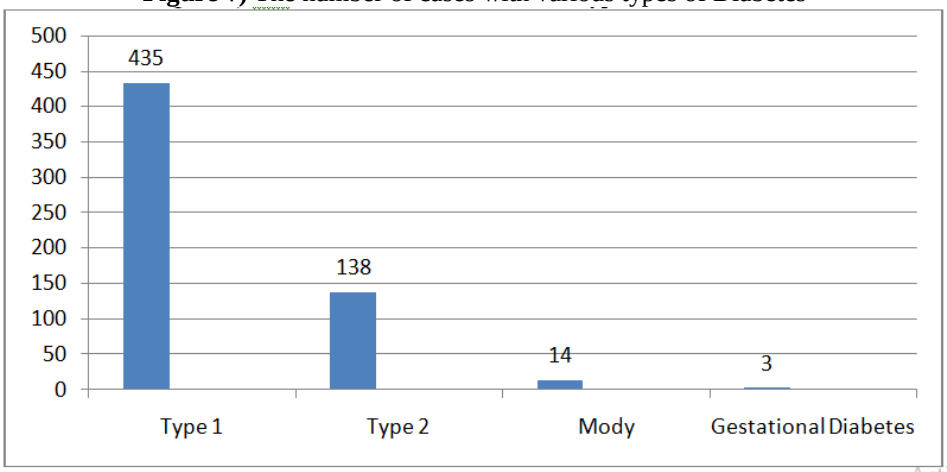
Figure iv) Increasing Prevalence of Diabetes in India



Data Source: INDIAB study, Diabetologia,2011

One of the ICMR Project, The Task Force project[3] on Indian National Diabetes Study-Phase I, aims to understand prevalence of diabetes and pre-diabetes along with its association with the genetic aspect at three states and one Union Territory. Among 16,607 individuals selected for the study, 14,277(86%)individuals participated. The overall weighted prevalence of diabetes (both known and newly diagnosed) in Tamil Nadu was 10.4%, Jharkhand, 5.3%, Chandigarh, 13.6% and Maharashtra, 8.4%. The prevalence of pre-diabetes was 8.3%, 8.1%, 14.6% and 12.8% respectively. The multicentre task force project entitled Registry of People with Diabetes in India withYoung Age at Onset, is continuing at nine centres with aim to understand magnitude ofproblem, disease pattern or types including the geographic variation and incidence andprevalence rate of complications. The data set of approximately 6000 subjects (age ≤25 years) is availablewith information on varied parameters such as duration and type of disease, treatmentpattern, family history, complications, immunology profile, etc.Among 1407 subjects enrolled, majority of the subjects were with type 1 diabetes (88.4%) followed bytype 2 diabetes (8.5%). Majority of the subjects were in the age group of 10-14 years. Most common type reported with type 1 diabetes followed by type 2 diabetes,MODY and gestational diabetes[11].

Figure v) The number of cases with various types of Diabetes



Data Source: Department of health and research, ICMR(2011-12)

In a study to assess the use of a large Diabetes Electronic Medical Record System in India,which was conducted at Dr. Mohan's Diabetes Specialities Centre (DMDSC), Chennai, India, for clinical and research purposes. This study reported on the usefulness of the DEMR and analysis was based on a total of 226,228 patients registered in the DEMR system at DMDSC between the years 1991 and 2010.The DEMR included data of 139,906 male and 86,322 female patients, of whom 92.6% had type 2 diabetes mellitus (T2DM), 1.4% had type 1 diabetes mellitus (T1DM), and the rest had other types[10].

RISE OF TYPE 1 DIABETES IN THE 20TH CENTURY

Childhood type 1 diabetes was rare but well recognized before the introduction of insulin. Low incidence and prevalence rates were recorded in several countries over the period 1920–1950. The overall pattern since then is one of linear increase, with evidence of a plateau in some high-incidence populations and of a catch-up phenomenon in some low-incidence areas. Steep rises in the age-group under 5 years have been recorded. The disease process underlying type 1 diabetes has changed over time and continues to evolve. Understanding why and how this produced the pandemic of childhood diabetes would be an important step toward reversing it. The change in the demography of childhood diabetes has major implications for understanding of the disease. A rapid change in incidence within a genetically stable population implies that nongenetic factors are active andthat the influence of genes is relative to population, time, and place. It suggests that something has changed in the environment our children encounter or in the way they are reared. Understanding this historical change opened the way to rational forms of intervention, which were introduced at the stage of development when they were most likely to prove effective[6].

Childhood diabetes before insulin

[3]Task Force studies are national projects, centrally planned and coordinated and usually implemented on a multi-centric basis. These projects are time-bound, with a goal-oriented approach and clearly defined targets, specific time frames and conducted by standardised and uniform methodologies. These task force projects are formulated taking into consideration the national priority areas of research. The ICMR's is one of the participating centre of Task Force multi-centric project.

Diabetes itself was an uncommon diagnosis in the 19th century. In 1892,edition of Osler's Principles and Practice of Medicine discussed about diabetes and mentions that only 10 of 35,000 patients treated at Johns Hopkins were affected.Massachusetts General Hospital admitted 47,899 patients over the period1824–1898, of whom 172 (0.004%) were diagnosed with diabetes. Of these, 18 were diagnosed under 20 years of age and 3 under 10 years of age. During Mid 19thcentury diagnosis was based on the taste of the urine, which may have curbed screening enthusiasm,self-monitoring was also recommended occasionally. Improved access to urine tests increased frequency of diagnosis from 1885 onwards, and by 1923, urinary glucose measurement was available in many U.S. drugstores.

Many of the clinician wrote about diabetes. The total number of 989 cases from clinical reports and mortality data.Of these,162 were before 5 years of age, 302 from 5-9 years of age,and 525 over 10 years of age.In 1920,with the introduction of Folin-Wu method blood glucose was measured on a finger stick sample but the blood was taken adjacent to laboratory because preservatives were not introduces till 1931.Some confusions were there with the renal glycosuria.It was observed that children under age of 7 years with the severe form of disease survived 18 months to 2 years while those with mild glucosuria lived 3-6 years and it was believed that younger the child shorter the course of the disease.In 1923 it was reported that 86 % of the children under the age of 16 years died because of ketoacidosis, so it was difficult to know that how many cases of the diabetes have been missed.The hereditary cause of diabetes was also known by the clinicians as patients coming to them were living with diabetes for very longer period of time, but the cases of type 1 diabetes were rare. The only source was available were clinics series and mortality statistics due to lack of epidemiological data. Clinic series are less helpful, since they typically describe the percentage of referrals.

Table ii) Reported death rate under age of 15 years per 100,000 /years

USA	1890	1.3
	1920	3.1
Denmark	1905-09	2
	1915-1919	4

This increase was viewed in favour of the better diagnostic methods of that time rather than actual increase in the frequency. Incidence between 1920-1950-Insulin changed childhood diabetes from a rare fatal disease to prolonged survival .The great advance was seen in the collection of social statistics during the period of war.

Table iii) United States Health Survey Report

US National Health Survey(700,000 household,83 Cities) for under 15 year of age	1935-36	0.35/1000 for boys 0.41/1000 for girls
National Health Interview Survey		
U S (under 16 years of age)	1973	1.3 /1000
	1976	1.6/1000

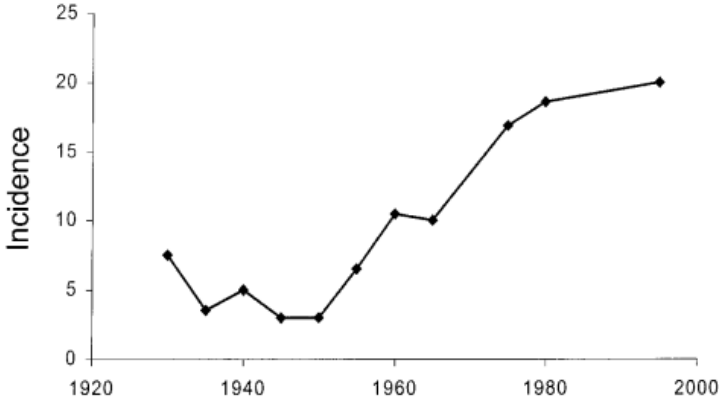
The main source of incidence and prevalence data for this period is Scandinavia.As per the Norwegian government survey in 1934, baseon the questionnaire to doctors identified total of 253 children under age of 15 years giving a minimum prevalence of 0.28/1000 but ascertainment was undoubtedly incomplete.Detailed information of Norway was available from two retrospective surveys in Oslo and Bergen.All the cases of Diabetes was examined who were admitted in the hospital in Oslo(1925-1954).A total of 4,251 individuals patients were identified ,and the incidence of Diabetes under age of 30 years was relatively constant over the period 1925-1954 under the age of 15 years was estimated 4.1/100,000/year.Meanwhile an independent Norwegian Survey was carried out in Bergen,in which the questionnaire was sent to all doctors asking them to register all the cases of diabetes prospectively over a 6 month period beginning March 1941, death certificates and post-mortem reports were also checked for the whole period.The total 402 patients with diabetes alive n 1941,46% of whom were receiving insulin and further 392 who had died over the preceding 16 years.It was concluded that total prevalence of diabetes had doubled over the 15 year period but this increased was confined to older age groups as in US it was attributed to the increasing age of populations.The war also had an indirect impact on Sweden ,the city contained 72 diabetic children under 15 years of age,giving a prevalence of just under 1/1,000.The prediabetic clinic in Vasterbotton in Northern Sweden retrospectively reported a war time incidence of 10.2/100,000/year.This estimate was highest available for the period and this city remained a high incidence area,with rates rising to 37.9/100,100 year by 1973-1977. Finland had wartime registry of patients receiving insulin or diet supplements.National population of 3.64 million was reported to contain 250 individuals less than 20 years of age with diabetes equivalent to prevalence of 0.21/1000 for this age group.The mortality reported was high that is 70 death per year .A questionnaire was addressed to physician to identify 663 children born since 1939 who had developed diabetes under the age of 14 years and further 169 who had died with the diagnosis of diabetes.The mortality rate is exaggerated by under ascertainment of living cases,but

was clearly very high. The Finland was under desperate struggle for survival during the war years,and living conditions was very hard.The annual incidence of the new cases in 1953 at 12.5/100,000/year, i.e., that was one third of the number affected by the end of the century.The two main reasons were given for the under ascertainment of the childhood onset diabetes.Contemporary prevalence estimates were spuriously high where the mortality of childhood diabetes was high, and death with undiagnosed diabetes with lower incidence and prevalence estimates.One of the insurance company collected data on mortality rates in families of wage earners in US & Canada who participated in their insurance scheme.They showed the fall in the mortality rate under the age of 20 years from 4.1/100,000/year in 1916-1920 to 1.1/100,100/year in 1931-1935 and remain steady until 1945 and the reason was given that onset of childhood have almost ceased to die of diabetes had died under 20 years of age in Oslo over the period 1925-1961.On the contrary one of the hospital in Denmark followed 307 patients diagnosed under the age of 31 years before 1933,Some of the patient died within 15 years of diagnosis,but almost all of these had presented before 10 years of age,the 10 year mortality was 20 % in those who lived in county areas but lack of follow up lead to poor prognosis.It was argued that access to medical care was the major factor for survival and it is the uneducated, untrained, and uncared for child in family with limited resources who is lost and this is applicable to the start of 21st century.The Incidence and prevalence of childhood diabetes before 1950 underestimate the true frequency of the condition and must be viewed with causation. One of the variables was access to medical support. With the same means of ascertainment over 30 years leading up to 1955 and found little variation in the younger age group.

INCREASE OF THE INCIDENCE OF TYPE 1 DIABETES

The increase in the incidence of childhood diabetes occurred in the late 20th century for example there was sharp increase in the US around themid-century.In Europe,the rise was seen in Norway when oslo survey was extended to 1964,an additional 3,368 patients were identified,97% of the records were traced,non residents and patient diagnosed out of the city were excluded the number fell to 2895;140 were aged under 20 years at diagnosis.The incidence increased from a stable baseline of 4.1 cases /100,000 year to new level of 8.4 /100,000 year over the period 1955-1964.National survey (1973-77) also supported this.Many of the studies also showed the increase in the incidence till the last decade of century(S shaped curve over 75 years) in Norway.

Figure vi) Incidence of Diabetes in Children under age 10 years in Norway



Data Source Gale, E (2006)

Denmark also showed the increase in the incidence in middle of the 20th century.Successive male birth cohort during 1949-1964 contained 638,718 individuals ,of whom 1,652 appeared to have typical insulin dependent diabetes by age 18 years while another 30 died with diabetes before that age. Like Norway, Denmark showed the same S shaped curve.In another study, males in Sardinia were called for medical test before military services at the age of 20 years and the prevalence of diabetes at that age was recorded for successive birth cohorts dating back to 1936.Diabetes was rare in males before 1945 but has risen in linear fashion after 1960's and reaching plateau at the end of the century. In another cohort study in Switzerland examined files from 514,747 males from birth year cohorts covering four periods between 1948-1972.The numbers of men with type 1 diabetes by age of 19 years rose by 62% over this period. In Netherland average 4.4 % increase in the risk of type 1 diabetes for each annual cohort of 18 year old during 1960-1970.In Finland during 1965 ,the drug treatment for diabetes was free provided by the certificate from the doctor which enabled 100 % ascertainment and showed linear trend with 2.4 % year on year increase (1965-1984) but Finland was different form Scandinavian countries and Sardinia as it was showing continuous increase in the incidence.

Table iv) Increase in the Diabetes cases in US (Mid-century)

US	1950-52	6.6/100,000/year
	1953-55	7.4/100,000/year
	1956-57	10.6/100,000/year

The first diabetes registry was established inAlleghenycounty from 1965 onwards with reported incidence rates ranging from 10.1 to 16.0/100,100/year according to sexand ethnic background. The information was not available from other parts of the country except from Europe and North America.The childhood diabetes showed a relatively low incidence over the first half of the 20thcentury followed by a clear increase after middle of the century.This increase occurred around the same time in Scandinavia, UK,US and Sardinia but may have occurred later in the other parts of the world. The attempts were made to explain the rise of type 1 Diabetes over30 years.Firstly something new has entered in the childhood environment;other influencing factors can be nutrition & infection.

-The leading hypothesis was related to early exposure of cow's milk or to enterovirus infection.Breast feeding pattern do not reflect changes in the incidence of childhood diabetes.Two of the three American women who breastfed in 1911-1955,failing to 22% in 1972,aand rising back to 60% in the 1980's and 1990's.The proportion of women who were not exposed to enteroviral infection was increasing also and that infection in early childhood has become less common in the course of the century [6]

-Alternate possibility is protective factors has been lost from the environment .i.e., the hygiene hypothesis suggested that infective agents in early childhood is required for successful maturation of neonatal immune repertoire. Pinworm infestation was common in childhood population of Europe and North America around mid century but lost in the late 20th century

-Spring Harvest Hypothesis-Assuming a finite pool of susceptible individuals within the population, an increase in the younger age should be balanced by a reduction in the older age group.

-Biological signature of each individual derives a dynamic process of adaptation. We are indeed part of all we met; the human responses are conditioned by the biological remembrance of the things past.The possible arguments can be understood with different point of views. From genecist point of view, it means that patterns of inheritance that confers susceptibility toimmune-mediated loss of pancreatic -cells became progressively maladaptive in a late 20th century environment.For the immunologist, it implies that the ontogeny of theimmune response in early childhood is changing in such away that potentially harmful responses are now moreprevalent, or more aggressive, in the subpopulation of genetically susceptible children. For the clinician, it means that childhood diabetes was in the past a partly preventable condition, and could become so again [6].

Natural History of type 1 Diabetes

The Eisenberth model (1986)for the natural history of Type 1 diabetes suggests that genetically susceptible individuals with a fixed number of β cells are exposed to a putative environmental trigger, which induces β-cell autoimmunity,which enables the development of islet reactive auto antibodies.These are capable of destroying β cells, resulting in loss in insulin secretary function.Type 1 diabetes does not present until >80%–90% of the β cells have been destroyed, and there is a marked gap between the onset of autoimmunity and the onset of diabetes.

This classic model has been updated for knowledge gain. The natural history of T1D is understood with the combined use of genetic, autoantibody, and metabolic markers of the disease.(Atkinson model,2005) which suggested that pancreatic β cells may persist in some individuals with T1D for an extended period of time (i.e., never reaching zero in many established T1D patients).In addition, the degree of β-cell destruction required for symptomatic onset is also of growing question, with recent studies suggesting that 40%–50% β-cell viability may be present at the onset of hyperglycemias, an aspect that may be related to subject age, among other factors (e.g., body mass index, physical activity, etc.).Despite persistent autoimmunity, insulin secretary function can remain stable for long periods of time in persons with T1D.

II. Conclusion

Incidence of Type 1 Diabetes has been increasing throughout the globe at rates that range from 3 to 5 % a year. The trends for type 1 diabetes are less published for developing countries as much emphasis is given on the type 2 prevalence. There is lack of specific code for type 1 in International classification 8, 9 and 10.Type 1 has the potential to disable or kill people so much in early lives. The causes of type 1 diabetes are still controversial whereas type 2 causes are attributed to lifestyle and risk factors are multiple. For older children moving into adolescence, distinguishing between type 1 diabetes and type 2 diabetes becomes more difficult; problems of misclassification can hamper efforts to estimate accurately the status of diabetes. There is lack of studies or data from sub-Saharan Africa and parts of the Western Pacific, which influences the figures for those regions. The quality and reliability of studies can vary greatly depending on the methods used and the

representation of the population. The Atlas reports which has been referred, estimates only for children between 0 and 14 years – and no older – because the majority of studies include this information. There are only few studies estimating the burden of type 1 diabetes among young people aged between 15 and 19, and even fewer capturing estimates for type 1 diabetes in adults. However, there is some indication that in high-income countries, between 10% and 15% of all diabetes is attributable to type 1 diabetes, while the estimate is likely to be lower in low- and middle-income countries.There is need for more high-quality studies, it is clear that type 1 diabetes is a serious health priority all over the world. It is essential to map the disease in order to set priorities for care and improve the life of people through improved access to medicines, social support and diabetes education. With type 1 diabetes on the rise in many parts of the world, resources must be developed to meet the needs of this growing population.The challenge for explaining the rising trend in type 1 diabetes is that if the increases are occurring worldwide, the causes must also be. So it is important to look for influences that stretch globally and consider the possibility that different factors may be more important in some regions than in others.

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