ECHO India

Project ECHO®

DIABETES MELLITUS

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- NCDs
- Burden of NCDs in India
- Overview of diabetes mellitus
- Risk factors
- Role of nurse in NPCDCS

CD

Noncommunicable Diseases (NCDs)

hese are chronic diseases that are not passed from person person, unlike infectious diseases. They have long-term ealth effects and often require long-term treatment

- cardiovascular diseases
- cancers
- chronic respiratory diseases,
- diabetes,

count for over 60% of total deaths and disability.

ortality rate of NCDs in 2021

Cardiovascular diseases account for most NCD deaths- 19 million deaths

followed by cancers (10 million)

chronic respiratory diseases (4 million),

diabetes (over 2 million including kidney disease deaths caused by diabetes).

ey Aspects of the NCD Burden in 202

gh Mortality:

NCDs are the leading cause of death and disability globally, accounting for roughly 41 million deaths annually.

nificant Mortality:

An estimated 5.8 million Indian deaths occur annually from NCDs.

k for Premature Death:

Approximately one in four Indians faces the risk of dying from an NCD before the age of 70.

sproportionate Impact in LMICs:

Low- and middle-income countries bear a disproportionately high burden, experiencing about 82% of all premature NCD-related deaths.

ontd…

lure to Meet Targets:

The global goal to reduce premature NCD mortality by 25% by 2025, set by the UN, was missed, with minimal progress made globally.

ing Risk Factors:

Key risk factors such as insufficient physical activity and rising metabolic risks like overweight and obesity continue to show concerning upward trends.

ck of Funding:

Funding for NCD and mental health services remains inadequate, particularly in LMICs, hindering effective implementation of necessary interventions.

npact and consequences of NCDs:

ss of Productive Years:

- NCDs result in a significant loss of potentially productive years of life for affected individuals.

cio-Economic Burden:

- The affected individuals are often the main income earners, leading to a high socio-economic impact on households.

creased Healthcare Expenditure:

- Households with NCDs face higher healthcare expenditures compared to those without.

isk factors of NCDs

havioural risk factors

tobacco use (including the effects of exposure to second-hand smoke);

unhealthy diets, including excess salt, sugar, and fats;

harmful use of alcohol; and

insufficient physical activity.

The social, commercial, and physical environment are key drivers of these behaviours.

etabolic risk factors

raised blood pressure (including hypertension);

overweight/obesity;

high blood glucose levels (including diabetes); and

abnormal blood lipids (including high cholesterol).

In terms of attributable deaths, the leading metabolic risk factor globally is elevated blood pressure (to which 25% of global NCD deaths are attributed) , followed by raised blood glucose and overweight and obesity.

nvironmental risk factors

Several environmental risk factors contribute to NCDs.

Air pollution – indoor and outdoor – is the largest of these, accounting for 6.7 million deaths globally,

of which about 5.6 million are due to NCDs, including stroke, ischaemic heart disease, chronic obstructive pulmonary disease, and lung cancer

iabetes mellitus

It is a chronic, metabolic disease characterized by elevated levels of blood glucose (or blood sugar), which leads over time to serious damage to the heart, blood vessels, eyes, kidneys and nerves.

Diabetes is a chronic disease that occurs either when the ancreas does not produce enough insulin or when the body annot effectively use the insulin it produces. Insulin is a ormone that regulates blood glucose.

mber of adults (20-79 years) with diabetes in India (IN)

0	32.7 million
1	61.3 million
4	89.8 million
0	156.7 million

India is one of the seven countries and territories in the IDF South-East As Region. India has the second highest number adults (20-79 years) wit diabetes in the world.

TOP 10 COUNTRIES/ TERRITORIES FOR NUMBER OF ADULTS (20-79 YEARS) WITH DIABETES IN 2021 AND 2045

2021			2045		
k	Rank Country or territory	Number of people with diabetes (millions)	Rank	Rank Country or territory	Number of people with diabetes (millions)
	China	140.9	1	China	174.4
	India	74.2	2	India	124.9
	Pakistan	33.0	3	Pakistan	62.2
	United States of America	32.2	4	United States of America	36.3
	Indonesia	19.5	5	Indonesia	28.6
	Brazil	15.7	6	Brazil	23.2
	Mexico	14.1	7	Bangladesh	22.3
	Bangladesh	13.1	8	Mexico	21.2
	Japan	11.0	9	Egypt	20.0
	Egypt	10.9	10	Turkey	13.4

Source: International Diabetes Federation,

ey facts of diabetes mellitus

The number of people living with diabetes rose from 200 million in 1990 to 830 million in 2022. Prevalence has been rising more rapidly in low- and middle-income countries than in high-income countries.

More than half of people living with diabetes did not take medication for their diabetes in 2022. Diabetes treatment coverage was lowest in low- and middle-income countries.

Diabetes causes blindness, kidney failure, heart attacks, stroke and lower limb amputation.

In 2021, diabetes and kidney disease due to diabetes caused over 2 million deaths. In addition, around 11% of cardiovascular deaths were caused by high blood glucose.

In 2021, diabetes was the direct cause of 1.6 million deaths

47% of all deaths due to diabetes occurred before the age of 70 years.

Another 530 000 kidney disease deaths were caused by diabetes

high blood glucose causes around 11% of cardiovascular deaths

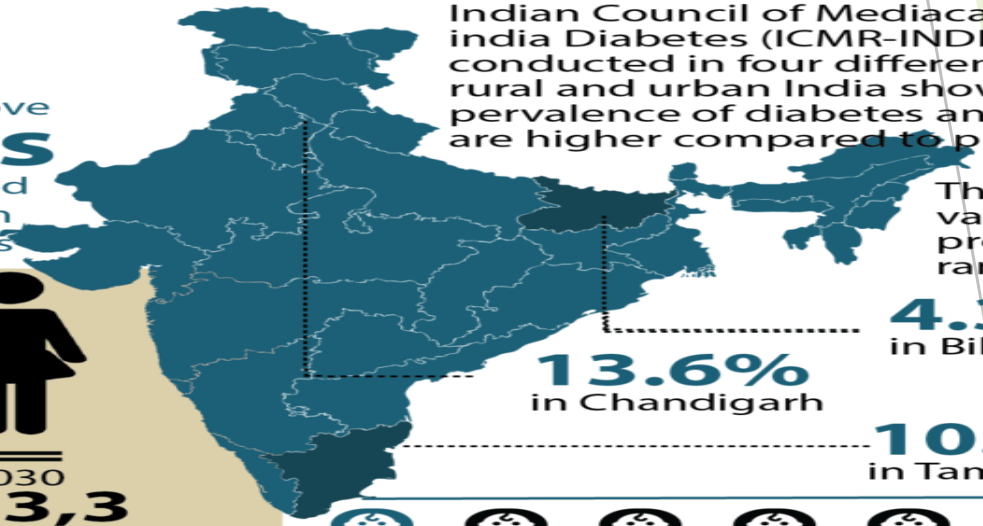
Diabetes ALERT

The World Health Organization (WHO) projects that diabetes will be the **7th** leading cause of **death by 2030**

In India, an estimated **7.8%** of the population above **18 Years** of age has raised blood glucose level or are on treatment for diabetes

out of every five
en with diabetes
f reproductive age,
unting for over
million
en worldwide

Indian Council of Mediacal Research-india Diabetes (ICMR-INDIAB) study conducted in four different zones of rural and urban India showed that the pervalence of diabetes and prediabet are higher compared to previous stud



The inter-state variations in prevalence ranging from

4.3% in Bihar

13.6% in Chandigarh

10.4% in Tamil Nadu

One in seven births is affectedby **gestational diabetes**

The prevalence of **hyperglycaemia** in pregnancy increases rapidly with age and is highest in women over the age of **45**

IDF estimaates that **20.9 million** or **16.2%** of live births to women in 2015 had some form of hyperglycemia in pregnancy

An estimated **85.1%** were due to gestational diabetes. **7.4%** due to other types of diabetes first detected in pregnancy and **7.5$** due to diabetes detected prior to pregnancy

Top 10 countries/territories of number of peo with diabetes (20–79 years), 2013 (in millions)

China 98.4 | **India 65.1** | **USA 24.4**

Brazil 11.9 | **Russian Federation 10.9** | **Mexico 8.7**

Indonesia 8.5 | **Germany 7.6** | **Egypt 7.5** | **Japan**

Almost half of all people with diabetes live in just three countries

CHINA, INDIA, USA

easons for India’s Rising Burden

- **Genetic Predisposition:** Indians have a higher genetic susceptibility to diabetes.
- **Changing Lifestyles:** Urbanization, sedentary habits, and unhealthy dietary patterns contribute to increased obesity and diabetes risk.
- **Obesity Epidemic:** Rising obesity rates in India are a major risk factor for diabetes.
- **Socioeconomic Factors:** Limited access to healthcare, lack of awareness, and resource constraints hinder diabetes management.
- **Urban-Rural Divide:** Diabetes is no longer limited to urban areas, as rural regions also experience a growing prevalence.
- **Delayed Diagnosis and Treatment:** Late diagnosis and treatment initiation impede effective disease management.

DIFIABLE RISK FACTORS

NON-MODIFIABLE RISK FACTOR

rweight/obese

Physical inactivity

Genetics

Family history

dietary habits

TYPE 2 DIABETES

Race/ethnicity

pertension

Smoking

Certain medications
e.g. glucocorticoids

History of gestational diabetes

Increasing age (

ypes of diabetes

pe 1 diabetes

Type 1 diabetes (previously known as insulin-dependent, juvenile or childhood-onset) is characterized by deficient insulin production and requires daily administration of insulin. In 2017 there were 9 million people with type 1 diabetes; the majority of them live in high-income countries. Neither its cause nor the means to prevent it are known.

pe 2 diabetes

Type 2 diabetes affects how your body uses sugar (glucose) for energy. It stops the body from using insulin properly, which can lead to high levels of blood sugar if not treated.

Over time, type 2 diabetes can cause serious damage to the body, especially nerves and blood vessels.

	Type 1 Diabetes	Type 2 Diabetes
Prevalence	Generally diagnosed in children and young adults	Usually diagnosed in adu but can occur at any ag
utoimmune	Autoimmune condition, immune system attacks pancreas	Not autoimmune, insul resistance or impaired insulin production
n Dependence	Requires insulin injections or insulin pump	May be managed with lifestyle changes, ora medication, or insulin
Onset	Sudden onset	Gradual onset
Causes	Genetic predisposition and environmental factors	Genetic and lifestyle fact including obesity

	underweight	obese
ulin Production	Little to no insulin production	Insulin resistance or inadequate insulin production
Treatment	Insulin therapy, blood sugar monitoring	Lifestyle changes, ora medication, insulin therapy if needed
Complications	Higher risk of diabetic ketoacidosis	Higher risk of heart disease, stroke, and ot complications
festyle Factors	Cannot be prevented or reversed	Can be prevented or managed through lifest changes
Prevention	No known prevention strategies	Focus on healthy lifesty weight management

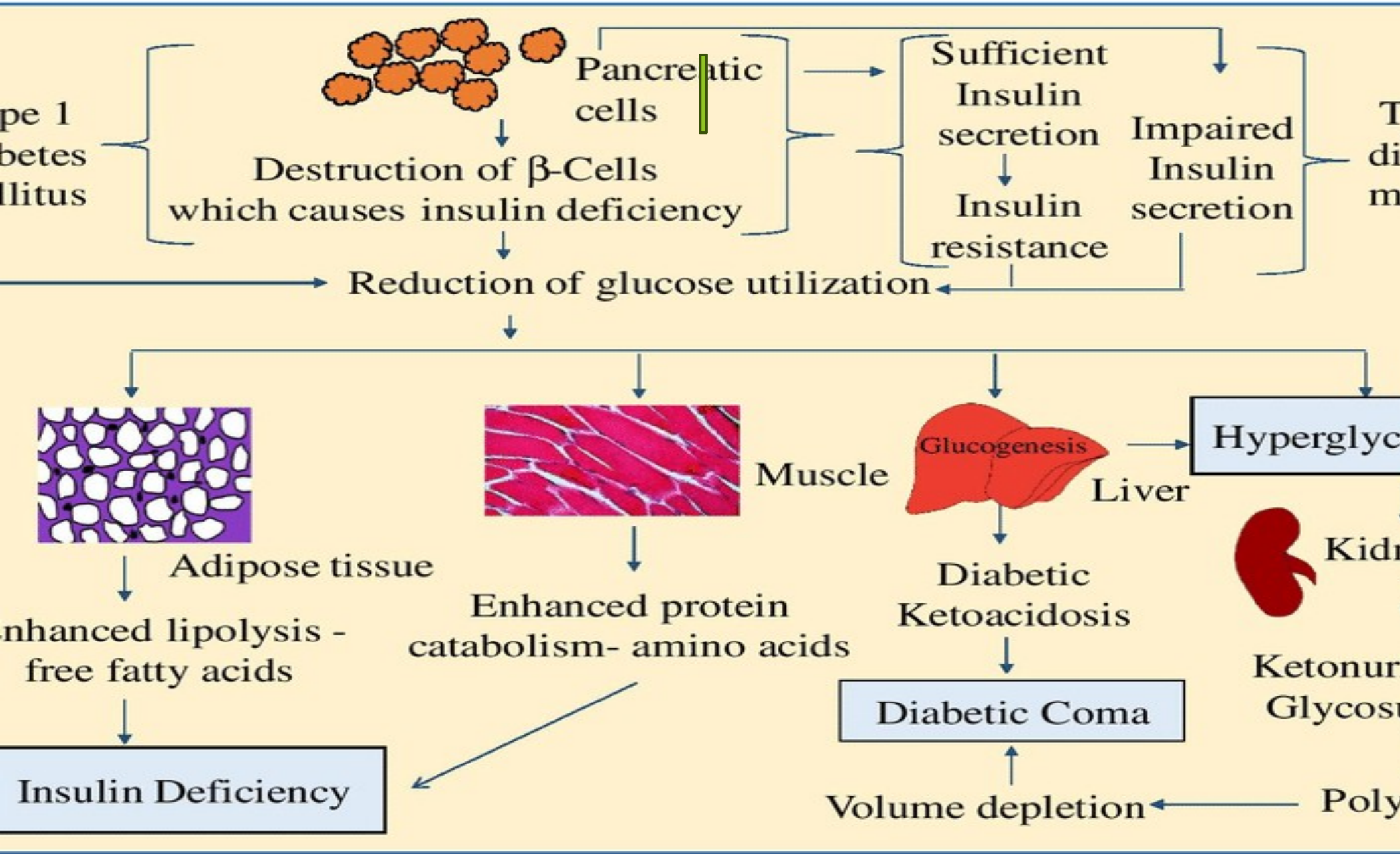
estational diabetes

Gestational diabetes is hyperglycaemia with blood glucose values above normal but below those diagnostic of diabetes. Gestational diabetes occurs during pregnancy.

Women with gestational diabetes are at an increased risk of complications during pregnancy and at delivery. These women and possibly their children are also at increased risk of type 2 diabetes in the future.

Gestational diabetes is diagnosed through prenatal screening, rather than through reported symptoms.

HOLOGY


pe 1
betes
llitus
Pancreatic cells
Destruction of β-Cells which causes insulin deficiency
Sufficient Insulin secretion
Insulin resistance
Impaired Insulin secretion
Reduction of glucose utilization
Adipose tissue
Muscle
Glucogenesis
Liver
Hyperglyc
Kidn
nhanced lipolysis - free fatty acids
Enhanced protein catabolism- amino acids
Diabetic Ketoacidosis
Ketonur
Glycosu
Diabetic Coma
Insulin Deficiency
Volume depletion
Poly

ymptoms

feeling very thirsty

needing to urinate more often than usual

blurred vision

feeling tired

losing weight unintentionally

Over time, diabetes can damage blood vessels in the heart, eyes, kidneys and nerves.

People with diabetes have a higher risk of health problems including heart attack, stroke and kidney failure.

Type 1 Diabetes Mellitus

Diagnosis

	Hemoglobin A1C (HbA1c)	Fasting Blood Sugar Test	Random Bloo Sugar Test
Normal	< 5.7%	< 100 mg/dL	N/A
ediabetes	5.7 - 6.4%	100 - 125 mg/dL	N/A
Diabetes	≥ 6.5%	> 125 mg/dL	≥ 200 mg/dL

Confirming the diagnosis of type 2 diabetes:

Fasting plasma glucose	126 mg/dL or higher on 2 separate occasions
HbA1c	6.5% or higher on 2 separate occasions
Oral glucose tolerance test (OGTT)	2-hour post OGTT blood glucose 200 mg/dL or higher

FBG, HbA1c or OGTT high on 2 occasions → **DIABETE**

Type 2 Diabetes Mellitus

Treatment

festyle Modifications

ced Diet

er-rich fruits/
es, brown
vn bread,
eat, etc.
te rice, white
stas, soda,
c.

Exercising

- **Aerobic exercise**
  150 minutes/week
  (walking, biking, etc.)
- **Resistance exercise**
  2-3 times/week (yoga,
  weightlifting, etc.)

2. Medications

Oral

- Metformin
- Glipizide
- Pioglitazone
- Dapagliflozin
- Sitagliptin
- Acarbose

Insulin

- Typically **"basal"** insulin is used
- Intermediate or long-acting forms
- Insulin regimens vary

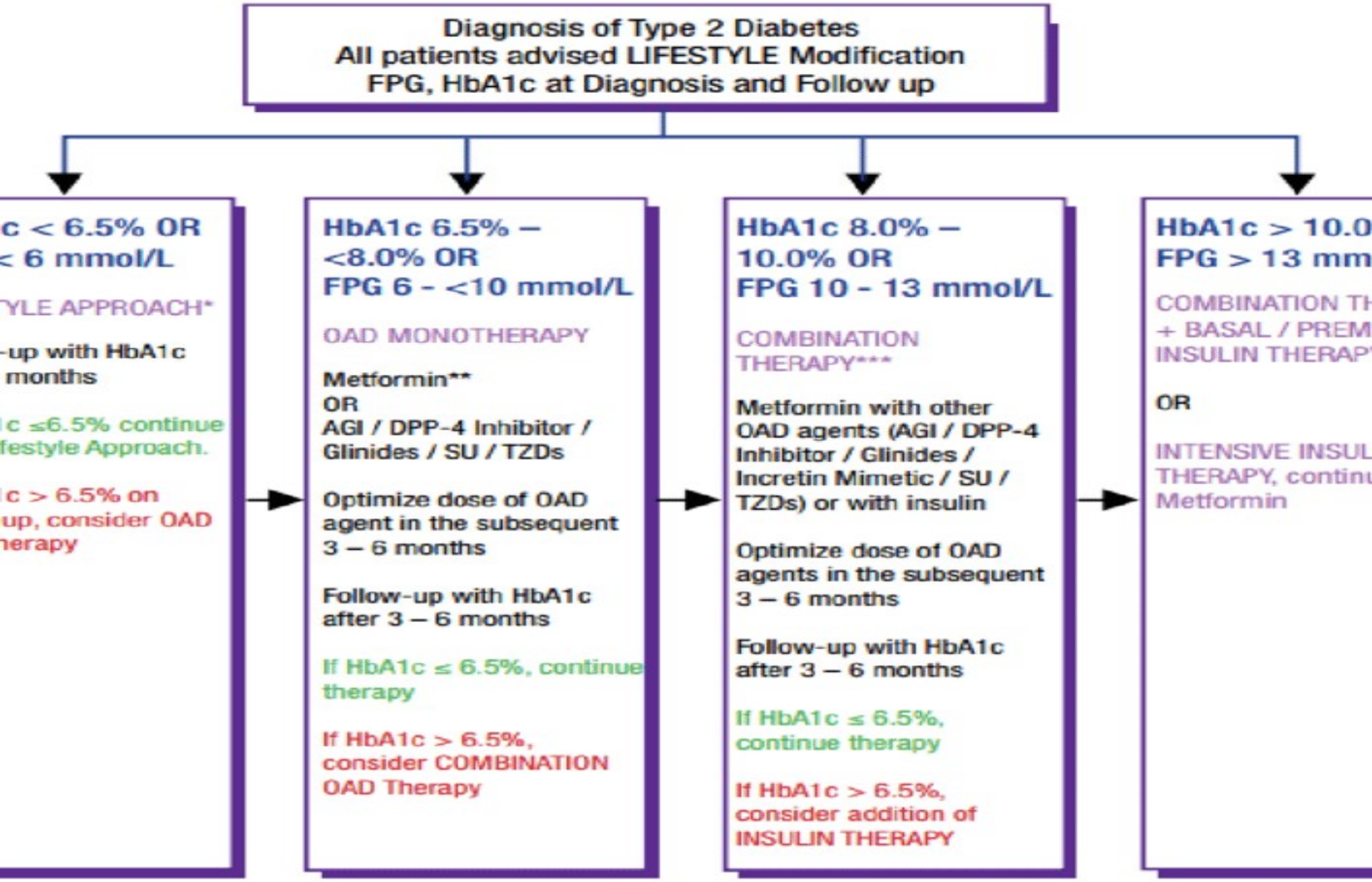
3. Glucose Monito

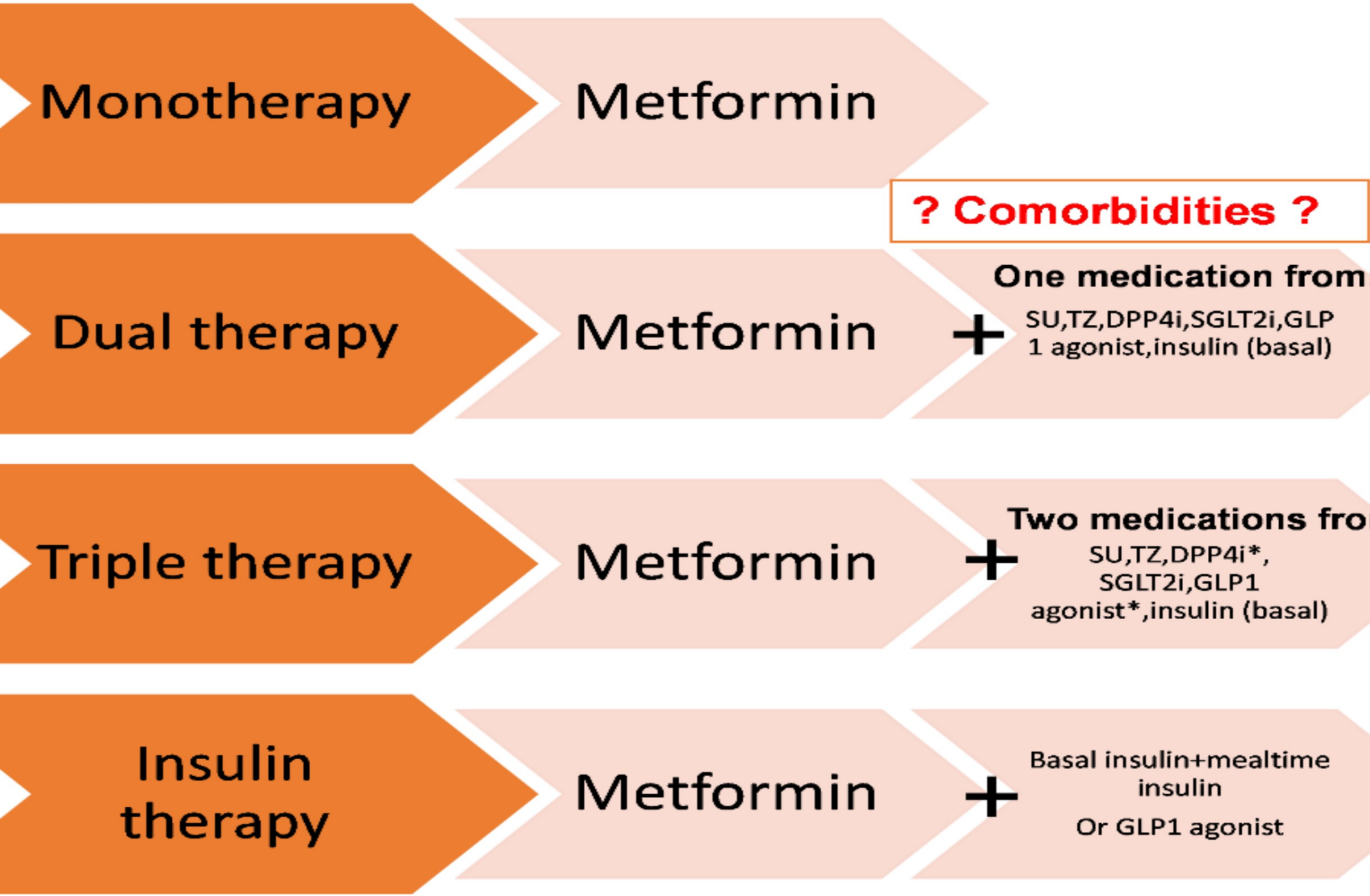
HbA1c Test

- Measures average blood glucose level over past **2-3 months**
- HbA1c goals vary between patients but may be **≤ 6.5-7.0%**

Finge

- Finger-
  glucose
  may be
  daily or
  times p
  depend
  treatme


Diagnosis of Type 2 Diabetes
All patients advised LIFESTYLE Modification
FPG, HbA1c at Diagnosis and Follow up
c < 6.5% OR
< 6 mmol/L
YLE APPROACH*
-up with HbA1c
months
1c ≤6.5% continue
festyle Approach.
1c > 6.5% on
up, consider OAD
herapy
HbA1c 6.5% –
<8.0% OR
FPG 6 - <10 mmol/L
OAD MONOTHERAPY
Metformin**
OR
AGI / DPP-4 Inhibitor /
Glinides / SU / TZDs
Optimize dose of OAD
agent in the subsequent
3 – 6 months
Follow-up with HbA1c
after 3 – 6 months
If HbA1c ≤ 6.5%, continue
therapy
If HbA1c > 6.5%,
consider COMBINATION
OAD Therapy
HbA1c 8.0% –
10.0% OR
FPG 10 - 13 mmol/L
COMBINATION
THERAPY***
Metformin with other
OAD agents (AGI / DPP-4
Inhibitor / Glinides /
Incretin Mimetic / SU /
TZDs) or with insulin
Optimize dose of OAD
agents in the subsequent
3 – 6 months
Follow-up with HbA1c
after 3 – 6 months
If HbA1c ≤ 6.5%,
continue therapy
If HbA1c > 6.5%,
consider addition of
INSULIN THERAPY
HbA1c > 10.0
FPG > 13 mm
COMBINATION TH
+ BASAL / PREM
INSULIN THERAP
OR
INTENSIVE INSUL
THERAPY, continu
Metformin


Monotherapy
Metformin
? Comorbidities ?
Dual therapy
Metformin
+
One medication from
SU,TZ,DPP4i,SGLT2i,GLP
1 agonist,insulin (basal)
Triple therapy
Metformin
+
Two medications fro
SU,TZ,DPP4i*,
SGLT2i,GLP1
agonist*,insulin (basal)
Insulin
therapy
Metformin
+
Basal insulin+mealtime
insulin
Or GLP1 agonist

ey Statistics and Projections (IDF 2025 tlas):

Total Adults with Diabetes: Around 537 million.

Prevalence: 11.1% of the global adult population (20–79 years).

Type of Diabetes: Over 90% of cases are type 2.

Unawareness: More than 4 in 10 adults with diabetes are unaware they have it.

Future Projections: Expected to reach 853 million adults by 2050.

OMPLICATIONS

People living with diabetes have an increased risk of developing diabetes complications. The most common are those that affect the heart, blood vessels, eyes, kidneys, nerves, teeth and gums.

People living with diabetes are up to **three times more likely** to develop **cardiovascular disease**.

1 in 3 people with diabetes will develop some form of **vision loss** during their lifetime.

Kidney failure is **10 times** more common in people with diabetes.

A **lower limb is lost** to diabetes somewhere in the world **every 30 seconds**

icrovascular Complications

tinopathy:

The prevalence of diabetic retinopathy in one Indian cohort was 17.6%, with figures varying across different studies.

phropathy:

Rates of diabetic nephropathy vary, with one study reporting a prevalence of 2.2% for overt nephropathy and 26.9% for microalbuminuria. Another study in India showed a range of 0.9% to 62.3%.

uropathy:

A study of Type 2 Diabetes Mellitus in India found 38% of patients had neuropathy.

Macrovascular Complications

rdiovascular Disease:

Over 65% of patients with T2DM die from cardiovascular disease, particularly coronary artery disease

ebrovascular Accidents (Stroke):

n a different study, 7% of individuals with diabetes had cerebrovascular ccidents.

Diabetic Foot Problems

etic Foot Ulcers:

An estimated 25% of people with diabetes will develop a foot ulcer during heir lifetime.

These infections are a major complication, leading to a heightened risk of mputation.

ER COMPLICATIONS

Cataracts: In one population, 15.4% of diabetics experienced cataracts.

Obstructive Sleep Apnea (OSA): The prevalence of OSA in people with iabetes is high, with one study reporting approximately 60%

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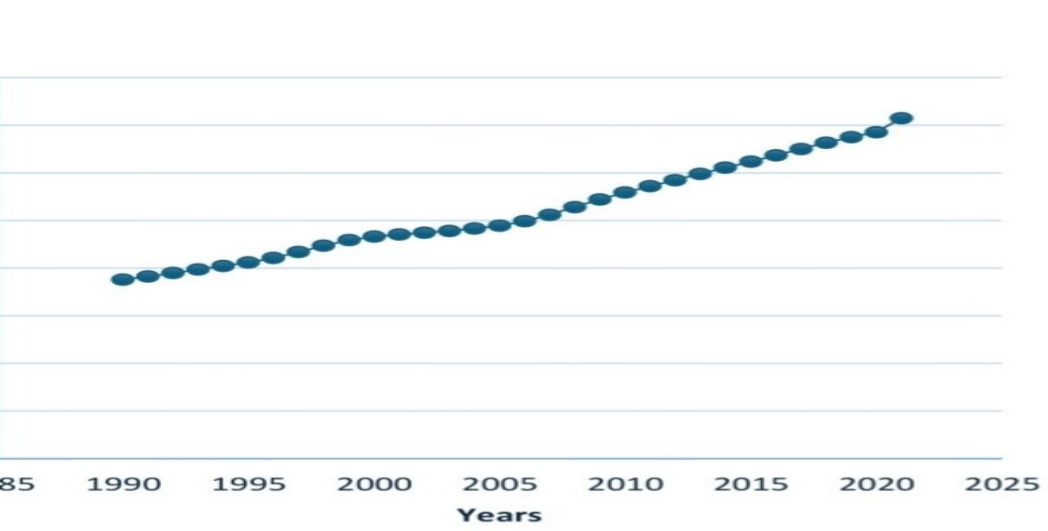
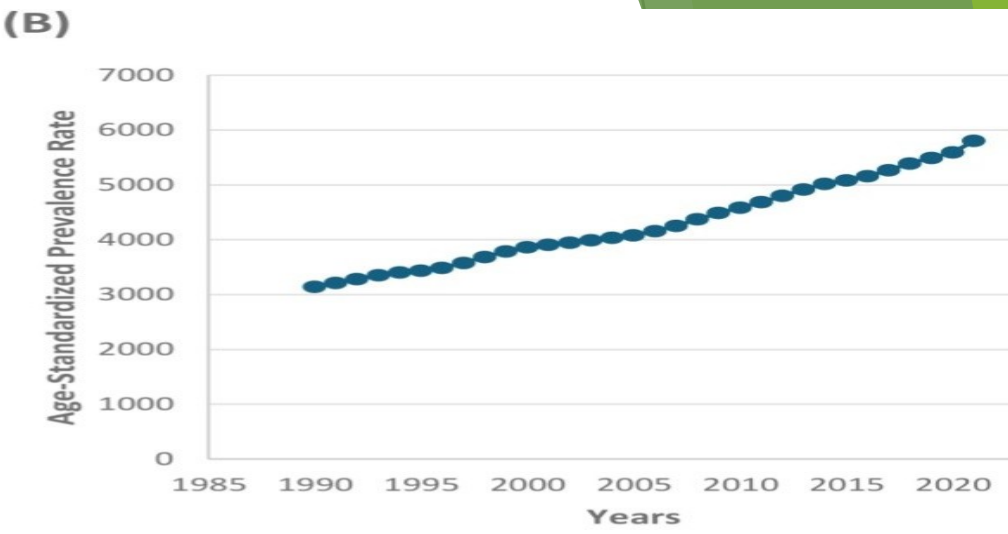
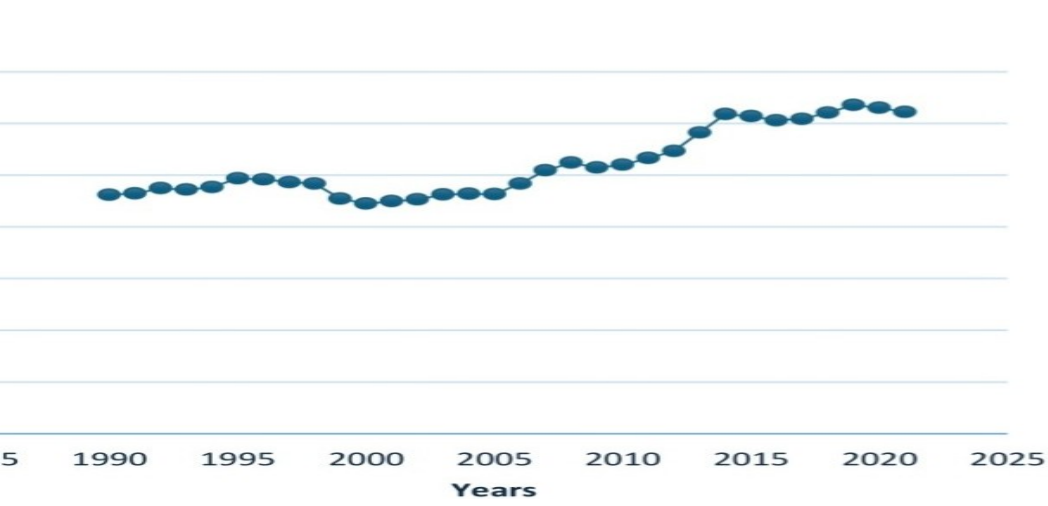
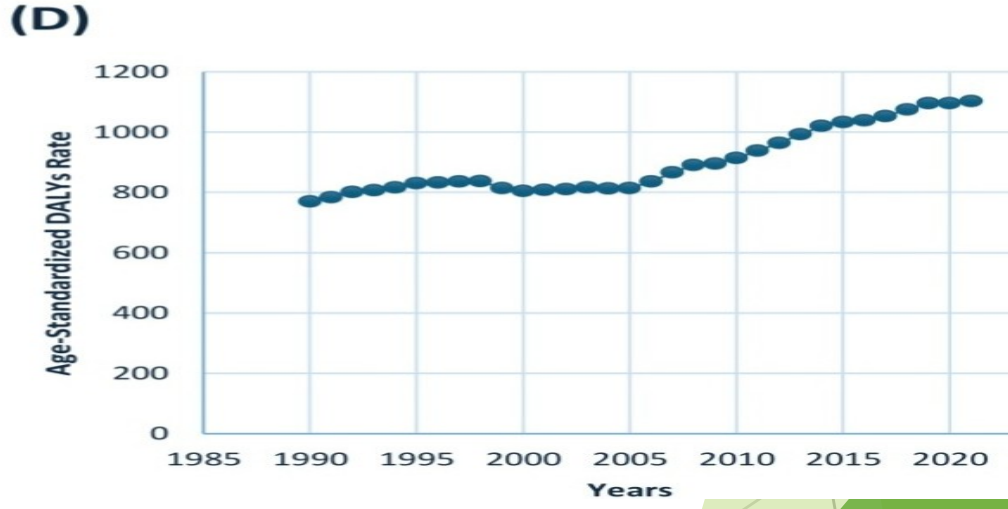




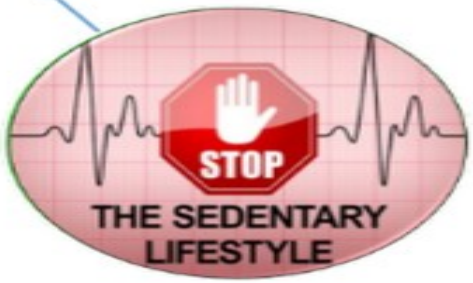




s in Age-standardized Rates (per 100,000) of Diabetes in India from 1990 t
showing **(A)** Incidence, **(B)** Prevalence, **(C)** Mortality, and **(D)** Disability-
ted Life Years (DALYs).

Prevention of Diabetes

SPLIT MEALS

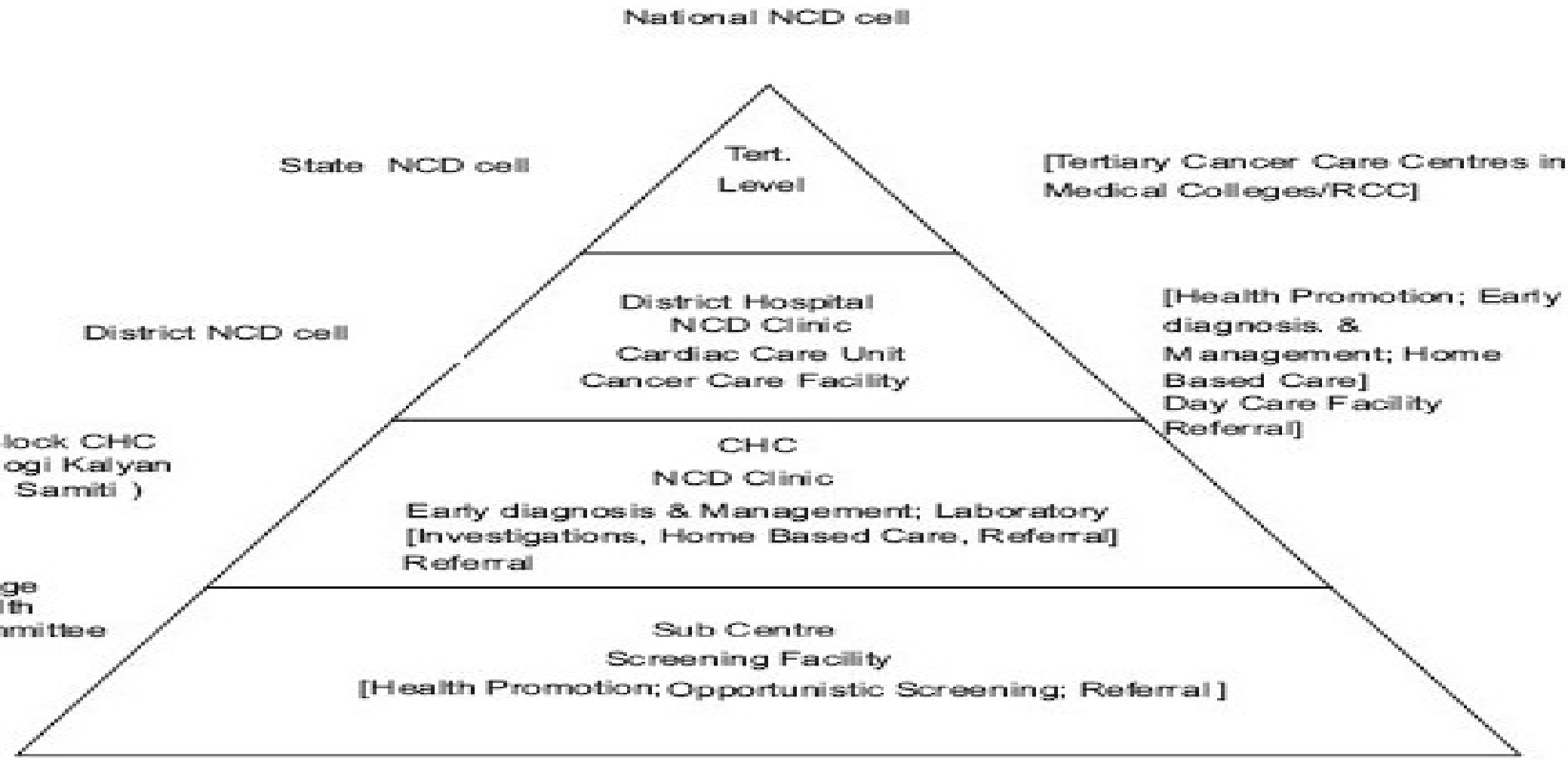


NPCDCS is the acronym for the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Disease & Stroke. Launched in 2010 by the Ministry of Health and Family Welfare, this program focuses on preventing and controlling the major Non-Communicable Diseases (NCDs) through early diagnosis, management, and public health awareness initiatives

trategies are as follows:

- Health promotion through behavior change
- Outreach Camps for early detection
- early diagnosis, treatment and follow up through setting up of NCD clinics.
- Build capacity at various levels of health care for prevention, early diagnosis, treatment, IEC/BCC, operational research and rehabilitation.
- Provide support for diagnosis and cost effective treatment at primary, secondary and tertiary levels of health care.
- Provide support for development of database of NCDs through a robust Surveillance System and to monitor NCD morbidity, mortality and risk factors.

stitutional Frame Work	Public Health Infrastructure	Services



ole of nurse

lealth promotion and education

- **Lifestyle counseling:** Nurses, including Auxiliary Nurse Midwives (ANMs) and Community Health Officers (CHOs), provide counseling on lifestyle changes to reduce NCD risk factors, including promoting healthy eating, regular physical activity, stress management, and tobacco and alcoho cessation.
- **Awareness campaigns:** They conduct community-level awareness campaigns on NCD risk factors, prevention strategies, and the importance of regular check-ups.
- **Nutritional guidance:** They offer nutrition counseling to help individuals, including those who are overweight or have diabetes, improve their diets by managing fat, salt, and processed food intake and increasing fiber consumption.

creening and early detection

Population-based screening: Nurses and other health workers screen the population, particularly those aged 30 and older, for common NCDs like diabetes, hypertension, and oral, breast, and cervical cancers.

Risk factor assessment: They use assessment checklists to capture information on age, family history, and risky behaviors like tobacco and alcohol use.

Clinical examinations: In clinics, nurses conduct screenings by measuring blood pressure and blood glucose and performing clinical breast and oral examinations.

reatment and management

Medication adherence: For diagnosed patients, nurses provide counseling to improve adherence to prescribed medications and lifestyle changes.

Follow-up care: They ensure continuity of care through regular follow-up visits, which may include home visits or mobile phone contact.

Patient support: They offer psychological and emotional support to patients and their families, addressing withdrawal symptoms and managing stress.

eferral services and coordination

Referral to higher centers: Nurses refer suspected or diagnosed cases to Primary Health Centres (PHCs), Community Health Centres (CHCs), or district hospitals for further diagnosis and management.

Coordination with allied workers: They coordinate with Accredited Social Health Activists (ASHAs) and other field staff to mobilize communities for screening camps and health services.

listic Care:

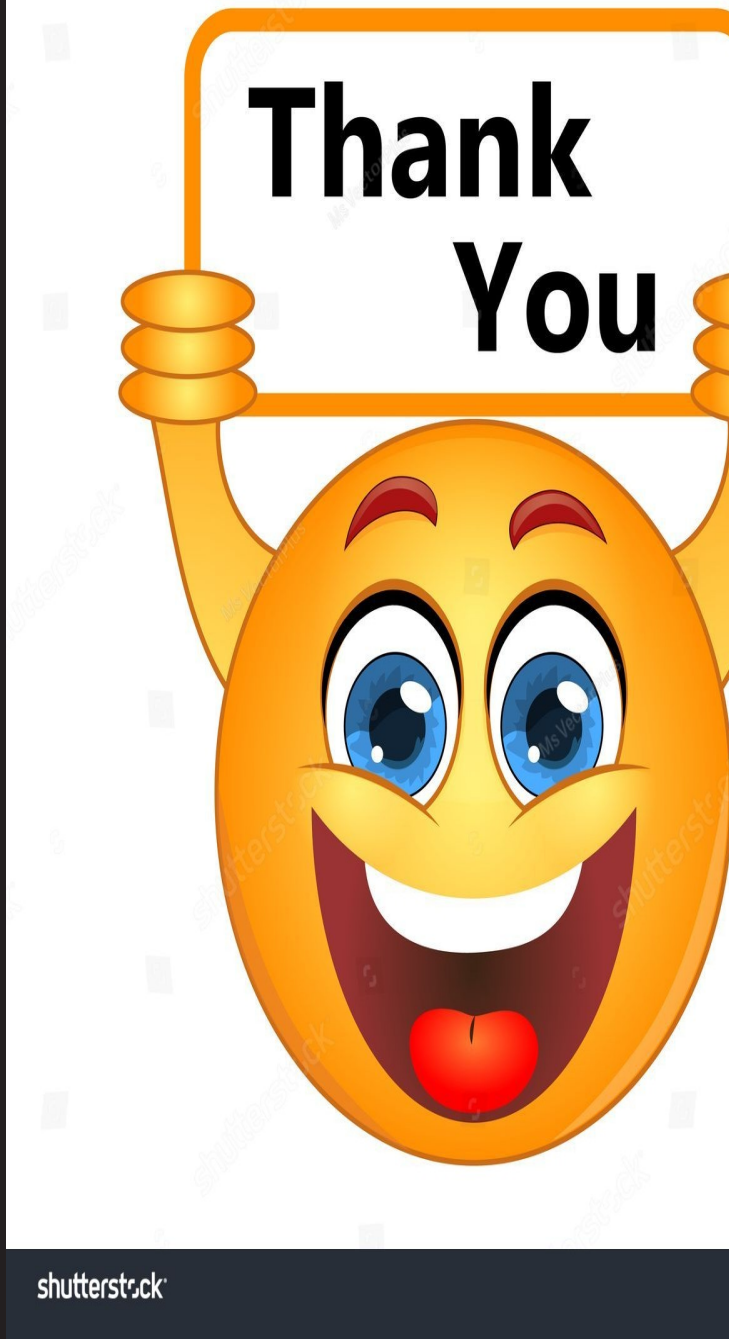
They offer comprehensive, holistic care that extends beyond treatment to include awareness, education, and support for individuals, families, and communities

mmunity Engagement:

Nurses work within communities, conducting home visits and leading support groups to provide tailored interventions and health education


QUESTIONS?
COMMENTS?
CONCERNS?


BE KIND TO
DIABETICS
WE DEAL
WITH ENOUGH
PRICKS
ALREADY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You
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