NON-COMMUNICABLE DISEASES CURRICULUM ENHANCE HEALTH LITERACY AMONG YOUTH – 4 CREDITS

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NON-COMMUNICABLE DISEASES CURRICULUM

- 30 minutes for each of 9 lectures.
- 15 minutes of Q&A.
- 15 minutes teaching measurement of BP and glucometer.
- Completion of 9 lectures, successful skills testing of measuring BP, glucometer and health literacy questionnaire leads to **4 credits.**

CAN A THEORY BASED NON-COMMUNICABLE DISEASE CURRICULUM ENHANCE HEALTH LITERACY AMONG YOUTH?

A RANDOMIZED CONTROLLED TRIAL

- Background: Health literacy skills help people make informed health decisions. However, there is a theory-praxis gap related to health literacy interventions focused on non-communicable diseases (NCD) among young people.
- Design: We designed a contextually relevant, theory-informed NCD health literacy curriculum and investigated its' effect on NCD health literacy among non-medical, non-nursing college students in the State of Gujarat, India.

METHODS

- We administered the curriculum to 120 randomly selected students across four colleges while 118 students from the same colleges, but not exposed to the curriculum, served as controls.
- Health literacy was measured using a specifically designed tool at baseline and endline in both groups.
- The average difference in health literacy percentage scores between the two time-points in both groups was statistically analyzed using the t-test.
- Difference in the proportion of students scoring 40% or higher in both groups, was analyzed using Chi-square test.
- Multiple linear and Poisson regression models were used to account for covariates.

RESULTS

- The endline to baseline difference in health literacy scores between the study groups was 18.49% ($p<0.001$).

- The proportion of participants scoring 40% or above on the health literacy measure at endline was significantly higher in the intervention versus control group ($p<0.001$).

CONCLUSIONS

- Our findings showed that a theory-driven curriculum may be a tool for enhancing NCD health literacy in Indian youth from diverse academic and socio-economic backgrounds.
- We provide empirical data to support health literacy and social epidemiology theories underpinning the curriculum.
- We believe that our study is the first of its' kind in a developing country, which has the potential of preventing NCD in India.

LECTURE 1

WHY STUDY NCDs?

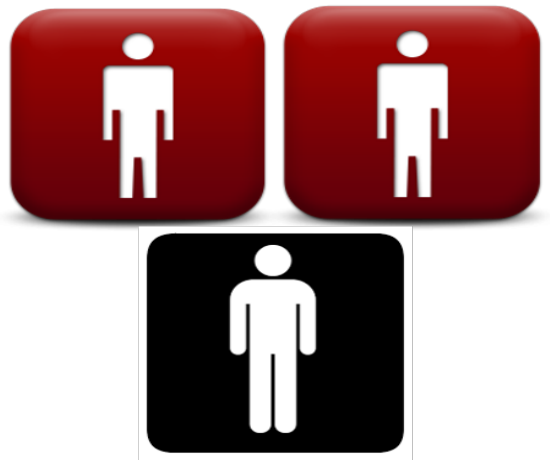
Why study NCDs?

Top 10 Causes of Death in India

- Cardiovascular Diseases
- Diarrheal Diseases
- Neonatal Disorders
- Non-communicable Diseases
- Chronic Respiratory
- Diabetes
- Mental Disorders
- Unintentional Injuries
- Neoplasms
- Nutritional Deficiencies

Source: World Bank India
Source: Population Reference Bureau (2017) India

Global burden of Non-communicable diseases (NCDs)



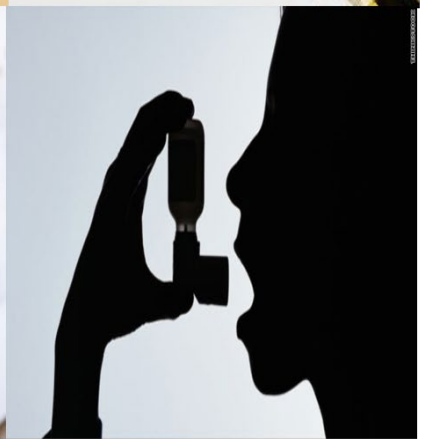
NCDs cause more than 2/3rd of deaths globally

80% of these deaths are caused by 4 major NCDs

Cardiovascular diseases (esp. heart attack and paralytic attack)

Cancers of different types

Diabetes mellitus



Chronic lung disorders Such as asthma, chronic bronchitis and emphysema

Global burden of NCDs

- Deaths and disabilities from NCDs are on rise world wide; at the fastest rate in low and middle income countries.
- Nearly 80% of deaths from NCDs occur in low and middle income countries.
- Nearly 1/4th of the deaths occur before age of 60 years.

NCDs burden in India

NCDs account for nearly

60% of all deaths in India

(facts, 2014, WHO)

and

43% of DALYs in India in 2003

(WHO, 2010)

DALY: disability adjusted life years

(1 DALY= 1 productive year)

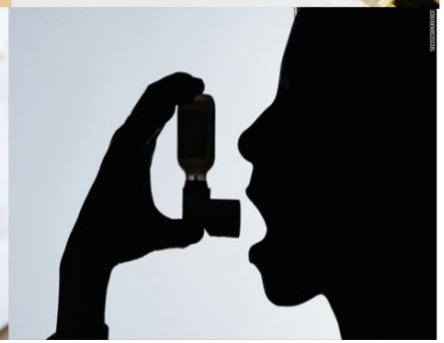
45%

Cardiovascular diseases (esp. heart attack and paralytic attack)

12%

Cancers of different types

Diabetes mellitus



Chronic lung disorders Such as asthma, chronic bronchitis and emphysema

3%

22%

Percentage of four major NCDs out of total NCDs

NCD burden in India

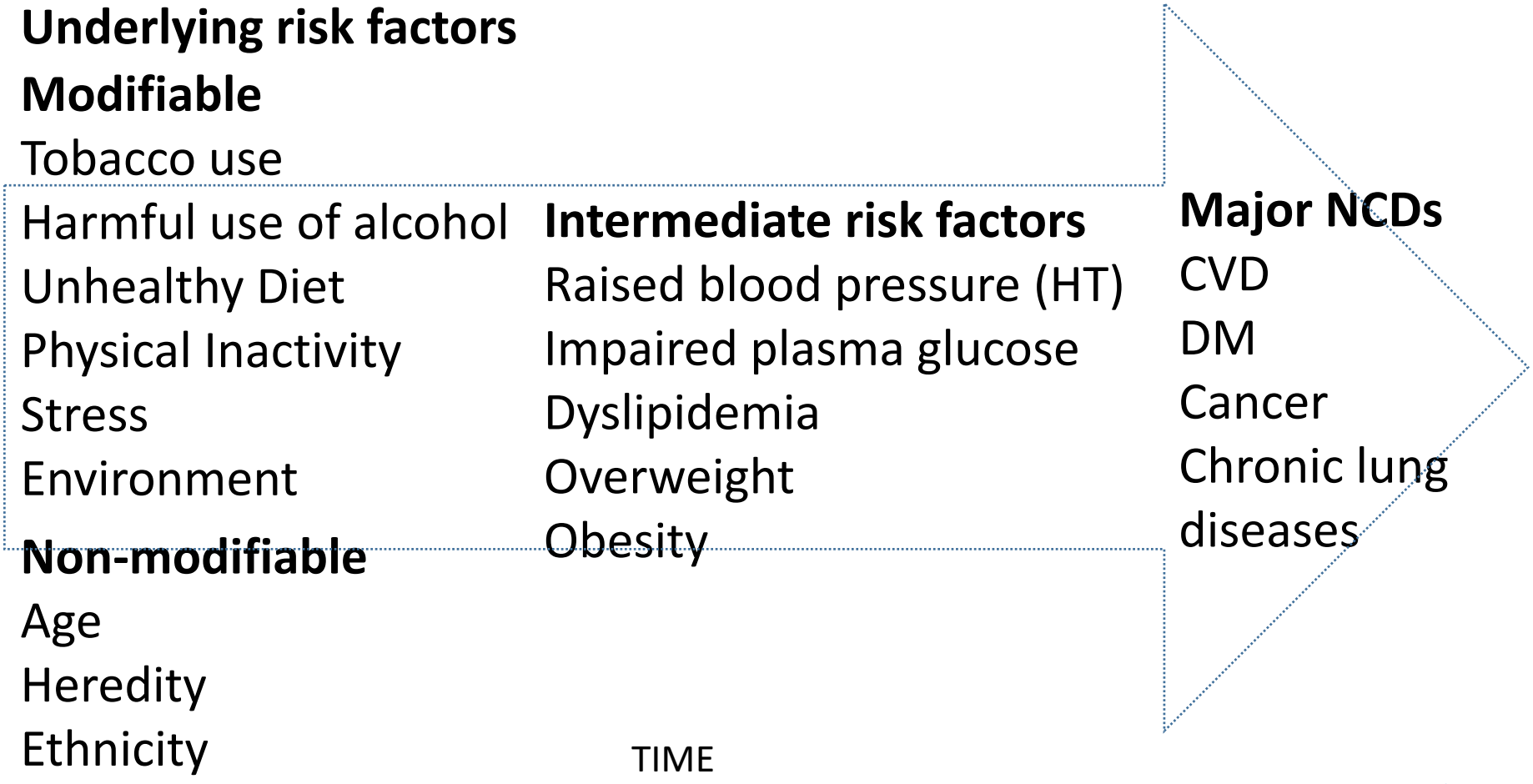
In India, NCDs develop prematurely (5-10 years earlier) and cause death in younger age-group compared to most of the other countries (WHO, 2011)

For instance,

Incidence of coronary artery disease in young Indians is about 12%–16%, which is higher than any other ethnic group

About 5%–10% of heart attacks occur in Indian men and women younger than 40 years

The causation model of NCDs



Underlying determinants

Poverty, Urbanization Illiteracy, Globalization, Health policy, Social status

Take home message

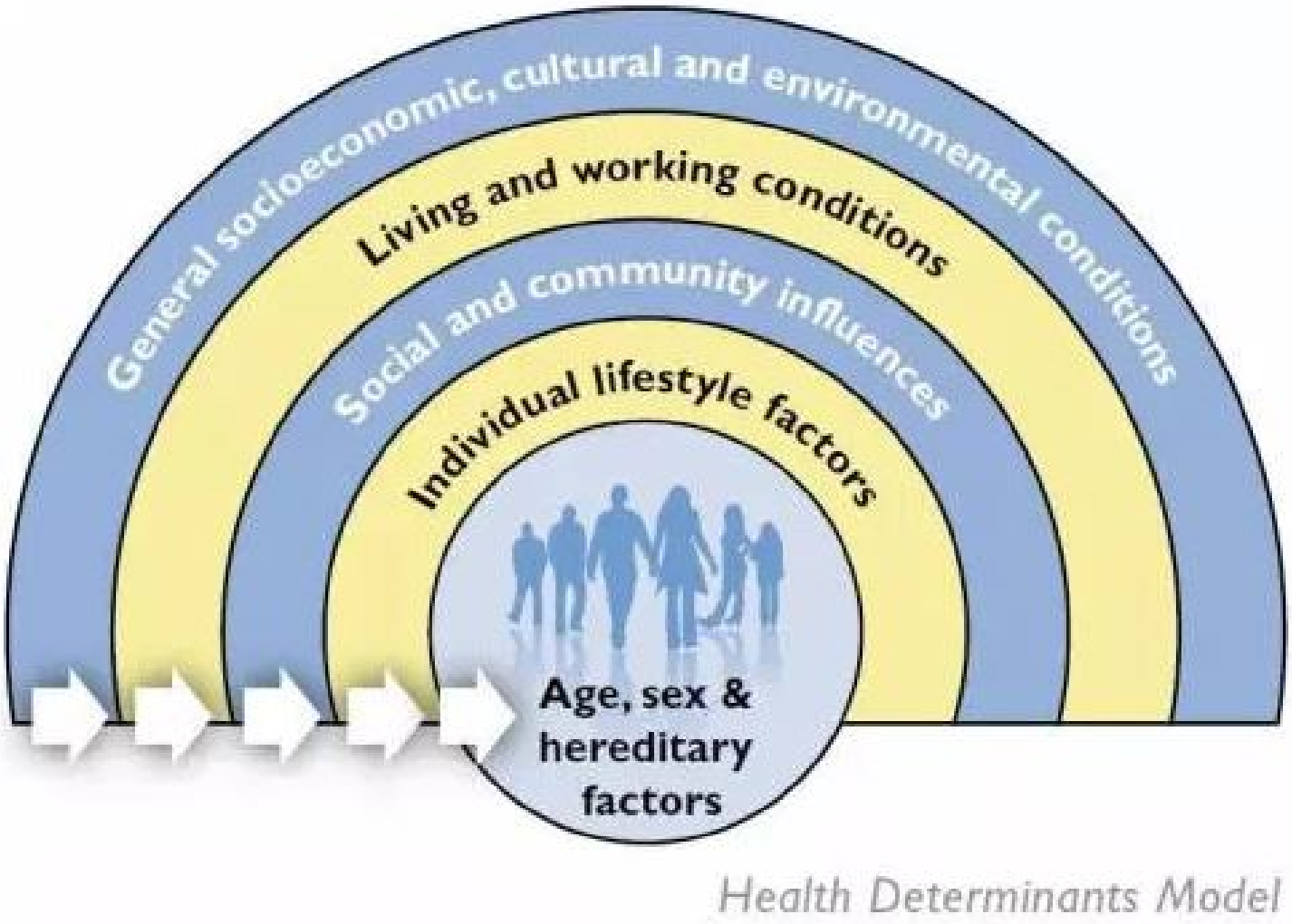
- Common major risk factors
- Most of those are preventable
- If major risk factors of NCD were eliminated at least
  80% of all heart disease, stroke and type 2 diabetes
  40% of cancer would be prevented

The NCD epidemic is preventable and reversible!

What and who are responsible for this increasing burden?

- Your genetic make up?
- Your age?
- Your life style choices and behaviors?
- Your family?
- Your peers and social network?
- The community and society?
- Health care facility?
- Government?
- Market?
- Broader global environment?

Social determinants of health



Example 1: Breakfast cereals

- These are replacing something, what is that?
- How are they replacing it?
- Who are being targeted?
- Who are reaping the benefits?

Example 2: Palmolein oil

- Where is this used?
- Where does this come from?
- Why do we use this?
- Are there any policy regulations?

Example 3: Fitness and weight management products

- Protein shakes and other protein supplements
- Various nutritional supplements such as vitamins, omega 3 and antioxidants
- Sugar substitutes
- Policies?

Example 4: Health services availability and access

- Who needs it?
- Is it available to them?
- Is it affordable?
- Is it timely?
- Is it adequate?

Who all need to act?

- Individual and family
- Community and society
- Government: financing, policies, inter-sectoral coordination, health system strengthening
- International organizations/authorities

LECTURE 2

ATHEROSCLEROSIS - લોહીની નળીઓનું જાડુ અને સખત થઇ જવું

Learning objectives

- Clearly state that atherosclerosis is a chronic (long term slow onset and gradually progressing) condition.
- Clearly state that atherosclerosis is implicated in life-threatening complications associated with high BP
- Clearly state that management of blood pressure within normal range significantly reduces risk of life threatening complications arising out of atherosclerosis

Learning objectives

- Clearly state that dyslipidemia is implicated in atherosclerosis and its related complications

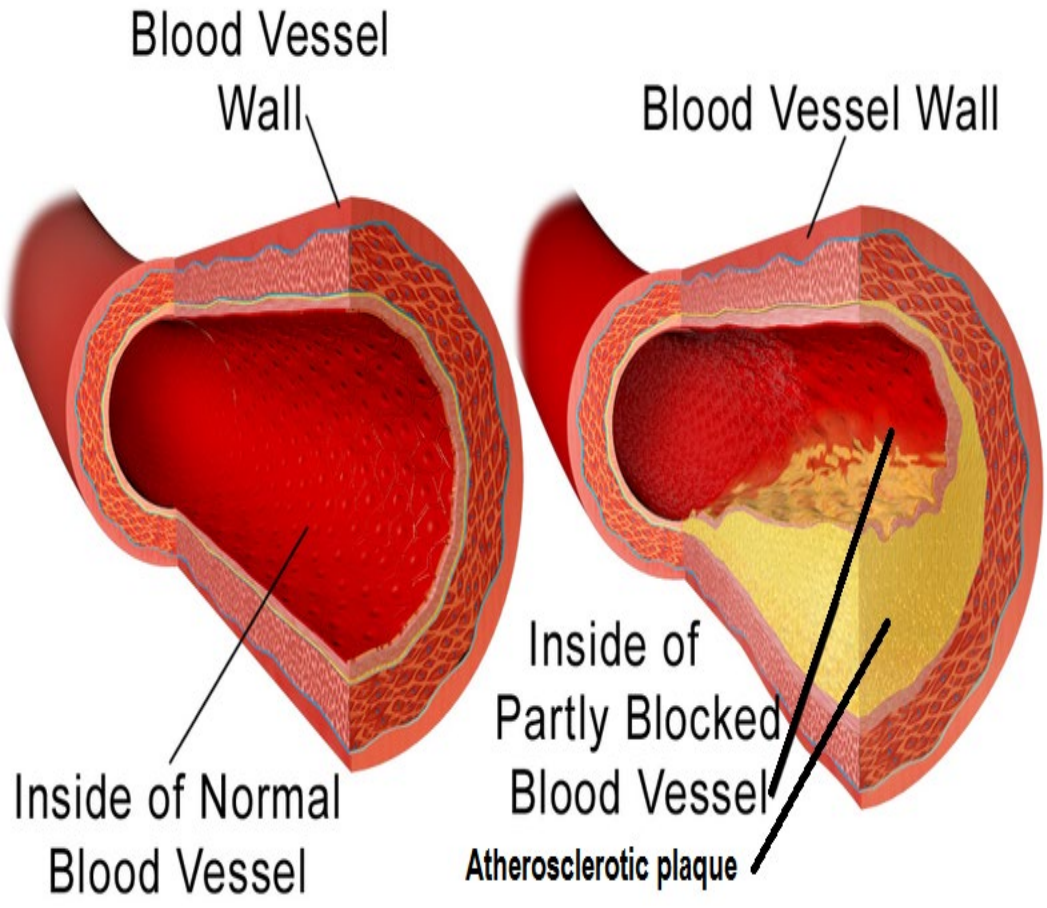
- Able to list at least three modifiable risk factors of atherosclerosis

અથેરોસ્ક્લેરોસીસ શું છે?

- લોહીની નળીઓમાં ચરબીનો ગઠ્ઠો જામી જવાથી નળીઓ જાડી અને સખત થઇ જાય છે

- *athero*: porridge like soft lipid rich material in the center of the *atheroma*

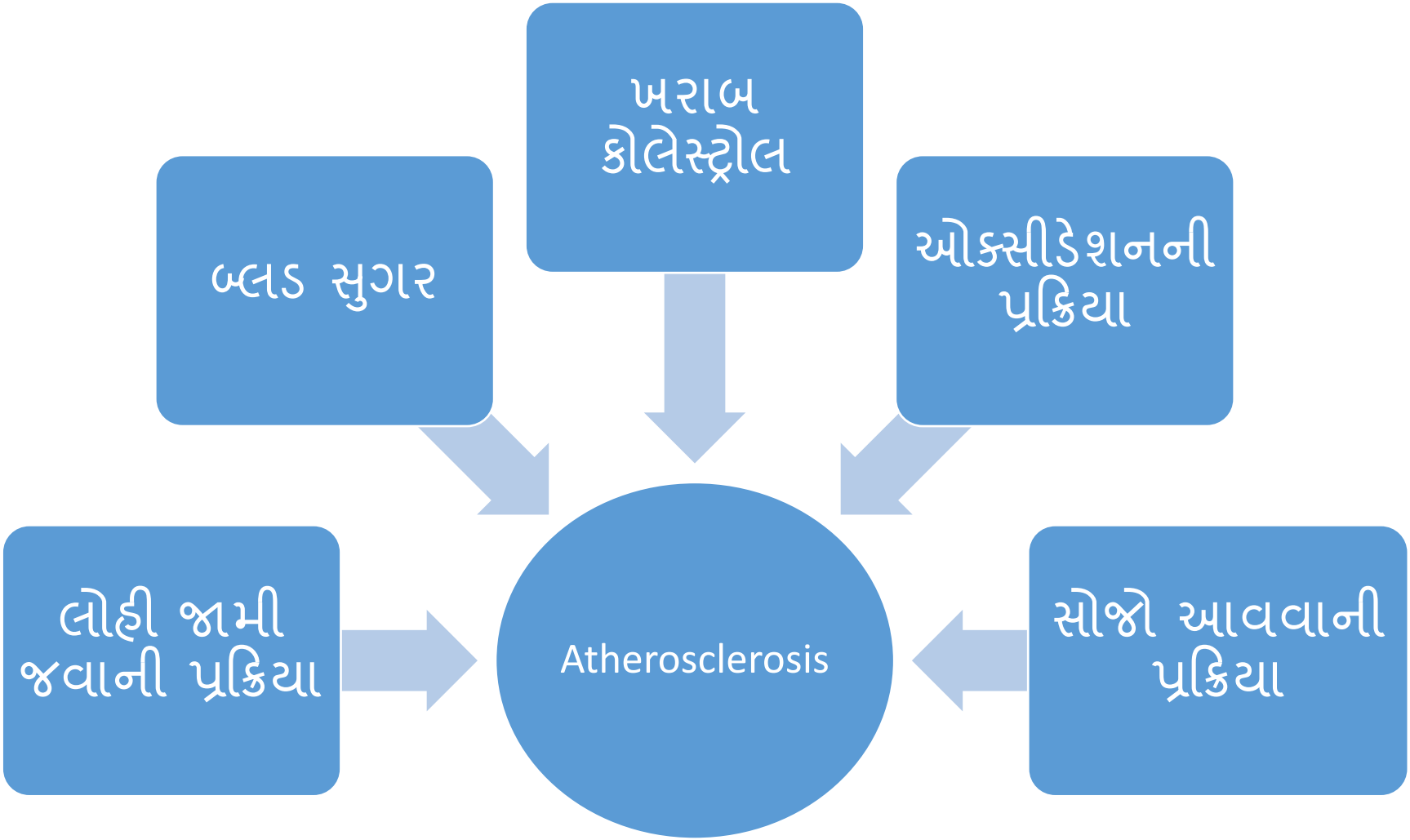
  sclerosis meaning scarring.



અથેરોસ્ક્લેરોસીસ.....

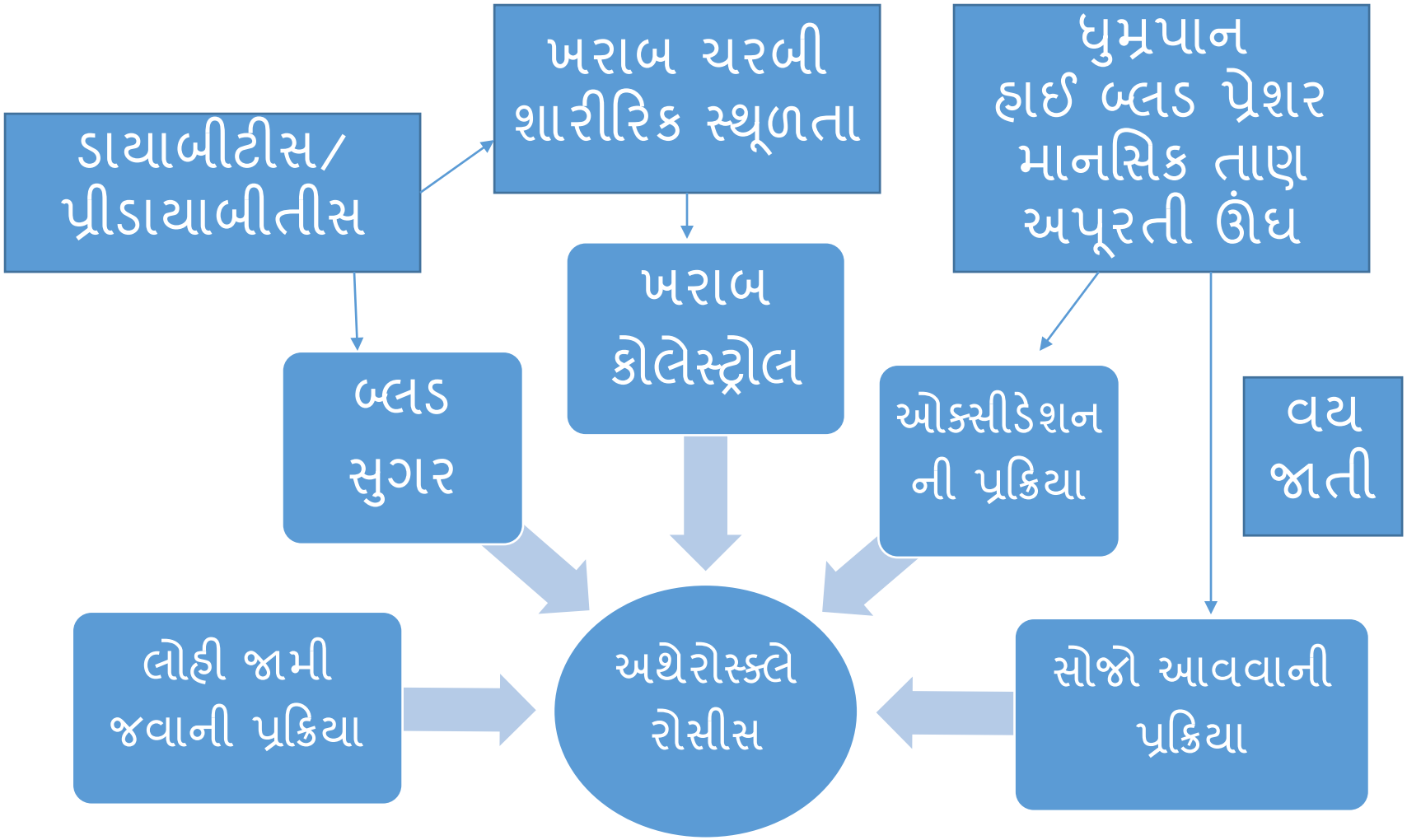
- ખુબ લાંબા સમય સુધી ધીમે ધીમે આગળ વધે છે.
- શરૂઆતમાં કોઈ લક્ષણ દેખાડતું નથી. ખુબ આગળ વધ્યા બાદ કોમ્પ્લીકેશનના રૂપે અપની સમક્ષ આવે
- Atherosclerosis can affect any artery, it commonly affects arteries in heart, brain, kidney, extremities and splanchnic circulation.

કઈ પ્રક્રિયાઓ અને પરિબળો જવાબદાર છે?



- https://www.webmd.com/heart-disease/video/atherosclerosis

આ પ્રક્રિયા માટે કયા જોખમી પરિબળો જવાબદાર છે?



જોખમી પરિબળો કયા?

- ખરાબ કોલેસ્ટ્રોલ (ખરાબ ચરબી)
- શારીરિક સ્થૂળતા
- ડાયાબીટીસ/ પ્રીડાયાબીટીસ
- તમાકુનું વ્યાસન/ સ્મોકિંગ
- અપૂરતી ઊંઘ
- ચિંતા / માનસિક તાણ
- હાઈ બ્લડ પ્રેશર
- હાઈ બ્લડ સુગર

અથેરોસ્ક્લેરોસીસથી શું થાય?

- ischemia (ઇસકીમિયા): અંગોને લોહી ઓછુ પહોચે
- aneurism (એન્યુરીઝ્મ): નળીઓ નબળી પડીનેપહોળી થઈ જાય
- stenosis (સ્ટેનોસીસ): નળીઓ સાંકડી થઇ જાય
- infarction (નળીઓ સંપૂર્ણ બ્લોક થવાથી અંગને લોહી મળતું તદ્દન બંધ થાય અને એ કોષો મૃત્યુ પામે
- જો આવું વાઈટલ અંગો જેવાકે મગજ, હૃદય કે કીડનીમાં થાય તો મૃત્યુ પણ થઈ શકે.

  જો હૃદયમાં થાય તો એને હાર્ટ એટેક કહીએ
  જો મગજમાં થાય તો એને સ્ટ્રોક કહીએ

અથેરોસ્ક્લેરોસીસ, હાઈ બ્લડ પ્રેશર અને જીવને જોખમમાં મુકતા કોમ્પ્લીકેશન

- અથેરોસ્ક્લેરોસીસ લગભગ હમેશા હાઈ બ્લડ પ્રેશર સાથે જોવા મળે છે
- હાઈ બ્લડ પ્રેશરથી અથેરોસ્ક્લેરોસીસ ઝડપથી આગળ વધે છે
- જો બ્લડ પ્રેશર કન્ટ્રોલમાં રાખીએ તો અથેરોસ્ક્લેરોસીસથી થતા ગંભીર કોમ્પ્લીકેશનોથી બચી શકાય છે

કઇ રીતે ખબર પડે?

- History
- Physical examination: BP, weight
- Laboratory investigation: lipid profile, blood sugar

How can you prevent it?

Diet:

- Avoid/reduce sugary and starchy food
- Healthy fats: Omega 3 rich food in adequate amount, no transfats
- Increase intake of anti-oxidants rich food in adequate amount

Physical activities: at least in adequate amount

Reduce weight/maintain weight in normal range

Sleep: adequately

Stress: control, reduce

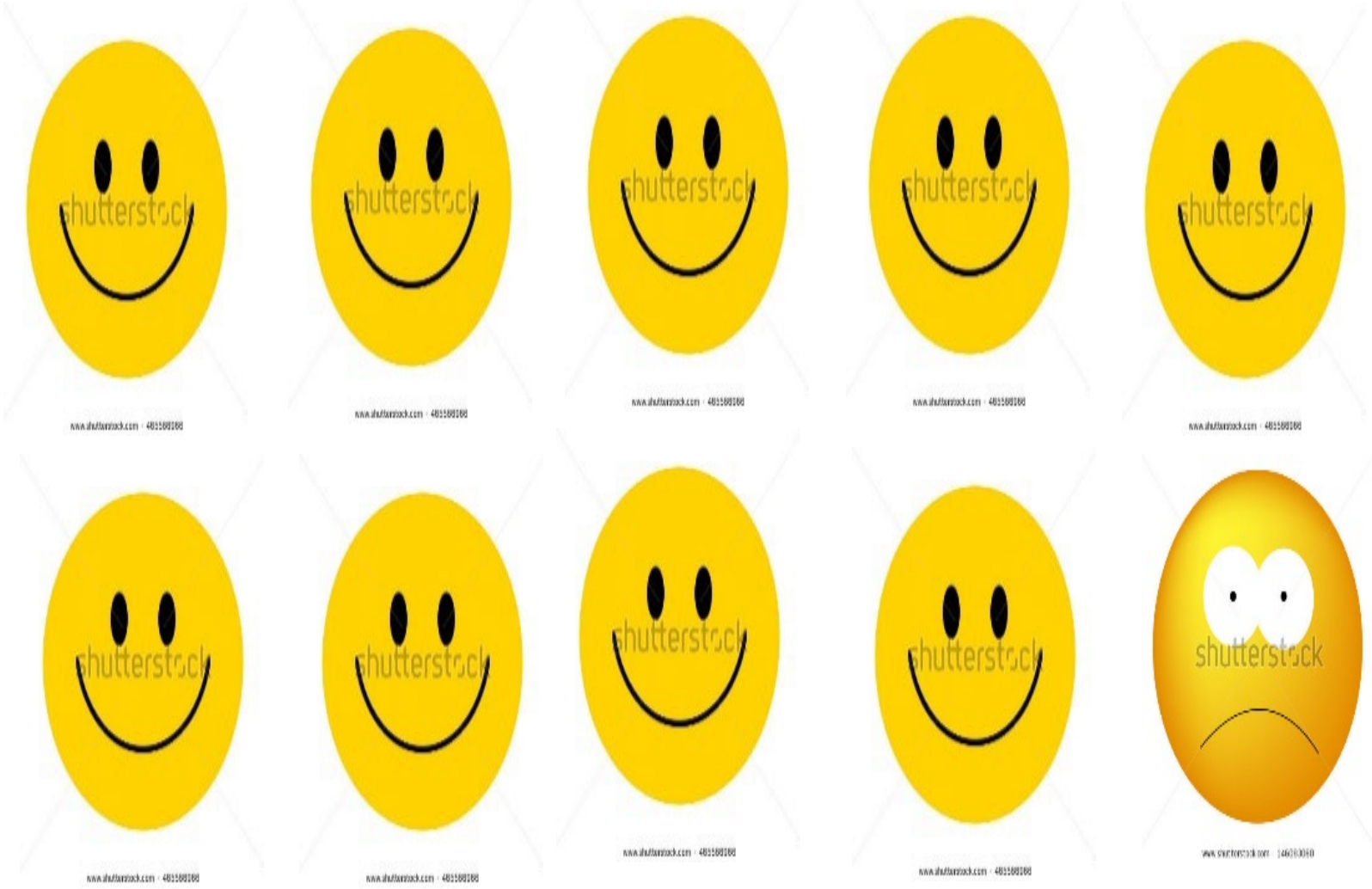
Treatment

- Medicines
  - For HT
  - For dyslipidemia
  - For prediabetes/DM
- Lifestyle changes

LECTURE 3

DIABETES અને તેના કારણો

ડાયાબીટીસ વિષે જાણવું શા માટે જરૂરી છે?



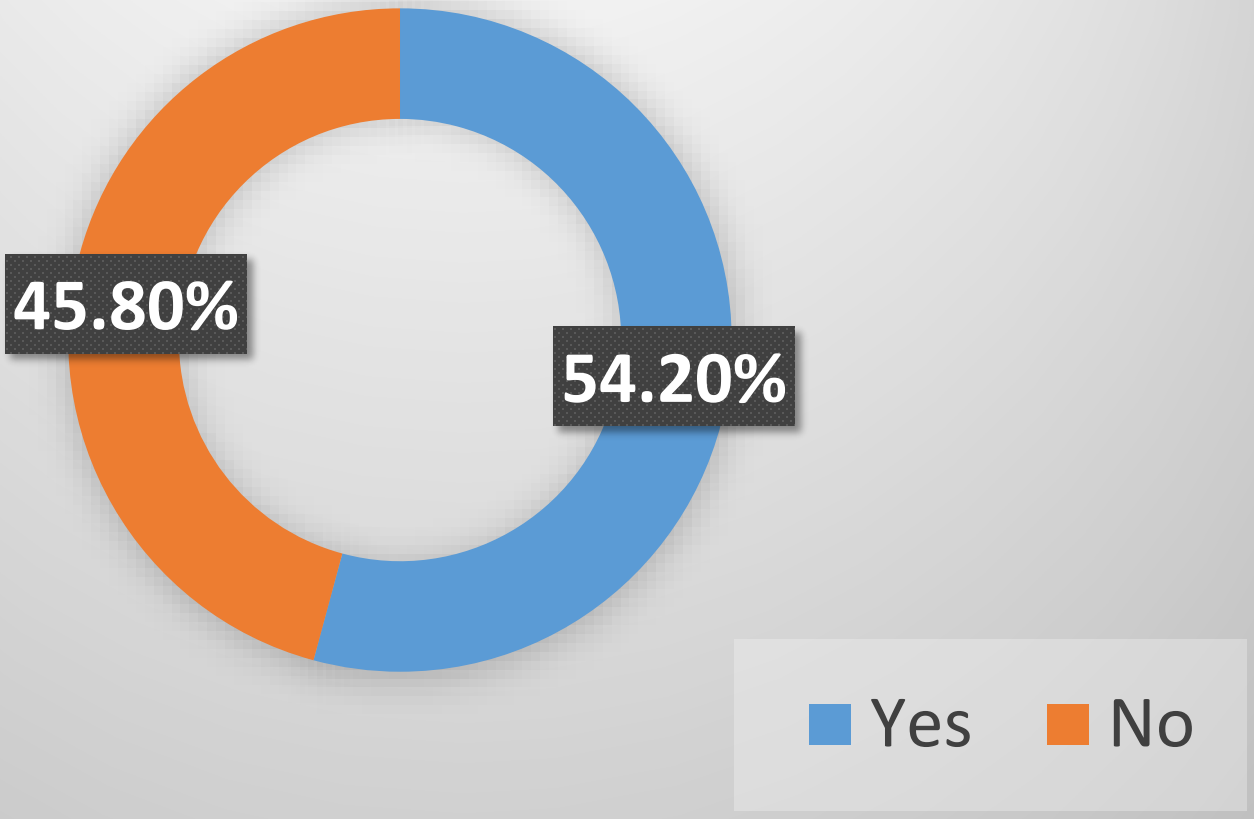
ભારતમાં 20-74 વર્ષની વયની દર દસમી વ્યક્તિને ડાયાબીટીસ છે

અન્ય વિકસિત દેશોની સાપેક્ષમાં ભારત જેવા વિકાસશીલ દેશોમાં

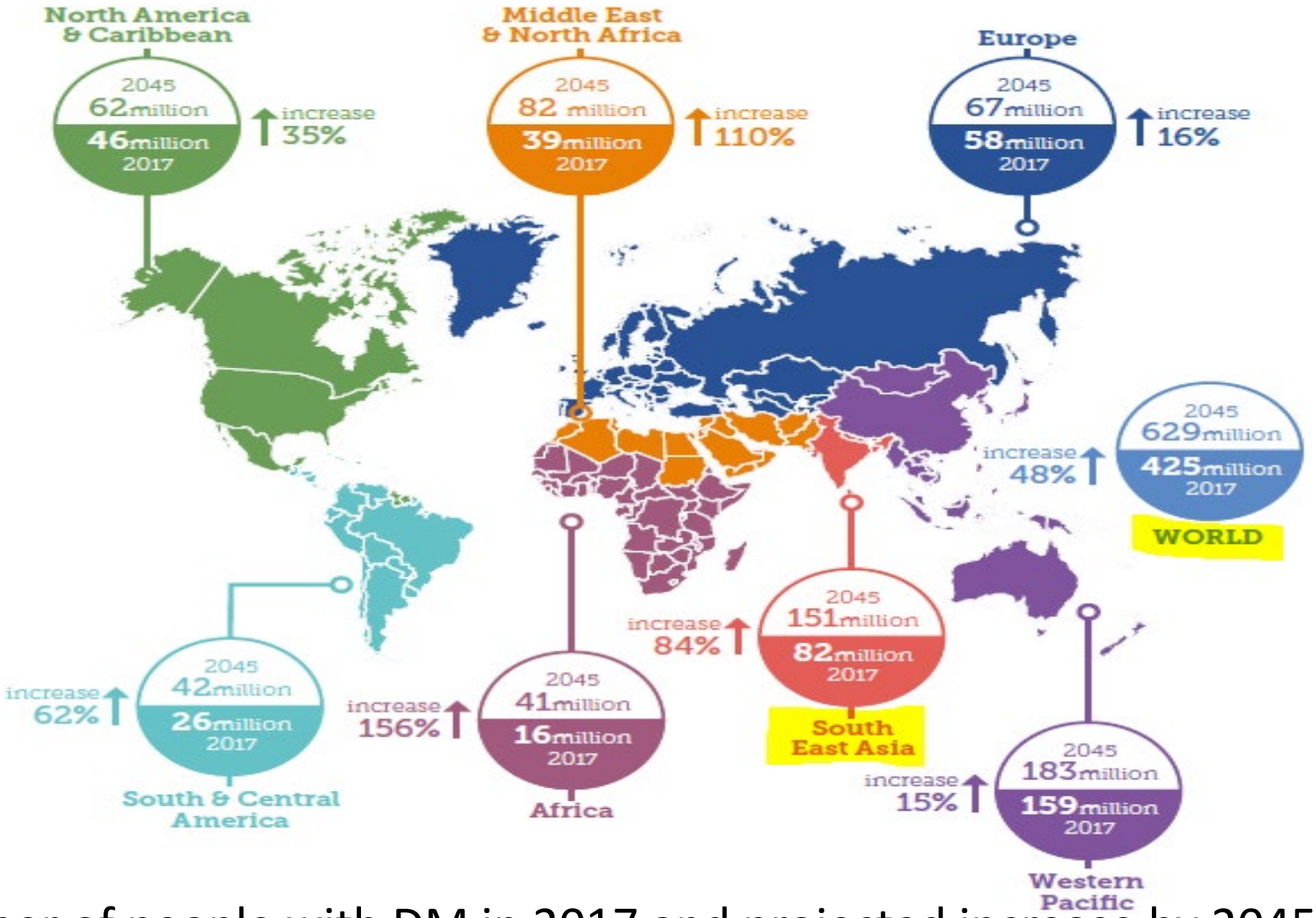
- ડાયાબીટીસ એક દસકા જેટલો વહેલો થાય છે,
- કોમ્પ્લીકેશન વહેલા થાય છે.
- મૃત્યુ વહેલું થાય છે

ડાયાબીટીસના નિદાન વિષયક પરિસ્થિતિ

2017ના આંકડા મુજબ



સમગ્ર વિશ્વની પરિસ્થિતિ



Number of people with DM in 2017 and projected increase by 2045, region wise and worldwide

Source: Diabetes atlas, IDF, 2017 executive summary page number 9

ડાયાબીટીસથી બચી શકાય?

- હા
- કઈ રીતે?
  જીવનશૈલીમાં બદલાવ લાવવાથી
- કેવા બદલાવ?
  સ્વાસ્થ્યપ્રદ ખોરાક
  શારીરિક પ્રવૃત્તિ અને કસરતો
  ચિંતા અને તાણથી બચાવ
  પુરતી ઊંઘ
  વ્યસનમુક્ત જીવન

ડાયાબીટીસ મટી શકે?

- ના
- એક વખત થાય તો તેને મટાડવો અતિશય મુશ્કેલ છે

તો શું કરી શકાય?

ડાયાબીટીસને કાબુમાં લઇ શકાય

કઈ રીતે?

- દવાઓ અને નિયમિત સારવાર
- નિયમિત સ્વાસ્થ્યનું નિષ્ણાત દ્વારા ચેકઅપ
- જીવનશૈલીમાં બદલાવ

જીવનશૈલીમાં બદલાવ લાવવાથી શો ફાયદો થાય?

- દવાની ધારી અસર થાય
- કોમ્પ્લીકેશન થવાનું જોખમ ઘટી જાય

ડાયાબીટીસ એટલે શું?

સામાન્ય રીતે આપણા લોહીમાં અમુક માત્રામાં ખાંડ એટલે કે સુગર (ગ્લુકોઝ) દરેક સમયે હોય છે

ડાયાબીટીસ એટલે

લોહીમાં સુગરનું પ્રમાણ સામાન્ય (નોર્મલ) કરતા વધારે હોવું

આ એક આજીવન બીમારી છે

લોહીમાં સુગર વધી જવાનું કારણ શું?

ઇન્સ્યુલીનનો અભાવ

અથવા

ઇન્સ્યુલીનની કાર્યક્ષમતામાં વિક્ષેપ

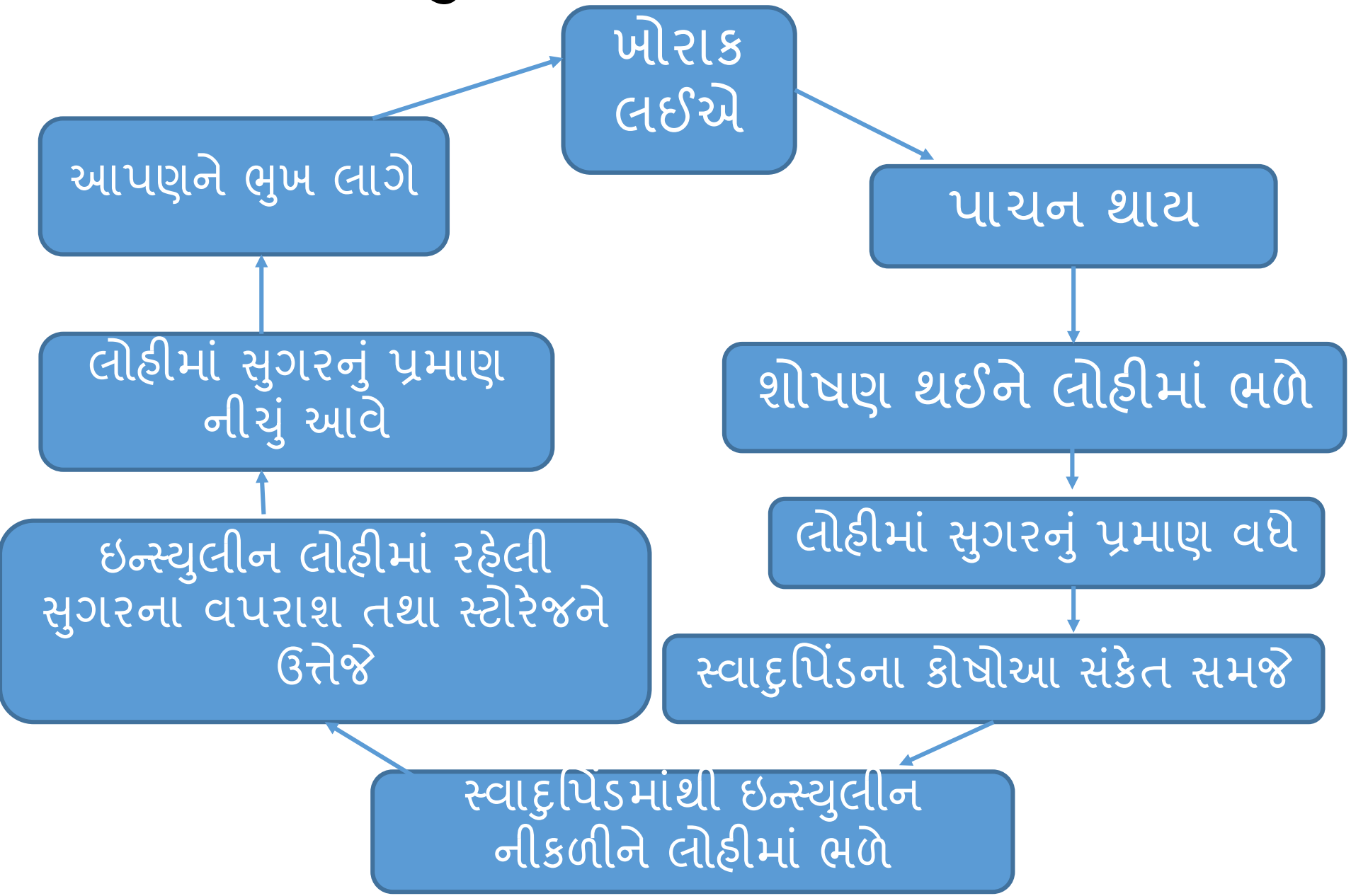
અથવા

બંને

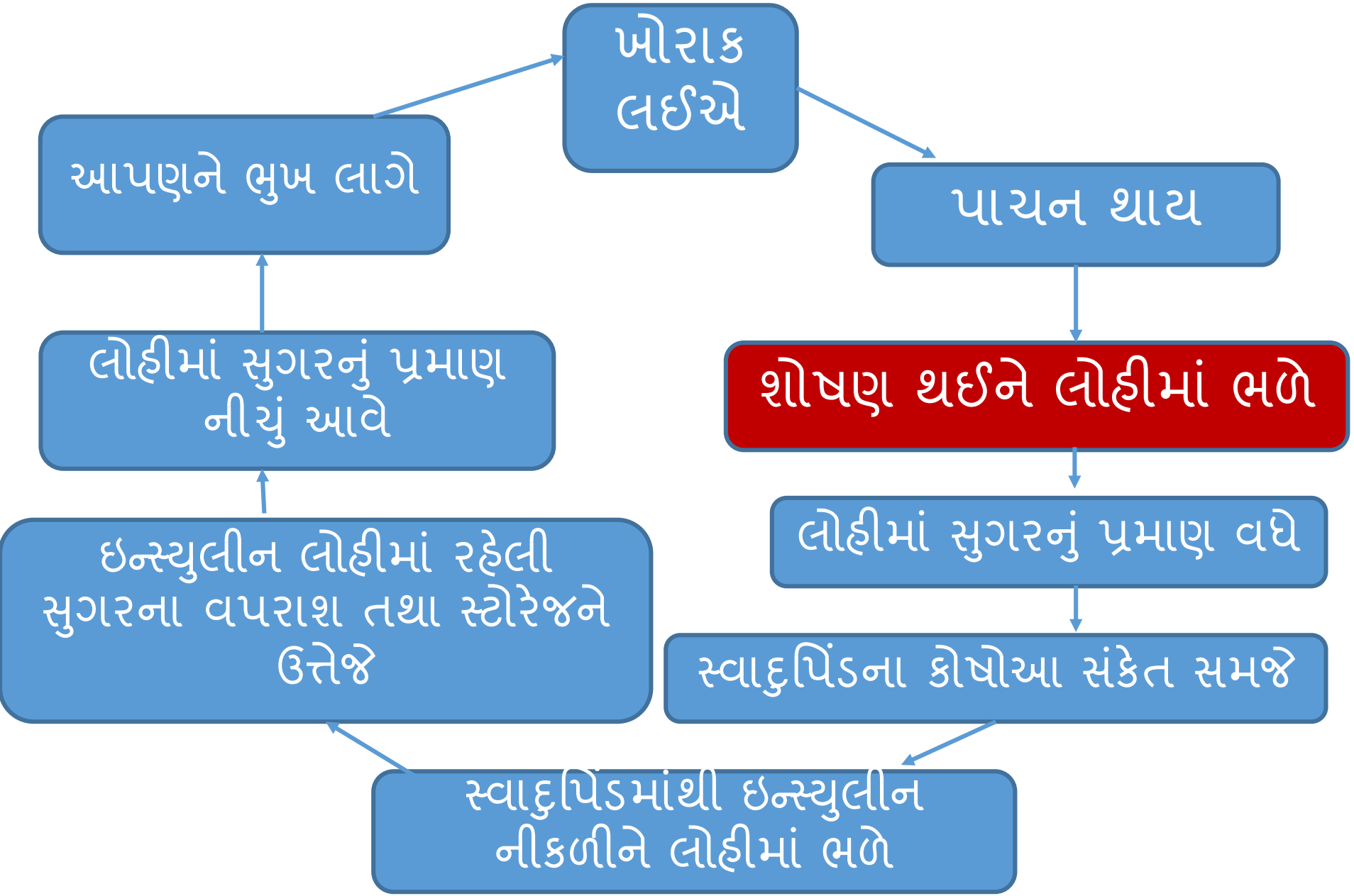
ઇન્સ્યુલીન શું છે?

- ઇન્સ્યુલીન સ્વાદુપિંડ (પેનક્રિયાસ)માંથી નીકળતો એક અંતઃસ્ત્રાવ છે
- ઇન્સ્યુલીનનું મુખ્ય કાર્ય લોહીમાં રહેલી સુગરનું નિયમન કરવાનું છે
- ઇન્સ્યુલીન લોહીમાં સુગરનું પ્રમાણ અમર્યાદિત રીતે વધી જતું અટકાવે છે

ઇન્સ્યુલીન ક્યારે નીકળે?

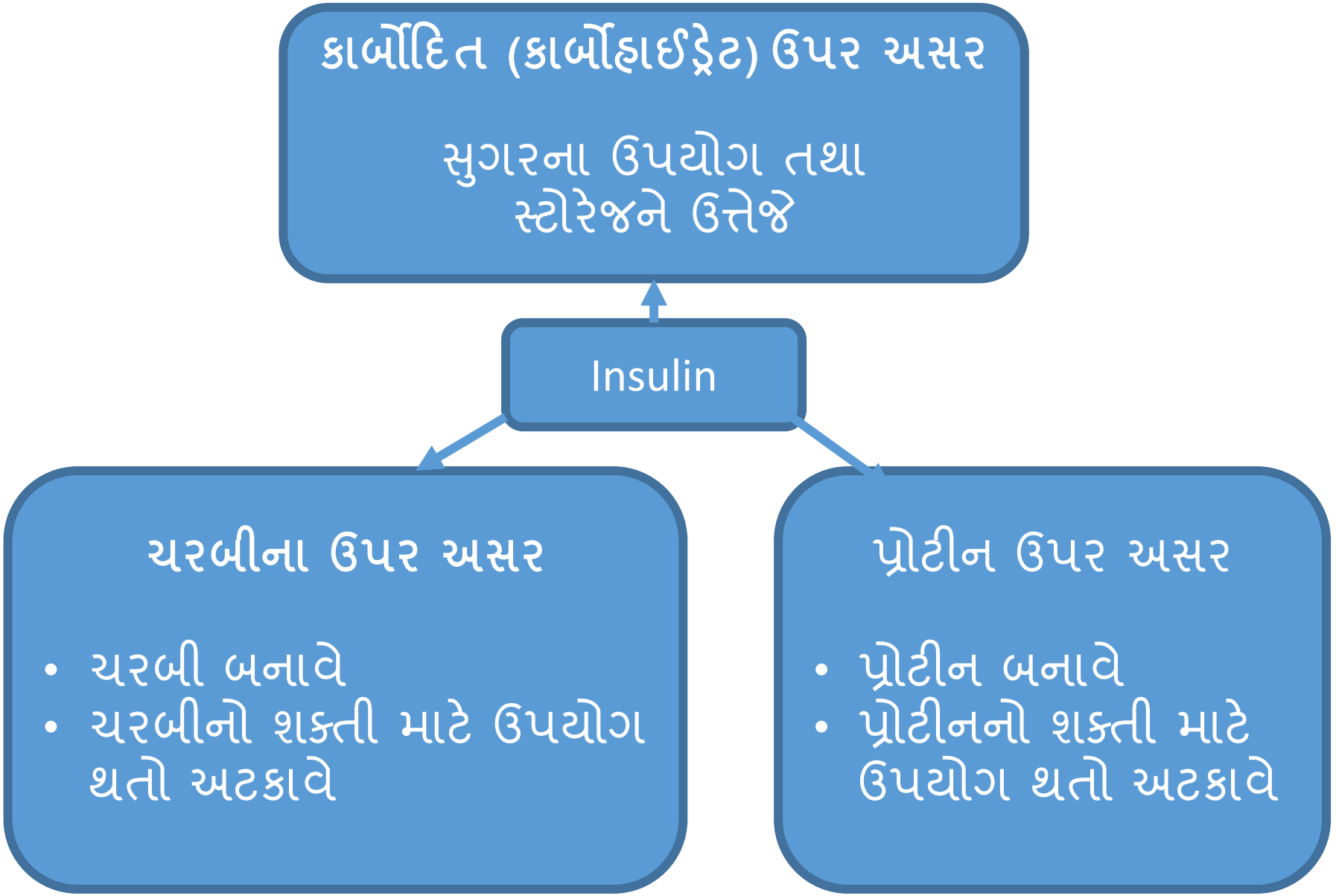


ઇન્સ્યુલીન ક્યારે નીકળે?



ઇન્સ્યુલીન સુગરને કઈ રીતે વાપરે અથવા સ્ટોર કરે?

ઇન્સ્યુલીન શરીરમાં કાર્ય કેવી રીતે કરે?



ઇન્સ્યુલીન અને ડાયાબીટીસ વચ્ચે શો સંબંધ?

- ઇન્સ્યુલીનની કાર્યક્ષમતામાં અવરોધ/વિક્ષેપ
- ઇન્સ્યુલીનના પ્રમાણમાં વધારો
- સ્વાદુપિંડ થાકી જવાથી ઇન્સ્યુલીન બનતું ઓછુ થાય

ડાયાબીટીસ માં શું થાય?

કાર્બોદિત (કાર્બોહાઈડ્રેટ) ઉપર અસર
સુગરના ઉપયોગ કોશો કરી શકે નહિ તથા
સુગરનું ચરબી માં રુપાંતર થઈને એ સ્ટોર ના થાય

Insulin

ચરબી ઉપર અસર
- ખોરાકમાની ચરબીમાંથી કોશો શક્તિ મેળવે
- સંગ્રહ થયેલી ચરબીનો શક્તી માટે ઉપયોગ થવા લાગે
- સુગરમાંથી નવી ચરબી બને નહિ

પ્રોટીન ઉપર અસર
- નવું પ્રોટીન બને નહિ
- પ્રોટીનનો શક્તી માટે ઉપયોગ થવા લાગે

ડાયાબીટીસના પ્રકારો

ટાઇપ 1 ડાયાબીટીસ:

- Body's immune system destroys cells producing insulin so none or very little production of insulin

ટાઇપ 2 ડાયાબીટીસ:

- **90% of people having DM has this type**
- None or insufficient production of insulin and/or body's inability to use insulin effectively

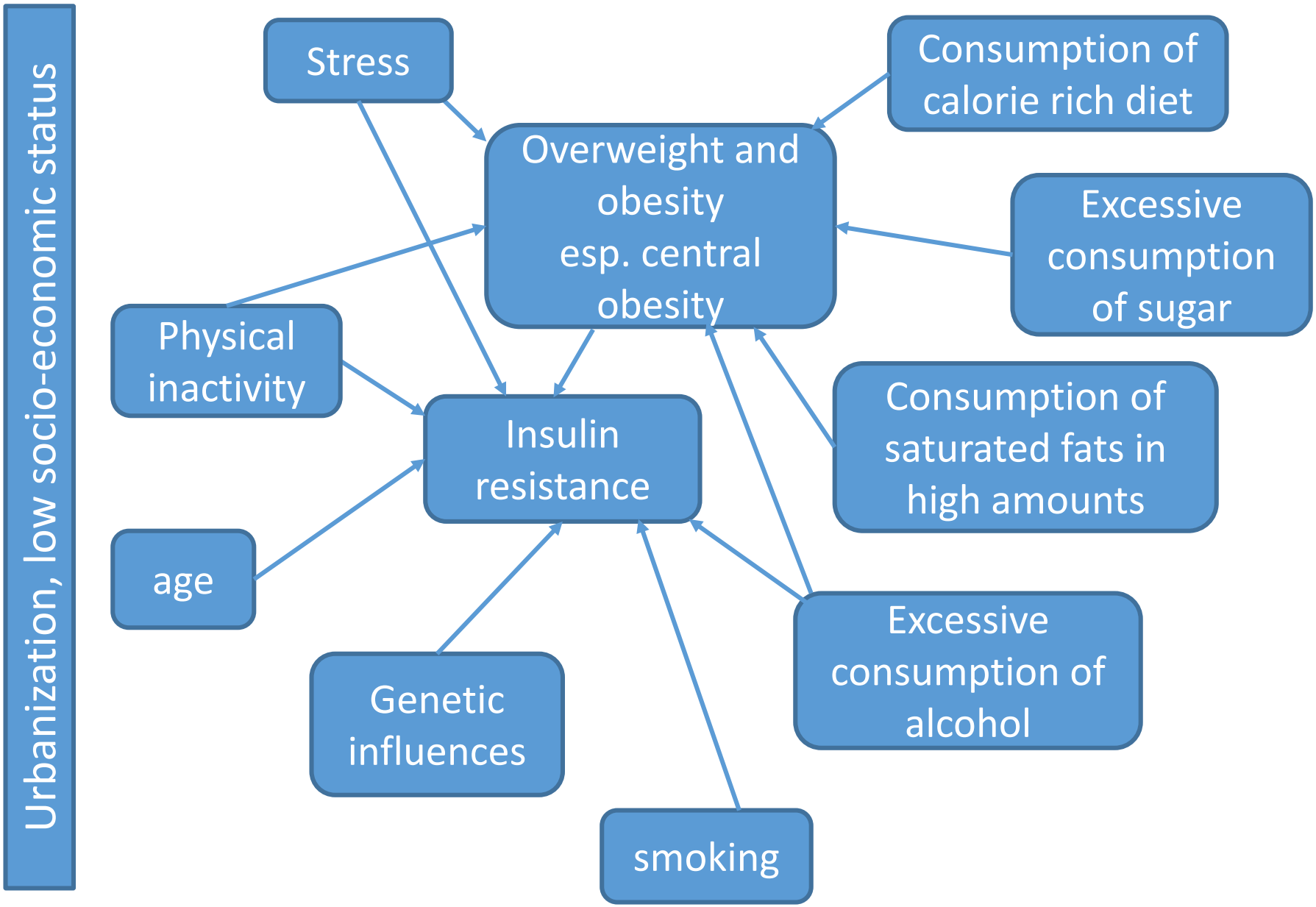
પ્રેગનન્સી દરમિયાન થતો (Gestational) ડાયાબીટીસ:

- High blood sugar during pregnancy
- Higher risk of developing type 2 DM 5 to 10 years after delivery
- Higher risk of developing adverse outcomes related to pregnancy

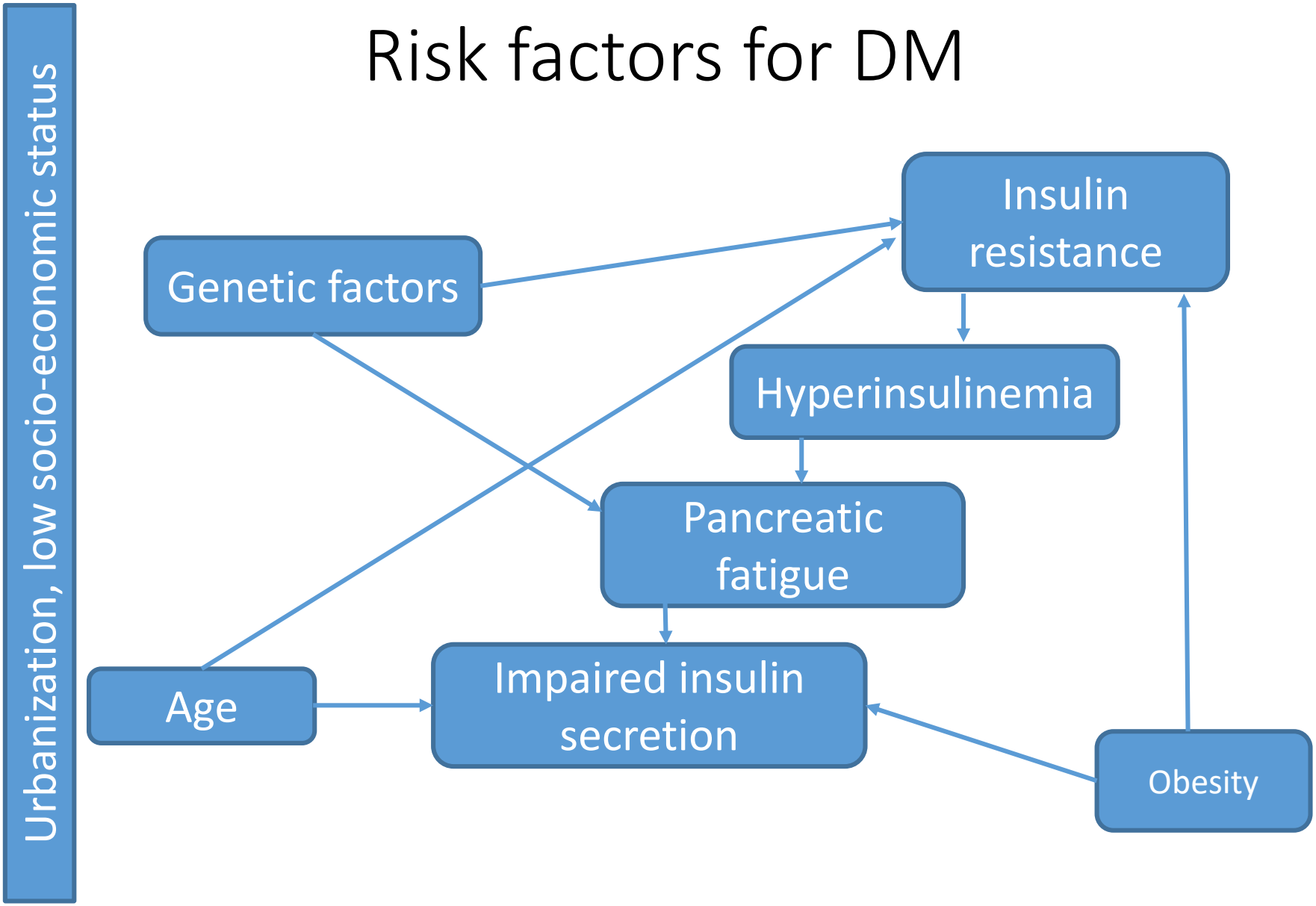
જોખમ વધારતા પરિબળો/કારણો

- શારીરિક સ્થૂળતા
- અસમતોલ કે અમર્યાદિત આહાર
  - ✓ simple carbohydrates
  - ✓ saturated fats
  - ✓ calorie rich diet
- બેઠાડું જીવન
- વધારે પડતી માનસિક ચિંતા કે તણાવ
- દારુનું સેવન
- ધુમ્રપાન
- વય
- વારસાગત કારણો

Risk factors for DM



Risk factors for DM



ડાયાબીટીસના લક્ષણો

વધુ તરસ લાગે

ખુબ ભુખ લાગે

વારંવાર બાથરૂમ જવું પડે

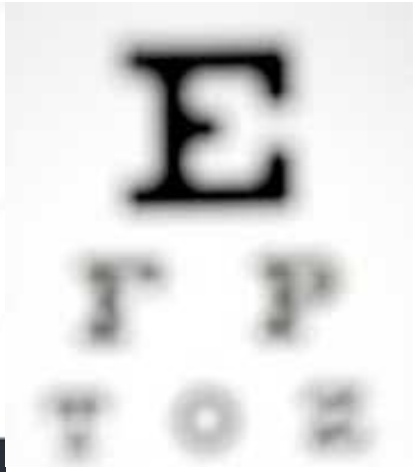
ખુબ થાક લાગે

વજન ઉતરતું જાય

વારંવાર ફંગસનો ચેપ લાગે

ઘા જલ્દી રુઝાય નહિ

આંખે ઓછુ દેખાય



How do you know your risk of DM? (diagnosis)

- History
- Physical examination
  - Signs and symptoms of DM
  - Signs and symptoms of complications related to DM
  - Body mass index
- Laboratory investigation
  - Blood glucose levels
  - Oral glucose tolerance test
  - **HbA1C**
  - Insulin assay
  - Urine test for presence of infection, albumin and sugar

નિદાન કઈ રીતે થાય?

Criteria	Low risk range (normoglycemia)	Prediabetes range	DM range
ભૂખ્યા પેટે થતી લોહીની તપાસ (FPG)	< 110 mgdl	110 – 125 mgdl	>/=126 mgdl
જમ્યા પછી ૨ કલાકે લોહીની તપાસ (2hPG)	<140 mgdl	140-199 mgdl	>/= 200mgdl
HbA1C (ગ્લાઈકેટેડ હિમોગ્લોબીન)	**<5.7%**	**5.7-6.4%**	**>/= 6.5%**

Ref. Harrison's Principles of Internal Medicine, 16th ed. Page 2152 and Diagnosis and Classification of Diabetes Mellitus American Diabetes Association Diabetes Care 2013 Jan; 36(Supplement 1): S67-S74, page S71.

Prevention and treatment of DM

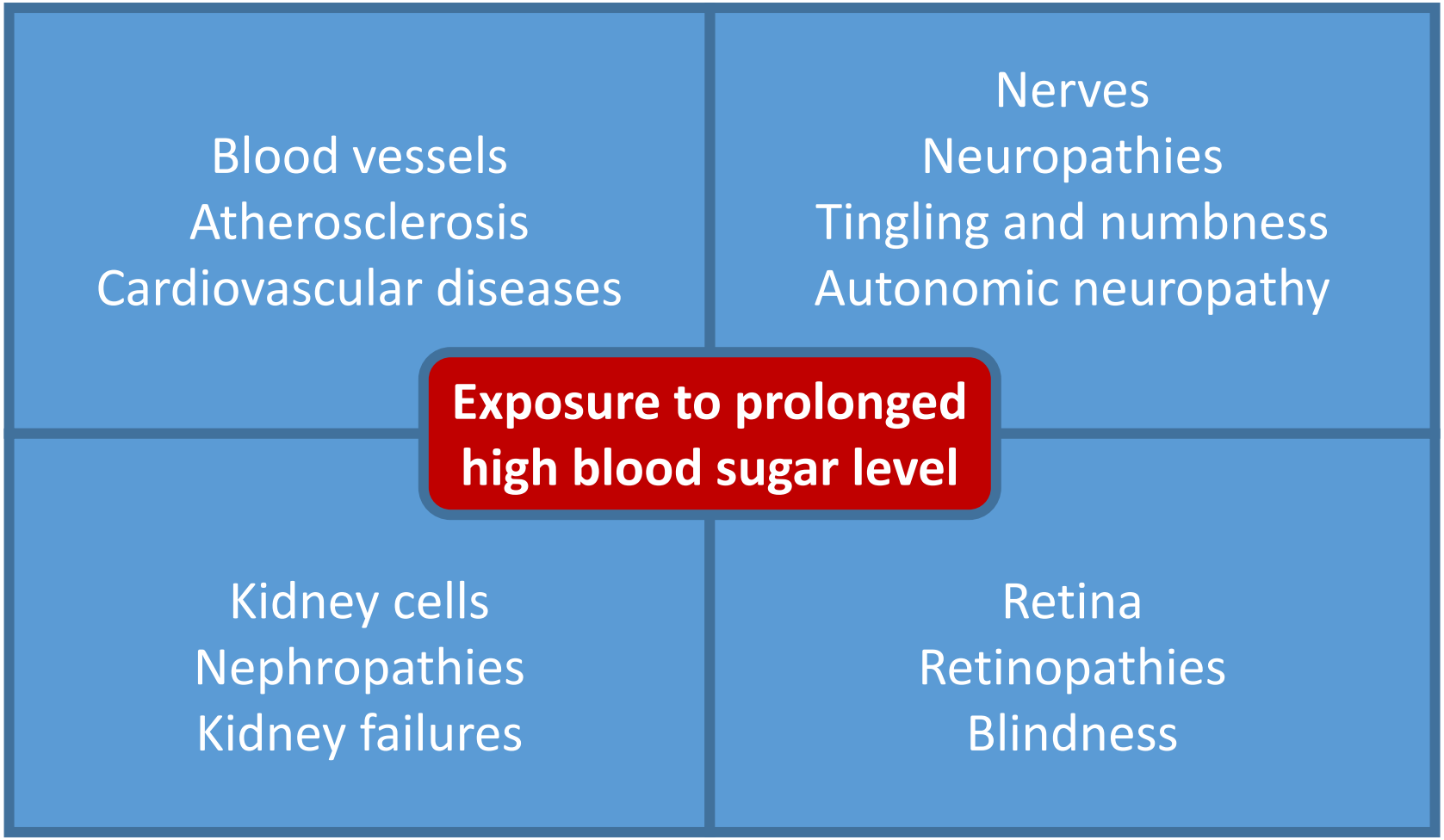
જોખમ વધારતા પરિબળો/કારણોને નિયંત્રણ માં લાવવા

- શારીરિક સ્થૂળતા
- અસમતોલ કે અમર્યાદિત આહાર
  - ✓ simple carbohydrates
  - ✓ saturated fats
  - ✓ calorie rich diet
- બેઠાડું જીવન
- વધારે પડતી માનસિક ચિંતા કે તણાવ
- દારુનું સેવન
- ધુમ્રપાન
- વય
- વારસાગત કારણો

યોગ્ય સારવાર લેવી

નિયમિત રીતે દવાઓ લેવી અને ચેક અપ કરાવતા રહેવું

યોગ્ય સારવાર ના લઈએ તો શું થાય?(complications)



યોગ્ય સારવાર ના લઈએ તો શું થાય?(complications)

Immune system
Weakening
Recurrent infections
Delayed wound healing

Multiple other complications
Include cancer, tuberculosis, depression *et cetera*

Exposure to prolonged high blood sugar level

Oral health
Teeth decay
Poor gum health

Diabetes related acute complications

Is there a way to protect yourself from prediabetes and DM? (prevention)

- Correcting diet
  - Reducing sugary and starchy food
  - Having healthier fats
- Physical activities: at least in adequate amount
- Achieving/maintaining weight within normal limits
- Balancing alcohol intake
- No to tobacco
- Getting yourself checked for DM at regular intervals

What can you do about DM/ prediabetes? (treatment)

GOAL: maintain blood sugar levels as close as possible to normal levels

- Follow the life style change recommendations
- Monitor your blood sugar levels regularly
- Take medicines as per expert advice and ensure regular consultations
- Get yourself checked for DM related complications at regular intervals and take necessary treatment for the complications

LECTURE 4

OBESITY

Learning objectives

- Clearly state that obesity/overweight means excess of fat in the body
- Clearly state that this is an important risk factor leading to a range of health problems (and not merely a beauty/physical appearance related concern)
- Clearly list at least three adverse health effects related to overweight/obesity

Learning objectives

- Clearly list at least three modifiable risk factors of overweight/obesity
- Clearly list at least five changes in life style to prevent or reduce overweight/ obesity
- Can clearly state 3 commonly used anthropometric measures to measure overweight and obesity
- Demonstrate ability to measure overweight and obesity using all these three measures and interpret the findings

What is overweight and obesity?

- In simple language overweight and obesity mean having body weight above what is considered normal for one's height.

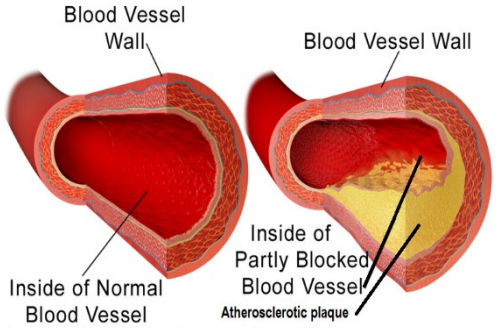
- It occurs as a result of abnormal or excessive fat accumulation in the body (WHO, 2017)

Why should obesity and overweight be of any concern to us?

- It is a serious health concern as excessive fat deposition in the body can impair health in multiple ways
- Adverse effects of obesity are more pronounced in case of central/ visceral/ abdominal obesity
- It increases morbidity and mortality (reduces life span)

How overweight and obesity are bad for the body?

Bone joints and skin problems



Lipid disorders and atherosclerosis

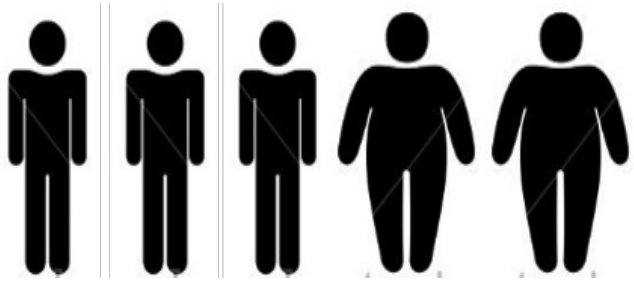
Reproductive disorders

Respiratory problems

Insulin resistance and DM

How widespread is this problem?

Obesity- Global burden

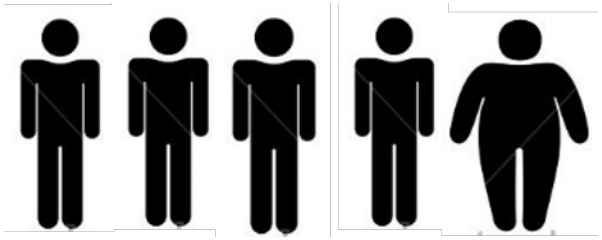


2 out of 5 adults >/= 18 years are overweight or obese

One out of five children and adolescents between 5-19 years are overweight or obese

- The rate of increase has been dramatic
- The epidemic has affected both genders, all age-groups, all countries and all socio-economic groups

Obesity- Burden in India

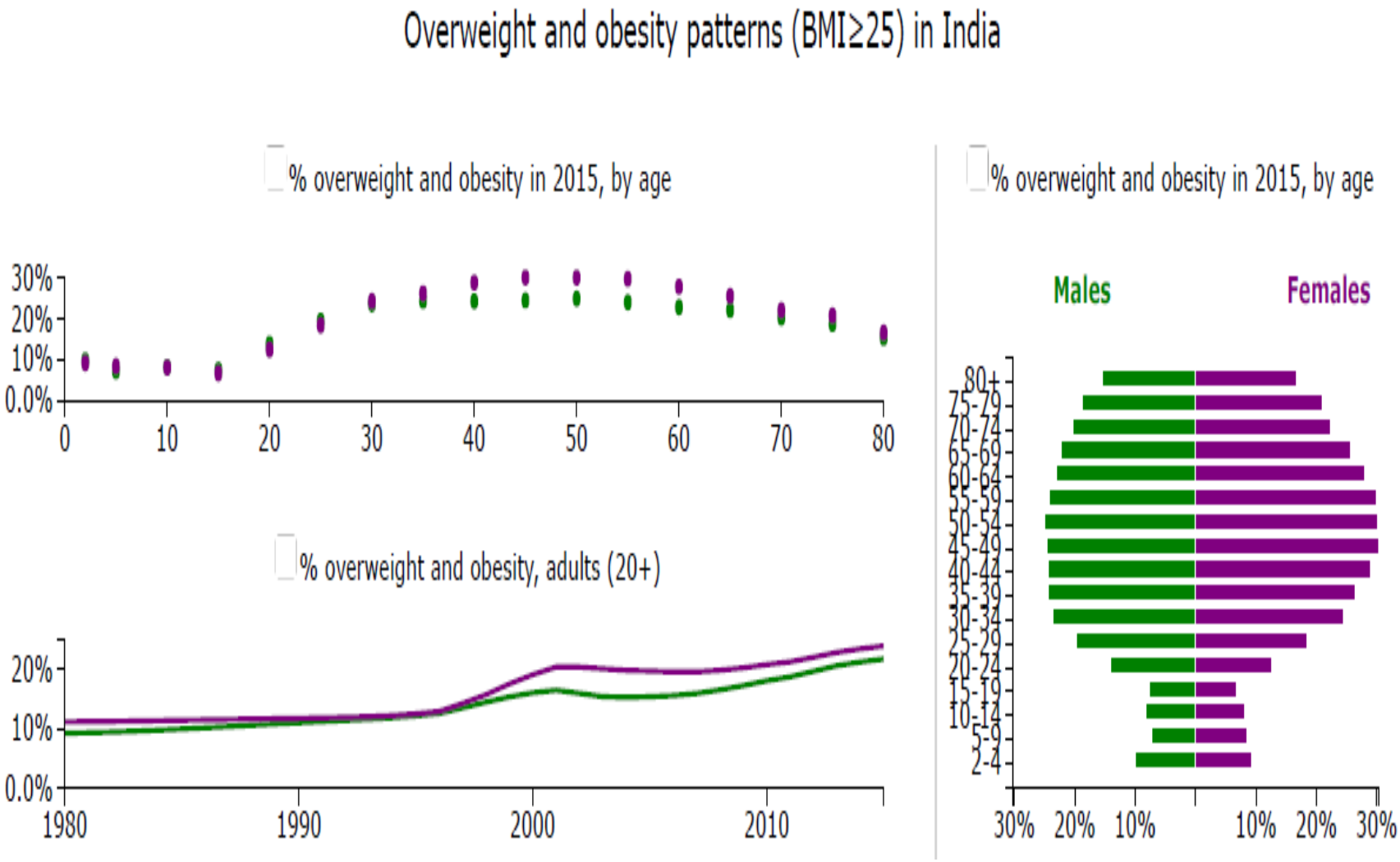


1 out of 5 men and women
between 15-49 years
are overweight or obese
(NFHS 4)

The prevalence of overweight and obesity in India is doubled in India in ten years

Overweight and obesity India is affecting
women more than men
urban more than rural

Obesity- Burden in India



- Source: https://vizhub.healthdata.org/obesity/

How damaging is this epidemic worldwide?

- High BMI accounted for

  4 million deaths globally every year (7.1% of total deaths)
  4.9% of DALYs worldwide in 2015

- CVD and DM are two leading causes of death due to overweight and obesity

What causes obesity?

- Genetic influences
- Endocrinal disorders related to other hormones: especially insulin resistance, thyroid dysfunctions
- Environmental factors
- Dietary indiscretion: frequency, amount, type of food
- Lack of physical activity
- Intra-uterine and childhood influences
- Stress

What can be done about this epidemic?

- This epidemic is preventable!
- Important facets to be considered
- Increasing availability of healthy food choices:
  - Regulation of food industry (marketing, cheap unhealthy alternatives, identifying and acknowledging the true culprit)
  - Affordability of healthier alternatives
- Making everyone and especially youth equipped to choose healthy food:
  - Why youth?: Habits are formed in young ages, overweight and obesity start setting in early, damages begin early
  - How to equip them?:
    - Raising awareness and skills: to choose the right food for health
    - Emphasizing the health consequences of food choice: Losing even 10 percent of the weight results in immediate health benefits

What should we know to avoid/manage this problem?

How does one become overweight or obese?

Whatever might be the cause of overweight and obesity,
weight gain practically results from disturbance in balance between the energy intake and energy expenditure

It is all about striking a balance between income (calories consumed) and expenditure (calories spent)!

What is calorie?

- The food that we eat gives us energy
- The energy that body needs to exist, survive, grow and to perform any task
- The energy that we consume or use is measured in several units: the most commonly used among those is ‘calorie’

Where does the body use energy (expenditure/spending) ?

- Body requires energy to perform any task.
- Even while we are at complete rest, considerable energy is required to carry out basic bodily functions.
- This minimum level of energy that our body requires to exist is termed as **basal metabolic rate** (BMR).
- Although BMR depends on body size, body composition (amount of skeletal muscle in the body), sex, age and several other factors, it normally ranges between 50 to 70% of daily energy expenditure.
- Apart from BMR, body needs energy to perform any task such as walking, climbing stairs, thinking, writing, cooking, talking, dancing, playing sports, doing household chores and so on…

From where do we get the energy (calories) (income) ?

The basic source is the food that we eat (income)

The unused energy from the food that we eat is stored in the body in the form of fat

(This is like a fixed deposit from the saved income!)

So, even the fat stored in our body is a source from where we get the energy that our body needs

How does the body save extra energy (savings) ?

- The fat that we accumulate in our bodies are basically extra (unused) energy (measured in the form of calories) stored by the body from the food that we eat
  (in simple way: savings to be used in future in difficult times!)
- Storing calories in the form of fat is the most efficient way to store the energy
- Three major components of our food are Protein, carbohydrate and fats; and all these components provide us the energy we need; in addition to serving several other functions
- Therefore, contrary to the popular belief, all these three food components and not only the fat component can lead to deposition of fat in the body
- One addition to this list is alcohol!

Apart from energy reservoir, is fat a necessary element in our body?

Fat and cholesterol- a fat like substance are an important component of our body structure

Each and every cell of the body has fat and cholesterol as part of its cell membrane, and its various organelles

Fats in our diet are the most concentrated source of energy, providing more than double the energy provided by the other two substances viz. carbohydrates and proteins

Other functions of fats

Additionally,

fats serve a range of important functions in our bodies which include

- Synthesis of hormones
- Vehicle for fat soluble vitamins
- Thermal insulation
- Cushioning for inevitable bruises
- Supports organs
- Structural component of cell membrane
- Gives skin its water resistance
- Prevents water evaporation from skin
- Shock absorbent pads in soles and palms

Where is fat stored in the body?

- Fats are stored largely in adipose tissue and in small amounts in liver
- Adipose tissue is distributed at several places in the body, including beneath the skin and surrounding viscera (internal organs).
- Adipose tissue contains adipocytes: the cells specialized to store fat in the body
- Adipocytes also synthesize and release several biochemical substances including several hormones
- Adipose tissue is regulated by neural and hormonal systems.

Why is fat stored in the body?

Fat storage:
once a survival advantage- now one of the biggest health risks

Story of ancestors!

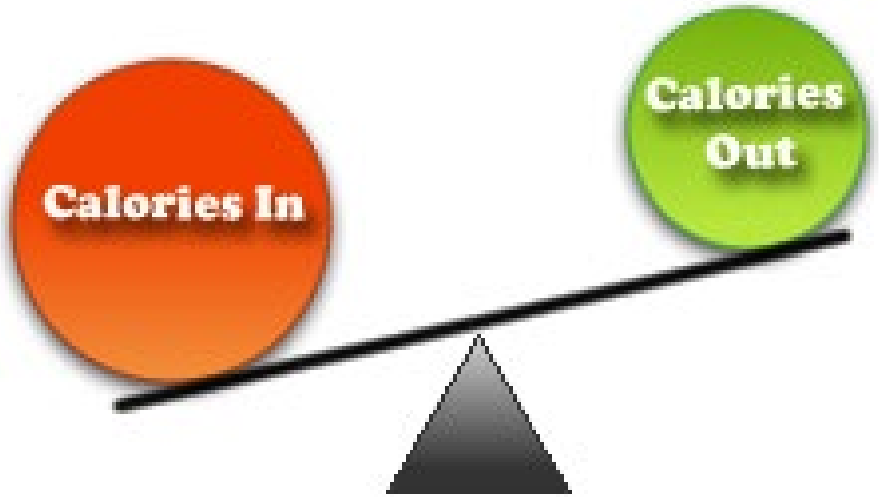
What can you do to avoid/manage this health problem?

Whatever might be the cause of overweight and obesity,
achieving and maintaining optimal body weight practically boils down to
striking balance between the energy intake and energy expenditure

How can we maintain stable weight?

When the calorie that we consume everyday exactly equals to the calorie that we spend, our weight remains stable

How do we gain weight?



When the calorie that we consume everyday is more than the calories that we can spend, we start putting up weight

How do we lose weight?

When the amount of calories consumed everyday is lesser than the amount that is spent we start losing weight

What can you do about overweight and obesity?

A. In case of identifiable primary cause of obesity, taking treatment for the primary cause
B. Treatment of complications associated with overweight and obesity
C. Regular monitoring of body weight and associated complications
D. Overall, achieving and maintaining optimal body weight requires sustained lifestyle changes which include
   - dietary modification(quantity, quality, variety and frequency of food consumed)
   - active lifestyle including adequate physical activity and exercises
   - adequate sleep
   - Better management of stress
   - Inculcating and sustaining healthy habits as early as possible in life
E. Therapeutic diet regimes
F. Surgical procedures to reduce obesity

How do I know whether I have proper weight or not?

- The most widely used measures are
  - Body mass index (BMI)
  - Waist circumference (WC)
  - Waist to hip ratio (WHR)
- We will learn to measure this in practical session

Body Mass Index (BMI)

- BMI is a person's weight in kilograms divided by the square of the person's height in meters (kg/m2)
- It is a kind of proxy indicator for the adiposity/fatness in the body
- BMI is strongly correlated with obesity related health outcomes
- It is simple and easy to measure and calculate and therefore most widely used tool to estimate risk of obesity related health outcomes

Classification of nutritional status based on BMI

BMI	Nutritional status
Below 18.5	Underweight
18.5-22.9	Normal weight
23-24.9	Overweight (pre-obesity)
>/=25	Obesity class 1

Ref. Manual for doctors, India

Waist circumference (WC) and Waist to hip ratio (WHR)

- WHR and WC are more accurate measure of visceral/central obesity

- WHR and WC complement BMI in assessing risk of health related outcomes

Normal values of WC and WHR

WC	Normal value (cm)
Men	<90
Women	<80
WHR	**Normal value (unit less)**
Men	<0.95
Women	<0.85

Ref. Manual for doctors, India

Ice breaking!

- Give five health tips to your mother, friends, sister and girl friend/boyfriend ☺
- Write five health tips for your self

LECTURE 5

HIGH BLOOD PRESSURE

હાઈ બ્લડ પ્રેશર વિષે જાણવું શા માટે જરૂરી છે?

- હૃદય સંબંધિત રોગો જેવાકે હાર્ટ એટેક, હાર્ટ ફેઈલ તથા લકવો (પેરાલીસીસ) થવા માટે જવાબદાર છે
- વિશ્વમાં કુલ ૧ બિલિયન લોકોને હાઈ બ્લડ પ્રેશર છે
- દર વર્ષે કુલ ૯ મિલિયન લોકો હાઈ બ્લડ પ્રેશરના કારણસર મૃત્યુ પામે છે

આપણા દેશમાં શું પરીસ્થિતિ છે?

આપણા દેશમાં કેટલા લોકોને હાઈ બ્લડ પ્રેશર છે?

વિસ્તાર	૨૦ વર્ષની વયથી ઉપરના લોકોમાં હાઈ બ્લડ પ્રેશરના કેસ
ભારત	29%
શહેરી	34%
ગ્રામ્ય	28%

Rule of halves

આ બધું જાણીને ફાયદો શું?

- હાઈ બ્લડ પ્રેશર તથા તેનાથી થતા કોમ્પ્લીકેશનથી બચવું શક્ય છે

- બચાવ એ સારવાર કરતા સસ્તો અને વધુ ફાયદાકારક રસ્તો છે

- શરૂઆતના સમયમાં હાઈ બ્લડ પ્રેશર કોઈ ચિહ્નો કે લક્ષણો દેખાડતું નહી હોવાથી આપણે તેને ઓળખી શકતા નથી અને તે છુપી રીતે જ આપણા શરીરને નુકસાન કરતુ રહે છે .

હાઈ બ્લડ પ્રેશર શું છે?

To understand this, let us understand some basic phenomena……

બ્લડ: એક ટ્રાન્સપોર્ટનું સાધન

Out of several important functions that blood performs in the body, one is transporting substances from source to target cells, tissues and organs.

These include:

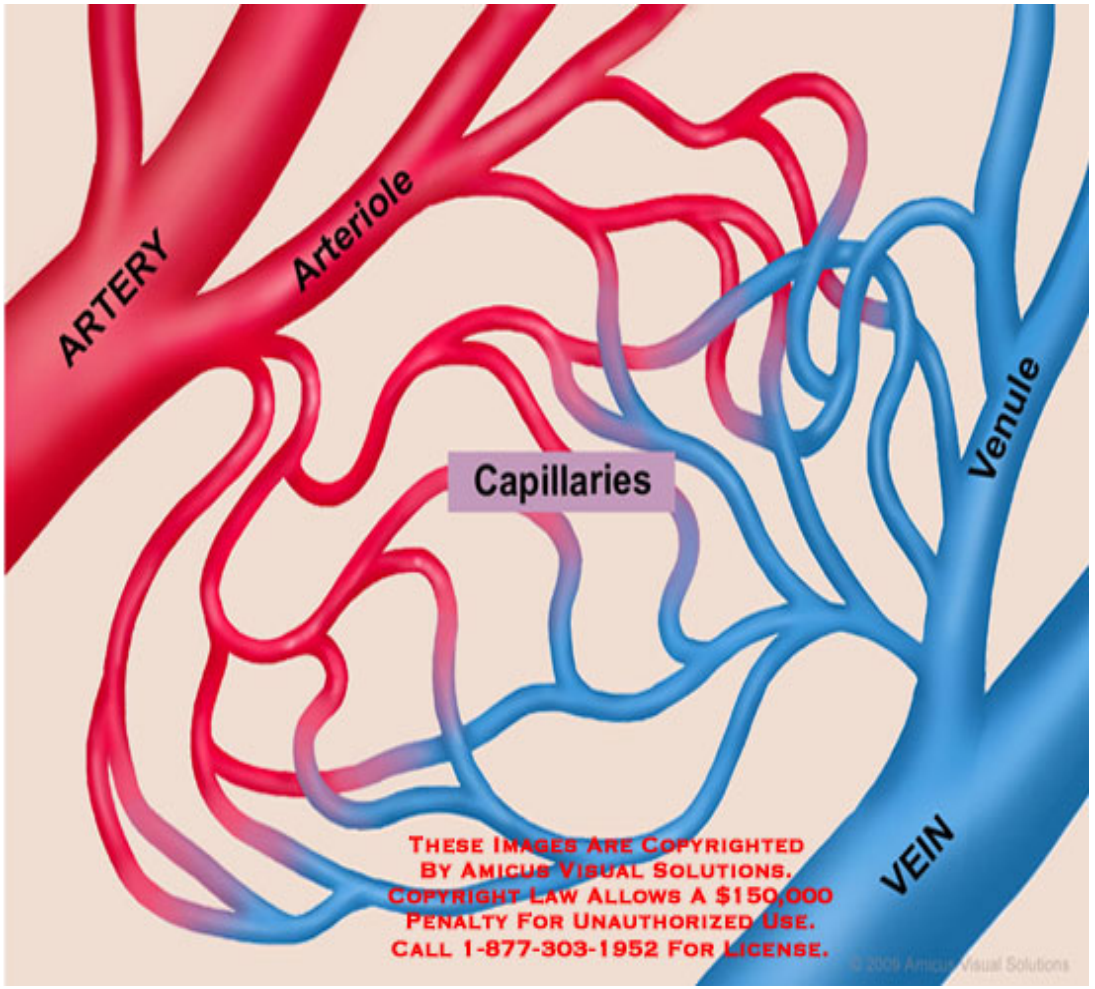
- ઓક્સિજન
- કાર્બન ડાયોકસાઈડ
- ગ્લુંકોસ (સુગર), ફેટી એસીડ, એમીનો એસીડ
- કોષો બનાવવાનો જરૂરી સમાન (such as cholesterol, phospholipids, glycolipids, glycoproteins);
- અંતઃ સ્ત્રાવો (chemical regulators of metabolic processes);
- એન્ટીબોડીઝ (that help fighting the infection)
- યુરિયા જેવા વેસ્ટ પદાર્થો

આપણું રુધિરાભિસરણ તંત્ર

Blood flows through blood vessels,

which can be compared with a closed loop network of roads,

originating from and terminating in the heart.



આપણું રુધિરાભિસરણ તંત્ર

દરેક કોષને બ્લડ પહોચાડે છે

Any guesses how many do we have?

About 100 trillion!

(ref. Guyton and Hall, Xth edition)

હૃદય- એક પંપ

એક વખત હૃદય ધબકે ત્યારે એક પમ્પીંગ સાઈકલ પૂરી થાય

બે હાર્ટબીટની વચ્ચે હૃદય રિલેક્ષ થાય અને એમાં લોહી ભરાય

નેક્સ્ટ હાર્ટબીટ દ્વારા આં બ્લડ ફોર્સથી પંપ થઈને આખા શરીરને પહોચે.

બ્લડ પ્રેશર શું છે?

- જ્યારે બ્લડ નળીઓમાંથી વહે છે ત્યારે એ નળીઓની દીવાલ પર પ્રેશર લગાવે છે; જેને આપણે બ્લડ પ્રેશર કહીએ છીએ
- આ બ્લડ પ્રેશર ત્રણ કારણોથી લાગે છે:

    ૧. હૃદય ફોર્સથી બ્લડને પંપ કરે છે; બ્લડનો જથ્થો જેટલો વધુ એટલું પ્રેશર વધુ

    ૨. લોહીની પોતાની સ્નિગ્ધતાને લીધે તે નળીઓમાં વહેતી વખતે એક અવરોધ ઉત્પન્ન કરે છે

    ૩. નળીઓ પોતે સંકુચિત કે વિસ્તૃત થઇ શકે છે

શું બ્લડ પ્રેશર હમેશા સ્થિર રહે?

- ના, સામાન્ય પરિસ્થિતિમાં જયારે રોગ ના હોય ત્યારે પણ બ્લડ પ્રેશરમાં વધ ઘટ થતી રહે છે. જયારે કસરત કરીએ ત્યારે કે જયારે સ્ટ્રેસમાં (ચિંતામાં) આવી જઈએ ત્યારે બ્લડ પ્રેશર વધી જાય છે પરંતુ પાછુ નોર્મલ પણ થઇ જતું હોઈ છે

- બ્લડ પ્રેશર માં થતી આં નોર્મલ વધ ઘટ એકદમ ચોક્કસ રીતે નિયંત્રિત હોય છે જેમાં જે-તે કોષો, ચેતા તંત્ર, અંતઃસ્ત્રાવો તથા કીડની મહત્વનો ભાગ ભજવે છે

તો હાઈ બ્લડ પ્રેશર એક રોગ ક્યારે કહેવાય?

જયારે કોઈ કારણસર બ્લડ પ્રેશર કાયમી ધોરણે સામાન્ય લીમીટ કરતા ઊંચું જ રહે અંદ નોર્મલ થાય નહિ ત્યારે તેને હાઈ બ્લડ પ્રેશર નો રોગ અથવા હાઇપર ટેન્શનનો રોગ કહે છે

આ એક આજીવન બીમારી છે

હાઈ બ્લડ પ્રેશરના પ્રકારો

સેકન્ડરી (10% of cases):

- Specific cause of HT can be identified such as several types of kidney diseases or endocrinal diseases
- Treating the specific cause cures the HT

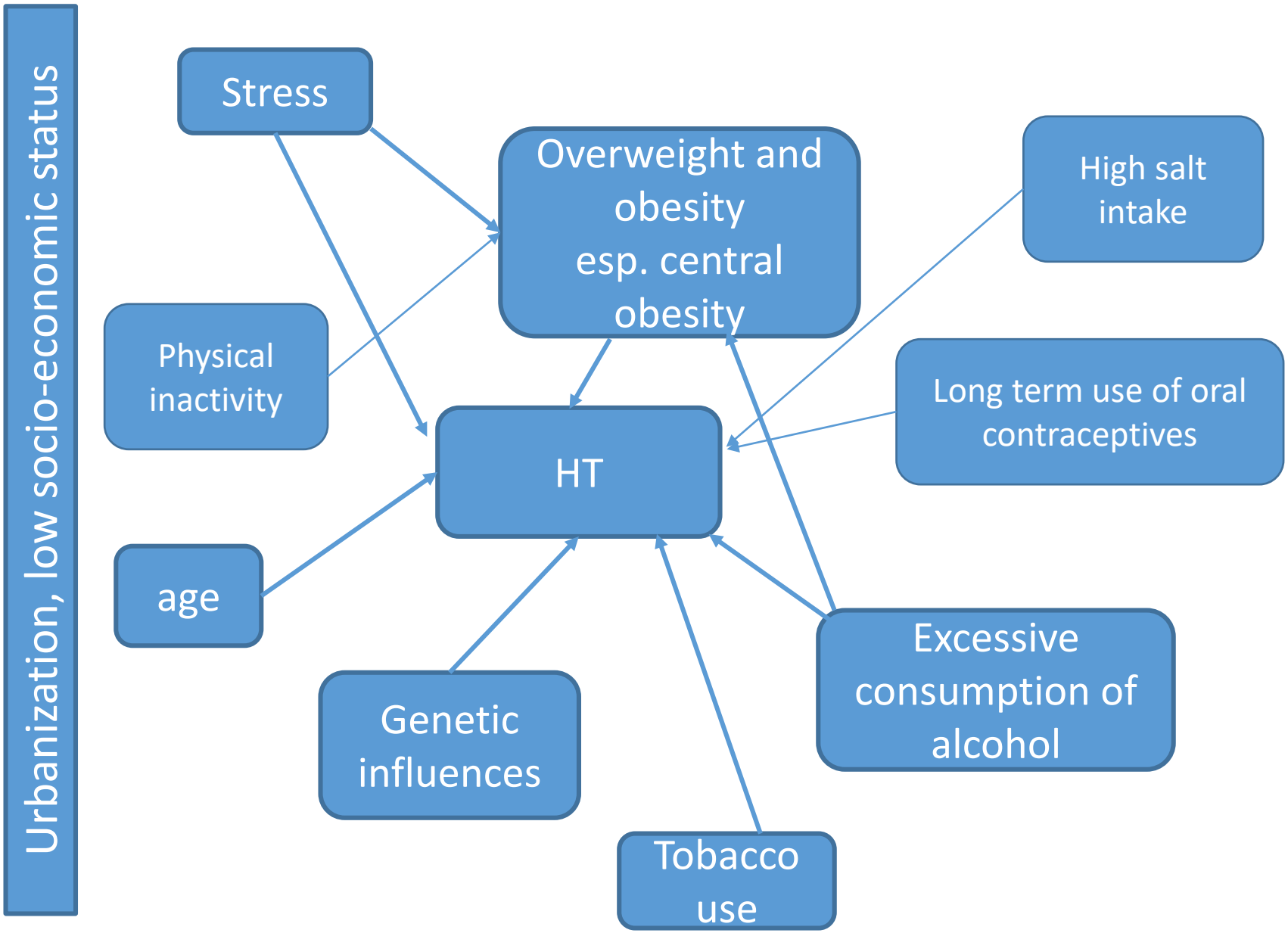
પ્રાઈમરી/ ઇસ્સેન્સીઅલ/ ઇડીઓપથીક :

- No specific cause of HT can be identified.
- Several factors are identified which are associated with increased risk of developing HT.
- Several among these risk factors are modifiable.
- Modifying these risk factors significantly reduce chances of occurrence of HT; help manage the course of HT and delay or avoid occurrence of complications associated with HT.

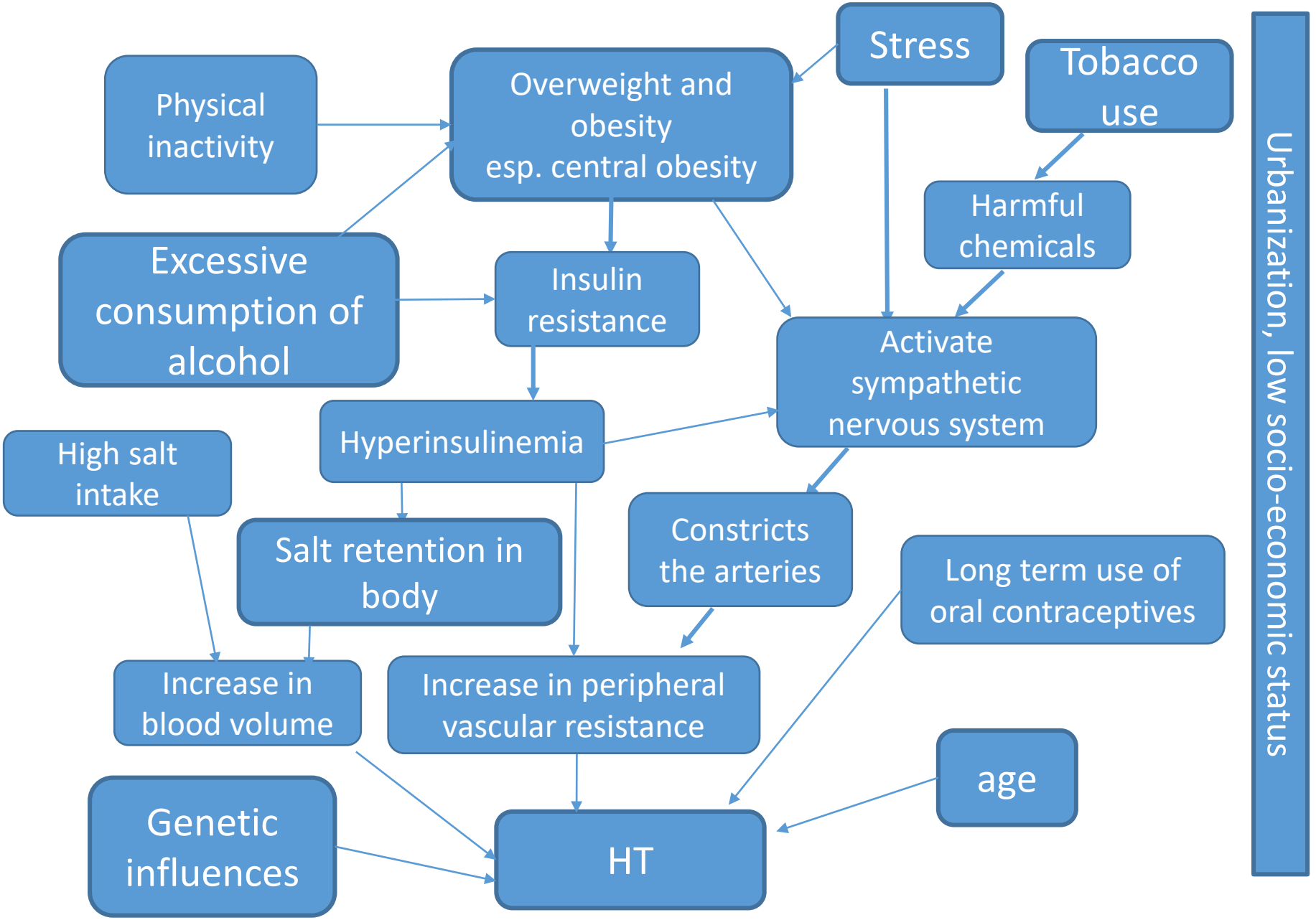
જોખમ વધારતા પરિબળો/કારણો

- શારીરિક સ્થૂળતા
- કોલેસ્ટ્રોલના પ્રમાણમાં ગરબડ
- અસમતોલ કે અમર્યાદિત આહાર
  - ✓ simple carbohydrates
  - ✓ saturated fats
  - ✓ calorie rich diet
  - ✓ salt
- બેઠાડું જીવન
- વધારે પડતી માનસિક ચિંતા કે તણાવ
- દારુનું સેવન
- ધુમ્રપાન અથવા તમાકુનું સેવન
- વય
- વારસાગત કારણો

Risk factors for HT



Risk factors for HT



અન્ય જોખમી પરિબળો

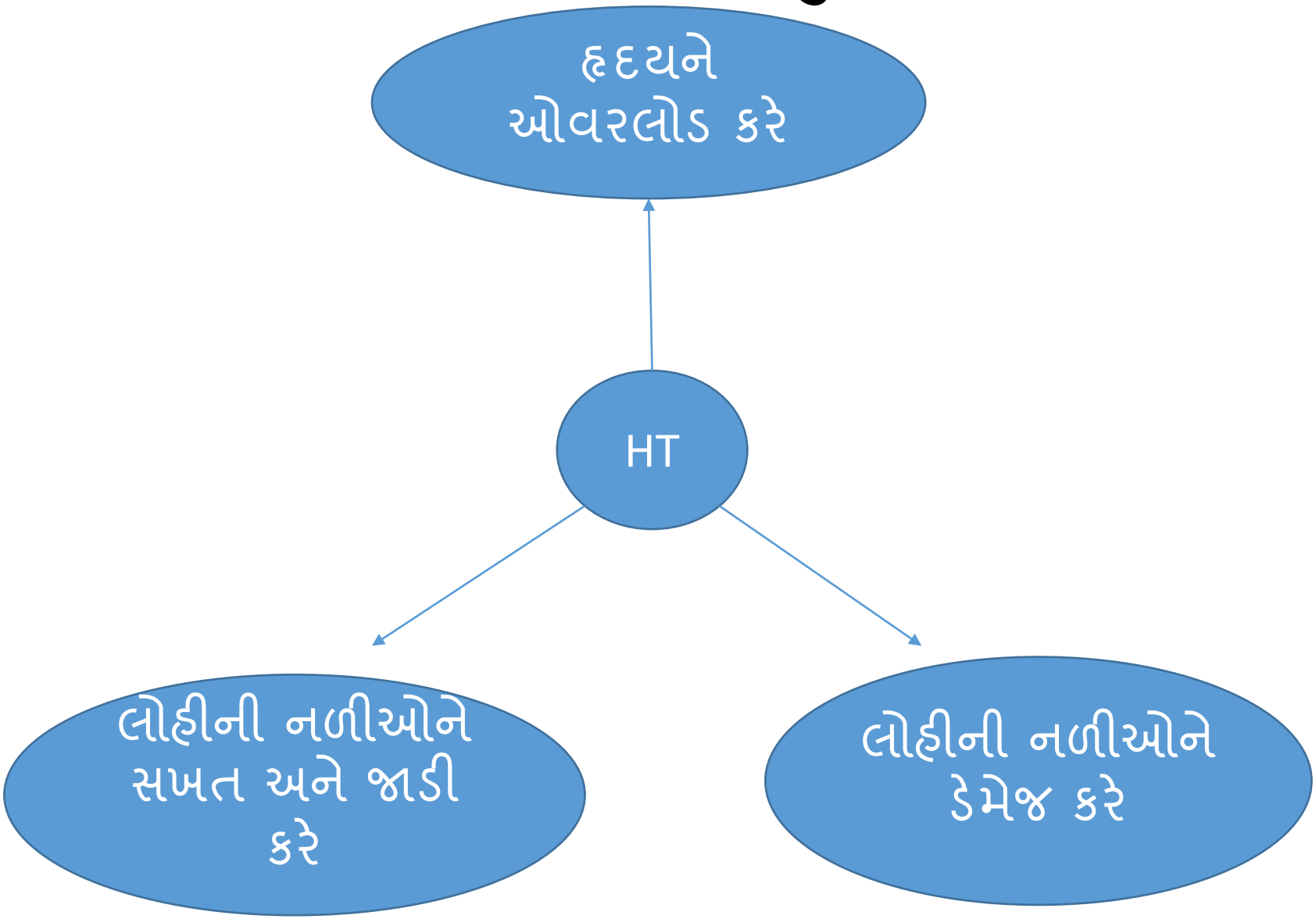
પ્રેગનન્સી દરમિયાન ખેંચ આવે કે બ્લડ પ્રેશર વધુ હોવું

ડાયાબીટીસ કે પ્રીડાયાબીટીસ હોવું

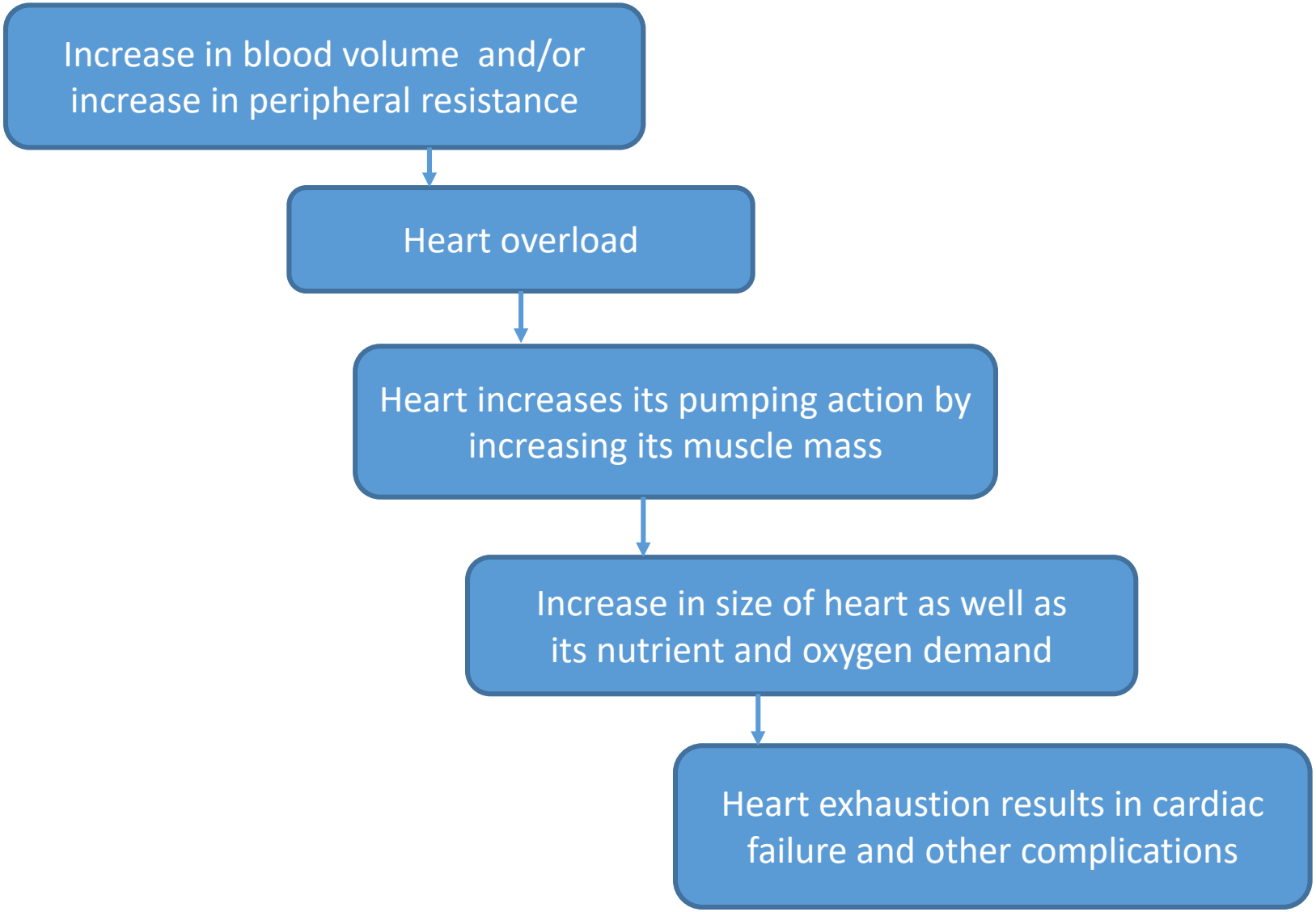
મેટાબોલિક સિન્ડ્રોમ

- કોલેસ્ટ્રોલના પ્રમાણમાં ગરબડ
- હાઈ બ્લડ પ્રેશર
- પેટ આસપાસ વધુ ચરબીનો ભરાવો
- હાઈ બ્લડ સુગર

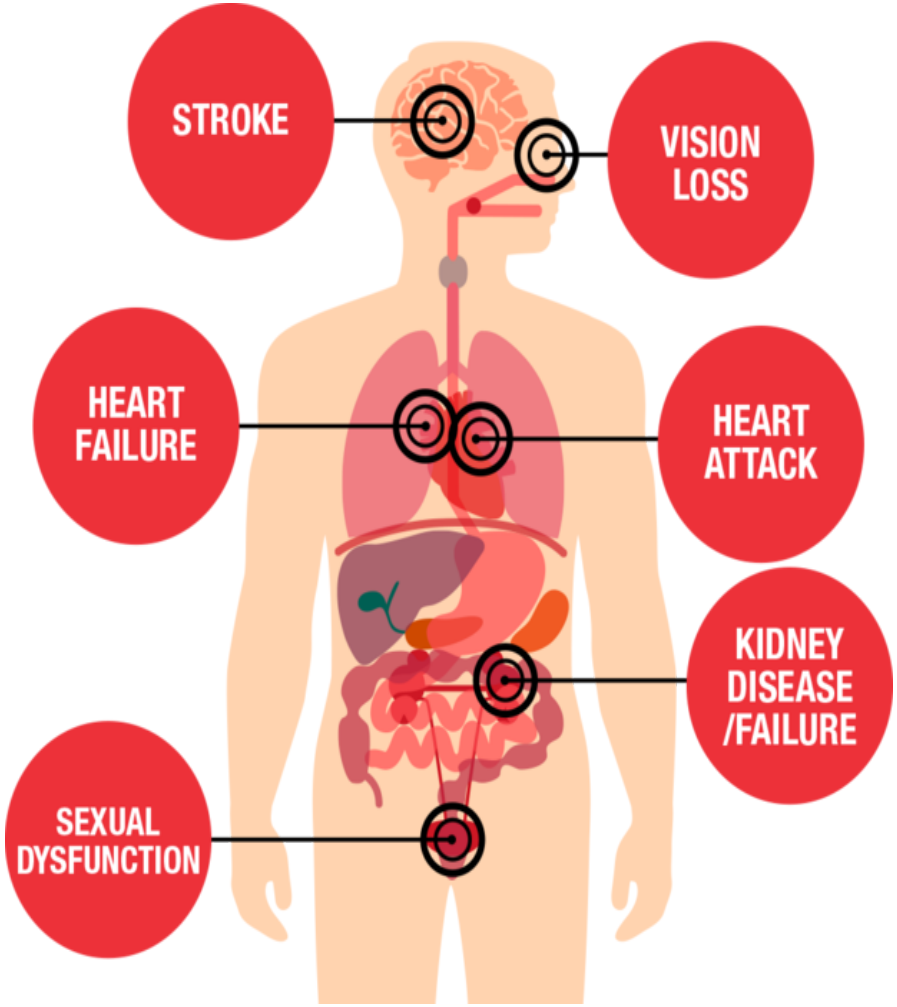
હાઈ બ્લડ પ્રેશર કઈ રીતે નુકસાનકારક છે?



How HT is bad for the body?



Complications of HT



- લકવો (પેરલીસીસનો હુમલો)
- મગજમાં હેમરેજ થાય
- હાર્ટ અટેક
- હાર્ટ ફેઈલ
- કીડની ફેઈલ
- આંખો ઉપર અસર
- નસકોરી ફૂટવી
- પેશાબમાં લોહી આવવું
- ગળફામાં લોહી આવવું

Atherosclerosis

- It is almost invariable accompaniment of HT
- Atherosclerosis is a kind of thickening and hardening of arterial walls characterized by formation of fibro fatty plaques or atheroma.
- *Athero*: porridge like soft lipid rich material in the center of the atheroma

  Sclerosis: scarring.

Atherosclerosis

- Atherosclerosis can affect any artery, it commonly affects arteries in heart, brain, kidney, extremities and splanchnic circulation.
- Atherosclerosis is responsible for life threatening complications such as stroke and myocardial infarction
- HT accelerates the process of atherosclerosis
- Control of hypertension significantly reduces risk of atherosclerotic complications.

કેવી રીતે ઓળખી શકાય?

- મોટાભાગે કોઈ ચિહ્નો કે લક્ષણો દેખાતા નથી જેથી છુપી રીતે ડેમેજ કરતુ રહે પણ ખ્યાલ ના આવે

- ક્યારેક આવા લક્ષણો દેખાડે

  - ઓક્સીપીટલ એરીઆમાં માથું દુખે ખાસ કરીને સવારમાં અને પછી એની જાતે જ ઓછું થઇ જાય
  - ચક્કર આવે
  - ધબકારા વધી જાય
  - થાક લાગે

- મોટાભાગે રોગ ખુબ આગળ વધી ગયા બાદ ખબર પડે: જયારે કોમ્પ્લીકેશન દેખા દે એટલે કે હાર્ટ અટેક આવે કે લકવો પડે

નિદાન કેવી રીતે થાય?

- History
- Physical examination
  - Signs and symptoms of HT including measuring BP
  - Signs and symptoms of underlying disease causing HT
  - Signs and symptoms of complications related to HT
  - Body mass index
  - Electrocardiogram ECG

- Laboratory investigations
  - Urine test for presence of infection, albumin and sugar and blood
  - Blood glucose levels
  - Other investigations necessary based on physical examination

નિદાન માટેની લીમીટ

Category	ઉપરનું Systolic BP in mmHg		નીચેનું Diastolic BP in mmHg
સામાન્ય	<120	and	<80
થોડું વધારે	120-129	and	<80
હાઈ બ્લડ પ્રેશર			
સ્ટેજ ૧	130-139	or	80-89
સ્ટેજ ૨	>/=140	or	>/= 90

Ref: 2017 Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults: A report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines

હાઈ બ્લડ પ્રેશરથી કઈ રીતે બચી શકાય?

જોખમ વધારતા પરિબળો/કારણોને નિયંત્રણમાં લાવવા

- શારીરિક સ્થૂળતા
- કોલેસ્ટ્રોલ પર નિયંત્રણ
- અમતોલ કે અમર્યાદિત આહાર
  - ✓ salt
  - ✓ simple carbohydrates
  - ✓ saturated fats
  - ✓ calorie rich diet
- બેઠાડું જીવન
- વધારે પડતી માનસિક ચિંતા કે તણાવ
- દારુનું સેવન
- ધુમ્રપાન કે તમાકુનું વ્યાસન
- વય
- વારસાગત કારણો

જોખમ વધારતા પરિબળો/કારણોને નિયંત્રણમાં રાખવા

- શારીરિક સ્થૂળતા
- કોલેસ્ટ્રોલ પર નિયંત્રણ
- અમતોલ કે અમર્યાદિત આહાર
  - ✓ salt
  - ✓ simple carbohydrates
  - ✓ saturated fats
  - ✓ calorie rich diet
- બેઠાડું જીવન
- વધારે પડતી માનસિક ચિંતા કે તણાવ
- દારુનું સેવન
- ધુમ્રપાન કે તમાકુનું વ્યાસન
- **વય**
- **વારસાગત કારણો**

યોગ્ય સારવાર લેવી

નિયમિત રીતે દવાઓ લેવી અને ચેક અપ કરાવતા રહેવું

દવા કઈ રીતે કામ કરે?

- Blood pressure drugs work in several ways, such as
  - removing excess salt and fluid from the body,
  - slowing the heartbeat or
  - relaxing and widening the blood vessels.
- Medicines for dyslipidemia
- Treatment for associated health problems such as diabetes mellitus

LECTURE 6

DISORDERS OF LIPOPROTEIN METABOLISM

ડીસલીપીડેમિયા અને હાઇપર લીપીડેમિયા

- લોહીમાં ચરબી કોલેસ્ટ્રોલના રૂપે હોય છે
- લોહીમાં રહેલું કોલેસ્ટ્રોલ અલગ-અલગ પ્રકારનું હોય છે
- દરેક પ્રકારના કોલેસ્ટ્રોલને પોતાનું ચોક્કસ કાર્ય હોય છે.
- લોહીમાં રહેલા દરેક પ્રકારના કોલેસ્ટ્રોલનું એક નિયત પ્રમાણ હોય છે; જેને હેલ્ધી બેલેન્સ કહી શકીએ

લોહીમાં કોલેસ્ટ્રોલ ક્યાંથી આવે?

- આપણે જે ખોરાક ખાઈએ એમાં થોડા પ્રમાણમાં કોલેસ્ટ્રોલ હોય (ફક્ત પ્રાણીજન્ય ખોરાકમાં) પરંતુ એનું પ્રમાણ ઘણું ઓછું હોય છે
- આપણે જે ખોરાક ખાઈએ એમાંથી મુખ્યત્વે ચરબી તથા કર્બોહાઈડ્રેટમાંથી લીવર શરીરની જરૂરિયાત મુજબનું કોલેસ્ટ્રોલ બનાવે.
- આપણા લોહીમાં જે કોલેસ્ટ્રોલ હોય છે એ મુખ્યત્વે આપણા લીવરમાં બનેલું હોય છે
- આપનું લીવર કેવું કોલેસ્ટ્રોલ બનાવશે એ અપને કયા પ્રકારનો કાચો માલ એને આપીએ છીએ તેના પર પણ નિર્ભર હોય છે

લોહીમાં રહેલા કોલેસ્ટ્રોલના પ્રકારો

Type	Function
VLDL	Transports TGL to adipose tissue
IDL	Transports phospholipids
LDL	Transports cholesterol
HDL	Brings back cholesterol and phospholipids to liver from periphery

Bad cholesterol
Good cholesterol

VLDL: Very low density lipoprotein
IDL: Intermediate density lipoprotein
LDL: Low density lipoprotein
HDL: High density lipoprotein
TGL: triglycerides

Classification of blood lipid levels

Blood level in mg/dl	Classification
LDL cholesterol	
<100	Optimal (જરૂરીયાત મુજબનું)
100-129	Near optimal/above optimal (જરૂરિયાત કરતા થોડું વધારે)
130-159	Borderline high (નોર્મલ કરતા ઊંચું)
160-189	High (ઊંચું)
>/=190	Very high (ખુબ વધારે ઊંચું)

Classification of blood lipid levels

Blood level in mg/dl	Classification
Total cholesterol	
<200 (160 for Indians)	Desirable (હોવું જોઈએ એટલું)
200-239	Borderline high (નોર્મલ કરતા ઊંચું)
>/= 240	High (ઊંચું)
HDL cholesterol	
<40	Low (નીચું)
>/=60	High (ઊંચું)

Classification of blood lipid levels

Blood level in mg/dl	Classification
Triglycerides	
<150	Normal (નોર્મલ)
150-199	Borderline high (નોર્મલ કરતા વધારે)
200-499	High (વધારે)
>/=500	Very high (ખુબ વધારે)

Ref. medical practitioner's manual (ATP III)

આવુ શા કારણે થાય?

- વારસાગત/ જનીન સંબંધિત કારણો
- શારીરિક સ્થૂળતા/ વધુ વજન
- પ્રીડાયાબીટીસ/ ડાયાબીટીસ
- ખોરાકનું અસંતુલન
- શારીરિક એક્ટીવીટી/ કસરતનો અભાવ/ બેઠાડું જીવનશૈલી

કેવી રીતે ખબર પડે?

- History
- Physical examination
- Laboratory investigation

કેવી રીતે બચી શકાય?

Diet:

- Avoid sugary starchy food
- Healthy fats: Omega 3 rich food in adequate amount, no transfats
- Anti-oxidants rich food in adequate amount

Physical activities: at least in adequate amount

Reduce weight/maintain weight within normal range

Sleep: adequately

Stress: control, reduce

સારવાર

- Medicines
  - For dyslipidemia
  - For prediabetes/DM
  - For HT
- Lifestyle changes

ડીસલીપીડેમિયા અને હાઇપર લીપીડેમિયા

- લોહીમાં ચરબી કોલેસ્ટ્રોલના રૂપે હોય છે
- લોહીમાં રહેલું કોલેસ્ટ્રોલ અલગ-અલગ પ્રકારનું હોય છે
- દરેક પ્રકારના કોલેસ્ટ્રોલને પોતાનું ચોક્કસ કાર્ય હોય છે.
- લોહીમાં રહેલા દરેક પ્રકારના કોલેસ્ટ્રોલનું એક નિયત પ્રમાણ હોય છે; જેને હેલ્ધી બેલેન્સ કહી શકીએ

લોહીમાં કોલેસ્ટ્રોલ ક્યાંથી આવે?

- આપણે જે ખોરાક ખાઈએ એમાં થોડા પ્રમાણમાં કોલેસ્ટ્રોલ હોય (ફક્ત પ્રાણીજન્ય ખોરાકમાં) પરંતુ એનું પ્રમાણ ઘણું ઓછું હોય છે
- આપણે જે ખોરાક ખાઈએ એમાંથી મુખ્યત્વે ચરબી તથા કર્બોહાઈડ્રેટમાંથી લીવર શરીરની જરૂરિયાત મુજબનું કોલેસ્ટ્રોલ બનાવે.
- આપણા લોહીમાં જે કોલેસ્ટ્રોલ હોય છે એ મુખ્યત્વે આપણા લીવરમાં બનેલું હોય છે
- આપનું લીવર કેવું કોલેસ્ટ્રોલ બનાવશે એ અપને કયા પ્રકારનો કાચો માલ એને આપીએ છીએ તેના પર પણ નિર્ભર હોય છે

લોહીમાં રહેલા કોલેસ્ટ્રોલના પ્રકારો

Type	Function
VLDL	Transports TGL to adipose tissue
IDL	Transports phospholipids
LDL	Transports cholesterol
HDL	Brings back cholesterol and phospholipids to liver from periphery

Bad cholesterol
Good cholesterol

VLDL: Very low density lipoprotein
IDL: Intermediate density lipoprotein
LDL: Low density lipoprotein
HDL: High density lipoprotein
TGL: triglycerides

Classification of blood lipid levels

Blood level in mg/dl	Classification
LDL cholesterol	
<100	Optimal (જરૂરીયાત મુજબનું)
100-129	Near optimal/above optimal (જરૂરિયાત કરતા થોડું વધારે)
130-159	Borderline high (નોર્મલ કરતા ઊંચું)
160-189	High (ઊંચું)
>/=190	Very high (ખુબ વધારે ઊંચું)

Classification of blood lipid levels

Blood level in mg/dl	Classification
Total cholesterol	
<200 (160 for Indians)	Desirable (હોવું જોઈએ એટલું)
200-239	Borderline high (નોર્મલ કરતા ઊંચું)
>/= 240	High (ઊંચું)
HDL cholesterol	
<40	Low (નીચું)
>/=60	High (ઊંચું)

Classification of blood lipid levels

Blood level in mg/dl	Classification
Triglycerides	
<150	Normal (નોર્મલ)
150-199	Borderline high (નોર્મલ કરતા વધારે)
200-499	High (વધારે)
>/=500	Very high (ખુબ વધારે)

Ref. medical practitioner's manual (ATP III)

આવુ શા કારણે થાય?

- વારસાગત/ જનીન સંબંધિત કારણો
- શારીરિક સ્થૂળતા/ વધુ વજન
- પ્રીડાયાબીટીસ/ ડાયાબીટીસ
- ખોરાકનું અસંતુલન
- શારીરિક એક્ટીવીટી/ કસરતનો અભાવ/ બેઠાડું જીવનશૈલી

કેવી રીતે ખબર પડે?

- History
- Physical examination
- Laboratory investigation

કેવી રીતે બચી શકાય?

Diet:

- Avoid sugary starchy food
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સારવાર

- Medicines
  - For dyslipidemia
  - For prediabetes/DM
  - For HT
- Lifestyle changes

LECTURE 7

MAKING SENSE OF FOOD LABELS

What health/nutrition related information is there on the packed food?

- Serving size
- Total number of servings
- Ingredients list
- Nutrition facts
- Amount of nutrients per serving
- Amount of nutrient per 100 gram
- Nutrition/health claims
- Some content related declarations
- Some health related warnings including related to allergens

What to see?

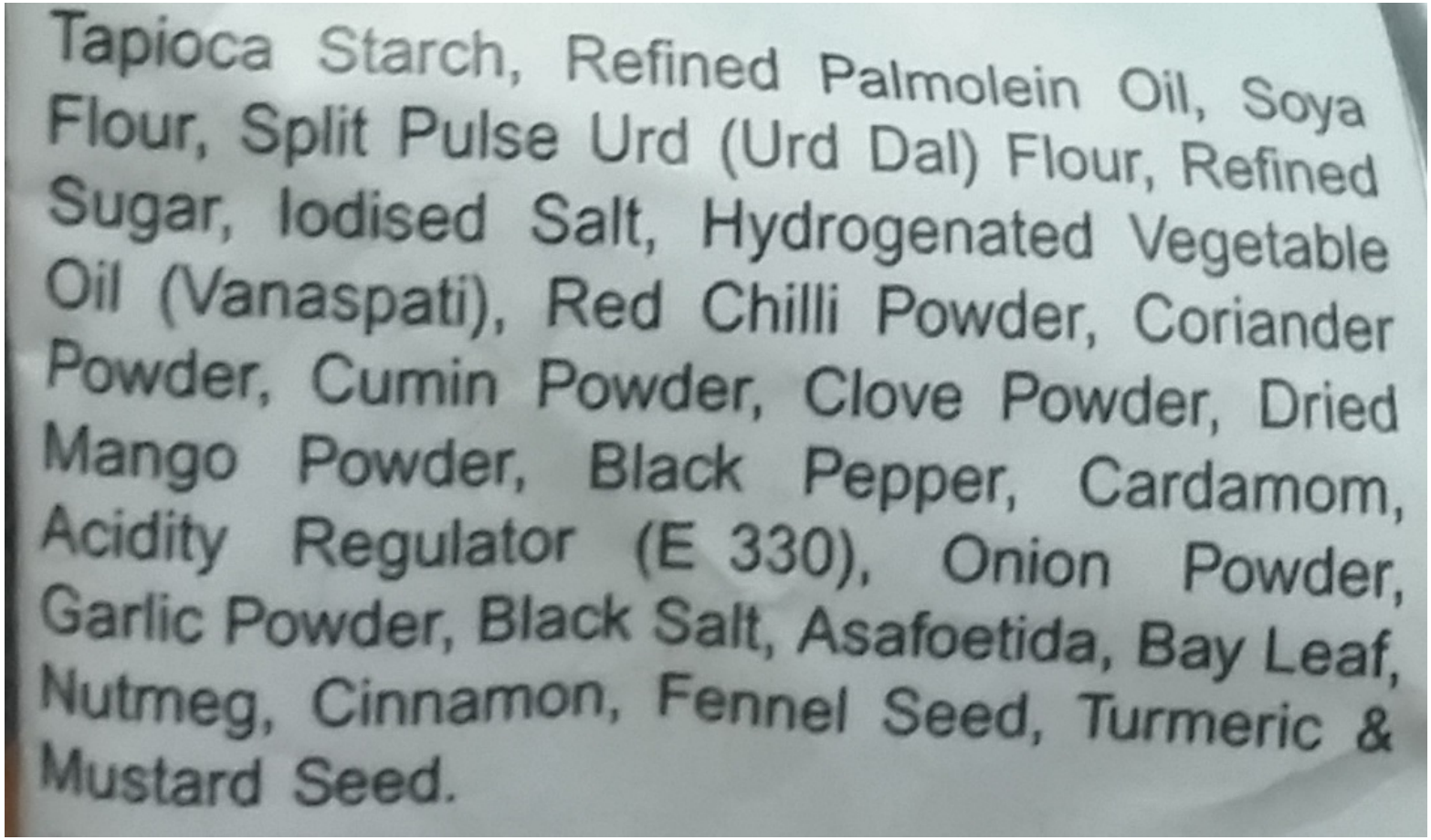
- Ingredients list
- Nutritional values (usually in the form of tables)
- Serving size

How to interpret the ingredients ?

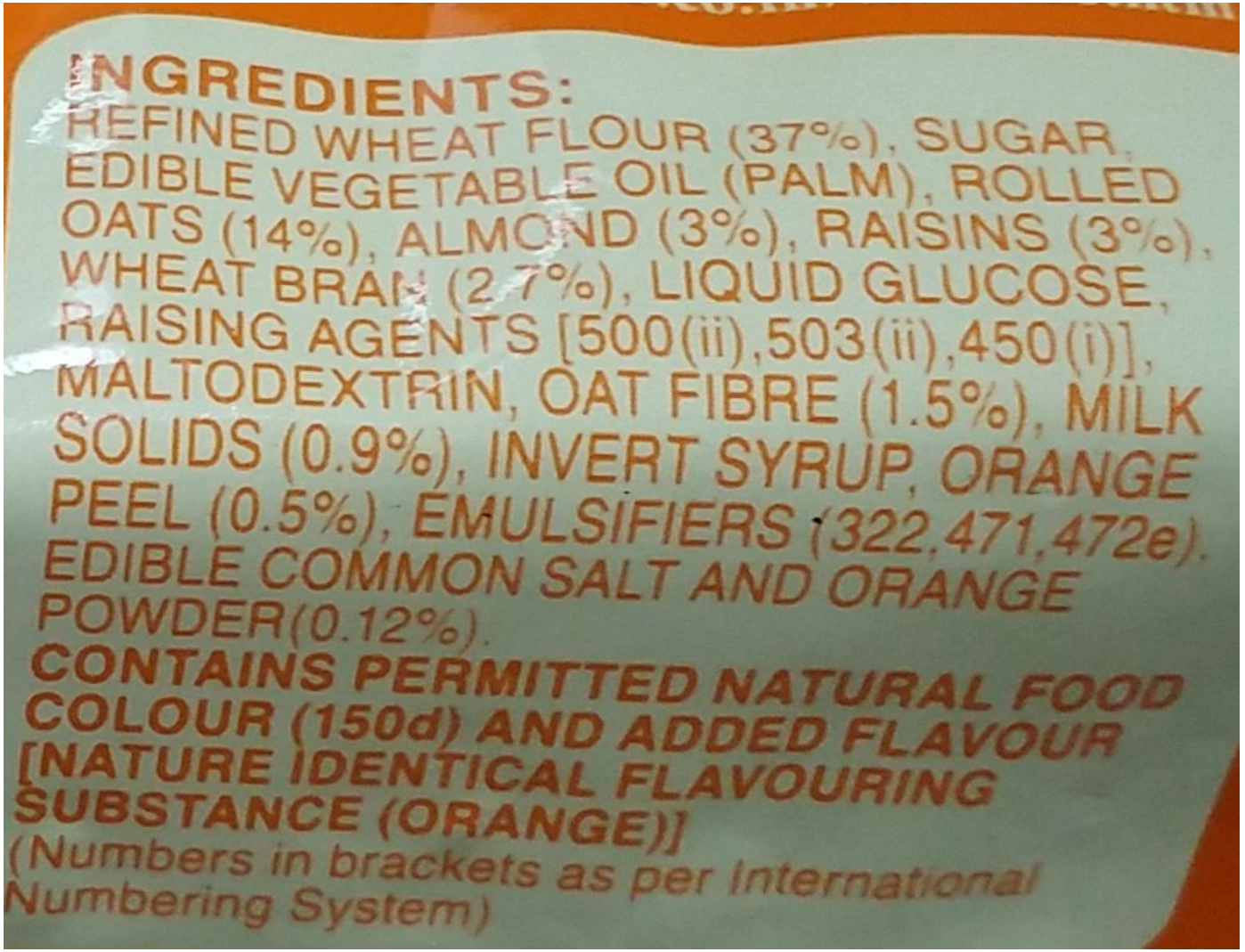
- Order of listing names
- Similar acting agents with different names
- Making sense of ingredients
- Critically evaluate the appropriateness of the health and/or nutritional claim made on the product

Caveat: use multiple similar ingredients in smaller quantities to move that down the order in the list

Find out what indicates trans fats?



Find out what indicates sugar?



Other names that indicate sugar

- Malt syrup
- Maltodextrin
- High fructose corn syrup (HFCS)
- Invert sugar
- Honey
- Jaggery
- Beet sugar
- Caramel
- Cane sugar
- Grape sugar
- Icing sugar
- Fruit juice concentrate
- Date sugar
- Confectionery candy
- Glucose
- Sucrose
- Brown sugar
- Dextrose
- Rice syrup
- Fructose
- Galactose
- disaccharides
- Mannitol
- Sorbitol
- Xylitol
- Maltitol

Find out what indicates salt/sodium?

Ingredients:
Wheat Flour, Sugar, Tomato Solids, Edible Starch, Salt, Dehydrated Vegetables, Milk Solids, Noodles, Flavour Enhancer 621, Onion Powder, Spices & Condiments, Garlic Powder, Acidity Regulator 330. Contain Permitted Synthetic Food Colours (E122, E102) and Added Flavours. - Natural, Nature Identical Flavouring Substances.
CONTAINS PERMITTED NATURAL & SYNTHETIC FOOD COLOUR(S) AND FLAVOURS.

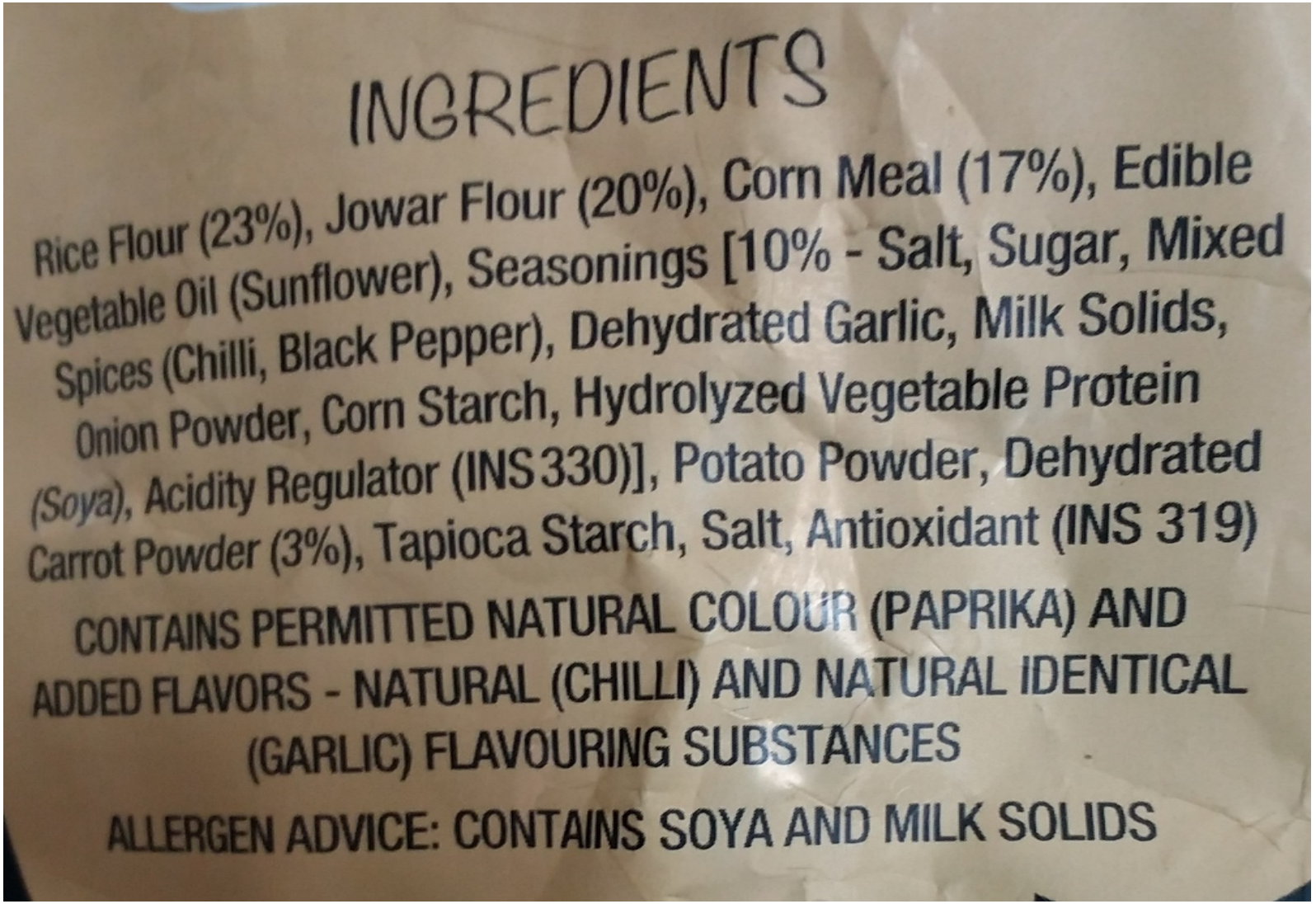
Nutrition Information

Typical Values per serving 150 ml.

Energy K.cal	44.0g
Protein	1.0g
Carbohydrate	8.2g
Fat	0.9g
Saturated Fat	0.4g
Pufa	0.1g
Mufa	0.3g
Trans Fat	0.0g
Cholesterol	0.0g

This package of Soup Powder contains added Monosodium Glutamate. Not recommended for infants below 12 months.

Find out what indicates salt/sodium?



Other names that indicate sodium

- Sodium chloride
- Sodium ascorbate
- Sodium lactate
- Kosher salt
- Sindhaloon
- Himalayan pink salt
- Black salt
- Rock salt
- Sea salt
- Sanchal
- Fruit salt (eno)
- Onion salt/vegetable salt
- Sodium bicarbonate
- Aji-no-moto
- Monosodium glutamate (MSG)
- Baking soda
- Glutamic acid
- Yeast extract
- Soy protein concentrate
- Whey protein concentrate
- Milk protein concentrate
- Flavoring agents
- Spices
- Anything that is enzyme modified
- Anything with the word protein in the ingredients list

How to interpret the nutritional values?

Values are given as:

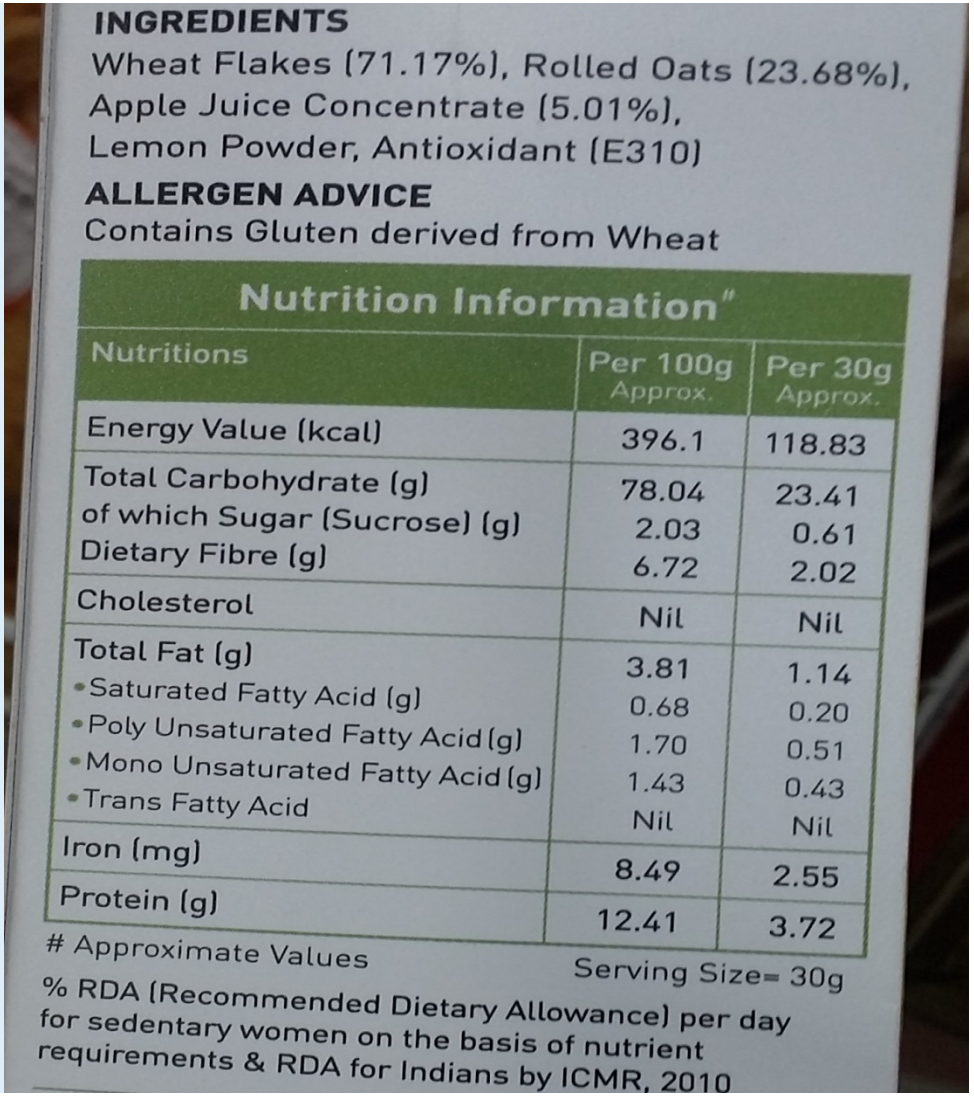
- Per serving/Per 100 gram of the product
- Percentage of recommended daily dietary intake guidelines/Absolute numbers in the unit of weight/volume

Caveat: Inappropriately small serving sizes → to avoid listing several ingredients such as transfats

How are the numbers given?

Milk FAT : 10% , Total Solids : 70% , Sugar Syrup : 62.5%,
Drain Weight : 17 gm each

Nutritional Information*	
Amount per 100 g	
Energy, kcal	292
Energy from Fat, kcal	54
Total Fat, g	6
Saturated fat,g	3
Cholesterol, mg	9
Sodium, mg	46.9
Total Carbohydrate, g	56
Added Sugar, g	46.9
Protein, g	3
Calcium, mcg	187.5
Not a significant source of Vitamin A, Vitamin C, Iron and Dietary fiber.	
*Approx. values	



INGREDIENTS
Wheat Flakes (71.17%), Rolled Oats (23.68%),
Apple Juice Concentrate (5.01%),
Lemon Powder, Antioxidant (E310)

ALLERGEN ADVICE
Contains Gluten derived from Wheat

Nutrition Information#

Nutritions	Per 100g Approx.	Per 30g Approx.
Energy Value (kcal)	396.1	118.83
Total Carbohydrate (g)	78.04	23.41
of which Sugar (Sucrose) (g)	2.03	0.61
Dietary Fibre (g)	6.72	2.02
Cholesterol	Nil	Nil
Total Fat (g)	3.81	1.14
• Saturated Fatty Acid (g)	0.68	0.20
• Poly Unsaturated Fatty Acid (g)	1.70	0.51
• Mono Unsaturated Fatty Acid (g)	1.43	0.43
• Trans Fatty Acid	Nil	Nil
Iron (mg)	8.49	2.55
Protein (g)	12.41	3.72

Approximate Values
Serving Size= 30g

% RDA (Recommended Dietary Allowance) per day for sedentary women on the basis of nutrient requirements & RDA for Indians by ICMR, 2010

How are the numbers given?

Nutritional facts per 100 gm**

Amount per Serving		
Energy 470.60 Kcal	Calories from fat	170.3 Kcal
		% Daily Value
Total fat	**18.9 g**	**29 %**
Saturated Fatty acids	6.1 g	30 %
Polyunsaturated fatty acids	5.0 g	
Monounsaturated fatty acids	7.0 g	
Trans fatty acids	0.0 g	0 %
Cholesterol	**0.0 mg**	**0 %**
Sodium	**721.0 mg**	**30 %**
Total Carbohydrates	**59.7 g**	**20 %**
Dietary Fiber	1.3 g	5 %
Sugar	1.1 g	
Total Protein	**15.4 g**	
Vitamin A	0.3 mcg	0 %
Vitamin C	1.7 mg	3 %
Iron	3.8 mg	27 %
Calcium	72.0 mg	7 %

*Percent Daily Values are based on a 2000 Calorie diet. Your Daily Values may be higher or lower depending on your calories needs

** Approx.

BEST BEFORE WITHIN 4 MONTHS
FROM THE DATE OF PACKING

Keep in a cool, dry place
Away from direct sunlight.

Nutrition Facts

Serving Size 2 pieces (60g)
Servings Per Container 7

Amount Per Serving	
Calories 320	Calories from Fat 40
	% Daily Values*
Total Fat 4.5g	7%
Saturated Fat 3g	15%
Trans Fat 0g	
Cholesterol 15mg	5%
Potassium 30mg	1%
Sodium 10mg	0%
Total Carbohydrate 65g	22%
Dietary Fiber 0g	0%
Sugars 65g	
Protein 4g	8%

Calcium 2%

*Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs.

	Calories	2,000	2,500
Total Fat	Less than	65g	80g
Saturated Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2400mg	2400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

How do you interpret all the numbers?

- Per 100 gram: useful to compare between two products
- Per serving: indicates how much quanity should be eaten and how much does that give
- Percentage of daily value: how much does the one serving give as a part of the total that should be consumed in a day

Sugar, Cocoa Butter
Milk Solids, Cocoa Powder,
Raisins & Almonds
permitted emulsifiers

Nutritional Information*	
Amount per 100g	
Energy, Kcal	535
Total Fat, g	33.2
Saturated Fat, g	1.5
Trans Fa, g	0
Total Carbohydrates, g	52.7
Added Sugar, g	42.3
Protein, g	6.2
*approx values	
For exact ingredients and nutritional information please refer to the individual packs	

Ingredients: peanuts, glucose syrup, ghee.

Nutrition Facts

Serving Size:

	per serve
Kilojoules	**2125 kj**
Calories	**508 kcal**
Protein	13.74 g
Carbohydrate	54.57 g
Sugar	36.16 g
Fat	26.12 g
Saturated Fat	3.32 g
Trans Fat	0 g
Monounsaturated Fat	11.24 g
Polyunsaturated Fat	7.31 g
Cholesterol	0 mg
Fibre	1.62 g
Sodium	30.15 mg

INGREDIENTS: Potato, Edible Vegetable Oil (Palmolein Oil, Rice Bran Oil), Sugar (5.5%), Starch, Salt, ~Spices & Condiments (Garlic Powder, Onion Powder, Chilli), Cocoa Solids, Milk Solids.

		Per 100g
Energy	kcal	544
Protein	g	7.0
Total Carbohydrate	g	54.7
of which Sugars	g	6.0
Total Fat	g	33.0
Saturated Fat	g	13.0
Trans Fat	g	0.1
Sodium	mg	676

Gram splits, edible oil, black salt, iodized salt, chilly powder, clove powder, turmeric powder dry mango powder, coriander powder

Nutritional Facts per 100 g*	
Energy (Kcal)	418.18
Energy from fat (Kcal)	190.62
Total Fat (g)	21.18
Saturated Fat (g)	6.95
Poly unsaturated Fat (g)	9.42
Mono unsaturated fat (g)	4.30
Trans fat (g)	0
Cholesterol (mg)	0
Protein (g)	19.6
Carbohydrates (g)	53.04
Sugar (g)	2.86
Potassium (mg)	730.78
Sodium (mg)	856.84
Dietary Fibre (g)	4.7

Ingredients:

Cashew Nut (Coarse Paste) Sugar and Silver leaf.

Nutrition Facts

Serving Size 20g
Serving per container

Amount per serving		
Calories 84 Kcal	Calories from Fat 36	
		% Daily Value*
Total Fat	4 g	6 %
Saturated Fat	1 g	5 %
Trans Fat	0 g	
Cholesterol	0 mg	0 %
Sodium	7 mg	0 %
Total Carbohydrate	10 g	3 %
Dietary Fiber	0 g	0 %
Sugars	8 g	
Protein	2 g	

Vitamin A	0 %	Vitamin C	0 %
Calcium	0 %	Iron	2 %

*Percent Daily values are based on a 2000 Calorie diet. Your Daily values may be higher or lower depending on your Calorie needs.

Proprietary Food: FINE BAKERY WARE – CAKE | INGREDIENTS: Wheat Flour, Sugar, Glucose syrup, Candied fruit (8.6%) (Sugar, papaya cubes, citric acid (INS330)), Edible vegetable oil (Palm), White compound drizzle (5.9%) (Sugar, Hydrogenated vegetable fat (Palm), Milk solids, Fructose, Emulsifier (INS322)), Glycerol (INS422), Water, Starch, Milk solids (3.0%), Fructose, Baking powder, Calcium Carbonate,Iodized Salt, Emulsifiers (INS471, INS475, INS433), Leavening agents (INS500(ii), INS341(i)), Stabilizers (INS415, INS410), Food Colours (INS110, INS102), Vitamin D

Nutritional information (Approx Value): Per serving 23g	Per 100 gm	Per serve (23 gms)	% GDA* per serve (23 gms)
Energy (kcal)	395	91	5
Protein (g)	5.4	1.2	2
Carbohydrates, g	69.7	16	6
Of which sugars, g	38.5	8.9	10
Fat, g	10.5	2.4	3.5
Of which Saturated Fat, g	6	1.4	7
Of which Trans Fat, g	0	0.0	0
Sodium, mg	639	147	7
		% RDA** per serve (23 gms)	
Calcium, mg	522	120	20

How much is too much, generally?

Depends on your caloric requirement

Portion size: amount of a food item that you actually eat

Serving size: a measured amount of a food item that should be eaten (and it offers the declared amount of nutrients)

Rough estimates of portion sizes

1 cup: 1 fist/size of cricket ball

Half cup: size of a wrapper of a cup cake

1 tsp: tip of index finger

2 tbsp: a cupped hand

28 gram (1 ounce): a cube made of 4 dice (10-12 chips)

85 gram (3 ounces): a palm/ a deck of card

Low/light/lite versus reduced

- **Low**: depends on the actual nutrient in question, **for each serving**
  - calorie: 40 calories or less per serving (snacks item)
    120 calories or less per serving (main dish)
  - fat: 3 gram or less per serving
  - saturated fat: less than 1 gram per serving and 15% or less energy from saturated fats
  - cholesterol: 20 mg or less per serving
  - sodium: 120 mg or less per serving
  - sugar: 5 gram or less per 100 gram (solid)
    2.5 gram or less per 100 ml (liquid)

Low/light/lite versus reduced

Reduced '……..':

At least 25% less than the original version but the original version may not be 'low'

Moderate

- Calories: 100 per serving
- Sugar: usually avoid/limit the food item if it is 10 gram or more per 100 gram for non-fruit items and if 20 gram or more per 100 gram for items containing fruits)
- Anything between 5% to 20% of daily recommended value

How much is too much generally?

- Fat: > 17.5 gram per 100 gram
- Sugar:
  - >22.5 gram per 100 gram for solid food items
  - >11.25 gram/100 ml for liquid food items
- Saturated fat: > 5gram/100 gram
- Calories: 400 or more per serving
- Sodium (salt): > 600 mg sodium per 100 gram
- Cholesterol: 60 mg or more per serving
- Trans fat: > 0.44 gram per serving

Source of…../high ‘….’ / ‘….’rich

- Source of fiber: 3 gram or more fiber per 100 gram
- High Fiber: 6 gram or more fiber per 100 gram
- Source of protein: at least 12% of energy value of food is provided by protein
- High protein: at least 20% of energy value of food is provided by protein
- Source of vitamins:
- Source of antioxidants:
- Source of Iron:

How to verify the claims?

- High fiber: 3 to 6 gram of fiber per serving
- Rich in PUFA: does not necessarily mean healthy
- Light versus reduced versus low: fat/oil/sugar/salt/calorie
- Losorb: does not necessarily mean healthy
- Trans fat free: does not mean there is no trans fat
- Zero sugar: does not necessarily mean low in calorie
- Heart friendly/promotes heart health/Heart healthy: does not necessarily mean that!
- Cholesterol free: does not necessarily mean low fat/something that will not raise blood cholesterol levels

Trans fats free myth

- The claim transfats free means that the food item has less than 0.2% of trans fat per SERVING. And does not mean that it does not have any transfats.
- Checking serving size and sticking to it for the portion size becomes very important here.
- Also if you have multiple items which has at least some amount of transfats, leaves you with really high amount of transfats everyday.
- Less than 2 grams of transfats per day is recommended. If you some how get 10 servings of such food items, you tend to exceed the maximum recommended limit for trans fats.

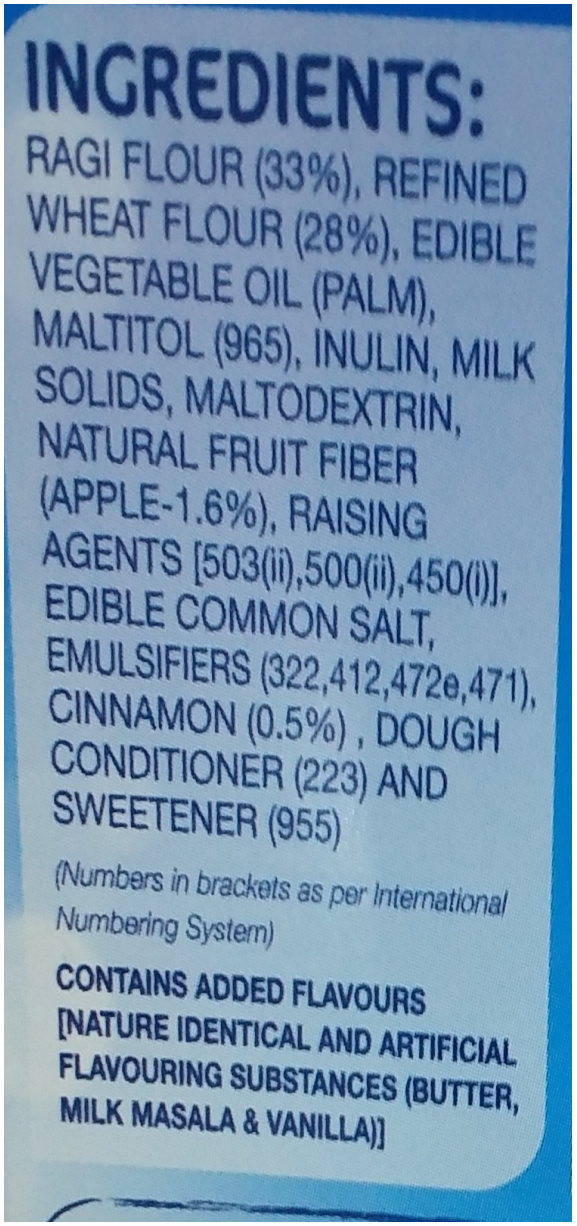
Tapioca Starch, Refined Palmolein Oil, Soya Flour, Split Pulse Urd (Urd Dal) Flour, Refined Sugar, Iodised Salt, Hydrogenated Vegetable Oil (Vanaspati), Red Chilli Powder, Coriander Powder, Cumin Powder, Clove Powder, Dried Mango Powder, Black Pepper, Cardamom, Acidity Regulator (E 330), Onion Powder, Garlic Powder, Black Salt, Asafoetida, Bay Leaf, Nutmeg, Cinnamon, Fennel Seed, Turmeric & Mustard Seed.

* Nutritional Information per 100g	
1. Energy	554 kcal
2. Carbohydrate	45.0 g
Sugar	4.21 g
3. Total Fat	38.21 g
Saturated Fatty Acids	18.56 g
Monounsaturated Fatty Acids	11.28 g
Polyunsaturated Fatty Acids	3.46 g
Trans Fatty Acids	0 g
4. Protein	7.46 g
5. Fiber	0.88 g
6. Sodium	629 mg
7. Cholesterol	0 mg

*These are approximate values

The zero sugar myth

- ‘Diet’ label often includes ‘artificially’ sweetened
- Zero sugar items have artificial sweeteners which are themselves addictive
- These are not necessarily low calorie, or less in calories in comparison to their original versions.



Nutrition Information per 100 gram approx.:
Carbohydrates: 72 g
Of which
Added sugars 0g
Naturally occurring sugars 3g
Dietary fiber: 9.6 g
Protein: 8.3 g
Fat: 19 g
Saturated fatty acids 8.3g
Mono Unsaturated Fatty acids: 8g
Poly Unsaturated Fatty acids 2.2g
Trans Fatty Acids 0g
Cholesterol 0mg
Energy 478 kcal

Wheat flour (67%), sugar, Edible oil, invert sugar syrup, raising agents, salt, milk solids, emulsifier, dough conditioner

Zero cholesterol myth

Cholesterol is synthesized in liver, from saturated fats and sugars; dietary cholesterol is of secondary importance

Cholesterol is absent in vegetarian food items. it is only present in food items of animal origin including milk and milk products

Reducing dietary cholesterol intake definitely helps, however, overall fat, saturated fat and sugar consumption should also be curtailed

High fiber/multigrain/nutritious veggies myth

- Small amounts
- In processed form
- Low nutritious value
- Food additives

INGREDIENTS:

REFINED WHEAT FLOUR (45%), SUGAR, EDIBLE VEGETABLE OIL (PALM), CEREAL PRODUCTS (14%) (RAGI FLOUR, OATS, CORN FLAKES, RICE FLOUR), WHEAT BRAN (6%), MILK SOLIDS, RAISING AGENTS [503(ii),500(ii)], EDIBLE COMMON SALT, EMULSIFIERS (322,472e,471) AND HONEY (0.4%).

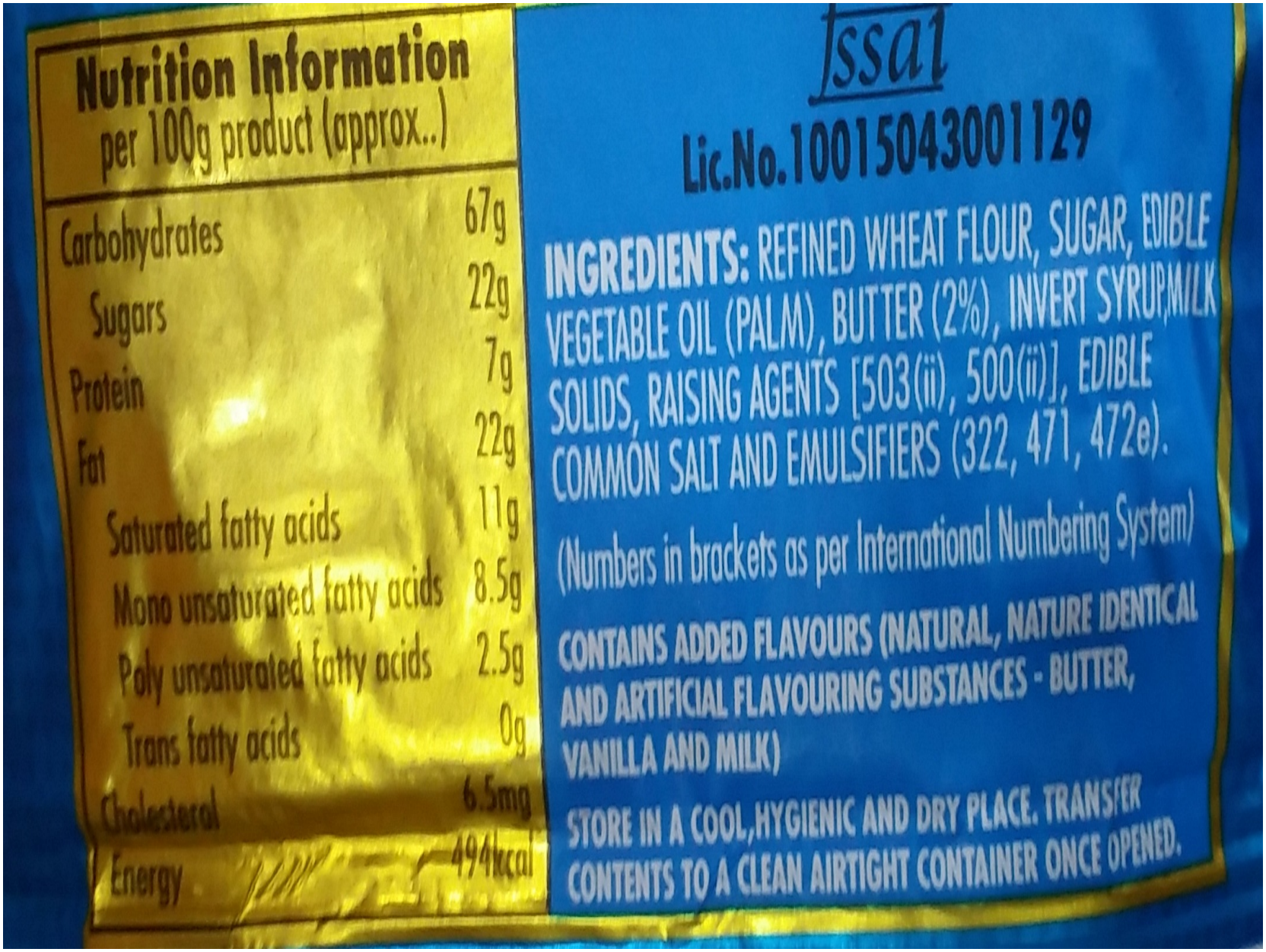
(Numbers in brackets as per International Numbering System)

CONTAINS ADDED FLAVOURS [NATURE IDENTICAL AND ARTIFICIAL FLAVOURING SUBSTANCES (HONEY, VANILLA, CEREAL & NUT)]

Nutrition Information

per 100g product (approx..)

Carbohydrates	70g
Sugars	20.5g
Dietary Fibre	6g
Protein	7g
Fat	20g
Saturated fatty acids	10.5g
Mono Unsaturated Fatty Acids	7.5g
Poly Unsaturated Fatty Acids	2g
Trans Fatty Acids	0g
Cholesterol	0mg
Energy	488kcal



Nutrition Information
per 100g product (approx..)

Carbohydrates	67g
Sugars	22g
Protein	7g
Fat	22g
Saturated fatty acids	11g
Mono unsaturated fatty acids	8.5g
Poly unsaturated fatty acids	2.5g
Trans fatty acids	0g
Cholesteral	6.5mg
Energy	494kcal

Issai

Lic.No.10015043001129

INGREDIENTS: REFINED WHEAT FLOUR, SUGAR, EDIBLE VEGETABLE OIL (PALM), BUTTER (2%), INVERT SYRUP, MILK SOLIDS, RAISING AGENTS [503(ii), 500(ii)], EDIBLE COMMON SALT AND EMULSIFIERS (322, 471, 472e).

(Numbers in brackets as per International Numbering System)

CONTAINS ADDED FLAVOURS (NATURAL, NATURE IDENTICAL AND ARTIFICIAL FLAVOURING SUBSTANCES - BUTTER, VANILLA AND MILK)

STORE IN A COOL, HYGIENIC AND DRY PLACE. TRANSFER CONTENTS TO A CLEAN AIRTIGHT CONTAINER ONCE OPENED.

Name of the oil	Saturated fats (as % of total fat)	MUFA (as % of total fat)	PUFA (as % of total fat)	Tran fats (as % of total fat)	Health claims /remarks
Ricebran+ sesame oil	24	39	35	2	Healthy fatty acid profile
Palmolein oil	52	36	11	1	-
Ricebran + soyabean oil	20	39	40	0	Trans fats free

What to choose?

- First check: transfats, sat(urated)fats, sugar
- Second check: calories
- Third check: proteins, fibers

Food is more than the sum of its nutrients

- Nutrient supplementation: supplementary and not substitutionary
- Bio-availability: different in natural and extracted items
- Prefer food item in its most natural form over nutritional supplements
- Prefer portion control over going for so called healthy substitutes

Class activity

- Pick commercials of food items, that claims it to be a healthy choice for you. Comment on the credibility of the health claim made.
- Based on the given nutritional information about different edible oils/fats, doing comparative analysis of health benefits as well as risks involved in consumption of those oils/fats. Suggesting at least one way of addressing the risks involved.

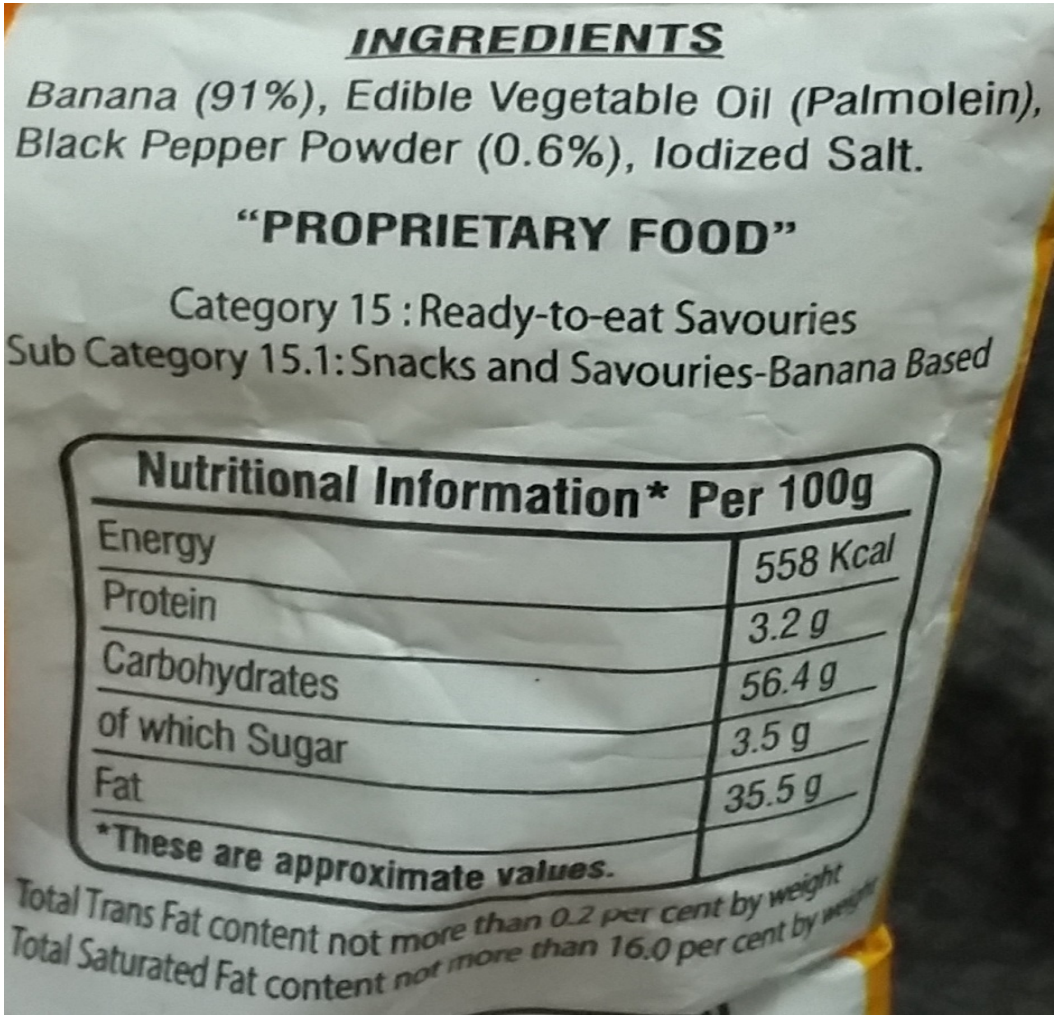
Class activity

- Read the given food labels and identify the contents that you think are harmful to your health. What could be its healthier substitute?
- Read the given food labels and identify the contents that you think are not so healthy choice for a diabetic. What could be its healthier substitute?
- Read the given food labels and identify the contents that you think are not so healthy choice for a person with dyslipidemia. What could be its healthier substitute?

Rough estimates of portion sizes

- https://www.myfooddiary.com/resources/estimating_serving_sizes.asp
- https://www.nia.nih.gov/health/serving-and-portion-sizes-how-much-should-i-eat


MUSKA
BUTTER
(ROASTED BREAD)
Ingredients :
Wheat Flour, Sugar, Edible Vegetable Oil,
Butter Vanaspati Ghee, Sesame Seeds,
Wheat Fiber, Liq., Glucose, Yeast & Salt.
Approx. Nutritional Value are (Per 100g)
CARBOHYDRATE 69.5 gm
OF WHICH SUGAR 14.92 gm
PROTEIN 9.15 gm
FAT 19.8 gm
CALCIUM 55 mg
VITAMIN A 30 mcg
TOTAL CALORIFIC VALUE 492.8 kcal



INGREDIENTS

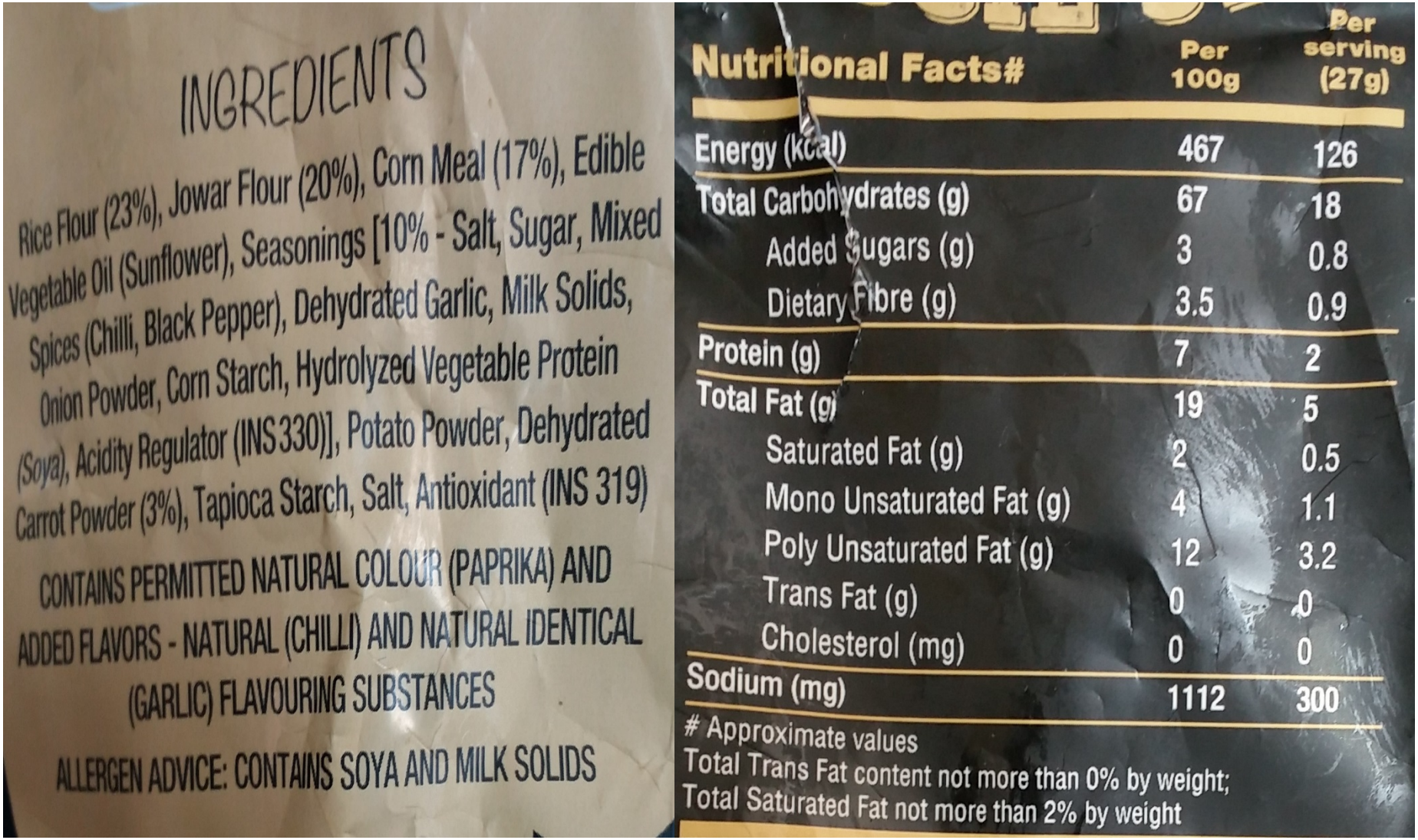
Banana (91%), Edible Vegetable Oil (Palmolein), Black Pepper Powder (0.6%), Iodized Salt.

"PROPRIETARY FOOD"

Category 15 : Ready-to-eat Savouries
Sub Category 15.1: Snacks and Savouries-Banana Based

Nutritional Information* Per 100g	
Energy	558 Kcal
Protein	3.2 g
Carbohydrates	56.4 g
of which Sugar	3.5 g
Fat	35.5 g
*These are approximate values.	

Total Trans Fat content not more than 0.2 per cent by weight
Total Saturated Fat content not more than 16.0 per cent by weight



INGREDIENTS

Rice Flour (23%), Jowar Flour (20%), Corn Meal (17%), Edible Vegetable Oil (Sunflower), Seasonings [10% - Salt, Sugar, Mixed Spices (Chilli, Black Pepper), Dehydrated Garlic, Milk Solids, Onion Powder, Corn Starch, Hydrolyzed Vegetable Protein (Soya), Acidity Regulator (INS 330)], Potato Powder, Dehydrated Carrot Powder (3%), Tapioca Starch, Salt, Antioxidant (INS 319)

CONTAINS PERMITTED NATURAL COLOUR (PAPRIKA) AND ADDED FLAVORS - NATURAL (CHILLI) AND NATURAL IDENTICAL (GARLIC) FLAVOURING SUBSTANCES

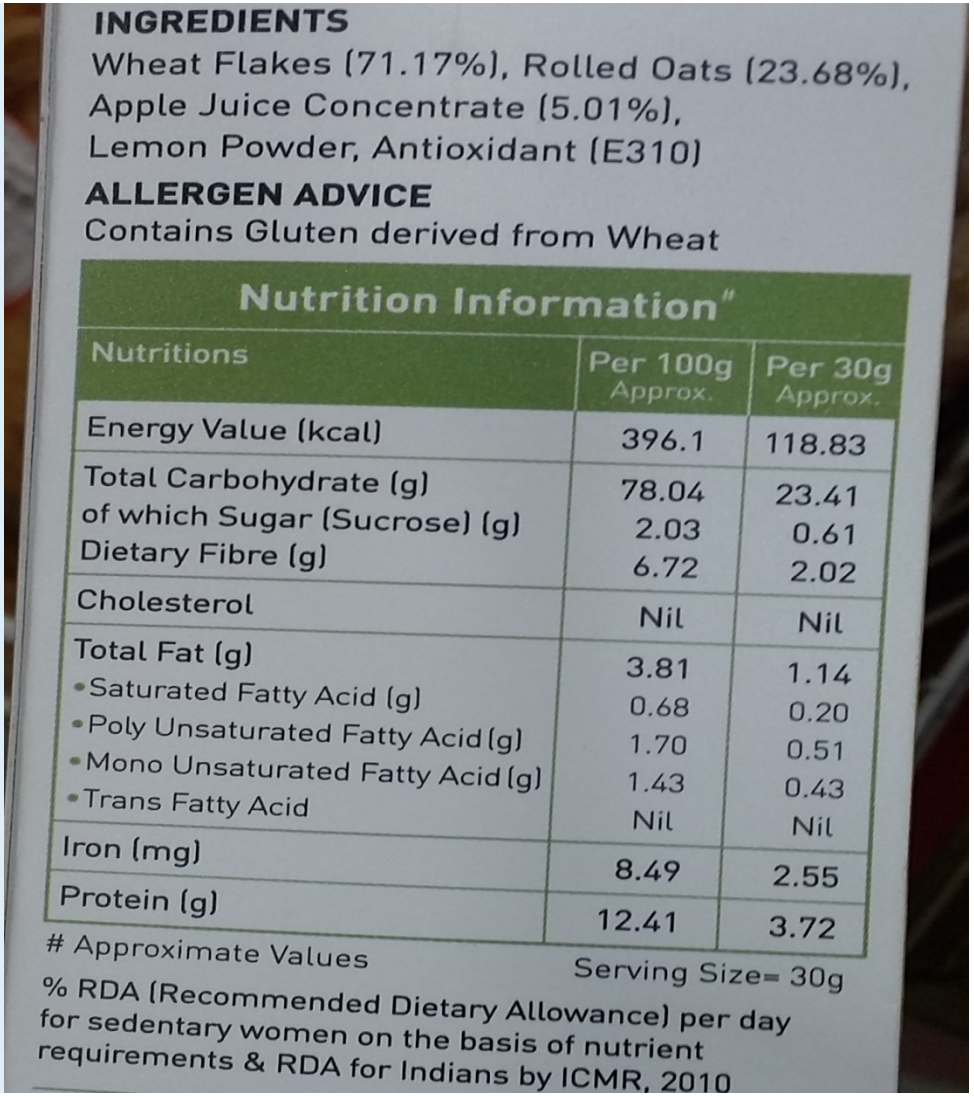
ALLERGEN ADVICE: CONTAINS SOYA AND MILK SOLIDS

Nutritional Facts#	Per 100g	Per serving (27g)
Energy (kcal)	467	126
Total Carbohydrates (g)	67	18
Added Sugars (g)	3	0.8
Dietary Fibre (g)	3.5	0.9
Protein (g)	7	2
Total Fat (g)	19	5
Saturated Fat (g)	2	0.5
Mono Unsaturated Fat (g)	4	1.1
Poly Unsaturated Fat (g)	12	3.2
Trans Fat (g)	0	0
Cholesterol (mg)	0	0
Sodium (mg)	1112	300

Approximate values
Total Trans Fat content not more than 0% by weight;
Total Saturated Fat not more than 2% by weight

Milk FAT : 10% , Total Solids : 70% , Sugar Syrup : 62.5%,
Drain Weight : 17 gm each

Nutritional Information*	
Amount per 100 g	
Energy, kcal	292
Energy from Fat, kcal	54
Total Fat, g	6
Saturated fat,g	3
Cholesterol, mg	9
Sodium, mg	46.9
Total Carbohydrate, g	56
Added Sugar, g	46.9
Protein, g	3
Calcium, mcg	187.5
Not a significant source of Vitamin A, Vitamin C, Iron and Dietary fiber.	
*Approx. values	



INGREDIENTS

Wheat Flakes (71.17%), Rolled Oats (23.68%), Apple Juice Concentrate (5.01%), Lemon Powder, Antioxidant (E310)

ALLERGEN ADVICE

Contains Gluten derived from Wheat

Nutrition Information#

Nutritions	Per 100g Approx.	Per 30g Approx.
Energy Value (kcal)	396.1	118.83
Total Carbohydrate (g)	78.04	23.41
of which Sugar (Sucrose) (g)	2.03	0.61
Dietary Fibre (g)	6.72	2.02
Cholesterol	Nil	Nil
Total Fat (g)	3.81	1.14
• Saturated Fatty Acid (g)	0.68	0.20
• Poly Unsaturated Fatty Acid (g)	1.70	0.51
• Mono Unsaturated Fatty Acid (g)	1.43	0.43
• Trans Fatty Acid	Nil	Nil
Iron (mg)	8.49	2.55
Protein (g)	12.41	3.72

Approximate Values

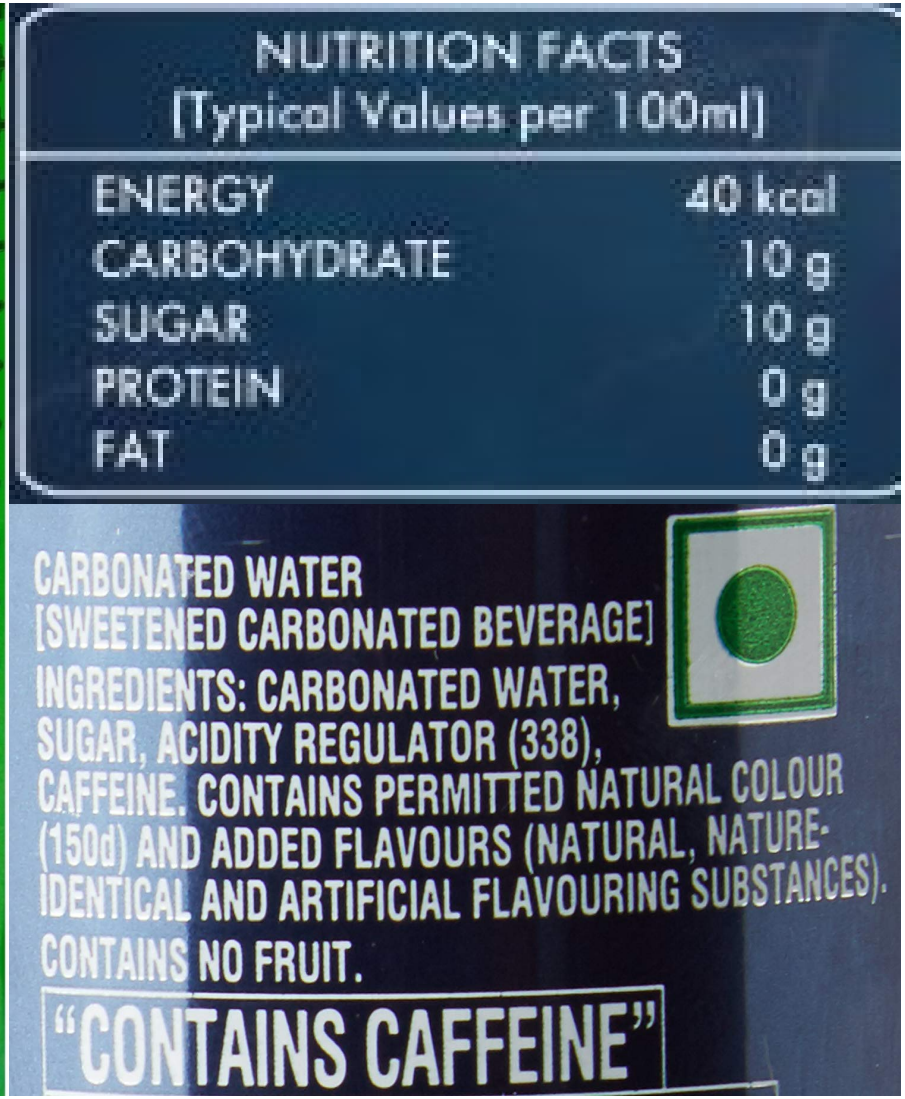
Serving Size= 30g

% RDA (Recommended Dietary Allowance) per day for sedentary women on the basis of nutrient requirements & RDA for Indians by ICMR, 2010

THERMALLY PROCESSED
READY TO SERVE FRUIT BEVERAGE
INGREDIENTS: **PURIFIED WATER, SUGAR,** MANGO JUICE (7.5%), APPLE JUICE (7.5%), CARBON DIOXIDE (INS290), ACIDITY REGULATORS (INS296, INS330 & INS331), VITAMIN C, PERMITTED CLASS II PRESERVATIVE (INS211) AND HONEY. CONTAINS PERMITTED SYNTHETIC COLOURS (INS102 & INS133). CONTAINS PERMITTED NATURE IDENTICAL FLAVOUR (MANGO)
TOTAL JUICE CONTENT : 15%

CONTAINS FRUIT JUICE

NUTRITIONAL INFORMATION	PER 100ML
ENERGY VALUE	40 Kcal
PROTEIN	<0.5g
CARBOHYDRATES	10g
FRUIT SUGAR	1.5g
ADDED SUGAR	8.5g
FAT	<0.5g
VITAMIN C	16mg



NUTRITION FACTS
[Typical Values per 100ml]

ENERGY	40 kcal
CARBOHYDRATE	10 g
SUGAR	10 g
PROTEIN	0 g
FAT	0 g

CARBONATED WATER
[SWEETENED CARBONATED BEVERAGE]
INGREDIENTS: CARBONATED WATER, SUGAR, ACIDITY REGULATOR (338), CAFFEINE. CONTAINS PERMITTED NATURAL COLOUR (150d) AND ADDED FLAVOURS (NATURAL, NATURE-IDENTICAL AND ARTIFICIAL FLAVOURING SUBSTANCES).
CONTAINS NO FRUIT.
"CONTAINS CAFFEINE"

LECTURE 8

INDIAN FOOD AND PREVENTION OF NCDs

Objectives-1

At the end of the session, the students should be able to

- List all the sources of calories
- Name five food sources each of carbohydrates, proteins and fats.
- List at least 2 important functions each of carbohydrates, proteins and fats in the body
- Name at least five micronutrients and state their importance in the body
- Name at least five food items rich in micronutrients

Objectives-2

- List two principles of selecting healthy protein food sources
- Name five food items of such kind
- List at least two adverse health effects (health hazards) of high protein food intake

Objectives-3

- List two principles of selecting healthy carbohydrate food sources
- Name five food items of such kind
- Understand (explain) mechanism of adverse effect of high carbohydrate food intake
- List at least two adverse health effects (health hazards) of high carbohydrate food intake

Objectives-4

- List three principles of selecting healthy food sources for fats
- Name five food items of such kind
- Understand categorization of fats in different types and their role in maintaining health
- Name at least 2 food sources for each type of fats (including essential fatty acids)
- Understand (explain) mechanism of adverse effect of high intake of fats
- List at least three adverse health effects (health hazards) of high intake of fats

Objectives-5

- State recommended proportion of energy intake from each energy source (and its categories) for maintaining good health
- Make balanced diet plan for a week including at least 3 different varieties in the menu for people with different requirements of calorie intake
- Plan diet to reduce up to 500 calories per day
- List at least 3 resources to refer when planning a diet for weight loss and/or improved health.

Imagine that…..

- ….you have a diabetic in your family and you want to choose a healthy option for evening snacks for him or her, what all would you consider while choosing a food item for him or her?
- ….you want to improve your fitness, how would you plan your meals?
- ….you want to lose some weight, what changes in your diet and routine would you make?
- ….somebody draws your attentions towards some aspect of your physical appearance or health and gives you diet or exercise related advices, would you follow their advice? Why or why not?

We have heard some of these advices from different sources, for instance…..

- We need to avoid eating fried food if we want to lose weight
- No oily and fatty food, only green salads and fruits, in order to lose weight
- Changing cooking oils is a healthy practice
- Ghee is bad, instead olive oil is good
- We should start using heart friendly cooking oil
- We should start using lite cooking oil need to use the cooking oil that is lite so that it gets absorbed in less amount in food

We have heard some of these advices from different sources, for instance…..

- Sugar gives calories, so replace it with sugar substitutes which don't give calories (and why this? To lose weight or maintain weight)
- Protein shakes and protein powders are healthy options to increase intake of proteins
- Good source of protein are eggs, chicken and meat (only)
- Food items with the label 'Zero cholesterol' help us improve our blood cholesterol level
- Food items with 'zero sugar' are low in calories
- Food items with 'low fats' (not fried but baked etc.) are healthy

….but is that true? Is that enough? Is that complete?

- Do we overrate the food supplements?
- Do we underrate our traditional food?
- Do our food choices get influenced by marketing gimmicks?
- We blame fats enough, but is all fat bad? And is fat all bad?
- Are sugar substitutes healthy?
- Is protein all good?
- Can nutrition claims labels on packed food items help us making healthy food choices?

Let’s start with the basics:

- Why do we feel we need to eat…….
- What is it that we eat…….
- Why do we eat what we eat……

Why do we eat?

- Desire for food? Hunger? Both?
- Hunger: physical signals that initiate food seeking behaviors
- Appetite: integrated response: to hunger, sensory perceptions (sight, smell or taste of food), cognitive and emotional aspects that initiates or delays eating

How much do we eat and how often do we eat?

Regulated by several factors (and it is not completely understood)

- Metabolic regulations
- Hormones
- Neural signals
- Emotions
- Sensory perceptions
- Body temperature
- Habit
- Availability of food etc…

- Seek food
- Start eating
- Satiation: feeling of satisfaction: end meal
- Satiety: feeling of fullness and satisfaction: allows the some time before we take our next meal

What is food and diet? What is a good diet?

- Food: one of the basic necessities of life that provides nutrients required for our survival and growth
- Nutrients: chemical components of food that provide nourishment to the body (Joshi)
- Diet: kinds of food on which a person or group lives

  (Park, 461)
- Balanced diet: one which contains a variety of foods in such quantities and proportions that the need for energy and all nutrients is adequately met for maintaining health, vitality and general well-being and also makes a small provision for extra nutrients to withstand short duration of leanness

  (modified from Park, 461)
- Nutrition is scientific study of food and its relation to health

- Basis of good health is having right kind of food in appropriate proportion and in adequate quantities
- Right kind of food → what all does it contain
- Appropriate proportion → how much of each of that it contains

these gives you the quality of food

- Adequate quantities → depending on your age, sex, physical condition and activity level

Why do we eat what we eat?

- Discuss why do we have foods?
- What functions does food serve in our body?
- How do we make choices about what we eat?

(direction is food provides us all nutrients that we need to survive, grow and work (as well as maintain health)

and food choice involves culture and family customs , habits, affordability, taste and preferences, emotions, (and sometimes health or fitness consciousness) and from there to make them aware about the central importance of what we eat everyday even in small quantity has immense bearing on our health in multiple ways and how we can take charge of what we eat to maintain and/or improve our health and well being)

Also emphasize on the changes in dietary habits over time, especially a shift from era of extremes in food availability to era of abundance and working hard in search of food to sedentary habits which has bearing on how much calorie you can burn and consequently how much calories you should consume

What nutrients does the food contain?

Nutrients that form the major bulk of the food - Macronutrients:

These are required by the body in large amounts (several grams per day)

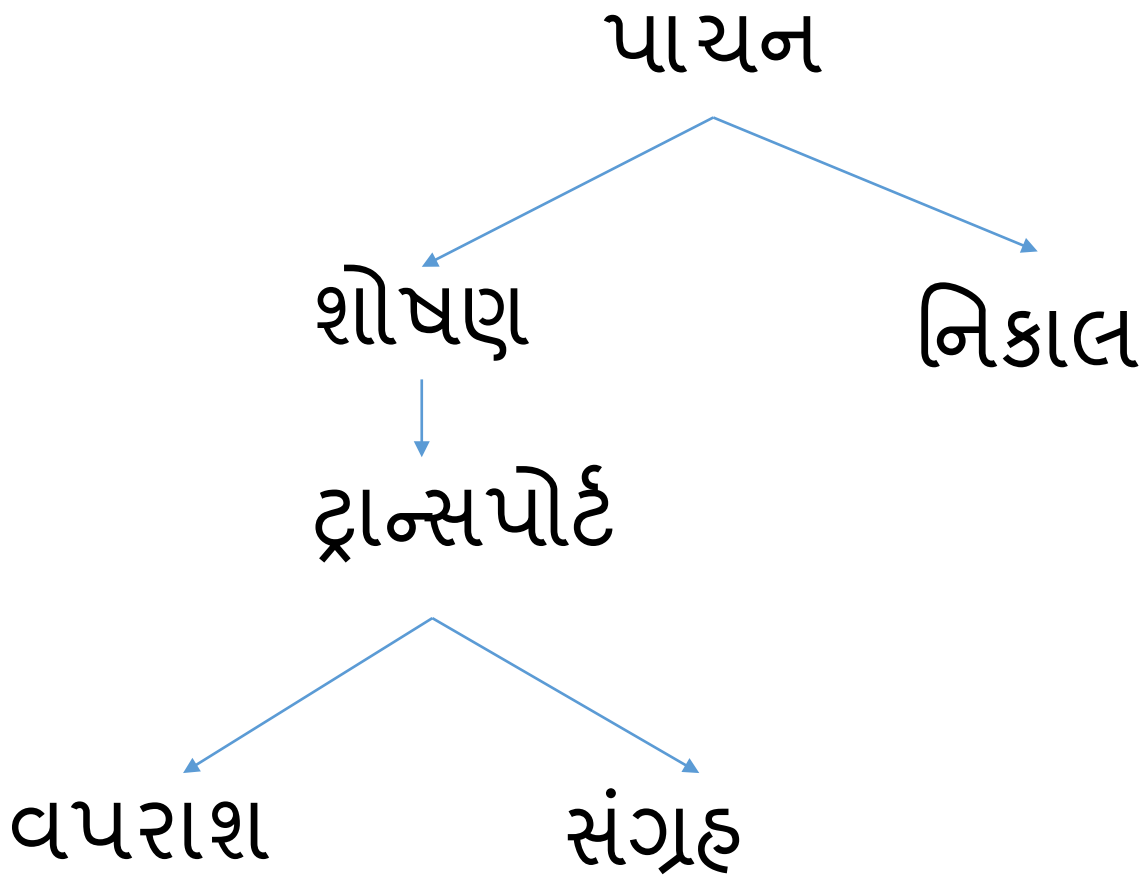
- Proteins
- Fats
- carbohydrates

Nutrients that are contained in the food in relatively smaller amounts - Micronutrients:

These are required by the body in small amounts which may vary from a fraction of a milligram to several grams per day

- Vitamins
- Minerals

આપણે જે ખારોક લઇએ એનું આપણા શરીરમાં શું થાય?



પ્રોટીન:

બંધારણીય ઘટક

Protein: functions

- Basic building material
  - Body: growth and maintenance (including muscles)
  - Hormones: chemical messenger for a range of activities
  - Enzymes: catalyst for a range of activities
  - Antibodies: Immunity
  - Hemoglobin: oxygen transport
  - Coagulation factors: help stop bleeding in case of injury
  - Plasma proteins
- Fluid balance in the body (by maintaining osmotic pressure)
- Alternative source of energy: not its primary function, wasteful

Protein types

- Complete proteins
- Incomplete proteins

પ્રોટીનના સ્ત્રોત (% of protein by weight)

વનસ્પતિજન્ય સ્ત્રોત	પ્રાણીજન્ય સ્ત્રોત
કઠોળ (20-25%) સોયાબીન (40%)	દૂધ (3 to 4.5%) દુધની બનાવટ (3-24%)
અનાજ (6-12%)	ઈંડા (13.3%)
લીલા કઠોળ (1- 10%)	માછલી (15-25%) અન્ય દરિયાઈ પ્રાણીઓ (15-61%)
તેલીબીયા અને ડ્રાયફ્રુટ (નટ્સ) (4-26%)	માંસ (15-21%)
	ચિકન (26%)

Source: Joshi, appendix x, Park

પ્રોટીન સ્ત્રોતની ખાસિયત

Characteristics	Plant sources	Animal sources
Protein type	ઇન-કમ્પ્લીટ (except soybeans) consuming different varieties supplement each other	કમ્પ્લીટ
Advantages	ચરબીનું પ્રમાણ ઓછુ સસ્તા નુકસાનકારક કેમિકલનું પ્રમાણ ઓછું	ઉંચી બાયોલોજીકલ ગુણવત્તા
Disadvantages	નીચી બયોલોજીકલ ગુણવત્તા	ચરબીનું પ્રમાણ વધુ મોંઘુ નુકસાનકારક કેમિકલનું પ્રમાણ વધુ

Proteins and health related problems

Deficiency:

- In children : PEM
- Weight loss, anemia, lower immunity, impaired wound healing, nutritional edema, easy fatigue, muscular illness (Joshi, 71)

Excess:

- Gout, kidney stones, osteoporosis and some types of cancer
- Excess proteins beyond 30 grams in a meal gets converted into fats and stored
- Healthy people don’t need protein or amino acid supplements. Body has to work overtime to breakdown extra protein and remove its byproducts (food for today, 106)

How much proteins should we have?

- 15 to 20% of total energy intake (Park, 459)

  1 gram of protein gives 4 kcal

  If your recommended daily calorie intake is 1800 calories, the amount of proteins you should eat daily should range between

  (1800*0.15)/4= 67.5 gram

  (1800*0.20)/4 = 90 gram

- General recommendation is 1-2 gram protein/kg body weight/day

How much proteins should we have?

- Caution:
  - Obligatory protein loss is 20 to 30 gram per day, which must be replaced everyday through diet.
  - One should avoid eating more than 30 gram of proteins in one meal, as body's capacity to use protein from meals at one time is not more than 30 gram. Rest gets converted into fat.

Food items with relatively good amount of protein

- Class activity

participants are encouraged to give names of food items, that they have access to which they think can be a rich source of protein and also encouraging them to think about what could be potential limitation of that particular food item and how can that be mitigated.

Which type of proteins should we have?

Discuss as class activity where participants builds on the earlier activity wherein they had given the list of food sources and its pros and cons.

Emphasis here is : key is your food preferences, fads, habits and weighing of pros and cons of different types of sources while making choices

General recommendation: balancing plant and animal sources adequately

preferring mix of different varieties of plant sources to supplement each other and avoiding excessive consumption of animal sources

How much to consume?

Average amount of protein in gram

1 for each serving of fruit or vegetables

5 per egg or handful of nuts

10 per cup of milk

15 per cup of beans

25 for every 3-4 ounce serving of meat, fish or poultry

Fat
A highly misunderstood nutrient
A well known energy powerhouse…
A lesser known building block

- Fats are generally greasy substances in the food either solid or liquid, not dissolved in water

Fat: functions

Fat and cholesterol- a fat like substance are an important component of our body structure

Each and every cell of the body has fat and cholesterol as part of its cell membrane, and its various organelles

Fats in our diet are the most concentrated source of energy, providing more than double the energy provided by the other two substances viz. carbohydrates and proteins

Other functions of fats

Additionally,

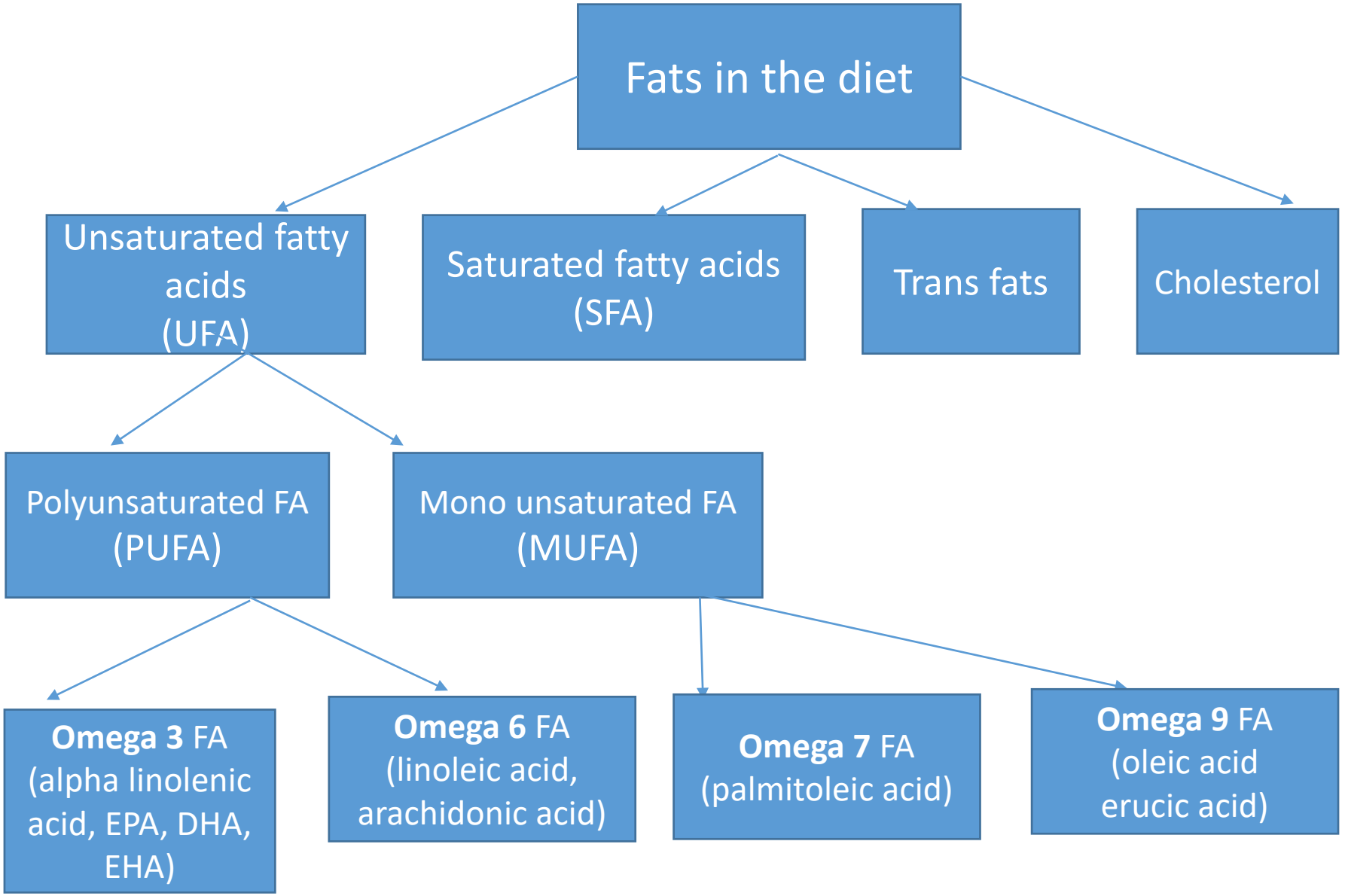
fats serve several important functions in our bodies which include

- Synthesis of hormones
- Vehicle for fat soluble vitamins
- Thermal insulation
- Cushioning for inevitable bruises
- Supports organs
- Gives skin its water resistance
- Prevents water evaporation from skin
- Shock absorbent pads in soles and palms

Yet other functions of fat.....

- Palatability to food
- Gives texture to several food items
- Satiety feeling
- Slowing of digestion

Types of fats in food-1



Type of fats in food-2

- Essential fatty acids:

  Linoleic acid (LA): omega-6 PUFA
  Alpha linolenic acid (ALA): omega-3 PUFA

Functions of each type of fat

Fat type	Function in body
SFA	Rigidity to cell structure, precursor of hormones
MUFA- oleic acid Omega-9	Combination of flexibility and rigidity to the cell membranes, makes arteries flexible and prevents atherosclerosis
Omega-3 PUFA (ALA, EPA, DHA)	Lowers BP, decreases risk of atherosclerosis, accelerates healing, aids in stress management, improves tissue oxygenation, slows growth and spread of cancer cells
Omega-6 PUFA (LA, AA)	Flexibility , precursor of hormones
Cholesterol	precursor of hormones part of cell membrane
Trans fat	No function to serve!

Undesirable/harmful

Desirable/essential

Type of fats in food-3

Oils and fats

- Healthy oil
- Light/lite oil
- Heart friendly oil
- Trans-fat free oil
- Zero cholesterol oil

Food items

- Reduced fat
- Low fat
- No cholesterol
- Zero trans-fat

Fats in the blood

Popularly known as cholesterol or blood cholesterol

It is generated by the liver.

It uses fats as well as other nutrients in the diet such as carbohydrates and proteins in the diet to form cholesterol

The cholesterol in blood is largely in the form of lipoproteins

Fats in the blood

In addition to total cholesterol in blood, we also need to know its composition, importantly:

LDL: low density lipoproteins: bad cholesterol

HDL: high density lipoproteins: good/protective cholesterol

Serum triglycerides: bad fat in the blood

Dietary fats and blood lipids have a complex relationship

Dietary fat	lipoproteins		Other effects
	HDL	LDL	
MUFA- oleic acid Omega-9	↑	↓	↓ inflammatory response
Omega-3 PUFA (ALA, EPA, DHA)	↑	↓	↓ inflammatory response
Omega-6 PUFA (LA, AA)	↑	↓	↑ inflammatory response
SFA		↑	↑coagulation ↑ oxidative stress Implicated in insulin resistance
Trans fat	↓	↑	↑ oxidative stress Implicated in insulin resistance Decrease testosterone
Cholesterol		↑	Atherosclerosis and plaque formation

Undesirable/harmful | Desirable/essential

ચરબીના સ્ત્રોત

વનસ્પતિજન્ય સ્ત્રોત	પ્રાણીજન્ય સ્ત્રોત
ખાદ્ય તેલ (શિંગ, કપાસીયા, સરસવ, સુર્યમુખી, કોપરેલ, પામોલીન, કેનોલા, રાઈસબ્રાન wheat germ, મકાઈ, સોયાબીન etc.)	ફેટવાળું દૂધ, દૂધની બનાવટો જેવીકે ક્રીમ, મલાઈ, ચીઝ, પનીર, માવો, આઈસ્ક્રીમ વિગેરે
તેલીબીયા અને નટ્સ	માખણ અને ઘી
	માંસ
Hydrogenated and partially hydrogenated vegetable oils વનસ્પતિ ઘી	ટેલો, લાર્ડ
માર્ગરિન	ચિકન
Shortening	ઈંડાનો પીળો ભાગ
	માછલી અને માછલીનું તેલ
વેજ મેયોનીઝ	ઈંડાવાળું મેયોનીઝ

Summary of fat sources

- Meat, egg and poultry are rich in saturated fats and cholesterol
- Fish are rich sources of omega 3 fats
- Vegetarian sources of omega 3 include flaxseeds, fenugreek seeds, mustard seeds, walnuts, canola oil and mustard oil
- Omega 3 fats can be found in lesser quantities in green leafy vegetables, fruits and in cereals and legumes and in butter and ghee.
- Sunflower oil, safflower oil, corn oil, cottonseed oil have excess omega 6
- Peanut oil, olive oil, sesame oil and canola oil and nuts such as pistachio, almond, cashews have high MUFA

Summary of fat sources

- Partially hydrogenated fats have high transfats
- Repeatedly heated oils at high temperature (esp. while deep-frying) have free radicals
- Refined oils tolerate high temperature, but can already contain harmful chemicals
- Saturated fats including hydrogenated fats have long shelf life and therefore preferred for packaged food
- hydrogenated fats are often preferred for their cheaper price and for obtaining desired food texture especially in bakery products

Food items with relatively high amount of fats

- Fried foods (dry snacks as well as fresh *farsan* items*)*
- Bakery goods including biscuits, cakes and pastries
- Sweets and desserts
- Nuts and oilseeds recipes
- Salad dressings and sandwich spreads
- Most of the pack food items
- *Achaar*/pickles
- Several *sabji* having high amounts of oil/ butter/ paneer/ cheese
- Several fast foods such as sandwiches (bread, cheese, butter), pizza, burger, etc.
- Ice creams, lassi and whole milk products, yogurt

Fat and health related problems- 1

Excessive fat intake:

1. Most concentrated source of energy, excess intake leads to over weight and obesity; which is one of the major risk factors for diabetes mellitus, insulin resistance and metabolic syndrome as well as Hypertension
2. Increases blood cholesterol levels which promotes atherosclerosis and plaque formation which increases the risk of heart attack and stroke

Fat and health related problems- 2

Inappropriate fat intake (eating wrong type of fats) (trans fats, high saturated fats, high cholesterol, high omega 6):

1. Promotes dyslipidemia and elevated blood cholesterol which promotes atherosclerosis
2. Increases inflammatory response in the arterial wall
3. Promotes platelet aggregation and leads to formation of vulnerable plaque

All of these increases risk of heart attack and stroke

Fat and health related problems- 3

Other effects

Excessive fat intake

1. leads to slowing down of digestion
2. Interferes with absorption of calcium
3. In absence of carbohydrate or in diabetes can lead to ketosis

Fat requirements

- Minimum: 15-20% E (20% for F of reproductive age, persons with BMI<18.5)
- Maximum: 30-35% E
- SFA: <10% E (Replace SFA with PUFA)
- MUFA: total fat intake-SFA-PUFA-trans-fats
- PUFA: 6-11% E
- Omega-3 (ALA) PUFA: 0.5-2% E
- Omega-3 (DHA+EPA): 0.250-2 gram/day
- Omega-6 (LA) PUFA: 2.5-9%E

- If your recommended daily calorie intake is 1800 calories, at the minimum what total amount of fats should you eat daily? Maximum, how much can you have? 1 gram of fat gives 9 kcal.

  At the minimum:

  (1800*0.15)/9= 30 gram = 6 tsp

  (1800*0.20)/9 = 40 gram = 8 tsp

  At the maximum,

  (1800*0.3)/9= 60 gram = 12 tsp

  (1800*0.35)/9 = 70 gram = 14 tsp

  (however it includes invisible sources of fats such as meat, eggs, milk, nuts and oilseeds as well)

- If your recommended daily calorie intake is 1800 calories, what total amount of saturated and unsaturated fats should you eat daily? (1 gram of fat gives 9 kcal.)
  - Saturated fats: (1800*0.01)/9= 2 gram
  - PUFA Omega 6:

    (1800*0.06)/9 = 12 gram

    (1800*0.11)/9 = 22 gram

  - PUFA omega 3:

    ALA: (1800*0.005)/9 = 1 to (1800*0.02)/9 = 4

    EPA+DHA = 0.250-2 gram/day

Relevant recommendations

- Replace simple carbohydrates (sugar) and starches with MUFA and PUFA
- Reduce SFA to < 10% E and replace excess with MUFA and PUFA

  (which means reduce consumption of animal fats and dairy products and replace it with plant sources of healthy fats,

  Also, replace fatty meats with lean meats and whole milk with low fat (but not skimmed) dairy products)
- Include sources of ALA and/or other omega-3 PUFA in the diet, to consume these in adequate amount
- Completely avoid trans fats in your diet
- Be cautious about invisible sources of fat consumption to maintain daily fat intake within optimum range

- Replacing fats with sugar is not a good idea. In fact it is harmful for health. Conversely one can safely replace sugars with MUFA and PUFA.
- Avoiding saturated fat altogether is neither recommended nor sustainable; rather intake of saturated fats should be limited .
- In PUFA, consumption of omega 6 fats should be limited.

- Class activity

participants are encouraged to give names of food items, that they have access to which they think are sources of healthy and less healthy fats and also encouraging them to think about how can they balance intake of different types of fat within recommended proportion

Carbohydrates:

best types replaced by the worst types over the course of changing eating practices

Functions

1. Predominant source of energy:

   Spares protein which can be used in body building and repair

   Spares fats which can be stored for future use

   Glucose is the only source of energy for some organs such as brain

2. Storage of energy for future use in the form of glycogen and triglycerides (fats)
3. Dietary fibers help in digestion of food, gives feeling of satiety, helps forming bulk of stool and prevents constipation
4. Dietary fibers possibly help lowering cholesterol by facilitating binding of cholesterol with bile acids to promote its excretion

Food sources of carbohydrates

- Cereals and millets
- Roots and tubers
- Fruits and vegetables
- Milk and milk products such as curd and yogurt
- Fresh beans
- Pulses and lentils
- Table sugar and other processed sugar
- Honey
- Jaggery

Carbohydrates: types

Simple carbohydrates			
Type	**Characteristics**	**Examples**	**Source**
Monosac-charides	No digestion required, so readily absorbed	Glucose Fructose Galactose	Fruits Vegetables Honey Glucose drinks High fructose corn syrup Invert syrup Processed food items with any of the monosaccharide containing ingredient
Disaccha-rides	Simple digestion, requires one step, so absorbed quickly	Lactose Table sugar (sucrose)	Milk and milk products such as ice creams, curd, lassi, yogurt Processed food items containing added sugar, jaggery

Carbohydrates: types

Complex carbohydrates			
Type	**Characteristics**	**Examples**	**Source**
In foods with fibers	digestion is complex (two or more steps) and slow, absorbed slowly	Starch	Whole grains, and millets, pulses, lentils, fresh beans
In foods with less or no fibers	Digestion is quick, absorbed quickly		Refined flour such as maida, white rice, roots and tubers such as potato, sweet potato, beet, carrots

Carbohydrates: types

Dietary fibers	• Can not be digested so does not give calories • Aid in digestion in multiple ways, important part of healthy diet • Gives satiety and feeling of fullness • Some of are considered prebiotics • Essential for bowel health

Type	Characteristics	Examples	Source
Soluble fibers	Help removing cholesterol Slows digestion and absorption (of carbohydrates)	Pectin gums	Whole grains, and millets, vegetables, fruits, vegetables, pulses, lentils, fresh beans, some processed food with pectin (jam, jelly) and with added fibers, Oat bran, wheat bran, fenugreek seeds some roots and tubers such as carrots, skin of potato etc.
Insoluble fibers	Form the main bulk of stool Helps movement of food in the gut (prevent constipation) May protect from colon cancer	cellulose	

Carbohydrates: important considerations

Concept	Meaning	Implications
Glycemic index (GI)	As compared to glucose, how fast the carbohydrates in the food item will be absorbed in the blood	The higher the GI, the immediate is the impact on blood sugar, requiring quick release of high amount of insulin. Lower the GI, slower is the absorption of sugar and less quantity of insulin is required to be released.

Classification	Examples
Low GI: 55 or less	apple, mango, cheela (besan), bajra roti
Medium GI: 56to 69	banana, pineapple, dalia, white rice
High GI: 70 or more	Watermelon, bread, chapatti, boiled potato

Limitations

- It does not take into account the amount of carbohydrate in the food
- It has to be estimated practically for each food item
- It changes when you consume a particular food item in combination with other food item

Carbohydrates: important considerations

Concept	Meaning	Implications
Glycemic load (GL)	How much is the impact of every serving of a particular food, on the blood glucose level? GL=GI/100*carb in gram/serving	The higher the GL, higher is the impact on blood sugar level, and more is the quantity of insulin released in the blood stream and vice versa.

Classification	Examples (for a standard serving of each food item)
Low GL: less than 11	Watermelon, mango, apple
Medium GL: 11 to 19	Banana, sweet corn
High GL: 20 or more	Bajra roti, white rice (boiled)

Limitations
• It is measured as per serving, so we need to be careful about the amount of food that we eat

Example

Food item	Glycemic index (as % of glucose)	Glycemic load per regular serving
Green peas (vatana/mutter)	75	6
Sweet corn	52	17
Watermelon	70	4

Carbohydrates: important considerations

Impact of food processing upon

- nutritive value of the food
- upon GI and GL

Other important considerations

- Empty calories:

  when apart from carbohydrates, especially simple carbohydrates such as sugar, a food item does not contain substantial amount of other nutrients that are critically important such as vitamins, minerals, antioxidants, protein, fibers or healthy fats, the energy obtained form such food items is called empty calories.

- For instance, candies, soft drinks, processed refined flours, alcohol and food containing high amount of added sugar etc.

Other important considerations

- Nutrient dense food:

  The food items that provide substantial amount of critical nutrients such as vitamins, minerals, antioxidants, dietary fibers and other essential nutrients such as healthy protein and healthy fats for relatively few calories.

- It has little or no added sugars, salt and fats; is unrefined and minimally processed.
- For instance, all vegetables, some roots and tubers, fruits, whole grains, seafood, eggs, beans and peas, unsalted nuts and seeds, low-fat dairy products, and lean meats and poultry -when prepared with little or no added solid fats, sugars, refined starches, and sodium.

Carbohydrates and health related problems

Inadequate intake of carbohydrates

- Implicated in bone mineral loss, and kidney stones

- Glucose is the only nutrient that can be utilized by the brain for energy. Diets completely devoid of carbohydrates require adaptation for the brain so that it can utilize other nutrients for energy

Carbohydrates and health related problems

Inadequate intake of dietary fibers

- Implicated in several cancers, constipation, gall bladder related ailments, appendicitis, diverticulosis as well as in heart disease and diabetes mellitus

- Implicated in increase in blood cholesterol and consequently DM and heart diseases

- Causes food to move slowly through the intestines, causing gas and bloating, and implicated in formation of some toxins

Carbohydrates and health related problems

Excess intake of carbohydrates, esp. refined or processed high GI and high GL food

Insulin resistance

- high blood sugar → high insulin → hypoglycemia → hunger and craving for sugar → high blood sugar
- Repeated insulin spurts → Cells lose sensitivity for insulin → Alternative cycles of hypo glycaemia and hyperglycemia
- Leading to metabolic syndrome, DM

Carbohydrates and health related problems

Excess intake of carbohydrates

Weight gain and atherosclerosis

- Excess sugars get converted into triglycerides and stored as fat at different places resulting in weight gain
- Rapid conversion into triglycerides or fats accelerates atherosclerosis and other degenerative processes

Carbohydrates and health related problems

Excess intake of carbohydrates

Immunity and infection

- Immune system is inhibited
- Vitamin C activity is inhibited
- Promotes growth of micro-organisms → infection

Degenerative processes: advanced glycation end products

- Accelerates aging process
- Accelerates atherosclerosis

What about sugar substitutes?

- Not recommended!
- Why?
  - Chemically synthesized
  - Addictive
  - Safety is not conclusively known
  - Implicated in irresponsible eating behavior
- Stevia:
  - A sugar substitute derived from a natural source
  - A temporarily recommended sugar substitute in small amounts
- Ideally, cut down the desire and liking for sweet taste!!!

Food items with relatively good amount of carbohydrates

How much and which type of carbohydrates should we have?

- Up to 45-50 % of daily calorie intake, mostly comprising of low glycemic variety and of different variety.
- Added sugar: not more than 100 Kcal/day for women and not more than 150 Kcal/day should come from added sugar
  - 1 gram of carbohydrate gives 4 Kcal
  - Which means that 25 grams (5 tsp) of added sugar for women and 37.5 grams (7.5 tsp) of sugar for men
- Dietary fiber: 20 to 30 grams of fibers/day

Recommended calorie intake for reference men and women India, ICMR, NIN

Group	Particulars	Body weight kg	Net Energy Kcal/d
Man	Sedentary work	60	2320
	Moderate work		2730
	Heavy work		3490
Woman	Sedentary work	55	1900
	Moderate work		2230
	Heavy work		2850
	Pregnant woman		+350
	Lactation 0-6 months		+600
	6-12 months		+520

Salt

- Sodium in the salt causes retention of water in the body, increases blood volume, and therefore implicated in hypertension
- Salt is natural constituent of many food items
- Additional use of salt should be limited to 5 gram/day (2300 mg) (1 teaspoon).
- Hypertensive patients may be asked to limit it to 2 gram/day (1500 mg) (2/3rd teaspoon)

Food items high in sodium

- Processed food including processed meat
- Several spices and sauces such as soy sauce, tomato ketch-up
- Salty snacks such as chips, crackers and cookies
- Pickles
- Papad

Antioxidants

- Protective factors against aging
- Protect against free radical induced damage.
- Strengthen immunity
- Protect against cancers
- Protect against diabetes, heart disease, blood pressure
- Influence body’s cholesterol production

Sources of antioxidants

- Ample in whole, unprocessed, fresh food items especially in fruits and vegetables, beans, cereals, and certain condiments (herbs) and tea.
- Eating food items with variety of colors help obtaining different anti-oxidants in adequate amounts

Food is more than the sum of its nutrients

- It has several other contents which we have no or limited knowledge about. Therefore supplementation of a few nutrients should only be a supplementary and not substitutionary
- Bio-availability of nutrients in the food and extracted nutrients in the form of chemicals is often very different.
- We should therefore never forego a food item in its most natural form with nutritional supplements.
- We should try to control our portion sizes rather than going for alternates that claim to be nutritious and give measured amount of calories.

Story about our ancestors!

Let’s sum up all this!

- Rather than focusing exclusively on weight gain or weight loss, priority should be balancing the nutrition and important health benefits of physical activities.
- Having a variety of all the food types every day largely helps getting balanced nutrition.
- Focus should be on having adequate of all the nutrients without going overboard, and less on the calorific value of the food.
- Minimizing sugar, salt, refined carbohydrates, starchy food without adequate dietary fibers and saturated fats; and choosing healthier and sustainable alternatives for all this should be the mainstay of dietary modifications.

Take home message!

- Even good or healthier options are healthy in moderation.
- Moderation is the key, even for moderation itself!
- Don’t rush, have patience, it takes time!

LECTURE 9

PHYSICAL ACTIVITY AND EXERCISE

Physical activity and exercise

A single best thing one can do
to improve and maintain health

Learning outcomes

This session will allow the participant to

- clearly state at least three **health benefits** from physical activity apart from aiding in weight loss, maintaining optimal weight and achieving muscular physique
- be able to identify **optimal levels of physical activity according to age** by looking at the chart.
- know different **types of physical activity** and will be able to give at least three **example** of each type.
- identify **barriers** to physical activity and **contextually feasible and suitable solutions** to overcome the identified barriers.
- Can **communicate about the benefits** of physical activity and **tips to incorporate** the same in daily routine in their social networks.

Additional learning outcome
(if time permits)

- Give rough estimate/plan of amount of physical activity that is contextually feasible and suitable to an individual and helps him/her achieving target level of energy expenditure/other health benefits based on the charts

Ice breaking

1. Today we are going to talk about physical activity and exercise
2. What comes to your mind when I say these words?
3. How do you think are these terms related to each other?
4. Do you think that doing exercise/physical activity is necessary?
5. For whom?
6. Why do you think so? What are the main benefits of doing it?
7. How do you think it helps improving fitness or health?
8. Do you think that exercise might be helpful in management of any disease? list the conditions.
9. Do you think that if you are healthy or fit or slim, you may safely avoid doing exercise?
10. Which age group should engage in doing physical activity?
11. Suppose you are asked to do exercise, do you think you can do it?
12. Why do you think so?
13. How can you incorporate it in your schedule/routine/lifestyle?

શારીરિક પ્રવૃત્તિ એટલે શું?

- સ્નાયુઓના હલન ચલન દ્વારા થતી કોઈ પણ પ્રવૃત્તિ કે જેમાં શક્તિ વપરાય.

- ઘરકામ
- વ્યવસાયિક કામ
- રમત ગમત
- ચાલવું વિગેરે

કસરત એટલે શું?

- જેમાં એક ને એક જ પ્રકારની શારીરિક પ્રવૃત્તિ આપણે પ્લાન બનાવીને વારંવાર કરીએ કે જેથી કરીને આપણી શારીરિક ક્ષમતા (physical fitness) જળવાય અથવા વધે.

- Exercise: planned, structured, repetitive physical activity that aims to improve or maintain one or more components of physical fitness (WHO)

Lifestyle: Based on level of physical activity

- **Sedentary**: only the light physical activity associated with typical day-to-day life
- **Moderately active** frequent walking or bodily movement which is equivalent to walking about 2.4 to 4.8 km per day at 4.8 to 6.4 km per hour, in addition to the light physical activity associated with typical day-to-day life.
- **Active** more continual physical activity equivalent to walking more than 4.8 km per day at 4.8 to 6.4 km per hour, in addition to the light physical activity associated with typical day-to-day life.

આપણી જીવનશૈલી

બેઠાડું:

રોજબરોજની પ્રવૃત્તિ જેવીકે ન્હાવું-ધોવું વિગેરે સિવાય કોઈ શારીરીક શ્રમ કરવો નહિ

થોડી પ્રવૃત્તિમય:

રોજબરોજ ના કર્યો ઉપરાંત, રોજનું ૪ થી ૫ કિલોમીટર જેટલું મધ્યમ ઝડપે ચાલવું અથવા ઓછા માં ઓછુ ૧ કલાક જેટલી અન્ય કોઈ શારીરિક પ્રવૃત્તિ કરવી

પ્રવૃત્તિમય:

રોજબરોજના કર્યો ઉપરાંત, રોજનું ૫ કીલોમીટર કરતા વધુ ચાલવું અથવા રોજનું ૧ કલાક કરતા વધુ શારીરિક શ્રમ પડે એવું કાર્ય કરવું

શું આપણે શારીરિક રીતે પ્રવૃત્તિમય જીવન જીવીએ છીએ?

વિશ્વમાં હાલમાં

- ૬૨ ૪ માથી ૧ પુખ્ત વયની વ્યક્તિ બેઠાડું જીવન જીવે છે
- ૬૨ ૫ માંથી ૪ કિશોર વયની વ્યકતી બેઠાડું જીવન જીવે છે (WHO)

ભારતમાં

૫૦ ટકાથી વધુ લોકો બેઠાડું જીવન જીવે છે

બેઠાડું જીવનશૈલી નુકસાનકારક છે?

- વિશ્વમાં મૃત્યુ થવાના પહેલા ૧૦ (top 10) કારણોમાંનું એક બેઠાડું જીવનશૈલી છે (WHO)

- જે લોકો બેઠાડું જીવન જીવે છે તેમને પ્રવૃત્તિમય જીવન જીવનાર વ્યક્તિની સાપેક્ષે અલગ-અલગ કારણોથી મૃત્યુ થવાનું જોખમ ૨૦ થી ૩૦ ટકા જેટલું વધારે હોઈ છે (WHO)

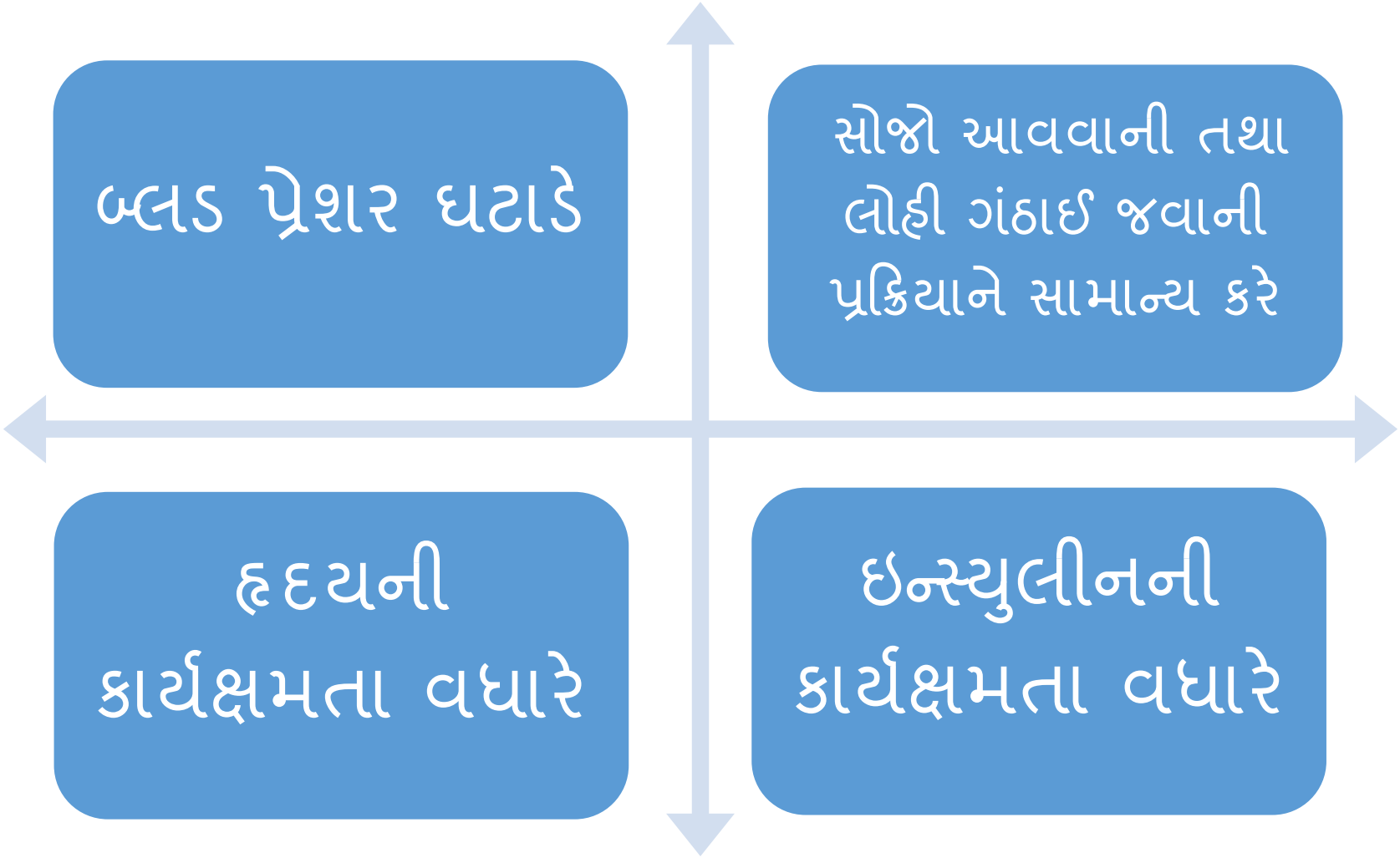
Is physical inactivity a risk to health?

- Physical inactivity is estimated to be the main cause for approximately
  - 30% of ischemic heart disease
  - 27% of diabetes
  - 21–25% of breast and colon cancers

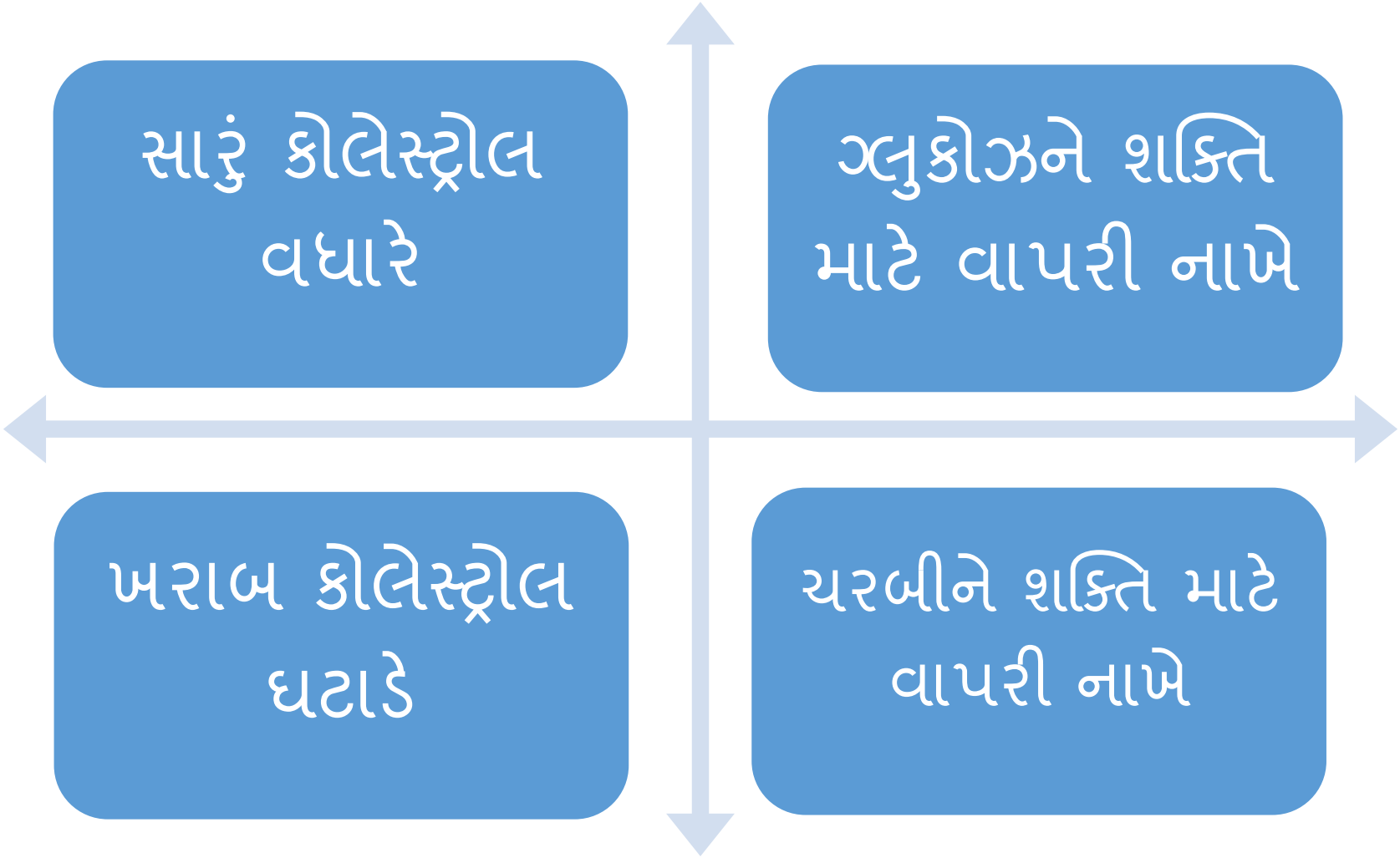
શારીરિક પ્રવૃત્તિના ફાયદા

- આપણા સ્વાસ્થ્યને સારું રાખવા તથા સુધારવા માટે જો કોઈ બેસ્ટ વસ્તુ હોય તો એ શારીરિક પ્રવૃત્તિ છે
- આપણું જીવન જેટલું વધુ શારીરિક પ્રવૃત્તિમય હોય એટલો વધુ ફાયદો થાય
- દરેક ઉમર ની વ્યક્તિ માટે શારીરિક પ્રવૃત્તિ જરૂરી છે તથા ફાયદાકારક છે

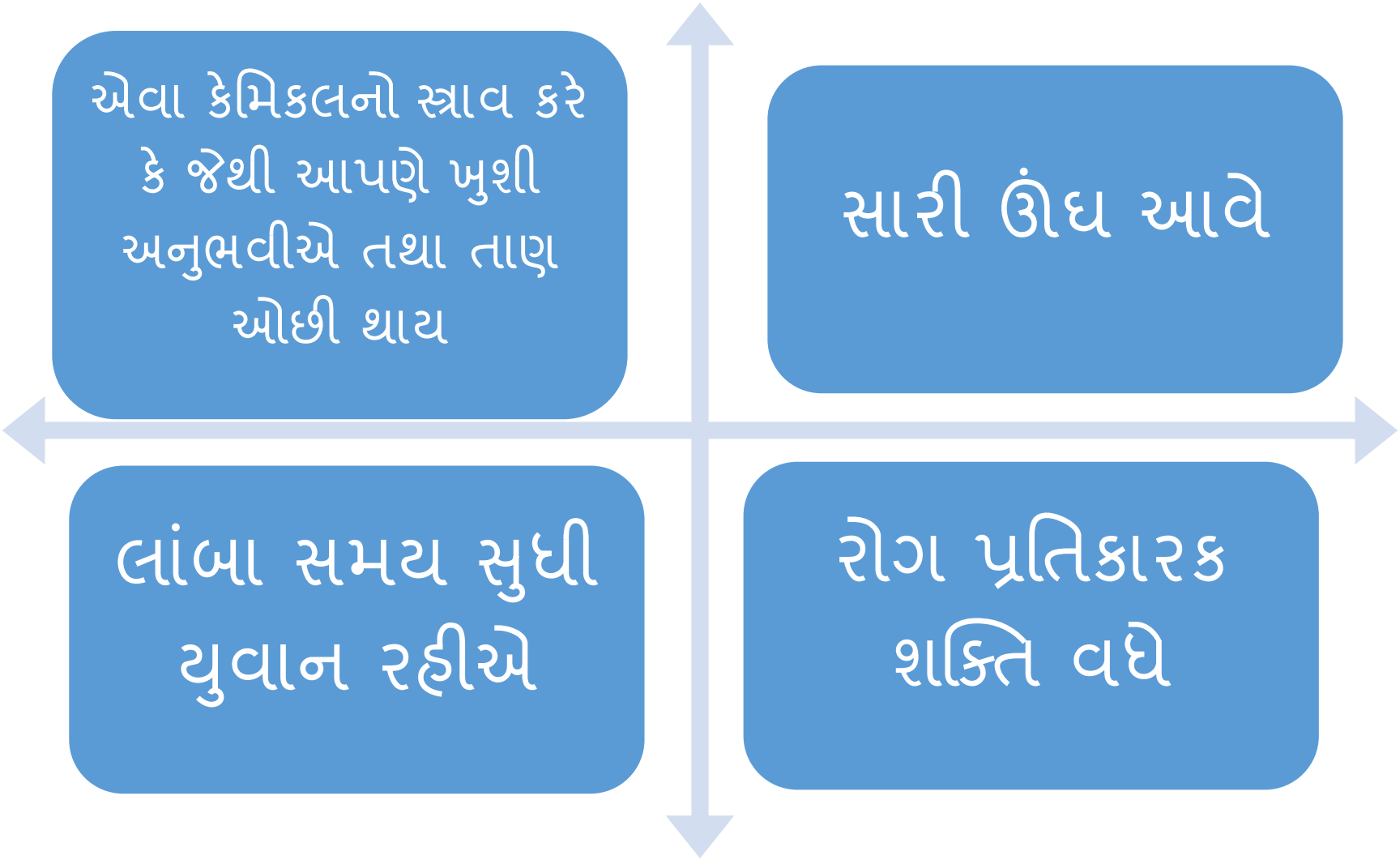
How does physical activity improve health?



How does physical activity improve health?



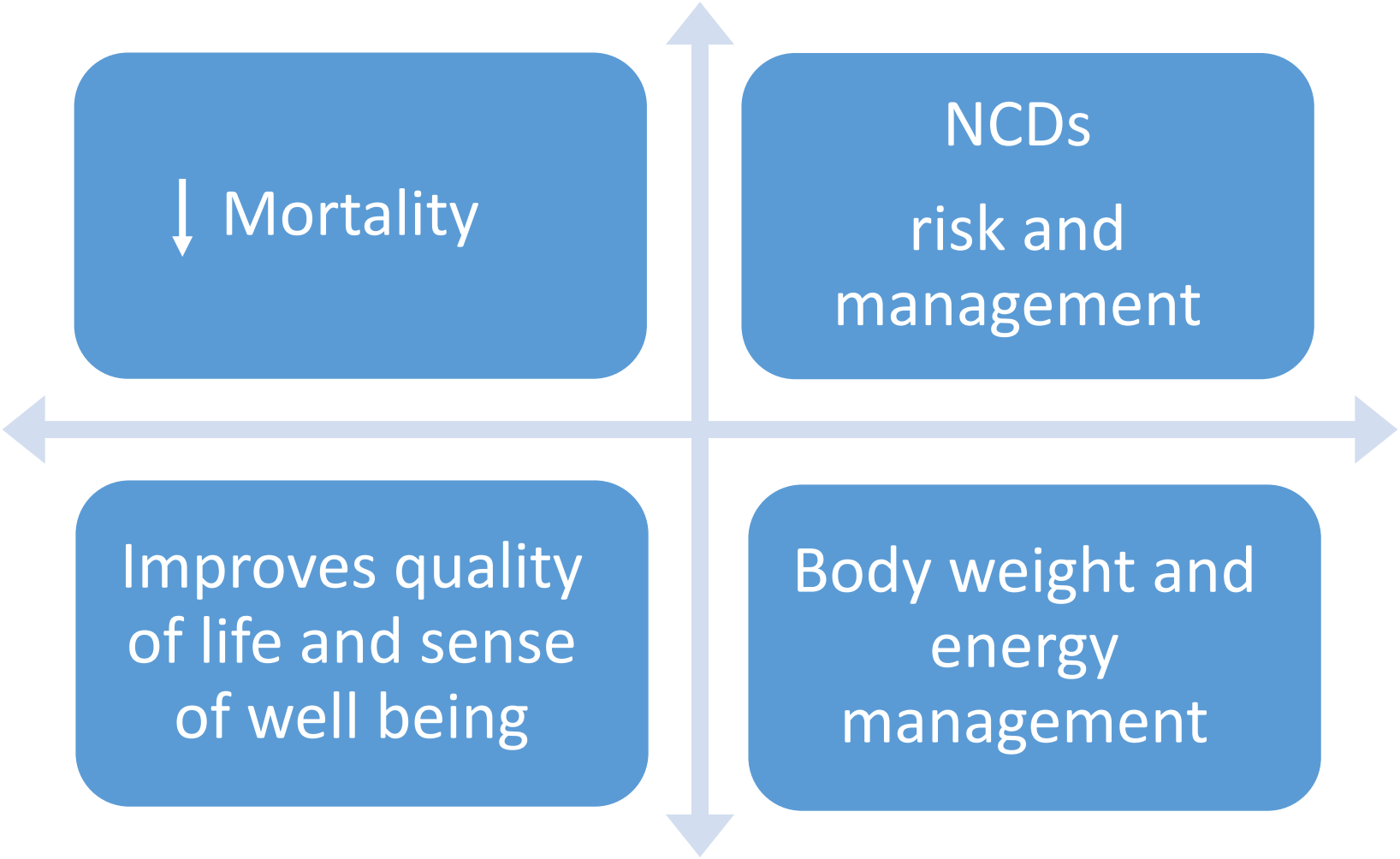
How does physical activity improve health?



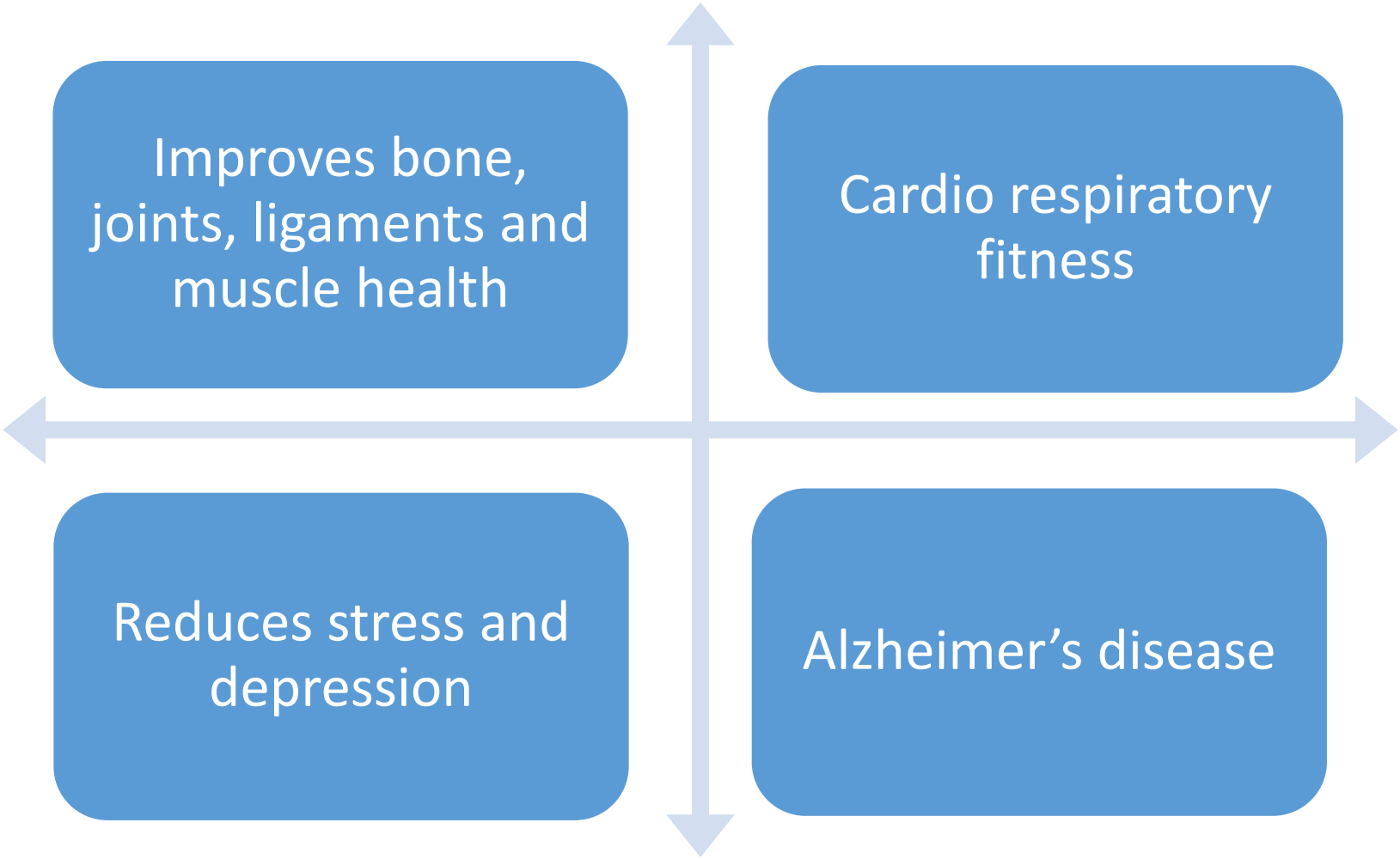
કયા રોગોથી બચાવે?

- હાઈ બ્લડ પ્રેશર
- ડાયાબીટીસ
- કોલેસ્ટ્રોલ
- અથેરોસ્ક્લેરોસીસ
- શારીરિક સ્થૂળતા
- કેન્સર
- અલ્ઝાઇમર
- વ્યંધત્વ
- હોર્મોનની અસમતુલા
- અનેક અન્ય રોગો

Benefits of physical activity



Benefits of physical activity



Types of Physical activity

Intensity of physical activity

Ratio of physical activity/exercise energy expenditure to energy expenditure while sitting/lying down quietly

Light: less than 3 MET

Moderate: between 3 to 6 MET

Vigorous: more than 6 MET

Energy expenditure in physical activities

- Approximate value of energy expenditure depends on :
  current weight
  Intensity of physical activity/exercise
  Duration of physical activity/exercise

- Average caloric expenditure for a person weighing 70 kg is for physical activity is
  Moderate intensity : **3.5 to 7 kcal/min**
  Vigorous intensity : **>7 kcal/min**

- A person weighing lower than 70 kg spends slightly lesser than this and a person weighing higher than 70 kg, spends higher than this amount

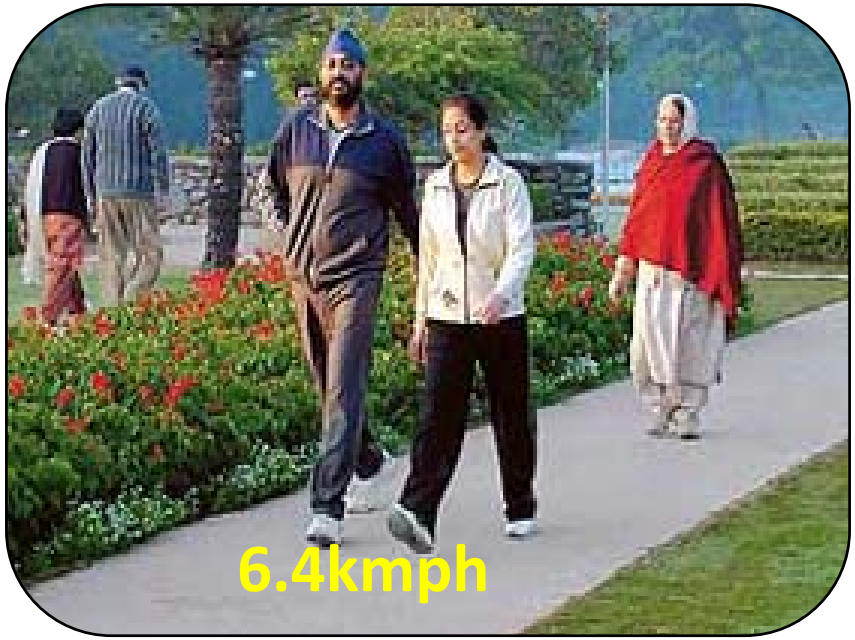
Other characteristic of physical activity

Impact of physical activity:

Low : at least one foot is in contact with ground all the time

High: jumping/hopping

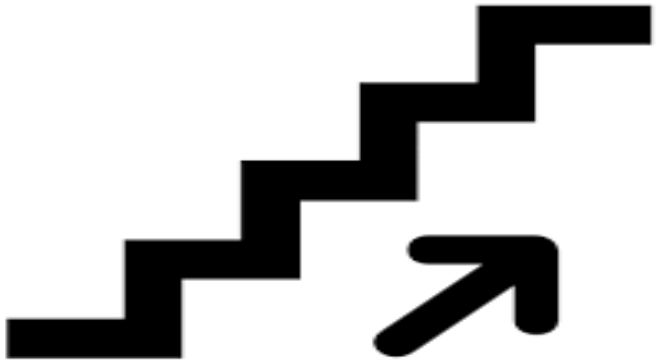
Moderate intensity activities



Moderate intensity activities

Source: Google images

Vigorous intensity activities



Source: Google images

Vigorous intensity activities

Source: Google images

Types of Exercise

Types of exercise

Type	Description	Specific importance
Aerobics (increases heart rate and breathing rate)	Require heart and lungs to work at an intense level to increase flow of oxygen to the body	For cardio-vascular health
Strength training	Requires muscular force to be exerted against an opposing object to build strength	For maintaining muscle mass
Flexibility training	requires muscle fibers to stretch to its maximum	Maintaining correct posture and preventing joint problems; must do after aerobic exercise
Balance training	helps maintaining physical balance	Esp. important for older adults to prevent falls

Some examples of each type

Type	Examples
Moderate intensity aerobics (3-6 MET)	Brisk walking (6.4kmph) bicycling (8-14.4kmph) Swimming Walking downstairs
Vigorous intensity aerobics (more than 6 MET)	Jogging (9.6 kmph) Running (more than 9.6 kmph) Climbing stairs Outdoor sports
Strength training	Lifting weights Abdominal crunch Gym
Flexibility training	Hamstring stretch Neck stretch deltoid stretch Yoga
Balance training	Weight shift exercise such as one leg balance

Strength training exercises

Flexibility training exercises

Balance training exercises

Hold for 10-20 seconds

Repeat on both legs

Recommended levels of physical activity/exercise

A. Children and adolescents aged 5-17years

Type	Duration	Frequency
Moderate to vigorous intensity aerobic activity	60 minutes	everyday
Strength training	Involving major muscle-groups	3 times per week

ref: WHO

Recommended levels of physical activity/exercise

B. Adults aged 18-64 years :

Type	Intensity	Duration	Frequency
Aerobics	Moderate	30 minutes	5 days/week
	or		
	Vigorous	25 minutes	3 days/week
Strength training	-	Involving major muscle-groups	2 days/week

ref: WHO

Recommended levels of physical activity/exercise

C. Older adults aged 65 years and above:

Same as B (for adults aged 18-64 years)

plus Balance training activities twice a week

ref: WHO

General considerations

- Minimum 10 minutes spells give health benefits
- Exercising on most days in a week is more beneficial
- Doing over and above the recommended levels confer additional health benefits
- Doing something is better than doing nothing

Caution

- People with health problems needs to take advice of medical practitioner before beginning exercise

- It is recommended that a physically inactive person should start with moderate intensity aerobic exercise for shorter spells and should gradually increase the time and intensity

- Exercise should not be painful rather it should develop pleasant feeling. In case of pain or injury, one should see the medical professional

Barriers and solutions (classroom activity)

Divide the participants into two groups and arrange a discussion between both the groups one group will identify barriers and the other group will come up with solutions to those barriers

Conclude with your comments.

Barriers and solutions (classroom activity)

Dislike
Time
Motivation
Environment
Pollution
Traffic
Previous unfavorable experience
Myths and misconceptions
Lack of knowledge and skills
Tiredness
Tedium

Solutions to the identified barriers

Never get time; you will have to find time

give it priority, make it a routine

Knowledge about benefits and risks

Know about different physical activities and how you can incorporate them in your daily life

Make health and fitness as your ultimate goal and not the weight loss

Make it a group activity, leverage your social network

Connect with friends and relatives who encourage and support your endeavor

Start with your favorite physical activity or outdoor sport

Take breaks in between when you have desk based job all the day

Search for alternatives

Engage in household chores or occupational chores that help you achieve your physical activity target

Change your mode of transport at least for a short distance on few days

Play with kids

Do household chores/ occupational activities in a way that helps you burn calories or improve muscle strength

Think what went wrong previously and seek help, let it not discourage you

Look for information from authentic sources

Research has suggested that at any age and circumstances, benefits from physical activity always outweigh the risks associated with it

Stop giving excuses to others and to yourself!

- Take help of technology such as

  heart beat rate counter

  Pedometer

  mobile based app that counts foot steps and calculates distance travelled

  Mobile based apps that calculate calorie expenditure of physical activities

  apps that maintain your log of exercise

HEALTH LITERACY TOOL

DEVELOPED BY THE AUTHORS IN INDIA, 2020

HEALTH LITERACY TOOL

- Comprises of 22 questions.
- Combination of multiple choice and descriptive answers.
- Skills testing for measurement of BP and blood sugar.
- Administered at the end of the course and at 6 and 12 months.
- Can be obtained from Dr Jindal (jindalr@msn.com)