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 1/4\textsuperscript{th} 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)

Cardiovascular diseases
(esp. heart attack and paralytic attack)

45%

Cancers of different types

12%

Diabetes mellitus

3%

Chronic lung disorders
Such as asthma, chronic bronchitis and emphysema

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
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

Health Determinants Model

- Individual lifestyle factors
- Social and community influences
- Living and working conditions
- General socioeconomic, cultural and environmental conditions
- Age, sex & hereditary factors
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 ઝડ અને સમત થાય 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
Atherosclerosis  શું છે?

- લોહીની નળીઓના ચરબીનો ગઠો જામી જવાથી નળીઓ જિંદગી અને સમત થઇ જાય છે.

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

  **sclerosis** meaning scarring.
Atherosclerosis

• Atherosclerosis can affect any artery, it commonly affects arteries in heart, brain, kidney, extremities and splanchnic circulation.
કહું પ્રકિયાઓ અને પરિત્રજનો જવાબદાર છે?

- લોહી જમી જવાની પ્રકિયા
- બરાબર કોલેસ્ટ્રોલ
- બ્લડ સુગર
- ઓક્સિડશનની પ્રકિયા
- સોજો આભાવની પ્રકિયા

Atherosclerosis
• [https://www.webmd.com/heart-disease/video/atherosclerosis](https://www.webmd.com/heart-disease/video/atherosclerosis)
આ પ્રક્રિયા માટે કયા જોવભામી પરિબળો જવાબદાર છે?

- ડાયાબીટીસ/પ્રીડાયાબીટીસ
- બલડ કોલેસ્ટ્રોલ
- બલડ સુગર
- બલડ કોલેસ્ટ્રોલ
- અધોરોસ્ક્લેરેસ
- લોહી જમી
- રહા જવાની પ્રક્રિયા
- અધોરોસ્ક્લેરેસ
- સોજો આવવાની પ્રક્રિયા
- બલડ પ્્રેશર
- માનસીક તાળું
ઘોમિ પરિણામો કયા?

- અરાબ કોલેસ્ટ્રોલ (જભાન ચરભૂરી)
- શારીરિક સ્થૃણતા
- ડાયાબીટિસ/ પ્રીડાયાબીટિસ
- તમાકણું વિયોસન/ સ્મિકિંગ
- અપૂર્તી વેંધ
- ચંતા / માનસિક તાપ
- હાઈ બ્લડ પ્રેશર
- હાઈ બ્લડ સુગાર
અથેરોસ્ક્લેરોસિસથી શું થાય?

• ischemia (ચસકીમિયા): અંગને લોહી ઓછુ પહોયે

• aneurism (અન્યુરિઝ્મ): નળીઓ નબળી પડીને પહોળી થાય જય

• stenosis (સ્ટેનોસીસ): નળીઓ સાંકડી થાય જય

• infarction (નળીઓ સંપૂર્ણ બલોક થવાથી અંગને લોહી મળતું તહેન બધ થાય અને એક કોષો મૃત્યુ પાંચે)

• જો આવું વાહ્નટલ અંગો જેવાં માગિય, હડય કે કીડનીમાં થાય તો મૃત્યુ પાંચે થઈ શકે.

જો હડયમાં થાય તો અને હિટ અટેક કરીયે,
જો માગિમાં થાય તો અને સ્ટ્રોક કરીયે.
અથેરોસ્ક્લેરોસિસ, હાઈ બલડ પ્રેશર અને જીવનના જીવનમાં મુકતા કોમ્પ્લીક્શન

• અથેરોસ્ક્લેરોસિસ લગભગ હમેશા હાઈ બલડ પ્રેશર સાથે જોવા મળે છે

• હાઈ બલડ પ્રેશરથી અથેરોસ્ક્લેરોસિસ ઉદાપથી આગળ વધે છે

• જો બલડ પ્રેશર કન્ટ્રોલમાં રાખીને તો અથેરોસ્ક્લેરોસિસથી થતા ગંભીર કોમ્પ્લીક્શનોથી બયો રાકાય છે
कड़ रीते अबर पड़े?

• 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
ડાયાબીટિઝ વિષે જાણવા માટે જરૂરી છે?
ભારતમાં 20-74 વર્ષની વયની દર દસમી વ્યક્તને ડાયાબીટિસ છે.
અન્ય વિકસિત દેશોની સાથેની સપેક્ષમાં ભારત જેવા વિકાસશીલ દેશોમાં 

• ડાયાબીટિસ એક દસકા જેટલા વહેલો થાય છે,
• કોમ્પ્લીક્શન વહેલા થાય છે.
• મૃત્યુ વહેલા થાય છે
દિયાબીટિસના નિદાન વિષયક પરિસ્થિતિ
2017ના આંકડા મુજબ

45.80% 54.20%

Yes No
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
ડાયાબીટિસથી બયી રહી શકાય?

• હા
• કયું રીતે?
  જવનશૈલીમાં બહેદાર લાવવાથી
• કેવા બહેદાર?
  સ્વાસ્થ્યપ્રક જોરાંક
  શારીરિક પ્રવૃત્િઃ અને કસરતો
  ચિત્તા અને તાળુંથી બયેખ
  પ્રત્િ ઉદ્દ્ધ
  વ્યસનમુકન જીવન
ડાયાเบટીઝ મટી શકે?

• ના
• એક વજત શાય તો તેને મટાડવો અતિશય મુશ્કેલ છે
તો શું કરી શકાય?

ડાયાબીટિસને કબુમાં લાભ શકાય

કહી રીતે?

• દવાઓ અને નિયમિત સારવાર
• નિયમિત સ્વસ્થનંબું નিষ્ણાત ક્લારીચાપ
• જ્ઞાન્યીલીમાં બદલાવ

જ્ઞાન્યીલીમાં બદલાવ લાભવાથી શો જાયાયો થાય?

• દવાની ધારી અસર થાય
• કોમ્પ્લીકેશન થવાનું જેરમં ઘટી જાય
ડાયાબીટિસ એટલે શું?

સામાન્ય રીતે આપણા લોહીમાં અમુક માત્રામાં વ Curl ખાંડ એટલે કે સુગર (ગુકોઝ) દરેક સમયે હોય છે ડાયાબીટિસ એટલે લોહીમાં સુગરનું પ્રમાણ સામાન્ય (નોમરલ) કરતા વધારે હોવું.

આ એક આજ્વન બીમારી છે.
લોહીમાં સુગર વધી જવાનું કારણ શું?

ઇન્સ્યુલીનનો અભાવ

અથવા

ઇન્સ્યુલીનની કાર્યક્ષમતામાં વિકૃત

અથવા

બંને

અથવા

અથવા

અથવા
ઇન્સ્યુલીન શું છે?

• ଇન્સ્યુલીન સ્વাঠૂપિંડ (પેનડીયાસ)માંથી નકાતી એક અંતસ્થાવ છે

• ଇન્સ્યુલીનનું મુખ્ય કાર્ય લોહમાં રહેતી સુગર નિયમન કરવાનું છે

• ଇન્સ્યુલીનનું લોહમાં સુગરનું પ્રમાણ અમર્યાદિત રીતે વધી જતું અટકાવે છે
ખોરાક લઈએ પાચન થાય શોષણ થઈને લોહીમાં ભળે સ્વાગતપ્રદના કોષોઆ સંકટ સમાચાર આપણને ખુખ લાગે ઇન્સ્યુલીન લોહીમાં રહીલે સૂગરના વપરાશ તથા સ્ટોરેજ ઉત્સ શોષણ થઈને લોહીમાં લાગે ઇન્સ્યુલીન લોહીમાં રહીલે સૂગરના વપરાશ તથા સ્ટોરેજ ઉત્સ લોહીમાં સુગરનું પ્રમાણ વધે સ્વાહાપિઠના ક્રેટર સમાચાર સ્વાહાપિઠમાથી ખસ્તુતિના નીકળને લોહીમાં લાગે
ઇન્સ્યુલીન ક્યાણે નીકળે?

1. ખોરાક લાયે પાચન થાય શોષણ થઈને લોહીમાં ભળે
2. લોહીમાં સુગરનું પ્રમાણ વધે સ્વાસ્થ્ય કોષોને સંકેત સમાધ્ય આપણે લુક લાગે

- આપણે લુક લાગે
- પાયન થાય
  - શોષણ થઈને લોહીમાં ભળે
    - લોહીમાં સુગરનું પ્રમાણ વધે
      - લોહીમાં સુગરનું પ્રમાણ વધે
        - સ્વાદૃભિદ્વિના કોષોનાં સંકેત સમાધ્ય
          - સ્વાસ્થ્યમાંથી ઇન્સ્યુલીન નીકળે લોહીમાં ભળે
ઇન્સ્યુલીન સુગરને કહ્ રીતે વાપરે અથવા સ્ટોર કરે?

દનસ્યુલીન સુગરને કહ્ રીતે વાપરે અથવા સ્ટોર કરે?

દનસ્યુલીન સુગરને કહ્ રીતે વાપરે અથવા સ્ટોર કરે?
ઇન્સુલીન શરીરમાં કાર્ય કરી રહેવું કે?

કારોટિટ (કારોહાઈડ્રેટ) ઉપર અસર

સુગરના ઉપયોગ તથા સ્ટોરેજને ઉત્તેજ

Insulin

યર્ભીના ઉપર અસર

• યરભી બનાવે
• યરભીનો શક્તી માટે ઉપયોગ થતો અટકાવે

પ્રોટીન ઉપર અસર

• પ્રોટીન બનાવે
• પ્રોટીનનો શક્તી માટે ઉપયોગ થતો અટકાવે
ઇન્સ્યુલીન અને ડાયાબીટિસ વચ્ચે શો સંબંધ?

1. ઇન્સ્યુલીનની કાર્યક્ષમતામાં અવરોધ/વિક્ષેપ
2. ઇન્સ્યુલીનના પ્રમાણમાં વધારો
3. સ્વાસ્થ્યપંક થઇ જવાથી ઇન્સ્યુલીન બનતું ઓછુ થાય
ડાયાબીટિસ માં શું થાય?

કારણતીત (કારોહાઈડ્રોજન) ઉપર અસર
સુગારના ઉપયોગ કોશો કરી શકે નથી તથા
સુગારનું યાર્થી માં દ્રાપાંતર થઈને એ સ્ટોર નથી થાય

Insulin

યાર્થી ઉપર અસર
• પોરાકમાની યાર્થીમાં કોશો શક્તિ મેળવે
• સંગ્રહ થતેલી યાર્થીનો શક્તિ માટે ઉપયોગ થવા લાગે
• સુગારમાંથી નવી યાર્થી બને નથી

પ્રોટીન ઉપર અસર
• નવં પ્રોટીન બને નથી
• પ્રોટીનનો શક્તિ માટે ઉપયોગ થવા લાગે
# Diabetes Types

## Type 1 Diabetes:
- Body’s immune system destroys cells producing insulin so none or very little production of insulin.

## Type 2 Diabetes:
- 90% of people having DM has this type.
- None or insufficient production of insulin and/or body’s inability to use insulin effectively.

## Gestational Diabetes:
- 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 પરિમણો/કારણો

• શારીરિક સ્થુલતા
• અસમતોલ કે અમર્યાદિત આહાર
  ✓ simple carbohydrates
  ✓ saturated fats
  ✓ calorie rich diet
• બેહારું જીવન
• વધારે પડતી માનસિક ચિંતા કે તધાવ
• દાદું સેવન
• ધીમું સેવન
• વધ
• વસ્તૃત કારણો
Risk factors for DM

- Insulin resistance
- Overweight and obesity, esp. central obesity
- Consumption of calorie rich diet
- Consumption of saturated fats in high amounts
- Excessive consumption of sugar
- Excessive consumption of alcohol
- Urbanization, low socio-economic status
- Genetic influences
- Smoking
- Stress
- Physical inactivity
- Age
Risk factors for DM

- Genetic factors
- Insulin resistance
- Hyperinsulinemia
- Pancreatic fatigue
- Impaired insulin secretion
- Age
- Obesity

Urbanization, low socio-economic status
ડાયાબીટિઝનના લક્ષણો

- વધુ તરસ લાગે
- પુષ્પ સુખ લાગે
- વારવાર બાથ જં પડે
- પુષ્પ થાક લાગે
- વજન ઉતરતું જય
- વારવાર ઇંગસનો રેપ લાગે
- ઘા જલ્દી દુજાવ નહીં
- આંધે ઓફ્સો દેભાઈ

- એનતરવતું જય
- વારવાર ઇંગસનો રેપ લાગે
- ઘા જલ્દી દુજાવ નહીં
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
<table>
<thead>
<tr>
<th>Criteria</th>
<th>Low risk range (normoglycemia)</th>
<th>Prediabetes range</th>
<th>DM range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood sugar at fasting (FPG)</td>
<td>&lt; 110 mgdl</td>
<td>110 – 125 mgdl</td>
<td>&gt;/ = 126 mgdl</td>
</tr>
<tr>
<td>2 hours after eating (2hPG)</td>
<td>&lt;140 mgdl</td>
<td>140-199 mgdl</td>
<td>&gt;/ = 200mgdl</td>
</tr>
<tr>
<td>HbA1C (glycosylated hemoglobin)</td>
<td>&lt;5.7%</td>
<td>5.7-6.4%</td>
<td>&gt;/ = 6.5%</td>
</tr>
</tbody>
</table>

Prevention and treatment of DM
ઝોખમ વધારતા\nપરિબળો/કારણોને નિયંત્રણ\nમાં લાવવા\n• શારીરિક સ્વસ્થતા\n• અસમત્તોલ કે અમર્ચિત આહાર\n  ✓ simple carbohydrates\n  ✓ saturated fats\n  ✓ calorie rich diet\n• બેઠાડું જવન\n• વધારે પકાડેલી માનસિક ચીંતા કે તાળવ\n• દ્રાતનું સેવન\n• ધુમ્પાન\n• વધ\n• વારસાગત કારણો
Exposure to prolonged high blood sugar level

Blood vessels
Atherosclerosis
Cardiovascular diseases

Kidney cells
Nephropathies
Kidney failures

Nerves
Neuropathies
Tingling and numbness
Autonomic neuropathy

Retina
Retinopathies
Blindness
 Yogya sarvar na lade to shun thay? (complications)

<table>
<thead>
<tr>
<th>Immune system</th>
<th>Multiple other complications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weakening</td>
<td>Include cancer, tuberculosis, depression et cetera</td>
</tr>
<tr>
<td>Recurrent infections</td>
<td></td>
</tr>
<tr>
<td>Delayed wound healing</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Oral health</th>
<th>Diabetes related acute complications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teeth decay</td>
<td></td>
</tr>
<tr>
<td>Poor gum health</td>
<td></td>
</tr>
</tbody>
</table>

Exposure to prolonged high blood sugar level
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 lifestyle 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 lifestyle 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

Reproductive disorders

Respiratory problems

Lipid disorders and atherosclerosis

Insulin resistance and DM

Cancer
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

Overweight and obesity patterns (BMI ≥ 25) 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

<table>
<thead>
<tr>
<th>BMI</th>
<th>Nutritional status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 18.5</td>
<td>Underweight</td>
</tr>
<tr>
<td>18.5-22.9</td>
<td>Normal weight</td>
</tr>
<tr>
<td>23-24.9</td>
<td>Overweight (pre-obesity)</td>
</tr>
<tr>
<td>&gt;=25</td>
<td>Obesity class 1</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>WC</th>
<th>Normal value (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>&lt;90</td>
</tr>
<tr>
<td>Women</td>
<td>&lt;80</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WHR</th>
<th>Normal value (unit less)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>&lt;0.95</td>
</tr>
<tr>
<td>Women</td>
<td>&lt;0.85</td>
</tr>
</tbody>
</table>

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 બલ્ડ પ્રેશર વિષે જણાવવું શા માટે જરુરી છે?

• હદય સંબંધિત રોગો જેવાં હાટે બેડેક, હાટ ઇન્ઝીટ તથા લક્ખો (પેરાલીસિસ) તમારા માટે જવાબદાર છે。

• વિશ્વમાં કુલ ১ મિલીયન લોકે હાઈ બલ્ડ પ્રેશર છે।

• દર વર્ષે કુલ ૮ મિલીયન લોકે હાઈ બલ્ડ પ્રેશરના કારણાર મૃત્યુ પામે છે।
આપણા દેશમાં કેટલા લોકોને હાઈ બ્લડ પ્રેશર છે?

<table>
<thead>
<tr>
<th>વિવિધતા</th>
<th>20 વર્ષની વયોધી ઉપરના લોકોમાં હાઈ બ્લડ પ્રેશરના કેસ</th>
</tr>
</thead>
<tbody>
<tr>
<td>ભારત</td>
<td>29%</td>
</tr>
<tr>
<td>શહેરી</td>
<td>34%</td>
</tr>
<tr>
<td>ગામડી</td>
<td>28%</td>
</tr>
</tbody>
</table>

Rule of halves

Out of every 8 people suffering from
Only 4 have been detected
Only 2 have been treated
Only 1 case is under control
આ બ્લડ પ્્રેશર ક્યાં શકાયું?

• હાં વખતે હાઇ બ્લડ પ્્રેશર હાઈ બ્લડ પ્્રેશર તથા તે સમાયી થવાની કોમિકેશનની ભયવંશ શકય છે

• ભયાન ચે સારવાર કરતા સસ્તો અને જઢુ વાંધકારક રમ્યો છે

• શું આ કોમિકેશનની સમયમાં હાં બ્લડ પ્્રેશર ક્યાં શકય છે તથે કોમિકેશનની લક્ષણો દેખાવવામાં નથી હોવાથી આપણે તે સમાયી શકય છે અને તે ક્યાં હોવાથી જ આપણે શરીરમાં નુકસાન કરતું રહે છે.
To understand this, let us understand some basic phenomena......
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:

- Oxygen
- Carbon dioxide
- Glucose (sugar), fatty acids, amino acids
- Cholesterol, phospholipids, glycolipids, glycoproteins;
- Chemical regulators of metabolic processes;
- Antigens (that help fighting the infection)
- Blood cells and blood platelets
Blood flows through blood vessels, which can be compared with a closed loop network of roads, originating from and terminating in the heart.
Any guesses how many do we have?

About 100 trillion!

(ref. Guyton and Hall, Xth edition)
હડયા - એક પંપ

એક વજની હડયા ઘડકે ત્યારે એક પમ્પિંગ સાધ્યકલ પૂરી થય.

લે હેટલીટ્સની વજય હડયાની શિલ્કી થાય અને અમાં લોહી સરાર.

નેક્સ્ટ હેટલીટ દ્વારા આ અલા કેલસ્થી પંપ તેમને આજા શરીરને પહોયો.
બલડ પ્રેશર શું છે?

• જ્યારે બલડ નળીઓમાંથી વહે છે ત્યારે આ નળીઓની દીવાળ પર પ્રેશર લગાવે છે; જેને આપણે બલડ પ્રેશર કહીએ છીએ.

• આ બલડ પ્રેશર રેલ કારણોથી લાગે છે:

  1. હદય જૈસમાં બલડને પંપ કરી છે; બલડની જથ્થા આટલો વધુ મેટપં પ્રેશર વધુ.

  2. લોહીની પોતાની સ્નિઝગભટાને લીધે તે નળીઓમાં વધેતી વગળા બેદ અવરોધ ઉતપન્ન કરી છે.

  3. નળીઓ પોતે સંકુંકિત કે વિવિધ થાય શકે છે.
શું બ્લડ પ્રેશાર હમેશા સ્થિર રહે?

• ના, સામાન્ય પરિસ્થિતિમાં જયારે રોગ ના હોય ત્યારે પણ બ્લડ પ્રેશારમાં વધ ઘડ થતી રહે છે. જયારે કસરત કરીએ ત્યારે કે જયારે સ્ટ્રેસમાં (જિંતામાં) આવી જદ્દો ત્યારે બ્લડ પ્રેશાર વધી જાય છે પરંતુ પણ નોમલ પણા વધ જરૂર હોય છે.

• બ્લડ પ્રેશાર માં થતી આ નોમલ વધ ઘડ અક્સર રીતે નિયંત્રિત હોય છે જેમાં જે-તે ક્રોશો, થેતા તંત્ર, અંત:સ્ટ્રાવો તથા કેડની મહત્વનો ભાગ લઈ શકે છે.
તો હાઈ બલડ પ્રેશર એક રોગ ક્યારે કહેવાય?

જયારે કેટલીક કારક્ષણો બલડ પ્રેશર કામી ધોરણે સામાન્ય લીમિટ કરતા હોય ત્રીજી રીતે અંદગી નોમ્ન થાય નહીં તેના તેને હાઈ બલડ પ્રેશર નો રોગ અથવા હાશપર ટેન્શનનો રોગ કહે છે

આ એક આજ્ઞાન બીમારી છે
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 પરિમણો/કારણો

• શારીરિક સ્થૂલતા
• ચોલેસ્ટ્રોલના પ્રમાણમાં ગરમાં
• અસમત્તલ કે અમર્યુદત આહાર
  ✔ simple carbohydrates
  ✔ saturated fats
  ✔ calorie rich diet
  ✔ salt
• બેહાદ જીવન
• વધારે પકાતી માનસિક ખંભાર કે તજાવ
• દાહનું સેવન
• ધુમ્રપાન અથવા તમાકણું સેવન
• વધ
• વાર્સાગત કારણો
Risk factors for HT

Urbanization, low socio-economic status

- Stress
- Overweight and obesity esp. central obesity
- Genetic influences
- Age
- Physical inactivity
- Tobacco use
- High salt intake
- Long term use of oral contraceptives
- Excessive consumption of alcohol
- Physical inactivity

HT
Risk factors for HT

- Physical inactivity
- Overweight and obesity esp. central obesity
- Genetic influences
- Tobacco use
- Stress
- Harmful chemicals
- Urbanization, low socio-economic status
- Excessive consumption of alcohol
- Harmful chemicals
- Physical inactivity
- Excessive consumption of alcohol
- High salt intake
- Hyperinsulinemia
- Constricts the arteries
- Salt retention in body
- Increase in blood volume
- Increase in peripheral vascular resistance
- Hyperinsulinemia
- Insulin resistance
- Activate sympathetic nervous system
- Long term use of oral contraceptives
- Increase in blood volume
- Increase in peripheral vascular resistance
- HT
- age
અન્ય જીફાળી પરિસ્થિતિ

પ્રેગ્નાન્સી દરમિયાન જેવી આવે કે બલક પ્રેશર વધુ હોવું

ડાયાબીટિસ કે પ્રીડાયાબીટિસ હેવં
લાભારવક સિન્ડ્રોમ

• કોલેસ્ટ્રોલના પ્રમાણમાં ગરબડ
• હાઈ બલડ પ્રેશર
• પેટ આસપાસ વધુ ચરબીનો ભરાવો
• હાઈ બલડ સુગર
હાય બ્લડ પ્રેશર કહી રીતે નુકસાનકારક છે?

- હદયને ઓવરલોડ કરે
- લોહની નળીઓને સમર્થ અને જરી કરે
- લોહની નળીઓને ડમેજ કરે
How HT is bad for the body?

Increase in blood volume and/or increase in peripheral resistance

Heart overload

Heart increases its pumping action by increasing its muscle mass

Increase in size of heart as well as its nutrient and oxygen demand

Heart exhaustion results in cardiac failure and other complications
Complications of HT

- Stroke (લક્ષયો)
- Heart attack
- Heart failure
- Kidney disease/failure
- Vision loss
- Sexual dysfunction
- Renal disease
- Liver impairment
- Gastrointestinal disorders
- Obstructive sleep apnea
- Occupational hazards
- Low iron
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 ક્લીન ચહેરી કે લક્ષણો દેખાતા નથી તેથી છુપી રીતે ડીમેઝ કરતું રહે પણ ફ્યાલન ના આવે

• ક્યારેક આવા લક્ષણો દેખાડે
  ➢ ઓક્સીપ્રીટલ એરીયામાં માટું હુંગે આસ કરીને સવારમાં અને પહી અને જંતુ જ ઓછુ થઇ જાય
  ➢ યકંઝ આવે
  ➢ ઘબડારા વધી જાય
  ➢ થીક લાગે

• મોટાભાગે રોગ પુસ્તક આગળ વધી ગયા હાં બંને પડે: જયારે કોમ્પ્લીટિકેશન દેખા હાઇટ અટેક આવે કે લડવો પડે
निदान कैसे रीते थाय?

• 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
<table>
<thead>
<tr>
<th>Category</th>
<th>Systolic BP in mmHg</th>
<th>Diastolic BP in mmHg</th>
</tr>
</thead>
<tbody>
<tr>
<td>सामान्य</td>
<td>&lt;120</td>
<td>and &lt;80</td>
</tr>
<tr>
<td>थोड़ा वधारे</td>
<td>120-129</td>
<td>and &lt;80</td>
</tr>
<tr>
<td>लाइट प्लेट प्रेशर</td>
<td></td>
<td></td>
</tr>
<tr>
<td>स्टेज १</td>
<td>130-139</td>
<td>or 80-89</td>
</tr>
<tr>
<td>स्टेज २</td>
<td>&gt;/=140</td>
<td>or &gt;/= 90</td>
</tr>
</tbody>
</table>

હાણ એટલ પ્રેશરથી કહુ રીતે ભયી શકાય?
જોખમ વધારતા પરિમણો/કારણોને નિવંતામાં લાવવા

• શારીરિક સંપ્રૂણતા
• કોલેસ્ટ્રોલ પર નિવંતા
• અમતોલ કે અમયાદિત આહાર
  ✓ salt
  ✓ simple carbohydrates
  ✓ saturated fats
  ✓ calorie rich diet
• બહુ જીવન
• વધારે પહાડી માનસિક ચિતા કે તશ્ચાવ
• દારુનું સેવન
• ઘૂમ્પાંન કે તમાકુંનું વ્યાસન
• વય
• વાર્તાસાગર કારણો
જોમ વધારતા 
પરિબળા/કારણોને નિયંંત્રણમાં 
રાખવા

• શારીરિક સ્થૂલતા
• કોલેસ્ટ્રોલ પર નિયંંત્રણ
• અમલોને અમ્મયાદત આહાર
  ✓ salt
  ✓ simple carbohydrates
  ✓ saturated fats
  ✓ calorie rich diet
• ગેર જીવન
• વધારે પડતી માનસિક વિંતા કે તાજાવ
• દાવું સેવન
• થુમ્પાન કે તમાકું વ્યાસન
• વધ
• વારસાગત કારણો

યોગ્ય સારવાર લેવી 
નિયમિત રીતે દવાઓ 
લેવી અને એક અપ 
કરાવતા રહેશું
• Blood pressure drugs work in several ways, such as
  o removing excess salt and fluid from the body,
  o slowing the heartbeat or
  o relaxing and widening the blood vessels.

• Medicines for dyslipidemia

• Treatment for associated health problems such as diabetes mellitus
ડિલલીપિડેમિયા અને હાઇપર લીપિડેમિયા

• લોહીમાં વાર્ણી કોલેસ્ટ્રોલના ઉપર હોય છે
• લોહીમાં રહેલું કોલેસ્ટ્રોલ અલગ-અલગ પ્રકારનું હોય છે
• દરેક પ્રકારના કોલેસ્ટ્રોલને પોતાનું યોકણ્સ કાર્ય હોય છે
• લોહીમાં રહેલા દરેક પ્રકારના કોલેસ્ટ્રોલનું એક નિયત પ્રમાણ હોય છે; જેને હેલ્થી બલેન્સ કહી શકીએ
લોહીમાં કોલેસ્ટ્રોલ ક્યાંથી આવે?

- આપણે જે હોરાક બાદયુ અમાં શોકા પ્રમાણમાં કોલેસ્ટ્રોલ હોય. (હાલત પ્રાણીજ્ઞય હોરાકમાં) પરતુ અનુ પ્રમાણ ઘેણું આહે હોય છે

- આપણે જે હોરાક બાદયુ અમાંથી મુખ્યતે ચરબી તથા કબૂહાઈડ્રટમાં લીવર શરીરની જુરી રીતાત મુજમનું કોલેસ્ટ્રોલ બનાવે.

- આપણા લોહીમાં જે કોલેસ્ટ્રોલ હોય છે તે મુજમતે આપણા લીવરમાં બનેલું હોય છે.

- આપણા લીવર કેવાં કોલેસ્ટ્રોલ બનાવી અને અપને હવા બુકાયા શું માલ અને આપણી છીયે તેના પર પણ નિખર હોય છે.
<table>
<thead>
<tr>
<th>Type</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>VLDL</td>
<td>Transports TGL to adipose tissue</td>
</tr>
<tr>
<td>IDL</td>
<td>Transports phospholipids</td>
</tr>
<tr>
<td>LDL</td>
<td>Transports cholesterol</td>
</tr>
<tr>
<td>HDL</td>
<td>Brings back cholesterol and phospholipids to liver from periphery</td>
</tr>
</tbody>
</table>

**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

<table>
<thead>
<tr>
<th>Blood level in mg/dl</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;100</td>
<td>Optimal (જુદી રીતે મુજબ થાય છે)</td>
</tr>
<tr>
<td>100-129</td>
<td>Near optimal/above optimal (જુદી રીતે કરતા થોડું વધારે)</td>
</tr>
<tr>
<td>130-159</td>
<td>Borderline high (નોમ્લ કરતા થાય છે)</td>
</tr>
<tr>
<td>160-189</td>
<td>High (થી જુદી કરતા થાય)</td>
</tr>
<tr>
<td>&gt;=190</td>
<td>Very high (ખુબ વધારે થાય)</td>
</tr>
</tbody>
</table>
## Classification of blood lipid levels

<table>
<thead>
<tr>
<th>Blood level in mg/dl</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total cholesterol</strong></td>
<td></td>
</tr>
<tr>
<td>&lt;200 (160 for Indians)</td>
<td>Desirable (હેવું જોઈએ અંદલું)</td>
</tr>
<tr>
<td>200-239</td>
<td>Borderline high (નોમ્રલ કરતા હીંયું)</td>
</tr>
<tr>
<td>&gt;= 240</td>
<td>High (હીંયું)</td>
</tr>
<tr>
<td><strong>HDL cholesterol</strong></td>
<td></td>
</tr>
<tr>
<td>&lt;40</td>
<td>Low (નીંયું)</td>
</tr>
<tr>
<td>&gt;= 60</td>
<td>High (હીંયું)</td>
</tr>
</tbody>
</table>
# Classification of blood lipid levels

<table>
<thead>
<tr>
<th>Blood level in mg/dl</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;150</td>
<td>Normal (નોમ્રલ)</td>
</tr>
<tr>
<td>150-199</td>
<td>Borderline high (નોમ્રલ કરતા વધારે)</td>
</tr>
<tr>
<td>200-499</td>
<td>High (વધારે)</td>
</tr>
<tr>
<td>&gt;/=500</td>
<td>Very high (ભૂમિક વધારે)</td>
</tr>
</tbody>
</table>

Ref. medical practitioner’s manual (ATP III)
આવુ શા કારણે થાય?

• વારસાગત/ જનીન સંબંધિત કારણો
• શારીરિક સ્થૂળતા/ વધુ વજન
• પ્લીડાયાબીટિસ/ ડાયાબીટિસ
• બોરાકનું અસંતુલન
• શારીરિક એક્ટિવિટી/ કસરતનો અભાવ/ બેઠાં જવનશૈલી
કેવી રીતે પ્રભાવ પડે?

• History
• Physical examination
• Laboratory investigation
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
• Medicines
  • For dyslipidemia
  • For prediabetes/DM
  • For HT
• Lifestyle changes
લોહીમાં ચરબી કોલેસ્ટ્રોલના ઉપર હોય છે
• લોહીમાં રહેલું કોલેસ્ટ્રોલ અલગ-અલગ પ્રકારનું હોય છે
• દરેક પ્રકારના કોલેસ્ટ્રોલને પોતાનું યોક્સ કાપ્ય હોય છે
• લોહીમાં રહેલા દરેક પ્રકારના કોલેસ્ટ્રોલનું અંક નિયંત પ્રમાણ હોય છે;
  જને હેલ્થિ બેલેન્સ કહી શકશે.
લોહીમાં કોલેસ્ટ્રોલ કયાંથી આવે?

• આપણે જે લોહીમાં કોલેસ્ટ્રોલ આવે છે, તે પ્રમાણે તેની પ્રમાણ વિશેષતા અને પ્રમાણ ચારો હોય છે. (કુલના પ્રાણીજયની લોહીમાં)

• આપણે જે લોહીમાં કોલેસ્ટ્રોલ આવે છે તે પ્રમાણે આપણે જે ખોરાક ખાયાં તે પ્રમાણે જ જે કચી તથા કચી ફલીના ઉપયોગી તે સ્થિરતા લાવશે અને આપણે જે લોહીની કોલેસ્ટ્રોલ આવે છે.

• આપણે જે લોહીમાં કોલેસ્ટ્રોલ આવે છે તે પ્રમાણે આપણે જે પ્રમાણે આપણે જે રંગીન લોહીમાં બનેલુ હોય છે.

• આપણું લીવર કેંદ્રે કોલેસ્ટ્રોલ આવે છે તેની પ્રમાણે આપણે જે લોહીની કોલેસ્ટ્રોલ બનાવી પૈદો પ્રાપ્ત કરશે તે પ્રમાણે આપણું લીવર રંગીન લોહીમાં બનેલુ હોય છે.

• આપણું લીવર કેંદ્રે કોલેસ્ટ્રોલ બનાવવો કે આપણું કયાં પ્રમાણે આપણે જે અને આપણે જે કયાં પ્રમાણ સમજાવો પણ નિખર હોય છે.
<table>
<thead>
<tr>
<th>Type</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>VLDL</td>
<td>Transports TGL to adipose tissue</td>
</tr>
<tr>
<td>IDL</td>
<td>Transports phospholipids</td>
</tr>
<tr>
<td>LDL</td>
<td>Transports cholesterol</td>
</tr>
<tr>
<td>HDL</td>
<td>Brings back cholesterol and phospholipids to liver from periphery</td>
</tr>
</tbody>
</table>

**Bad cholesterol**
- VLDL: Very low density lipoprotein
- IDL: Intermediate density lipoprotein
- LDL: Low density lipoprotein

**Good cholesterol**
- HDL: High density lipoprotein
- TGL: triglycerides
## Classification of blood lipid levels

<table>
<thead>
<tr>
<th>Blood level in mg/dl</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>LDL cholesterol</td>
<td></td>
</tr>
<tr>
<td>&lt;100</td>
<td>Optimal (જુરીયાત મુજબનું)</td>
</tr>
<tr>
<td>100-129</td>
<td>Near optimal/above optimal (જુરીયાત કરતા થોડુ વધારે)</td>
</tr>
<tr>
<td>130-159</td>
<td>Borderline high (નોમર્લ કરતા થી ઊંચું)</td>
</tr>
<tr>
<td>160-189</td>
<td>High (ઊંચું)</td>
</tr>
<tr>
<td>&gt;=190</td>
<td>Very high (પુષ્પ વધારે ઊંચું)</td>
</tr>
</tbody>
</table>
## Classification of blood lipid levels

<table>
<thead>
<tr>
<th>Blood level in mg/dl</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total cholesterol</strong></td>
<td></td>
</tr>
<tr>
<td>&lt;200 (160 for Indians)</td>
<td>Desirable (હેલું જોઈએ અટલું)</td>
</tr>
<tr>
<td>200-239</td>
<td>Borderline high (નોમ્રલ કરતા જીયું)</td>
</tr>
<tr>
<td>&gt;/= 240</td>
<td>High (ઢીયું)</td>
</tr>
<tr>
<td><strong>HDL cholesterol</strong></td>
<td></td>
</tr>
<tr>
<td>&lt;40</td>
<td>Low (નીયું)</td>
</tr>
<tr>
<td>&gt;/=60</td>
<td>High (ઢીયું)</td>
</tr>
</tbody>
</table>
# Classification of blood lipid levels

<table>
<thead>
<tr>
<th>Blood level in mg/dl</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;150</td>
<td>Normal (નોમ્રલ)</td>
</tr>
<tr>
<td>150-199</td>
<td>Borderline high (નોમ્રલ કરતા વધારે)</td>
</tr>
<tr>
<td>200-499</td>
<td>High (વધારે)</td>
</tr>
<tr>
<td>&gt;=500</td>
<td>Very high (ભૂમ વધારે)</td>
</tr>
</tbody>
</table>

Ref. medical practitioner’s manual (ATP III)
આવુ શા કારણે થાય?

• વાર્સાગત/ જનીન સંબંધિત કારણો
• શારીરિક સ્થૂળતા/ વધુ વજન
• પ્રિડાયાબિટીસ/ ડાયાબિટીસ
• ઓરાકનું અસંતુલન
• શારીરિક એક્ટિવિટી/ કસરતનો અભાવ/ બેઠાં જવનશૈલી
डेवी रीते अबर पडे?

• History
• Physical examination
• Laboratory investigation
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


• 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?

**INGREDIENTS:**
- REFINED WHEAT FLOUR (37%), SUGAR,
- EDIBLE VEGETABLE OIL (PALM), ROLLED
- OATS (14%), ALMOND (3%), RAISINS (3%),
- WHEAT BRAN (2.7%), LIQUID GLUCOSE,
- RAISING AGENTS [500(ii), 503(ii), 450(i)],
- MALTODEXTRIN, OAT FIBRE (1.5%), MILK
- SOLIDS (0.9%), INVERT SYRUP, ORANGE
- PEEL (0.5%), EMULSIFIERS (322, 471, 472e).

EDIBLE COMMON SALT AND ORANGE
POWDER (0.12%).

CONTAINS PERMITTED NATURAL FOOD
COLOUR (150d) AND ADDED FLAVOUR
[NATURE IDENTICAL FLAVOURING
SUBSTANCE (ORANGE)]
(Numbers in brackets as per International
Numbering System)
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?
Find out what indicates salt/sodium?

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
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
**Nutritional Information**

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Amount per 100 g</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy, kcal</td>
<td>292</td>
</tr>
<tr>
<td>Energy from Fat, kcal</td>
<td>54</td>
</tr>
<tr>
<td>Total Fat, g</td>
<td>6</td>
</tr>
<tr>
<td>Saturated fat, g</td>
<td>3</td>
</tr>
<tr>
<td>Cholesterol, mg</td>
<td>9</td>
</tr>
<tr>
<td>Sodium, mg</td>
<td>46.9</td>
</tr>
<tr>
<td>Total Carbohydrate, g</td>
<td>56</td>
</tr>
<tr>
<td>Added Sugar, g</td>
<td>46.9</td>
</tr>
<tr>
<td>Protein, g</td>
<td>3</td>
</tr>
<tr>
<td>Calcium, mcg</td>
<td>187.5</td>
</tr>
</tbody>
</table>

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**

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

# Approximate Values

% 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?
How do you interpret all the numbers?

• Per 100 gram: useful to compare between two products
• Per serving: indicates how much quantity 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
Ingredients: peanuts, glucose syrup, ghee.

<table>
<thead>
<tr>
<th>Nutritional Information*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Amount per 100g</strong></td>
</tr>
<tr>
<td>Energy, Kcal</td>
</tr>
<tr>
<td>Total Fat, g</td>
</tr>
<tr>
<td>Saturated Fat, g</td>
</tr>
<tr>
<td>Trans Fa, g</td>
</tr>
<tr>
<td>Total Carbohydrates, g</td>
</tr>
<tr>
<td>Added Sugar, g</td>
</tr>
<tr>
<td>Protein, g</td>
</tr>
</tbody>
</table>

*approx values

For exact ingredients and nutritional information please refer to the individual packs

---

**Nutrition Facts**

<table>
<thead>
<tr>
<th>Serving Size:</th>
<th>per serve</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Kilojoules</strong></td>
<td>2125 kj</td>
</tr>
<tr>
<td><strong>Calories</strong></td>
<td>508 kcal</td>
</tr>
<tr>
<td><strong>Protein</strong></td>
<td>13.74 g</td>
</tr>
<tr>
<td><strong>Carbohydrate</strong></td>
<td>54.57 g</td>
</tr>
<tr>
<td><em>Sugar</em></td>
<td>36.16 g</td>
</tr>
<tr>
<td><strong>Fat</strong></td>
<td>26.12 g</td>
</tr>
<tr>
<td><em>Saturated Fat</em></td>
<td>3.32 g</td>
</tr>
<tr>
<td><em>Trans Fat</em></td>
<td>0 g</td>
</tr>
<tr>
<td><em>Monounsaturated Fat</em></td>
<td>11.24 g</td>
</tr>
<tr>
<td><em>Polyunsaturated Fat</em></td>
<td>7.31 g</td>
</tr>
<tr>
<td><strong>Cholesterol</strong></td>
<td>0 mg</td>
</tr>
<tr>
<td><strong>Fibre</strong></td>
<td>1.62 g</td>
</tr>
<tr>
<td><strong>Sodium</strong></td>
<td>30.15 mg</td>
</tr>
</tbody>
</table>
Gram splits, edible oil, black salt, iodized salt, chilly powder, clove powder, turmeric powder, dry mango powder, coriander powder.
**Ingredients:**
Cashew Nut (Coarse Paste) Sugar and Silver leaf.

**Nutrition Facts**

<table>
<thead>
<tr>
<th>Serving Size: 20g</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serving per container</td>
</tr>
</tbody>
</table>

**Amount per serving**

<table>
<thead>
<tr>
<th>Calorie Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calories: 84 Kcal</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>% Daily Value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Fat: 4 g</td>
</tr>
<tr>
<td>Saturated Fat: 1 g</td>
</tr>
<tr>
<td>Trans Fat: 0 g</td>
</tr>
<tr>
<td>Cholesterol: 0 mg</td>
</tr>
<tr>
<td>Sodium: 7 mg</td>
</tr>
<tr>
<td>Total Carbohydrate: 10 g</td>
</tr>
<tr>
<td>Dietary Fiber: 0 g</td>
</tr>
<tr>
<td>Sugars: 8 g</td>
</tr>
<tr>
<td>Protein: 2 g</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vitamin Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin A: 0 %</td>
</tr>
<tr>
<td>Calcium: 0 %</td>
</tr>
<tr>
<td>Vitamin C: 0 %</td>
</tr>
<tr>
<td>Iron: 2 %</td>
</tr>
</tbody>
</table>

*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

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

* 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

Ingredients:

- Wheat flour (67%), sugar, Edible oil, invert sugar syrup, raising agents, salt, milk solids, emulsifier, dough conditioner
- Ragi flour (33%), refined wheat flour (28%), edible vegetable oil (palm), maltitol (965), inulin, milk solids, maltodextrin, natural fruit fiber (apple-1.6%), raising agents [503(ii), 500(ii), 450(i)], edible common salt, emulsifiers (322, 412, 472e, 471), cinnamon (0.5%), dough conditioner (223) and sweetener (955)

Contains added flavours [nature identical and artificial flavouring substances (butter, milk masala & vanilla)]
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.)

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbohydrates</td>
<td>70g</td>
</tr>
<tr>
<td>Sugars</td>
<td>20.5g</td>
</tr>
<tr>
<td>Dietary Fibre</td>
<td>6g</td>
</tr>
<tr>
<td>Protein</td>
<td>7g</td>
</tr>
<tr>
<td>Fat</td>
<td>20g</td>
</tr>
<tr>
<td>Saturated fatty acids</td>
<td>10.5g</td>
</tr>
<tr>
<td>Mono Unsaturated Fatty Acids</td>
<td>7.5g</td>
</tr>
<tr>
<td>Poly Unsaturated Fatty Acids</td>
<td>2g</td>
</tr>
<tr>
<td>Trans Fatty Acids</td>
<td>0g</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>0mg</td>
</tr>
<tr>
<td>Energy</td>
<td>488kcal</td>
</tr>
</tbody>
</table>
Nutrition Information

per 100g product (approx.)

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbohydrates</td>
<td>67g</td>
</tr>
<tr>
<td>Sugars</td>
<td>22g</td>
</tr>
<tr>
<td>Protein</td>
<td>7g</td>
</tr>
<tr>
<td>Fat</td>
<td>22g</td>
</tr>
<tr>
<td>Saturated fatty acids</td>
<td>11g</td>
</tr>
<tr>
<td>Mono unsaturated fatty acids</td>
<td>8.5g</td>
</tr>
<tr>
<td>Poly unsaturated fatty acids</td>
<td>2.5g</td>
</tr>
<tr>
<td>Trans fatty acids</td>
<td>0g</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>6.5mg</td>
</tr>
<tr>
<td>Energy</td>
<td>494kcal</td>
</tr>
</tbody>
</table>

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.
<table>
<thead>
<tr>
<th>Name of the oil</th>
<th>Saturated fats (as % of total fat)</th>
<th>MUFA (as % of total fat)</th>
<th>PUFA (as % of total fat)</th>
<th>Tran fats (as % of total fat)</th>
<th>Health claims /remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ricebran+ sesame oil</td>
<td>24</td>
<td>39</td>
<td>35</td>
<td>2</td>
<td>Healthy fatty acid profile</td>
</tr>
<tr>
<td>Palmolein oil</td>
<td>52</td>
<td>36</td>
<td>11</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Ricebran + soyabean oil</td>
<td>20</td>
<td>39</td>
<td>40</td>
<td>0</td>
<td>Trans fats free</td>
</tr>
</tbody>
</table>
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.myfoooddiary.com/resources/estimating_serving_sizes.asp
• https://www.nia.nih.gov/health/serving-and-portion-sizes-how-much-should-i-eat
### Ingredients:
- Wheat Flour
- Sugar
- Edible Vegetable Oil
- Butter Vanaspati Ghee
- Sesame Seeds
- Wheat Fiber
- Liquid
- Glucose
- Yeast
- Salt

### Nutritional Value (Per 100g):

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbohydrate</td>
<td>69.5 gm</td>
</tr>
<tr>
<td>Of which Sugar</td>
<td>14.92 gm</td>
</tr>
<tr>
<td>Protein</td>
<td>9.15 gm</td>
</tr>
<tr>
<td>Fat</td>
<td>19.8 gm</td>
</tr>
<tr>
<td>Calcium</td>
<td>55 mg</td>
</tr>
<tr>
<td>Vitamin A</td>
<td>30 mcg</td>
</tr>
<tr>
<td>Total Calorific Value</td>
<td>492.8 kcal</td>
</tr>
</tbody>
</table>
**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**

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>558 Kcal</td>
</tr>
<tr>
<td>Protein</td>
<td>3.2 g</td>
</tr>
<tr>
<td>Carbohydrates</td>
<td>56.4 g</td>
</tr>
<tr>
<td>of which Sugar</td>
<td>3.5 g</td>
</tr>
<tr>
<td>Fat</td>
<td>35.5 g</td>
</tr>
</tbody>
</table>

*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**

<table>
<thead>
<tr>
<th></th>
<th>Per 100g</th>
<th>Per serving (27g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy (kcal)</td>
<td>467</td>
<td>126</td>
</tr>
<tr>
<td>Total Carbohydrates (g)</td>
<td>67</td>
<td>18</td>
</tr>
<tr>
<td>Added Sugars (g)</td>
<td>3</td>
<td>0.8</td>
</tr>
<tr>
<td>Dietary Fibre (g)</td>
<td>3.5</td>
<td>0.9</td>
</tr>
<tr>
<td>Protein (g)</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Total Fat (g)</td>
<td>19</td>
<td>5</td>
</tr>
<tr>
<td>Saturated Fat (g)</td>
<td>2</td>
<td>0.5</td>
</tr>
<tr>
<td>Mono Unsaturated Fat (g)</td>
<td>4</td>
<td>1.1</td>
</tr>
<tr>
<td>Poly Unsaturated Fat (g)</td>
<td>12</td>
<td>3.2</td>
</tr>
<tr>
<td>Trans Fat (g)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cholesterol (mg)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sodium (mg)</td>
<td>1112</td>
<td>300</td>
</tr>
</tbody>
</table>

# 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**

<table>
<thead>
<tr>
<th>Amount per 100 g</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy, kcal</td>
<td>292</td>
</tr>
<tr>
<td>Energy from Fat, kcal</td>
<td>54</td>
</tr>
<tr>
<td>Total Fat, g</td>
<td>6</td>
</tr>
<tr>
<td>Saturated fat, g</td>
<td>3</td>
</tr>
<tr>
<td>Cholesterol, mg</td>
<td>9</td>
</tr>
<tr>
<td>Sodium, mg</td>
<td>46.9</td>
</tr>
<tr>
<td>Total Carbohydrate, g</td>
<td>56</td>
</tr>
<tr>
<td>Added Sugar, g</td>
<td>46.9</td>
</tr>
<tr>
<td>Protein, g</td>
<td>3</td>
</tr>
<tr>
<td>Calcium, mcg</td>
<td>187.5</td>
</tr>
</tbody>
</table>

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**

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

# Approximate Values

% 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%

<table>
<thead>
<tr>
<th>NUTRITIONAL INFORMATION</th>
<th>PER 100ML</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENERGY VALUE</td>
<td>40 Kcal</td>
</tr>
<tr>
<td>PROTEIN</td>
<td>&lt;0.5g</td>
</tr>
<tr>
<td>CARBOHYDRATES</td>
<td>10g</td>
</tr>
<tr>
<td>FRUIT SUGAR</td>
<td>1.5g</td>
</tr>
<tr>
<td>ADDED SUGAR</td>
<td>8.5g</td>
</tr>
<tr>
<td>FAT</td>
<td>&lt;0.5g</td>
</tr>
<tr>
<td>VITAMIN C</td>
<td>16mg</td>
</tr>
</tbody>
</table>

NUTRITION FACTS
(Typical Values per 100ml)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ENERGY</td>
<td>40 kcal</td>
</tr>
<tr>
<td>CARBOHYDRATE</td>
<td>10g</td>
</tr>
<tr>
<td>SUGAR</td>
<td>10g</td>
</tr>
<tr>
<td>PROTEIN</td>
<td>0g</td>
</tr>
<tr>
<td>FAT</td>
<td>0g</td>
</tr>
</tbody>
</table>

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 $\rightarrow$ what all does it contain
• Appropriate proportion $\rightarrow$ how much of each of that it contains
  these gives you the quality of food
• Adequate quantities $\rightarrow$ 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 બારોક લક્ષણે એનું આપણા શરીરમાં શુ થાય?

પાયન

શોષણ

નિકાલ

ટ્રાન્સપોર્ટ

વપરાશ

સંગ્રહ
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)

<table>
<thead>
<tr>
<th>વનસપતિજન્ય સ્ત્રોત</th>
<th>પ્રાણીજન્ય સ્ત્રોત</th>
</tr>
</thead>
<tbody>
<tr>
<td>કઠોળ (20-25%)</td>
<td>દૂધ (3 to 4.5%)</td>
</tr>
<tr>
<td>સોયાબીન (40%)</td>
<td>દૂધની બનાવી (3-24%)</td>
</tr>
<tr>
<td>અનાજ (6-12%)</td>
<td>દીકર (13.3%)</td>
</tr>
<tr>
<td>લીલા કઠોળ (1-10%)</td>
<td>માયલી (15-25%)</td>
</tr>
<tr>
<td>તેલબીયા અને ફ્યાટટ (નાટ્સ) (4-26%)</td>
<td>અન્ય દરના પ્રાણીઓ (15-61%)</td>
</tr>
<tr>
<td></td>
<td>માંસ (15-21%)</td>
</tr>
<tr>
<td></td>
<td>ચિકન (26%)</td>
</tr>
</tbody>
</table>

Source: Joshi, appendix x, Park
<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Plant sources</th>
<th>Animal sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein type</td>
<td>દન-કમ્પલીટ (except soybeans) consuming different varieties supplement each other</td>
<td>કમ્પલીટ</td>
</tr>
<tr>
<td>Advantages</td>
<td>ઉર્વરીનું પ્રમાણ ઓખણ સસ્તા નુકસાનકારક કેમિકલનું પ્રમાણ ઓખણ</td>
<td>ઉચી બયોલોજિકલ ગુણવતા</td>
</tr>
<tr>
<td>Disadvantages</td>
<td>નીચી બયોલોજિકલ ગુણવતા</td>
<td>ઉર્વરીનું પ્રમાણ વધુ મોધું નુકસાનકારક કેમિકલનું પ્રમાણ વધુ</td>
</tr>
</tbody>
</table>
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
  \((1800\times0.15)/4 = 67.5 \text{ gram}\)
  \((1800\times0.20)/4 = 90 \text{ gram}\)

• 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

Fats in the diet

- Unsaturated fatty acids (UFA)
  - Polyunsaturated FA (PUFA)
    - Omega 3 FA (alpha linolenic acid, EPA, DHA, EHA)
    - Omega 6 FA (linoleic acid, arachidonic acid)
  - Omega 7 FA (palmitoleic acid)
- Saturated fatty acids (SFA)
- Trans fats
- Cholesterol

- Omega 9 FA (oleic acid erucic acid)
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

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

<table>
<thead>
<tr>
<th>Undesirable/harmful</th>
<th>Desirable/essential</th>
</tr>
</thead>
</table>
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

<table>
<thead>
<tr>
<th>Dietary fat</th>
<th>lipoproteins</th>
<th>Other effects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HDL</td>
<td>LDL</td>
</tr>
<tr>
<td>MUFA- oleic acid</td>
<td>↑</td>
<td>↓</td>
</tr>
<tr>
<td>Omega-9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Omega-3 PUFA (ALA, EPA, DHA)</td>
<td>↑</td>
<td>↓</td>
</tr>
<tr>
<td>Omega-6 PUFA (LA, AA)</td>
<td>↑</td>
<td>↓</td>
</tr>
<tr>
<td>SFA</td>
<td></td>
<td>↑</td>
</tr>
<tr>
<td>Trans fat</td>
<td>↓</td>
<td>↑</td>
</tr>
<tr>
<td>Cholesterol</td>
<td></td>
<td>↑</td>
</tr>
</tbody>
</table>

Undesirable/harmful Desirable/essential
<table>
<thead>
<tr>
<th>વનસપતિજન સ્રોત</th>
<th>પ્રાણીજન સ્રોત</th>
</tr>
</thead>
<tbody>
<tr>
<td>બાદ્ય તેલ (શિંગ, કપાસીયા, સરસવ, સુરાભ્યુંપીય, ક્યુઝિલ, પામોલીન, નેલીસ, રાઇસબ્રાન wheat germ, મકાઈ, સોયાબીન etc.)</td>
<td>ફ્રેટ્વાલું દ્ીધ, દ્ીધની બનાવવો જ લીક ક્રીમ, મલાઈ, ચીઝ, પનીર, માલો, આઈસક્રીમ વિજેર</td>
</tr>
<tr>
<td>તેલીબીયા અને નટ્સ</td>
<td>માઘણ અને ઘી</td>
</tr>
<tr>
<td>Hydrogenated and partially hydrogenated vegetable oils</td>
<td>તેલો, લાઈર</td>
</tr>
<tr>
<td>માર્જરીન</td>
<td>ચિકન</td>
</tr>
<tr>
<td>Shortening</td>
<td>ડાંડાનો પીળો ભાગ</td>
</tr>
<tr>
<td>વેજ મેયોનીઝ</td>
<td>ટેકાવાળું મેયોનીઝ</td>
</tr>
</tbody>
</table>
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:
\[(1800*0.15)/9 = 30 \text{ gram} = 6 \text{ tsp}\]
\[(1800*0.20)/9 = 40 \text{ gram} = 8 \text{ tsp}\]

At the maximum,
\[(1800*0.3)/9 = 60 \text{ gram} = 12 \text{ tsp}\]
\[(1800*0.35)/9 = 70 \text{ gram} = 14 \text{ tsp}\]

(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: \( \frac{1800 \times 0.01}{9} = 2 \) gram
  
  • PUFA Omega 6:
    \[ \frac{1800 \times 0.06}{9} = 12 \] gram
    \[ \frac{1800 \times 0.11}{9} = 22 \] gram

  • PUFA omega 3:
    ALA: \( \frac{1800 \times 0.005}{9} = 1 \) to \( \frac{1800 \times 0.02}{9} = 4 \) gram/day
    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
<table>
<thead>
<tr>
<th>Type</th>
<th>Characteristics</th>
<th>Examples</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monosaccharides</td>
<td>No digestion required, so readily absorbed</td>
<td>Glucose, Fructose, Galactose</td>
<td>Fruits, Vegetables, Honey, Glucose drinks, High fructose corn syrup, Invert syrup, Processed food items with any of the monosaccharide containing ingredient</td>
</tr>
<tr>
<td>Disaccharides</td>
<td>Simple digestion, requires one step, so absorbed quickly</td>
<td>Lactose, Table sugar (sucrose)</td>
<td>Milk and milk products such as ice creams, curd, lassi, yogurt, Processed food items containing added sugar, jaggery</td>
</tr>
</tbody>
</table>
### Complex carbohydrates

<table>
<thead>
<tr>
<th>Type</th>
<th>Characteristics</th>
<th>Examples</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>In foods with fibers</td>
<td>digestion is complex (two or more steps) and slow, absorbed slowly</td>
<td></td>
<td>Whole grains, and millets, pulses, lentils, fresh beans</td>
</tr>
<tr>
<td>In foods with less or no fibers</td>
<td>Digestion is quick, absorbed quickly</td>
<td>Starch</td>
<td>Refined flour such as maida, white rice, roots and tubers such as potato, sweet potato, beet, carrots</td>
</tr>
</tbody>
</table>
## 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

<table>
<thead>
<tr>
<th>Type</th>
<th>Characteristics</th>
<th>Examples</th>
<th>Source</th>
</tr>
</thead>
</table>
| 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

<table>
<thead>
<tr>
<th>Concept</th>
<th>Meaning</th>
<th>Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glycemic index</td>
<td>As compared to glucose, how fast the carbohydrates in the food item will be absorbed in the blood</td>
<td>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.</td>
</tr>
</tbody>
</table>

### Classification Examples

<table>
<thead>
<tr>
<th>Classification</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low GI: 55 or less</td>
<td>apple, mango, cheela (besan), bajra roti</td>
</tr>
<tr>
<td>Medium GI: 56to 69</td>
<td>banana, pineapple, dalia, white rice</td>
</tr>
<tr>
<td>High GI: 70 or more</td>
<td>Watermelon, bread, chapatti, boiled potato</td>
</tr>
</tbody>
</table>

### 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

<table>
<thead>
<tr>
<th>Concept</th>
<th>Meaning</th>
<th>Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glycemic load</td>
<td>How much is the impact of every serving of a particular food, on the blood glucose level? GL = GI/100 * carb in gram/serving</td>
<td>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.</td>
</tr>
</tbody>
</table>

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

**Limitations**

- It is measured as per serving, so we need to be careful about the amount of food that we eat.
<table>
<thead>
<tr>
<th>Food item</th>
<th>Glycemic index (as % of glucose)</th>
<th>Glycemic load per regular serving</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green peas (vatana/mutter)</td>
<td>75</td>
<td>6</td>
</tr>
<tr>
<td>Sweet corn</td>
<td>52</td>
<td>17</td>
</tr>
<tr>
<td>Watermelon</td>
<td>70</td>
<td>4</td>
</tr>
</tbody>
</table>
Carbohydrates: important considerations

Impact of food processing upon
  • nutritive value of the food
  • upon GI and GL
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 $\rightarrow$ high insulin $\rightarrow$ hypoglycemia $\rightarrow$ hunger and craving for sugar $\rightarrow$ high blood sugar

- Repeated insulin spurts $\rightarrow$ Cells lose sensitivity for insulin $\rightarrow$ 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

<table>
<thead>
<tr>
<th>Group</th>
<th>Particulars</th>
<th>Body weight kg</th>
<th>Net Energy Kcal/d</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Man</strong></td>
<td>Sedentary work</td>
<td>60</td>
<td>2320</td>
</tr>
<tr>
<td></td>
<td>Moderate work</td>
<td></td>
<td>2730</td>
</tr>
<tr>
<td></td>
<td>Heavy work</td>
<td></td>
<td>3490</td>
</tr>
<tr>
<td><strong>Woman</strong></td>
<td>Sedentary work</td>
<td></td>
<td>1900</td>
</tr>
<tr>
<td></td>
<td>Moderate work</td>
<td></td>
<td>2230</td>
</tr>
<tr>
<td></td>
<td>Heavy work</td>
<td></td>
<td>2850</td>
</tr>
<tr>
<td></td>
<td>Pregnant woman</td>
<td>55</td>
<td>+350</td>
</tr>
<tr>
<td></td>
<td>Lactation 0-6 months</td>
<td></td>
<td>+600</td>
</tr>
<tr>
<td></td>
<td>6-12 months</td>
<td></td>
<td>+520</td>
</tr>
</tbody>
</table>
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
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 ઓઠલે શું?

• સનાયુષોના હતન યતન કારણ થતી કોઈ પણ પ્રવૃત્તિ કે જેમાં શક્તિ વપરાય.

• ધરકામ
• વ્યવસાયિક કામ
• રમત ગમત
• યાલવું વિગરે
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

નેહકિ: રોજગારીની પ્રવૃત્તિ જેવી હવાનું-ધોણું વિગેરે સિવાય કોઈ શારીરિક શ્રમ કરવો નથી

શોકી પ્રવૃત્તિમય: રોજગારી ના કયા ઉપરાંત, રોજગારું ৪ થી ૫ કલાકમીટર મધ્યમ ઝડપે એલવા અથવા ઓછા માં ઓછુ ૧ કલાક જેટલી અન્ય કોઈ શારીરિક પ્રવૃત્તિ કરવી

પ્રવૃત્તિમય: રોજગાર ના કયા ઉપરાંત, રોજગારું ૫ કલાકમીટર કરતા વધુ એલવા અથવા રોજગારું ૧ કલાક કરતા વધુ શારીરિક શ્રમ પડે શેવલ કાર્ય કરવું
શું આપણે શારીરિક રીતે પ્રવૃત્તિમાં જીવન જીવીને છીએ?

વિષયમાં હાલમાં

• દર ૪ માસી ૧ પુષ્ટ વયની વ્યક્તિ મેકાઇં જીવન જીવે છે
• દર ૫ માસી ૧ કેંદ્રીય વયની વ્યક્તિ મેકાઇં જીવન જીવે છે (WHO)

ભારતમાં

૫૦ ટકાથી વધુ લોકો મેકાઇં જીવન જીવે છે
બેઠાં જ્ઞાનશીલી નુકસાનકારક છે?

• વિશ્વમાં મૃત્યુ ઘટાડા પહેલા ૧૦ (top 10) કારણોમાંથી એક બેઠાં જ્ઞાનશીલી છે (WHO)

• જ લોકો બેઠાં જ્ઞાન જુઓ છે તેમના પ્રવૃત્તિમય જ્ઞાન જ્ઞાનનાર વ્યક્તિની સાથે અલગ-અલગ કારણોથી મૃત્યુ ઘટાડું જોમં ૨૦ થી ૩૦ ટકા જેટલારું 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 જાયદા

• આપણું સ્વાસ્થ્યને સારું રાખવા તથા સુધારવા માટે કે કેટલીક લેસ્ટ વસ્તુ હોય તો એ શારીરિક પ્રવૃત્તિ હે

• આપણું જીવન જેટલું વધુ શારીરિક પ્રવૃત્તિમય હોય અંગેલો વધુ જયદી થાય

• એક ઉમર ની વ્યક્તિ માટે શારીરિક પ્રવૃત્તિ જુરી છે તથા જયદાધાર છે
How does physical activity improve health?

- Blood pressure drops
- Reduced risk of diseases
- Kidney function improves
- Insulin sensitivity improves

- ब्लड प्रेशर घटाडे
- सोજો આવવાની તથા લોહી ગંધાં જવાની પ્રક્રિયાને સામાન્ય કરે
- હેડયની કાર્યક્ષમતા વધારે
- હસસ્પતિલીની કાર્યક્ષમતા વધારે
How does physical activity improve health?

- Controls cholesterol levels (સાંભાલે કોલેસ્ટ્રોલ વધારે)
- Lowers cholesterol (ખરાબ કોલેસ્ટ્રોલ ઘટાડે)
- Strengthens muscles (જુડીકોંને શક્ત માટે વાપરી નામે)
- Improves flexibility (યરબીને શક્ત માટે વાપરી નાંભ)
How does physical activity improve health?

- Long term health improves
- All should have
- Healthier young people
- Disease resistant
કયા રોગોથી બચાવે?

• હાઈ બલડ પ્રેશર
• ડાયાબીટિસ
• કોલેસ્ટ્રોલ
• અથરોસ્ક્લેરોસિસ
• શારીરિક સથૂલતા

• જેન્સર
• અદાલહામર
• વયંધત્વ
• હોરોનની અસમસત્તા
• અનેક અન્ય રોગો
Benefits of physical activity

- Mortality
- NCDs risk and management
- Improves quality of life and sense of well being
- Body weight and energy management
Benefits of physical activity

- Improves bone, joints, ligaments and muscle health
- Cardio respiratory fitness
- Reduces stress and depression
- Alzheimer’s disease
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

- Cycling at 8-14.4 km/h
- Walking at 6.4 km/h

Source: Google images
Moderate intensity activities

Source: Google images
Vigorous intensity activities

Speed: 6.4 to 9.6 kmph

Source: Google images
Vigorous intensity activities

Source: Google images
Types of Exercise
## Types of exercise

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Specific importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerobics (increases heart rate and breathing rate)</td>
<td>Require heart and lungs to work at an intense level to increase flow of oxygen to the body</td>
<td>For cardio-vascular health</td>
</tr>
<tr>
<td>Strength training</td>
<td>Requires muscular force to be exerted against an opposing object to build strength</td>
<td>For maintaining muscle mass</td>
</tr>
<tr>
<td>Flexibility training</td>
<td>requires muscle fibers to stretch to its maximum</td>
<td>Maintaining correct posture and preventing joint problems; must do after aerobic exercise</td>
</tr>
<tr>
<td>Balance training</td>
<td>helps maintaining physical balance</td>
<td>Esp. important for older adults to prevent falls</td>
</tr>
<tr>
<td>Type</td>
<td>Examples</td>
<td></td>
</tr>
<tr>
<td>----------------------------------</td>
<td>----------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Moderate intensity aerobics</td>
<td>Brisk walking (6.4 kmph)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>bicycling (8-14.4 kmph)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Swimming</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Walking downstairs</td>
<td></td>
</tr>
<tr>
<td>Vigorous intensity aerobics</td>
<td>Jogging (9.6 kmph)</td>
<td></td>
</tr>
<tr>
<td>(more than 6 MET)</td>
<td>Running (more than 9.6 kmph)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Climbing stairs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Outdoor sports</td>
<td></td>
</tr>
<tr>
<td>Strength training</td>
<td>Lifting weights</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Abdominal crunch</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gym</td>
<td></td>
</tr>
<tr>
<td>Flexibility training</td>
<td>Hamstring stretch</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Neck stretch</td>
<td></td>
</tr>
<tr>
<td></td>
<td>deltoid stretch</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yoga</td>
<td></td>
</tr>
<tr>
<td>Balance training</td>
<td>Weight shift exercise such as one leg balance</td>
<td></td>
</tr>
</tbody>
</table>
Strength training exercises

Flexibility training exercises

Source: Google images
Balance training exercises

Hold for 10-20 seconds
Repeat on both legs
**Recommended levels of physical activity/exercise**

**A. Children and adolescents aged 5-17 years**

<table>
<thead>
<tr>
<th>Type</th>
<th>Duration</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate to vigorous intensity aerobic activity</td>
<td>60 minutes</td>
<td>everyday</td>
</tr>
<tr>
<td>Strength training</td>
<td>Involving major muscle-groups</td>
<td>3 times per week</td>
</tr>
</tbody>
</table>

ref: WHO
Recommended levels of physical activity/exercise

B. Adults aged 18-64 years:

<table>
<thead>
<tr>
<th>Type</th>
<th>Intensity</th>
<th>Duration</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerobics</td>
<td>Moderate</td>
<td>30 minutes</td>
<td>5 days/week</td>
</tr>
<tr>
<td></td>
<td></td>
<td>or</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vigorous</td>
<td>25 minutes</td>
<td>3 days/week</td>
</tr>
<tr>
<td>Strength training</td>
<td>-</td>
<td>Involving major muscle-groups</td>
<td>2 days/week</td>
</tr>
</tbody>
</table>

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)