FOOD AND NUTRITION

**Food and nutrition**

**Food –** Food are those chemical substances that an individual takes digest and assimilates and which provides the nutritive requirement of an individual to maintain growth and physical well being.

 or

Whatever we take by mouth to satisfy our hanger and growth, development maintain our body .

**Function of food**

i) It supply energy

ii) It helps in body building and repair.

iii) Maintenance and regulation of tissue function (a) Growth b) Activity c) Lactation d) reproduction

**Constituents of food**

1. Carbohydrate
2. Protein
3. Fat
4. Vitamins
5. **Minerals**
6. Water

**Classification**

1. On the basis of the predominant function
2. Energy yielding foods – This food are rich in carbohydrate and fats etc.
3. Body building food – This food are rich in protein ex – Milk, fish, meat, liver, pulses etc.
4. Protective foods –This food are protein, vitamin and minerals – like green vegetable, egg, milk liver fruits.
5. On the basis of the calorigenicity
6. Calorigenic food – This food which gives caloric that is necessary for energy production growth and maintains of the tissue, carbohydrate, protein.
7. Non calorigenic food – This food do not provide any caloric but necessary for chemical mechanism.

1. Utilization of energy

2. Synthesis of various metabolites energy hormones, enzyme. they are vitamins minerals and water.

**Diet:-** According to FAO

It is a designed or prescribed calculated allowance of food adapted for a particular state of health or disease of an individual is called diet.

**Diet needed for home**

Normal diet need form i) infant ii) Children, iii) Adolescence, iv) Adult, v) Pregnant women v) lactating mother 12-21 years)

**Normal diet dependent on**

1. Environment
2. Behavior
3. Specific country
4. Socio – economic condition

**Balanced diet –**

It is a diet containing all proximate principle of food adequate in proportionate amount so that in addition to supplying calorie requirement, it must be able to maintain growth. Working nitrogen balance and prevent any specific deficiency disorder.

Factors necessary to formulate a balance diet:-

1. Age, sex, energy value
2. Occupational activity of an individual
3. Quality and quantity
4. Socio economic condition
5. Seasonal factors
6. Geographical factors
7. Allergic condition
8. Digestibility
9. Psychological factors

**Criteria of a Balance Diet-**

1. It should contain all the proximal principles of food in adequate and proportion ate amount.
2. 1/3 to 1/2 protein and fat should come on animal source
3. It should contain sufficient fruits and vegetable.
4. It should to easily digest able, absorbed and assimiable
5. It should to easily available.
6. It should contain certain amounts of cellulose to promote peristalsis..

**Percentage of different food item in a balance diet-**

1. Balance died should contain different food items as follows-
2. Carbohydrate – 60-70%
3. Protein - 10-15%
4. Fat 20-25%

Protein and fat should be provide 1gm/kg body wt.

**Proportion of food**

Carbohydrate: protein: fat

 4 : 1 : 1

**Nutrition**

It is the dynamic process in which the body that is consumed it utilized for nourishing the body.

**Criteria of nutrition:**

1. It should protect the body from infection and deficiency diseases
2. It should help in making fair complication of body and protect it from obesity.
3. Good nutrition should nourish the body and make the person energetic.

**Aims of nutrition:**

The word nutrition derived from nutricous (Greek word) meaning to suckle of the Brest. The aims of nutrition is to find to who food can best supply the chemicals needed for the optimum physiological function of every individual.

**Nutrient** – It means chemical in gradient present in food which produce energy. Other works any substances nourishing the body.

**Caloric –** It is defined as the amount of heat required to raise the temperature of 1 gm of H20 by 10C (15-160C).

This amount of heat is small so in nutrition it is common to use instead the large colonic or kilocalories (written with a capital “C” on “cal”) which is one thousand time the energy for the small calorie.

The international unit of energy is **joule.**

To convert energy allowances from kcal to joule a factor of 4.2 is used : 1 k cal = 1000 x 4.2 = 4200.0 Joules = 4.2 k Joules

The calorie or energy is measured by “Bomb” calorimeter

**Energy value or calorie value of food staffs:**

When food staffs or oxidized in the body carbohydrate and fat are completely oxidize into Co2 and H20. Protein is not completely oxidized in the body. So offer metabolism protein yield some metabolic end produce like urea, uric acid, creatinine which contains some amount of energy that is not available in the body. For this reason the energy value of protein in the body is less. Then that obtined by “Bomb” calorimeter.

**Calorie value of different food**

 **Kcal/gm kcal/gm**

 **Bomb calorimeter In the body**

Carbohydrate 4.1 4

Fat 9.4 9

Protein 5.6 4

**Calorie requirements**

 **Nature of work Calorie**

 **Requirement**

1. Adult Male Light worker 2400 kcal/day

 Moderate worker 2800 kcal /day

 Heavy worker 3900 kcal/day

2. Adult Female Light worker 1900 kcal/day

 Moderate worker 2200 kcal /day

 Heavy worker 3000 kcal/day

3. Pregnant mother Additional Allowance 300 kcal/day

4. Lactating mother Additional Allowance 550kcal/day

The total requirement of food 25-50% comes from protein source.

INFS (Institution of Nutrition and food Science)

**Dhaka University recommendation as follows:**

Adult male (55kg) 2300 kcal/day

Female (45kg) 1900 kcal/day

Pregnant 2100 Kcal/day

Lactating 2300 kcal/day

**Factors responsible for calorie requirement**s:

Daily calorie requirement depend on-

i) Basal metabolism

ii) Nature of Work

iii) Specific dynamic action

**Calculation of daily caloric requirement**

For estimation of caloric need the concept of reference man and reference women is universally accepted. A reference man is one who is between the age (i) 22-39 years (ii) Weight 55kg (iii) Free from diseases (iv) fit for physiological activity.

Suppose if we estimate the caloric value of a moderate worker that means he poses his days in different ways. The whole day is divided into three parts:

1. 8 hours sleep

2. 8 hours non occupational activities

a) Sitting b) standing c) walking d) Dressing e) Undressing

3. 8 hours moderate works on occupational activity.

Suppose the workers body surface area is 17 square meter and weight is 55kg and the basal requirement is 40 cal/m2 body surface area/hour.

So, the energy required in 24 hours as follows

1. 8 hours sleeping caloric requirements cal/m2 body surface area x hour: 40 cal/1.7/8 hours = 544C caloric.

2.2nd 8 hours: occupational activities, additional 30% of the basal requirement should be added.

40 cal x 30% = 12 cal 40x 30/100 = 12 col

12 x 1.7 x 8 = 163.2 cal

544 + 163 = 707 cal

3. 3rd 8 hours for moderate work 1000 cal+544 = 1544 cal

In 24 hours of a moderate work the caloric requirement 15%

544 + 707 + 1544 = 2795 cal.

 **SPECIFIC DYNAMIC ACTION – S.D.A**

**Definition:-**

The specific dynamic action of food stuff is the extra heat production over and above the caloric value of a given amount of food which is produced when the food is used by the body.

S.D.A of Protein - 30%, Fat -13%, Carbohydrate -6%

When the glucose and protein are combined S.D.A is 12.5% of total caloric value. This observation is important because it indicates that the high dynamic action of protein can be reduced depending on the quality of after food stuff in the diet. Extra heat comes from combustion (`nb) of tissue substances causing loss of body weight. The substance must be supplemented extra caloric allowances for S.D.A of food stuff.

**Site of S.D.A-** Liver is the main site for the S.D.A of protein.

**Importance of S.D.A**

1. S.D.A. starts within an hour of taking food and becomes maximum of about 3 hours and maintains this level for several hours.
2. In fasting and under nutrition the S.D.A. of all food stuff increases.
3. During positive Nitrogen balance S.D.A of protein does not seem to occur.
4. S.D.A of protein cannot be utilized after anyway. It is a waste of heat and lost but the case is different for carbohydrate and fat. Their S.D.A. can be utilized for performance of work.
5. S.D.A of protein is useful in maintaining heat balance in cold climate.

**High S.D.A of protein (causes):-**

1. The chemical reactions which break down the protein molecule during digestion are much more than carbohydrate and fat.
2. Some of the amino acid released during digestion of protein molecule which is directly stimulatory to metabolic rate.

**Special note:-**

In calculation the total energy requirement for daily activity 10% of total caloric requirement is added to provide energy for S.D.A.

**Obesity:-**

It is defined as the state in which the accumulation of reserved fat becomes so extreme that the function of the organism is interfered.

**Causes of obesity**

1. Energy imbalance

Energy intake = energy expenditure

Energy intake > energy expenditure

If energy intake is more than energy expenditure that will lead to weight gain. If a person’s daily requirement 1800 kcal/day.

Intake 1900 kcal/day

Store 100 kcal/ day

100x 30 = 3000 kcal/m

3000 x 12 = 36000 kcal/years

So, yearly wt gain 36,000 ÷ 3500 = 12-13lb/years

1. Metabolic and endocrine problem: - Thyroxine is involved in energy utilization. So hypothyroidism leads to obesity. In obesity blood glucose and insulin level is increased. This is due to binding capacity of the receptor the cellular size is increased.
2. Lack of exercise and physical activity.
3. Psychogenic factor
4. Genetic factor
	1. If one parent is obese = 40% chance in children
	2. If Both parents are obese = 80% chance in children
5. Childhood over nutrition: - over due to excess of fat causes excess of cell number which increases in infancy but not in adult.

**Consequences:**

1. Diabetes
2. Hypertension
3. Atherosclerosis
4. Respiration/ pulmonary insufficiency
5. High surgical Risk
6. Decrease longevity
7. Joint pain specially lower limbs
8. Social problem (Job problem)

**Malnutrition**

It may be defined as a pathological state resulting from relative and absolute deficiency or excess of one or more essential nutrient. Here the Calorie requirement is adequate but proportion of proximal principle of food is not adequate.

**Classification**

**(1) Under nutrition-**It is the condition which results when insufficient food is taken for an extended period of time.

 **(2) Over nutrition-**This is the pathological state regulating from the consumption of excessive quantity of food over an extended period of time.

**(3) Imbalance-**It is the pathological state resulting from disproportion of essential nutrient with or without absolute deficiency of any nutrient.

**(4) Specific deficiency-**It is the pathological state result form a relative and absolute deficiency of individual nutrient.

**Sub Nutrition:-**

It is condition which result when insufficient food is taken for an extended period of time. Here calorie requirement is not adequate but the portion of proximal principle of food is normal.

**Effect of malnutrition: -**

1) **Direct effect:-**

* 1. Kwashiorkor
	2. Marasmus
	3. Vitamin and mineral deficiency diseases

**2) Indirect effect:-**

 a) High morbidity and mortality among young children

 b) Retardation of mental and physical growth and development

 c) Lower the vitality of the people

 d) Decreased Life expectancy

**Basal Metabolic Rate – (BMR)**

**Definition:-**

The metabolic rate of basal condition of the body is called B.M.R. or

The total heat production or energy expenditure of the body is the sum of that required merely maintaining life together with such additional energy as may be expended for any additional activity. So the lowest level of energy production consonant with life is the BMR.

 Male – 40 cal/m2/hours

 Female-37 cal/m2/hours

**The basal conditions are –**

(1) A post absorptive state subject should have had nothing by mouth for 12 hours.

(2) Mental and physical relaxation daily preceding the test usually 1 – 1-1/2 hour bed rest in needed. Ideally the subject should not arise from bed after a prolong rest.

(3) Recumbent position during sleep

(4) The subject must be awake

(5) Environment temperature should be 20-250c.

Factor effecting B.M.R:-

**(1) Surface area –** The B.M.R of different individual are directly proportional to the body surface area.

**(2) Age –**In new born the rate of metabolism is slow. It rises to maximum at the age of 5. Then it Inatually decreases and continuing decreases (exception – slight range puberty.

B.M.R at the age of year 5-50-53 cal/m2/hours

Adult 36- 41 cal/m2/hours

**(3) Sex-**

 Women normally have a lower BMR then male properly due to grater fat contain of female body.

(4) Climate BMR is low in warm climate

**(5) State of Nutrition –** In starvation and under nutrition BMR is lower

**(6) Disease condition –** Infection and febrile disease raise the B.M.R.

**(7) Effect of Normans –** Thyroxin is responsible

Thyroxine is hyperthyroidism B.M.R

Thyroxine is hypo thyroids B.M.R

**(8) Pregnancy –** B.M.R of pregnant women after 6 month gestation increases.

**(9) Body temperature –**B.M.R increase about 12% person rise in 100C

**(10) Racial variation –** when BMR different racial group is compared certain variation are notched such as BMR of oriental women average 10% below stranded B.M.R that of the American women is same age. BMR of the chains adult are equal on less than that of the accidentals. –

High values have been imported in the ESKIMOS living in the Baffin bay

**B.M.R increase in-**

 (i) Hyperthyroidism

 (ii) Hypertension

1. Leukemia
2. Polycythemia
3. Cardiac failure
4. Fever

**B.M.R decrease in-**

 (i) Hyperthyroidism

 (ii) Starvation

1. Under nourishment
2. Addison’s disease

**Important of nothing B.M.R**

1. For prescribing a diet of adequate
2. For the diagnosis of various pathological condition like hype or hyper thyroids
3. To not the effect of different types of food and drugs on B.M.R.

**Calorie value of different Food**

**(1) Roots and Tubes -**

 i) Carrot - 44 cal in 1009gm

 ii) Potatoes - 85 cal in 1009gm

 iii) Spinach - 25 cal in 1009gm

 iv) Tomatoes - 23 cal in 1009gm

v) Cauliflower - 25 cal in 1009gm

 vi) Pepper - 25 cal in 1009gm

 vii) Pumpkin - 31 cal in 1009gm

 viii) Cabbage - 28 cal in 1009gm

**Calorie value of different fruits**

 (1) Grapes - 40 cal/100gm

 (2) Lemon - 30 cal/100gm

 (3) Orange - 45 cal/100gm

 (4) Banana - 88 cal/100gm

 (5) Apple - 58 cal/100gm

 (6) Guava - 70 cal/100gm

 (7) Papaya - 43 cal/100gm

 (8) Pitch - 49 cal/100gm

 (9) Coconut - 40 cal/100gm

**Diet chart for sedentary worker:-**

In order to make a diet chart the cal requirement is estimated. Out of this 1gm of protein and fat per kg body wt. should be provided. An the remaining portion comes from carbohydrate. As only protein carbohydrate and fat do not need the critrationof a balance died thus adquet amount of green leafy and yellow vegetable and fruit should be given the euitra of balance diet and to need the vitamin minarets.

A man of 55 kg body wt. daily requirement = 2400 cal/day are as follows-

Protein 55gm x 4 = 220 cal/day

Fat 55gm x 9 = 495 cal/day

Carbohydrate 400gm x 4 = 1600 cal/day

Green leafy vegetable =100gm 25 cal

Fruits = 60gm 30 cal

Roots and Tubers = 75gm 45 cal

**Total caloric 2415**

2400 + 240 = 2640 cal/day [SDA = 2400, 10% of calorie]

Diet chart for pregnant women

During progeny additional 300 cal/day should be added + addition 30gm/day of protein

Beside this extra amount of other nutrients catt, iron folic acid and vitamin should be added.

1900 + 300 = 2200 cal/day

Protein (45+30) = 75x4 = 300 cal

Fat 45 gm 45x9 = 405 cal

Carbohydrate 350gm = 350 x 4 = 1400 cal

Green leafy vegetable = 125gm = 30 cal

Fruits = 30gm = 15gm

Root and tubers = 160gm = 60gm

Total caloric = 2210

SDA = 2210 x 10%

 = 221

 = 2210 + 221 = 2431 cal

Thus extra cal requirement for the growing of the fetus

An adult women of 45gm kg the daily requirement is 1900 cal. The diet is as follows-

Protein 45gm x 4 = 180 cal

Fat 45 gm x 9 = 405 cal

Carbohydrate 300gm x 4 = 1200 cal

Leafy vegetable 100gm = 25 cal

Fruits 30gm = 15 cal

Root and tubers 100gm = 25 cal

Total caloric = 21885 cal

SDA - 10% for of food

 = 180

 = 1885 + 190 = 2075

Measurement of body surface area

Circumference of x High + in c.m. = surface area in cm2

Mid thigh cm x 2

Surface area in cm2 divided by 1000 = surface area in m2

Mid thigh 20 cm x 2 x 160 cm = surface area cm2

40 x 160 = 6400 cm2

Nutritional deficiency disease

1. Kwashiuker

2. Marasms

3. Vit A deficiency

4. Vit B complex deficiency especially

 A) Thyamine

 B) Niacin

5. Vit C deficiency

6. Vit D

7. Hyper vitaminosis of A and D

8. Iron deficiency anaemia

9. Obesity

**Kwashiorkor –** cicely Williams in 1933 was the first to record that some amino acid and protein deficiency might be and a etiological factor in Kwashiorkor. The name given to disease by the GA tribe. Living in an around ACCRA The capital of GHANA.

Aetiology of Kwashiorkor-

1) After prolong brest feeding the child is weaned on to a traditional family died which is low in protein on to a cereal that has been refined and diluted.

2) In many rural areas where Kwashiorkor is endemic (==========) The food supply become scarce each year before the harvest. At this hungry system the incident of Kwashiorkor and other nutritional disease increase.

3) Gastroenteritis measles and malarias these are the three pricipating causes of Kwashiorkor.

Clinical factures Kwashiorkor

**i) Failure to growth**

Child weight usually below standard for the age. Adema due to hypoalbumin aemia of an found usually affect the fect some times may found in the hand and face. Slight asating (water in albumin) may also seen.

**ii) Muscle and fat –**

Muscle are wasted usually the upper arm and chest. Wasting of the less and around lip are conciled by adema complex leck of subcutarius fat.

iii) Meantal changes-

 Child is apathetic and miserable

iv) Hair

Becomes fine straight and after sparse

v) Changes in skin

 After ration in he skin is usually present which include

* + - 1. Pigmentation
			2. Desquamation
			3. Ulceration

vi) Sucous membrane

* + - * 1. Anguloe stomartities
				2. Cheilosis
				3. Smoth tongue

Some time ulceration may be found around the anous

vii) Liver may be enlongeral

viii) Gostointesiinal system,

* 1. Anoriesia
	2. Vomiting
	3. Diarrhoea– undigested food pratieal

These are thue to imperaed secretion digestive enzyme.

ix) Anaemia

Some degree anemia is usually present

x) Associated vitamin deficiency

 a) Vit A deficiency with

 i) Xerophthalmia and

 ii) Keratomalacia may occure

 b) Thiamine and fotate deficiency may also occure

**Complicant**

1. GI. Infections
2. Respiratory tract infection
3. Viral disease like meals
4. Tuber culosis
5. Strep to and staphylococcal skin infection
6. Helminthes infection.

**MARASMUS:-**

If effect principally infant under one year of age in contrast to Kwashiorkor which is chiefly is encounter between 1-4 year of age.

It is more likely occur in poor people who live in the cities in under developed countries while Kwashiorkor occurs more frequently in people living in the rural area.

**AETIOLOGY**

1. Ripid
2. Early and after abroped weahing followed by direly artificial feeding of the infants with very dilute milk and milk products give in adequate aninount to avoid express. Thus the died is low both in colories and protein.

**Clinical feature**

1) Peterdational gowth and reduction of wt which is much more marked than that of wight.

2) Wasting of subcutaneous muscle and fat which gives the infant wizened and old appearance

3) Watery diarrhea

4) In contrast to Kwashiorkor oedemia is absent

5) Changes in the hair skin apathy, aneroid are usually absent.

6) Distended abdomen with out liver enlargement

7) Assicated deficiency

Angularis stonatitis Kwashiorkor may develop

Dehydrottatin frequently occurs as a consequence – gusted – intestinal in faction

**Minarels –**

Na, Po4, mg, K, ca, 5 – 60 -70% - principle

Fe cu, co, J, Br,-

No assential – An, Hg

**What is the important of oxyntic cell**

Oxyntic cell is acidic and all body fluid of the body is alkalized

Adenosine is a nucleoside

How do you determine and partern of Hcl of gostin juice ?

\*\* Obazone test sime cristal

Becouse the test 4 corbon ofon are same

Fructos

C H2OH H-C= N – NH (0)

C = 0 C = N – NH

oH-C-H OA – C – H

H – C – OH H – C – OH

CH20H C 1 + 20H