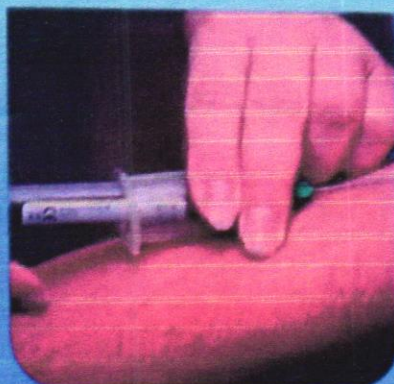


2023-2024

Textbook of **NURSING FOUNDATION - I**

NURSING B.SC 1ST SEM



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To,
Dear Anjani Devi Nelavala

This certificate confirms that **Anjani Devi Nelavala** is the author of book chapter titled "**Protein-Energy Malnutrition**" of published book entitled "**Advances in Nutrition (Volume - 8)**" having ISBN 978-93-5570-774-1.

Yours Sincerely,

Akhil Gupta



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Chapter - 4

Protein-Energy Malnutrition

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Chapter - 4

Protein-Energy Malnutrition

Anjani Devi Nelavala and Dr. Bhopal Chandra

Abstract

Proteins are necessary macronutrients of food that supply essential as well as nonessential amino acids needed for the growth, repair and maintenance of tissues. Protein is obtained from a variety of sources to supply amino acids for growth and repair. Humans are unable to synthesize nine amino acids out of the 20 found in protein. Nonessential amino acids are synthesized from essential amino acids in the body. The daily requirement of protein (about 65 and 50 g) in food by males and females, respectively, provides about 10%-15% of total energy in a balanced diet; however only about 5% of body energy comes from the catabolism of protein under normal circumstances. Protein-energy malnutrition (PEM) is composed of a spectrum of biological disorders caused by the lack of food. Despite the name, it is not necessary for affected individuals to be experiencing a lack of protein, but rather a deficiency of total energy.

Keywords: Protein-energy malnutrition, marasmus

Introduction

Malnutrition is a state of nutrition in which a deficiency or excess (or imbalance) of energy, protein and other nutrients causes measurable adverse effects on tissue/body form (body shape, size and composition) and function and clinical outcome. The term malnutrition does include obesity, however BAPEN is focussed on the problem of “under nutrition”. The term “malnutrition” is used on this website to mean “under nutrition”. Malnutrition can often be very difficult to recognise, particularly in patients who are overweight or obese to start with. Malnutrition can happen very gradually, which can make it very difficult to spot in the early stages.

Mal nutrition

Mal nutrition is a health problem especially in children under 5 years of age. Globally, there are 15 percent of world's population, who are having problem of malnutrition according to FAO reports.

Mal nutrition refers to deficiencies, excesses or imbalances in a person's intake of energy and/or nutrients. The term malnutrition covers two broad group of condition.

A pathological state resulting from a relative or absolute, deficiency or excess of one or more essential nutrients. Hunger and mal nutrition are the problems present every were in the world.

Definition: Malnutrition is a health problem occurring due to relative or absolute deficiency or excess of nutrients in human body and causing pathological changes.

In other words, malnutrition can be defined as the condition due to absence, deficiency or excess of one or more essential nutrients.

Problems of mal nutrition

1. Under nutrition

This is the condition which results when insufficient food is eaten un extent period of time in case of starvation

2. Over nutrition

This is a pathological state resulting from consumption of excessive quantities of food over a period of time.

3. Imbalance nutrition

It is a pathological state resulting from a disproportion among essential nutrition with or without the absolute deficiency of any nutrient

4. Specific nutrient deficiency

This is a pathological state resulting from a relative and absolute lack of an individual nutrient.

Causes of malnutrition

- **Infectious diseases:** Diarrhoea, Intestinal parasites, Malaria, tuberculosis.
- **Food habits:** Food habits are passed from generation to generation because of culture. These food habits are deeply entrenched in the culture. The food habits of southern states of India are different from northen states. Even religion plays an important role in developing food habits such as Hindus do not eat beef and Muslim do not eat pork.

- **Food taboos:** Food taboos plays an important role in developing malnutrition. Food taboos prevent people from consuming certain foods such as orthodox. Hindus do not eat onion, garlic etc.
- **Personal choice for food:** Personal likes and dislikes for foods, preference for one particular type of food is also the factor causing malnutrition.
- **Cooking practices:** Cooking practices such as throwing the water in which the rice or pulses were soaked.
- Cutting the vegetables into smaller pieces and cooking for a longer time.
- Throwing away the part of fruit or vegetables having nutritive value such as throwing of leaves of radish.
- **Women's status:** In some communities or some part of India especially in rural communities, women do not get the same status as men. They are advised to eat at last the left out of food. This affects the health by developing malnutrition among girl children and women.
- **Lack of knowledge:** The people lack knowledge regarding the nutritive value of foods due to which they are unable to take appropriate nutrition.
- **Poverty:** Poverty loses the purchasing power of the individual, due to which an individual is unable to eat food which is required to maintain the health.
- **Poor sanitary environment:** Poor sanitary environment causes disease to occur more frequently, there by contributing to malnutrition.

Types of malnutrition

Protein energy malnutrition

Proteins are the building blocks of human body. They provide required energy to body for its functioning. A reduced intake of proteins for longer period may lead to the followings. The protein Energy Malnutrition is refers to there is a deficiency in both proteins and carbohydrates; it is commonly seen in the children. Protein Energy Malnutrition (PEM) is the deficiency of macronutrients or energy and protein in the diet. It is a nutritional disorder, which affects all the segments of population like children, women and adult males particularly from the backward and downtrodden communities.

Definition

Protein Energy Malnutrition is defined as a group of clinical conditions that may result from varying degrees of protein deficiency and energy inadequacy. "WONG'S"

Protein Energy Malnutrition is a term used to describe clinical disorders, resulting from deficiency of protein and energy. It mostly occurs in preschool children and diarrhoea is the main cause of it.

Incidence

Protein Energy Malnutrition has been identified as a major public health and nutrition problem in India. The incidence of Protein Energy Malnutrition in India is preschool children is about 1 to 2%. PEM affects every 4th child world-wide, 150 million (26.5%) are underweight, 180 million (32%) are stunted.

Classification for assessment of nutritional status is depicted in table

Weight for age	Malnutrition
91-100	Normal
76-90	1 degree
61-75	2. degree
<60	3 degree

Different Types of PEM

Clinical forms

- Kwashiorkor
- Marasmus
- Marasmic kwashiorkor

Sub-clinical forms

- Underweight
- Wasting
- Stunting

Deficiencies of proteins

In fancy and early childhood	In children	In adults	In pregnancy
Mental retardation	Protein energy malnutrition	• Protein deficiency in adult leads to loss of body weight	Premature birth

Stunted growth and development		• Reduced subcutaneous fat	Still birth
		• Anaemia	Low birth weight babies (weight <2500)
		• Susceptibility infection etc.	

Etiology: Leading cause of death (less than 5 years of age) Primary PEM: Protein + energy intakes below requirement for normal growth. Secondary PEM: ♣ the need for growth is greater than can be supplied. ♣ Decreased nutrient absorption ♣ increase nutrient losses linear growth ceases Static weight

- Economic factors
- Low birth weight
- Infections
- Population growth
- Feeding habits
- Lack of exclusive breast feeding till 6 months
- Inadequate supplements after 6 months
- Repeated pregnancies & inadequate spacing
- Increased protein energy requirements
- Diarrhoea
- Increased metabolic needs and decreased intestinal absorption
- In appropriate management of food allergies and psychiatric diseases such a anorexia nervosa.
- Lack knowledge regarding food values Inadequate sanitary environment

Cultural influences:

- Food habits and attitude
- Religious belief
- Cooking practices

Classification

Protein Energy Malnutrition is classified on the following basis

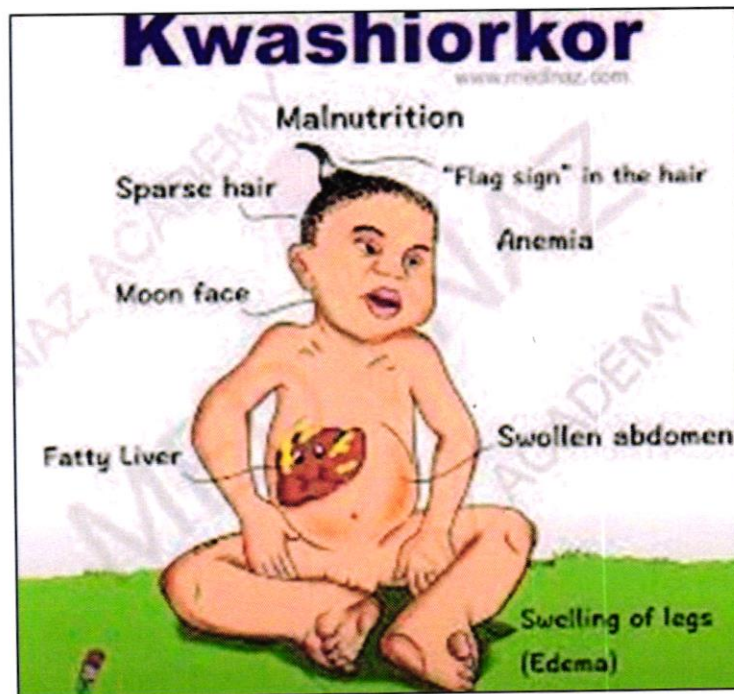
- Kwashiorkor

- Marasmus

Kwashiorkor

Introduction

Kwashiorkor is the one type of the malnutrition caused by the deficiency of proteins in the diet; it was first discovered by the Dr. Cicely Williams in 1935. It is otherwise called as “sickness of weaning”. It is a protein energy mal nutrition condition which is commonly occurs in children who are weaned from mother’s breast to a diet rich in starch and low in proteins.



Definition

Kwashiorkor is a severe form of malnutrition characterized by is too much fluid in the body’s tissues, which causes swelling under the skin.

Kwashiorkor has been defined as “predominant deficiency of proteins with an adequate supply of the calories”.

According to B.T Basavanthappa.

“Deficiency in the intake of both protein and calories but protein lack is more predominant characterized by presence of edema”.

Etiology

- Inadequate diet.
- Artificial feedings with quantitative diluted formulae.
- Infectious diseases such as gastro-enteritis.

- Lack of knowledge.
- Ignorance.
- Economic factors.
- Cultural factors.

Clinical features: Growth retardation, Edema, Hair changes, Sparseness(alopecia) Change in texture (coarse/silky), Easy pluckability, Skin Changes, Hypo pigmentation, Dermatitis, Pyoderma, GI Manifestations, Diarrhoea, Infections/Parasitic infestation, Mucosal atrophy, Mineral & Vitamin deficiency, Liver enlargement- Fatty liver, Super added infections, Tuberculosis, Bronchopneumonia, Measles, Poor renal function, Behavioural changes.

Symptoms: Changes in skin pigment. Decreased muscle mass, Diarrhoea Failure to gain weight and grow, Fatigue, Hair changes (change in colour or texture), Increased and more severe infections due to damaged immune system, Irritability, Large belly that sticks out (protrudes), Lethargy or apathy, Loss of muscle mass, Rash (dermatitis), Shock (late stage).

Diagnosis of kwashiorkor

- The physical examination shows general swelling, protruded belly and hepatomegaly.
- Arterial blood gas analysis.
- Total protein levels.
- Urinalysis.
- Serum potassium, creatinine clearance, serum creatinine, blood urea nitrogen, completed blood count.

Treatment of kwashiorkor

- In the early stages of the disease, treatment revolves around providing an adequate diet for the child, with more calories and protein.
- Carbohydrates in the form of simple sugars and fats, are given first to cater to the catabolic needs.
- Proteins are given after other sources of energy have been provided. They only serve anabolic purposes.
- Vitamins and minerals are also essential to restore the nutritional status of the patient.

Prognosis of kwashiorkor

Early treatment can produce better results. Treatment in the later stages improves the nutritional status of the child. However, it does not compensate for the physical and mental damage that has already been if not treated on time.

Prevention of kwashiorkor

An adequate diet containing sufficient carbohydrates and fats that provide 10% of the total caloric needs and proteins that make up 15% of the caloric intake.

Marasmus

Introduction

The term Marasmus derived from Greek word "Marasmus" which means withering or wasting. Nutritional marasmus is also termed as infantile atrophy; commonly seen in infants and toddlers. In this condition there is loss of weight of more than 50% of the expected weight for given age, with severe wasting of muscles and losses of subcutaneous fat of body.

Definition: Marasmus is a type of malnutrition primarily caused by a deficiency in calories and energy. There is a severe deficiency of nearly all nutrients, especially proteins, carbohydrates and lipids.

Marasmus is defined as "Inadequate intake of proteins and calories and is characterized by emaciation".

It is commonest type of severe PEM that occurs in preschool children and results in growth retardation and muscle wasting without edema.

Etiology: Negative energy balance cause marasmus, which can be due to factors such as

- Decreased energy intake.
- Increased loss of ingested calories due to emesis.
- Chronic diarrhoea.
- Burns.
- Increased energy expenditure.
- Viral bacterial parasitic infections.
- Bottle feeding.
- Combinations of the above factors.

Primary causes

- Inadequate diet.
- Artificial feedings with quantitative diluted formulae.
- Infectious diseases such as gastro-enteritis.

Secondary causes

- Age.
- Chronic vomiting.
- Repeated episodes.
- Chronic infections.
- Congenital diseases.
- Serious organic disorders.
- Certain metabolic disorders.
- Poverty and food scarcity.
- Wasting diseases such as AIDS.
- Infections that cause chronic diarrhea.
- Anorexia.

Additional causes affecting children include:

- Inadequate breastfeeding or early weaning of infants.
- Child abuse/neglect.
- Additional causes affecting adults include:

- Dementia.
- Elder abuse/neglect.

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Grading of marasmus

Gomez classification

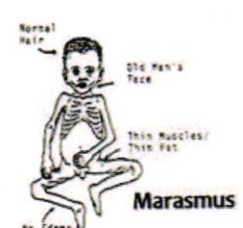
- Based on Weight for age.
- In this system the normal reference child is the 50th centile of the Boston standard.
- Weight for age (%) =
$$\left(\frac{\text{Weight of the child}}{\text{Weight of the normal child of same age}} \right) \times 100$$

Stage of Malnutrition	Weight for age (%)
Normal	> 90 %
Grade I	75 - 90 %
Grade II	60 - 75 %
Grade III	< 60 %

- **Grade 1:** Wasting starts in axilla & groin.
- **Grade 2:** Wasting extended to thigh and buttocks.
- **Grade 3:** Chest and abdomen.
- **Grade 4:** Wasting of buccal pad of fat also.

Gradings of Marasmus & Kwashiorker

Mediwood
by Dr Naveen Koval



Marasmus


Grading of Marasmus (marasmus is **Ab**normally thin)

Grade I: Axilla and groin **A**XILLA

Grade II: Buttocks and thigh +1 **B**UTTOCKS

Grade III: Chest and abdomen +2 **A**BDOMEN

Grade IV: Buccal pad of fat +3 **B**UCCAL



Kwashiorker

Grading of Kwashiorker (kwashiorker is **Pu**ffy)

• Grade 1: Pedal edema **P**EDAL EDEMA

• Grade 2: 1 + Facial edema **F**ACIAL EDEMA

• Grade 3: 2 + Paraspinal and chest edema **P**ARASPINAL EDEMA

• Grade 4: 3 + Ascites **F**LANKS FULL(ASCITES)

Pathophysiology

In adequate diet, congenital anomalies, infections that produce anorexia, food allergies, emotional problems. When adequate calories are not ingested to full fill the metabolic needs of the body. Reserve food elements such as proteins and fat in tissues are used to sustain life.

Muscle wasting and thinning of body occurred. Results in Protein Energy Malnutrition. The weight of many organs is decrease like spleen, liver, are greatly reduced in size and the heart and lungs are also affected.

Fat stores decrease up to 5% of the total body weight and the extracellular water content of the body increases.

↓
Protein mass can decrease up to 30% in severe cases, protein sparing mechanisms redirect amino acids to vital organs.

↓
Hypothermia and hypoglycaemia

↓
Potassium deficiency

↓
Intracellular sodium

↓
Metabolic adaptations in marasmus are like those in starvation.

↓
Basal metabolic rate decreases, Muscle loss

↓
Brain, skeleton, and kidney are preserved, whereas the liver, heart, pancreas, and digestive tract are affected first.

↓
Impaired glucose clearance

↓
Decreased HCL production and slow peristalsis

↓
Adaptations are seen by thyroid hormones insulin and growth hormone.

↓
Immunocompromised state

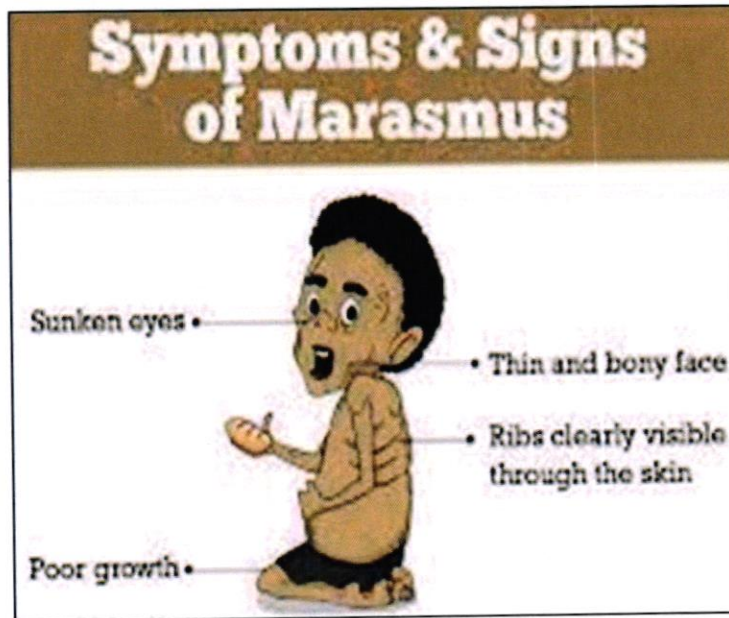
↓
Myofibril contractility

Signs and symptoms of marasmus

The external signs of marasmus

- Visible wasting of fat and muscle.
- Prominent skeleton.
- Head appears large for the body.

- Face may appear old and wizened.
- Dry, loose skin (skin atrophy).
- Dry, brittle hair or hair loss.
- Sunken fontanelles in infants.
- Lethargy, apathy and weakness.
- Weight loss of more than 40%.
- BMI below 16.



Other symptoms and complications can marasmus cause

- Dehydration.
- Electrolyte imbalances.
- Low blood pressure.
- Slow heart rate.
- Low body temperature.
- Gastrointestinal malabsorption.
- Stunted growth.
- Developmental delays.
- Anaemia.
- Osteomalacia or rickets.

Clinical manifestations

Essential features

- Marked growth retardation.
- Gross wasting of muscles.
- Complete loss of subcutaneous fat from buttocks, abdomen and medial aspect of thighs and arms and even the face.
- The face has a prematurely aged look.
- The cheeks and temples are hollow, due to the complete loss of fat.
- Loss of elasticity.
- Bony points appear unduly prominent.

Non-essential features

- Hair changes hypo pigmented and appear dull brown or yellow.
- Sub normal temperature is present, pulse is low.
- Skin looks dry, scaly, loose folds and having reduced mid arm circumference.
- Super added infections are common.
- Liver usually stunk.
- **Psychomotor changes:** Irritability, apathy.
- Severe electrolyte imbalance occurs and may responsible for neurological signs and convulsions.

Diagnosis and Tests

How is marasmus diagnosed?

Healthcare providers will begin by physically examining the person's body. Marasmus has some tell-tale physical features, the primary one being the visible wasting of fat and muscle. People with marasmus appear emaciated. The loss of fat and muscle under the skin may cause the skin to hang loose in folds. Beyond appearances, healthcare providers will measure the height or length of the person's body and the circumference of their upper arm.

Healthcare providers use a few different charts to measure a child's or adult's weight-to-height ratio against medical standards, depending on their age. Marasmus is defined differently on different charts, but it is always significantly below average. To use a chart more people are familiar with,

marasmus would score below a 16 on the BMI (body mass index). The purpose of the scoring is mostly to confirm the diagnosis and rate how severe it is.

What tests are used to diagnose marasmus?

Diagnosis primarily relies on body measurements, which are then scored according to different scoring systems for children and adults. Upper arm circumference and height-to-weight ratios help healthcare providers rate the severity of undernutrition. Height-to-age ratios help define growth delays in children. Healthcare providers will usually recognize the type of undernutrition (marasmus) based on physical signs.

The next step will be to take a blood test to identify the secondary effects of marasmus, including specific vitamin, mineral, enzyme and electrolyte deficiencies. This will help determine the child's or adult's nutritional needs for refeeding. A complete blood count can also help reveal any infections or diseases that may have contributed to or resulted from marasmus. They may check a stool sample for parasites. Infections will need to be treated separately.

Management and Treatment: People in treatment for marasmus are at risk of refeeding syndrome, a life-threatening complication that can result when the undernourished body tries to reboot too fast. For this reason, rehabilitation happens in stages. Ideally, people with marasmus should be treated in a hospital setting, under close medical supervision. Healthcare providers who are trained to anticipate and recognize refeeding syndrome can help prevent or correct it by supplementing missing electrolytes and micronutrients.

Stage 1: Rehydration and stabilization

The first stage of treatment is focused on treating dehydration, electrolyte imbalances and micronutrient deficiencies to prepare the body for refeeding. In many cases, these can all be treated with one formula, Rehydration Solution for Malnutrition (Resomal), given orally or through a nasogastric tube. It's also important to keep the person warm to prevent hypothermia and to treat infections, which compromise their meager energy resources. Depending on the individual, it may take several hours to days before they are considered stable enough to begin refeeding.

Stage 2: Nutritional rehabilitation

Refeeding begins slowly with liquid formulas that carefully balance carbohydrates, proteins and fats. For inpatients, healthcare providers prefer tube feeding because it allows for gradual but continuous nutrition. Calories are introduced at about 70% of normal recommended values for the person's age. Eventually, they may increase to 140% of recommended values

to meet the growth requirements of stunted children. This phase may last two to six weeks. During this time, patients gradually progress to more ordinary oral feeding with solid foods.

Stage 3: Follow-up and prevention

Since marasmus can recur, a complete treatment protocol includes education and outgoing support for the patient and/or their caregiver before they are discharged. In the developing world, this may mean breastfeeding support, safe drinking water and food preparation guidelines, immunizations and education to prevent widespread diseases. In the developed world, caregivers may need guidance on how to recognize signs of malnutrition in those they care for. The Malnutrition Universal Screening Tool (MUST) can help identify people at risk.

Prevention: In your own community, you can help prevent marasmus by advocating for the needs of children and elders who may be unable to advocate for themselves, especially those living in hospitals and care homes.

In the global community, preventing marasmus means:

- Fighting poverty.
- Eliminating food deserts.
- Improving nutritional education.
- Controlling widespread infectious diseases.
- Improving sanitation in developing countries.
- Improving elder care in developed countries.

Outlook/Prognosis: The average time spent in treatment for marasmus is 42 days. After treatment, those who return to a caring environment with the resources they need to maintain good health can generally expect to make a full recovery. Many children appear to catch up on their growth and development deficits, though these long-term outcomes are still being studied. Continuing vitamin and mineral supplementation may help.

Micronutrient malnutrition

Diseases caused by deficiency of vitamins and minerals, The person should take a well-balanced diet which contains all the vitamins and minerals along with protein, fats and carbohydrates. In the absence of these, the individual can suffer from a variety of diseases

Diseases cause by deficiency of vitamins

1. Deficiency of vitamin A causes diseases

Night blindness, conjunctival xerosis, bitots spots, corneal xerosis and keratomalacia.

2. Deficiency of vitamin D causes

Rickets, Osteomalacia.

3. Vitamin E deficiency causes

No clear indication of dietary deficiency disease. The role of vitamin E at the molecular level is little understood.

Cytotoxic effect of vitamin E on human lymphocytes in vitro at high concentration has been reported.

4. Vitamin K deficiency

Prothrombin level of blood is decreased and blood clotting time is increased.

Deficiency of vitamin B

- **Thiamine deficiency (B₁):** Beriberi.
- **Riboflavin deficiency (B₂):** Angular stomatitis.
- **Niacin:** Pellagra
- **Pyridoxine deficiency (B₆):** Peripheral neuritis.
- **Deficiency of folate:** Megaloblastic anaemia, Glossitis, Cheilosis.
- **Deficiency of vitamin B₁₂:** Pernicious anemia, Demyelinating neurological lesions and infertility.

5. Deficiency of vitamin C

Deficiency of vitamin C results in Scurvy which has signs of swollen and bleeding gums, subcutaneous bruising or bleeding into skin or joints, delayed wound healing, anaemia and weakness.

Diseases caused by deficiency of minerals

1. **Deficiency of calcium:** Rickets and Osteomalacia.
2. **Deficiency of sodium:** Deficiency of sodium causes muscular cramps.
3. **Deficiency of magnesium:** irritability, tetany, and hyperreflexia.

4. **Deficiency of iron:** Anaemia, Impaired cell mediated immunity and reduced resistance to infection.
5. **Iodine deficiency:** Hypothyroidism, cretinism in children, Deaf-mutism, severe mental retardation and goitre.
6. **Fluorine deficiency:** Dental caries.

Over nutrition

Due to over nutrition, obesity results. Increased intake of energy giving food leads to prolonged post-prandial hyperlipidaemia. Due to this, triglycerides in adipose tissue are deposited. This results in obesity. The obesity is found in relation to body mass index.

Obesity is a form of malnutrition which is prevalent in developed and developing countries. It is a risk factor for chronic, non-communicable diseases such as hypertension, coronary artery disease and diabetes mellitus.

Risk factors

- Over eating.
- Physical inactivity.
- Genetic factors.
- Emotional disturbances.
- Endocrinological factors.
- Alcohol intake.
- Drugs such as corticosteroids.

Signs and symptoms

Symptoms of malnutrition in adults

- The most common symptom is a notable weight loss.
- Weakness of muscles and fatigue.
- Many people complain of tiredness all day and lack of energy.
- Increased susceptibility to infections.
- Delayed and prolonged healing of even small wounds and cuts.
- Irritability and dizziness.
- Skin and hair becomes dry. Skin may appear dry, and flaky and hair may turn dry, lifeless, dull and appear like straw. Nails may appear brittle and break easily.

- Some patients suffer from persistent diarrhea or long term constipation.
- Menstruation may be irregular or stop completely in malnourished women.

Depression is common in malnutrition. This could be both a cause as well as an effect of malnutrition.

Symptoms of malnutrition in children include

- Growth failure. This may be manifested as failure to grow at a normal expected rate in terms of weight, height or both.
- Irritability, sluggishness and excessive crying along with behavioral changes like anxiety, attention deficit are common in children with malnutrition.
- The skin becomes dry and flaky and hair may turn dry, dull and straw like in appearance. In addition, there may be hair loss as well.
- Swelling of the abdomen and legs. The abdomen is swollen because of lack of strength of the muscles of the abdomen. This causes the contents of the abdomen to bulge out making the abdomen swollen. Legs are swollen due to edema. This is caused due to lack of vital nutrients. These two symptoms are seen in children with severe malnutrition.
- There are classically two types of protein energy malnutrition (PEM) in children. These are Marasmus and Kwashiorkor.
- In Marasmus there may be obvious weight loss with muscle wasting. There is little or no fat beneath the skin. The skin folds are thin and the face appears pinched like an old man or monkey. Hair is sparse or brittle.
- In Kwashiorkor the child is between 1 and 2 with hair changing color to a listless red, grey or blonde. Face appears round with swollen abdomen and legs. Skin is dry and dark with splits or stretch marks like streaks where stretched.
- In nutritional dwarfism the patient appears stunted in growth.

Assessment of malnutrition

Various techniques are used to assess the nutritional status of people. These techniques will help in making decisions to improve the nutrition.

1. Clinical Examination

- Clinical examination is practical method to determine the nutritional status. In this method, various signs and symptoms associated with under nutrition, over nutrition are assessed.
- In case of under nutrition, the signs and symptoms related to deficiency of protein, vitamins and minerals are assessed as each deficiency has its own clinical manifestations while in over nutrition, the signs and symptoms occurring due to increased amount of protein, mineral and vitamins causing toxicity are assessed.

2. Anthropometry

- Anthropometric measurements are valuable measurements to determine the nutritional status.
 - The parameters used are weight, height, skin fold thickness, arm circumference, head and chest circumference to assess nutritional status.
3. Growth chart Protein energy malnutrition can be detected by assessing the weight for age. If the weight for age is under the reference standard, it means the child is losing the weight. Health workers are maintain growth chart for children and while looking at this maintained Growth chart, malnutrition can be assessed.

Obesity assessment is based on following criteria.

- Body weight.
- Skin fold thickness.
- Waist circumference and waist hip ratio.

Body weight

1. **Body mass index:** It is defined as the ratio of weight in kg to square of height in meter. The formula used is

$$\text{B.M.I.} = \frac{\text{Weight (kg)}}{\text{Height}^2 (\text{m})}$$

2. **Broca index:** Broca index is used to assess the ideal weight, through which it can be calculated that the individual is over weighed or not.

$$\text{Broca index} = \text{Height I cm} - 100.$$

3. **Corpulence index:** It is the ratio of actual weight to desirable weight and it should not exceed 1.2.

$$\text{Corpulence index} = \frac{\text{Actual weight}}{\text{Desirable weight}}$$

Skin fold thickness

Harpender skin callipers are used to measure the mid-axilla, biceps, sub scapular and supra-iliac region. For boys, the sum of these measurements should be 40 mm and for girls it should be 50 mm.

Waist hip ratio

It should not be more than 1.0 in men and 0.85 in women.

Diagnostic findings of malnutrition

According to WHO

- Physical examination.
- Anthropometric assessment.
- **Blood:** Hb%.
- CBC, Culture/sensitivity.
- Urine-routine and C/s.
- Stool examinations.
- X- Ray Chest-pneumonia, TB, micro cardia or Cardiomegaly.
- Biochemical-Protein, Albumin A/G ratio, S. electrolytes, liver and renal function tests, creatinine and height index.

Complications

- Serious infections, especially septicaemia or pneumonia.
- Hypoglycaemia due to loss of energy stores.
- Hypothermia.
- Heart failure due to a small, weak heart.
- Bleeding, usually purpura.
- Anaemia due to protein and iron deficiency.
- Electrolyte imbalances, especially potassium deficiency.
- Malabsorption.
- Tremors.

- Sudden death.

Prevention and control of malnutrition

1. Identification of affected individuals

- A survey should be carried out in the community to identify the affected individuals through clinical examination and body measurements.
- The survey will provide the data about the nutritional status of the community.
- This survey should be continued so as to plan the strategies to reduce the number of affected people and to control and prevent the malnutrition.

2. Special feeding programmes

- The affected individuals should be rehabilitated by focusing on special feeding programme.
- The children suffering from severe PEM may be admitted to hospital and less severely cases can be treated through special nutrition rehabilitation programmes.

3. Health education

- Health education is one of the ways to improve the nutritional status of community by creating awareness about the type of foods to be eaten and the total calorie intakes according to energy needs of body.
- Promotion of breast feeding and improvement in infant and child feeding practices.
- Improving the purchasing power of people.
- Educating the selection of right kind of food.
- Correction of harmful taboos and dietary prejudices.

Role of dietitian

- Assessment of nutritional status.
- Physical examination and anthropometric measures.
- Assisting in diagnostic investigations.
- Implementing nutritional rehabilitation activities.
- Encouraging the parents for home care and rehabilitation.
- Nutrition education, demonstration and counselling.


- Promotion of preventive measures.
- Maintenance of record and reports.
- Assisting in implementation of national nutritional programmes.
- Participating in nutritional research projects.

Conclusion

The rapid rates of growth and development of infants and young children require that feeding practices be continuously adjusted. Feeding regimens that are appropriate for the 3-month old are inadequate when the infant is 6 to 8 months of age, and practices suitable at those ages are unsatisfactory at later stages of infancy. Data that assess this process have led to the following conclusions and recommendations.

References

1. Srilakshmi. Human nutrition, (1st ed.). new age international limited
2. Sheela John, Jasmine Jenifer. Essential of nutrition and Dietetics for Nursing, (3rd Ed.) Wolters Kluwer publishers India Ltd.
3. Neelam Kumari. The text book of community health nursing, 12th edition, S. Vikas & Company Medical Publishers, 313-314.
4. Marta Lonnie. Protein for Life: Review of Optimal Protein Intake, Sustainable Dietary Sources and the Effect on Appetite in Ageing Adults journal of nutrition. 2018;10(3):60.
5. American journal of clinical nutrition. 2003;67:114.
6. <http://nhm.gov.in/publications/proceeding-of-the-Health.html>
7. <https://www.slideshare.net/sweety-7912/Nutrition.com>
8. <http://www.mal nutrition.com>
9. <http://nhm.gov.in/publications/proceeding-of-the-Health.html>
10. <https://www.slideshare.net/sweety-7912/Nutrition.com>
11. <http://www.mal nutrition.com>


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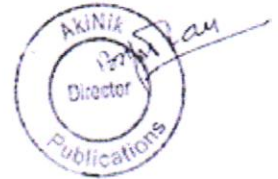
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To,
Dear Anjani Devi Nelavala and Dr. V. Bhopal Chandra

The book chapter titled "**Limbic System**" is very well written and has been accepted for publication in edited book titled "**An Introduction to Brain and Behaviour (Volume - 1)**".

Yours Sincerely,

Akhil Gupta



Akhil Gupta
Manager
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Chapter - 2
Limbic System

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Chapter - 2

Limbic System

Anjani Devi Nelavala and Dr. V. Bhopal Chandra

Abstract

The limbic system is a neuroanatomical as well as a conceptual neuroscientific term. It encompasses several core structures of the brain involving development, architecture, connectivity, and function. In conceptual terms, the limbic system is regarded as an integral system for relating information to emotion, forming motivations of behaviour, regulating autonomous and endocrine function, and consolidating memories. Key structures of the limbic system are found in all vertebrates. The lack of a universally accepted definition of what constitutes the limbic system mandates an explicitly informed scientific use of this term.

Keywords: Allocortex, amygdala, brainstem, cingulate gyrus, hippocampus, hypothalamus, memory, pallium, papez circuit, parahippocampal gyrus, septal nuclei

Introduction

The ability to feel and express emotion is a unique feature that has been observed in a significant number of animals. Humans in particular experience and express an eclectic plethora of emotions that help to shape an individual's behaviour. The region of the brain believed to be responsible for these activities formed a physical border between the hypothalamus and the cerebrum. Therefore, it was called the limbic system; arising from the Latin word *limbus*, meaning edge.

The limbic system is considered to be the epicentre of emotional and behavioural expression.

A quick way to remember the functions of the limbic system is to think about five "F's":

- Feeding (satiety & hunger).
- Forgetting (memory).
- Fighting (emotional response).

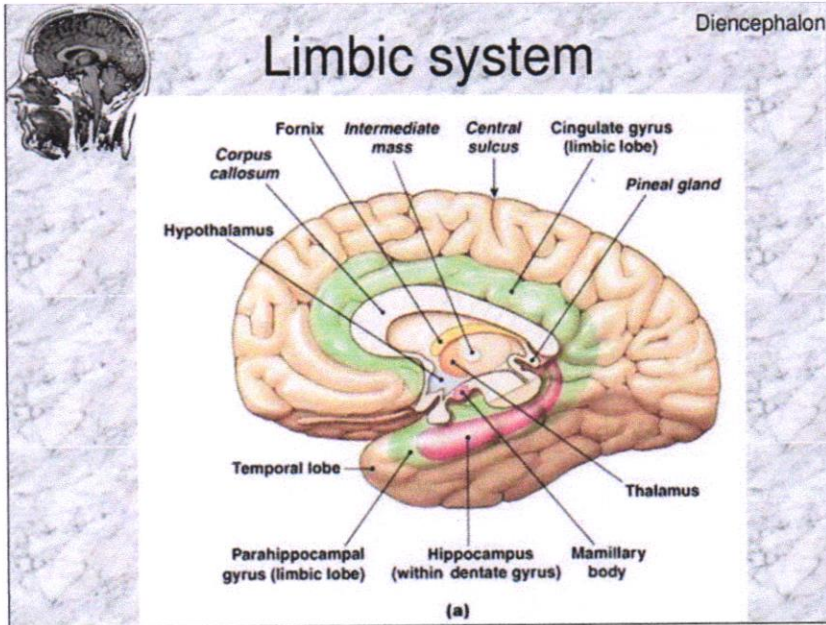
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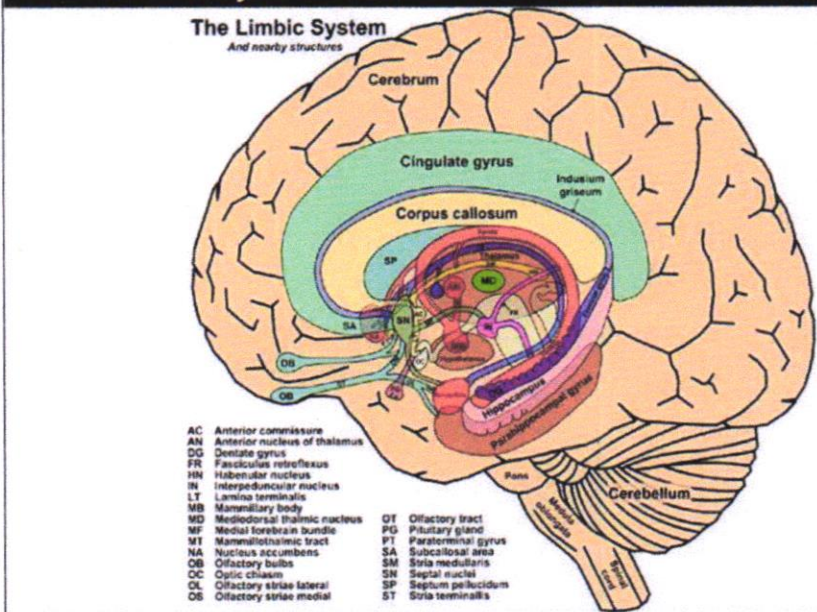
- Family (sexual reproduction and maternal instincts).
- Fornicating (sexual arousal).

It is able to complete these activities through intricate connections to other systems of the brain. Traditionally, it has been divided into two groups: a cortical and a subcortical component. The former comprises of the neocortex, orbital frontal cortex, hippocampus, insular cortex and the cingulate, subcallosal and para hippocampal gyri.

The latter, on the other hand, includes the amygdala, olfactory bulb, septal nuclei, hypothalamus and the anterior and dorsomedial nuclei of the thalamus. The cortical region is referred to as the limbic lobe (discussed below). The subcortical region works in conjunction with the limbic lobe. This article will discuss the gross anatomy of the limbic system and associated pathways.



The Limbic System



Function	5 F's: feeding (satiety and hunger), forgetting (memory), fighting (emotional response), family (sexual reproduction, maternal instincts), fornicating (sexual arousal)
Cortical components (limbic lobe)	Orbital frontal cortex: Perceive smell, involved in formation of memories. Hippocampus: Associated with long-term memory. Insular cortex: Associated with desires, cravings, addiction. Cingulate gyrus: Perception of neuropathic pain and nociception. Para hippocampal gyrus: Provides path for communication between cortical association areas and hippocampus.
Subcortical components	Amygdala: Fear, anxiety responses. Olfactory bulb: Receives olfactory input about smells detected in nasal cavity. Hypothalamus: Final output of the limbic system anterior and dorsomedial nuclei of the thalamus septal nuclei.
Circle of Papez	Cingulate gyrus-para hippocampal gyrus-entorhinal cortex-subiculum-lateral and medial mammillary nuclei-anterior thalamic nucleus-internal capsule-cingulate gyrus.
Clinical relations	Amygdala lesions, anterograde amnesia.

Limbic lobe: The limbic lobe refers to a specific group of anatomical structures found in the region of the cortex on the medial aspect of cerebral hemisphere forming a rim around the corpus callosum. It also includes cingulate and para hippocampal gyri. These structures also have

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interdependent functional similarities associated with the formation of memories and the expression of a variety of emotions. These structures are explained below.

Subcallosal gyrus: The subcallosal gyrus is a relatively small gyrus that is found anterior to the lamina terminalis (anterior wall of the hypothalamus) and the anterior commissure. Also, it is inferior to the rostrum (first part) of the corpus callosum and posterosuperior to the orbitofrontal cortex of the cerebrum. The area also corresponds with sections of Brodmann areas 24 and 32 and area 25. It is believed to be involved in depression.

Cingulate gyrus

The cingulate gyrus is best appreciated while visualizing the medial aspect of either hemisphere of the cerebrum. It is a "C" shaped structure that is divided into a prelimbic and an infralimbic cortex, an anterior cingulate and a retro splenic cortex. The cingulate cortex commences ventral to the rostrum of the corpus callosum, curves rostrally then follows the genu of the corpus callosum to progress posteriorly to blend with the praecuneus of the parietal lobe. The cingulate gyrus is separated from the corpus callosum by the callosal sulcus (inferiorly) and from the medial frontal gyrus and paracentral lobule by the cingulate sulcus superiorly. The cingulate sulcus is continuous with the marginal sulcus, which separates the paracentral lobule from the praecuneus. It is believed that the cingulate gyrus is strongly associated with the perception of neuropathic pain and nociception.

Para hippocampal gyrus: The para hippocampal gyrus is more readily appreciated on the inferior surface of the temporal lobe of the cerebrum. It is located medial to the rhinal sulcus (an anterior continuation of the collateral sulcus) and the lateral occipitotemporal gyrus, lateral to the uncus, geniculate bodies and pulvinar of the thalamus and anterior to the medial occipitotemporal gyrus. The area corresponds with several Brodmann areas such as the entorhinal cortex (area 27, 28), and areas 35, 36, 48 and 49. The para hippocampal gyrus provides a path of communication between the hippocampus and all cortical association areas through which afferent impulses enter the hippocampus.

Orbitofrontal cortex: The inferior surface of the frontal lobe rests on the roof of the orbit in the anterior cranial fossa. This region of the cerebrum is therefore known as the orbitofrontal cortex. The olfactory bulb and tract can be found running along the olfactory sulcus. The olfactory sulcus separates the straight gyrus of the orbitofrontal cortex from the medial orbital gyrus. The orbitofrontal cortex perceives smell, which can also be involved in the formation of memories.

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Amygdala characteristics: The almond-shaped amygdala (amygdaloid body) is located anterosuperior to the temporal (inferior) horn of the lateral ventricle, inferior to the lentiform nucleus (putamen and globus pallidus interna and externa) and deep to the uncus. The apex of the tail of the caudate nucleus fuses and the amygdala merge in the roof of the temporal horn of the lateral ventricle.

The amygdala can be subdivided into a large ventrolateral component and a smaller dorsomedial division. The ventrolateral group has central and basolateral nuclei that link the corticomедial nuclei of the dorsomedial division to the entorhinal cortex. The corticomедial nuclei receive sensory input from the olfactory bulb. From the posterior aspect of the amygdala, the stria terminalis emerges and pursues a concave pathway. It extends posteriorly along the ventral surfaces of the basal ganglia and thalamus. Subsequently, the stria terminalis travels superiorly in a posterior relation to the thalamus. Finally, it travels anteriorly along the dorsal or ventricular surface of the thalamus, between the thalamus and the caudate nucleus and rostral to the thalamus triate veins. These fibres allow communication between the amygdala and regions of the hypothalamus to regulate the fear and anxiety responses.

Uncus: The uncus is the home of the amygdala. It is located on the inferior surface of the cerebrum, posteromedial to the temporal lobe, lateral to the posterior perforated substance and mammillary bodies, anterior to the lateral geniculate body and anterolateral to the mesencephalic midbrain. In gross specimen, the uncus appears to be an anteromedial extension of the para hippocampal gyrus.

There are three major components of the uncus. Posteriorly there is an intra limbic gyrus; anteriorly there is the uncinate gyrus and the tail of the dentate gyrus between them. The uncus is also related to two other gyri that are superficially related to the amygdala known as the gyrus semilunaris and the gyrus ambiens. The former is located medially and continuous with the lateral olfactory stria; while the latter is located laterally and is continuous with the lateral olfactory gyrus (thin grey matter covering of the lateral olfactory stria).

Hippocampal formation: The hippocampal formation is an umbrella term used in reference to a specific cluster of structures. These structures are the hippocampus, dentate gyrus, Subicular complex and entorhinal cortex.

Hippocampus: The hippocampus is a bundle of grey matter, residing in the floor of the temporal horn of the lateral ventricle; that resembles a ram's

horn. Subsequently it has also been called cornu ammonis (after the ancient Egyptian deity, Ammon). Anteriorly, the cornu ammonis is wider than the posterior extension and is indented to resemble a paw.

This region of the hippocampus is called the pes hippocampus. As the hippocampus courses posteriorly, its ventricular surface forms a convexity before travelling superomedially to merge with the crus of the fornix.

Dentate gyrus: The dentate gyrus is a serrated grey matter structure that is found medial to the hippocampus and lateral to the para hippocampal gyrus as it travels along the floor of the temporal horn of the lateral ventricle. It extends anteriorly into the uncus and continues superomedially with the fimbria of the hippocampus (see below) and becomes the indusium griseum (a thin grey matter structure that covers the dorsal surface of the corpus callosum).

Subicular complex: In a coronal section, the cornu ammonis (CA) is subdivided into three regions, CA1 (adjacent to the subiculum), CA3 (proximal to the dentate gyrus and CA2 (between CA1 and CA3). The Subicular complex is a region of the hippocampus (best appreciated in coronal section) that is made up of (from superficial to deep) a Para subiculum, presubiculum, and a subiculum. This complex contains pyramidal neurons that project to the entorhinal cortex and other parts of the hippocampal formation. Histologically, the subiculum, which is adjacent to CA1, contains the apical dendrites of Subicular pyramidal cells and polymorphic cell layers. The distinguishing factor between the presubiculum and the subiculum is the significantly packed area of pyramidal cells.

Entorhinal complex: Finally, the entorhinal cortex (Brodmann 28) is made up of the anterior pole of the parahippocampal gyrus and the uncus and is preceded by the gyrus semilunaris. This cortex extends rostrocaudally from the anterior amygdala to parts of the hippocampal formation. It is a direct recipient of afferents stimulation from the olfactory bulb. The entorhinal cortex is histologically divided into six layers based on their cellularity.

Hypothalamus Location and functions: The hypothalamus is a diencephalic region in the third ventricle situated caudal to the hypothalamic sulcus and the thalamus. It is involved in sexual arousal, emotional response, endocrine regulation, sexual development, thermoregulation, regulation of satiety and hunger, and is also involved in osmoregulation. It not only feeds information into the limbic system, but it serves as its final output. The hippocamp hypothalamic fibres connect the hippocampus with the mammillary bodies via the fornix.

Fibers and nuclei: This pathway serves as the major output of the limbic system. There are also amygdala hypothalamic fibers that journey from the amygdaloid complex, travels caudal to the lentiform nucleus via the stria terminalis and enters the hypothalamus. There are several nuclei that make up the hypothalamus. The preoptic, dorsomedial, lateral, and ventromedial nuclei are examples of hypothalamic nuclei that are closely related to the limbic system. The preoptic nucleus regulates the secretion of gonadotropin releasing hormone (GnRH), which is important for sexual development. The lateral nucleus modulates the feeding impulse (lesions associated with this nucleus has been associated with anorexia nervosa), while the dorsomedial and ventromedial nuclei are involved in the regulation of satiety, fear and sexual activity. Destruction of these regions in lab rats has resulted in obesity.

Other components of the limbic system

Alveus: The alveus is a thin veil of white matter covering the hippocampus, deep to the ependymal layer. The nerve fibers traveling through the alveus from the cornu ammonis unite on the medial surface to form the fimbria of the hippocampus. The fimbria continues their journey superomedially and become the fimbria of the fornix as the hippocampus terminates and the fornix begins ventrally to the splenium of the corpus callosum.

It should be noted at this point where the crura of the fornix ascend posterior to the thalamus, they communicate with each other via the commissure of the fornix. The decussating fibers permit communication between the hippocampi of each side.

Habenular nucleus: The Habenular nucleus lies deep to the Habenular commissure that resides in the supra pincal space (above the pincal gland and recess). This nucleus communicates with the rest of the limbic system via the stria medullaris thalami (along the midline of the roof of the third ventricle).

In addition to connecting the Habenular nucleus to the hypothalamus, it also connects it to nuclei of the septum (septal area). The septum communicates superiorly with the septum pellucidum (separates the left and right lateral ventricles). It also contains dorsal, medial, caudal and ventral groups of nuclei inferior to the septum pellucidum.

The lateral septal nucleus (recipient of most afferent stimuli) is found in the ventral group, while the dorsal septal nucleus resides in the dorsal group. The nucleus of the diagonal band of Broca and the medial septal nucleus reside in the medial group and the triangular septal and fimbrial nuclei reside in the caudal group. The septum also communicates with the limbic system via the pre-commisural fornix (anterior fibers of the fornix).

Mammillary bodies: The mammillary bodies are a pair of rounded structures found inferior to the floor of the third ventricle. They are posterior to the pituitary gland and the tuber cinereum (floor of the hypothalamus) and anterior to the posterior perforated substance and interpeduncular fossa. The mammillary bodies communicate with the limbic system via the post commissural fornix (posterior fibers of the fornix) and by way of the mammillothalamic tract.

Circle of Papez: In 1937, James Papez made a proposition that there had to be reciprocating interactions between the cerebral cortex and the hypothalamus in order for emotional behaviour to be consciously perceived. This proposal laid the framework for what is termed the circle of Papez. This circuit involves communications between the entorhinal area, cingulate gyrus, mammillary nucleus, hippocampal formation and anterior thalamic nucleus.

The perforant and alvear tracts provide a pathway between the entorhinal cortex and the hippocampal formation. By way of the fornix and fimbria, the hippocampal formation can then transmit information to the mammillary bodies. Subsequently, the mammillary bodies communicate with the anterior thalamic nucleus through the mammillothalamic tract. The internal capsule then takes information from the thalamus to the cingulate gyrus, which then returns impulses to the entorhinal area via the cingulum. The afferent and efferent information travelling to and from the limbic system originate in cortical, reticular and diencephalic regions of the brain.

Clinical notes
Amygdala lesions
The amygdala has been implicated in moderating emotion and behavior. While the term colloquially refers to how an individual “feels”, neuroscientists define the word as any brain function driven by the desire to survive. Therefore, in the context of limbic function, emotion does not refer to “happiness” or “sadness”, but rather drinking when thirsty or a response to a potential mate. While memory remains intact following lesions or trauma to the amygdaloid complex, individuals may demonstrate increased sex drive and hunger and a decrease in aggression.
Anterograde amnesia
Medical literature supports the notion that the hippocampus has the responsibility of transforming short-term memories into long-term memories. Therefore, insult to the hippocampus would impair this process, resulting in anterograde amnesia. As a result, the patient would recall past events prior to the insult, but not new memories after the injury has occurred.
Antagonists
Research has suggested that pharmacologically antagonizing (blocking) dopamine receptors of the limbic system mitigates the severe symptoms of schizophrenia. Unfortunately, most pharmacological agents also antagonize dopamine receptors

outside the limbic system, resulting in deleterious events.

References

1. Gail W Stuart. A text book of principles and practices of psychiatry nursing, 8th edition. published by Elsevier India private limited, 2007, 23-32.
2. Marry Ann Boyd. A text book of psychiatric nursing”, 4th edition. published by Wolters Kluwer, 2008, 22-26.
3. Mary C. Townsend” a text book of Psychiatry nursing, 5th edition, published by Jaypee Publishers, 34-36.
4. Carol Sheena *et al.* Text book of Advanced practice in psychiatric mental health nursing, 1st edition, MCS by publications, 1999, 468-478.
5. Maya Gurge. Text book of “Mental health & Psychiatric nursing”, 1st edition, ACTBS publications, New Delhi, 2003, 212-218.
6. Ross and Wilson text book of anatomy and physiology” 10th edition, evolve publications, London, 156-178.
7. Elmquist JK, *et al.* 'Leptin Activates Distinct Projections from the Dorsomedial and Ventromedial Hypothalamic Nuclei'. Proceedings of the National Academy of Sciences. 1998;95(2):741-746.
8. Hamani, Clement *et al.*: 'The Subcallosal Cingulate Gyrus in the Context of Major Depression'. Biological Psychiatry. 2011-2015 July;69.4:301-308
9. Kiernan JA, Murray Llewellyn Barr, Nagalingam Rajakumar: Barr's the Human Nervous System. 10th ed. Philadelphia, PA: Wolters Kluwer Health/Lippincott Williams & Wilkins. Print.
10. Singh, Inderbir. Textbook of Human Neuroanatomy. 7th ed. New Delhi: Jaypee Brothers, 2006.

Chapter - 3
Brain Structure

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Chapter - 3

Brain Structure

Syed Sumiya

Abstract

The brain is the most complex part of the human body. This three-pound organ is the seat of intelligence, interpreter of the senses, initiator of body movement and controller of behavior. Lying in its bony shell and washed by protective fluid, the brain is the source of all the qualities that define our humanity. The brain is the crown jewel of the human body.

Keywords: Behavior, cerebrum, cerebellum, brainstem

Introduction

The brain is an amazing three-pound organ that controls all functions of the body, interprets information from the outside world and embodies the essence of the mind and soul. Intelligence, creativity, emotion and memory are a few of the many things governed by the brain. Protected within the skull, the brain is composed of the cerebrum, cerebellum and brainstem.

The brain receives information through our five senses: sight, smell, touch, taste and hearing—often many at one time. It assembles the messages in a way that has meaning for us, and can store that information in our memory. The brain controls our thoughts, memory and speech, movement of the arms and legs and the function of many organs within our body.

The central nervous system (CNS) is composed of the brain and spinal cord. The peripheral nervous system (PNS) is composed of spinal nerves that branch from the spinal cord and cranial nerves that branch from the brain.

Definition

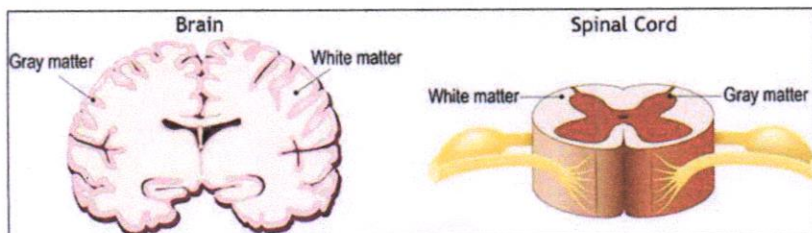
The brain is a complex organ that controls thought, memory, emotion, touch, motor skills, vision, breathing, temperature, hunger and every process that regulates our body. Together, the brain and spinal cord that extends from it make up the central nervous system, or CNS.

Components of brain

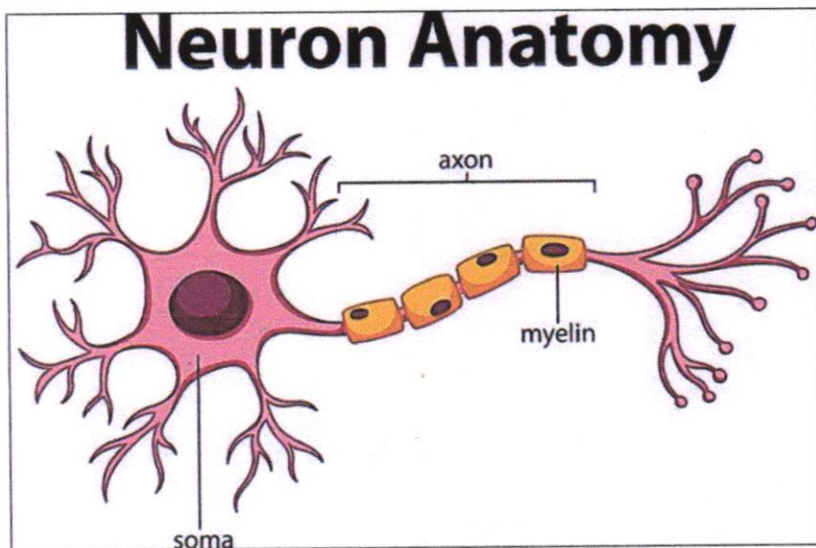
Weighing about 3 pounds in the average adult, the brain is about 60% fat. The remaining 40% is a combination of water, protein, carbohydrates and salts. The brain itself is not a muscle. It contains blood vessels and nerves, including neurons and glial cells.

The gray matter and white matter

Gray and white matter are two different regions of the central nervous system. In the brain, gray matter refers to the darker, outer portion, while white matter describes the lighter, inner section underneath. In the spinal cord, this order is reversed: The white matter is on the outside, and the gray matter sits within.



Gray matter is primarily composed of neuron somas (the round central cell bodies) and white matter is mostly made of axons (the long stems that connects neurons together) wrapped in myelin (a protective coating). The different composition of neuron parts is why the two appear as separate shades on certain scans.



Each region serves a different role. Gray matter is primarily responsible for processing and interpreting information, while white matter transmits that information to other parts of the nervous system.

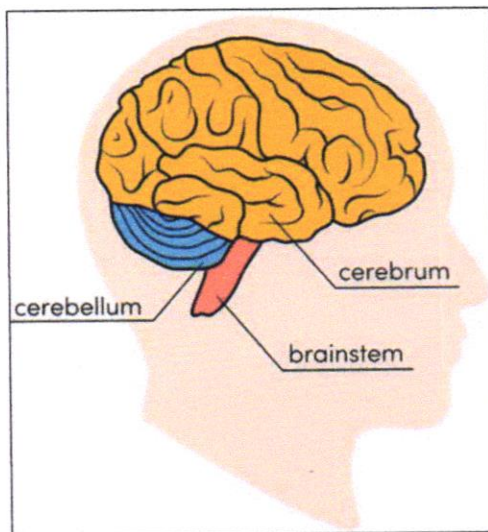
How does the brain work?

The brain sends and receives chemical and electrical signals throughout the body. Different signals control different processes and our brain interprets each. Some make us feel tired, for example, while others make us feel pain.

Some messages are kept within the brain, while others are relayed through the spine and across the body's vast network of nerves to distant extremities. To do this, the central nervous system relies on billions of neurons (nerve cells).

Main parts of the brain and their functions

At a high level, the brain can be divided into the cerebrum, brainstem and cerebellum.



Cerebrum

The cerebrum (front of brain) comprises gray matter (the cerebral cortex) and white matter at its center. The largest part of the brain, the cerebrum initiates and coordinates movement and regulates temperature. Other areas of the cerebrum enable speech, judgment, thinking and reasoning, problem-solving, emotions and learning. Other functions relate to vision, hearing, touch and other senses.

Cerebral cortex

Cortex is Latin for “bark,” and describes the outer gray matter covering of the cerebrum. The cortex has a large surface area due to its folds, and comprises about half of the brain’s weight.

The cerebral cortex is divided into two halves, or hemispheres. It is covered with ridges (gyri) and folds (sulci). The two halves join at a large, deep sulcus (the interhemispheric fissure, AKA the medial longitudinal fissure) that runs from the front of the head to the back. The right hemisphere controls the left side of the body, and the left half controls the right side of the body. The two halves communicate with one another through a large, C-shaped structure of white matter and nerve pathways called the corpus callosum. The corpus callosum is in the center of the cerebrum.

Brainstem

The brainstem (middle of brain) connects the cerebrum with the spinal cord. The brainstem includes the midbrain, the pons and the medulla.

- **Midbrain:** The midbrain (or mesencephalon) is a very complex structure with a range of different neuron clusters (nuclei and colliculi), neural pathways and other structures. These features facilitate various functions, from hearing and movement to calculating responses and environmental changes. The midbrain also contains the substantia nigra, an area affected by Parkinson’s disease that is rich in dopamine neurons and part of the basal ganglia, which enables movement and coordination.
- **Pons:** The pons is the origin for four of the 12 cranial nerves, which enable a range of activities such as tear production, chewing, blinking, focusing vision, balance, hearing and facial expression. Named for the Latin word for “bridge”, the pons is the connection between the midbrain and the medulla.
- **Medulla:** At the bottom of the brainstem, the medulla is where the brain meets the spinal cord. The medulla is essential to survival. Functions of the medulla regulate many bodily activities, including heart rhythm, breathing, blood flow and oxygen and carbon dioxide levels. The medulla produces reflexive activities such as sneezing, vomiting, coughing and swallowing.

The spinal cord extends from the bottom of the medulla and through a large opening in the bottom of the skull. Supported by the vertebrae, the spinal cord carries messages to and from the brain and the rest of the body.

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Cerebellum

The cerebellum ("little brain") is a fist-sized portion of the brain located at the back of the head, below the temporal and occipital lobes and above the brainstem. Like the cerebral cortex, it has two hemispheres. The outer portion contains neurons, and the inner area communicates with the cerebral cortex. Its function is to coordinate voluntary muscle movements and to maintain posture, balance and equilibrium. New studies are exploring the cerebellum's roles in thought, emotions and social behavior, as well as its possible involvement in addiction, autism and schizophrenia.

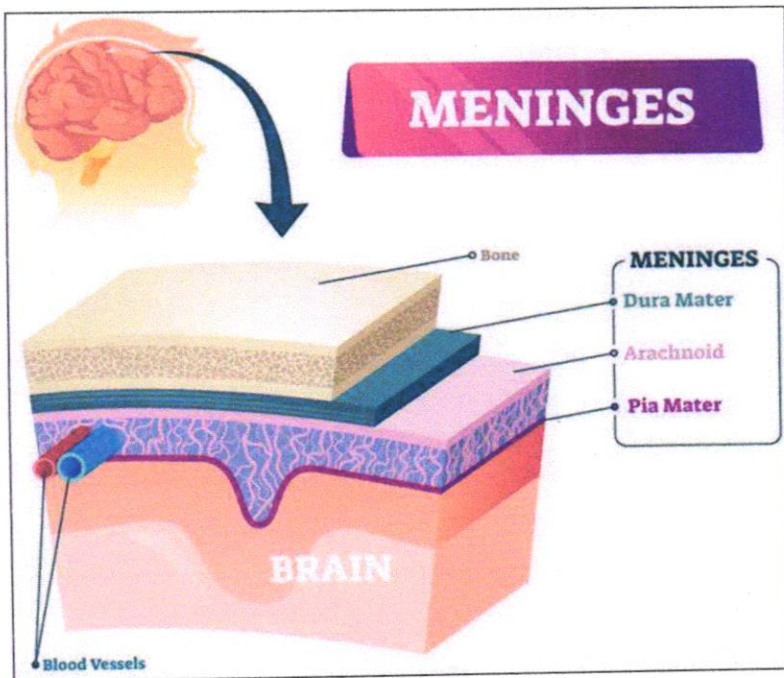
Brain Coverings: Meninges

Three layers of protective covering called meninges surround the brain and the spinal cord.

- The outermost layer, the dura mater, is thick and tough. It includes two layers: The periosteal layer of the dura mater lines the inner dome of the skull (cranium) and the meningeal layer is below that. Spaces between the layers allow for the passage of veins and arteries that supply blood flow to the brain.
- The arachnoid mater is a thin, web like layer of connective tissue that does not contain nerves or blood vessels. Below the arachnoid mater is the cerebrospinal fluid, or CSF. This fluid cushions the entire central nervous system (brain and spinal cord) and continually circulates around these structures to remove impurities.
- The pia mater is a thin membrane that hugs the surface of the brain and follows its contours. The pia mater is rich with veins and arteries.

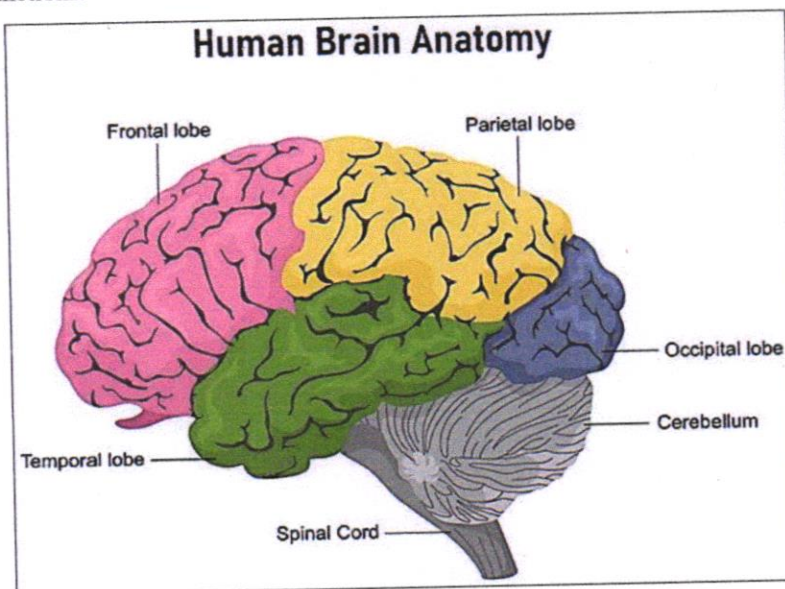
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Lobes of the brain and what they control

Each brain hemisphere (parts of the cerebrum) has four sections, called lobes: frontal, parietal, temporal and occipital. Each lobe controls specific functions.



- **Frontal lobe:** The largest lobe of the brain, located in the front of the head, the frontal lobe is involved in personality characteristics, decision-making and movement. Recognition of smell usually involves parts of the frontal lobe. The frontal lobe contains Broca's area, which is associated with speech ability.
- **Parietal lobe:** The middle part of the brain, the parietal lobe helps a person identify objects and understand spatial relationships (where one's body is compared with objects around the person). The parietal lobe is also involved in interpreting pain and touch in the body. The parietal lobe houses Wernicke's area, which helps the brain understand spoken language.
- **Occipital lobe:** The occipital lobe is the back part of the brain that is involved with vision.
- **Temporal lobe:** The sides of the brain, temporal lobes are involved in short-term memory, speech, musical rhythm and some degree of smell recognition.

Deeper Structures within the Brain

Pituitary gland

Sometimes called the "master gland," the pituitary gland is a pea-sized structure found deep in the brain behind the bridge of the nose. The pituitary gland governs the function of other glands in the body, regulating the flow of hormones from the thyroid, adrenals, ovaries and testicles. It receives chemical signals from the hypothalamus through its stalk and blood supply.

Hypothalamus

The hypothalamus is located above the pituitary gland and sends it chemical messages that control its function. It regulates body temperature, synchronizes sleep patterns, controls hunger and thirst and also plays a role in some aspects of memory and emotion.

Amygdala

Small, almond-shaped structures, an amygdala is located under each half (hemisphere) of the brain. Included in the limbic system, the amygdalae regulate emotion and memory and are associated with the brain's reward system, stress and the "fight or flight" response when someone perceives a threat.

Hippocampus

A curved seahorse-shaped organ on the underside of each temporal lobe, the hippocampus is part of a larger structure called the hippocampal

formation. It supports memory, learning, navigation and perception of space. It receives information from the cerebral cortex and may play a role in Alzheimer's disease.

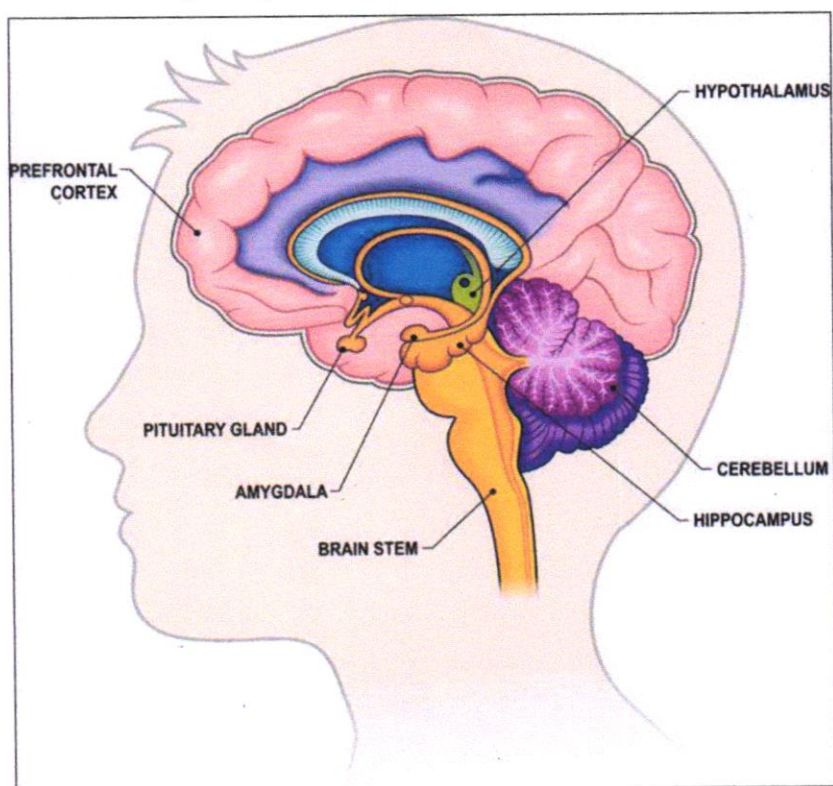
Pineal gland

The pineal gland is located deep in the brain and attached by a stalk to the top of the third ventricle. The pineal gland responds to light and dark and secretes melatonin, which regulates circadian rhythms and the sleep-wake cycle.

Ventricles and Cerebrospinal fluid

Deep in the brain are four open areas with passageways between them. They also open into the central spinal canal and the area beneath arachnoid layer of the meninges.

The ventricles manufacture cerebrospinal fluid, or CSF, a watery fluid that circulates in and around the ventricles and the spinal cord, and between the meninges. CSF surrounds and cushions the spinal cord and brain, washes out waste and impurities, and delivers nutrients.



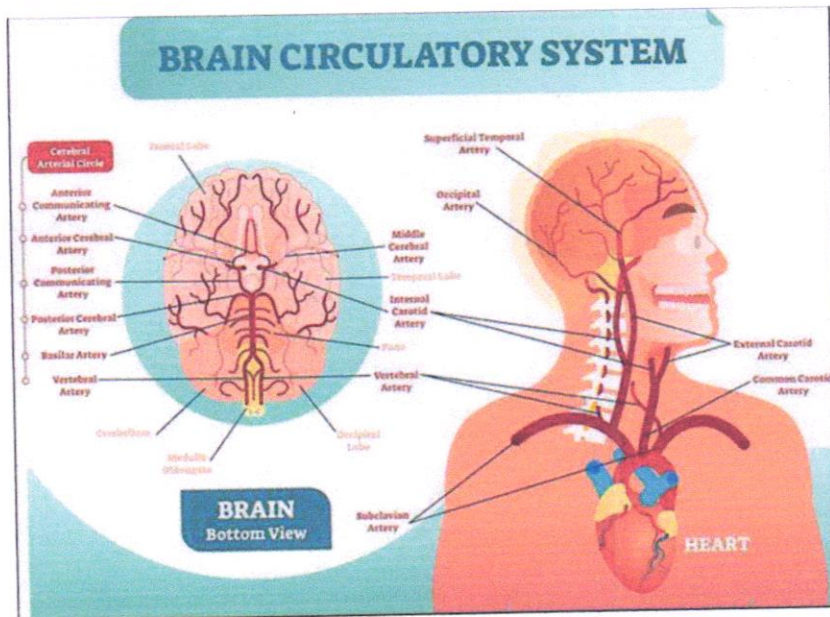
Blood supply to the brain

Two sets of blood vessels supply blood and oxygen to the brain: the vertebral arteries and the carotid arteries.

The external carotid arteries extend up the sides of your neck, and are where you can feel your pulse when you touch the area with your fingertips. The internal carotid arteries branch into the skull and circulate blood to the front part of the brain.

The vertebral arteries follow the spinal column into the skull, where they join together at the brainstem and form the basilar artery, which supplies blood to the rear portions of the brain.

The circle of Willis, a loop of blood vessels near the bottom of the brain that connects major arteries, circulates blood from the front of the brain to the back and helps the arterial systems communicate with one another.



Cranial nerves

Inside the cranium (the dome of the skull), there are 12 nerves, called cranial nerves:

- **Cranial nerve 1:** The first is the olfactory nerve, which allows for your sense of smell.
- **Cranial nerve 2:** The optic nerve governs eyesight.

- **Cranial nerve 3:** The oculomotor nerve controls pupil response and other motions of the eye, and branches out from the area in the brainstem where the midbrain meets the pons.
- **Cranial nerve 4:** The trochlear nerve controls muscles in the eye. It emerges from the back of the midbrain part of the brainstem.
- **Cranial nerve 5:** The trigeminal nerve is the largest and most complex of the cranial nerves, with both sensory and motor function. It originates from the pons and conveys sensation from the scalp, teeth, jaw, sinuses, parts of the mouth and face to the brain, allows the function of chewing muscles, and much more.
- **Cranial nerve 6:** The abducens nerve innervates some of the muscles in the eye.
- **Cranial nerve 7:** The facial nerve supports face movement, taste, glandular and other functions.
- **Cranial nerve 8:** The vestibulocochlear nerve facilitates balance and hearing.
- **Cranial nerve 9:** The glossopharyngeal nerve allows taste, ear and throat movement, and has many more functions.
- **Cranial nerve 10:** The vagus nerve allows sensation around the ear and the digestive system and controls motor activity in the heart, throat and digestive system.
- **Cranial nerve 11:** The accessory nerve innervates specific muscles in the head, neck and shoulder.
- **Cranial nerve 12:** The hypoglossal nerve supplies motor activity to the tongue.

The first two nerves originate in the cerebrum, and the remaining 10 cranial nerves emerge from the brainstem, which has three parts: the midbrain, the pons and the medulla.

References

1. "Encephalo-Etymology". Online Etymology Dictionary. Archived from the original on, 2017 Oct. Retrieved October 24, 2015.
2. Parent A, Carpenter MB. "Ch. 1". Carpenter's Human Neuroanatomy. Williams & Wilkins, 1995. ISBN 978-0-683-06752-1.
3. Jump up to:^a Bigos KL, Hariri A, Weinberger D. Neuroimaging Genetics: Principles and Practices. Oxford University Press, 2015, 157. ISBN 978-0-19-992022-8.

4. Cosgrove KP, Mazure CM, Staley JK. Evolving knowledge of sex differences in brain structure, function and chemistry. *Biol Psychiatry*. 2007;62(8):847-855. Doi: 10.1016/j.biopsych.2007.03.001. PMC 2711771. PMID 17544382.
5. Molina D, Kimberley, Di Maio, Vincent JM. Normal Organ Weights in Men. *The American Journal of Forensic Medicine and Pathology*. 2012;33(4):368-372. Doi: 10.1097/PAF.0b013e31823d29ad. ISSN 0195-7910. PMID 22182984. S2CID 32174574.
6. Molina, Kimberley D, Di Maio, Vincent JM. Normal Organ Weights in Women. *The American Journal of Forensic Medicine and Pathology*. 2015;36(3):182-187. Doi: 10.1097/PAF.0000000000000175. ISSN 0195-7910. PMID 26108038. S2CID 25319215.
7. *Anatomy and physiology in health and illness* by Ross and Wilson tenth edition, 2008.
8. *Textbook of anatomy and physiology for nurses* by Jaypee and Ashalatha PR by Jaypee brother's medical publisher third edition, 2011.
9. Brainfacts.org
10. Thebrain.mcgill.ca

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First Edition

NURSING CASE STUDY

(Practical Manual)



**Usha Rani Kandula
Bagyavathi Battini
Anjani Devi Nelavala
Reeta Murugesan
Siresha Inapagolla**



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Chapter - 1
Nursing Care Bundle on Tracheostomy

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Chapter - 1

Nursing Care Bundle on Tracheostomy

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Abstract

Tracheostomy is an opening made by a surgical incision into the anterior wall of the trachea to make an exterior opening or stoma. This method is called as tracheostomy. A tracheostomy tube is inserted at the time of surgery to maintain patent airway. The aim of tracheostomy is to by-pass obstruction in the upper airway, to aid prolonged and assisted ventilations and to facilitate the removal of respiratory secretion. Tracheostomy can be a transitory solution or a long-term measure caring for a patient with tracheostomy requires the nurse to have a thorough understanding of airway management and maintain an ongoing assessment of the patient respiratory function. Critical situations would require instantaneous interventions to ensure that respiratory arrest is avoided. Nurses play an important role in providing active tracheostomy care. Better tracheostomy administration has a major impact on the patients general, welfare and quality of life. It is therefore important that nurses are equipped with appropriate skills and knowledge to care for patient's safety and competency and to avert possible complications. Inadequate knowledge and practice may lead to nosocomial infections, prolonged hospitalization airway complications and even death. The set of practice guidelines will augment existing knowledge for health care providers to carry out consistent practice in the care of a patient with tracheotomy. The nursing care should include oxygen treatment & humidification, inner cannula suctioning, Tracheotomy dressing/Tapes & safeguarding the tracheotomy, cuff check, oral care & assessment of swallowing, Recording, safety, Communication, weaning and decannulation.

Keywords: Tracheostomy, airway obstruction, mechanical ventilation, pulmonary aspiration, nursing care, general anesthesia

Introduction

Tracheostomy is creating and opening in the neck in order to place a tube into a person's windpipe.

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Purposes

Conditions that may require a tracheostomy include

- Anaphylaxis
- Birth defects of airway
- Cancer in the neck
- Coma
- Chronic Lung disease.
- Obstructive sleep apnea.
- Paralysis
- Tumors
- Infection
- Vocal cord Paralysis
- Sever neck or mouth injuries

Preparations for tracheostomy

- Before the tracheostomy, the patient should be fasting for 12 hours.
- Explain the procedure to the patient as well as the family members.
- Prepare the patient for anesthesia.
- Clean the area before tracheostomy.

Performance of tracheostomy

Foremost of the tracheostomies, general anesthesia will be given. This helps the patient to fall asleep and won't feel any kind of pain; in case of any emergencies the patient will be given local anesthesia for tracheostomy. The surgeons will make a cut into the neck just below Adam's apple in case of male. The cut will go through the cartilaginous rings of the outer wall of trachea also known as windpipe. The hole is then widely opened to fit a tracheostomy tube. The doctor hook up the tube to a Ventilator.

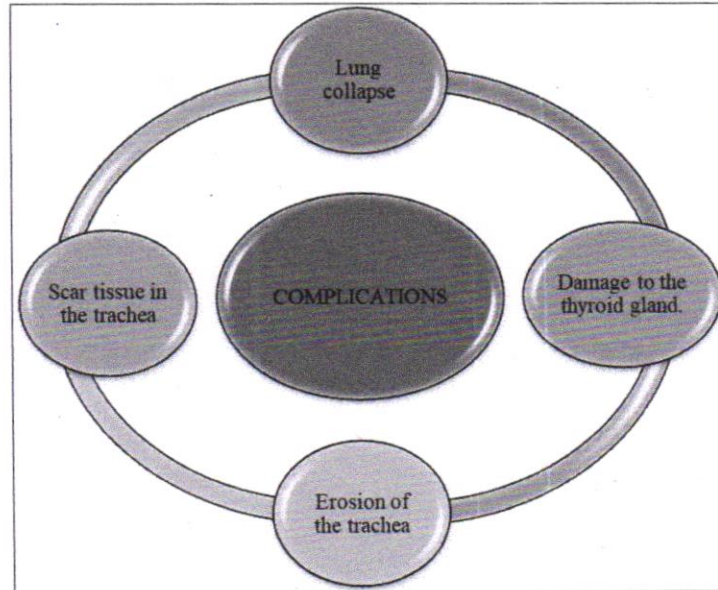
Adaptation to a tracheostomy tube

It usually takes one to three days to adjust to breathing through a tracheostomy tube. Talking and making sounds can be difficult because the air which breath is no longer passes through voice box. Special valves can be attached to the tracheostomy tube these valves allows air to exit the mouth and nose, permitting speech.

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Complications



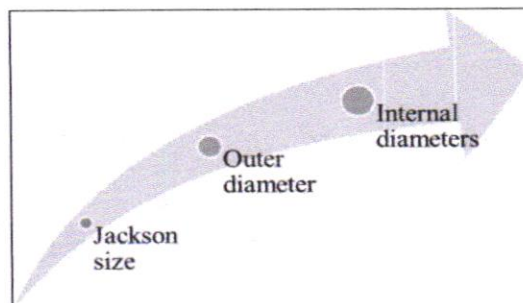
- Lung collapse
- Scar tissue in the trachea.
- Erosion of the trachea.
- Damage to the thyroid gland.

Tracheostomy tube

Tracheostomy tube differs in rigidity, Internal/ external diameter and cuff design. The tubes can be

- Metal stainless, steel tubes, which is very rigid and flexible
- Plastic and silicone tube, these are soft and flexible

Sizing



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- Internal diameters
- Outer diameter
- Jackson size

Parts of tracheostomy tube

The parts of tracheostomy include

Outer cannula: These are the main shaft of the tube.

Inner cannula: These are the disposable or non-disposable.

It can be removed for the periodic cleaning to prevent airway obstruction.

Obturator: These are the smooth, round tip device inside the tracheostomy tube.

Trach tube flange: It stabilizes the tube in the trachea and provides holes for securing the tube for the neck with a trach tie or holder.

Tracheostomy tube types

The tracheostomy tube has been divided into three types;

- Cuffed
- Un cuffed
- Fenestrated

Cuffed tracheostomy tube

The tube may be plastic or Silicone or disposable-A cuff is a balloon-like device around of distend end of the tube. The cuff can be inflated with air to create a tight fit.

To minimize the risk of tracheal leisure damage, low pressure, low volume is used. Some of the cuffs are made up of foam and inflate when pilot line is opened to room all.

Cufflers tracheostomy tube

These tube are made up of plastic, silicone or metal. These allow the air to flow freely.

Fenestrated tracheostomy tube

Some of the tube has simple or multiple fenestrations on the superior curvature of the shaft. Fenestration permits air flow; fenestrated tube is divided into two type: Cuffed and uncuffed.

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Cuffed fenestrated Tube are used in patients who are being weaned of their tracheostomy.

Uncuffed fenestrated Tube are used in patient who no longer dependent on a cuffed tube.

Nursing care bundle on tracheostomy

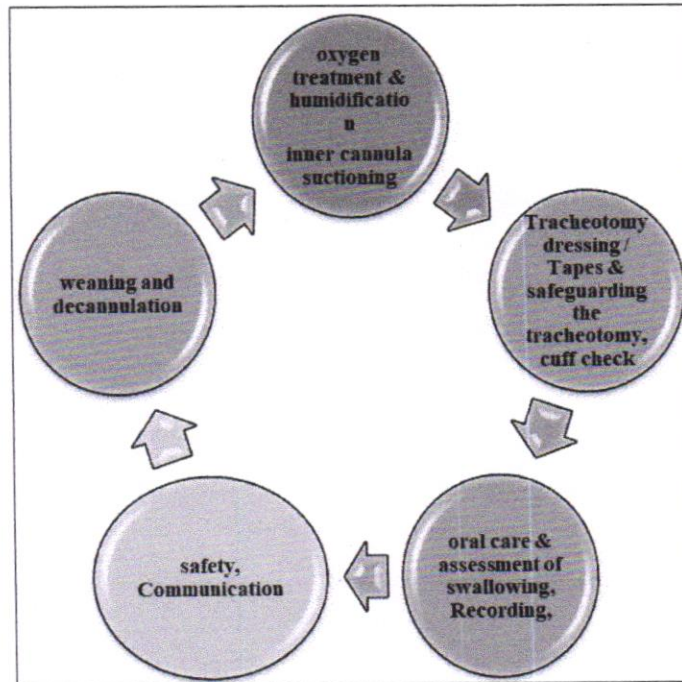
- 1) This nursing care should include oxygen treatment & humidification, inner cannula suctioning, Tracheotomy dressing/Tapes & safeguarding the tracheotomy, cuff check, oral care & assessment of swallowing, safety, Communication, weaning, decannulation and Recording& Documentation.

Components

- 1) Oxygen treatment and humidification
- 2) Inner cannula
- 3) Suctioning
- 4) Tracheostomy dressing/tapes and safeguarding the tracheostomy
- 5) Cuff check
- 6) Oral care & assessment of swallowing
- 7) Safety
- 8) Communications and weaning plan
- 9) Decannulation
- 10) Recording& Documentation

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1. Oxygen treatment and humidification

Patients with a tracheostomy usually comprise the administration of oxygen passed through high humidity device there are two main ways. To administer oxygen to patients they are low flow delivered at less than 10 liters/minute (LPM) and high flow delivered at greater than 10 LPM.

Tracheostomy humidification: The mouth and nose provide warmth, moisture and filtrations for the air. The patients with tracheostomy must be provided humidification to keep secretions thin and to avoid mucus plugs. The use of heat and moisture exchange (HME) also known as artificial noses. They are passive humidifiers, they retain, heat and moisture from the expired air of the patient.

2. Inner cannula

Inner cannula is one of the parts of tracheostomy tube. The inner cannula sits inside the outer cannula it has lock to keep it from being coughed out and it is removed for cleaning. Not all tracheostomy tube has inner cannula.

The inner cannula reduces the diameter of the tracheal tube lumen, increasing resistance and work of breathing. If the tube becomes blocked the

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inner cannula can be easily removed and replaced. The inner cannula should be removed and inspected every 8 hours to reduce the risk of infection.

Cleaning the tracheostomy inner cannula tube

The tracheostomy inner cannula tube should be cleaned two to three times per day or more needed. Cleaning is needed more immediately after surgery.

Equipment's

- Small brush or cleaner.
- Half strength solution of hydrogen peroxide.
- Saline or sterile salt water.
- Two small bowl.

Procedure

- Wash your hands
- Place ½ strength peroxide solution in one of the bowl and sterile salt water in the other
- take away the inner cannula whereas holding the neck plate of trach still
- place the inner cannula in peroxide solution and soak until the crusts removed
- Use the brush to clean the inside, outside and inner of the tube.
- Do not use swing powder or brillo pads
- Inspect inside the inner cannula to make certain it is spotless and clear of mucus
- Rinse the tube in saline or sterile salt water
- Reinsert it whereas holding the neck plate of the trach unmoving
- Rotate the inner cannula up until it locks into position
- Double check
- The locking pulling forwarded gently on the inner cannula.

3. Suctioning

Suctioning is the procedure required to the intubated patient to remove secretion, which interferes with the oxygenation and ventilation. The indication for tracheal suctioning is coarse bronchi and crack less on auscultation and an inability to raise secretions.

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The suction regulation is turned on maintaining 100-200mmHg. The oxygen flow meter should be set at 15L for the 100% manual resuscitator bag. The sterile water should be used for cleaning suction tubing, sterile gloves and catheter are opened.

4. Tracheostomy dressing, tapes and safeguarding the tracheostomy

Sterile tracheostomy dressing permits the secretions from the stoma to be absorbed then to prevent pressure damage from the tracheostomy tube. The dressing must be changed after each cleaning procedure.

Regular dressing helps in the identification of the inflammatory process and skin excoriation. The dressing requires two peoples, one to secure the position of the device while the other performed dressing.

Equipments required

- Glove and apron
- Standard dressing packing
- Swabs
- Sterile 0.9% saline
- Tracheostomy dressing tray
- Tracheostomy tube fixation device

Procedure

- Explain the procedure to the patient
- Wash hands and wear plastic aprons
- Prepare dressing equipment's
- Apply gloves
- Remove the dressing and dispose of it
- Observe the stoma if any discharge, inflammation.

Response

- Remove the gloves, clean the hand with alcoholic gel and apply fresh gloves.
- Using sterile 0.9% saline, clean the stoma and the surrounding clean.
- Allow the area to dry, apply skin barriers film, if indicated, allow to dry.

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- The help of the nurse secure the tracheostomy; slide the dressing under each slange.
- Reapply the tube fixation device.
- Asses the patency of the air way.
- Ensure whether oxygen therapy is needed.
- Dispose of equipment's, wash hands.
- Documents the dressing, fixation device and other observations.

5. Tracheotomy dressing/tapes & safeguarding the tracheotomy

Sterile tracheostomy dressings allow cleaning the secretions from the stoma to be absorbed & prevent pressure damage from the tracheostomy. Regular dressing changes & skin inspection permit timely identification of inflammatory process & skin excoriation enabling prompt treatment to be instigated it must be changed after each cleaning procedure or when it becomes wet or soiled cleaning of the reusable inner cannula to the replacement of a disposable inner cannula, must be done 1 to 2 times a day or more often, depending on the recommendations.


Need of tracheostomy dressing

Maintain airway patency, prevent infection at the tracheostomy site facilitate healing & prevent skin excoriation around tracheostomy care promote comfort assess conditions of ostomy.

Equipment: Tracheotomy care kit containing mainly gallipots-3, sterile towel, sterile nylon brush/tube brush, sterile gauze squares, cotton ties or tracheostomy tie tapes. A clean tray containing hydrogen peroxide, normal saline, sterile glove pairs, face mask & eye shield, water proof pad.

Procedure

Nursing action	Rationale
• Evaluate condition of stoma (redness, swelling, character of secretions occurrence of purulence or bleeding.	Occurrence of any of these indicates infection & culture examination may be necessary.
• Inspect neck for subcutaneous emphysema showed by crepitus around the ostomy site.	Indicates air leak in to subcutaneous tissue.
• Explain procedure to the patient & teach means of communication such as eye blinking or raising a finger to indicate pain or distress.	Cooperation from patient.
• Assist patient to a fowlers position &	Promotes using expansion & prevents


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place waterproof pad on chest	soiling of linen prevents cross infection.
• Wash hands thoroughly	
• Assemble equipment open the sterile tracheostomy kit pour hydrogen peroxide & sterile normal saline in separate gallipots open other sterile supplies as needed including sterile applicators, care kit put on face mask & eye shield	Hydrogen peroxide & saline remove mucous & crust which promotes bacterial growth enhances performance phase of procedure & protects the nurses.
• Do sterile gloves keep sterile towel on patient chest	Maintain aseptic techniques.
• Unlock the inner cannula and remove it by yeasty pulling it out towards you in the line with its curvature place the inner cannula in the bowel with hydrogen peroxide suction.	Hydrogen peroxide moistens and loosens dried secretions.
• Remove the soiled tracheostomy dressing discard the dressing and gloves.	
• Clean the flange of the tube using sterile applicator or gauze moistened with hydrogen peroxide and then with normal saline use each applicator once only.	Using the applicator or gauze once only avoid contaminating a clean area with a soiled gauze.
Clean the stoma tube with gauze half strength hydrogen peroxide may be used	
• Wipe the stoma tube with the gauze half strength hydrogen peroxide may be used. Carefully rinse the cleaned area with gauze squares soaked with sterile normal saline.	Hydrogen peroxide help to loosen day crusted secretions hydrogen peroxide is irritating to the skin and inhibits healing if not removed thoroughly.
• Dry the stoma tube with dry sterile gauze an infected wound may be cleaned with gauze salt water with an antiseptic solution then dried a thin layer of antibiotic ointment may be put on to the stoma with a cotton swab.	May help to clear the wound infection.
• Cleaning the inner cannula remove the inner cannula soaking solution cleans the entire cannula thoroughly using the brush. Wash the cleaned cannula by soaking it with sterile normal saline.	Carefully rinsing is important to remove hydrogen peroxide from inner cannula. This eliminates solution adhering of the cannula.
• Replace the inner cannula and secure it in place insert the inner cannula by gasping the outer Lock the cannula in	This secure the plange of the inner cannula to the outer cannula.

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place by turning the cannula into the lock position.	
<ul style="list-style-type: none"> Apply sterile dressing open and refold a 4*4 gauze dressing in to a 'v' shape and place under the plange on the tracheostomy tube do not cut gauze pieces. Make sure that the tracheostomy tube is firmly supported while applying dressing. 	Avoid using cotton filled 4*4 gauze cotton or gauze fiber can be aspirated by the patient potentially creating tracheal abscess excessive movement of the tracheostomy tube irritate the trachea.
<ul style="list-style-type: none"> Change the tracheostomy ties leave the soiled tape in place until the new one is applied. Grasp the slit end of clean tape and pull it through opening on the side of the tracheostomy tube on the other side. Tie the tape at the side to side of neck in a square knot. 	Leaving tape in place ensure that tube will not be expelled if patient laugh or move. This action provide a secure attachment with that prevent irritation and aids in rotation of pressure size excessive tightness compress jugular vein decrease blood circulation to the skin and result discomfort for patient.

Apply the tie tape as follows

Thread one side of the tape into the upper half of the slot on one side. Bring both ends of the tape together and take them around the client neck keeping them flat and untensed. Ask the client to flex the neck if closest to the client neck from back to front through the tape before tying and tie it with a double square knot then cut off any long ends and the old tracheostomy tie and check for tautness of the tracheostomy site.

Document all relevant information in the chart of tracheostomy care carried out dressing changed and observation.

special Consideration

Tracheostomy dressing should be done every hourly or whenever dressing is soiled. Tracheostomy tubes may come with disposable inner cannula is present then replace the one that is inside with a new one if only single lumen is present then suction the tracheostomy tube and rinse the neck plate as well as tracheostomy site.

Nurses responsibility

Tracheostomy dressing should be done every 8 hourly or whenever dressing is soiled if disposable inner cannula is present then replace the one that is inside with new one. If only single lumen is present clean the neck plate and tracheostomy site emphasize the importance of hand washing before performing tracheostomy care proper way on how to remove, change and replace the inner cannula check and clean the tracheostomy stoma assess for symptoms of infection.

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6. Cuff check

The air you breathe will be much drier because it no longer passes through your moist nose & throat before reaching your lungs this can cause irritation, coughing & excess mucus coming out of the tracheotomy,

The cuff on an endotracheal or tracheotomy tube need be inflated if the patient needs mechanical ventilation or is at high risk for aspiration the pressure within the cuff should be the lowest possible pressure (20 to 25 mm hg) that allows delivery of the adequate tidal volumes & prevents pulmonary aspiration (Arden *et al.* 2014) the cuff pressure needs to be monitored by the respiratory therapist 'or' nurse at most every 8 hours by attaching a handheld pressure gauge to the pilot balloon of the tube or as a result of using the minimal leak volume or minimal occlusion volume technique.

Both cuffed & uncuffed tracheotomy tubes are available a tracheotomy tube with an inflated cuff is used if the patient is at risk of aspiration or needs mechanical ventilation because an inflated cuff exerts pressure on tracheal mucosa, it is impossible to inflate the cuff with the minimum volume of air required to obtain an air way seal.

Tracheostomy tubes types with characteristics

Tracheostomy tube with cuff Epilot Balloon: when properly inflated, low pressure, high volume cuff distributes cuff Pressure over large area, minimizing pressure on tracheal wall

Fenestrated tracheostomy tube with cuff inner cannula and decannulation plug

When inner cannula is detached cuff deflated then decannulation plug inserted air flows around tube through fenestration in outer cannula and up over vocal cords patient can then speak. Speaking tracheostomy tube with cuff two external

Tubing's: Tubing has two tubing's one leading to cuff then second to opening above the cuff as port is connected to air source, air flows out of opening and up over the vocal cords, permitting speech with cuff inflated.

Tracheotomy tube with foam filled cuff

Cuff is filled with plastic foam before insertion cuff is deflated after insertion cuff is allowed to fill passively with air pilot tubing is not capped and no cuff pressure monitoring is required.

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Procedure for cuff inflation

Mechanically ventilated patient: inflate the cuff to minimal occlusion pressure by gently injecting air into the cuff until no leak (sound) is heard at highest inspiratory pressure (end of ventilator inspiration) when a stethoscope is placed over trachea use cuff pressure monitor to determine cuff inflation pressure. An alternative approach, teamed minimal leak technique (MLT) involves inflating the cuff to minimal occlusion pressure and then with drawing 0.1 ml of air.

Spontaneously breathing patient: inflate cuff to least occlusion pressure by gradually injecting air into the cuff until no sound is heard later deep breath or during inhalation with manual resuscitation bag if using MLT, remove 0.1 ml of air while maintaining seal. MLT should not be used if there is risk for aspiration.

Immediately after cuff inflation: Verify pressure is within accepted range ($<20\text{mm Hg}$ or $\geq 25\text{cm H}_2\text{O}$) with a manometer. Record cuff pressure and volume of air used for cuff inflation in chart.

Care of patient with an inflated cuff

Monitor and record cuff pressure, cuff pressure should be $\leq 20\text{mm Hg}$ or $\leq 25\text{cm H}_2\text{O}$ to allow adequate tracheal capillary perfusion, if needed remove. Or add air to the pilot tubing by means of a syringe and stopcock. Afterward verify cuff pressure within established range with manometer.

Keep the cuff inflated or need to use progressively larger volumes of air to keep cuff inflated potential causes include tracheal dilation at the cuff site or a crack or gradual leak in the housing of the one-way inflation valve. If the leak is anticipated from tracheal dilation, the physician may perhaps intubate the patient with a larger tube. Crack inside the inflation valve may perhaps be temporarily managed by clamping the small-bore tubing with a hemostat. The tube should be changed with 24hr.

Assess risk of aspiration before removing inner cannula. Deflate cuff. Note coughing. Have patient swallow a small amount of clear liquid (grape juice) or 30ml of water with a few drops of blue food coloring observe the secretions after patient coughs or when suctioned for presence of colored secretions. If no aspiration is shown a fenestrated tube can be used.

Never: Insert decannulation plug in to tracheostomy tube wait for cuff is deflated and. Inner cannula removed, prior insertion will prevent from breathing (no air inflow). This may precipitate a respiratory arrest. Evaluate for signs of respiratory distress once a fenestrated cannula is first utilized in

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this case, the cup should be removed. The inner cannula replaced and the cuff inflated. One tube is inserted. Wait two days earlier use so that the stoma will close around the tube and prevent leaks.

The minute patient desires to speak, connect port to compress air (or oxygen) Be certain to identify correct tubing. If gas enters the cuff, it will over inflate and rupture requiring an emergency tube change use lowest flow (typically 4-6 L/min) that results in speech. High flows dehydrate mucosa.

Cover port adapter, thus will cause the air to flow upward. Inform patient to tell short sentences because voice becomes a whisper with long sentences.

Detach flow when patient does not want to speak to avoid mucosal dehydration.

Before insertion withdraw all air from the cuff using a 20 ml syringe (apillot balloon tubing to prevent reentry of air. After tracheostomy is inserted, remove cap from the pilot tubing flow cuff to passively re inflate. Do not inject air in to tubing's or cap apillot balloon tubing while in patient. Air will flow in and out in response to tubing alerting staff not to cap or inflate cuff. Deflate cuff day to day via pilot balloon to assess integrity of cuff. Also assess ability to easily deflate cuff. Struggle deflating cuff shows a need for tube change if aspirate return with air the cuff is no longer intact. Tube can be used for up to 1 no in patients on home mechanical ventilation. Good choice for patients who need inflated cuff at home from the time when teaching about cuff pressure is simplified.

7. Oral care & Assessment of the swallowing for tracheostomy patients

The majority of patients with a tracheostomy will be Nil by mouth & regular mouth care is essential in preventing problems such as mouth ulcers & oral thrush. Poor oral hygiene is also associated with VAP & daily use of 0.12% chlorhexidine gluconate mouth wash or gel is recommended (conley *et al*, 2013). If the patient eat's by mouth, it is recommended that the tracheostomy tube be suctioned prior to eating, this often prevents the Need for suctioning during or after. Meals which may stimulate excessive coughing & could resulting in vomiting, encouraging & fluid intake is helpful for a patient with a tracheostomy.

Most people with a new tracheostomy will have a Nasogastric tube or similar feeding route & regimen established. The cuff of the tracheostomy 'or' the tube itself interferes with the swallowing mechanics of the larynx. These muscles can waste it not used (during prolonged ventilation or

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immobility) & require care full rehabilitation & assess the speech & language therapist (SAIT) is an essential member of the multi-disciplinary team. The cuff pressing on the esophagus behind the trachea, offering, a physical obstruction to swallowing. The tracheostomy tube tethers the anterior structures of the neck & limits the amount of movement the larynx & upper air way's that is required for normal safe swallowing.

The nurses has to frame Nursing action with rationale

To maintain the healthy state of teeth gums and lips. To clean the mouth of food particles, plaque and bacteria. To relieve discomfort resulting from unpleasant odors and taste. Artery forceps, Thumb forceps, A clean tray containing Small mackintosh with towel, antiseptic solution: sodium chloride, ethynol, diluted solution of potassium permanganate, emollient if Needed: liquid paraffin coconut oil glycerin and Vaseline, Tongue depressor and suction apparatus if needed, sterile gloves and mask.

Nursing Procedure: for tracheostomy conscious patient

Nursing Action	Rationale
Describe the procedure to the patient then encourage him/her to participate.	Reduce anxiety and promote patient participation.
Provide privacy.	To Mountain dignity of the patient.
Wash hands and done gloves.	To Prevent cross infection.
Position or ask the patient in high fowlers/semi fowlers position.	To Prevent aspiration.

Preparation of equipment

The equipment's required for both conscious and unconscious tracheotomy patients are, for a conscious patient:-

A clean tray containing face towel, glass with water, soft brushed tooth brush, tooth paste or tooth powder or mouthwash solution (according to the patient preference) (solution Includes: Sodium-chloride, thymol, diluted solution of potassium permanganate and chlorhexidine), cotton applicators 'or' cotton balls, emollient in a container glycerin, liquid paraffin Vaseline, coconut oil, small mackintosh with towel, clean gloves.

For unconscious patient

A sterile mouth care bay containing

Place the small mackintosh	Prevent soiling of linen
With the ace towel on the chest Place kidney tray close to the patient chin	Prevent soling of linen

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Wash the brush by pouring small amount of water into the basin apply tooth paste to the brush. Hold the brush over the k-brush and pour small amount of water over tooth paste.	Moisture ads in distribution of tooth paste over tooth surface.
Instruct-the patient to had tooth-brushing at 45 degree to gum line. Brush inner and outer surface of upper and lower teeth by brushing gum to clean of each tooth.	Angle permit brush to touch all tooth surfaces and to clean under gum line where plaque and tartar accumulate.
Cleanse the biting surface back and forth, farther side first and then nearer side, finish the upper jaw first and later lower Jaw.	Back and forth movement dislodges food particles caught between teeth and alone the chewing surface.
Have the patient hold the brush at the same angle (45 degrees) over tongue and brush tightly over surface horizontal taking care not to initiate gag reflex.	Microorganism collect and grow on tongue surface and contribute to halitosis gagging may cause aspiration of tooth paste or may induce vomiting.
Allow the patient to rinse mouth thoroughly by taking mouthful of water and spilling in to the K-basin.	Rinsing help to remove debris and toothpaste.
Utilize mouthwash if the patient asks or need arises.	Mouth wash leave a pleasant taste in mouth.
Assist in wiping mouth with towel.	Promotes a sense of comfort.
Apply emollient to lips.	Prevents cracking and drying of lips.
Position the patient comfortably.	To promote comfort.
Dispose the collected waste, clean the used articles then replace equipment as appropriate.	Leaves the unit hygienic and articles prepared for further use.
Wash hands.	To prevent cross-infection.
Document the procedure done.	For legal evidence and to prevent duplication of care.

Nursing care for tracheostomy: Unconscious Patient.

Nursing action	Rationale
Clarify the procedure to the patient then encourage him/her to participate.	Reduces anxiety and promote patient participation.
Provide privacy.	To maintain dignity of the patient.
Check the doctors order for specific precaution regarding the movement and postponing of the patient.	Prevents injury to patient.
Position the patient toward the nurse's side on the edge of the bed.	Support correct body mechanism then reduces strain on back muscles.
Position the patient in high fowlers/semi fowlers position as tolerated.	To prevent aspiration.

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Keep the small mackintosh along with the face towel on the chest.	Prevent soiling of clothes.
Place K-basin close to the patient's chin.	Prevent soiling of clothes.
Access the mouth care tray arrange the article carefully without contamination pour the solution, open the glove pack and put in it.	To prevent contamination.
Lower the side rails on the right side.	For easy access.
Wear mask: wash hands: wear gloves.	Reduces the transfer of microorganisms.
Open the pack fully: take gauze piece with the thumb forceps make folds hold the gauze piece with the artery forceps ensure that the tip of the artery forceps is covered.	To prevent injury to oral cavity.
Explore the oral cavity with padded tongue depression by inserting it swiftly and gently if necessary.	Provides access to oral cavity.
Use different gauze piece for each stroke soak the gauze piece in antiseptic solution and squeeze out excess.	To prevent aspiration of solution.
Clean each tooth gently but firmly playing attention to all the side of the tooth.	Ensure thorough cleaning and prevents injury to the oral mucous membrane and gums.
Cleanse from farther incisor to molars by means of up and down movements starting gums to crown of the tooth.	UP and down strokes enhance dislodgement of food particle effectively.
Cleanse the molars by means of circular stroke clean the outer surface first then inner surface next, repeat the same for the nearer side.	Circular strokes are further effective than up and down strokes to get rid of food particles from molars.
Cleanse the upper teeth on both the sides followed by lower teeth.	
Gently Cleanse the roof of the mouth gums then inner side of cheeks with gauze piece.	Ensure through cleaning.
Clean the tongue from inner to outer aspect.	To prevent or reduce growth of microorganism on tongue surface which promote halitosis
Apply emollient to the lips using cotton applicators.	Lubricate the lips to prevent their drying and cracking
Position the patient in comfortable position raise side rails.	To promote comfort.
Replace well the articles after discarding the waste remove gloves, discard and wash hands.	Prevents transfer of microorganism.
Document the care provided.	Meant for legal evidence formerly to prevent duplication of care.

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8. Tracheotomy safety

Tracheotomy Safety is a web based educational resource developed by the National tracheotomy safety project in partnership with the Royal college of anaesthetists and Health education England – e learning for Health care the programme contains three sessions which are intended support the educational requirements of those caring for neck breathing patients, either routinely or in an emergency the resources are applicable for general and specialist nursing staff, medical staff and allied health professionals from all back grounds. Although primarily aimed at staff working in hospitals the resources are also applicable to those who care for patients community setting's these sessions also provide a learning resource for trainer's which can be effectively. Integrated in to local teaching and educational programmes.

Adult tracheotomy and laryngectomy emergencies are uncommon but lead to significant morbidity and mortality the national tracheotomy safety project aims to improve the management of tracheotomy and critical incidents, any of which are the result of recurring issues some related to basic knowledge of anatomy or airway procedures the types of tracheotomy tubes, the devices which can be attached to these and knowledge of the principles of Nursing care for patients with a tracheotomy or in addition routine or emergency equipment is sometimes unavailable or not used correctly and emergencies can be managed in a haphazard fashion.

To address these as issues the national tracheotomy safety project has developed resources and emergency algorithms, taking into account existing guidelines, evidence and experience. Key stake holder groups include the difficult airway society intensive care society the royal college of anaesthetics ENT UK, British association of oral and maxillo facial surgeons college of emergency medicine, Resuscitation council UK, Royal college of Nursing, speech and Long usage therapists Association of chartered physiotherapists in Respiratory care and the National Patient safety agency.

8a) Communication

All patients with a tracheotomy will have some problems with communication at some stages in their care with a tracheotomy tube in place there may still be a connection to the upper airways so that gas will pass upwards then out past the vocal cord's allowing speech.

This involves a high degree of involvement of the muscles of the throat as well as larynx, the mouth and tongue and enough breathing reserve to exhale gas out via the upper airways. This may be tough following a severe illness or stroke for example.

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Some Neurological conditions or if a patient wants on going help with their breathing out of a ventilator.

The gift of speech is priceless for patients but also for families and staff patient anxiety and stress levels have been shown to be reduced through effective communication ex engagement and cooperation with treatment can be similarly improved with clear benefits for patients and staff.

Techniques are available to help patients communicate to staff and to their formalities during these difficult and stress full times. Nonverbal communication aids can be used by staff and family but usually require some dexterity and strength from the patient there are also a number of techniques that can be used to promote air flow through the larynx and lead to speech techniques and success will vary from patient to patient and over time depending on the underlying problem and other medical needs.

Numerous methods can be used to communicate including gestures, head nods writing use of communication board's argumentative communication these methods may be tailored to meet individualized patients' needs

8b) Weaning

The process of weaning involves manipulation of the tracheotomy tube which may increase the patient work load of breathing. The patient should be closely observed for early signs of clinical detection to ensure patient safety and prevent distress. The change in airflow form breathing via the tracheotomy tube to utilizing the upper airway can be distressing for the patients.

The majority of tracheotomies are inserted as temporary respiratory support measure the removal process is known as decannulation. This is commonly carried out on the critical care unit. Weaning programmer take place on the ward in many hospitals. It is vital that the staff involved is competent and have an understanding of the weaning process they may be required to undertake specific training in their hospital. The purpose of weaning is to steadily return airflow to the upper airway then to restore normal physiological functions. The process of weaning involve the manipulation of the tracheotomy tube which may increase the workload of breathing,

Criteria to commence weaning

The patient will be assess by the MBT using the below criteria and if suitable a weaning programme will begin. Indicators for the tracheotomy

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have been resolved. Can the patient protect their own airway oxygen saturation of >90% with oxygen therapy less than 40%. The patient is haemodynamically stable. The patient is cardio vascular stable. The Patient is able to maintain upright sitting position in a bed or chair. The patient is able to stay awake and alert for 15 minutes while seated upright can they cough and clear secretion independently.

Cuff deflation

This removes the protection from aspiration the patient is required to manage their own secretion and swallowing.

Gloved finger occlusion: Established if the patient can achieve adequate airflow around the tracheotomy tube up into the upper airways (mouth and nose) stridor or minimal absent breath sounds above the level of the tracheotomy tube indicates revised airflow around the tube.

One way speaking valve: Ensuring the cuff is deflated a one-way speaking valve is placed over the opening of the tracheotomy tube allowing inspiration through the valve, but close on expiration, allowing air to flow over the vocal cords. The length of time the speaking valve is tolerated will vary from patient to patient and can only be gauged from observing patients work of breathing. Building up to tolerance of using the speaking valve aiming for more than. Four hours in one block. It is not advisable to leave on overnight as secretion or sleeping position may occlude the one-way valve if the patient is able to swallow, speech and language therapist should perform a swallow assessment. There are no signs of deteriorating bioscopy pulmonary infection excessive pulmonary secretion. Are they infection free? Do they have any forthcoming planned procedure requiring an anesthetic in the next 7-10 days? Is the care environment suitable to commence a tracheotomy weaning programme?

Continuation to weaning

Unable to tolerate cuff down deflation or airway obstruction. Medically unstable, severe anxiety about removal of the tracheotomy, cognitive impairment severe narrowing of the larynx or trachea, end stage pulmonary disease, Risk of severe aspiration / recurrent aspiration pneumonia.

Stage of weaning

During the course of the weaning process the patient requires to be monitored for respiratory distress.

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Decannulation cap

The cuff is always deflated. This is the final stage of the weaning process where the tracheotomy tube is blocked off resulting in the use of the mouth and nose for inspiration and expiration. The aim is to build upto four hours with the cannulation upon.

9. Decannulation

(Removal of tracheotomy tube) can tolerate the cuff down for 24 hours can tolerate the speaking value for 12 hours or the decannulation cap for 4 hours MDI in agreement for decannulation.

When the patient can adequately exchange air and expectorate secretions' the tracheotomy tube can be removed the stoma is closed with tape strips and covered with the an occlusive dressing the dressing must be changed if it gets soiled or wet the patient should be instructed to splint the stoma with the fingers when coughing swallowing or speaking epithelial tissue begin to from in 24 to 48 hours and the opening will close in several days surgical intervention to close the tracheotomy in not required.

Purpose

Permanent removal of tracheotomy tube with intent for tracheotomy site to close personal note (HTN) routinely visualize the airway (oropharyngeal/ hypopharyngeal/ laryngeal and sometimes tracheal airway) before decannulating a patient of their tracheotomy tube. A trial of successful corking or excluding a tracheotomy tube for a specified period of time to ensure safety of removal may be helpful in making the decision to remove the tracheotomy tube but does not supplant the value in critically assasin the airway usually before removal.

Articles

Back up equipment's to establish and airway nasal speculum (to place into the tracheotomy if necessary to maintain opening access to replacement tubes (trach or on do tracheal tube) if needed Decannulate canula (shiley fenest treated and cuffless tubes) 10 CC syringe for tracheotomy cuff Deflation. Jackson metal tubes small cork, full cork, sterile dressing and tape.

Procedure

Wash hands thoroughly and done gloves explain the procedure to the patient always deflate the cuff before the decannulation (see tracheotomy tube cuff procedure). Evaluate the patient cautiously for signs of respiratory

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strain and continue to observe at numerous intervals the frequency of monitoring is dictated according to patient tolerance. Remove the tracheotomy tube cork/ Decannulation cannula with signs of respiratory difficulty and report to the physician.

Instruct the patient regarding the location of the tracheotomy tube cork/ Decannulation cannula and demonstrate how to remove it a mirror may be helpful to assist in this procedure, when corking the Jackson metal tube, continue to clean the inner cannula. If the patient tolerate the full tracheotomy tube cork/ decannulation cannula for 1-2 days the entire tube is removed as ordered position the patient with the neck flexed apply an occlusive sterile dressing and tape securely over the tracheotomy to promote healing encourage the patient to cover the tracheostomal dressing when coughing and talking to facilitate site closure. Stoma dressing should be changed as often as necessary to maintain clean, cleanse the skin as needed and observe the wound for drainage infection and degree of closure wash hands thoroughly.

Considerations and observation

The physician may order oximetry during the decannulation process to evaluate the patient's respiratory status. Not at all cork a tracheostomy tube while the tracheotomy cuff is inflated. The size of the tracheotomy cork should correspond with the size of the Jackson metal tracheotomy tube tracheotomy cork should only be used with a Jackson metal tracheotomy tube. If a tracheotomy tube cork is used during the cannulation procedure secure the strings of the tracheotomy, tube cork to the tracheotomy ties. For the patients with Jackson metal tracheotomy tube, the physician may begin the decannulation procedure with a half cork if the patient shows no respiratory distress, the physician may demand the tracheotomy tube to be full corked. Prior to corking a pediatric tracheotomy tube, it is operative that the physician decrease the size of the tracheotomy tube to allow air passage around the tracheotomy tube to the oral or nasal airway. A variation in reestablishing a nasopharyngeal laryngopharyngeal airway consists of decreasing the size of the tracheotomy tube daily or every other day until the physician determines that the patient can tolerate complete removal of the tube following decannulation a tracheotomy tube of the appropriate size should be readily available before reinsertion if the patient develops respiratory distress.

The weaning process

Day 1: Ensure the cuff if present is deflating insert fenestrated inner tube if appropriate. Keep an occlusion cap to the end of the tracheotomy

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tube. Observe for signs of respiratory distress and stay with the patient for at least the first 10 minute. The patients oxygen saturation and vital signs should be recorded after 15 minutes. Continue to dude tube for 12 hour.

Day 2: Conclusion cap in site for 24 hrs.

Day 3: Decannulation.

10. Recording & Documentation

Recording should include the following

Patient and family education and comprehension., vital signs assessed before and after procedure Date, time and frequency of tracheotomy care type and size of tracheotomy care type and size of tracheotomy tube, changing of inner cannula, replacement of tracheotomy tube holder and general condition of stoma and surrounding skin, nursing interventionism response to assessed complications use of medications for sedation or pain and patient response expected and unexpected outcomes type and amount of secretions and frequency off suctioning performance of oral care pain assessment, interventions and effectiveness.

Conclusion

Tracheostomy care requires a multidisciplinary comprehensive approach to expedite the decannulation of patients with tracheostomy and subsequently reducing the duration of ICU stay. Health care professionals managing tracheostomised patients must adhere and develop guidelines feasible in their institution to cater this subset of the population. This prevents unpropitious incidents and hence reducing the tracheostomy-related complications and the number of readmissions to critical care units. Nursing care bundle for tracheotomy patients will be helpful for it. The set of practice guidelines will augment existing knowledge for nurses and health care provider's carryout competent and consistent practice in the care of tracheotomy. This Nursing care bundle for tracheotomy patients should include oxygen treatment, humidification, inner cannula, suctioning, tracheotomy Dressing / tapes safeguarding the tracheotomy, cuff check, oral care and assessment of swallowing, safety, communication, weaning, decannulation and Documentation.

References

1. Hess DR. Tracheostomy tubes and related appliances. Respir Care 2005;50(4):497-510.

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2. Epstein SK. Anatomy and physiology of tracheostomy. *Respir Care* 2005;50(4):476-482.
3. Frutos-Vivar F, Esteban A, Apezteguia C, Anzueto A, Nightingale P, González M, *et al.* Outcome of mechanically ventilated patients who require a tracheostomy. *Crit. Care Med.* 2005;33(2):290-298.
4. Mah JW, Staff I, Fisher S, Butler KL. Improving decannulation and swallowing function: a comprehensive, multidisciplinary approach to post-tracheostomy care. *Respir Care* 2017;62(2):137-143.
5. Speed L, Harding KE. Tracheostomy teams reduce total tracheostomy time and increase speaking valve use: a systematic review and meta-analysis. *J Crit Care.* 2013;28(216):e1-216, e10.
6. Stanbury C. "Guidelines for tracheostomy care". NHS foundation trust (Tees, Esk & Wear Valley) intranet, guideline no. CLIN/0062/v1, 2011 March.
7. Hettige R, Arora A, Ifeicho S, Narula A. Improving tracheostomy management through design, implementation and prospective audit of a care bundle: how we do it. *Clinical Otolaryngology.* 2008;33:472-94.
8. Laws-Chapman C, Rushmer F, Miller R, Flanagan K, Prigmore S, Chabane C. Guidelines for the Care of patients with Tracheostomy Tubes. St George's Healthcare NHS Trust, London, 2000 Aug, 41.
9. Mallet S, Dougherty L. The Royal Marsden Hospital Manual of Clinical Nursing, 5th edn. Procedures Blackwell Scientific, Oxford, 2000.
10. Cetto R, Arora A, Hettige R, Nel M, Benjamin L, Gomez CMH. Improving tracheostomy care: a prospective study of the multidisciplinary approach. *Clin. Otolaryngol.* 2011;36:482-88.
11. Arora A, Hettige R, Ifeicho S, Narula A. Driving standards in tracheostomy care: a preliminary communication of the St Mary's ENT-led multi disciplinary team approach. *Clin. Otolaryngol.* 2008;33:596-99.
12. Ron B Mitchell, Heather M Hussey, Setzen G, Jacobs IN, Nussenbaum B, Dawson C. Clinical Consensus Statement: Tracheostomy Care. *Otolaryngology-Head and Neck Surgery.* 2013;148:6-20.
13. Lennon S, Prince D. Safe Management of the patient with a Tracheostomy-A Care Bundle Approach. Armadale Tracheostomy Care Group, Western Australia, 2012. {<http://cmsdata.smahs.health.wa.gov.au>}

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To,
Dear Anjani Devi Nelavala

This certificate confirms that **Anjani Devi Nelavala** is the author of book chapter titled "**Communicable Diseases**" of published book entitled "**Fundamental of Health and Basic Health Care System (Volume - 1)**" having ISBN **978-93-5570-335-4**.

Yours Sincerely,

Akhil Gupta



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2021-2022

List of Books Published Last Five Years 2017-2021

This book deals with Nursing that is a vital aspect of the health care system, and nurses are vital members of health care. Nursing is facing new development in the 21st century. In a wide variety of settings, nurses are increasingly likely to care for patients on mechanical ventilators. The nurses are challenged to make quick yet critical decisions in the rapidly expanding health care system relating to the provision of quality care to the clients with mechanical ventilators. The quality of care is attainable through nursing practice which becomes the cornerstone for nursing education, service and research. We have discussed in this book, Mechanical ventilators, concepts of ventilation, principles of ventilator care, standards of care to the patients with mechanical ventilators.



Indira. A

Mechanical Ventilator

The Effectiveness of STP for Nurses on Care of the Patients with Ventilator and the Outcome of Ventilator Care of India.



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Description

This book deals with Nursing which is a vital aspect of the health care system, and nurses are vital members of health care. Nursing is facing new development in the 21st century. In a wide variety of settings, nurses are increasingly likely to care for patients on mechanical ventilators. The nurses are challenged to make quick yet critical decisions in the rapidly expanding health care system relating to the provision of quality care to the clients with mechanical ventilators. The quality of care is attainable through nursing practice which becomes the cornerstone for nursing education, service, and research. We have discussed in this book, Mechanical ventilators, concepts of ventilation, principles of ventilator care, standards of care to the patients with mechanical ventilators.

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**Question Bank
for
First year B.Sc.
(Nursing)
2015 - 2021**

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Question Bank for First Year B.Sc.

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2019-2020

Assessing the Knowledge on Vitamin 'D' Deficiency among Adults in Nellore (Andhra Pradesh)

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Vitamin D is known as the sunshine vitamin. Phytoplankton, zooplankton and most plants and animals that are exposed to sunlight can produce vitamin D. It is an essential steroid involved in bone metabolism, cell growth, differentiation, and regulation of the minerals in the body. Vitamin D is unique in terms of its metabolism and physiological features and the human reliance on both endogenous production (exposure to UV light) and exogenous sources (diet mainly fortified foods) to meet biological requirements. Vitamin D deficiency (VDD) is epidemic in India despite plenty of sunshine.

Vitamin D maintains blood calcium level in normal range, which is vital for normal function. Breast milk is perfect food, since it contains all nutrients in adequate quantities including vitamin D and calcium. Exclusive breastfeeding is recommended up to six months of age with all its beneficial effects on child survival globally.

Approximately 1 billion individuals worldwide, nearly 15 percent of the world population, are vitamin D deficient or insufficient (< 20 ng/ml or between 20-30 ng/ml, respectively).

Recent studies have revealed that 65-70 percent Indians are vitamin D deficient and another 15 percent are insufficient. For starters, vitamin D is not a simple vitamin. It is a steroid hormone that impacts virtually every cell in the body. It is synthesised in the skin on exposure to sunshine and is needed to absorb calcium and for bone health.

In our country, availability, acceptability and cost of these dietary products limits their widespread use by the general population. This complex interplay between lack of adequate sun exposure, deficient intake and effective food fortification strategies makes Asian Indian population particularly susceptible to vitamin D insufficiency/ deficiency. The study was conducted in urban and rural pregnant subjects at term alkaline phosphate parathyroid hormone, 25-hydroxy vitamin D 25 (OH) D were measured in cord blood of 117 newborns. Mean ma-

ternal serum 25 (OH) D was 14 ± 9.3 ng/ml, and cord blood 25(OH) D was 8.4 ± 5.7 ng/ml. PTH rise was about the normal range when 25 (OH) D was <22.5 ng/ml; 84.3 percent of urban and 83.6 percent of rural women had low 25 (OH) D values. Calcium intake was uniformly low although higher in urban (842 ± 459 mg/d than in rural 549 ± 404 mg/d subjects ($p < 0.001$); maternal blood 25 (OD) H correlated positively with cord blood 25 ($r = 0.79$, $p < 0.0001$) and negatively with $r = 3.35$, $p < 0.001$ showing high prevalence of vitaminosis. Dietary deficiency of vitamin D and calcium deficiency were common in developing countries, and associated with viral infection, growth retardation and child mortality. So, the investigator undertook a study to assess the knowledge on vitamin D deficiency among adults in Saraswathi Nagar, Nellore (AP).

Objectives

The study endeavoured to (a) assess the knowledge on vitamin D deficiency among adults, and (b) to find out the association between levels of knowledge on vitamin D deficiency among adults with selected Socio demographic variables.

Operational definitions: *Assess:* Evaluation of knowledge about vitamin D deficiency; *Adult:* Fully developed and mature person or organism aged from 20-60 years; *Knowledge:* Information or idea that is gained through observation or experience of education regarding vitamin D sources and deficiencies; *Vitamin D deficiency:* Vitamin D deficiency or hypovitaminosis D can result from inadequate nutritional intake of vitamin D or inadequate sunlight exposure in adults if vitamin D intake is <10 mg per day.

Assumptions: Adults may have some knowledge on vitamin 'D' deficiency.

Delimitations: The study is delimited to: (a) adults aged between 20-60 years in Saraswathi Nagar, (b) sample size of 100 adults; (c) adults who were available during the period of data collection.

Review of Literature

Akhtar S (2016) conducted a study on Vitamin D Status in South Asian Populations. The review concluded that global efforts are needed to overcome hypovitaminosis in the region. In addition, dietary diversification, supplementation and fortification of foods with vitamin D, adequate exposure to sunlight, and consumption of animal foods were suggested as viable approaches to maintain 25 (OH) D levels for optimal health.

Rachana Kapoor (2015) assessed vitamin D status of people of slums and its suburbans in Kolkata; 1058 had low vitamin D level, 232 had moderate and 660 had adequate vitamin D level.

Niwas Sanvageot (2015) determined the prevalence of vitamin D deficiency and insufficiency and related risk factors among 1432 healthy adults in Luxemburg; only 17.1 percent of population had a desirable serum 25 (OH) D level, whereas 27.1 percent had inadequate, 40.4 percent the insufficient and 15.4 percent had deficient. Inadequate vitamin D status was highly prevalent among adults in Luxemburg, and associated with specific life style factors.

Lithac R (2014) conducted a study on using mother advocacy group to enhance knowledge and home management of VDD mothers in rural community of Sokato State, Nigeria, on 150 mothers aged 18 - 47 years, with a mean age of 33±7.14 years. Results showed that 90 percent of mothers were not having any knowledge on VDD, 2.5 percent had little knowledge on VDD and 7.5 percent had moderate knowledge. The study found that most of the mothers had poor knowledge regarding VDD.

Alok Sachan et al (2013) assessed prevalence of calcium and vitamin D deficiency among 207 pregnant women and 117 newborns. The result revealed a high prevalence of hypo vitamin D among pregnant women than their new born.

In a systematic study review of nutritional rickets in Ethiopia, Fischer PR et al concluded that the major cause of nutritional rickets in Ethiopian children is lack of exposure to sunshine and inadequate calcium intake. Lack of awareness and traditional beliefs are major cause for not exposing children to sunshine. There is a need for well-designed epidemiological and ecological studies. Studies are required to establish criteria for the diagnosis of clinical and sub clinical rickets, particularly in malnourished children.

The conceptual framework of the study is shown in Fig 1.

Material and Methods

The non-experimental descriptive research design was used for the study; 100 adults were selected by using non-probability convenience sampling technique. The study was conducted in Saraswathi Nagar at Nellore after formal permission from the Medical Officer, Saraswathi Nagar, Nellore (Andhra Pradesh). The purpose of the study was explained to participants in their language and informed consent was obtained from them. The structured questionnaire was administered to determine level of knowledge regarding the vitamin D deficiency among adults.

Inclusion criteria: Adults willing to participate in this study, and residing in Saraswathi Nagar, Nellore were included. *Exclusion criteria:* The people who were not present at the time of data collection.

Research variables: Knowledge on vitamin D deficiency among adults.

Demographic variables: Age, religion, education, occupation, type of diet, family income, area of living, number of children and source of information.

Study tool: The tool for data collection consisted of 2 parts: Part 1: Socio-demographic data, and Part 2: Structured questionnaire to determine level of knowledge regarding the vitamin D deficiency among adults.

Score key: The questionnaire consisted of 35 questions. Each correct answer was rewarded by one mark

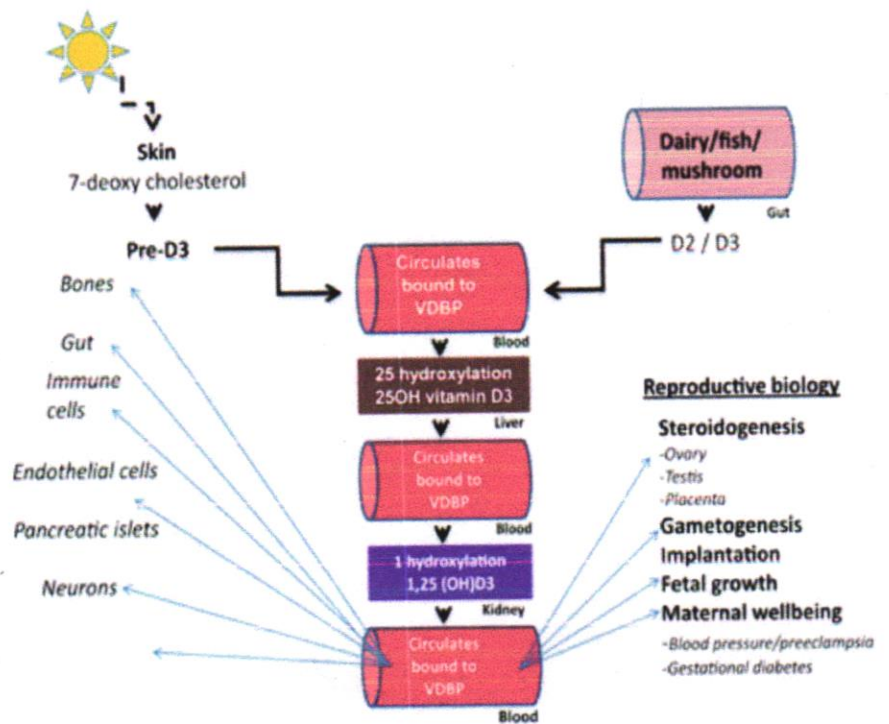


Fig 1: Study model based on Conceptual Framework for Nutrition.

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and wrong answer by zero mark. Based on the score, the knowledge level was assessed (Table 1).

Table 1: Score interpretation

Level of knowledge	Score	Percentage
A+	>33	More than 85
A	32-33	More than 75
B+	26-29	More than 65
B	22-25	More than 55
C	18-21	More than 50
D	1-17	Less than 50

Content validity: The content validity was cleared from experts. The necessary modifications were incorporated based on suggestions given. This tool was tested by the pilot study.

Reliability: The reliability of the tool was established by administering the tool to 10 adults who were not included in the pilot study and who fulfill the inclusion criteria. The reliability value is 0.98 so the tool was found reliable ($R=2r/1+r$).

Feasibility: Feasibility of tool was tested by a pilot study, which showed the tool to be feasible.

Data was collected for a period of 2 weeks from 21 to 26 March 2017 for 100 samples using non-probability convenience sampling technique with minimum of 17 samples per day from 9 am to 1 pm. Written consent was obtained from the samples by explaining the purpose and nature of study assuring anonymity. The sample size was 100 and who fulfilled the inclusion criteria were included in the study. Data was collected using structured questionnaire to assess the knowledge on Vitamin D deficiency among adults; 15 minutes was taken by the investigator for each sample. Data was analysed in terms of objectives of the study using descriptive and inferential statistics and tabulated.

Results

Table 2 shows that with regard to age of adults, 26 (26%) were between 20-30 years, 31 (31%) were between 31-40 years, 27 (27%) between 41-50 years and 16 (16%) were above 50 years. As for religion of adults, 77 (77%) were Hindu, 14 (14%) were Muslim and 9 (9%) were Christian (Table 3).

Table 4 shows that with regard to education level of adults, 14 (14%) were illiterate, 34 (34%) had primary education, 30 (30%) had secondary education and 22 (22%) were graduates. As for occupation, 17 (17%) were government employees, 26 (26%) were private employees, 32 (32%) were self-employees and 25 (25%) were unemployed (Table 5).

Considering the type of diet among adults, 18 (18%) were vegetarians, 21 (21%) were non-vegetarians and 61 (61%) were taking mixed type of diet (Table 6). Regarding family income, 6 (6%) earned upto Rs. 5000, 45 (45%) earned between Rs. 5000 - 7000, 24 (24%) between Rs.7001-10,000 and 25(25%) earned above Rs. 10,000 (Table 7).

Table 8 shows that with regard to area of living, all i.e. 100 (100%) were residing at urban area. Twelve (12%) adults had one child, 67 (67%) had two children, 17 (17%) had three children and 4 (4%) had more than three children (Table 9). Table 10 shows that with regard to source of information among adults, 6 (6%) received from friends, 62 (62%) from health care professionals, 26 (26%) from mass media and 6 (6%) received from non-governmental organisations. Table 11 shows that with regard to level of knowledge regarding vitamin D deficiency among adults 1 (1%) had 'A' grade, 20 (20%) obtained 'B+' grade, 43 (43%) secured 'B' grade, 12 (12%) scored 'C' grade and 24 (24%) had 'D' grade. Mean and standard deviation of level of knowledge regarding vitamin 'D' deficiency among adults was 19.11 and 4.685 respectively (Table 12). Table 13 shows that there is no association between the level of knowledge regarding Vitamin 'D' deficiency among adults with respect to age, religion, education, occupation, type of diet and number of children, and there is association in respect of only two parameters viz. family income and source of information.

Table 2: Frequency and percentage distribution of adults based on age (n=100)

Age	Frequency (f)	Percentage (%)
20-30 years	26	26
31-40 years	31	31
41-50 years	27	27
>50 years	16	16
Total	100	100

Table 3: Frequency and percentage distribution of adults based on religion (n=100)

Religion	Frequency (f)	Percentage (%)
Hindu	77	77
Muslim	14	14
Christian	9	9
Total	100	100

Table 4: Frequency and percentage distribution of adults based on education (n=100)

Education	Frequency(f)	Percentage (%)
Illiterate	14	14
Primary education	34	34
Secondary education	30	30
Graduates	22	22
Total	100	100

Table 13: Association between the levels of knowledge regarding vitamin D deficiency among adults with demographic variables (n=100)

Demographic variables	A		B+		B		C		D		Chi-square
	f	%	f	%	f	%	f	%	f	%	
Age											C=16.176
a) 20-30 years	-	-	4	4	8	8	3	3	11	11	df=12
b) 31-40 years	-	-	9	9	13	13	4	4	5	5	p=0.05
c) 41-50 years	-	-	6	6	15	15	2	2	4	4	t=21.03
d) >50 years	1	1	1	1	7	7	3	3	4	4	NS
Religion											C=9.38
a) Hindu	1	1	14	14	33	33	8	8	21	21	df=8
b) Muslim	-	-	2	2	6	6	4	4	2	2	p=0.05
c) Christian	-	-	4	4	4	4	-	-	1	1	t=15.51
											NS
Education											C=7.88
a) Illiterate	-	-	4	4	6	6	2	2	2	2	df=12
b) Primary	-	-	6	6	16	16	4	4	8	8	p=0.05
c) Secondary	-	-	5	5	13	13	5	5	7	7	t=21.03
d) Graduates	1	1	5	5	8	8	1	1	7	7	NS
Occupation											C=13.33
a) Govt employee	1	1	4	4	6	6	-	-	6	6	df=12
b) Private	-	-	5	5	9	9	5	5	7	7	p=21.03
c) Self	-	-	6	6	19	19	3	3	4	4	NS
d) Unemployed	-	-	5	5	9	9	4	4	7	7	
Diet											C=2.51
a) Vegetarian	-	-	2	2	4	4	5	5	7	7	df=8
b) Non-vegetarian	-	-	4	4	9	9	3	3	5	5	p=0.05
c) Mixed	1	1	14	14	30	30	4	4	12	12	t=15.51
											NS
Family income											C=27.8
a) Rs.<5000	-	-	1	1	2	2	2	2	1	1	df=12
b) Rs.5000-7000	-	-	10	10	24	24	5	5	6	6	p=0.05
c) Rs.7001-10000	1	1	4	4	12	12	4	4	3	3	t=21.03
d) Rs.>10,000	-	-	5	5	5	5	1	1	14	14	S
Number of children											C=10.99
a) One	1	1	2	2	4	4	2	2	3	3	df=12
b) Two	-	-	13	13	30	30	6	6	18	18	p=0.05
c) Three	-	-	4	4	7	7	3	3	3	3	t=21.03
d) More than Three	-	-	1	1	2	2	1	1	-	-	NS
Source of information											C=24.99
a) Friends	-	-	1	1	1	1	1	1	3	3	df=12
b) Health care professionals	-	-	14	14	36	36	7	7	5	5	p=0.05
c) Mass media	1	1	4	4	3	3	3	3	15	15	t=21.03
d) Non-government organisation	-	-	1	1	3	3	1	1	1	1	S

Note: NS - Non-significant, T - Table value, C - Calculated value, S - Significant

questionnaire. When participants were asked questions in this format, they showed a better knowledge of vitamin D, compared with those who were asked open-ended questions. This demonstrates that the expression of knowledge regarding vitamin D is greatly dependent on the method of questioning. This fact was spotted by Kung & Lee, who interviewed groups of Chinese women aged >50 years using either open-ended questions or prompted responses on vitamin D. They found that the type of questioning played a major role in proportionate outcome of correct responses. Previous studies have demonstrated poor knowledge about vitamin D and its sources. Our study findings establish that majority of adults have inadequate knowledge regarding vitamin D deficiency.

Implications

Vitamin D deficiency is reportedly common world-

wide and has been linked to an increased risk of a wide range of diseases. Low vitamin D status may not be clinically apparent until it is severe. There has been a tendency to recommend high blood levels of vitamin D for optimum health, and such levels can generally only be achieved with supplementation. Patients with risk factors for vitamin D deficiency should have serum 25 (OH) D levels done as part of annual preventive health maintenance.

Recommendations

The findings of this study may be used in health policy-making. Non-government organisations and social workers may collaborate with the government to educate parents and children regarding the uses and benefits of vitamin D. This will help improve overall health among the Nellore population. A study can be conducted among the sample having vitamin D deficiency in multiple settings.

Conclusion

The public should be educated to improve their knowledge, awareness, and attitudes regarding vitamin D and its sources. This information should be provided in conjunction with messages on preventative measures to ensure people do not increase their risk of skin cancer to improve their vitamin D levels through excessive sun exposure.

References

1. Sohi Darshan. Textbook of Nutrition; 2nd edn 2008; Pee Vee, pp 120-35
2. Dordcn Wardlaw. Textbook of Complementary Nutrition; 2nd edn 1994; Mosby Publication, pp 87-100
3. Swaminathan. Textbook of Dietetics; 5th edn 2007; Bangalore Printing, pp 44-49
4. Garshan Sohi. Textbook of Nutrition; 5th edn 2010; Pee Vee Publication, pp 141-74
5. Garrow JS. Textbook of Human Nutrition and Dietetics; 10th edn 2000; Churchill Livingstone, p 211
6. Kantha Katari. Spirulina the best food for future. www.scopemed.org/mno=228758 [Access: September 26, 2016]
7. Kantha Katari. Human milk banking. www.scopemed.org/mno=229095 [Access: September 26, 2016]
8. Arumugam Indira, Katari Kantha. Nutritional status of antenatal and postnatal mothers in selected rural areas at Nellore. *International Journal of Recent Scientific Research* 2015; 6(2): 2796-2800

Table 5: Frequency and percentage distribution of adults based on occupation (n=100)

Occupation	Frequency (f)	Percentage (%)
Government employee	17	17
Private employee	26	26
Self-employed	32	32
Unemployed	25	25
Total	100	100

Table 6: Frequency and percentage distribution of adults based on type of diet (n=100)

Type of diet	Frequency (f)	Percentage (%)
Vegetarian	18	18
Non-vegetarian	21	21
Mixed	61	61
Total	100	100

Table 7: Frequency and percentage distribution of adults based on family income (n=100)

Family income (Rs)	Frequency (f)	Percentage (%)
<5000	6	6
5001-7000	45	45
7001-Rs.10,000	24	24
>10,000	25	25
Total	100	100

Table 8: Frequency and percentage distribution of adults based on area of living (n=100)

Area of living	Frequency (f)	Percentage (%)
Urban	100	100
Total	100	100

Table 9: Frequency and percentage distribution of adults based on number of children (n=100)

No. of children	Frequency (f)	Percentage (%)
One child	12	12
Two children	67	67
Three children	17	17
More than three children	4	4
Total	100	100

As for level of knowledge regarding vitamin D deficiency, 1 (1%) had 'A' grade, 20 (20%) obtained 'B+' grade, 43 (43%) secured 'B' grade, 12 (12%) scored 'C' grade and 24 (24%) had 'D' grade (Table 11).

Mean and standard deviation of level of knowledge regarding vitamin D deficiency among adults: the mean and standard deviation of level of knowledge regarding vitamin D deficiency among adults, mean is 19.11 with standard deviation of 4.68 (Table 12). Table 13 shows association between level

of knowledge about VDD among adults with demographic variables like age, religion, education, occupation, diet, income etc.

Discussion

Vitamin D plays an important role in the maintenance of one's physiology and health. Nevertheless, only 50 percent of patients were aware of the health implications of vitamin D status, compared with 70 percent of healthy individuals. The present study findings were similar to other studies. Previous study reported that those with more information on the sources of vitamin D were inclined to consume more vitamin D-rich foods and supplements. In this study, we found those with more knowledge were more cautious about intake of vitamin D. Public education regarding the importance of vitamin D and the risk of deficiency may increase concern on serum vitamin D titer at both the population and individual level. This awareness could lead to actions that potentially improve vitamin D levels through food, supplements, and safe sun exposure. There is a lack of studies assessing the value of educational interventions on behavioural change and vitamin D levels.

Earlier studies have relied on open-ended questions, which usually misjudged the participants' knowledge. In this study, we used a multiple-choice

Table 10: Frequency and percentage distribution of adults based on source of information (n=100)

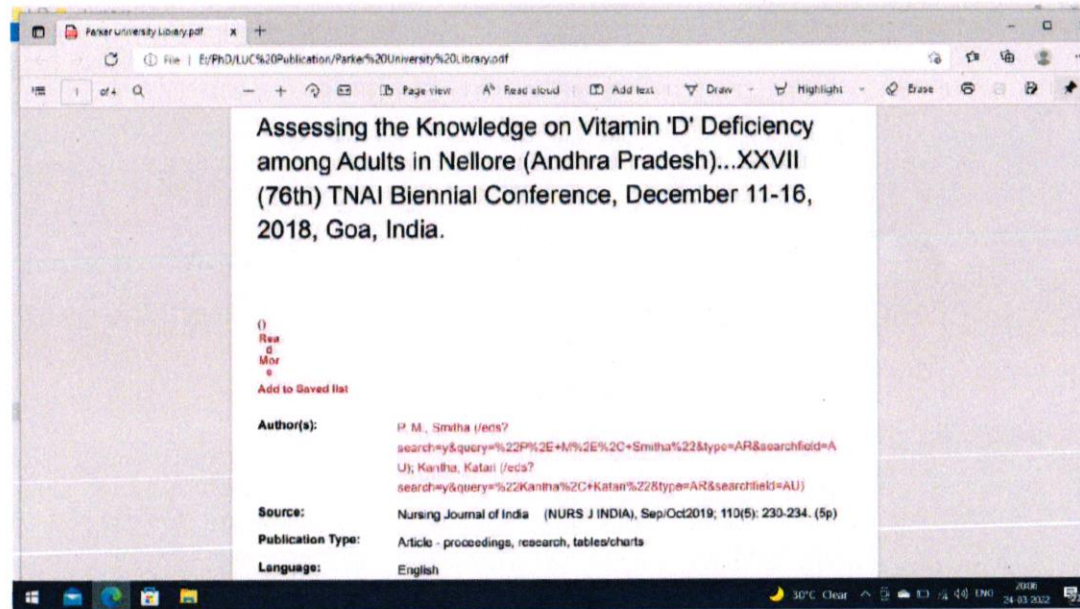
Source of information	Frequency (f)	Percentage (%)
Friends	6	6
Health care professionals	62	62
Mass media	26	26
Non-governmental organisation	6	6
Total	100	100

Table 11: Level of knowledge regarding vitamin D deficiency among adults (n=100)

Level of knowledge regarding vitamin D deficiency	Frequency (f)	Percentage (%)
A	1	1
B+	20	20
B	43	43
C	12	12
D	24	24
Total	100	100

Table 12: Mean and standard deviation of level of knowledge regarding vitamin D deficiency among adults (n=100)

Category	Mean	Standard deviation
Adults	19.11	4.685



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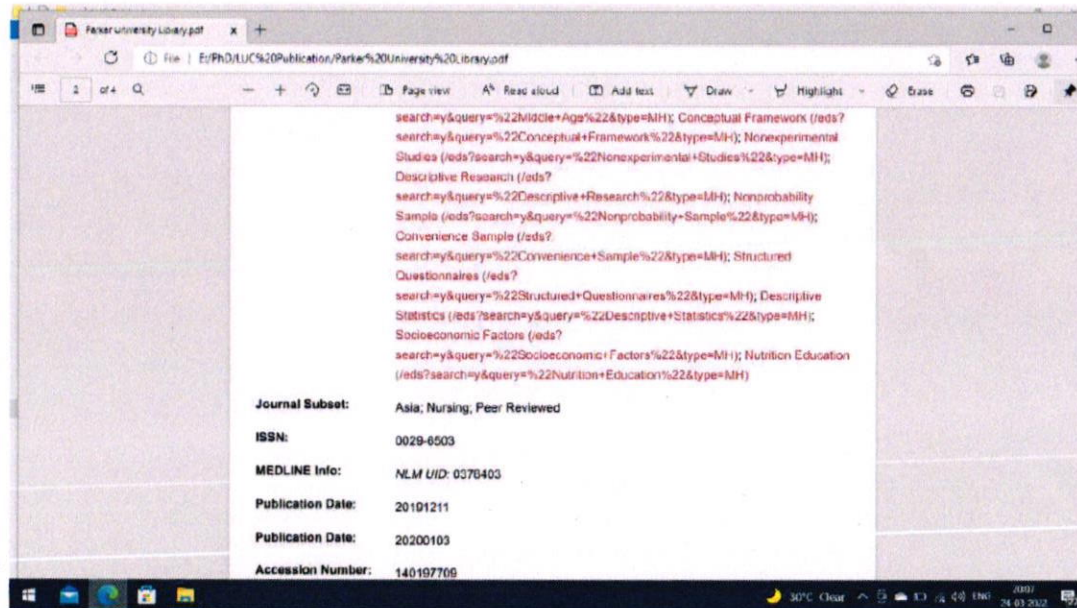
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Subject Terms: Vitamin D Deficiency (/eds?search=y&query=%22Vitamin+D+Deficiency%22&type=MM) -- India (/eds?search=y&query=%22Vitamin+D+Deficiency+India%22&type=MM); Health Knowledge (/eds?search=y&query=%22Health+Knowledge%22&type=MM) -- Evaluation (/eds?search=y&query=%22Health+Knowledge+Evaluation%22&type=MM) -- in Adulthood (/eds?search=y&query=%22Health+Knowledge+Evaluation+In+Adulthood%22&type=MM)

Subject Terms: Human (/eds?search=y&query=%22Human%22&type=MH); Congresses and Conferences (/eds?search=y&query=%22Congresses+and+Conferences%22&type=MH) -- India (/eds?search=y&query=%22Congresses+and+Conferences+India%22&type=MH); India (/eds?search=y&query=%22India%22&type=MH); Adult (/eds?search=y&query=%22Adult%22&type=MH); Middle Age (/eds?

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