Hello students, welcome to this modulec On etiology, prevalence and clinical features of undernutrition. We're going to focus on protein energy malnutrition, and look at the preventive strategies of PEM.This is under unit 2 on nutritional problems, their implications and related Nutrition Programs under the subject Public nutrition.

The outline of this module is as follows. Will be dealing with the introduction. PEM stages, symptoms, clinical features of protein energy malnutrition and will look at the dietary management .at the end of this module, The students are expected to differentiate between kwashiorkor and marasmus and advise dietary measures in management of protein energy malnutrition.

It's a well known fact that we are what we eat and nutrients are substances that are crucial for human life, growth and well being. We have two sets of nutrients, macro, nutrients, and micronutrients which are required for various purposes. They are needed for energy and cell multiplication and repair, and they are also essential for various metabolic processes.

Let us have a quick look at what protein energy malnutrition is.

It's a major public health problem in many

developing countries and most commonly affecting children

between six months to five years of age. It may result from a

lack of food or chronic or recurrent infections that cause

loss of appetite while increasing the bodies, nutrient

requirements and losses. It can also result from prolonged

starvation. Children between 12-36months , six months older,

Are specially at risk. In fact, they are referred to as the most

vulnerable groups. Infecttions Such as gastroenteritis and

Measles can make them more prone, and hence we need to deal with this age group A

little more carefully. Chronic Protein energy malnutrition has

many short term and long term physical and mental effects,

including growth retardation,lowered resistance to

infection, and increased mortality rates in this group.

We have different forms of protein energy malnutrition.

In fact it starts with undernutrition and it results

into growth failure and thereafter it causes severe

underweight. There are classic features of kwashiorkor and marasmus an

in between there are certain mix features seen which is

called as marasmic kwashiorkor.

In general, the symptoms of protein energy malnutrition

includes failure to gain weight and failure of linear growth,

irritability, lethargy or apathy ,decrease muscle mass. We usually

see swelling in the extremities which is referred to as edema.

There is a pot belly or large belly which takes out or

protruding belly diarrhea.Dermatitis , change in

skin is observed. Skin may lose pigments

where the skin has peeled away.hair may be

thin or sparse. Easy to pluck,and can even become brittle.

Damageto immune system occur and the ability to

Resist infections is reduced.Also shock in the later stage of

PEM is seen . It can eventually result in coma.

There are classic differences in marasmus and kwashiorkor child,

so in Marasmic child severe growth retardation , loss

of subcutaneous fat with severe muscle wasting is seen .the

Child appears to look very thin with wrinkled skin, bones

are prominently seen. In fact,we call this child is skinny

Bony. There is dryness in the skin ,there are no hair

changes usually seen , which we see more in kwashiorkor.

Also there is no sign of edema and overall the child appears to

be like a old man. Hence we say old men's face, the clinical

features of kwashiorkor usually are growth, failure, edema,mental change, pitting edema in

feet and legs and then whole body and you can determine it easily

if you press the extremities,specially the legs. If the

impression remains, then it's a sign of pitting edema. The face

is puffy with sagging cheeks.Hair becomes light brownish. dry

thin and easy to pull,Moon Face, low appetite, irritable

With low concentration. respiratory

tract infections are also common .

so how do we identify protein energy malnourished

child? So we of course require growth monitoring, the requirements are weighing

machine which has to be read into precision of 10 grams with

minimal clothing. The weighing time is very important. Usually

we do about one about one hour before or after. for children

unable to stand alone, we make mothers stand along with the

child and then take the weight of both and then.

, you can measure the length of child of less than two years old if

unable to stand. So for that we use in stadiometer , mid upper arm circumference called MUAC to

be measured twice to ensure an accurate interpretation on upper

left arm. And you need to analyze the data by using the

Reference standards of WHO and the growth charts .weight for age

group charts which are readily available.

Now let's have a look at theNational Family Health Survey

findings. It has been observed that under the age of five years, 38.4% are stunted. 35 . 7% are underweight. Under the age of five years, 21%are wasted and under the age of five years, 7.5% are severely wasted. And in Goa under the age of five years, 20. 1% are stunted, 23.8% underweight, 21.9% of wasted, and 9.5% of under five years of age of children are severely wasted. Soit is very important that we identify children and then intervened and take Timely measures because the consequences of PEM could be hypoglycemia, hypothermia,dehydration, electrolyte imbalance, various micronutrient deficiencies can accompany an. Of course, it can lead to infections, as this children are more and more susceptible to infections. As far as management of protein energy, malnutrition is concerned, we have to look at the consequences an intervened,timely and correct all this consequences.

Of an the various symptoms which are appearing by time rehospitalization, specially the severe cases we need to give them adequate diet. Rehydration in hyperthermia needs to be well taken care of and if required,and the child needs to be put on

medications. So looking at the dietary management, the demand

for calories and protein is much higher than the normal levels

for that age. If the child is severely malnourished, you need

to start on liquid that initially and then graduate to

solids always give small frequent meals at the beginning

and then gradually increase the quantity to make or to increase

the density of the diet. Oil or ghee be OK. I'm referring to an

oils with the medium chain triglycerides or having a right

balance of. Saturated in newfine PUFA can be added in the

diet to increase the calorie content. Milk based formula can

be given to children. In fact,it is followed in many states in

India. In case if the child is having watery stools, you need

to Introduce non starchy

base particularly grains like cereals and millets and pulse

or can even give them buttermilk which will be a very good source

of probiotics. Provide adequate vitamins and minerals through

fruits and vegetables . if Doctor

has advised you need to use antibiotics and if needed even vitamin E

supplementation can be given. Along with probiotics.

caregiver specially or The mother needs to ensure that there is proper therapeutic feeding

approach followed and ensure food hygiene right from

boiling of water to washing of hands before and after

every activity. Continue Breastfeeding if the child is

on breast milk.

Now we've seen that one of the consequences of PEM is

dehydration. So treating dehydration needs to be well advocated, depending on the severity in case if the

child is having severe dehydration, then the preferred.

Rehydration solution is a resomal, which is a rehydration

solution for malnutrition. You Need to give 5ML per kg body weight every

30 minutes ,The first 2 hours and 5 to 10 ML per kg body weight

Of every hour for the next 4 to10 along with ready

to use therapeutic food which will be called as RUTF in the

subsequent slides. If resomal is not available then you can

prepare half strength of ORS approved by WHO with

concentrated electrolyte or mineral solution in same doses

as that of my resomal. If neither of this is available, of course you

need to address to the nearest hospital. we need to refer the

child to the nearest hospital totake proper measures. Now how

long to give resomal?

assess the child every 30 minutes for

first hour and every hour for the next 4 to 10 hours. And if

the child improves, the caregiver can be sent home

with Resomal or half strength ORS for two days

and she should give 5200 MLafter each loose stool.

To summarize, nutrition is essential for human

development. Malnutrition Enhances.

Morbidity and mortality in children, which is a significant

factor in approximately 1/3 of nearly 8,000,000 deaths in under

five years Children worldwide.It can lead to reduced work

capacity and poor productivity,especially in adulthood, so

there is a need to provide counseling and support for

optimal infant and young child feeding practices, including for

low birth weight infants. Weight Gain of the infant or children

should be monitored weekly or regularly to observe any changes

observed for adequate weight gain, or else you need to

intervene. Assess physical and mental health status of mothers

or the caregivers and you can provide relevant treatment or

support to this Attendants and treat children with protein energy Malnutrition Appropriately by

inculcating right type of dietary practices if

required. Ready to use therapeutic food needs to

be given and the resomal solution and even the approved antibiotics with right type of probiotic.

Read the references

. Thank you very much.