TUTORIAL 15

INFANT FEEDING

1. BREAST FEEDING

Physiology:

During pregnancy the glandular tissue in the breasts increases under the influence of the pituitary hormone prolactin as well as oestrogen and progesterone. They prepare the breasts for later work of lactation

Colostrum

Before birth a very small quantity of colostrum is secreted. For the first few days after delivery it alone is secreted and gradually replaced by mature milk. It contains a very high concentration of Immunoglobulins and Immunologically active cells such as macrophages and lymphocytes. It is an important means of providing the newborn baby with passive immunity. The small volume corresponds with the neonate's low fluid requirements in the first few days of life.

Mature milk

Consists of two main portions; the Foremilk which is produced in the early part of a feed. It is relatively dilute containing less protein and fat than the creamy Hindmilk produced later in the feed. Babies are able to regulate the dilution of the milk they drink by varying the proportions of Fore-and Hindmilk. It is incorrect to think that the Foremilk which looks rather bluish and watery is not suitable for feeding.

Prolactin

Between feeds milk is secreted by the milk producing glands in the breasts in preparation for the next feed. The quality of milk produced depends on the amount of prolactin in the circulation. Prolactin secretion is increased by:

- **Sucking by the by the baby:** the more minutes per day of sucking the more prolactin is produced. This is why it is important not to reduce suckling by complementary bottles.
- **Sleep:** rest is important
- **Lack of Mental Stress:** A worried, tense mother will secrete less prolactin than a comfortable and relaxed mother.

Oxytocin

The release to the baby from the storage ducts of milk that has been secreted is controlled by another pituitary hormone called Oxytocin.

Sucking is the most powerful stimulus to its secretion but even the sight or sound of the baby is effective. The action of oxytocin on the breast is to cause contraction myoepithelial cells (resembling muscle fibres) surrounding the breast ducts resulting in ejection of milk. Oxytocin does not cause milk to be made; it only affects its release.

Nipples:

For satisfactory breast feeding it is essential that the baby is able to get the nipple and surrounding areola into its mouth. The nipples should be checked during the antenatal

period and if found inverted or flat, Hoffman's exercises should be taught to the mother. In these exercises the nipples are drawn out and rolled between the forefinger and the thumb. The wearing of a nipple shield which helps to protrude nipple is often used.

THE ADVANTAGES OF BREAST FEEDING

1) **Protection against infection:** as the breast milk is sterile and contains both immunoglobulins and immune cells, it provides protection against viral and bacterial infections, which enter the intestine via oral route as in gastroenteritis.
2) **Protection against allergy:** the fact that human milk protein is less 'foreign' than cow's milk protein accounts for the much lower incidence of allergic disorders in breast fed babies.
3) **Protection against Malnutrition:** Breast milk is always available when the baby needs it, even when the family finances are low. It cannot be diluted as is the case so often with the artificial milk. Breast feeding remains a protection even in the second year of life as it will provide an important protein supplement to a staple carbohydrate **food such as mealie meal or samp.**
4) **Promotion of mother-infant bonding:** Breast feeding brings a mother and the baby very close together, especially in the early weeks when the process of bonding is at **its most delicate.**
5) **Protection against breast cancer:** women who have breast fed babies for a good length of time have a reduced incidence of breast cancer.
6) **Uterine resolution:** the oxytocin secreted during breast feeding has a powerful **effect on the uterus causing it to contract and undergo involution more rapidly.**
7) **Convenience:** Breast milk is always available at the right strength and temperature not needing preparation or sterilisation.

MEANS OF PROMOTING BREAST FEEDING

1) **Early contact:** newborn babies and their mothers are alert and seek each other in the first hour after a normal delivery. They should be allowed to have maximum contact in that period. Routine procedures that keep them apart (such as bathing) should be delayed for at least one hour. It has been shown that increased contact in this period leads to increased length of breast feeding as well as superior mother-infant relationships.
2) **Avoid supplementary/complementary feeds:** during the first few days the normal term newborn has a low fluid requirement. This means that the rather small volumes of colostrum/milk that are produced are enough. Providing extra artificial milk or water is usually not necessary and serves to reduce the production of breast milk. Also, it seems that it is easier for a baby to obtain milk by sucking on rubber teat than from the mother's nipple. So once a baby has experienced a teat it may object to the nipple. It is thus best to keep teats way from breast feeding babies.
3) **Mother's nutrition:** for good lactation it is essential that the mother takes an adequate balanced diet and extra fluids.
4) **Rest and relaxation:** it is very helpful if a mother can take a regular rest period during the day and get adequate sleep at night. Many mothers find it more restful and satisfying to have the baby sleep in bed with them. The dangers of overlying have been greatly over emphasised in the past.

5) **Prolactin stimulators:** certain medications have the effect of stimulating the hypothalamus to secrete prolactin. These may be used to re-stimulate a failing milk supply. Their use must always be accompanied by good diet, extra fluids, and as much sucking on the nipple by the baby as possible. These medications are Maxolone (metoclopramide), Eglonyl (sulpiride) and must be prescribed by the Doctor.

COMMON MISCONCEPTIONS ABOUT BREAST FEEDING

1) **The working mother – cannot breast feed a baby:** This is not so. If the baby is artificially fed by a caretaker during the working day, the mother can breast feed during the evening, night and early morning. Lactation is especially well maintained if the baby sleeps with the mother. Many nurses use this scheme very successfully with their own babies.
2) **Small breasts – cannot produce enough milk:** This is not so as much of the contour of a breast is made up of adipose tissue. Small breasts produce quite as much as larger ones.
3) **A short period of breastfeeding is not worth the trouble:** this is not so. Many of the positive advantages of breastfeeding are of particular benefit to the very young infant. These include the anti-infective and antiallergic effects. Even a period as short as 2-3 weeks can be a lasting benefit to the baby.

COMMON PROBLEMS OF BREAST FEEDING

1) **Breast engorgement:** the breast become enlarged, painful and even oedematous on the 2^{nd}-5^{th} day after delivery. The milk flow is poor and mastitis is often wrongly diagnosed. The correct management is to empty the breasts by manual expression or with a breast pump and then to encourage the infant to suck as much as possible
2) **Mastitis:** Staphylococci may enter the breast either via the milk ducts, Montgomery's tubercles or an abrasion in the nipple. The incomplete emptying of the breasts always makes infection more likely and should be avoided. Mastitis is not a reason to stop breastfeeding. The baby should feed from unaffected breast whilst the infected breast is expressed. If the mastitis is at an early stage treatment with Penicillin or Cloxacillin may be adequate. If an abscess has already formed the patient needs hospital referral for incision and drainage. In either case once mastitis is improved, feeding from that breast may be resumed.
3) **Painful or cracked nipples:** this condition may be due to a variety of causes including; flat nipples, engorged breasts, and tugging by the baby before fixing to the nipple has occurred. Do not advise stopping breast feeding. The mother may need to express her milk for 24-48 hours to give them a chance to recover. An emollient cream such as Vandol or lanolin cream short spells of exposure of sunlight and the treatment of candida infection if present may all help.

Inadequate lactation: the main causes of this are;

1) Use of 'sup' or 'cump' artificial feeds
2) Missing out feeds
3) Anxiety
4) Fatigue and other emotional problems

5) Certain contraceptive pills

MANAGEMENT INCLUDES

1) Ensuing adequate fluid intake and diet
2) Frequent suckling
3) Prolactin stimulators such as Maxolon and Eglonyl

2. ARTIFICIAL FEEDING

Choice of Milk:

0-3 months

Use a humanise formula such as NAN or S26. The main advantage of these milks is that they present a lower solute load to the immature kidneys. Unlike breast milk however, they do not provide protection against infection or allergy

4-6 months

Use a full cream or dried milk e.g. Lactogen, Nespray, Klim, Babymilk Plus.

6-12 Months

a) Skim milk: this is prepared from milk that has had most of the cream (fat) removed. This results in a powder that is high in protein and lactose. If used to provide the same number of calories as full cream milk, the high lactose content may lead to lose stools in some infants – especially in infants with reduced lactose tolerance, such as those with sever acute malnutrition or chronic diarrhoea. It should not be used as routine milk feed for infants less than 9 months of age. Its main use is a high protein supplement to solid foods. For example: skim milk powder sprinkled onto porridge makes a well-balanced energy and protein food.
b) Soya based milk: like Isomil, Infasoya, Sobes, Mullsoy. These milks all contain soya protein and are lactose free. They are prescribed in cases of lactose intolerance or allergy to cow's milk and have sucrose as their sugar.
c) Special milks for chronic Diarrhoea or Malabsorption e.g. Nutramigen, AL110, Alfare. These are used for specific conditions and should only be prescribed at specialist level.
d) Bottle hygiene in all cases. The bottle should be thoroughly washed with soap or detergent. A bottle brush is of great assistance, teats should be washed and rubbed with salt and both the bottle and the teats are boiled in a pot of water for at least 15 minutes and allow cooling down before filling. Or **prepare a solution of diluted Jik** and leave the bottles and teats submerged for 10 minutes or until the next feed. It is not necessary to rinse the bottle before filling it with milk. Teats perish very quickly when boiled so rather use this method.
e) **To prepare the Jik solution:** place 2 litres of clean water in a suitable container and add 1 table spoon of un-perfumed Jik. This solution should be changed daily.
f) Note:
    - If a fridge is available for storage it is fine to make up a whole day's feeds at once.

- Otherwise make only one feed at a time as the milk is breeding ground for bacteria.
- Throw away the unfinished feed for the same reason.

3. MIXING FEEDS

Use clean cooled water

- Use 1 scoop (as provided by the manufacturer) per 25 ml of water. Avoid heaping or packing the powder as this will produce an over concentrated feed and may lead to salt overload and hypernatraemia.
- The most dangerous error is to prepare a dilute feed as the baby then receives insufficient energy and protein with the result that growth is slowed down leading before long to sever acute malnutrition.
- Volume of feeds: after first 5 days of life 150 ml/kg/24 hrs is a rough guide. The best guide is the baby's weight gain. Adequate weight gain is about 25g per day in the first 4 months and 500g per month from 5-12 months of age.

How many feeds per day?

- Under 6 months: not less than 5
- 6-12 months: not less than 3

Feeding of solids to older infants and preschool children

Food is needed in the body for three main purposes:

The energy requirements of the baby which include the maintaining of body temperature, the work done by muscles including the heart, the carrying out of the many, different chemical reactions involved in the body's metabolism and for many other purposes.

The foods providing most of the body's energy are carbohydrates, (4Kcal/g), and fats (9 Kcal/g): 1 kilojoule = 4.2 Kcal). Proteins are able to provide energy if no other source is available.

The repair of tissues and cells that normally "wear out" i.e. the hair, skin, blood cells, and cells of small intestinal villi etc. this process requires both energy and protein.

The growth of the child and adolescent: this requires both energy and protein. If a child is not getting enough to eat, the first of these processes to suffer will be growth which slows down and in severe cases even stops completely. If the food intake is even more decreased the processes of repair will cease. The skin will become thin, the number of red cells will decline and the lining of the small intestine will become flattened. This stage is typically seen sever acute malnutrition with oedema. The most severe case of all is when the energy supply falls. In this situation the child's activity is reduced, the body temperature falls and death is very close.

Food value of some common foods:

Energy containing foods:

Carbohydrates containing foods:

Mealie meal Samp

Rice Sugar

Potatoes

Fat containing foods such as:

Margarine	Cooking oil
Lard	Dripping
Peanut butter	

Protein containing foods

More expensive

Milk	Skim powder
Meat	Fish
Eggs	

Less expensive

Beans	Nuts

Protective foods

These contain vitamins and minerals but generally very little in the way of protein or energy. Some examples:

Green vegetables	yellow vegetables
Spinach	Squash
Cabbage	Carrots
Cauliflower	Pumpkin

Points about individual food stuffs

A mealie seed consists of a large upper sac below which is a small protein rich germ bud. When the seeds are ground coarsely and the meal is left unsifted a useful quantity of protein remains in the meal. The highly relined and sifted meal usually sold in the shops has led almost all the germ bud removed and thus has very low protein content.

Samp:

This is almost pure starch. It requires prolonged cooking, the fuel for which must be added to its cost.

Beans

These are rich in both energy and protein and are one of the most economical sources of protein.

Instant cereals

Nestum, Pronutro, Cerelac etc. are all scientifically prepared cooked foods of excellent nutrients. Their major drawback is cost.

An outline of ideal feeding of preschool children

0-4 months

Breast milk is the ideal

If necessary artificial milk is used

Vitamins: for breast fed babies and babies fed on artificial milks, which do not contain added vitamins, it is important to recommend a multivitamin preparation which contains vitamin D 400 IU, Vitamin C 50 mg, Vitamin A 5000 IU in daily doses.

4-9 months

Start at 4 months with a simple porridge. Later add vegetables one at a time giving the baby time to get used to new tastes and textures. The quantity is gradually increased. The milk feeds continue as before.

9 months to 4 year

600 ml of breast, artificial or fresh cow's milk per day is required throughout this period. In addition, 3-4 good sized solid food meals are given. The small stomach size of the young child makes it necessary to give feeds frequently in this way. The most economical way to provide balanced meals at this age is basic porridge such as mealie meal with small amounts of beans or skim milk powder which are rich in protein, added. Finally add a small quantity of fat or oil.

Some examples are:

- Mealie meal + beans + cooking oil
- Samp + skim milk

The six golden rules of good nutrition for young children are:

1. Breast feed for 2 years of age
2. Start porridge at 6 months, not sooner
3. Add protein and fat/oil to the porridge
4. Give infants and toddlers 4 good-sized meals a day
5. Give protective foods to children over 6 months
6. A sick child needs to be fed as well as any other child

THE END

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