



Common problems during lactation and their management

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Abstract

Objective: To present an update review on common problems associated with breastfeeding and their management.

Source of data: A comprehensive bibliographic review on the issue was performed by searching publications from the MEDLINE database and from national and international organizations. Books and some key articles cited in other sources were also selected.

Summary of the findings: Several common problems that may arise during the breastfeeding period, such as breast engorgement, plugged milk duct, breast infection and insufficient milk supply, originate from conditions that lead the mother to inadequately empty the breasts. Incorrect techniques, not frequent breastfeeding and breastfeeding on scheduled times, pacifiers and food suppliers are important risk factors that can predispose to lactation problems. The adequate management of those conditions is fundamental, as if not treated they frequently lead to early weaning. There are specific measures that should be taken to empty the breasts effectively. Besides, the emotional support and actions that yield more comfort to the lactating mother can not be neglected.

Conclusions: Most common problems associated with breastfeeding can be prevented if the mother empties her breasts effectively. If they occur, they should be carefully and adequately approached, thus avoiding the early weaning resultant from painful and stressing situations the mother may face.

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The human species is the only one among mammals in which breastfeeding and weaning are not governed only by instinct. Therefore, breastfeeding and weaning have to be learned. Currently, especially in modern societies, women have few opportunities to learn something about breastfeeding because their traditional sources of learning – more experienced women in the family – were lost as extended families were replaced by nuclear families. Consequently, women become mothers with little or no ability to breastfeed, which makes them more vulnerable to difficulties during the process. Health professionals play a crucial role in the prevention and management of such difficulties, but to do that, they need specific knowledge, attitudes and skills.

The present article reviews the major difficulties encountered in breastfeeding and their management and seeks to provide technical and practical information necessary for health professionals to promote, protect and support the breastfeeding practice. Common problems related to breastfeeding are discussed, including breast engorgement, nipple pain/trauma, nipple infection caused by *Staphylococcus aureus*, candidiasis, Raynaud's phenomenon, plugged ducts, mastitis, breast abscess and galactocele – besides poor milk production or hypogalactia.

Breast engorgement

The three basic components of breast engorgement are: congestion/increased vascularization, accumulation of milk and edema caused by the congestion and obstruction of lymphatic drainage. In 1951, the sequence of events implicated in breast engorgement was published: milk retention in the alveoli → alveolar distension → duct compression → milk flow obstruction → deterioration of alveolar distension → increased obstruction. Later on, there is edema due to vascular and lymphatic stasis. If no relief is obtained, milk production is interrupted, with later

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reabsorption of the residual milk.¹ The increase in intraductal pressure causes the residual milk to undergo an intermolecular transformation, and to become thicker.²

It is important to distinguish between physiological and pathological engorgement. The former is discrete and is a positive sign that milk is "coming in." It requires no intervention. In pathological engorgement, there is excessive tissue distension, causing great discomfort, sometimes accompanied by fever and malaise. The breast is bigger, painful, with diffuse shiny reddish areas, and edema. Nipples become flat, hampering proper latch-on, and milk sometimes does not flow normally. This type of engorgement often occurs around the third to fifth day after delivery and usually is associated with one of the following factors: late initiation of breastfeeding, infrequent breastfeeding, restriction on the duration and frequency of breastfeeding, use of complementary foods, and babies with poor suck.³

Engorgement may affect only the areola (areolar engorgement) or the main body of the breast (peripheral engorgement) or both. In case of areolar engorgement, latch-on may be hindered, preventing the proper emptying of the breast, which increases engorgement and pain.

Prevention

The following recommendations are useful for the prevention of breast engorgement:³

- start nursing as soon as possible;
- breastfeed on demand;
- use a proper breastfeeding technique;
- avoid the use of supplements.

Treatment

Once breast engorgement is established, the following measures are recommended:³

- if the areola is engorged, manually express some milk before breastfeeding, so that the areola gets soft enough for the baby to grasp it properly;
- breastfeed on demand on a regular basis;
- massage the breasts gently – this is important to fluidify the viscous milk and to stimulate the let-down reflex;
- use systemic analgesics/anti-inflammatory drugs. Ibuprofen is regarded as most efficient, and it also helps to reduce inflammation and edema. Paracetamol can be used as an alternative;⁴
- wear a well-fitting, supportive bra with large flaps for pain relief and in order to keep the ducts in an anatomical position;
- apply warm compresses to help the ejection of the milk;
- apply cold compresses after or between breastfeeding to reduce edema, vascularization and pain.

If the baby is not sucking, the milk must be manually expressed or pumped. The emptying of the breast is essential for maternal relief, to reduce mechanical pressure on the alveoli, remove the hindrance to the drainage of

the lymphatic system and edema, minimize the risk of insufficient milk production and, especially, the risk of mastitis.

Snowden et al., in a systematic review of the literature including eight randomized or quasi-randomized clinical trials, concluded that there is no scientific evidence that treating breast engorgement with ultrasound, oxytocin or cold compresses is efficient in alleviating the symptoms. The use of anti-inflammatory drugs was the only treatment that proved to be efficacious.⁵ Although the efficacy of cold compresses (or of a cloth-wrapped ice pack) for the relief of breast engorgement symptoms has not been confirmed, they may be useful in reducing milk production. Local hypothermia produces temporary vasoconstriction and, consequently, reduces blood flow, with consequent reduction of the edema, increase in lymphatic drainage and lower milk production. These cold compresses should not be used for over 15 to 20 minutes.⁶ On the other hand, warm moist compresses produce vasodilation, alleviating local compression, but, later, they increase the volume of milk in the breasts, which can be a disadvantage in the presence of breast engorgement.

Sore nipples/nipple trauma

At the beginning of breastfeeding, most women feel a mild pain or discomfort, and this may be considered to be normal. However, too sore or damaged nipples, albeit very common, are not normal. Nipple trauma includes erythema, edema, fissures, blisters, white "spots," yellow or dark spots and ecchymosis.

The most common cause of pain during breastfeeding is due to nipple trauma caused by improper positioning and inappropriate latch-on.⁷ Other causes include short/flat or inverted nipples, oral dysfunctions in the infant, excessively short frenulum, prolonged nonnutritive sucking, improper use of milk pumps, not breaking suction before taking the infant off of the breast, use of creams and oils that cause allergic reactions on the nipples, use of nipple shields and prolonged exposure to wet nursing pads. The myth that fair-skinned women are more vulnerable to nipple trauma than dark-skinned women has never been confirmed.³

Prevention

Pain on breastfeeding is an important cause of weaning and, therefore, its prevention is essential. Preventive measures include the following:⁸

- use a proper breastfeeding technique;
- keep the nipples dry by exposing them to air or sunlight and change the nursing pads used to prevent milk flow, on a regular basis;
- avoid products that remove the natural protection of nipples, such as soaps, alcohol or any drying agent;
- breastfeed on demand – infants who are put to the breast as soon as they show they want to feed feel less hungry and tend not to suck vigorously on the breast;

- manually express milk from the areola before breastfeeding if it is engorged, since this increases flexibility and allows for a proper latch-on;
- if a feeding has to be discontinued, slip the index or little finger into the infant's mouth between his/her gums to break suction before the infant is taken off of the breast;
- avoid the use of nipple shields.

Treatment

Once established, nipple trauma is extremely painful and often serves as a portal of entry for bacteria. Therefore, besides treating the problem that is causing nipple pain (inappropriate latch-on, in most cases), an intervention is necessary to alleviate the pain and help lesions to heal as fast as possible.

First of all, the following measures, aimed at minimizing the stimulation of pain receptors located on the skin of the nipple and areola, are recommended:⁸

- offer the least affected breast first;
- express enough milk before breastfeeding to stimulate the let-down reflex, thus preventing the infant from sucking too vigorously on the breast;
- alternate between different positions, reducing the pressure on sore areas or on damaged tissues;
- use "breast shells" (an alternative is to use a small plastic strainer, with no handle) between feedings, eliminating the friction of the sore area against the mother's clothes. However, this device favors spontaneous milk drainage, which makes the tissue more vulnerable to maceration. Therefore, this recommendation should be assessed on a case-by-case basis, weighing its benefits and risks;
- use oral systemic analgesics, if necessary.

It should be underscored that restricting the duration of the feedings does not have any effect on the prevention or treatment of nipple trauma.⁹

There are two treatment options to hasten the healing of nipple trauma: dry wound healing and moist wound healing.⁸ The dry healing of cracked nipple (exposure to light, sunbathing, blow-drying), quite popular in the last few decades, has not been recommended anymore because scar healing is believed to be more efficient if the internal layers of the epidermis (exposed by the lesion) are kept moist. Currently, the moist treatment of nipple fissures (use of breastmilk, and appropriate creams and oils) has been recommended, with the aim of forming a protective layer that prevents the dehydration of the deepest layers of the epidermis.⁸ Although no studies exist that advocate the use of expressed breastmilk after feedings in the treatment of cracked nipple, this practice has been recommended by specialists, due to the anti-infective properties of breastmilk, which may theoretically help prevent mastitis, an important complication of sore nipple.¹⁰ Even though its efficacy has not been corroborated by any studies, some experts recommend the use of creams containing vitamin A and D, modified anhydrous lanolin and corticosteroid creams or ointments. The latter are used for more severe nipple trauma, provided that fungal or bacterial infection has been

ruled out.^{8,10} Corticosteroids mentioned in the literature are mometasone 0.1% (synthetic corticosteroid) and halobetasol propionate.

A randomized clinical trial compared four different strategies for the treatment of sore nipple: modified lanolin, warm moist compresses, expressed breastmilk and only education. The conclusion was that no difference exists between the different treatments with regard to pain intensity and maintenance of breastfeeding.¹¹ Another study revealed that modified lanolin is useful in alleviating nipple pain, especially between the sixth and tenth days after delivery.¹²

A practice that has become quite popular in some Brazilian regions is the use of tea bags for the treatment of sore nipple. This practice is not supported in the literature, since there are at least two studies that show that the use of tea bags is as effective as the use of warm moist compresses.^{13,14} These compresses, because of vasodilation, may bring some relief to mothers with sore nipples. Tannic acid found in tea may actually cause damage to the nipples.

There are several popular practices believed to heal cracked nipple, such as the use of banana and papaya peels. These practices should be avoided until studies that indicate their efficacy and harmlessness are conducted. Novak et al. found significant levels of potentially pathogenic microorganisms in banana peel, which may trigger an infectious process if the peels are applied on the fissures.¹⁵

Nipple infection caused by *Staphylococcus aureus*

Secondary nipple infection is quite common, especially that which is caused by *Staphylococcus aureus*. A study demonstrated that 54% of mothers with infants younger than one month, with cracked nipple and moderate to severe pain, tested positive for *S. aureus*.¹⁶

When *S. aureus* infection is suspected, the topical use of mupirocin at 2% or even systemic antibiotic therapy is recommended.¹⁶ A study showed that systemic antibiotic therapy (dicloxacillin) was highly efficient in the treatment of nipple infection caused by *S. aureus*, compared to other treatment schemes: guidance to improve the breastfeeding technique, topical mupirocin and topical fusidic acid. The treatment was better in terms of regression of symptoms and also prevented the development of mastitis: 25% of mothers with nipple infection caused by *S. aureus* not treated with systemic antibiotics developed mastitis whereas only 5% of treated mothers had the disease.¹⁷ Neifert recommends that the risks and benefits of systemic antibiotic therapy be weighed in relation to early weaning due to persistent nipple pain and to the morbidity associated with puerperal mastitis.¹⁸

Candidiasis

Breast infection caused by *Candida albicans* in the puerperium is quite common. Infection can be superficial or

affect the lactiferous ducts, and often occurs in the presence of moist nipples (candida interacts with carbohydrate-containing substrates) and of lesions. Vaginal candidiasis, use of antibiotics, oral contraceptives and steroids and use of contaminated pacifiers increase the risk of breast candidiasis.¹⁹ Usually it is the infant who transmits the fungus, even if no symptoms are present.

Candida infection often is characterized by itching, burning sensation and "twinges" in the nipples, which persist after breastfeeding. The nipples usually have a reddish and shiny appearance. Some mothers complain of burning and twinges in the breasts. The infant usually has oral white patches, which should not be mistaken for milk patches (the latter of which are removed without leaving a bloody area).

Prevention

As the fungus grows in a moist, warm and dark environment, maintaining the nipples dry and exposing them to air, and also exposing them to light for some minutes every day, are preventive measures against the development of candida infection.

Treatment

Mother and infant must be treated simultaneously, even if the infant does not present with signs of candidiasis. Treatment is initially topical and includes nystatin, clotrimazole, miconazole or ketoconazole for two weeks. Women can apply the cream after each breastfeeding and do not have to remove it before the next breastfeeding. A large number of candida species are resistant to nystatin. Gentian violet 0.5 at 1% can be used on the nipples/areolas and in the mouth of the infant once a day for three to four days. If topical treatment is not efficacious, the use of systemic oral fluconazole is recommended for 14 to 18 days.^{3,20}

In addition to the specific treatment against the fungus, some general measures are useful during treatment, such as rinsing the nipples and air-dry them after breastfeedings and expose the nipples to sunlight for at least some minutes every day. Pacifiers and bottle nipples are an important source of reinfection, therefore, if it is not possible to eliminate them, they should be boiled for 20 minutes, at least once a day.³

Raynaud's phenomenon

Raynaud's phenomenon, an intermittent ischemia caused by a vasospasm that often occurs in the fingers and toes, can also affect the nipples. In general, it occurs in response to cold temperature exposure, abnormal compression of the nipple in the infant's mouth or severe nipple trauma. However, the cause can not always be identified. Vasospasms may cause nipples to become pale (due to the lack of blood irrigation) and often are very painful. They can appear before, during or after breastfeedings, but it is more common for them to occur

after breastfeedings, probably because, in general, the air is cooler than the infant's mouth. Many women report a twinging pain or burning sensation when the nipple is pale, and therefore, this condition often is mistaken for candidiasis, although fungal infection itself can lead to Raynaud's phenomenon. Spasms, with a characteristic pain, last from seconds to minutes, but the pain can last for one hour or more. Usually a sequence of spasms occurs, with short intervals in-between. Some medications such as fluconazole and oral contraceptives can aggravate vasospasms.²¹

Treatment

The management consists in treating the basic cause that produces the vasospasm in the nipple. Warm compresses can alleviate the pain. When pain is severe and does not improve with the afore-mentioned measures (which is rare), some medications can be used, although there are no studies that scientifically confirm this recommendation. Among these medications, there are nifedipine (5 mg, three times a day for one to two weeks or 30 mg once a day for the slow-releasing formulation), vitamin B₆ (200 mg/day, once a day, for 4 to 5 days and later 50mg/day for another 1 to 2 weeks), calcium supplementation (2,000 mg/day), magnesium supplementation (1,000 mg/day) and ibuprofen.^{21,22}

Plugged ducts

Lactiferous ducts are plugged when the milk produced in a certain breast area does not drain properly for some reason (solid obstruction is not necessary). This often occurs when the breast is not properly emptied, which may occur when breastfeeding is infrequent or when the infant has a poor suck. It may also happen when there is local pressure on some area, for instance, a very tight bra, or as a consequence of the use of creams on the nipples.

Plugged ducts are typically characterized by the presence of sensitive and painful breast lumps in a mother without any other breast disease. There may be pain, heat and erythema in the affected area, not accompanied by high-grade fever. Sometimes, this condition is associated with a small, almost imperceptible, white spot at the tip of the nipple, which may hurt a lot during breastfeeding.⁴

Prevention

Any measure that facilitates the complete emptying of the breast can prevent the occurrence of plugged ducts. Thus, a proper nursing technique and frequent breastfeedings minimize this complication, as well as wearing a bra that does not interfere with milk drainage and avoiding the use of unnecessary creams on the nipples.

Treatment

In the presence of plugged ducts, the following measures are necessary:

- breastfeed on a regular basis;
- alternate between breastfeeding positions, offering the infant the affected breast first, with the infant's chin pointed towards the affected area, thus facilitating the removal of milk from the area;
- apply local heat, and gently massage the affected region in the direction of the nipple, before and during feedings;
- express milk from the breast if the infant cannot empty it.

If there is a whitish spot at the tip of the nipple, rub it off with a towel or use a sterilized needle.⁴

Mastitis

Mastitis is an inflammatory process of one or more breast segments (the upper left quadrant is most commonly affected) that may or may not progress into bacterial infection. It usually occurs in the second and third weeks after delivery, and very rarely, after the twelfth week.⁴ Initially, the intraductal pressure rises due to milk stasis (a plugged duct often is the precursor of mastitis), with consequent flattening of alveolar cells and development of spaces between the cells. Some components (mainly immunoproteins and sodium) cross from plasma into milk and from milk into the interstitial tissue (especially cytokines) through this space, inducing an inflammatory response, most times involving the interlobular connective tissue. The accumulated milk, the inflammatory response, and the resulting tissue damage facilitate the establishment of the infection, usually by *Staphylococcus (aureus and albus)* and occasionally by *Escherichia coli* and *Streptococcus* (alpha-, beta- and non-hemolytic), and nipple damage often are the portal of entry for the bacteria.⁴

Any factor that favors the stagnation of breastmilk predisposes to the development of mastitis, including scheduled feedings, sudden change in the number of feedings, infant's long sleep period at night, use of pacifiers or bottles, failure to completely empty the breast, short frenulum, infant with a poor suck, excessive milk production, separation of mother and infant, and abrupt weaning.⁴ Maternal fatigue facilitates the development of mastitis.²³ Women who have already had mastitis in the current lactation or in previous lactations are more susceptible to developing other mastites, due to the broken integrity of the junction between alveolar cells.²³

In mastitis, the affected portion of the breast is painful, hyperemic, edematous and warm. If infection is present, important systemic manifestations occur, such as malaise, high-grade fever (above 38 °C) and chills. Sodium and chloride levels are elevated in the milk whereas lactose levels are low, which makes the milk taste saltier and may be rejected by the infant. Mastitis usually is unilateral, but it may be bilateral as well.

The distinction between infectious and non-infectious mastitis through signs and symptoms is not always possible. Whenever possible, it is recommended to count cells and colonies in the milk for a more accurate diagnosis.⁴

A sample with more than 10⁶ leukocytes and over 10³ bacteria per ml of milk characterizes infection; more than 10⁶ leukocytes and less than 10³ bacteria per ml indicates non-infectious inflammation; and less than 10⁶ leukocytes and less than 10³ bacteria per ml represents only milk stasis.²⁴ Whenever possible, milk culture is recommended to determine the infectious agent, if present. If milk culture is not viable as a routine practice, it should be performed in the following situations: lack of response to antibiotic therapy, recurrent mastitis, hospital-acquired mastitis and in severe cases.⁴ The milk sample for culture should be collected using the same rigor for the collection of other samples (e.g.: urine). After washing the breast in running water and carefully washing the hands with soap and water, the milk should be expressed, not letting the nipple touch the collection vial, which should have been sterilized. The first 3 to 5 ml of milk should be disregarded.³

Prevention

The preventive measures are the same ones recommended for breast engorgement, plugged ducts and cracked nipple, and so is the early management of these intercurrent diseases.

Treatment

Proper emptying of the breast is the most important part of the treatment for mastitis, with maintenance of breastfeeding and manual milk expression after feedings, if necessary. Despite the presence of bacteria in breastmilk, in case of mastitis, breastfeeding should be maintained, as it does not pose any risks to healthy full-term infants.^{4,25}

Antibiotic therapy is indicated in the presence of the following criteria: (1) cell and colony count and milk culture indicating infection; (2) severe symptoms right from the beginning; (3) visible nipple crack; and (4) persistence of symptoms after 12 to 24 hours of the effective removal of the accumulated milk.⁴ Since *S. aureus* is the bacterium most frequently found in infections, antistaphylococcal drugs (dicloxacillin, amoxicillin, cephalosporins, clindamycin or erythromycin) are the antibiotics of choice, and they should be implemented as soon as possible and maintained for 10 to 14 days. Besides antibiotic therapy and complete emptying of the affected breast, the following measures are also part of the treatment: maternal rest (preferably in bed), analgesics or non-steroidal anti-inflammatory drugs such as ibuprofen, and abundant intake of fluids. Warm compresses before feedings can help drain the milk, whereas cold compresses after feedings or short intervals help relieve the symptoms. Other useful measures to minimize discomfort include offering the unaffected breast first and wearing a well-fitting bra.^{3,26} As mastitis is quite painful, with involvement of the general health status, emotional support should always be part of the treatment.⁴ If no improvement is obtained within 48 hours, the presence of breast abscess should be investigated.

Breast abscess

In general, breast abscess is caused by untreated mastitis or results from late or inefficient treatment. It affects 5 to 10% of women with mastitis. Improper emptying of the breast affected by mastitis, which often occurs when feeding is discontinued on that breast, favors the development of breast abscess.

The abscess can be detected by a floating sensation on palpation, but it is not always possible to confirm or rule out the presence of abscess only through clinical examination. Ultrasonography can confirm the disease, also indicating the best site for incision or aspiration.

Prevention

Considerable effort should be made to prevent breast abscess, as this disease may compromise future lactations in approximately 10% of cases. Extensive abscesses may need large resections, which can result in breast deformities and functional involvement. Any measure that prevents the development of mastitis will consequently prevent breast abscess, and so will the early treatment of mastitis, if it cannot be prevented.

Treatment

The treatment of breast abscess consists in emptying the abscess by way of surgical drainage or aspiration. Repeated aspirations have the advantage of being less painful and less mutilating than incision and drainage, and can be performed under local anesthesia. Despite the presence of bacteria in the milk, in case of breast abscess, breastfeeding should be maintained as it does not pose any risks to healthy full-term infants.^{4,25} Maintaining lactation is important for treating the abscess. There are several studies showing that breastfeeding is safe for the infant, even in the presence of *Staphylococcus aureus*.⁴

If it is necessary to discontinue feeding on the affected breast, this breast should be regularly emptied and feeding should be maintained on the healthy breast.

Galactocele

Galactocele is the cystic formation observed in lactiferous ducts containing milky fluid. The liquid, which is initially a fluid, becomes thick, and may leak from the nipple. Galactocele is believed to be caused by a plugged duct. On palpation, it feels like a smooth and round-shaped mass, but the diagnosis is established by aspiration or ultrasonography. Treatment consists of aspiration. However, the cysts should be surgically removed because they fill with milk again after aspiration.⁴

Poor milk production

After childbirth and expulsion of the placenta, the maternal serum levels of progesterone decrease drastically, with consequent prolactin secretion by the anterior pituitary gland, which stimulates lactogenesis

phase 2 and begins milk secretion. The posterior pituitary gland secretes oxytocin, which causes the contraction of the myoepithelial cells that surround the alveoli, allowing milk to be secreted. Initially, breastmilk synthesis is basically controlled by hormone action and "milk comes in," which often occurs up to the third or fourth day after delivery (it occurs even if the infant is not sucking). After that, lactogenesis phase 3, known as galactopoiesis, begins. This phase, which lasts up to the end of lactation, is controlled by autocrine mechanisms and basically depends on the emptying of the breast. Therefore, the quality and quantity of suction by the infant now regulate the synthesis of maternal milk. With the suction and transfer of the milk to the infant, the hypothalamus inhibits dopamine secretion (prolactin inhibitory factor); this decrease in dopamine levels stimulates prolactin secretion, which promotes milk secretion. The integrity of the hypothalamic-pituitary axis, which regulates prolactin and oxytocin levels, is essential to trigger and maintain breastmilk synthesis. Oxytocin secretion can occur in response to conditioned stimuli, such as vision, smell and infant crying, and to emotional factors, such as motivation, self-confidence and tranquility. On the other hand, pain, discomfort, stress, anxiety, fear and lack of self-confidence may inhibit the let-down reflex, hampering lactation.²⁷

Milk secretion increases from less than 100 ml/day at the beginning to approximately 600 ml on the fourth day, on average.²⁸ The volume of milk produced in the established lactation varies according to the infant's demand. On average, it amounts to 850 ml a day in exclusive breastfeeding. The rate of breastmilk synthesis after each breastfeeding varies, but it is higher when the breast is emptied on a regular basis.²⁹ In general, the mother's capacity to produce milk is larger than the infant's appetite.

The storage capacity of the breast varies among women and may vary between the two breasts in the same woman. This capacity tends to increase with breast size, but it is not related to milk production in 24 hours. It may be important to determine the frequency of feedings. Thus, infants of mothers with a lower storage capacity satisfy their demand by breastfeeding more frequently.³⁰

Most women can produce enough milk to meet their infants' demand. However, "weak milk" or "insufficient milk" is the most frequent argument for the introduction of complementary foods, which may culminate in weaning. The complaint of "insufficient milk" is more often than not a wrong perception of the mother, fostered by the mother's uncertainty about her capacity to feed her baby properly, no knowledge about the normal behavior of a baby (who usually nurses frequently) and negative opinions of significant persons. The wrong perception by the mother often leads to the introduction of complementary feeding, which negatively affects milk production, as the infant tends to suckle less.

When milk is not sufficient, the infant does not feel satisfied after feedings, cries a lot, wants to nurse frequently, takes very long feedings and does not gain weight properly (< 20 g a day). The number of wet diapers a day (less than

six to eight) and infrequent bowel movements, with a small amount of stools, which are dry and hard, indirectly indicate low intake of milk. The following signs indicate that an infant is not receiving enough milk in the first weeks of life: weight loss greater than 10% of the birthweight, not regaining birthweight up to two weeks of life, no urinary output for 24 hours, absence of yellow stools in the first week and clinical signs of dehydration.³¹

Figure 1 shows the negative cycle that occurs between low intake of milk and low milk production. Any maternal or infant factor that restricts the emptying of the breasts may reduce breastmilk synthesis, by mechanical and chemical inhibition. The continuous removal of feedback inhibitor of lactation (FIL) from the milk guarantees the total restoration of the removed milk.³² Inappropriate latch-on is the major cause of inefficient milk removal. Infrequent and/or short breastfeedings, scheduled feedings, absence of breastfeedings at night, breast engorgement, use of complementary foods and use of pacifiers and nipple shields can also result in inappropriate emptying of the breasts. Other less frequent situations associated with a poor suck (cleft lip and/or palate, short frenulum, micrognathia, macroglossia, choanal atresia, maternal or infant medication that causes drowsiness, neonatal asphyxia, preterm birth, Down’s syndrome,

hypothyroidism, neuromuscular dysfunction, central nervous system diseases, abnormal suck), anatomical breast disorders (oversized, inverted or flat nipples), maternal diseases (infection, hypothyroidism, untreated diabetes, Sheehan’s syndrome, pituitary tumor, mental disease), retention of placental membranes, maternal fatigue, emotional disorders, medications that reduce breastmilk synthesis, important dietary restriction, breast reduction surgery, smoking and pregnancy are possible determinants of low milk production. Therefore, it is important to have a detailed history and a careful observation of breastfeedings in order to rule out such problems.³³

Treatment

If milk production seems to be insufficient for the infant, due to low weight gain, in the absence of diseases, the first thing to do is to check whether the infant is properly positioned during breastfeeding and whether the latch-on is appropriate. To increase milk production, the following measures are useful:

- improve latch-on, if necessary;
- increase the frequency of feeding;
- offer both breasts in each breastfeeding;

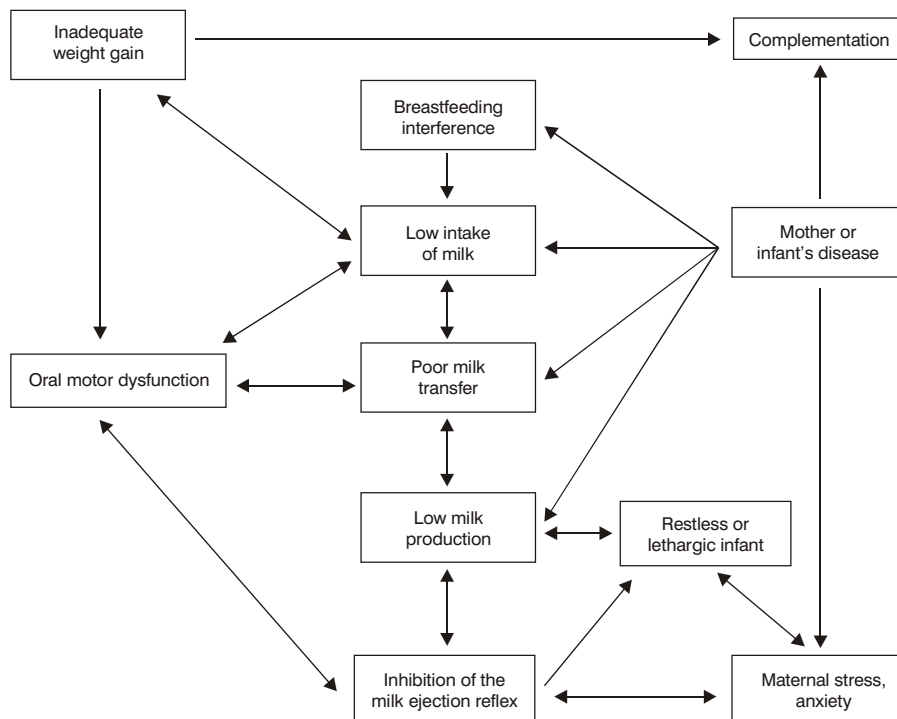


Figure 1 - Interrelation between several variables that lead to low milk production, infant’s insufficient weight gain and complementary feeding

- allow the infant to empty the breasts completely;
- alternate between breasts during the same feeding if the infant feels drowsy or if he/she is not sucking vigorously;
- avoid the use of bottles, pacifiers and nipple shields;
- eat a balanced diet;
- drink enough fluids (recall that excessive intake of fluids does not increase milk production, and can even reduce it.^{34,35});
- take a rest.

In some selected cases, when the measures mentioned above do not work, the use of medications may be useful. The most widely used medications are domperidone and metoclopramide, dopamine antagonists, which increase prolactin levels (see the article entitled "Breastfeeding and maternal medications" in this supplement). Domperidone, widely used in Canada and Mexico, does not cross the blood-brain barrier, which makes it safer than metoclopramide, with fewer side effects, and may be used for an undetermined time period. However, these drugs seemingly do not stimulate milk secretion when prolactin levels are already sufficiently high or when there is not enough glandular tissue.³⁶

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