

Original Article: The Effect of Massage on the Occurrence of Complications in Premature Infants Admitted to the Neonatal Intensive Care Unit

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ABSTRACT

According to the report of the World Health Organization in 2009, 3438 babies (5.7%) were born prematurely and the average hospitalization days of premature babies (less than 32 weeks of pregnancy) was 35 days. In America, approximately 12% of low-birth-weight babies and 8% of premature babies are born. The length of hospitalization of these babies lasted an average of 3 weeks and cost 1000 to 2500 dollars per day of hospitalization. A baby's age is an important determining factor for his chances of survival and natural growth and development. According to the definition of the World Health Organization, babies who are born earlier than 37 weeks from the last day of menstruation are considered premature. A growing percentage of the deaths of children under 5 years of age occur in infancy. About 38% of deaths in this age group occur within the first month of life, and 28% of these cases are attributed to the birth of premature babies. Since the last two decades, the number of babies with low birth weight has increased mainly due to the increase in the number of premature births, and the rate of mortality and morbidity in the neonatal period is mainly influenced by the gestational age and to a lesser extent by the influence of the birth weight. The global prevalence of preterm birth is 9.6% and approximately 12.9 million babies per year, most of which occur in Africa and Asia.

Introduction

In developed countries, the number of low-birth-weight babies is lower than in third world countries [1]. However, most of these babies are premature, but in third world and developing countries, where low birth weight babies are born, the main cause of low birth weight is fetal growth restriction [2]. Iran is also one of the

regions with a high prevalence of premature birth and approximately 10% of births are premature babies. Considering the high costs of caring for these babies and their many neurological and physiological problems, the post-natal care of these babies has been the focus of researchers for the past few decades in various ways to improve the living environment of premature babies or to speed up the process.

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One of the important problems of premature babies is one of the main reasons for their hospitalization in the special care department for low birth weight babies and their respiratory and nutritional problems, and in many cases it leads to prolonged hospitalization and increased costs and problems caused by long-term hospitalization [3-5].

A premature baby has many problems at birth

- Feeding of a premature baby will start and continue slowly due to the lack of development of the digestive system.
- Problems such as lung immaturity, especially in babies who are born before the 32nd week of pregnancy [6].

In addition to the initial costs of hospitalization and care of the baby, other negative consequences await the baby after hospitalization in the neonatal intensive care unit. Among these cases, we can mention lower IQ compared to peers, need for re-hospitalization, developmental delay and behavioral problems. Advances in medical science and nursing care have led to the survival of premature and small babies [7-9].

However, in 43% of these babies, developmental delay occurs during the first year of life, and most of the concerns are directed towards this developmental delay. In general, the problems of premature babies can be divided into two groups: Short-term problems and complications (hypothermia, hypoglycemia, respiratory distress syndrome, jaundice, infection, cerebral hemorrhage) and long-term problems and complications (vision and hearing problems, repeated hospitalizations) in childhood and behavioral and developmental problems). Part of the natural development of the baby depends on the emotional interaction between him and the mother [10-12], which connects them psychologically and physiologically. Bowlbi considers attachment to be very important for healthy development and believes it is known that attachment is an emotional bond between the child and the person who cares for him. Touching the baby and skin-to-skin contact after birth causes a very strong attachment pattern to be achieved and this increases the mother's care for the child. Therefore, immediately after birth,

it is named as the feeling period, and it is recommended that the contact between the parent and the baby takes place during this time. The baby is calm and alert at this time and is able to react to the parents.

Touch is the first sensory system to develop and provides the primary communication between infants and caregivers. Touch is a powerful means of emotional exchange between parent and infant. Touch is a useful sensory stimulus for premature babies. Touch or silent speech or non-verbal communication is a physiological feeling that occurs as a result of receiving touch receptors in the skin and analyzing it in the brain. The common two forms of skin contact and touch in babies are maternal care, hugs and massage (Figure 1).

Massage in babies creates a sense of security, increases physical growth and weight, improves blood circulation, optimal functioning of the nervous system, and reduces sleep disorders as well as behavioral disorders. The results of a research entitled "Effect of touch on arterial blood oxygen saturation percentage of newborns with respiratory distress syndrome" conducted by Nayereh Baghcheghi (2006) showed that a significant increase in arterial blood oxygen saturation occurs as a result of an intervention such as infant massage. It should be mentioned that the results of the researches that investigated the effect of massage on other physiological parameters of premature babies also confirm the positive effects of massage therapy in babies [13-15].

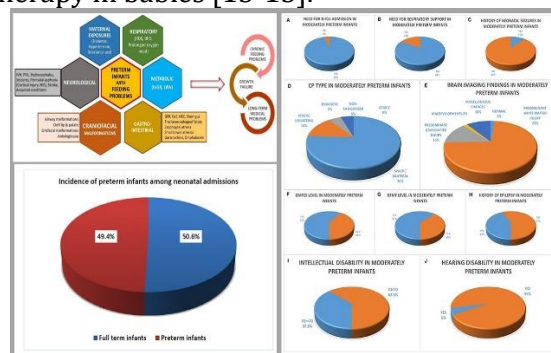


Figure 1. Feeding Problems and Long-Term Outcomes in Preterm Infants

Among the results of the Osborn DA, Henderson-Smart DJ research, it was shown that apnea longer than 14 seconds and bradycardia below 100 beats per minute were not seen in any of the

babies. It has also been found in various studies that the growth rate of babies with the programmed touch program has increased more than the control group [16-18]. Massage is also used for premature babies because it makes breathing more regular and reduces periods of apnea. It is clear that the majority of premature babies whose birth weight is between 1000 and 1500 grams are deprived of soft touch. Because these babies are transferred to the neonatal intensive care unit after birth, and at this time, the efforts of the medical and nursing personnel to stabilize the baby will lead to painful processes. Research results have shown that premature babies hospitalized in the neonatal intensive care unit are touched very little, and the small amount that they are touched is for therapeutic and medicinal measures [19-21]. There are many benefits of baby massage. From improving the state of neurodevelopment to teaching relaxation and reassurance, babies who have experienced proper and continuous massage in the neonatal intensive care unit have better sleep and have a more appropriate weight gain. The most important and reliable reported benefit of massage for premature babies is the increase in weight gain during hospitalization in the neonatal intensive care unit. This amount has been reported to increase weight by 47% compared to the control group, and the duration of hospitalization has been reduced for 6 days and about 10,000 dollars has been saved per infant [22-25].

Touching a premature baby is psychologically necessary for both mother and newborn. A premature baby needs as much as a normal baby to be loved and hugged by a mother. Many studies have been conducted by Field and colleagues about the benefits of massage in the neonatal intensive care unit, and it has been determined that what is felt and experienced by the fetus in the womb is ideal for its neuro-behavioral growth and development [26-28]. Instead of being in a calm and rich environment of sensory stimuli needed for his growth and development, the premature baby is placed in the neonatal intensive care unit. A place where there is no light, noise, and in other words it is stressful for the baby. Massage helps these babies to reduce their stress levels and also improves growth and development in

premature and low birth weight babies. In the neonatal wards [29-31], premature babies are repeatedly handled and touched while receiving the necessary medical and nursing care. They often find this type of touch disturbing and disturbing. On the contrary, massage is pleasant for them and gives them a feeling of comfort and affection. It is possible that massage therapy will make the premature baby resistant to stress and improve the general adaptation of the baby by affecting the hypothalamus-pituitary-adrenal axis [32-35].

Despite the fact that the therapeutic effects of massage have been used in adults for a long time, over the past three decades, researchers in the West have discovered that children can also benefit from massage, although for centuries women in parts of Africa [36-38], South and Central America have been massaging their children. But in the West and Britain, this practice has recently gained considerable recognition and is recommended even in health centers and hospitals covered by the National Health Service [39-41]. Researchers are trying to provide various forms of complementary stimulation for premature babies, and help their development by enriching the environment of the neonatal intensive care unit [42-45]. These supportive cares and interventional stimuli aim to restore the development of the baby to its original path by simulating the environment inside the womb and keep it on this path. Of course, touch cannot be used in very premature babies. Because there is a possibility of apnea and a decrease in heart rate, however, KMC method can be used in this group of babies [46-48]. There is evidence that the transfer process from the incubator to the mother's breast is stressful for the baby, and before the transfer, the baby's vital signs must be stable. Gentle massage is a form of interaction and studies have shown that it is well tolerated by premature babies, and it affects the development of the baby [4-51].

A research conducted by Arora et al. (2005) has shown that when premature babies receive the usual care in the hospital, their pulse rate increases and their oxygen levels decrease, and this decrease indicates the distress of the newborn [52-55]. But when they are massaged, the opposite result occurs, i.e. the pulse rate

decreases and the oxygen levels increase, indicating that massage is soothing and calming for babies [56-58]. Massage of babies and infants is an important component of care in different societies, which is done traditionally. Meanwhile, massage with natural oils has a special place in some countries, especially India. For thousands of years, in some East Asian countries, oil massage has been used in adults, children and infants [60-62].

In general, the following can be mentioned about the effects of massage in babies

In similar studies conducted in this case, it was observed that massaged premature babies gained more weight. Kelmanson 's 2006 study found that massaged babies sleep deeper and wake less during sleep. In the studies conducted, the serum level of triglyceride and linoleic acid (essential fatty acid) in massaged premature babies increased significantly [63-65]. Massage using oil helps regulate the temperature and the baby loses less heat. In a study in Nepal, the incidence of early hypothermia was reduced by 50% and late hypothermia by 30% in infants (by taking measures such as maternal care and massage). Massage removes dead cells from the surface of the skin and prevents it from drying out. Mendes observed in a study in 2008 that the prevalence of sepsis in massaged babies was significantly lower and the number of hospitalization days was also reduced [66-68]. The increase in the body's defense power occurs through the increase of natural killer cells. Also, the reduction of the stress level by the reduction of the serum level of cortisol and norepinephrine and the increase of the urinary excretion of epinephrine and norepinephrine have been observed in babies who are massaged [69-71]. Massage increases attachment and reduces depression. Massage stimulates the vagus nerve and increases bowel movements, increases rhythmic contractions of the stomach, accelerates food digestion and makes it easier for the baby to tolerate. Also, the branches of the vagus nerve are present in the lung, which helps to improve breathing [72-75]. As a result of the massage, the oxygenation of the tissues increases, and as a result, the nutrition of the cells and tissues improves and the blood flow increases [75-77]. Babies with massage will be

able to start oral feeding earlier and thus be discharged from the hospital faster. With the massage [78-80], the heart rate and breathing of the babies will be regulated, and as a result, less oxygen will be consumed and they will save energy, and they will use this energy for their growth, and the development of the brain and the development of the nervous system will be accelerated [80-82].

The weight of babies is one of the important indicators of health, and it is one of the main criteria for the discharge of premature babies, and on the other hand, long-term stay in the neonatal intensive care unit causes problems such as infection with symptoms such as lethargy [83-85], feeding intolerance, hypothermia or hyperthermia, Jaundice, hypertonia, apnea, possibly convulsions, and the tests show a decrease in platelets, an increase or positive CRP, an increase in ESR, and a positive culture (it is possible that hemolysis may occur as a result of this infection). So considering that massage does not require special technology and is a non-invasive method that has healing properties and by reducing the length of stay in the hospital, it reduces complications, costs, capital, time and optimal use of beds in special departments [86-88]. The researcher tries to make massage as a daily care for hospitalized babies common in the near future by conducting this research and stating other evidences that prove the effectiveness of massage [89-91].

Definition of keywords

Massage

Theoretical definition

Massage is a series of regular hand movements that are performed regularly and uniformly on body tissues to affect the neuro-muscular system, skin, joints and blood circulation [92].

Practical definition

It means massage with field technique, which was performed daily in the evening during 3 periods of fifteen minutes and in 3 consecutive times (at 12:45, 14:45 and 16:45) for 5 days. At the beginning of the massage, the researcher smeared his hand with 3-5 drops of olive oil to reduce the friction between the interventionist's hand and the baby's body [93-95].

Premature infants

Theoretical definition

According to WHO, live babies born before the 37th week of pregnancy from the first day of the last menstrual period are considered premature.

Practical definition

Babies with a gestational age of 28-37 weeks who were admitted to the NICU department of Ghaem Hospital (Aj). Since any manipulation (even weighing) of babies with a fetal age of less than 28 weeks may lead to complications; Therefore, in this research, babies over 28 weeks were studied [96-98].

Nutritional intolerance

Theoretical definition

Having a residue of more than 50% of the feeding volume at each time, having colored stool residual and vomiting without a clear cause [99-101].

Practical definition

If the baby vomits or has residue more than 20% of the feeding volume at each time, or if the baby has long-lasting (bile-brown) stool color or bloating [102-105].

Apnea

Theoretical definition

Stopping breathing for more than 20 seconds or stopping breathing with bradycardia and cyanosis [106-108].

Practical definition

It corresponds to the theoretical definition.

Weight

Theoretical definition

Weight is the force exerted on objects by the earth's gravity [109-111].

Practical definition

It means the weight of premature babies under study, which was controlled by a nurse every morning with minimum coverage (dry diaper) using a digital scale for babies with an accuracy of 10 grams [112-115].

Weighing

Practical definition

Weighing in this study means weight changes in the form of weight loss and weight gain that premature babies will have during the study period from birth to discharge [116-118].

Standard care

Theoretical definition

A therapeutic and diagnostic process that a physician must follow for a particular form of patient, disease or clinical event. For example, light therapy for neonatal jaundice is a standard of care [119-121].

Practical definition

It includes the care that all premature babies hospitalized in the neonatal intensive care unit who weigh between 1000 and 1800 grams normally receive as follows:

Actions in the first 24 hours of hospitalization

Conducting blood culture tests, complete blood cell count, determination of blood group and Rh, direct coombs, administration of 10% sugar serum without ions, if necessary, administration of antibiotics including ampicillin and gentamicin injection, usually the dose of ampicillin is 50 to 100 mg per each kilogram of body weight in 24 hours and the dose of gentamicin is 5 mg per kilogram of the baby's weight in 24 hours. If necessary, a chest X-ray is taken. On the first day of starting enteral feeding, the minimum amount of milk is 10 cc per kilogram of baby's weight every 2 to 3 hours in 24 hours, but no more than 20 cc per kilogram of weight should be added to the volume of milk daily. Also, from the second day, sodium and potassium ions are added to the baby's serum. Tests on the third day of the baby include blood urea nitrogen, creatinine, sodium and potassium. On the third to fifth day, a brain ultrasound is requested for babies under 1500 grams [122-124].

Stable condition

Theoretical definition

A baby whose central temperature is between 36.5 and 37.5. Average blood pressure is more than 30 to 40 mm Hg and heart rate is between

110 and 160. The baby's blood sugar is more than 45 mg/dL. The tongue, skin and mucous membranes are pink. The baby's airways are open and ventilation is done well. Blood PH is more than 3.7. Practical definition: Corresponds to the theoretical definition [125-127].

Conceptual framework

The conceptual framework of this study is based on the concepts of premature baby, premature complications and massage. A premature baby is a baby born before the 37th week of pregnancy, and according to the definition of the World Health Organization, a baby born before the 37th week and after the 20th week of pregnancy is called a premature baby. The pathogenesis of preterm birth is still not well defined. There are various risk factors for preterm birth, including; Environmental, clinical and epidemiological issues. In the United States, race has a significant effect, so that the preterm birth rate is 16-18% in the black race and 7-9% in the white race. Another factor is the age of the mother. Women aged less than 17 years and older than 35 years are at risk of premature birth. The next risk factors include: literacy level, low socio-economic status, very low maternal weight (body mass less than 19.8 kg/m²), smoking or drug use, physical activity or stress during pregnancy (Figure 2) [128-130].

Every year, nearly 13 million premature babies are born around the world. In America, the rate of premature birth is approximately 9% to 12%, and in Europe, it varies between 5% and 7%. In the study of Egan et al. in 2008, the prevalence of preterm birth was reported from 5 to 12% in developed areas and up to 40% in poor areas. Despite the progress in midwifery care, the rate of premature birth has not changed significantly in the last 40 years and has actually increased in the last two decades. The global prevalence of preterm birth is 9.6% and approximately 12.9 million babies per year, most of which occur in Africa and Asia. According to the report of the World Health Organization in 2009, 3438 babies (5.7%) were born prematurely and the average hospitalization days of premature babies (less than 32 weeks of pregnancy) was 35 days [131].

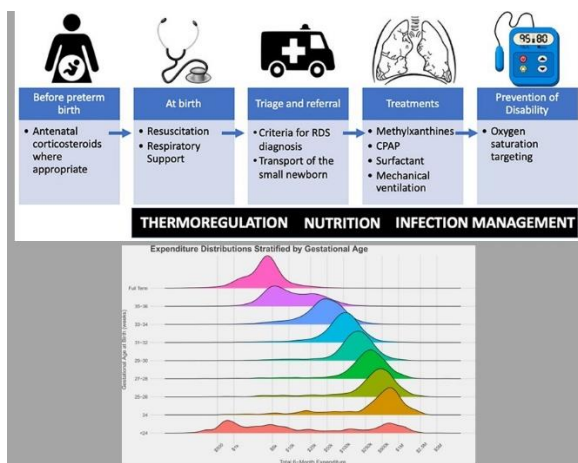


Figure 2. Estimates of healthcare spending for preterm and low-birthweight infants in a commercially insured population: 2008–2016

Iran is also one of the regions with high prevalence of premature birth, and almost 10% of births are premature babies. A natural birth occurs between 38-40 weeks of pregnancy. When a premature baby is born, it may have problems in breathing, maintaining body temperature due to the immaturity of the body systems, and will inevitably be admitted to the neonatal intensive care unit [132-135].

Due to the progress in obstetrics and newborns, the survival rate of premature babies has increased significantly, so that today more than 95% of babies are born after 28 weeks of pregnancy, that is, babies who were born 12 weeks earlier and weighing less than 1250 grams. Premature babies are actually fetuses whose development continues in the extra uterine environment. Their immature organs need an environment with advanced medical technology and unique nursing care to develop. Despite the progress of care, sometimes advanced care and diagnostic procedures are a threat to premature organs. In patients hospitalized in special departments, there will be two types of complications: Morbidity and mortality [136-138].

Unfortunately, despite spending money and buying equipment and training specialist staff in NICUs, the death rate of babies in the first 4 weeks of birth in our country is still very high and it is reported about 12.56 per thousand live births. In a study conducted by Momeni et al. in 2010 with the aim of investigating the causes of

death in different provinces of the country, it was determined that the causes of death of infants in Tehran include prematurity, respiratory distress syndrome, intracerebral hemorrhage, septicemia, congenital anomalies, and leakage syndrome [140-142].

In Ardebil, these causes include prematurity, aspiration, septicemia and asphyxia. In Birjand, the causes of death were found to be prematurity, low birth weight and congenital abnormalities. Hematyar and Yarjoo (2004) also consider the most common causes of perinatal death to be congenital anomalies, severe prematurity and asphyxia. Direct causes of infant mortality in developing countries mainly include infection, asphyxia, complications of prematurity and low birth weight.

Premature birth increases the risk of developmental problems. In these babies, problems such as respiratory distress syndrome (RDS) 74%, bronchopulmonary dysplasia (BPD) 32%, necrotizing enterocolitis (NEC) 7%, intraventricular hemorrhage (IVH) 9% and periventricular leukomalacia (CPVL) 3%, patent ductus arteriosus retinopathy of prematurity is seen. These babies not only suffer from acute complications of prematurity, but also suffer from long-term complications such as neuro-developmental disabilities. Specifically, the incidence of respiratory complications from the 34th week to the 37th week of pregnancy decreases by approximately 50% per week with increasing gestational age. A premature baby has many problems at birth. For example, the: Problems such as lung immaturity, especially in babies who are born before the 32nd week of pregnancy. Birth before the 28th week of pregnancy will have more serious problems and complications.

Feeding of a premature baby will start and continue slowly due to the lack of development of the digestive system.

Respiratory distress is the first area of concern in the initial examination of the newborn. This point reflects the vital importance of establishing and maintaining effective ventilation and oxygenation in the treatment of critically ill infants.

Transient or persistent respiratory disorders are the most common conditions that we encounter in newborn care, especially in

premature babies. Paying attention to the initial signs and symptoms of respiratory failure prevents instability and subsequent deterioration.

Successful cardiopulmonary transition from intrauterine life to extra uterine life includes a series of changes that begin with ventilation and ventilation of the lungs immediately after birth. During this process, air replaces the liquid in the alveoli, and as the pulmonary blood vessels expand, the lung blood flow increases.

Warning signs of respiratory distress include the following

- 1. Nasal flaring:** The outward movement of the nasal lobes is an attempt to bring more air into the lungs.
- 2. Grunting:** It is a sound that can be heard when the baby exhales against a half-closed glottis to provide pressure at the end of exhalation.
- 3. Tightening of the intercostal muscles:** Retraction of the intercostal spaces is due to the increase of negative pressure in the chest.
- 4. Retraction of the sternum:** The contradictory movements of the sternum in the tail are due to the increase of negative pressure inside the chest [143].
- 5. Gasping:** It is an ominous symptom of brain hypoxia that manifests itself as deep, single or multiple, slow and irregular breaths and last breaths.
- 6. Cyanosis with respiratory distress**
- 7. Apnea:** Stopping breathing for more than 20 seconds or for any period of time if it is accompanied by cyanosis or bradycardia.
- 8. Baby receiving respiratory support (CPAP or ventilator or Ambobag).**

Neonatal apnea

Apnea is a symptom of many early diseases that affect the baby. Apnea is actually a control disorder of the respiratory center and may be obstructive, central or a mixture of the two.

Causes of neonatal apnea and bradycardia

Central Nervous System: Intraventricular hemorrhage, drugs, seizures, hypoxic injury, hernia, neuromuscular disorders, infarction, or brainstem anomalies after general anesthesia.

Pulmonary: Pneumonia, obstructive airway lesions, upper airway collapse, atelectasis,

phrenic nerve palsy, severe hyaline membrane disease, pneumothorax, hypoxia.

Infectious: Necrotizing enter colitis, meningitis, respiratory syncytial virus [144].

Gastrointestinal: Oral feeding, intestinal movements, esophagitis, intestinal perforation.

Metabolic: Decrease of glucose and calcium, decrease or increase of sodium, increase of ammonia, increase of organic acids, increase of ambient temperature, hypothermia.

Cardiovascular: Hypotension, hypertension, heart failure, anemia, hypovolemia.

Misc.: Prematurity of the respiratory center, sleeping position.

Apnea is a common problem in premature babies, which can be caused by co-morbidities or prematurity. In term infants, apnea is often worrisome and requires immediate diagnostic evaluation. Periodic breathing should be distinguished from prolonged apneic intervals because the latter may be accompanied by serious diseases. Apnea is a symptom of many early diseases that involve infants [145].

The most common pattern of idiopathic apnea of premature infants has a compound cause and occurs before or after central apnea and obstructive apnea. In premature babies, idiopathic apnea is rare on the first day of life, and in case of apnea immediately after birth, you should think about another disease. Idiopathic apnea of prematurity occurs in the absence of detectable underlying diseases. It is a disorder of breathing control and can be obstructive, central and mixed. Obstructive apnea (pharyngeal instability, neck flexion, nasal obstruction) is characterized by continued chest movements and lack of air flow.

Collapse of the pharynx occurs as a result of the negative pressure of the respiratory tract created during inhalation, or it may be caused by the lack of coordination of the tongue with other muscles of the upper respiratory tract to keep the respiratory tract open. In central apnea, which occurs due to the reduction of stimuli of the central nervous system to the respiratory muscles, there is no air flow and no respiratory movements are seen. Gestational age is the most important indicator of respiratory control and the frequency of apnea is inversely proportional to gestational age.

Immaturity of the brainstem respiratory center is characterized by a reduced response to carbon dioxide and a paradoxical response to hypoxia, which causes apnea instead of hyperventilation. The most common form of idiopathic apnea in premature infants has a mixed etiology (50-70%) Obstructive apnea usually occurs before and sometimes after central apnea. Short periods of apnea are usually central, longer types are usually mixed. Apnea depends on sleep position. Its frequency increases during active sleep (along with rapid eye movements). Contradictory movements of the chest wall (abdominal expansion during inspiration and inward movements of the chest) are common during active sleep and cause a decrease in arterial oxygen pressure due to insufficient blood supply ventilation. In addition, the increase in negative pressure during inadequate breathing and inhibition of pharyngeal muscle tone during active sleep can cause upper airway collapse and obstructive apnea [18].

Clinical protests

Prevalence of idiopathic apnea of prematurity is inversely related to gestational age. In premature babies, it is usually seen on the first day of birth, and apnea that appears immediately after birth has another cause. The onset of idiopathic apnea is on the 2nd-7th day of birth. In premature babies, severe apnea means stopping breathing for more than 20 seconds or any time if it is accompanied by cyanosis, sinus bradycardia. The prevalence of observed bradycardia increases with the duration of apnea and is related to the severity of hypoxia. Short periods of apnea (10 seconds) are rarely associated with bradycardia. While long-term apneas (more than 20 seconds) have a higher incidence of bradycardia. In more than 95% of bradycardia cases, bradycardia occurs 1-2 seconds after apnea and is usually sinusoidal, but sometimes it may be nodal type. Vagal response and rarely heart block are causes of bradycardia without apnea [49].

Table 1. Classification of apnea severity

Indications for treatment with methyl xanthine	Type of therapeutic intervention required	Severity of apnea
More than 3 times in a 12 hour period	Gentle touch Back rub along with a decrease in blood oxygen saturation up to 80% and bradycardia up to 90% beats per minute	Mild
More than 2 times in a 24 hour period	Move the baby. Oxygen administration	Medium
Once	Prolonged and intense stimulation Positive pressure ventilation	Intense

General recommendations

All infants with a gestational age of less than 32 weeks should be monitored in the neonatal intensive care unit due to the possibility of apnea and bradycardia. The warning sign of the device should be set when breathing stops for more than 10 to 15 seconds.

- Positioning the baby properly to prevent airway obstruction.
- Frequent feeding with small volume to prevent stomach expansion.
- Place the baby in a neutral ambient temperature.

The following tests are recommended following the occurrence of apnea

- Measurement of Hb, Hct and full count of white blood cells and CRP, blood sugar, electrolytes and calcium.
- Blood and urine culture, examination and culture of spinal fluid in suspected cases of meningitis or increased intracranial pressure.

- Examination of arterial blood gases.
- Brain ultrasound according to the case (in cases of suspected brain bleeding, abnormal neurological symptoms, impaired consciousness)
- Chest X-ray.
- Examination in terms of metabolic diseases by case.
- Investigating gastroesophageal reflux by case.
- Echocardiography if necessary.

Prevention

Administration of caffeine or aminophylline in infants less than 30 weeks of gestational age at the stage of weaning from mechanical ventilation or before removal of the tracheal tube. Babies with a gestational age of less than 30 weeks who do not need respiratory support and all babies with a gestational age between 30 and 34 weeks who are at risk of apnea should be connected to cardiorespiratory monitors [10].

Treatment of the acute stage: if you observe apnea, do the following in order

- First, irritation of the skin of the abdomen or soles of the feet.
- Administration of oxygen with low concentrations.
- If the baby does not recover, the position is changed and suction of the airways is performed and then the skin is stimulated again.
- Positive pressure ventilation if no improvement.

Long-term treatment: The onset of apnea after the second week of life in a preterm infant who was previously well or in a term infant at any time is an important event and requires prompt evaluation. Before connecting apnea to prematurity, pathological factors should be investigated and treated if proven. The decision for the type of treatment for apnea of prematurity is related to the clinical condition of the baby. Factors considered include the number and duration of apneas, the severity of hypoxia, and the amount of stimulation required to correct the apneas [11].

General care

Correction of anemia with hemoglobin less than 8 gm/dl and hematocrit less than 25%.

Prognosis

Apnea of prematurity usually does not affect the baby's prognosis unless it is severe and recurrent and does not respond to treatment. Associated problems such as intraventricular hemorrhage, bronchopulmonary dysplasia, retinopathy of prematurity, play a vital role in determining the prognosis of newborn apnea. Apnea of prematurity usually resolves after 36 weeks of PCA (fetal age plus postnatal age) and does not play a predictive role in sudden infant death in the future. If it is possible to monitor the heart and breathing at home, some of these babies can be discharged. If there is no unexpected accident, the leg can be safely amputated at home after 43 weeks of PCA [2].

Nutritional intolerance

Neonatal adaptation: The structure of the mouth and esophagus in infants is only limited to the development of sucking and swallowing. The function of the swallowing reflex is for the first 3 months after birth, but then it becomes a voluntary control. The cardia sphincter, which is usually strong in adulthood, is very loose in infancy. For this reason, the infant often spits up and often has reflux. The sphincter of the pylorus is located in the stomach and the infant is tighter than the cardia, due to the smoky movements, the time to empty the milk is fast. In babies, the stomach empties every 2.5 to 3 hours, and in older infants, the stomach empties every 3 to 6 hours. The increase in gastric emptying time following the increase in gastric capacity in older age is a reason for feeding at longer intervals. Stools in infants and toddlers are loose due to the fast passage of food through the digestive system. The primary stool of a baby is called meconium and is black to green. Excretion of meconium takes place in the first 36 hours after birth. Full-term and almost full-term babies are fully alert and suckle strongly in the first 30 minutes, so this is the right time for feeding. After this stage, they may become drowsy for 2-3 hours and not be interested in sucking again after that. They wake up and expel meconium. The feces of babies who eat breast milk: It has a

looser consistency and is golden yellow in color, it has less smell and is less irritating. After starting food through the mouth, the natural flora of the digestive system develops. Gut flora changes will be the same as adults with the first meal.

The tissue of the digestive system does not have the power to secrete enzymes and fluids due to its delicacy. The immunological properties of the intestinal mucosa of infants and young children are lower. For this reason, infections and injuries of the digestive system are more common in infants, and due to the motility of the intestines and stomach, diarrhea and vomiting are more common at this age. Good nutrition is necessary in the control of high-risk infants, but it should be done according to the physical and developmental characteristics of the infant, with 105-130 Kcal/kg/day, the infant will grow satisfactorily. The volume and method of feeding is decided by the size and condition of the infant.

Necrotizing enter colitis

NEC is an acute inflammatory bowel disease with a high prevalence in high-risk infants and other infants, which is more common in premature infants. Its incidence is between 1-5% of admission to the neonatal intensive care unit. NEC is the most common gastrointestinal emergency in infancy.

Three effective factors in creating NEC

Intestinal ischemia, the accumulation of pathogenic bacteria, the presence of waste products from milk powder, and prematurity are the most important risk factors for its occurrence. Its root cause is unknown. But it seems to occur in infants with gastrointestinal vascular problems.

Additional risk factors: Blood transfusion, sudden spread of infection among other babies in the ward

Reducing the blood flow of intestinal mucosal cells causes the death of a large number of them and therefore stops the secretion of protective substances. The vulnerable wall is attacked by proteolytic enzymes. The intestinal wall is swollen and is not able to synthesize protective IgM, and the intestinal mucosa is permeable to macromolecules, all of which cause further

disruption of the intestinal defense. Invasion of gas-producing bacteria to vulnerable areas causes intestinal pneumatization. NEC rarely occurs before the initiation of oral feeding and is much less common in breastfed infants. Bacterial and viral agents including *Escherichia coli*, *Klebsiella*, *Clostridium*, *Staphylococcus epidermidis* and *Rotavirus* were obtained from cultures. The outbreak is usually in the first two weeks of life. Affected babies have different symptoms. It may start quietly or suddenly by catastrophic [53].

The most common clinical symptoms

Abdominal bloating, retention of food in the stomach, blood in the stool. Non-specific symptoms include: Lethargy, poor nutrition, bile residue, decreased blood pressure, apnea, vomiting often with blood vessels, decreased urinary output, temperature instability, diarrhea. Radiography shows a sausage-like dilatation in the intestines, a soapy floor appearance or a bubbly appearance of the intestinal wall, the presence of air in the circulation of the portal vein is a sign of severe disease, and the presence of air in the peritoneum suggests a rupture. Laboratory findings include anemia, leukopenia, leukocytosis, metabolic acidosis, positive guaiac test, the presence of organisms in blood culture, it is necessary to stop oral feeding for 24-48 hours in babies with birth asphyxia and for a longer period in babies with severe low birth weight. At least enteral feeding has been effective in not increasing the prevalence of necrotizing enterocolitis.

In infants suspected of NEC, feeding is stopped immediately, intestinal gas pressure is reduced by inserting a gastrostomy tube. Fixing the loss of extracellular volume starts with intravenous fluids and broad-spectrum antibiotics. Regular abdominal radiographs are performed every 4-6 hours in the acute phase to control the possibility of bowel perforation. Blood tests and blood gas analysis are controlled. Isolation of babies with similar risk from other babies should be done.

Despite the symptoms of perforation, surgery is performed and the necrotic intestinal tissue is removed and a colostomy or ileostomy is performed. When the intestinal infection

improves, the anastomosis is given again. Peritoneal drainage is used instead of laparotomy in patients who have secondary rupture and those who have severe peritonitis and are unstable to tolerate surgery. Fast diagnosis and treatment has a successful control. Complications include: Short bowel syndrome, stricture combined with colon obstruction, fat malabsorption and secondary growth failure, the time to re-establish oral feeding is different, but usually it is done at least 7-10 days after treatment.

Intracerebral-intraventricular hemorrhage (IVH) and periventricular leukomalacia (PVL)

Intracerebral bleeding is due to trauma and asphyxia and rarely primary bleeding disorders or congenital vascular abnormalities. Major neurological lesions in VLBW premature babies include IVH and PVL due to premature blood vessels and poor protection of the blood vessel wall in the reproductive matrix of premature babies. When the germinal matrix bleeding enters the ventricles, acute ventricular dilatation occurs and is a common complication in IVH.

Predisposing factors and events of IVH

Prematurity, respiratory distress syndrome, damage caused by hypoxic ischemic encephalopathy or hypotension (asphyxia or hypotension alone do not give IVH unless they cause changes in blood flow), reperfusion of damaged vessels, increase or decrease in cerebral blood flow that Due to the decrease in O_2 and increase in CO_2 , the vessels narrow and dilate. Periventricular leukomalacia (PVL) is characterized by necrotic lesions of the periventricular white matter or more diffuse white matter damage. In the mild type of leukomalacia, there is spastic paralysis of the legs, and in the severe type of leukomalacia, there is quadriplegia, and in the more severe type, there is destruction of the optic disc and vision problems [4].

Signs

The most common symptoms are decreased or absent Moro reflex, decreased muscle tone, lethargy, sleep apnea, or metabolic

vasodilatation. It is helpful to diagnose clinical symptoms and sonography. Brain sonography is routinely performed to detect IVH in premature babies. The right time to perform sonography is at the end of the first week, and two weeks later sonography is performed again in terms of causing dilatation and that it is progressive. Sonography may not show small amounts of bleeding. In small grade 1 hemorrhages: there is hemorrhage in the germinal region. In grade 2, there is intraventricular bleeding, but the size of the ventricles is normal. In moderate IVH hemorrhages, there is acute dilatation of the ventricles, and in severe IVH hemorrhages, there is parenchymal hemorrhage. Hydrocephalus is also seen after IVH, which is due to the reduction of CSF absorption, which can initially be without clinical symptoms such as increased head circumference, apnea, bradycardia, lethargy, fontanel prominence, or opening of sutures. In infants with symptomatic hydrocephalus, despite the progress of ventricular expansion and pressure on the cerebral cortex, symptoms may appear with a delay of 2-4 weeks. In the case of hydrocephalus requiring ventriculo-peritoneal shunt and intraparenchymal bleeding and extensive PVL, the prognosis is not good. In case of careful handling of the incompatibility of the fetal head and mother's pelvis and forceps delivery with caesarean section, it is possible to reduce the occurrence of traumatic intracerebral hemorrhage [55].

Treatment

Correction of hypoxia and PCO_2 , acidosis, anemia and pressure reduction. The treatment of hydrocephalus seen after IVH is giving acetazolamide and furosemide, which reduces CSF production, and using a shunt.

Repeated LP is not effective in acute IVH and increases the risk of infection. It is effective in cases of communicating hydrocephalus that progresses slowly.

Vit E: In babies who took vitamin E in the first hours, they had less IVH.

Vit K: Vitamin K injection in mothers who are at risk of bleeding diseases is effective in reducing IVH in newborns. Panconium calms the baby and prevents changes in blood pressure and O_2 and reduces IVH.

Steroids should be given to the mother to reduce the infant's IVH. The most important thing in preventing IVH is to prevent premature birth.

Neonatal infection

Blood infection means the body's response to an infection that has spread throughout the blood and tissues. The body shows a series of inflammatory responses against infection that can control it, but on the other hand, these responses may harm the body itself. Blood infection is considered a very serious condition, even if it is diagnosed and treated very quickly, it can lead to shock, dysfunction of various body organs, permanent disability or death. Other names of this condition are blood poisoning or the presence of bacteria in the blood. Bacteria are almost always the cause of blood infections in babies. Bacteria such as *Escherichia coli*, *Listeria monocytogenes*, *Neisseria meningitidis*, *Streptococcus pneumoniae*, Hemophilic influenza type B, *Salmonella*, and Group B beta-hemolytic streptococcus (GBS) are the most common factors involved in causing blood infections in babies less than three months old. GBS is a particularly common cause of neonatal infection. Viruses, parasites or fungi can also lead to very severe infections that lead to blood infections.

In many cases of neonatal blood infection, bacteria are transferred from the mother to the fetus or newborn during pregnancy or during delivery. Some of the complications during pregnancy that increase the chance of infection in the baby include bleeding, maternal fever, uterine or placental infection, premature rupture of the amniotic sac during childbirth, and prolonged and difficult childbirth. Premature babies who are hospitalized in the neonatal intensive care unit are very sensitive to the occurrence of blood infections due to the weak immune system and special measures such as having serum, the presence of various tubes connected to their bodies, and also breathing through tubes and ventilation devices. Microbes that live naturally on the skin, very easily enter the bloodstream through the ways mentioned and lead to blood infection. Some of the most common symptoms of infection in babies include lack of interest or problems in breastfeeding, hypothermia or hyperthermia, restlessness and moodiness, weakness and

lethargy, lethargy, changes in heart rate that is either much faster than normal or much slower than that rapid breathing or respiratory problems, the presence of periods when the child seems not to breathe, and the presence of jaundice [16].

Since the symptoms of blood infection in many newborns are vague, laboratory tests play an essential role in diagnosing this disease. If the infant had a fever for less than three months; Even if it looks good, in order to confirm or reject the infection, a series of tests must be done, which includes blood test, blood culture, and urine test, which must be done in a correct and sterile way. Cerebrospinal fluid culture (which is test should be done based on the age and general condition of the baby) and taking pictures of the chest especially if there are any tubes or ducts inside the body should be done and the secretions or fluids in these tubes should also be tested.

The presence of blood infection and even suspicion of it in infants requires special care and treatment in the hospital, where antibiotics are administered intravenously for at least 48 hours. Usually, before the diagnosis is confirmed, doctors start prescribing antibiotics; Because it takes two to three days to complete the tests and their results. Therefore, not starting the treatment and waiting for the answer can allow the infection to spread completely in the body and lead to serious consequences. If the infection is not treated, it will spread and lead to very severe complications. Infection can affect the function of different organs of the body and lead to kidney failure, lung diseases and brain damage. Usually, the sense of hearing is also affected. If the infection is not treated quickly or not at all, especially in infants, it can lead to death. Although all types of infections cannot be prevented; But some of them can be avoided. Pregnant women should be evaluated for the presence of any infection in the birth canal. Usually, this test is performed at 35-37 weeks of pregnancy, and sometimes it can be repeated even before delivery. If the presence of infection in the birth canal is confirmed, she should receive intravenous antibiotics during delivery. Even if the pregnant woman has not been checked for infection, but is in the high-risk

group; For example, if she had a fever during childbirth, or if she had premature rupture of the water sac, or if she had a prolonged delivery, or if she had previously given birth to a baby who had an infection, she should also take intravenous antibiotics in order to reduce the risk of transmission of infection during childbirth [17].

Jaundice

Rh and ABO incompatibilities are among the most common causes of hemolytic disease of newborns. About 15% of live births are at risk of this disease. In most cases, jaundice is the only clinical manifestation. In 10 to 20% of affected babies, serum indirect bilirubin reaches 20 mg/dl or more unless phototherapy is started. Phototherapy is effective in reducing serum bilirubin levels. If bilirubin is not lowered, it leads to encephalopathy caused by bilirubin and kernicterus, which is probably the result of bilirubin deposition on the basal nuclei of the brain. Clinical jaundice and indirect hyperbilirubinemia are reduced below pathological values by blue or white light. The therapeutic effect of phototherapy depends on the light energy and effective wavelength (420 to 470 nm), the distance between the light source and the infant (10 to 15 cm), as well as the amount of hemolysis and excretion of bilirubin. To achieve the maximum therapeutic effect, all the skin should be exposed to light and the baby's temperature should be checked at regular intervals in order to prevent hypothermia and hyperthermia.

Due to the high costs of caring for premature babies and their many neurological and physiological problems, the post-natal care of these babies has been the focus of researchers for the past few decades. In a way that they have tried in different ways to improve the living environment of premature babies or speed up the development process of these babies. What the fetus feels and experiences in the womb is ideal for its neuro-behavioral growth and development. Instead of being in a calm and rich environment of sensory stimuli needed for his growth and development, the premature baby is placed in the neonatal intensive care unit, where it is full of light with a lot of noise, and in other words, it is stressful for the baby. During the last

two decades, considering the mentioned problems, researchers have decided to provide various forms of complementary stimulation for premature babies and help their development by enriching the NICU environment.

Complementary stimulations such as massage cause comfort and a sense of relaxation, and correct physical performance disorders, change physiological responses, and reduce fear associated with disease symptoms. These development supporting cares and interventional stimulations aim to return the development of the baby to its original path by simulating the environment inside the womb and keep it on this path and facilitate it. Massage of babies and infants is an important component of care in different societies, which is done traditionally, and in the meantime, massage with different types of natural oils has a special place in some countries, especially India. In Nepal, 99% of babies are massaged with natural oils. For thousands of years, in some East Asian countries, oil massage has been used in adults, children and infants [145].

Massage therapy is part of alternative treatments and complementary medicine, massage therapy is a traditional healing art that is known as regular and conscious manipulation of the soft tissues of the body. Massage with various healing caresses can be very effective in interacting with the nervous system and correcting physical balance and body balance. The skin, muscles and muscles contain many nerve endings and connections, and a gentle, balanced and healing massage is spread by them in every part of the body, and this causes relief, development and a sense of health. It is possible that therapeutic massage can make the premature baby resistant to stress by affecting the hypothalamus-pituitary-adrenal axis and improve the overall adaptation of the baby. For centuries, women in parts of Africa, South and Central America massage their children. In the West and Britain, this practice has recently gained considerable recognition and is recommended even in health centers and hospitals covered by the National Health Service. When parents enjoy observing and understanding their child's reactions and respond to it, the child also reacts and in this way a positive relationship is created between them.

For example, parents who massaged their children clearly became kinder to them, and their children seemed happier and more confident than before. Parents have reported that since they started massaging their babies, they have calmed down, cried less and slept better. Parents of restless children, such as those who cry a lot, claimed that even when the massage did not calm their child, they had a better sense of taking positive action and therefore more ability to deal with those situations. Massage can strengthen the muscles and joints of the child and relieve common pains in the first years of life. Baby massage is a wonderful practice. Massage is a simple word, but it is very rich and powerful in what it conveys, that is, affection, love, understanding and attention. Baby massage is easy to learn and perform, and does not require a lot of equipment, and in fact, it does not cost anything except time. Correct massage has many long-term and short-term benefits for children and also has a positive effect on parents [12].

In the neonatal wards, premature babies are repeatedly touched while receiving the necessary medical and nursing care. They often find this type of touch disturbing and disturbing. On the contrary, massage is pleasant for them and gives them a feeling of comfort and affection. Arora's research showed that when premature babies receive the usual care in the hospital, their pulse rate increases and their oxygen levels decrease, which indicates that the baby is suffering. But when they are massaged, the opposite result occurs, that is, the pulse rate decreases and the oxygen levels increase, which indicates that the massage is calming and soothing for them. It should be massaged after taking care of the baby. This will help him calm down, plus he may be more awake and alert at this time. Depending on his condition and tolerance, he can be massaged for up to 15 minutes. If the baby is connected to an artificial respiration device or is very sick, it should not be moved, but should be massaged very gently through the opening of the incubator. In this case, several delicate movements are performed on the face and head using the tips of the fingers. If there is no side reaction, we continue and gently massage his back, arms, legs and head using two or more fingers. These initial

movements make him familiar with being touched. Massage can increase weight, strengthen growth and development, improve response to stimuli, improve digestion and absorption in the digestive system. Considering the high prevalence of premature birth in our beloved country and the many problems that premature babies and their families are dealing with, it seems that massage is a cost-effective method that can reduce some of the problems and complications in this special group.

An overview of studies

At this stage of the research, a review of related studies was conducted in order to know how much attention has been paid to massage in preventing complications in premature babies. For this purpose, Science Direct, MD Consult, Pub Med, Nursing Consult, Sid, Iran Medex and Iran doc databases were used until October 2012 and March 2011. The keywords included: Neonate, Complication, Massage, which were used separately and in combination. According to the searches that were conducted in the information bases of the Central Library of Mashhad University of Medical Sciences. A study similar to the present research that covers all research objectives was not found. Therefore, for a simpler and more comprehensive review of the found studies, we classified them according to the research objectives. In this section, studies were given that measured the effect of the independent research variable, that is, massage, on different variables [146].

4- Mendes and Persiano (2008) conducted a study titled "Massage therapy reduces the duration of hospitalization and the occurrence of late sepsis in very premature infants" in the Brazilian Nursing School in the Maternal-Infant Department of Brasília Hospital. The purpose of this study was to investigate the effect of maternal massage therapy on the duration of hospitalization in very low birth weight infants admitted to the skin-to-skin care center.

A random study was conducted on 104 infants, including infants with a weight between 750 and 1500 grams and a gestational age of less than 32 weeks. The massage and control groups were similar in terms of age (29.7 ± 1.6 and 29.4 ± 1.6) weeks, birth weight (1186 ± 194 and 1156 ± 198) grams, gender, height and head

circumference at birth. Babies were divided into two intervention groups (standard care plus maternal massage) and control group. Massage was performed four times a day on the face of Vandams. Passive movements of upper and lower limbs were also performed by mothers.

The result of the study indicated a significant decrease in the prevalence of late sepsis in the intervention group compared to the control group (10.8% vs. 38.3%, $P=0.005$). The intervention group was discharged from the hospital 7 days earlier than the control group.

The results of this study support other researches that consider massage to be the cause of early discharge of infants, and it is related to the reduction of the prevalence of late-onset sepsis in infants. On the other hand, it seems that the faster weighing of babies (as one of the main criteria for discharge) may reduce the duration of hospitalization, which requires more detailed studies in larger statistical groups to prove or disprove any of these. However, since the current research considers the occurrence of late sepsis as a main variable in addition to the duration of hospitalization, it is commendable. Because the occurrence of sepsis and the start of antibiotic treatment increases costs.

5- Lahat et al. (2007) conducted a study titled "Energy expenditure in the growth of infants who receive massage therapy" in the Neonatal Department of Liz Women's Hospital in Tel Aviv, the center of occupied Palestine. The purpose of this study was to investigate the hypothesis of reducing energy consumption in healthy premature babies as a mechanism for increasing growth in these babies. A randomized and prospective study was conducted on 10 healthy babies who had the appropriate weight for fetal age in a crossover method. Infants were fed by gavage and each infant was examined twice: After a 5-day period of massage, the infants underwent another 5-day period in which no massage therapy was performed, or vice versa. During the daily massage period, 3 times of 15 minutes in 3 consecutive hours, massage therapy was performed for the baby every morning. Calories were measured indirectly by special metabolic cards. Energy consumption after the 5-day period of massage was significantly lower than the period without

massage (59.6 ± 3.6 kcal/kg in 24 hours versus 63.1 ± 5.4 kcal/kg in 24 hours).

Energy consumption of healthy preterm infants decreased after a 5-day period of massage. Although a part of the increase in the growth of healthy premature babies may be related to it, it does not seem logical to consider all the weight gain of babies through massage to be related to the reduction of energy expenditure. In this study, the samples were small and it seems necessary to conduct another study with a larger sample size. Also, there is no mention of the amount of calories that babies consume during the massage period and after, the similarity of the number of massage days and also the reason for gaining weight was the reason for choosing this study.

6- Hosseinzadeh et al. (2006) conducted a study titled "Effect of massage on the physical growth process of low birth weight babies in delivery wards" at Hazrate Fatemeh School of Nursing and Midwifery, Shiraz University of Medical Sciences. The purpose of this study was to investigate the effect of massage by mothers on the physical growth process of low birth weight babies in the maternity wards of hospitals affiliated to Shiraz University of Medical Sciences. The mothers of the intervention group were taught massage and then they repeated the technique correctly for the researcher to perform the massage at home from the third day to four weeks later [147].

Another issue regarding the technique was the amount of pressure and its direction. The amount of pressure was moderate, that is, until the baby did not close his face, did not cry, and the muscle under the mother's hand was touched. The direction of the massage was from proximal to the distal side. After learning the massage, the mothers would repeat it for the researcher.

The massage lasted for 15 minutes in three phases, the first and third phases were 6 minutes each. Two minutes of the legs (four times each leg from the top to the ankle, two times the soles of the feet, two times the toes, two times the back of the foot, four times the rotation of the ankle), two minutes of the hands (four times each hand from the top to the wrist, two palm, fingers twice, back of hand twice, wrist rotation four times), chest and abdomen for 30 seconds (chest

butterfly position four times, chest cross position four times, palms down from below the chest twice, four times in a circular position on the stomach), 30 seconds head and face (one time forehead, eyes, nose, lips, chin, face), one minute back (4 times back and forth movement of the hand on the back, four times smooth movement from the neck to rump) was massaged and the second phase of passive movement which was 3 minutes. 90 seconds of the upper limb and 90 seconds of the lower limb opening and closing and diagonally closing the arms four times, four times diagonal movements of the left hand and right leg, four times diagonal movements of the right hand and left foot, four times simultaneously gathering the legs towards the stomach, there were four pedaling movements of the legs.

The average birth weight in the intervention group was 2362 grams with a standard deviation of 143.5 and in the control group it was 2334.8 grams with a standard deviation of 148.4 and a difference in weight of 27.2 grams. In the fourth week, the intervention group was 3446.4 grams with a standard deviation of 213.8. For the control group, it was 3202.6 grams with a standard deviation of 207 and the average weight difference was 243.8 grams.

This weight gain during four weeks in the intervention group was 217 grams more than the control group, which is statistically significant. ($p < 0.001$) regarding the height of term babies, based on the obtained information, the average height at birth in the intervention group was 46.6 cm and in the control group was 46.9 cm, and the height difference was 0.25 cm, which after follow-up in the last week, i.e. the fourth week, the average height in the intervention group was 51.7 cm and in the control group was 50.3 cm, and the difference in height was 1.3 cm. The control group was statistically significant ($p = 0.002$).

The obtained results show that massage has an effect on the weight gain of term babies. Since one of the main variables of the current study is weighing, this review was selected. The important point is regarding the correct measurement of the babies and also the technique performed by the mother and the assurance of the correct implementation of the technique and the amount of pressure applied

by different mothers, which can be varied according to their number, but according to these points, we still see an increase in weight. which can be because the massage technique is easy and can be done for mothers and babies even at home.

7- Badiei et al. (2011) conducted a study entitled "Comparison of the effect of massage by mother and nurse on the weight gain of premature babies 28 to 34 weeks old" and the aim of this study was to investigate the effect of massage therapy by the mother on the weight gain of premature babies and it was compared with massage by trained personnel. In this clinical trial, 60 premature babies with a gestational age of 28 to 34 weeks were randomly assigned to one of the three groups of 20: Control, massage by the mother, and massage by the nurse.

Infants in all groups did not receive serum or formula. Massage therapy was performed after the seventh day of birth and if the baby's condition was stable for five consecutive days and three times a day. The duration of hospitalization, daily weighing and the amount of fluid received were recorded. The collected data were analyzed by SPSS software and one-way analysis of variance and Kruskal-Wallis tests. Weight gain in the massage group by the nurse was significantly higher than the other two groups (control and massage by the mother).

This increase in the three groups was 2.5 ± 6.5 respectively and 3.7 ± 51.5 and 4.6 ± 1 was ($P=0.001$). The group massaged by the mother had significantly more weight gain than the control group ($P<0.05$). The duration of hospitalization was not significantly different between the groups.

This study compared the intervention by the mother and the nurse and showed that massage therapy for premature babies with a gestational age of more than 28 weeks is a safe way to increase the weight of these babies that even mothers can do it and use this method to in this study, the length of hospitalization was investigated, which was the reason for this study. Another point is the non-receipt of serum and milk powder by the groups present in the intervention and how to meet the nutritional needs of the babies, which is more debatable.

8- Javadifar et al. (2009) conducted a study entitled "Investigation of the effect of massage with coconut oil on the weight gain of premature babies". This study was designed to investigate the effect of massage with coconut oil on the weight gain of premature babies. This research was a clinical trial that was conducted on 72 healthy premature babies with a gestational age of 34-37 weeks in Imam Khomeini Hospital of Ahvaz with a purpose-based sampling method. Babies were divided into three groups: control, massage alone and massage with oil. In the massage therapy group, massage was given by the mother according to the taught method 3 times a day and each time for 15 minutes from the 3rd to the 17th day after birth. In the oil massage group, the same technique was performed using coconut oil at the rate of 10 milliliters per kilogram of the baby's body weight for 14 days. Finally, the weight was measured on days 7 and 14 after the intervention [148].

Conclusion

The average gestational age of the babies was 35.37 and the average weight was 2314 grams, and the three groups were not significantly different from each other. In the average weight gain on the 7th day after the intervention, there was a statistically significant difference in the oil massage group (2525.42 grams) compared to the control group (2267.29 grams) ($P=0.04$) and in the massage alone group (2444.38 grams). It was observed compared to the control ($P=0.02$). Also, in the average weight gain on the 14th day after the intervention, there was a statistically significant difference in the oil massage group (2789.58 grams) compared to the control group (2375.42 grams) ($P=0.000$) and the massage alone group (2606.67 grams) (compared to the control with ($P=0.009$) and oil massage group compared to massage alone ($P=0.04$).

The above study shows that massage, especially massage with oil, can be a useful and valuable method in the process of gaining weight in premature and low birth weight babies, and its use is useful in improving the outcomes of babies. But similar to this study should be done in infants with a lower gestational age. Also, in this study, it is not stated whether the near-term babies stayed in the ward for 17 days to

complete the massage course, despite being healthy, or whether there was another reason. Since this study also had a variable similar to the main variable of the present study, it was stated. 9- A study titled "Effect of deep massage on the weighing of low birth weight infants" was conducted by Pntea Rafati et al. (2003). This study was conducted with the aim of determining the effect of deep massage on the weight gain of low birth weight babies. This clinical trial was conducted on two groups of 27 low birth weight infants hospitalized in the special neonatal units of Isfahan hospitals in 2002-2003 with easy sampling. The intervention group received deep massage for 15 minutes, three times a day for 10 days, and the control group received only usual care; The data were collected by interview and observation method using a check list and a baby weighing scale, and the weight of the babies of two groups was measured at the beginning of the study and on the tenth day with a single weight by one person in a double-blind manner. The statistical results comparing the average weight changes before and after the study (average 215.92 grams in the intervention group and 81.11 grams in the control group) showed a significant difference between the two groups ($P=0.006$). Deep massage improves weight growth in low-birth-weight babies. But the method of measuring weight and other measured variables should be investigated in a larger statistical group, and another question is that in this study, it was not determined exactly what day the massage started. The similarity of the main variable is the reason for this review. Studies show the effect of massage with or without oil on the physiological parameters of premature, term and low birth weight babies. Most of the studies conducted in infants have considered the weight gain variables and length of hospitalization with massage periods of more than 5 days, and a few limited studies that have been conducted on the effect of massage on other problems of hospitalized premature infants have not reached a single conclusion. In the present study, variables such as apnea and feeding intolerance have been studied, which have been studied in fewer studies. According to the results and the lack of sufficient studies on the effect of massage on the many problems of

premature babies, the researcher decided to investigate the effect of massage on the occurrence of complications in premature babies in order to be a promise for better care and prevention of long-term complications of this special population.

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