Osteopenia among Preterm Newborns and Nursing Care

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Abstract
Incidence of preterm birth has been increasing since 1980s. Despite this increase in the incidence, survival rate of preterm newborns has been going up although it changes depending on gestational age. It is stated that such critical diseases that progress slowly as sensory losses, neurological disorders, developmental deficits, respiratory failures, bone mineral problems occur despite decreasing number of health problems that develop rapidly thanks to the increasing rate of preterm survival rate. One of the bone mineralization problems seen in preterm newborns is osteopenia. Because osteopenia, described as poor bone mineralization, occurs during the last trimester of pregnancy and bone development period, it is often seen among preterm newborns and is thus termed as preterm osteopenia. As birth weight and gestation age of newborns reduce, incidence of preterm osteopenia increases. In diagnosing preterm osteopenia, biochemical parameters and radiological tests are used. Preterm osteopenia may lead to fractures in long bones, respiratory insufficiency due to softening or fractures of ribs, inability to leave ventilator during newborn period as well as retardation of tooth development and short stature in future. Therefore, it is highly important to prevent preterm osteopenia. First intervention against preterm osteopenia is to prevent disease progress. Enabling preterm newborns to be fed with fortified breast milk or formula with calcium and phosphorous supplements may fail in preventing preterm osteopenia. Besides; osteopenia and osteopenia-related complications may be prevented by offering daily physical activities that have no adverse effects to preterm newborns who suffer from movement restrictions. It is suggested that nurses who are responsible for the protection, maintenance and development of health can make contributions to prevent osteopenia by assessing behaviors of the newborns with the health care team and providing nutritional supplements, proper treatment modalities and physical activity programs. Thus, undesired results including long hospital stay and repeated hospitalizations that will worsen general physical status of preterm newborns and will increase cost of health care can be avoided.

Keywords
Nurse, Osteopenia, Preterm

Introduction
Incidence of preterm birth has been increasing since 1980s. Despite this increase in the incidence, survival rate of preterm newborns has been going up although it changes depending on gestational age [1,2]. Although survival rate of preterm newborns aged 23 weeks has increased from 0% to 65% at some health institutions thanks to scientific and technological advancements over the last 20 years, the survival rate varies from institutions to institutions [3]. It is stated that such critical diseases that progress slowly as sensory losses, neurological disorders, developmental deficits, respiratory failures, bone mineral problems (osteopenia) occur despite decreasing number of health problems that develop rapidly thanks to the increasing rate of preterm survival rate [4,5].

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One of the bone mineralization problems seen in preterm newborns is osteopenia. Because osteopenia, described as poor bone mineralization, occurs during the last trimester of pregnancy and bone development period, it is often seen among preterm newborns and is thus termed as preterm osteopenia [6-10]. As birth weight and gestation age of newborns reduce, incidence of preterm osteopenia increases [6,11-13].

The most prevalent chronic diseases in the newborns, pharmacological agents as corticosteroids and diuretics and long-term parenteral nutrition are some of the risk factors that increase the incidence of osteopenia [6,11,14]. A loss in mechanical stimulant is also an important risk factor for preterm osteopenia [6,10,15].

In diagnosing preterm osteopenia, biochemical parameters and radiological tests are used [11,13,16]. Of these biochemical parameters; particularly in case of low Ca-P (calcium phosphorous) and high ALP (alkaline phosphatase), osteopenia is suspected. Serious osteopenia is diagnosed if ALP > 800 IU/L or P < 3.5 mg/dl is present. However, because specificity and sensitivity of biochemical parameters is not high, these parameters are only indicative for detailed examination in suspicious cases of osteopenia [11].

Biochemical Parameters used Diagnosis of Preterm Osteopenia

Diagnosis of osteopenia can be done more accurately with the measurement of bone mineral content (BMC) or histological examination (Table 1). Various screening methods have been developed in order to detect changes in bone mass because histological examination is not suitable for newborns [11,17]. Of these screening methods; SPA (Single Photon Absorptiometry) and DPA (Dual Photon Absorptiometry) perform measurements with radioactive isotopes while QCT (Quantitative Computed Tomography) and DEXA (Dual energy X-ray absorptiometry) perform measurements with X-rays. Apart from SPA, DPA, QCT and DEXA techniques; QUS

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Calci̇tonin Normal  
Fractional excretion of Ca Increased  
Urinary deoxypyridinol Collagen breakdown product, decreased  
Pyridoxine in urine Collagen breakdown product, decreased  
PICP Collagen breakdown product, decreased  
ICTP Collagen breakdown product, decreased  
B-ALP No superiority of total ALP, increased

**Biochemical Parameters used Diagnosis of Preterm Osteopenia**

1. Pieltain C, de Halleux V, Senterre T, Rigo J (2013) Prematurity and bone treatment modalities and physical activity programs. Thus, undesired effects to preterm newborns who suffer from movement restrictions. Besides; osteopenia and osteopenia-related complications may be prevented by offering daily physical activities that have no adverse effects to preterm newborns who suffer from movement restrictions. It is suggested that nurses who are responsible for the protection, maintenance and development of health can make contributions to prevent osteopenia by assessing behaviors of the newborns with the health care team and providing nutritional supplements, proper treatment modalities and physical activity programs. Thus, undesired results including long hospital stay and rehospitalizations that will worsen general physical status of preterm newborns and increased cost of health care can be avoided.

**References**


