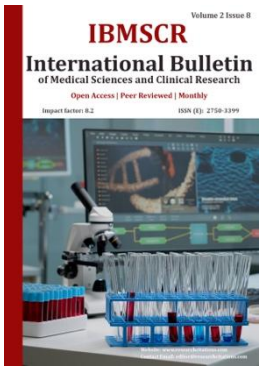

EARLY DIAGNOSIS AND CLINICAL COURSE CHARACTERISTICS OF CONJUGATIONAL JAUNDICE IN NEWBORNS DEPENDING ON THE TYPE OF FEEDING

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Annotation. Neonatal jaundice is one of the most common conditions encountered in neonatology, and its course is directly influenced by the type of feeding. This article analyzes the early diagnosis and clinical course characteristics of jaundice in newborns who are breastfed, formula-fed, or receive mixed feeding. A review of the literature indicates that jaundice is more frequent and tends to last longer in breastfed infants; however, this condition is often associated with insufficient fluid and calorie intake. Proper organization of feeding practices plays an important role in preventing severe forms of jaundice.

Keywords: newborn, jaundice, conjugational bilirubin, breast milk, formula feeding, early diagnosis.

Introduction

Neonatal jaundice occurs in 60–80% of newborns and is predominantly physiological in nature. However, certain forms of jaundice, particularly prolonged or severe cases, require early diagnosis and careful monitoring. The type of feeding is an important factor in the pathogenesis of neonatal jaundice, and specific features of bilirubin metabolism are particularly observed in breastfed infants. Recent studies have demonstrated a significant association between feeding methods and the duration of jaundice.

During the neonatal period, bilirubin metabolism is not fully matured, and the conjugation of bilirubin in hepatocytes is limited. In particular, the low activity of the enzyme uridinediphosphate-glucuronyltransferase leads to the accumulation of bilirubin. Although this physiological condition is temporary in most infants, in some cases it may contribute to a pathological course of jaundice[1]. Hemolysis, immaturity of liver function, increased enterohepatic circulation, and inadequate feeding patterns play an important role in the development of jaundice in newborns. The type of feeding directly affects the activity of enterohepatic circulation and may either increase or decrease the reabsorption of bilirubin. Therefore, assessing the feeding method is an important clinical criterion for the early detection of jaundice[2].

Numerous studies have reported that jaundice occurs more frequently and lasts longer in breastfed infants. However, according to modern scientific perspectives, this condition is not caused by breast milk itself but is associated with insufficient milk intake during the first days of life, reduced fluid consumption, and significant weight loss[3]. As a result, intestinal reabsorption of bilirubin increases. In infants who are formula-fed or receive mixed feeding, jaundice tends to regress more rapidly, as these feeding methods ensure adequate caloric and fluid intake. At the same time, excessive reliance on formula feeding may limit the long-term benefits of breastfeeding. Therefore, an individualized approach is of particular importance in clinical practice.

Early diagnosis of neonatal jaundice, especially in infants belonging to risk groups, is crucial in preventing severe complications, including bilirubin encephalopathy. Monitoring that takes feeding type into account, dynamic assessment of bilirubin levels, and optimization of

feeding strategies improve the quality of neonatal care. These factors further highlight the relevance of the present study.

Materials

In this study, international scientific articles published between 1987 and 2025 were systematically analyzed. Research papers from reputable journals such as PubMed, Pediatrics, Acta Paediatrica, and others were selected. The studies compared feeding types (exclusive breastfeeding, formula feeding, and mixed feeding), bilirubin levels, and the onset and duration of jaundice. The findings were synthesized using qualitative and quantitative analytical methods.

A retrospective and analytical research design was chosen. Based on the literature review, the development of jaundice in newborns, its onset and duration, as well as laboratory indicators were examined in relation to different feeding types. Only studies involving full-term infants without congenital anomalies or signs of hemolytic disease were included. The infants under investigation were classified into three groups according to their feeding type: exclusively breastfed, exclusively formula-fed, and mixed-fed. For each group, the time of jaundice onset, peak bilirubin levels, duration of jaundice, and the need for phototherapy were analyzed separately. Feeding type was determined based on the feeding regimen used during the first seven days of life. Laboratory assessment included measurements of total and fractionated bilirubin levels, including conjugated bilirubin. Priority was given to studies in which bilirubin levels were measured in serum using spectrophotometric methods. In addition, physiological weight loss, fluid balance, and urine output were evaluated as factors influencing the course of jaundice.

In comparing the research results, the clinical presentation of jaundice, threshold values for initiating phototherapy, and treatment duration were taken into account. Some studies specifically analyzed the association between inadequate feeding, weight loss exceeding 8–10%, and severe jaundice. These data were used to assess the clinical significance of feeding type.

Statistical findings were qualitatively synthesized based on the data reported by the authors. Differences between results were interpreted from a cause-and-effect perspective. The study was conducted within the framework of works that complied with international bioethical standards and were based on anonymized clinical data.

Results

According to the analyzed data, bilirubin levels were found to be higher in breastfed infants compared to those who were formula-fed. Several studies reported that jaundice in breastfed infants tends to persist longer and resolve more slowly. However, this condition has been shown to be associated not with breast milk itself, but with insufficient feeding, inadequate fluid intake, and greater weight loss during the early days of life. In infants who are formula-fed or receive mixed feeding, jaundice was observed to regress more rapidly (see Table 1).

Table 1

Feeding type and neonatal jaundice

No.	Main Finding
1	Bilirubin levels are significantly higher in breastfed infants compared to those who are formula-fed.
2	Inadequate feeding and excessive weight loss increase the risk of developing jaundice and contribute to its severe course.
3	Breastfeeding may prolong the duration of jaundice and slow the decline of bilirubin levels.
4	Mixed feeding enhances the effectiveness of phototherapy and accelerates jaundice regression.

The analysis showed that clinical signs of jaundice in breastfed infants typically appear on days 2-3 of life and peak bilirubin levels are reached later. In this group, higher bilirubin levels and a slower decline were observed. Jaundice was more pronounced particularly in infants who received insufficient amounts of breast milk during the early days.

In formula-fed infants, jaundice reached its peak earlier and regressed more rapidly. Bilirubin levels in this group were lower compared to breastfed infants, and the need for phototherapy was less frequent. Additionally, the lower degree of physiological weight loss contributed to a faster resolution of jaundice.

In infants receiving mixed feeding, the course of jaundice exhibited intermediate characteristics. Bilirubin levels in this group were lower than those of exclusively breastfed infants but higher than those of formula-fed infants. Mixed feeding was associated with a shorter duration of jaundice and relatively higher phototherapy effectiveness.

Additional analyses showed that the severity of jaundice was more closely related to feeding adequacy than to the type of feeding itself. Infants with weight loss exceeding 8–10%, decreased urine output, and signs of fluid deficit had higher bilirubin levels. This finding highlights the importance of monitoring not only the type of feeding but also the effectiveness of feeding practices (see Figure 1).

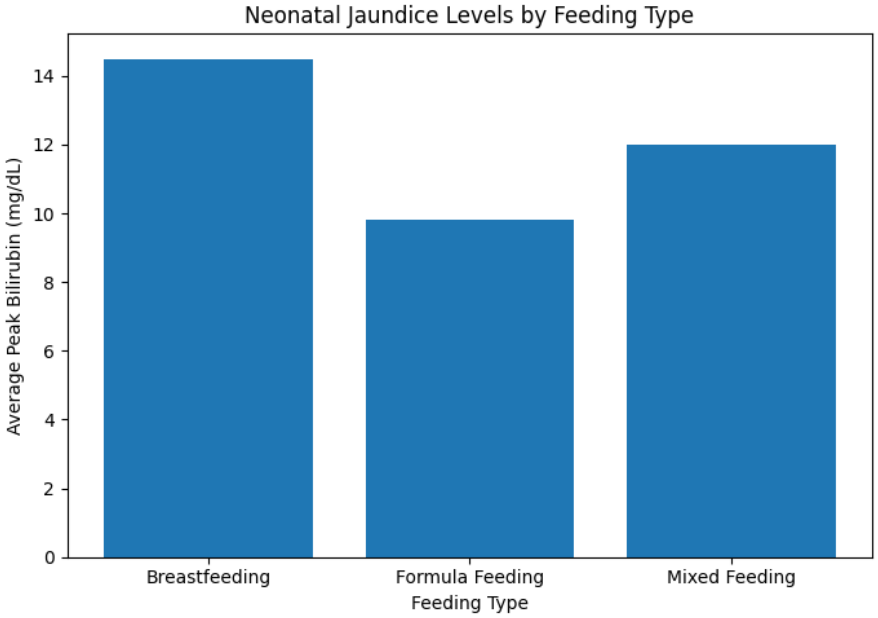

Figure 1. Neonatal jaundice levels by feeding type

This figure presents a comparison of average peak bilirubin levels in newborns according to the type of feeding. The chart visually illustrates the degree of jaundice expression among infants who are breastfed, formula-fed, and mixed-fed.

Discussion

The results indicate that the type of feeding has a significant impact on the clinical course of neonatal jaundice. Although breastfeeding is physiologically the most optimal form of nutrition, inadequate intake during the early days of life may lead to an exacerbation of jaundice. Therefore, close monitoring of weight loss and bilirubin levels is essential in breastfed infants.

The findings demonstrate that while the development and progression of jaundice in newborns are influenced by the feeding method, the most decisive factor is the adequacy of feeding. The higher incidence and longer duration of jaundice observed in breastfed infants are often explained by insufficient breast milk intake. This highlights the clinical importance not of discontinuing breastfeeding but of ensuring proper breastfeeding practices. The study further confirms that breastfeeding itself is not a direct cause of jaundice pathogenesis. Rather, reduced fluid intake, insufficient caloric supply, and excessive weight loss increase enterohepatic

circulation, thereby enhancing bilirubin reabsorption. For this reason, assessing the infant's overall condition and weight dynamics is equally important as evaluating the type of feeding when determining the severity of jaundice.

The relatively milder and shorter course of jaundice in formula-fed infants is attributed to more stable caloric and fluid intake in this group. However, this does not imply that formula feeding is the preferable method, as breast milk remains the most optimal source of nutrition from both immunological and metabolic perspectives. Thus, in the presence of jaundice, formula feeding should be considered only as a temporary supportive measure when clinically indicated.

The findings that mixed feeding accelerates jaundice regression and enhances phototherapy effectiveness suggest that this approach may be beneficial in selected clinical situations. Mixed feeding can be especially effective as a short-term strategy in infants experiencing excessive weight loss or signs of dehydration, as it allows for jaundice management while maintaining breastfeeding. Overall, the results of this study emphasize the necessity of an individualized approach in managing neonatal jaundice. Evaluating the type of feeding, monitoring feeding adequacy, and conducting dynamic assessment of bilirubin levels are crucial for preventing severe jaundice and its complications. Considering these factors in clinical practice contributes to improving the quality of neonatal care.

Conclusion

The type of feeding has a significant influence on the early diagnosis and clinical course of jaundice in newborns. Although jaundice tends to be more frequent and prolonged in breastfed infants, this condition can be effectively managed through properly organized feeding practices. Early diagnosis and an individualized approach play a crucial role in preventing severe complications. The findings of this study once again confirm that feeding type is an important factor in the development and progression of neonatal jaundice. In particular, the higher incidence and longer duration of jaundice in breastfed infants are often linked to inadequate feeding rather than breast milk itself, and can be controlled through optimized feeding strategies.

Considering the type of feeding when diagnosing jaundice, monitoring bilirubin levels dynamically, and regularly assessing changes in body weight are essential in clinical practice. This approach helps prevent severe complications, including bilirubin encephalopathy, and ensures timely and appropriate treatment decisions.

In summary, the management of neonatal jaundice should go beyond standardized protocols and instead focus on developing individualized feeding strategies for each infant. Ensuring adequate feeding effectiveness and using mixed feeding judiciously when necessary can reduce the severity of jaundice and contribute to healthy development in newborns.

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