

行政院國家科學委員會專題研究計畫成果報告

極低體重早產兒的行走發展與預測因子研究

Walking Development and Its Predictive Factors in Very Low-birthweight Infants

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一、中文摘要

本研究的目的是在比較極低體重早產兒與正常足月兒獨立行走達成年齡，並探討影響早產兒獨立行走達成的可能因子。參與的受試者為 96 位極低體重早產兒與 82 位正常足月兒，在矯正年齡 6、9、12 及 18 個月大時到院檢查，本研究以前瞻性追蹤的方式確定其行走達成的年齡並追蹤記錄嬰兒的粗動作發展，再依病歷搜集嬰兒出生資料與家庭社經地位等資料。極低體重早產兒的行走達成年齡（中位數為 14 個月）顯著的晚於正常足月兒（中位數為 12 個月）。18 個月大時，所有正常足月兒已達成獨立行走，然而仍有百分之十一的極低體重早產兒還未達成獨立行走。根據多變項迴歸分析，極低體重早產兒的低懷孕週數和行走達成的遲緩有顯著相關，除了低懷孕週數外，長期使用呼吸器或用氧，以及嚴重早產兒視網膜病變亦與行走達成遲緩明顯相關。本研究發現：極低體重早產兒易發生行走達成遲緩，此外，低懷孕週數所造成的行走達成遲緩可能來自於新生兒呼吸窘迫和嚴重早產兒視網膜病變兩個可能的途徑。

關鍵詞：動作發展、早產、危險因子、行走

Abstract

The purpose of this study was to compare the age of walking attainment between very low-birthweight (VLBW) preterm infants and normal term infants, and to determine the variables that affect the walking attainment in VLBW infants. Ninety-six VLBW preterm infants and 82 normal term infants were prospectively followed to determine their age of walking attainment and to monitor gross motor development with sequential clinic visits at 6, 9, 12 and 18 months corrected age. Perinatal and sociodemographic data were collected through review of medical records. The VLBW infants were significantly older at attainment of walking (median 14 months) than the term infants (median 12 months) after correction for prematurity. By the age of 18 months, all term infants had attained walking ability; while 11% of VLBW infants were still unable to walk. Multivariate proportional hazards regression analysis revealed that low gestational age was significantly associated with late attainment of walking in VLBW infants. With the adjustment for gestational age, prolonged ventilation (or oxygen therapy) and severe retinopathy of prematurity were significant predictors of late walking attainment. Our findings indicate that VLBW preterm infants

have an increased risk of delayed attainment of walking. Furthermore, the contribution of low gestational age to the delayed walking attainment in VLBW infants may occur via the plausible pathways of neonatal respiratory distress and severe retinopathy of prematurity.

Keywords: Motor development; Prematurity; Risk factor; Walking.

二、緣由與目的

Very low-birthweight (VLBW) preterm infants (gestational age <37 weeks and birth weight <1501 g) are at high risk for developmental disabilities, with motor delays accounting for the largest proportion of these problems. Recent approaches to the remediation of motor disorders in preterm infants have emphasized provision of early intervention programs. However, limitations in current service resources necessitate the identification of preterm infants who are at greatest risk for motor delays and in most need of early therapeutic intervention.

Among the wide ranging motor behaviors during infancy, attainment of walking is an important milestone that expands mobility and attention of a child to an extended environment. The attainment of the walking milestone requires a learning period of approximately 12 months in normal term infants. Recent studies on preterm infants have found that more than half of infants with walking attainment after 18 months had developmental disorders, and a high proportion (>80%) of those with cerebral palsy were found to have delayed attainment of walking. Therefore, determination of the age of walking attainment may provide valuable clues for diagnosing motor delays and possible related neurological abnormalities in preterm infants.

Evidence regarding whether preterm infants walk at later ages than normal term infants is inconclusive. Some studies showed that preterm infants attain the ability to walk at older ages than term infants, after correction for prematurity. However, others reported that preterm infants attain walking

ability at similar ages, yet with larger variation and poorer quality of movement, in comparison with term infants. These inconsistent results might be due to factors including variation in sample characteristics (e.g., difference in birth weight and length of gestation) and definition of walking attainment (e.g., difference in distance of walking).

Early identification of preterm infants for risk of motor delays is important because intervention could be started when the child is still young. Such a screening work is usually guided by developmental examination and chart review. Although clinical motor tests would provide accurate assessment for preterm infants, they are not of predictive utility until nine months postterm. Alternatively, chart record containing the medical and demographic information of preterm babies is readily available. Previously studied predictors for walking attainment have only included a few perinatal and sociodemographic variables. For example, late attainment of walking in preterm infants was shown to be associated with short gestation, but not with intrauterine growth retardation. In addition, black preterm infants were found to attain walking at earlier ages than white preterm infants. However, gender and socioeconomic status were reported to have no impacts on the attainment of walking in preterm infants. A further limitation of previous studies on the risk factors for late attainment of walking is the failure to perform multivariate analysis to account for the effects of many interdependent parameters which arise in the developmental process.

The present study had two purposes: (1) to compare the age of walking attainment between VLBW preterm infants and normal term infants, with age of walking attainment being defined as the time when the child is first able to move for five successive steps; (2) to determine the predictive value of multiple perinatal and sociodemographic variables on the attainment of the walking milestone in VLBW infants with the use of both univariate and multivariate analysis.

三、結果與討論

Our results illustrate that VLBW preterm infants were significantly older at attainment of walking compared with normal term infants. The close relation of late walking attainment with neuromotor disorders indicates that age of walking attainment may be used as an outcome measure for preterm infants. Furthermore, risk analysis data in this study suggest that short gestation, the presence of neonatal respiratory distress and severe retinopathy of prematurity, are predictive of late attainment of walking in preterm infants. Future study is needed to explore the characteristics and role of these plausible neonatal mechanisms in modifying developmental outcome.

四、計畫成果自評

Part of the data of this project has been published in the following paper: Jeng, S.F., Yau, K.I.T., Liao, H.F, Chen, L.C. and Chen, P.S. Prognostic factors for walking attainment in very low-birthweight infants. *Early Human Development*. 2000;59:159-173.