

Infants Motor Development of 3-18 Month Premature Infants in Comparison with Their Normally Developing Peers based on Home Environment Affordance

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Abstract

Introduction: Premature infants are susceptible to different types of developmental disability in future. Therefore, the home environment, toys & educational materials should support and improve their developmental status. The aim of this study was to investigate the home affordances of 3-18 months infants, who were born premature, and compare their motor performance with infants who were born mature at the same age span. **Material and Methods:** In this cross-sectional study, the home affordances of 90 infants were conducted (50 premature and 40 mature infants). The means gestational age of premature infants was 31.1±27.3 weeks. Affordance in the Home Environment for Motor Development-Infant Scale (AHMED-IS) was used to evaluate home environments of them. For data analysis the Mann-Whitney U was used. **Result:** There was a significant difference between premature and mature infants in using fine motor toys ($P=0.03$). This means that a less fine motor toys were provided for premature infants. Other environmental possibilities (variety of stimuli ($P=0.70$), physical environment ($P=0.72$), gross motor toys ($P=0.10$), and total test score of AHMED-IS ($P=0.19$) showed no statistically significant difference between two groups of infants. **Conclusion:** according to the findings, adequacy of affordances in the home environment of premature infants in comparison to their mature peers were poor, while premature infants need enriched home environments .

Keywords: Development; Home Environment; Infant; Play; Premature

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Introduction

In the world, it is estimated that 11.1% of all births are premature births (1). Premature infants have different experiences at the Neonatal Intensive Care Unit (NICU). The developing brain is exposed to unpleasant auditory (2, 3), visual (4), vestibular and tactile stimulation. Early life experiences influencing developmental trajectories during maturation of the brain can have a wide range of long-lasting effects on adult life (5). Family socio-economic status (6), environmental stimuli exposure and opportunity to engage in learning activity are often strong contributors to overall infants wellbeing during the first years of life (7). One of the key aspects of a child's environment is the facilities it offers as opportunities for learning and development. When it comes to a child's home environment, the affordances

available can play a crucial role in shaping their experiences, skills, and development (8). Equipment's such as toys, books, art supplies, and educational materials can provide infants with opportunities for learning and creativity (8).

Home affordances are powerful predictors of the developmental outcomes in infants (9).

Also a rich home environment is a good predictor of higher Bayley scores in premature infants (10). Best of our knowledge no study has been found that compares the home environment of premature and mature infants after discharge.

In a Low Birth Weight Premature sample by Watson, results found a strong relationship between parenting subscale of HOME inventory and child adaptive social behaviors (11, 12). Another test to evaluate the home affordance is AHMED-IS .In this study, this scale was used, which is a parental questionnaire

that investigates the quality and quantity of the family and the home environment factors influencing infants' motor development (13). The home environment of premature infants is very significant and requires training. AHMED-IS test evaluates the environment which is useful for parents, considering different aspects (variety of stimuli, physical environment, gross and fine motor toys).

According to the importance of home environment for infants' development, the question is whether the different conditions of premature infants cause these infants to have a different home environment compared to their mature peers or not? In other words, are the home affordances in these infants such as physical space, educational materials, toys and parenting interactions differ from mature peers? This study aimed to investigate the motor performance of premature infants in comparison with their normally developing based on their home affordances.

Material and Methods

This cross-sectional study included 90 infants at aged between 3-18 months (50 premature and 40 mature) from southern Iran. The inclusion criterion was no current health related condition as determined via parental interview and health recorded profiles. In the present study, infants were selected from the Child Development Center of Shiraz University of Medical Sciences. All participants who were qualified considering the inclusion criteria were invited to participate and the university approved human subjects consent form was fulfilled. Participating parents met in a quiet and appropriate room at the center and were asked to complete the questionnaires. The data gathered within 3 months. Two participants' groups match considering social-emotional status including mother and father education and family income.

Assessment Instrument

Affordance in the Home Environment for Motor Development-Infant Scale (AHMED-IS): this scale is the infant version of the original version of AHMED-SR developed to assess infants aged 3-18 months (14). It is a parental questionnaire used as a research and clinical instrument in several countries. It investigates the quality and quantity of the family factors influencing infants' motor development: family characteristics (SES), physical space, daily activity (DA), and availability of toys. Two age groups were available and were used in the present study: 3-11 months and 12-18 months. The AHMED-IS includes 41 questions and four domains of physical space (PS)

(indoor and outdoor), DA, gross-motor toys (GMT) and fine-motor toys (FMT). Assessment of each domain is identified as: 1. Less than adequate, 2. moderately adequate, 3. Adequate, and 4. Excellent. Content Validity Index (CVI) for the Persian version of the AHMED-IS ranged from 0.63 to 0.95 respectively. The Intra Class Correlation Coefficient (ICC) of total score was 0.87 ($0.83 < ICC < 0.97$) and Cronbach's alpha was 0.75 which indicates good reliability of its Persian version (13, 15).

Statistical analysis

Descriptive statistics were used to describe the frequency, median and interquartile range of variables. To compare the motor performance of infants based on home environment affordance between two groups, Mann-Whitney U was used. $P < 0.05$ is considered significant.

Results

Participants included 40 mature infants with a mean age of 10.92 ± 4.83 months and 50 premature infants with mean age of 9.92 ± 4.3 months. The mean weight gestational age at birth for all infants were 1780 ± 498.26 grams 31.1 ± 3.27 weeks respectively. There were no significant differences in socioeconomic status of family between two groups. Table 1 shows demographic characteristics of the mature and premature infants.

As the variables were ordinal types so to compare the home environment between two groups, the Mann-Whitney U test was used which also compares the total score of questionnaire and subscales of AHMED-IS.

Results showed that there was no significant difference in (PS) (indoor and outdoor), and DA and GMT scores of AHMED-IS in the two groups. Only there was significant differences in FMT of two groups. Table 2 shows the results in detail. As can be observed in the table, all aspects of home environment in the premature infants were lower than mature infants, but this differences were only significant for FMT (P -value = 0.03).

Discussion

The purpose of this study was to investigate the home environment of premature infants aged (3-18 months) in comparison with mature peers. The results showed that there was no significant difference in the home affordances (variety of stimuli, physical environment, gross motor toys and total score) of premature and mature infants. The findings of this study showed that there was a significant difference between

premature and mature infants considering FMT. It means that a less fine motor toys were provided for premature infants.

Because the premature infants are placed in the NICU at birth, which is very different from the environment inside the mother's uterus, their sensory-motor experience is different from mature infants (16, 17). It is expected that environment be adapted and enriched in premature infants. The findings of this study indicated that the home environment in premature infants is poorer than mature infants at the same age.

A similar study which compares the home environment of premature and mature infants was not found, but various studies have pointed to the significant impact of the environment on the development of premature and mature infants (18-21).

In the study by Heydari et al. (8), the home affordances were investigated in mature infants aged 18-42 months. The results of their study showed that the best predictor of the total score of the AHMED-SR is FMTs too. Findings in this study indicated that the fine motor toys had a lower score in premature infants compared to mature infants. Based on this fact, it is possible that the total score of AHMED-IS, is poorer in premature infants.

In the study by Bakhshinezhad *et al.* (22), the effect of the home affordances on premature infants aged 18-42 months was investigated. The results showed that the level of home affordance had a significant effect on the motor development of premature infants.

Considering the importance of home affordances, why the environmental stimuli and toys of premature infants are poorer than mature peer. It can point to the lack of awareness of the families, the fear of the families of these infants that explains why their sensory-motor experiences may be different from mature infants. Therefore, premature infants need an enriched home environment after discharging from the NICU compared with their mature peers. Programs such as H-HOPE have been able to improve the social and emotional environment of premature infants after discharging from the NICU (23). A proper environment will greatly help infants' neurodevelopment. Enriching the home environment of premature infants is very important and requires education for parents. In the meantime, the AHMED-IS test evaluates the environment by considering various aspects (variation of stimuli, physical environment, gross and fine toys), which is useful and practical for parents and can also be considered as an educational factor. Considering the high speed of infants' brain development in the beginning years of their life, if this environmental adjustment is done on time, it will have significant effects on infants' development and prevention of many developmental disorders.

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Ethical consideration

None.

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Conflict of interest

None.

Authors' contributions

Conceptualization and methodology: S.K and R.A.K; Procedure: M.P and R.A.K; Statistical analysis: M.P; Writing-original draft: M.P, and R.A.K; Writing-review, and editing: S.K. All authors read and approved the final manuscript.

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