

REVIEW PAPER

Container baby syndrome – has infant equipment overuse an impact on motor skill development?

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ABSTRACT

The popularity of the use of accessories supporting baby caring such as rockers, car seats, baby carriers, and walkers is defined as container culture or container lifestyle. There is a tendency to use such items incorrectly, often leaving the infant without parental supervision.

Reduction of a child's spontaneous motor activity, prolonged stay in a forced supination position, premature sitting, or premature standing cause disturbances in motor, cognitive, social, and emotional development. The aim of the study is to present the problem of container baby syndrome. We would like to present recommendations that can be used during the parents' education, to raise their awareness of proper conduct and stimulation of their child's development.

KEY WORDS:

motor development, tummy time, container baby syndrome.

INTRODUCTION

The childhood ability to play is crucial for building the child's interactions with the environment. Exploratory play is the driving force behind the child's development and learning processes. To have that ability, however, both timely neurological and motor development are required. Motor development is conditioned by the interaction between biological, genetic, and environmental processes.

Stability (the ability to control central parts of the body) and mobility (the ability to make increasingly complex movements) are significant motor skills. Proper development of motor skills affects other areas such as cognitive, social, language, and adaptive behaviour development. The connections between the former and the latter are especially strong in the first year of life. Any delays in early motor behaviours lead to limitations in exploration of the environment and can negatively impact the infant's global development [1].

Container baby syndrome is a term used to describe problems observed in infants who spend too much time in devices that limit spontaneous motor activity [2]. Such devices include equipment used for transporting babies (car seats, strollers), accessories securing the lying or sitting position (bouncers, rockers, swings, slings, floor seats, highchairs), items which help to maintain upright position and locomotion (exersaucers, jumpers, walkers), or pillows.

The aim of the study is to present the issue of container baby syndrome and to put forward recommendations that would help to avoid this problem.

SAFE SLEEP

There have been many campaigns aimed at reducing the incidence of sudden infant death syndrome (SIDS). The most famous one is the *Back to Sleep* campaign on the initiative of the American Academy of Pediatrics (AAP). The supine position is considered the safest.

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The risk of death from SIDS is higher in the prone position (2.3–13.1 times), and the lateral position (2.0 times) compared with the supine one. To reduce the risk of SIDS, infants should be set up for sleep in a supine position (wholly on their back) on a separate, firm, non-inclined surface for every sleep until one year of age. This position does not increase the risk of choking and aspiration in infants and is recommended for every sleep, even for infants with gastroesophageal reflux. Soft objects such as pillows and pillow-like toys should be removed from the baby's bed. Infants should sleep in their parents' bedroom, close to their parents' bed, but on a separate surface. Breastfeeding and offering a pacifier at naptime and bedtime are recommended. Sitting devices are not recommended for routine sleep, particularly for infants under 4 months old [3–6].

The effectiveness of the AAP campaign in reducing the percentage of deaths from SIDS has been proven as many developed countries have started implementing its recommendations [3, 4]. The results of numerous studies, however, point out that optimal sleep routines and care practices are not commonly used. The percentage of women who are unaware of the correct baby sleeping position is very high [7, 8]. The campaign has increased the interest in the problem of child safety and influenced the change of parental attitudes. Overinterpretation of those recommendations has influenced awake positioning practices. It has led to avoidance of the prone position also during wakeful time. The consequences of such conduct are an increased rate of deformational plagiocephaly and gross motor delays, which have been confirmed in many studies [9–16]. Thus, the AAP has tried to solve the problem. In 2006, recommendations for developmental surveillance at each well-child visit and a standardized screening of all children at 9, 18, and 30 months to observe for possible developmental delays were established. In 2008, recommendations regarding the positioning of a child in the prone position (immediately after birth for 3 to 5 minutes, 2 to 3 times a day) were developed [6, 17].

TUMMY TIME, FLOOR-BASED PLAY

The supine position is considered to be the safest and, in addition, is favoured by both parents and infants. It is easier to make eye contact with the child or to organize play. In comparison with the prone lying position, the supine position is easier to maintain due to the lower intensity of anti-gravity muscle activity. It also allows infants to observe the environment freely (because the head rests on the ground) and play (the upper limbs are not involved in supporting functions). However, it cannot be the only position in which the child remains. Experience gained in the prone position is crucial for optimal development of infants. This position gives the opportunity to improve synergistic trunk muscle control and to increase

motor control against the force of gravity. The balance between trunk flexors and extensors provides synergistic stability for distal muscles [1]. “Tummy time” is the term used to describe time spent awake lying in the prone position with unrestricted movement of limbs. Tummy time promotes exploratory play, stimulating the infant's desire to move, and it reduces the risk of positional plagiocephaly. The World Health Organization (WHO) recommends that infants under one year old be physically active several times a day in a variety of ways, which is best in the form interactive floor-based play. This activity should include at least 30 minutes in the prone position (tummy time) spread throughout the day while awake [18]. In 2022 the AAP recommended supervised, awake tummy time for short periods beginning soon after hospital discharge, increasing to at least 15–30 minutes total daily by 7 weeks of age [5]. Buchanan *et al.* [19] analysed the influence of early tummy time (before or after 4 weeks of age) on the total development and sleep behaviours. Early introduction of tummy time and the higher frequency of the activity has been associated with more favourable movement and sleep in young children at 12 and 24 months of age.

CONTAINER BABY SYNDROME

Limiting the child's spontaneous motor activity by making it remain in a forced, often asymmetric, supination position for a long time may cause motor development delay and secondary delay in other areas (i.e. sensory, cognitive, communication, social, emotional). Prolonged pressure on the occipital area can lead to deformational plagiocephaly, asymmetrical facial features, or brachycephaly. Long-term consequences such as decreased muscle strength, poor coordination, attention deficit hyperactivity disorder (ADHD), increased weight, or obesity may occur [2, 9–15]. According to the WHO, infants under one year of age should not be restrained for more than one hour at a time [18].

Studies on the use of containers concern mainly car seats and walkers. When sitting in a semi-reclined position, babies born prematurely or babies with medical conditions may experience breathing problems due to poor head control. Arya *et al.* [20] assessed the risk of cardiovascular failure in children in a car seat. Both term and preterm infants showed more significant signs of potentially adverse cardio-respiratory effects in the 40° upright position during motion than when in a 30° position. This may suggest that it is the more vertical position combined with movement of the vehicle that is responsible for the occurrence of harmful effects in infants rather than the prolonged period spent in a sitting position. For those reasons, the AAP recommends predischarge observation of all pre-term and at-risk newborns while seated in car seat, to monitor for episodes

of apnoea, bradycardia, and oxygen desaturation. The observation called the Infant Car Seat Challenge should be conducted in the child's own car seat at the angle at which it will be used in the vehicle [21]. The assessment of segmental postural control while sitting, performed in a group of moderate-to-late preterm infants has shown that baby rocking recliner and baby walker usage were negative factors for achieving the sitting milestone [22].

Car seats should not be used as sleeping devices outside of the vehicle, and children should never remain in a car seat with unbuckled or partially buckled straps [5, 23]. In a retrospective review of deaths involving sitting and carrying devices *Batra et al.* [23] pointed out that strangulation from straps, and positional asphyxia are the main causes of death.

Baby walkers are a popular type of equipment which is highly associated with head and neck injuries that are most often caused by falling down the stairs. Soft tissue injuries, lacerations, and skull fractures are the most common. Those devices are used to passively maintain a standing position or to accelerate learning to walk, often without close supervision of parents who are doing household chores at the time [24, 25]. According to *Yaghini et al.* [26] gross movement abnormality was more frequent in baby walker users at the age of 12 months, but no significant difference was found between users and non-users. Recent studies indicate that walkers do not cause a delay in gait acquisition but they can cause qualitative changes in kinematic and trunk gait control and thus should not be recommended for use [27, 28].

PARENT EDUCATION

It can be difficult to change the container lifestyle because it is impossible to completely eliminate the equipment that facilitates positioning of the infants. However, it should be used as intended with care for the safety of children. There are no specific guidelines in the literature regarding the time a child may spend in the container. A period of up to 30–60 minutes is given at one time without specifying a daily limit.

The task of medical professionals dealing with neurodevelopment is to educate parents, aiming at raising awareness of the negative consequences of overuse of containers. The benefits of tummy time and floor-based play should be emphasized. The following are examples of recommendations that can be used in parent communication.

Recommendations for parents:

1. Limit the baby's time in the container. Allow for no more than 30–60 minutes at a time. Do not leave your child unattended.
2. Put the baby to sleep in the supine position, alone in a crib, in a ventilated room (no pillows or toys). The prone sleeping position is not recommended for your baby's safety. Babies should not fall asleep in

swing seats (car seat sleeping is only allowed while traveling).

3. When the child is active, change its position frequently to improve motor skills in the supine, prone, and side-lying position. During play the child should be under your supervision.
4. The baby should play in the prone position for at least 30 minutes a day (not including sleeping time in the prone position). If there are no health contraindications, you can put the baby in the prone position in the first month of life (immediately after returning home from the hospital). Extend tummy time gradually.
5. Place the baby on its stomach on a harder, stable surface (e.g. on a blanket or mattress on the floor). A soft, collapsing surface does not make it easier for your child to maintain the position.
6. If your baby does not like to lie on its stomach, turn it on its back more often. Use alternate positions (across your knees or across your chest). If this position is problematic for your child (i.e. they grimace, have trouble holding their head, or raise it too high arching the body or rotating uncontrollably on the back), seek help from a physiotherapist.
7. Do not seat your child with pillows or floor seats when it is not sitting down by itself. This skill appears most often after your child takes the quadruple position (in the support on the knees and hands).
8. Do not use exersaucers, jumpers, or walkers. This equipment will not accelerate the standing or walking skills of the baby. They teach incorrect reflection from the toes. They can cause toe-walking, foot defects, and lower limb axis disturbances.
9. Use age-appropriate toys and equipment.
10. Use car seats only when traveling (not for feeding, sleeping, during shopping or walking). In the first few months, journeys should be no longer than 30 minutes. If your journey is longer, make regular breaks (after one hour of travelling).

CONCLUSIONS

Conscious and mature parenthood requires both parents to be responsible for the health and life of a child, to create the best conditions for its development, and to acquire the ability to care for it after birth. Container lifestyle is a response to the need to ensure the safety of the child during various everyday situations, such as traveling. It makes life easier because the child can be quickly placed in a stable, controlled position and quickly moved to another room where the parent is currently present. Importantly, this position is well-tolerated by the child, often being more attractive to it and not objectionable. Most containers are considered essential. The huge selection of various products creates the belief that if the product goes on sale, it must be safe for the child. It cannot be denied that the use of some

of the products mentioned above is recommended (e.g. the obligation to transport children in a car in safety seats). However, some equipment is used improperly; this concerns most often car seats that are used as recliners or seats. Using infant equipment inconsistently with its intended use and outright misuse (e.g. extending the time of use) limits tummy time, floor play, and exploration. It furthermore reduces the amount of time infants spend playing with their parents and reduces tactile and vestibular stimulation and mother/father-infant interaction.

The role of medical professions such as neuro-paediatricians and physiotherapists is to educate parents about safe use of containers and home routine change, appropriate techniques for handling and positioning the baby, the importance of lying on the stomach as an activity conducive to the acquisition of motor skills, and developing age-appropriate motor skills.

DISCLOSURE

The authors declare no conflict of interest.

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