

Parents' choice of non-supine sleep position for newborns: a cross-sectional study

The back to sleep (BTS) campaign was introduced to encourage the supine positioning of infants when sleeping (American Academy of Pediatrics (AAP) 1992; NHS Choices, 2012) to reduce the risk of sudden infant death syndrome (SIDS). Before this, more than 70% of infants in the US were being placed prone to sleep (Davis et al, 1998). In the UK before 1990, at least 58% of babies were placed to sleep prone (Fleming et al, 1990). This was likely due to the stated recommendations from health care books between 1943 and 1988 (Gilbert et al 2005). The relationship between the prone sleeping position and SIDS was first suggested in 1965 (Chung-Park, 2012). Due to this presumption and further research, a supine sleeping position has been recommended worldwide since 1992 to all parents with infants in good health and born at full-term.

Supine sleeping has been shown to be seven times safer than prone sleeping and two times safer than side-lying positions (Gunn et al, 2000). The AAP (1992) recommended supine or side-lying over prone sleeping positions, despite the fact that side sleeping has shown to be unstable as the infant is at greater risk of rolling onto their stomach (AAP, 1996). Since the BTS campaign, there has been a significant drop in prone sleeping positioning. As of March 2000, approximately 20% of infants were reported to sleep in the prone position and the incidence of SIDS had dropped by more than 40% (AAP, 2000). The National Institute of Child Health and Human Development (NICHD, 2012) claim that the large rise in supine sleeping has been noted since their educational campaign in 1994. Colson et al (2009) also found a drop in prone sleeping from 70% to 10% between 1993 and 2006 in infants under seven months old in the USA.

Prone sleep, however, can be beneficial in infants with certain conditions. A prone sleeping position has been shown to decrease the risk of thoracoabdominal asynchrony in those with respiratory disorders, as well as being a more beneficial position in those with acid reflux

Abstract

The objective of this study was to investigate the sleeping position of infants attending an outpatient clinic, considering the influences of the back to sleep (BTS) campaign. A paper survey was given to 678 parents who presented their infant (under 1 year of age) to the paediatric chiropractic clinic for care asking their infant's sleep position.

Of the total survey sample, 50% of parents selected the supine position as the preferred position they placed the baby to sleep, 19% of parents preferred to place their babies prone, 34% on the babies side and 2% selected other. Some mothers selected more than one preferred sleeping position.

The initial decline of mothers using non-supine positioning, seen shortly after the implementation of the BTS campaign, is no longer evident.

Recent research implies approximately half of infants are now placed in a non-compliant sleeping position. If an infant's most preferred sleeping position is not that of current guidelines, manual therapy such as chiropractic care should be sought to help infants sleep supine with comfort.

Keywords: Infant, Sleep, Position, Prone, Supine, Back to sleep campaign

(Kattwinkel et al, 2006; Oliveira et al, 2009). Prone sleeping is usually the recommended position for low birth weight babies (Hutchinson et al, 1979; Kattwinkel 2006; Jarus et al, 2011). Furthermore, prone positioning allows a better quality of sleep with less arousal (Ariagno et al, 2006). Conversely, the absence of deep sleep is thought to reduce the risk of SIDS (Harper et al, 2000; Kahn et al, 2003).

Mothers fear of SIDS associated with prone positioning led to supine being the primary position mothers chose to place their infants, both during awake and sleep time (Davis et al, 1998). Since the drop in prone sleeping, there has been an increase in plagiocephaly (or positional head deformity) (Davis et al, 1998; Hummel and Fortado, 2005). It is due to this rise in plagiocephaly that the idea of 'tummy time' was introduced in 1996 (AAP, 1996; Persing et al, 2003). Tummy time has been shown to improve motor development and muscle strength (Davis et al, 1998; Hauck et al, 2008). Without sufficient tummy time, a delay may be seen in early motor milestones (Davis et al, 1998).

The objective of this study was to understand the sleeping patterns and comfort of infants attending

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Table 1. The primary sleeping position of infants reported by parents (n=678)

Infant sleep position	Frequency (%)
Supine	338 (50%)
Prone	132 (19%)
Right side	116 (17%)
Left side	113 (17%)
Other	14 (2%)

Table 2. Exclusively selected positions of infants reported by parents (n=678)

Infant sleep position	Frequency (%)
Exclusively supine	338 (50%)
Exclusively prone	106 (16%)
Exclusively side	103 (15%)

an outpatient teaching clinic, considering the influences of the BTS campaign.

Methods

A demographic paediatric intake survey was given to every parent of new baby patients, under the age of one, attending an outpatient chiropractic teaching clinic in the UK.

Inclusion and exclusion criteria

Inclusion criteria were parents presenting their child to the clinic for examination and the ability to read and write English. Due to the nature of this survey no exclusion criteria were implemented.

Ethical approval

The local research ethics subcommittee gave approval for the survey.

Study design

This was considered a convenience sample and consent was assumed by completion of the survey.

Data collection

The first version of the survey was distributed in September 2011 to 369 parents. An edited version was distributed in January 2012 to 309 parents. The surveys were distributed to parents of all new infant patients and no parents declined to participate. The original paper-based survey included the following questions:

- Child's age (weeks)
- Reason for coming to the clinic
- Preferred sleeping position (back, front, left side, right side, other)

- Preferred head position (left/ right/none)
- Tummy time (yes/sometimes/no)
- Restfulness of sleep (scale of 1–10 [1= restful; 10= restless]).

The newly formatted survey added the following questions:

- Wincing/fussing when placed on back (yes/no)
- Wincing/fussing when placed on tummy (yes/no).

Since all of the questions were the same for both surveys ($n=369$ and $n=309$, respectively) the results were combined ($n=678$) with one exception. The second survey asked two additional questions regarding fussy behaviour of the infant on supine or prone position. Therefore, the second survey ($n=309$) was used for sub-group analysis to compare variables in infants relative to sleep position (Table 3).

Confidentiality was assured and re-iterated to the participants by asking them to complete a consent form that all parents who attend the clinic complete on their first visit. Numbers were allocated to all completed surveys so that they remained anonymous.

The data were collected from September 2011 to 11th November 2012. The data were entered into Microsoft Excel as numerical codes using a key system. Following this, data were imported into Statistical Package for Social Sciences (SPSS) version 21, where percentages and frequencies of each survey response were analysed. Primary sleeping choice was collected from the entire sample of 678. Smaller subgroups in the 2012 cohort of primary supine and prone sleepers were analysed with descriptive statistics.

Results

In total, 678 surveys were collected. The average age of infants included in this study was 7 weeks (mean=6.95 weeks); 53% ($n=359$) of the infants were male. Table 1 shows each sleep position chosen by the parents for their infant. Multiple responses from 55 parents caused addition to 105%. Table 2 includes only those babies where one sleep position was chosen.

A subgroup of parents from the 2012 survey were investigated for specific postural preferences. The data collected regarding the differences in demographics between supine and prone sleepers is summarised in Table 3.

Discussion

Only half of the 678 infants in this study were put down to sleep in a supine position. In consideration of the BTS campaign in 1992 and Safe to Sleep campaign in 1994, which states that infants should

be placed on their backs to sleep, with parent compliance, higher percentages of supine sleepers would be expected (NICHD, 2012).

These numbers contrast earlier work showing a solid preference for supine sleep after the 1992 AAP guidelines. Gibson et al (2000) showed that there had been a steady increase in supine sleeping position, from 1993 to 1996. However, a more recent study by Colson et al (2009) suggested that supine sleep has reached a plateau. In 2001, of the 1000 mothers interviewed by telephone, just over half reported that their infants slept supine (Colson et al, 2001). No further increase in supine sleep position was noted between 2003 to 2007.

The trend of a plateau in supine sleeping position in infants has been shown in several other studies. An international study of 4656 families showed that before 2001, just over 50% of infants were placed in a non-supine sleeping position, and of those more were placed on their side than prone (Nelson et al, 2001). Moon et al (2004) questioned 310 mothers in an interview on the sleeping position of their infant. More than half of the infants slept in a supine position with the remainder sleeping either in a prone or side position. The high prevalence of side-lying positioning was unanticipated, especially with the risk of SIDS being two times higher in this position compared with supine sleeping (Gunn et al, 2000).

Infant age is an important consideration; in this study, the average age was 7 weeks, with most infants 4 weeks of age. It seems logical that this study should reveal parents choosing sleep positions as educated by the health professionals just after birth. Other studies, such as Colson et al (2006) which included 671 mothers, found that there is a positive correlation between infant's age and non-compliance to the BTS campaign (Colson et al, 2006; Hauke et al, 2008). Hauke et al (2008) found that at 3 months of age, a quarter of the 2300 mothers in the study did not use the recommended supine position for sleep. This finding is of particular concern as according to the AAP (2000), the incidence of SIDS peaks between 2 to 4 months of age. At 12 months follow up, the 1800 mothers included in the study showed a steady increase in the rate of non-compliance (Hauke et al, 2008); however, this may be due to most infants being able to roll over themselves by this age.

After 4 months of age, the risk of SIDS decreases (AAP, 2000). This could provide an explanation as to why prone sleeping increases with age (along with the baby's ability to roll over). Mothers may become less concerned about the risk of SIDS with prone sleeping, and therefore despite

Table 3. Comparison of finding of prone and supine sleepers (n=309)

Of those that selected supine/prone as the preferred position to place babies to sleep:		
	Supine (n=227)	Prone (n=82)
Mean age of infants	7 weeks	7 weeks
Primary complaint of colic/excess crying	82 (36.6%)	39 (48.1%)
First presented to a chiropractor at the age of <1 week	49 (45.8%)	16 (64%)
Wincing and fussed when placed on their backs	40 (26.7%)	29 (80.6%)
Preferred sleeping with their head to the:		
Right	72 (32%)	13 (16%)
Left	61 (27.1%)	14 (17.3%)
No preference	92 (40.9%)	54 (66.7%)
Tummy time:		
Daily tummy time	73 (35.3%)	36 (66.7%)
Some tummy time	64 (30.9%)	9 (16.7%)
No tummy time	70 (33.8%)	9 (16.7%)
Wince or cry when placed on their tummy	40 (35.7%)	4 (11.4%)
Rated their restful sleep as:		
1 (restful)	23 (10.9%)	1 (1.8%)
2	31 (14.7%)	5 (8.9%)
3	26 (12.3%)	9 (16.1%)
4	22 (10.4%)	4 (7.1%)
5	25 (11.8%)	9 (16.1%)
6	26 (12.3%)	7 (12.5%)
7	30 (14.2%)	4 (7.1%)
8	16 (7.6%)	7 (12.5%)
9	8 (3.8%)	7 (12.5%)
10 (restless)	4 (1.9%)	3 (5.4%)
Percentage most restless (5 or > 5)	51.6%	66.1%

recommendation, place their child in a non-supine position. Furthermore, Colson et al (2006) found that a third of infants less than 8 months of age were placed prone to sleep. At 3–6 months of age infants should be able to turn over unaided (NHS, 2009). Colson et al's study may have therefore under-reported the number of infants sleeping prone, as they only recorded the position that infants were placed in to sleep, not the actual position in which they slept (Colson et al, 2006).

There appeared to be reasons that parents chose the sleep position for their child. For example, data from this study showed that prone sleepers had higher sleep ratings (meaning less restful sleep)

Key points

- When providing advice on sleeping positioning of infants, healthcare professionals should advise parents based on the Back to Sleep guidelines
- Over 50% of the participants in this study selected a non-supine preferred sleeping position for their infants some of the time
- The initial decline of mothers using non-supine positioning, seen shortly after the implementation of the BTS campaign, is no longer evident

than supine sleepers where the sleep ratings were more evenly distributed (*Table 3*). This could mean that the parents who placed their child to sleep in the prone position (and thus, breaking the 'rules' of the BTS campaign) were doing so in the hope of finding a more comfortable position and thus, better sleep for the child. Ponsonby et al's (1994) findings suggest there are reasons for parents to choose prone sleep. Infants included in their study who slept prone slept better in that position. The reasoning behind this may be due to differences in the samples of infants included within the studies. All of the infants included in our study were seeking chiropractic care for complaints such as excessive inconsolable crying, pain syndromes and restlessness when laid supine and therefore may have been restless sleepers regardless of position but some particularly when laid on their backs.

A 3 year case-control study of 485 infants who died of SIDS along with 1800 controls (Mitchell et al, 1999), claimed that the risk of SIDS is in fact increased the most (seven to eight times more) when infants are placed in an 'uncomfortable' position. This highlights the issue of whether preferred sleep position of the infant is in fact more important than recommendations from health care providers. However, no other research supported these findings.

A number of studies have shown that applying an intervention can increase the number of infants being placed to sleep in a supine position (Gibson et al, 1995; Colson and Joslin, 2002; Goetter et al, 2005). Whether the intervention is given to mothers, or midwives, it is seen to have the same effect, an increase in supine positioning. Interventions are aimed to educate either the mother or midwife on the importance of the BTS campaign, where a supine position is recommended for all healthy babies. Interventions in Moon et al's (2004) and Colson and Joslin's (2002) studies, consisted of a 15–30 minute video on the importance of supine sleeping and the

risk of SIDS. Interventions for the infant with a musculoskeletal irritant (by chiropractic manual therapy to help them lie comfortably supine) may also improve compliance because the infant will no longer be fussy or restless when laid supine, thus improving compliance (Miller et al, 2013). This would help parents make the correct choice of supine sleep for their infant, guilt-free, finding it not only provides safety but also comfortable sleep for their newborn.

A lack of continuing reiteration of the BTS campaign since its first year may be responsible for the plateau of supine sleeping seen in more recent studies (Colson et al, 2009). Brenner et al (1998) highlighted that of the 43 mothers who observed their infants in the prone sleep position while in the hospital, 93% of them intended to place their infants prone at home. This finding reinforces the importance of educating not only mothers but also all health professionals.

Conclusion

Supine sleep positioning in infants may have now plateaued. The initial decline of mothers using non-supine positioning, seen shortly after the implementation of the BTS campaign, is no longer evident. Recent research implies half of infants are now placed in a non-compliant sleeping position (prone or side).

More needs to be done to remind and re-educate mothers, family members and midwives of the importance of safe sleeping positions of infants. It is crucial that the advice given to mothers is based on the most accurate, recent research. The BTS campaign is now 21 years old and its recommendations need to be revalidated and the importance of sleeping positions reviewed. **BJM**

American Academy of Pediatrics (1992) Positioning and SIDS. *Pediatrics* **89**(6): 1120–6

American Academy of Pediatrics (1996) Task force on infant positioning and sids: Positioning and sudden infant death syndrom(SIDS). *Pediatrics* **98**(6): 1216–8

American Academy of Pediatrics (2000) Changing concepts of sudden infant death syndrome: Implications for infant sleeping environment and sleep position. *Pediatrics* **105**(3): 650–6

Ariagno RL, Liempt SV, and Mirmiran M (2006) Fewer spontaneous arousals during prone sleep in preterm infants at 1 and 3 months corrected age. *J Perinatol* **26**(1): 306–12

Brenner RA, Simons-Morton BG, Bhaskar B, Mehta N, Melnick VL, Revenis M, Berendes HW, Clemens JD (1998) Prevalence and predictors of the prone sleep position among inner-city infants. *JAMA* **280**(4):341–6

- Chung-Park MS (2012) Knowledge, opinions, and practices of infant sleep position among parents. *Mil Med* 177(2): 235-9
- Colson ER, Bergman DM, Shapiro E, Leventhal JH (2001) Position for newborn sleep: associations with parents' perceptions of their nursery experience. *Birth* 28(4): 249-53
- Colson ER, Joslin SC (2002) Changing nursery practice gets inner-city infants in the supine position for sleep. *Arch Pediatr Adolesc Med* 156(7): 717-20
- Colson ER, Levenson S, Rybin D, Calianos C, Margolis A, Colton T, Lister G, Corwin MJ (2006) Barriers to following the supine sleep recommendation among mothers at four centers for the Women, Infants, and Children Program. *Pediatrics* 118(2): 243-50
- Colson ER, Rybin D, Smith LA, Colton T, Lister G, Corwin MJ (2009) Trends and factors associated with infant sleeping position: The national infant sleep position study, 1993-2007. *Arch Pediatr Adolesc Med* 163(1): 1122-8. doi: 10.1001/archpediatrics.2009.234
- Davis BE, Moon RY, Sachs HC, Ottolini MC (1998) Effects of sleep position on infant motor development. *Pediatrics* 102(5): 1135-40
- Fleming PJ, Gilbert R, Azaz Y, Berry PJ, Rudd PT, Stewart A, Hall E (1990) Interaction between bedding and sleeping position in the sudden infant death syndrome: a population based case control study. *BMJ* 301(6743): 85-9
- Gibson E, Cullen JA, Spinner S, Rankin K, Spitzer AR (1995) Infant sleep position following new AAP guidelines. *Pediatrics* 96(1): 69-72
- Gibson E, Dembofsky CA, Rubin S, Greenspan JS (2000) Infant sleep position practices 2 years into the 'back to sleep' campaign. *Clin Pediatr (Phila)* 39(5): 285-9
- Gilbert R, Salanti G, Harden M, See S (2005) Infant sleeping position and the sudden infant death syndrome: systematic review of observational studies and historical review of recommendations from 1940 to 2002. *Int J Epidemiol* 34(4): 874-87
- Goetter MC and Stephens MB (2005) First-time mothers' selection of infant supine sleep positioning. *J Perinat Educ* 14(4): 16-23
- Gunn AJ, Gunn TR, Mitchell EA (2000) Is changing the sleep environment enough? Current recommendations for SIDS. *Sleep Med Rev* 4(5): 453-69
- Harper RM, Kinney HC, Fleming, PJ, Thach BT (2000) Sleep influences on homeostatic functions: Implications for sudden infant death syndrome. *Respir Physiol* 119(2-3): 123-32
- Hauck FR, Signore C, Fein SB, Raju TNK (2008) Infant sleeping arrangements and practices during the first year of life. *Pediatrics* 122(2): S113-20
- Hummel P, Fortado D (2005) Impacting infant head shapes. *Adv Neonatal Care* 5(1): 329-40
- Hutchison AA, Ross KR, Russell G (1979) The effect of posture on ventilation and lung mechanics in preterm and light-for-date infants. *Pediatrics* 64(4): 429-32
- Jarus T, Bart O, Rabinovich G, Sadeh A, Bloch L, Dolfin T, Litmanovitz I (2011) Effects of prone and supine positions on sleep state and stress responses in preterm infants. *Infant Behav Dev* 34(2): 257-63. doi: 10.1016/j.infbeh.2010.12.014
- Kahn A, Groswasser J, Franco P, Scaillet S, Sawaguchi T, Kelmanson I, Dan B (2003) Sudden infant deaths: Stress, arousal and SIDS. *Early Hum Dev* 75(Suppl): S147-66
- Kattwinkel J (2006) *Textbook of neonatal resuscitation*. 5th Edn. American Academy of Pediatrics and American Heart Association, Ik Grove Village, IL
- Miller J, Fontana M, Jernlas K, Olofsson H, Verwijst I (2013) Risks and rewards of early musculoskeletal assessment. *British Journal of Midwifery* 21(10): 736-43
- Mitchell EA, Thach BT, Thompson JM, Williams S (1999) Changing infants' sleep position increases risk of sudden infant death syndrome. New Zealand cot death study. *Arch Pediatr Adolesc Med* 153(11): 1136-41
- Moon RY, Oden RP, Grady KC (2004) Back to Sleep: an educational intervention with women, infants, and children program clients. *Paediatrics* 113(3 Pt 1): 542-7
- Nelson EA, Taylor BJ (2001) International Child Care Practices Study: infant sleep position and parental smoking. *Early Hum Dev* 64(1): 7-20
- NHS (2009) *Expected Child development 0-5 years old* <http://www.nhs.uk/Tools/Pages/birthtofive.aspx#close> (accessed 15 August 2014)
- NHS Choices (2012) *Getting your baby to sleep - pregnancy and baby guide*. www.nhs.uk/conditions/pregnancy-and-baby/pages/getting-baby-to-sleep.aspx (accessed 15 August 2014)
- National Institute of Child Health and Human Development (2012) *Safe to sleep public education campaign*. *Safe to sleep Public education Campaign*. www.nichd.nih.gov/SIDS/Pages/sids.aspx (accessed 12 August 2014)
- Oliveira TG, Reg MA, Pereira NC, Vaz IO, Franca DC, Vieira DS, Parreira VF (2009) Prone position and reduced thoracoabdominal asynchrony in preterm newborns. *J Pediatr (Rio J)* 85(5): 443-8. doi: 10.2223/JPED.1932
- Persing J, James H, Swanson J, Kattwinkel J (2003) Prevention and management of positional skull deformities in infants. American academy of pediatrics committee on practice and ambulatory medicine, section on plastic surgery and section on neurological surgery. *Pediatrics* 112(1): 199-202
- Ponsonby AL, Dwyer T, Kasl SV, Cochrane JA, Newman NM (1994) An assessment of the impact of public health activities to reduce the prevalence of the prone sleeping position during infancy: the Tasmanian Cohort Study. *Prev Med* 23(3): 402-8