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Active head lifting from supine in infancy in the general population: Red flag or not?

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ABSTRACT

Background: Previously it had been reported that active head lifting from supine (AHLS) in high-risk infants was associated with lower cognitive scores in the second year. AHLS was generally accompanied by stereotyped leg movements.

Aims: To examine in a standardized way whether AHLS with or without stereotyped leg movements in the general population is associated with prenatal, perinatal, neonatal and socio-economic risk factors or with lower scores on concurrent infant tests.

Study design: Cross-sectional study

Subjects: 1700 infants aged 2–18 months representative of the Dutch population.

Outcome measures: Infant Motor Profile (IMP) and Standardized Infant NeuroDevelopmental Assessment (SINDA).

Assessments were video-recorded and included at the youngest ages 3min of behaviour in supine. AHLS and the presence of stereotyped leg movements were recorded. Standardized information on early risk factors was available.

Results: AHLS occurred at 4–9 months (prevalence per months: 1–14%; highest prevalence at 6 months). It was not associated with early risk factors or scores on infant tests. When AHLS was accompanied by stereotyped leg movements it was associated with a higher prevalence of a IMP-variation score < P15 (Odds Ratio (OR) 2.472 [95%CI 1.017; 6.006]). Stereotyped leg movements irrespective of AHLS were associated with more unfavourable total IMP scores and IMP performance scores (B coefficients 3.212 [4.065; 2.360], 2.521 [3.783; 1.259]) and IMP variation and SINDA neurological scores (ORs 5.432 [3.409; 8.655], 3.098 [1.548; 6.202]).

Conclusions: The data suggest that AHLS is not a red flag. Rather its co-occurring stereotyped leg movements may signal less favourable neurodevelopment.

1. Introduction

The observation of spontaneous movements forms an important part of neuromotor assessments in infancy. In the youngest infants the assessments include spontaneous movements in supine position. Van Haastert et al. [1] observed that some preterm and term high-risk infants discharged from a level three neonatal intensive care unit showed active head lifting from supine (AHLS). The authors described AHLS as follows: “From supine position the head is raised forward with the shoulders and upper extremities off the surface, often in combination with extension and adduction of the lower extremities off the surface, with the ankles in plantar flexion and clawing of the toes. The upper extremities may show variable postures or movements” [1]. AHLS was especially observed in the age period of 6 to 9 months corrected age (CA). Moreover, AHLS during infancy was associated with lower cognitive scores in the second year of life [1].

The finding of van Haastert et al. is intriguing and deserves further research [2]. We wondered in particular which part of the AHLS-pattern would have most clinical significance: the active head lifting, the stereotyped leg movements, or the combination of these two behaviours. The IMP-SINDA project offered an excellent opportunity to study not only the prevalence of AHLS with or without stereotyped leg movements in the general population, but also its association with early risk factors and the infants’ concurrent performance on various infant assessments.

Abbreviations: AHLS, Active Head Lifting from Supine; CA, corrected age; IMP, Infant Motor Profile; SINDA, Standardized Infant NeuroDevelopmental Assessment.

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In the IMP-SINDA project we collected norm data for the Infant Motor Profile (IMP) [3] and the Standardized Infant Neurodevelopmental Assessment (SINDA) [4,5]. The project included 1700 infants aged 2 to 18 months CA who were representative of the general Dutch infant population in terms of social and perinatal characteristics [6,7]. The IMP is a video-based method that includes 3 min of observation of the infant’s spontaneous movements in supine up to the age that infants spontaneously move out of the supine position.

We addressed the following questions: (1) What is the prevalence of AHLS with and without stereotyped leg movements at various infant ages in the general Dutch population; (2) Is AHLS with or without stereotyped leg movements associated with specific perinatal risk factors; (3) Is AHLS with or without stereotyped leg movements associated with lower scores on concurrent motor, neurological and developmental infant scales? In addition, we addressed the question (4) whether the two phenomena, i.e. active head lifting in supine and stereotyped leg movements, each of them would have a dissimilar association with lower scores on infant tests. We hypothesized that the association between active head lifting and lower scores on infant tests is less strong than the one between stereotyped leg movements and lower test scores. The twofold reason for this assumption is that active head lifting per se is part of typical foetal behaviour [8] and that it is considered as positive behaviour in the Gross Motor Function Measure [9].

2. Methods

2.1. Participants

The IMP-SINDA project is a cross-sectional study in which 1700 infants aged 2–18 months CA were assessed once. Note that from this point all ages used are corrected ages, i.e. ages in preterm infants have been corrected for gestational age at birth. Infants were recruited via well-baby clinics and advertisements. Inclusion criteria were age between 2 and 18 months, living in the northern part of the Netherlands, and no evident abnormality on the IMP-section on motor development. As a result, 1737 infants were included.

Table 1
Socio-economic and perinatal characteristics of infants aged 4–9 months with and without AHLS.

<table>
<thead>
<tr>
<th>Age of infants</th>
<th>AHLS-all</th>
<th>No AHLS</th>
<th>OR (95% CI)</th>
<th>AHLS-ster</th>
<th>No AHLS-ster</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female sex</td>
<td>25 (70%)</td>
<td>252 (45%)</td>
<td>2.814 (1.358-5.829)</td>
<td>16 (67%)</td>
<td>261 (45%)</td>
<td>2.414 (1.017-5.729)</td>
</tr>
<tr>
<td>Maternal educational level, a</td>
<td>High</td>
<td>12 (33%)</td>
<td>252 (45%)</td>
<td>1.626 (0.797-3.316)</td>
<td>9 (38%)</td>
<td>255 (44%)</td>
</tr>
<tr>
<td>Med</td>
<td>24 (67%)</td>
<td>299 (53%)</td>
<td>15 (62%)</td>
<td>308 (54%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>0 (1%)</td>
<td>11 (2%)</td>
<td>0</td>
<td>11 (2%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maternal occupation level, a</td>
<td>Low</td>
<td>5 (14%)</td>
<td>111 (20%)</td>
<td>0.650 (0.247-1.709)</td>
<td>3 (12%)</td>
<td>113 (20%)</td>
</tr>
<tr>
<td>Paternal occupation level, b</td>
<td>Low</td>
<td>4 (11%)</td>
<td>68 (13%)</td>
<td>0.892 (0.305-2.605)</td>
<td>4 (17%)</td>
<td>68 (12%)</td>
</tr>
<tr>
<td>Maternal ethnicity, non-native Dutch</td>
<td>3 (8%)</td>
<td>42 (8%)</td>
<td>0.973 (0.723-1.310)</td>
<td>1 (4%)</td>
<td>44 (8%)</td>
<td>0.538 (0.071-0.480)</td>
</tr>
<tr>
<td>Maternal ethnicity, non-native Dutch</td>
<td>7 (19%)</td>
<td>63 (11%)</td>
<td>1.877 (0.790-4.646)</td>
<td>4 (17%)</td>
<td>66 (12%)</td>
<td>1.512 (0.501-4.560)</td>
</tr>
<tr>
<td>Maternal age (years) ≥35</td>
<td>6 (17%)</td>
<td>95 (17%)</td>
<td>0.985 (0.399-2.433)</td>
<td>51 (21%)</td>
<td>96 (17%)</td>
<td>1.313 (0.479-3.602)</td>
</tr>
<tr>
<td>Assisted reproduction</td>
<td>1 (3%)</td>
<td>43 (8%)</td>
<td>0.243 (0.046-2.564)</td>
<td>1 (4%)</td>
<td>43 (8%)</td>
<td>0.543 (0.070-4.049)</td>
</tr>
<tr>
<td>Prepregnancy maternal BMI ≥25 kg/m²</td>
<td>12 (33%)</td>
<td>232 (41%)</td>
<td>0.713 (0.350-1.455)</td>
<td>29 (12%)</td>
<td>237 (41%)</td>
<td>0.587 (0.240-1.438)</td>
</tr>
<tr>
<td>Maternal smoking</td>
<td>5 (14%)</td>
<td>59 (11%)</td>
<td>1.378 (0.516-3.680)</td>
<td>17 (13%)</td>
<td>60 (10%)</td>
<td>1.717 (0.568-5.190)</td>
</tr>
<tr>
<td>Maternal substance use (alcohol and/or drugs) b</td>
<td>0</td>
<td>6 (1%)</td>
<td>n.a.</td>
<td>0</td>
<td>6 (1%)</td>
<td>n.a.</td>
</tr>
<tr>
<td>Maternal nutrition</td>
<td>12 (33%)</td>
<td>192 (34%)</td>
<td>0.966 (0.473-1.974)</td>
<td>26 (5%)</td>
<td>198 (34%)</td>
<td>0.635 (0.248-1.642)</td>
</tr>
<tr>
<td>Maternal diabetes</td>
<td>2 (6%)</td>
<td>40 (7%)</td>
<td>0.769 (0.178-3.318)</td>
<td>2 (9%)</td>
<td>40 (7%)</td>
<td>1.216 (0.276-5.356)</td>
</tr>
<tr>
<td>Maternal hypertension</td>
<td>7 (19%)</td>
<td>70 (12%)</td>
<td>1.703 (0.716-4.027)</td>
<td>4 (17%)</td>
<td>73 (13%)</td>
<td>1.375 (0.457-4.137)</td>
</tr>
<tr>
<td>Maternal thyroid disease</td>
<td>1 (3%)</td>
<td>13 (2%)</td>
<td>1.209 (0.154-9.507)</td>
<td>1 (4%)</td>
<td>13 (2%)</td>
<td>1.880 (0.236-14.989)</td>
</tr>
<tr>
<td>Instrumental delivery</td>
<td>15 (42%)</td>
<td>156 (31%)</td>
<td>1.223 (0.947-1.578)</td>
<td>9 (38%)</td>
<td>162 (28%)</td>
<td>1.207 (0.886-1.644)</td>
</tr>
<tr>
<td>Gestational age in weeks</td>
<td>40 (34-42)</td>
<td>40 (29-42)</td>
<td>0.943 (0.780-1.141)</td>
<td>40 (29-42)</td>
<td>40 (29-42)</td>
<td>0.910 (0.731-1.132)</td>
</tr>
<tr>
<td>Preterm birth (&lt;37 wk)</td>
<td>1 (3%)</td>
<td>27 (5%)</td>
<td>0.567 (0.075-4.297)</td>
<td>1 (4%)</td>
<td>27 (5%)</td>
<td>0.882 (0.115-6.780)</td>
</tr>
<tr>
<td>Very preterm (&lt;32 wk)</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birthweight in grams</td>
<td>3330</td>
<td>3500</td>
<td>3398</td>
<td>3492</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SGA (&lt;p10), n (%)</td>
<td>2240-4320</td>
<td>(1120-4950)</td>
<td>(2240-4320)</td>
<td>(1120-4950)</td>
<td>0.500 (0.068-3.787)</td>
<td></td>
</tr>
</tbody>
</table>

Bold: factors included in the perinatal risk score and their criteria; score range 0–23; a higher score denoting a higher risk; at the bottom of the table. n.a.: not applicable.

AHLS-all: AHLS with or without stereotyped leg movements; AHLS-ster: AHLS with stereotyped leg movements. Controls of AHLS are all infants assessed in supine without AHLS and all infants that had ‘grown out’ of the supine position, as they spontaneously moved out of supine position.

Numbers indicate median values with range or number with percentage (n.a.).

a High education: vocational college and university; medium level: primary or secondary vocational education and training, senior general secondary education and university preparatory education; low level: no or only primary education.

b OR calculated of high vs non-high education.


d Used one of the following: insulin; antihypertensive medication; thyroid stimulating medication; antidepressants/antipsychotics/benzodiazepines; anti-epileptic medication.

e Perinatal risk score range 0–23; a higher score denoting a higher risk.
having caregivers with sufficient comprehension of the Dutch language. Infants were only excluded if they were too ill to be evaluated. According to plans we were able to recruit 100 infants per month of age and to generate a sample that was representative of the Dutch population (Table 1) [3,6,7].

The caregivers filled out a standardized questionnaire on prenatal, perinatal and neonatal and socio-economic history. If the questionnaire revealed complications, medical records were consulted. On the basis of the prenatal, perinatal, neonatal and socio-economic information also a perinatal risk score was calculated with a higher score indicating higher risk (maximum: 23; see Table 1) [6]. The Medical Ethical Committee of the University Medical Centre in Groningen (UMCG) approved of the study design (METC 2016/284). Caregivers provided written informed consent.

2.2. Procedures

All infants were examined with the IMP and SINDA; the entire assessment session was video recorded. AHLS could be assessed on the basis of the IMP-assessment which includes for the youngest infants three minutes of assessment of spontaneous movements in supine position. We evaluated on the basis of these supine assessments whether (1) AHLS was present, implying that the head was actively anteflexed and lifted from the support surface for at least 2 seconds; (2) its frequency; (3) its total duration in seconds in the 3-minute-period consisting of the sum of the individual durations; and (4) whether it was accompanied by stereotyped leg movements. PAMvI assessed all supine videos (n = 620). The videos in which she had observed AHLS or was in doubt about its presence (for instance to check whether AHLS had reached the 2 seconds criterion) were independently assessed by MH-A. The few disagreements were discussed to reach consensus.

The IMP is a standardized assessment of infant motor behaviour which especially focuses on the quality of movements. Its 80 items can be assessed in about 15 min. They yield five domains scores (variation, adaptability, symmetry, fluency and performance) and a total score. Raw scores are percentage scores with a maximum of 100%. Recently, IMP’s norm reference values (percentile curves) have been published [3]. The IMP has good psychometric properties, including predictive validity: low IMP scores are associated with cerebral palsy and lower intelligence quotients at school age [3,10]. In addition, the IMP is also an instrument that is more responsive to detect an effect of intervention than the Alberta Infant Motor Scale [11–14]. We used the IMP-data also to determine the presence of stereotyped leg movements. To this end we used the item variation in leg movements in supine position or, when the infant had ‘outgrown’ supine, the item variation of legs movements in prone position. The IMP-videos were also used to assess the Alberta Infant Motor Scale (AIMS). Previously we have calculated the Dutch norms for the AIMS [7].

The SINDA is a novel neurodevelopmental test for infants aged 6 weeks to 12 months. It comprises a neurological, a developmental and a socio-emotional scale. In the current study we used the neurological scale (28 dichotomized items; maximum score 28) and developmental scale (15 dichotomized items per month; maximum score 15). SINDA has good psychometric properties, including a high predictive value for cerebral palsy and learning disability [4,5].

2.3. Statistical analyses

Our primary outcome parameter in the evaluation of the association of AHLS with performance on infant tests was the total IMP-score. The norm-data of the IMP-SINDA project in the age-range of AHLS (4–9 months) (see Results section); n = 600 infants) indicated that two groups of 16 infants would yield a power of 80% (α = 0.05) to detect a difference of 1 SD (6 points). This corresponds to power calculations in previous studies [15,16]. Statistical analyses were performed with SPSS version 25.

Differences between groups in perinatal risk and scores on infant tests were calculated with parametric (t-test) or non-parametric tests (chi-square, logistic regression). In order to correct for a potentially confounding effect of age at assessment and sex in the associations between AHLS with and without stereotyped leg movements and infant test scores multivariable linear and logistic regression analyses were performed. Results are expressed as regression coefficients (B) or odds ratio (OR) with 95% confidence intervals (95% CI). Probability values of <0.05 are considered statistically significant.

3. Results

3.1. Prevalence of AHLS

Motor behaviour in supine was assessed in all infants aged 2 and 3 months, 98 4-month-olds, 99 5-month-olds, 97 6-month-olds, 70 7-month-olds, 31 8-month-olds, 17 9-month-olds, 2 10-month-olds, 4 11-month-olds and 2 12-month-olds (n = 620). Thirty six infants between 4 and 9 months showed AHLS with or without stereotyped leg movements (AHLS-all), yielding an AHLS-all prevalence that varied from 1% at 4 months to 14% at 6 months (Fig 1). Two thirds of the infants with AHLS showed AHLS with stereotyped leg movements (AHLS-ster; n = 24, Fig 2). The prevalence of AHLS-ster varied from 2% at 8–9 months to 9% at 7 months (Fig 1). The frequency of AHLS-all ranged from one to ten times in 3min (median value 3 times) and the total duration of head-lift varied from three to 52 s (median 29 sec).

3.2. AHLS and perinatal risk

AHLS-all and AHLS-ster occurred about twice as often in girls than in boys (AHLS-all: OR 2.814 (95%CI 1.358–5.829); AHLS-ster: OR 2.414 (95% CI 1.017–5.729). Yet, none of the prenatal, perinatal, neonatal and socio-economic variables was associated with AHLS-all or AHLS-ster (Table 1). Also the perinatal risk score was not associated with AHLS-all or AHLS-ster.

3.3. AHLS, stereotyped leg movements and performance on infant tests

Univariable analyses indicated that AHLS-all and AHLS-ster were not associated with lower scores on the IMP, AIMS and SINDA (Supplementary Material S1). Multivariable analyses confirmed that most associations between AHLS and infant test scores did not reach statistical significance (data not provided). However, there was one exception: AHLS-ster was associated with a higher prevalence of an IMP-variation score < P15 (OR 2.472 [1.017; 6.006]).

Stereotyped leg movements in supine or prone were associated with lower total IMP scores, lower IMP-performance scores, a higher prevalence of IMP-variation scores <P15 and a higher prevalence of an at risk score (<21) on SINDA’s neurological scale (Table 2) and Supplementary Material S2 Multivariable analysis to tease out whether AHLS contributed more to lower scores on infant tests than stereotyped leg movements revealed that AHLS was not associated with lower test scores, but that stereotyped leg movements continued to be associated with lower total IMP scores, lower IMP-performance scores, (B coefficients –3.212 [–4.065; –2.360] and –2.521 [–3.783; –1.259], respectively) and higher prevalences of IMP-variation <P15 and at risk neurological SINDA scores (ORs 5.432 and 3.098, respectively; Supplementary Material S3).

4. Discussion

Our study showed that AHLS occurs in the general population at the ages of 4 to 9 months and that active head lifting from supine may or may not be accompanied by stereotyped leg movements. Our study also indicated that AHLS in the general population is not associated with prenatal, perinatal, neonatal and socio-economic risk nor evidently with...
lower scores on concurrent infant tests. In contrast, stereotyped leg movements in supine or prone were associated with lower IMP-scores and neurological scores.

Van Haastert et al. described AHLS in high-risk infants [1]. This might have implied that AHLS is associated with risk factors in early life. Our study indicates that AHLS in the general population is not associated with perinatal risk. We only found an association with female sex, with girls showing AHLS twice as often as boys. The higher prevalence in girls is in line with Van Haastert et al. [1], but it is hard to come up with a plausible scientific explanation for the sex difference.

Van Haastert et al. reported that AHLS was associated with lower cognitive scores in the second year [1]. We did not have follow-up data, but we were able to associate AHLS with scores on concurrent infant tests. We found that AHLS-all was not associated with lower scores on infant tests. Yet, AHLS with stereotyped leg movements, i.e., the pattern that van Haastert et al. described, was associated with a doubling of the risk of low IMP-variation scores. From other studies we know that lower scores on movement variation in infancy are associated with atypical neurodevelopmental outcome, including lower cognitive scores at later age [17–20]. Thus, our data support the notion that AHLS with stereotyped leg movements may be associated with lower cognitive scores at later age.

Our further analysis indicated that not the active head lifting from supine per se explained the association with lower infant test scores, but the presence of stereotyped leg movements. The association between stereotyped leg movements was not restricted to lower IMP-variation scores or lower SINDA neurological scores – which could simply have been brought about by a one point reduction of the IMP and SINDA scores on the basis of stereotyped leg movements. Stereotyped leg movements were also associated with lower performance scores. In addition, Table 2 indicates that the presence of stereotyped leg movements signalled the presence of more stereotypies, as stereotyped leg movements were associated with a reduction in the variation and neurological scores that exceeded the reduction brought about by stereotyped leg movements only. This means that our findings suggest that stereotyped leg movements may be a better indicator of the presence of a reduced variation than active head lifting from supine and therefore also a better sign of less optimal neurodevelopment. It should be noted, however, that in general a single neuromotor sign, such as stereotyped leg movements, by itself does have little clinical significance.
Neurological signs get clinically relevant when they are accompanied by more signs and together form a neurological pattern [4].

The strengths of this study are the large sample that is representative of the Dutch infant population and the standardized approach to study AHLS, i.e. being based on 3 min of video-recorded spontaneous movements in supine and specifying whether the head lifting was or was not associated with stereotyped leg movements. Weaknesses of the study are that the study did not include a more elaborate developmental test of infant cognition, such as the Bayley Scales of Infant and Toddler Development, and that the infants – inherent to the study design - were only assessed once, implying that follow-up data are missing.

In conclusion, the study indicated that AHLS in the general population occurs at 4–9 months, is not associated with early risk factors and is – when its presentation includes stereotyped leg movements – weakly associated with lower IMP-variation scores. The study also indicated that it is rather the presence of stereotyped leg movements with or without AHLS that may function as a red flag, as it was associated with lower total IMP scores, lower IMP variation and performance scores and lower neurological scores. We recommend studies that evaluate the significance of AHLS and stereotyped leg movements during the first year for long-term developmental outcome in large groups of at risk infants.

Declaration of competing interest

None declared.

Acknowledgments

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Table 2
IMP, SINDA and AIMS scores infants aged 4–9 months with AHLS and with stereotyped legs.

<table>
<thead>
<tr>
<th></th>
<th>No AHLS n = 564</th>
<th>AHLS all n = 36</th>
<th>B coefficient or OR (95% CI) adjusted*</th>
<th>Stereotyped legs n = 115</th>
<th>Varied legs n = 485</th>
<th>B coefficient or OR (95% CI) adjusted*</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMP total score:</td>
<td>85 ± 6</td>
<td>84 ± 6</td>
<td>0.425 (~0.881;2.089)</td>
<td>82 ± 6</td>
<td>85 ± 6</td>
<td>~3.216 (~0.408;2.364)</td>
</tr>
<tr>
<td>Variation score</td>
<td>93 (79–100)</td>
<td>94 (67–100)</td>
<td>87 (67–97)</td>
<td>94 (71–100)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variation &lt; P15</td>
<td>100</td>
<td>104 (18%)</td>
<td>1.507 (0.680;3.341)</td>
<td>50 (44%)</td>
<td>63 (13%)</td>
<td>5.377 (3.280;8.556)</td>
</tr>
<tr>
<td>Performance score</td>
<td>9 (25%)</td>
<td>65 ± 12</td>
<td>0.840 (~1912.2;352)</td>
<td>63 ± 12</td>
<td>66 ± 12</td>
<td>~2.522 (~0.783;1.261)</td>
</tr>
<tr>
<td>SINDA neurological scale:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At risk score (&lt;21)</td>
<td>1 (3%)</td>
<td>36 (6%)</td>
<td>0.463 (0.061;3.513)</td>
<td>15 (13%)</td>
<td>22 (5%)</td>
<td>~3.098 (1.548;6.200)</td>
</tr>
<tr>
<td>SINDA Developmental scale:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total score</td>
<td>10 ± 2</td>
<td>10 ± 2</td>
<td>0.490 (~0.478;0.996)</td>
<td>10 ± 2</td>
<td>10 ± 2</td>
<td>~0.003 (~0.445;0.439)</td>
</tr>
<tr>
<td>At risk score (&lt;7)</td>
<td>2 (6%)</td>
<td>77 (14%)</td>
<td>0.431 (0.100;1.849)</td>
<td>15 (13%)</td>
<td>64 (13%)</td>
<td>0.938 (0.506;1.732)</td>
</tr>
<tr>
<td>AIMS Total score</td>
<td>20 (13–28)</td>
<td>21 (6–52)</td>
<td>20(6–48)</td>
<td>21 (6–52)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total score &lt; P10</td>
<td>3 (8%)</td>
<td>91 (16%)</td>
<td>0.470 (0.141;1.564)</td>
<td>23 (20%)</td>
<td>71 (15%)</td>
<td>1.487 (0.881;2.507)</td>
</tr>
</tbody>
</table>

Note that the study group consists of 600 infants, i.e., all infants assessed at 4–9 months. Controls of AHLS are all infants assessed in supine without AHLS and all infants that had ‘grown out’ of the supine position, as they spontaneously moved out of supine position.

Numbers indicate mean with standard deviation, median values with range, or number with percentage (%). Missing data in infants without AHLS: SINDA developmental scale: n = 1; AIMS: n = 3; in infants with stereotyped legs: AIMS n = 2; in infants with varied legs: SINDA developmental scale: n = 1.

* Adjustment for age at assessment (see Fig. 1) and sex (see Table 1).

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.earlhumdev.2021.105466.

References


