**Natalya N. Korableva, Ekaterina N. Pershina, Vladimir A. Gusev**

Pitirim Sorokin Syktyvkar State University, Syktyvkar, Russian Federation

**The Prevalence of Symptoms of Life-Threatening Events in Children of the First Year of Life: a Cross-Sectional Population Study**

**Corresponding author:**

*Korableva Natalya Nikolaevna*, MD, PhD, assistant professor, head of paediatric department of Medical institution in Pitirim Sorokin Syktyvkar State University

**Address:** 167001, Syktyvkar, Oktyabrsky ave., 55, **phone:** +7 (8212) 39-04-13, **e-mail:** [kemcard@yandex.ru](mailto:kemcard@yandex.ru)

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***Background****.* *The prevalence of symptoms of life-threatening events in infants was previously* *studied using hospital data. However, not all parents in the event of such symptoms seek medical help in the hospital.* ***Objective.*** *The purpose of the study was to identify the prevalence and risk factors of life-threatening events in children in the first year of life.* ***Methods****. In the period from November 2017 to February 2018, we interviewed mothers who have children in their second year of life who are registered at children's outpatient clinics in Syktyvkar. Respondents noted episodes of absent, infrequent or irregular breathing, blanching or cyanosis of the skin, changes in muscle tone (hypo- or hypertonia), changes in the level of responses that occurred in infancy. The prevalence of symptoms of life-threatening events was estimated based on the total number of children in the first year of life (n = 3088) who lived in Syktyvkar as of January 1, 2018.* ***Results.*** *At least one symptom of life-threatening events in infancy was reported by 43 (4.3%) of the 1001 mothers surveyed. The prevalence of symptoms was 429.5 [95% confidence interval (CI) 321–574] per 10,000 children of the corresponding age. Independent predictors of life-threatening events in children of the first year of life were sudden deaths of relatives under the age of 50 years [odds ratio (OR) 2.4; 95% CI 1.1–5.3], cases of pre-syncope or syncope in relatives (OR 4.4, 95% CI 2.1–9.0), artificial feeding of infants (OR 4.0, 95% CI 1.5–11.2). The sensitivity of the model, which took into account the presence of at least one of the three predictors, was 19% (8/43), specificity — 99% (2/958).* ***Conclusion.*** *The issue of the occurrence of life-threatening events in an infant can impact every 25th family. In every fifth infant, the occurrence of symptoms of life-threatening events can be predicted based on risk factors.*

***Key words:*** *infants, life-threatening events, apparent life-threatening event, brief resolved unexplained event, survey, risk factors, artificial feeding, sudden cardiac death, syncope, prognostic value.*

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**RESULTS**

**Table 1**. Comparative analysis of children groups with or without symptoms of life-threatening conditions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Indicators** | **Children with BRUE (*n* = 43)** | **Children without BRUE (*n* = 958)** | **OR (95% CI)** | ***р*** |
| ***Demographic factors*** | | | | |
| Sex (female), abs (%) | 33 (76,7) | 581 (60,6) | 2,14 (1,05–4,39) | 0,033 |
| Mother’s age, years; abs (%)   * 18−25 * 26−35 * > 35 | 8 (18,6)  24 (55,8)  11 (25,6) | 188 (19,6)  600 (62,6)  170 (17,8) | 0,94 (0,43–2,05)  0,75 (0,41–1,39)  1,54 (0,77–3,11) | 0,869  0,366  0,221 |
| Father’s age, years; abs (%)   * 18−25 * 26−35 * > 35 | 5 (11,6)  22 (51,2)  16 (37,2) | 98 (10,2)  593 (61,9)  267 (27,9) | 1,15 (0,45–2,99)  0,64 (0,35–1,19)  1,53 (0,81–2,89) | 0,767  0,157  0,183 |
| ***Social factors*** | | | | |
| Statutory marriage, abs (%) | 38 (88,4) | 712 (74,3) | 2,62 (1,02–6,73) | 0,037 |
| Mother’s higher education, abs (%) | 27 (62,8) | 518 (54,1) | 1,43 (0,76–2,69) | 0,261 |
| Father’s higher education, abs (%) | 10 (23,3) | 394 (41,1) | 0,43 (0,21–0,89) | 0,019 |
| Family income, RUB in thousands/mo; abs (%)   * < 24 * 24−49 * > 50 | 6 (14,0)  20 (46,5)  17 (39,5) | 194 (20,3)  420 (43,8)  344 (35,9) | 0,64 (0,27–1,53)  1,12 (0,64–1,94)  1,17 (0,63–2,18) | 0,312  0,729  0,628 |
| ***Hereditary background*** | | | | |
| Burdened familial history, abs (%)   * sudden death < 50 years * death by heart disease < 50 years * syncope/presyncope | 13 (30,2)  7 (16,3)  28 (65,1) | 124 (12,9)  163 (17,0)  248 (25,9) | 2,92 (1,42–6,01)  0,95 (0,45–2,0)  5,34 (2,91–9,78) | 0,001  0,899  0,001 |
| ***Neonatal factors*** | | | | |
| Prematurity, abs (%) | 9 (20,9) | 96 (10,0) | 2,37 (1,06–5,34) | 0,022 |
| Type of feeding, абс. (%)   * breastfeeding * artificial feeding * mixed feeding | 17 (39,5)  20 (46,5)  6 (14,0) | 729 (76,1)  96 (10,0)  133 (13,9) | 0,21 (0,11–0,38)  7,82 (3,66–16,73)  1,0 (0,45–2,24) | 0,001  0,001  0,989 |
| ***Behavioural factors*** | | | | |
| Smoking, abs (%) | 27 (62,8) | 451 (47,1) | 1,89 (1,08–3,33) | 0,043 |
| Alcohol abuse abs (%) | 5 (11,6) | 49 (5,1) | 2,44 (0,83–7,17) | 0,064 |

*Note.* BRUE ― brief resolved unexplained event.

**Table 2.** Results of regression analysis of life-threatening conditions and the studied factors in the infant

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Indicators** | **β factor** | **Standard error** | ***р*** | **OR (95% CI)** |
| Female sex | 0,610 | 0,395 | 0,123 | 1,84 (0,84–3,99) |
| Statutory marriage | -24,264 | 16 137,1 | 0,999 | 0,00 |
| Father’s higher education | -0,524 | 0,412 | 0,204 | 0,59 (0,26–1,33) |
| Relatives’ sudden death under 50 years | 0,884 | 0,395 | 0,025 | 2,42 (1,12–5,25) |
| Syncope/presyncope in relatives | 1,475 | 0,368 | 0,000 | 4,37 (2,13–8,99) |
| Prematurity | 0,348 | 0,464 | 0,453 | 1,42 (0,57–3,52) |
| Breastfeeding | -0,510 | 0,514 | 0,322 | 0,60 (0,22–1,65) |
| Artificial feeding | 1,397 | 0,520 | 0,007 | 4,04 (1,46–11,20) |
| Smoking | 0,510 | 0,365 | 0,162 | 1,67 (0,81–3,41) |

*Note.* Determination coefficient for multifactor model (R2) is 0,309.

**Table 3.** Incidence of apparent life-threatening event due to the reported studies (1985–2017 yy)

|  |  |  |  |
| --- | --- | --- | --- |
| **Source, year** | **Country** | **Study characteristics** | **Incidence** |
| [25]  1985 | Sweden | Prospective study for 2,5 years covered 60% of healthy mature newborns (near-miss SIDS during first 4 days of life) | 0,35/1000 live-borns |
| [24]  1987 | Sweden | Prospective multi-centre study for 24 months covered nearly 40% of all deliveries in Sweden | 0,46/1000 live-borns |
| [23]  2001 | New Zeeland | Retrospective analysis of hospital statistics data (9-year period) | 9,4/1000 live-borns |
| [12]  2002 | Great Britain | Prospective study for 12 months including newborns who undergone emergency medical care due to ALTE | 0,6% of total number of references for emergency medical care for infants |
| [26]  2004 | USA | Retrospective cohort study (1-year period) | 7,5% of infants hospitalized in emergency department (with diagnosed ALTE) |
| [6]  2005 | Austria | Prospective study involving all liveborn infants in Tirol for 9-year period: ALTE identified according to hospitalization data | 2,46/1000 live-borns |
| [27]  2005 | USA | Retrospective study (32-months period) | 5,9% of all infants hospitalized in emergency department (with diagnosed ALTE) |
| [28]  2007 | Spain | Prospective study of case series (14-months period) | 0,53% of all hospitalized in emergency department (with diagnosed ALTE) |
| [29]  2010 | Netherlands | Cross sectional study (during 1 year) | 0,58/1000 live-borns |
| [20]  2010 | Russia | Retrospective analysis of infants hospitalization (5-year period) | 0,61/1000 live-borns  0,14% of all emergency visits children at age of 0–14 years |
| [13]  2012 | USA | Prospective cohort study (20-months study) | 1% of all emergency visits to emergency department |
| [30]  2013 | Iran | Prospective study (11 months, newborns with ALTE) | 11 (1,1%) out of 1000 newborns hospitalized in emergency department |
| [11]  2017 | Italy | Case cohort study (5-year period) | 4,1/1000 live-borns |

*Note.* ALTE ― apparent life-threatening event.

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Not specified.

**CONFLICT OF INTEREST**

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