

## Prospective study on the prevalence of sudden infant death and possible risk factors in Brussels: preliminary results (1987–1988)

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**Abstract.** A prospective study was carried out to assess the frequency of sudden infant death (SID) in the Brussels area. The study was conducted between January and December 1987, on infants presented to the health clinics of the Brussels "Office de la Naissance et de l'Enfance" (ONE). The infants entered the study if: (a) they were born between January 1 and December 31, 1987; (b) they attended an ONE consultation in the Brussels area between January 1987 and December 1988; (c) visits were repeated monthly during the first 12 months of life, or until death occurred; and (d) standard questionnaires were completed for each visit. For 4,064 infants these four criteria were fulfilled. During the study period 7 infants died of SID. Their deaths were unexpected and remained unexplained despite post-mortem investigations. For each SID case, 10 control infants were selected from the same health clinics. Controls matched the SID cases in the following respects: (a) dates of visits; (b) sex; (c) gestational age; (d) legal age; and (e) the profession of both parents. For most of the 65 items studied no significant difference was seen between the 7 SID infants and their 70 matched controls. Only two variables significantly differentiated the two groups. Repeated fatigue during feeding was seen in 4 of the 7 SID cases, but only in 10 of the 70 control infants (Fisher  $P = 0.017$ ). Profuse sweating during sleep was reported in 2 of the 7 SID infants, and in none of the 70 controls (Fischer  $P = 0.007$ ). These two infants' bedclothes were repeatedly wet with sweat. Fatigue during feeding and sweating during sleep found in the 70 control infants could not be statistically differentiated from the frequency of symptoms reported for the general population of infants studied. It is concluded that the prevalence of SID in our local population was 1.72 SID cases per 1,000 infants studied. Similar figures are reported in other European and North American studies. An estimated loss of 505 potential years of life can be computed from our survey. The symptoms associated with SID in this selected population need to be validated by the prospective investigation of a larger population.

**Key words:** Sudden infant death – Infant mortality – Epidemiology – Sleep – Sweating

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**Abbreviations:** ONE = Office de la Naissance et de l'Enfance; SID = Sudden infant death

There is a paucity of data on the prevalence of the sudden infant death (SID) in Belgium [5]. We have undertaken a prospective study to assess the frequency of SID cases in our local population, whilst collecting data on some candidate risk factors for SID.

### Method

#### *The population studied*

The Belgian "Office de la Naissance et de l'Enfance" (ONE) is a national institution providing primary care to infants and children. Parents are offered a free service by paediatricians and nurses from health clinics, and visiting nurses give help and advice to mothers at home. Of 15,739 births in the Brussels area between January and December 1987, 10,294 infants (65.4%) were presented to one of the 137 ONE clinics [2, 11]. Infants were retained in the study if four conditions were fulfilled: (a) the infants were born between January 1 and December 31, 1987; (b) attended an ONE consultation in the Brussels area between January 1987 and December 1988; (c) visits were repeated monthly during the first 12 months of life, or until death occurred; and (d) standard questionnaires were completed for each visit. For 4,064 infants the four criteria were fulfilled. These infants were representative of the general population seen in the ONE consultations, for sex, age, and socioeconomic background.

#### *The questionnaires*

At each visit the paediatrician performed a standard physical examination, and completed a standard research questionnaire which included 65 items related to growth, feeding, psychomotor development, immunization and the presence of infections. On the basis of previously published literature on SID [6, 10, 15], parents were specifically asked about possible episodes of fatigue during feeding, and of snoring, pallor, cyanosis, or sweating during sleep. Percentiles of weight/height for age were assessed from national growth curves [16, 17].

#### *SID cases and matched control infants*

The follow up routines of the ONE and of the visiting nurses ensured that all cases of death occurring in infants who had vi-

sited an ONE clinic were reported. When a death occurred, a questionnaire was sent to the physician in whose care the infant had been, and/or to the day-care nursery attended. Home visits were made by a visiting nurse, who recorded details of the death and all parental observations. A post-mortem report was solicited from the hospitals to which the bodies had been referred and included all autopsy, chemical and bacteriological findings. Four University hospitals contributed to the analysis of the post-mortems. According to commonly accepted criteria, a child was considered a SID victim if the death was unexpected and no explanation was to be found in the child's history or from the post-mortem investigations [14]. For each SID case, 10 matched control infants were selected. Controls were chosen at random from the same health clinics. They were included in the study if they matched the SID victims in the following respects: (a) dates of visits; (b) sex; (c) gestational age; (d) legal age; and (e) the profession of both parents. Every control child survived the 1st year of life without SID or a known life-threatening event.

Statistical comparison of data was performed by means of the chi-square, and the Fisher Exact tests, with a level of significance of 0.05.

## Results

Among the 4,064 infants who entered the study, 8 died during the study period. For 1 infant, post-mortem investigations confirmed the clinically suspected glycogenosis, but for 7 infants who died unexpectedly, no cause for the deaths was found. The prevalence of SID among the infants surveyed was 7 out of 4,064 infants, or 1.72 SID cases per 1,000 infants studied (Table 1).

No SID victim was a SID sibling. Treatments were given for a urinary infection during the 1st trimester of gestation in

one mother, and for premature contractions during the first 3 months of gestation, in another. Birth was uneventful in the seven newborns. Their Apgar scores were above 6. One 2470 g infant stayed for 4 days in the nursery because of hypoglycaemia. Three infants were artificially fed, one with cow's milk, two with soya milk. Three infants were breastfed during 3 weeks, and one was still being solely breastfed at the time of death. No infant had received immunization. Psychomotor development was considered normal. The deaths occurred between midnight and 0700 hours in four infants, during an afternoon nap in three. Five infants died in their crib at home, one in a day-nursery, and one in a buggy, during an outing. An upper-airway infection had been noticed in 3 infants, but none had received sedative drugs. No change in percentile for weight/height was seen in the weeks preceding the deaths.

For most of the items studied no significant difference was seen between the 7 SID infants and their 70 matched controls. Growth curves, psychomotor development, or immunization status were similar. During sleep episodes of pallor or cyanosis, noisy breathing, snoring, or sobbing were equally rare in both groups. Only two variables significantly characterised the SID victims: repeated fatigue during feeding, and profuse sweating during sleep. For two future SID victims the bedclothes were repeatedly wet with sweat, at least 4 nights per week, although according to both the parents and the visiting nurses, the rooms were not overheated, nor were the infants excessively wrapped or covered. The characteristics of the 70 control infants could not be differentiated from those of the 4,064 infants included in the study. Associations of symptoms were reported for the two SID infants. A boy, who died at 3 months of age had shown repeated episodes of fatigue and coughing during feeding at 1 month, and profuse sweating at 3 months. Another boy who died at 5 months, had presented fatigue during feeding at 3 and 4 months of age, pallor during sleep at 3 months, and profuse sweats at 3 and 4 months of age. Such as-

**Table 1.** Major symptoms reported for the SID and control infants. Comparison of the 7 SID victims and their 70 matched control infants. Figures represent absolute values

	SID infants (n = 7)	Control infants (n = 70)	P
Number of cases	7	70	
Sex (M/F)	4/3	40/30	
Gestational age (weeks)	40 (37-40)	40 (37-40)	
Weight at birth (g)	3,220 (2,420-4,200)	3,340 (2,510-3,950)	
(PC)	25 (10-90)	25 (10-90)	
Social class II/III	6/1	59/11	
Mothers' age at birth	28 (26-32)	28 (25-31)	
Fathers' age at birth	30 (27-32)	31 (28-34)	
Birth rank in the family	2 (1-2)	2 (1-4)	
Characteristics at the time of death or selection			
Age (weeks)	11 (8-20)	11 (9-19)	
Weight (Pc)	25 (3-90)	25 (3-90)	
Months: October-March	7	70	
Upper-airway infection	3/7	38/70	
Symptoms reported before the age of death or selection			
During feeding			
Fatigue	4	10	0.02
During sleep			
Profuse sweating	2	0	0.01

sociations of symptoms was not found in the matched control infants.

## Discussion

The seven SID victims observed among the 4,064 infants who visited the ONE clinics give a prevalence of 1.72 SID cases for 1,000 infants studied. This figure is lower than the 2.23 death ratio from SID reported from the national statistics [9]. As national figures result from uncontrolled, retrospective collection of death certificates, with an estimated incidence of autopsies of less than 25%, bias in the estimation of SID prevalence is possible [14, 15]. Our figures are expected to be more accurate, as the study was conducted prospectively, and all SID cases were defined by post-mortem investigations. Nevertheless, care should be applied when extrapolating our figures to the general Belgian population, as so far only a small number of SID cases was collected. The addition of only a few SID cases, or an increase in the denominator population, could lead to significant modifications in the prevalence ratio. Despite these considerations, our figures lie well within the SID prevalence figures, ranging from 3 per 1,000 in some areas of the United States [12], or the United Kingdom [1], to the 1.29 rate reported in Norway [3]. SID represents 33% of the Belgian infant mortality [9]. With a life expectancy of 70 years for men, and 75 years for women, an estimated loss of 505 potential years of life can be computed from our survey [9, 19]. For 118,000 births, each year 14,615 potential years of life could be lost to SID in Belgium.

The limited number of SID cases collected precludes any overinterpretation of the infants' histories. This is probably the main reason why some of the epidemiological risk factors reported for SID such as the young age of the mother [13], the short gestational period [4], or the low birth weight of the infant [8] were not found. However, other characteristics attached to SID were found in the seven SID cases, such as the prevalence of males, born in middle or lower social class families, who died between the ages of 8 and 20 weeks, at a time when they were believed to be asleep, sometimes with presence of upper-airway infections, and during the winter period [14, 15, 18]. In the present study two further symptoms were found to be related to SID: repeated fatigue during feeding and profuse sweating during sleep. Fatigue during feeding had been reported in retrospective studies as a characteristic of SID infants [6, 10]. Profuse sweating during sleep, with the bedclothes repeatedly wet with sweat, was retrospectively found in about 25% of the SID victims [5, 6], and was measured in some infants clinically considered at higher risk for SID [7]. Further information collected during the on-going study should help to validate these findings.

In conclusion, by avoiding most of the major shortcomings of retrospective analysis of death certificates, our prospective study offers the first available estimation of SID prevalence in our local population, and contributes to a prospective data base on the characteristics of SID victims.

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