Prevalence and triggers of syncope and orthostatic dizziness in young people with Down syndrome – brief report

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Abstract

Background: The objective of this study is to determine the prevalence and triggers of syncope episodes in people with Down syndrome.

Method: A random sample of 1000 relatives of people with Down syndrome received a questionnaire consisting of 29 questions on general personal and clinical characteristics and specific questions concerning episodes of transient loss of consciousness (TLOC), dizziness upon standing, cardiac history and epilepsy.

All data were entered into a database and analysed using SPSS.

Results: Seventy three (12.9%) of 564 people had experienced a TLOC-episode during their life so far, 25 (4.4%) of them during the last year. The median age when having their first TLOC was 12 years (range 0-27). Sixty-three persons suffered from a reflex syncope. The top six of most frequently mentioned triggers of syncope included illness, emotion, warm environment, insufficient food intake, menstruation and standing up. These syncope triggers were related to conditions that affect orthostatic blood pressure regulation and vasomotor responses.

Conclusion: For people with Down syndrome reflex syncope is the most common cause of TLOC, though other causes are more frequent than in a normal young population.

Key words: Down syndrome; transient loss of consciousness; reflex syncope; vasovagal syncope; orthostatic hypotension

Syncope can be caused by serious cardiac conditions, like arrhythmias or structural abnormalities, but is far more frequently caused by relatively benign conditions like reflex-syncope (for instance vasovagal syncope (the common faint) or carotid sinus syncope) or orthostatic hypotension.

The lifetime cumulative incidence of syncope in a native Dutch study population, aged 35-60 years, was 35%. Syncope occurred more often in women than in men (41 vs. 28%). A peak incidence of syncope occurred around the age of 15 years in both men and women. The median number of episodes in persons with syncope was 2. The top five of most frequently mentioned triggers of syncope included warm environment, pain, insufficient food intake, seeing blood/venipuncture and emotion. These syncope triggers were related to conditions that affect orthostatic blood pressure regulation and vasomotor responses.

People with Down syndrome have a low blood pressure compared to people without Down syndrome. Besides this, they frequently suffer from cardiac conditions and epilepsy. Due to the low blood pressure, people with Down syndrome could have a higher than normal risk on syncopal episodes caused by vasovagal syncope or (initial) orthostatic hypotension, whether they have a cardiac condition or not. There is evidence that people with Down syndrome have altered autonomic modulation of heart rate and blood pressure. The exact mechanism is yet unknown. To be able to properly diagnose the cause of episodes of loss of consciousness the pre-test likelihood of the various possible causes of episodes of TLOC should be known. The prevalence of the various causes of syncopal episodes in people with Down syndrome is currently unknown. The objective of this study is to determine the prevalence and triggers of syncope episodes in people with Down syndrome.

Methods

Population

Relatives of people with Down syndrome were approached through the Dutch ‘Down Syndrome Foundation’. A random sample of 1000 relatives of people with Down syndrome received a questionnaire with return envelope and a letter explaining purpose of study by regular mail. Because of law on privacy, the questionnaire was conducted fully anonymously and it was therefore not possible to send a reminder.

Questionnaire

The questionnaire was a modified version of the questionnaires used in earlier studies on the epidemiology of TLOC adapted for use by relatives of subjects and com-
pleted with some specific questions on Down syndrome. The questionnaire finally consisted of 29 questions on general personal and clinical characteristics and specific questions concerning episodes of TLOC, dizziness upon standing, cardiac history and epilepsy.

**Analysis**

All data were entered into a database and analysed using SPSS (version 23.0). For all dichotomous variables frequencies were calculated, with confidence intervals calculated the Wilson statistic. Normally distributed continuous variables were summarised as means with standard deviations (SD) and 95% confidence intervals (95% CI). Non-normally distributed continuous variables are expressed as medians with quartiles and ranges.

**Results**

**Population**

The questionnaire was returned by 564 relatives (response rate 53.5%). The study population consisted of 302 men (53.5%). Median age was 10 (range 0-65), and 76.6% of the total study population was under 18y. Clinical characteristics of the population are described in table 1.

**Episodes of syncope**

Seventy three (12.9%) of 564 people had experienced a TLOC-episode during their life so far, 25 (4.4%) of them during the last year. The median age when having their first TLOC was 12 years (range 0-27).

Sixty-three persons suffered from a reflex syncope. For 10 persons the reason for the TLOC was not reflex-syncope: 2 persons had a seizure, 4 persons had a TLOC because of a heart problem, 2 persons choked on a piece of food, 2 had a traumatic incident. The median number of episodes in persons with syncope was 1. Thirty one persons (5.5%) had experienced one episode, 11 (2%) 2 episodes, the others experienced more episodes ranging from 2 to 18, and one person experienced up to 168 episodes.

Syncope occurred with similar frequency in women and men (12.6% vs. 13.4%; p =0.80).

**Comparison between younger and older subjects**

Four hundred thirty-two persons were under age of 18. Of those people under 18, 29 (6.9%) had a reflex syncope. Of the 119 persons above 18 years old, 44 (37%) had a reflex-syncope.

Triggers for syncope, suggested by the relatives are described in table 2. The top six of most frequently mentioned triggers of syncope included illness, emotion, warm environment, insufficient food intake, menstruation, and standing up. These syncope triggers were related to conditions that affect orthostatic blood pressure regulation and vasomotor responses. Thirty three persons (5.9%) are dizzy during rising, 491 experience no dizziness, for 40 persons this information is missing.

**Discussion**

In this study 12.9% of the subjects experienced a TLOC-episode during their life so far. This is low compared to studies in a population without Down syndrome, where an incidence of 35% 6 and 39% 11 was found and compared to studies in a population with Down syndrome, where an incidence of TLOC of 45%, and reflex syncope 18% was found. 13

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**Table 1: demographic and clinical characteristics of the population**

| Gender | 302 (53.5%) men |
| Housing | 509 (90.2%) with their parents |
| Level of intellectual disability | 196 (34.8%) mild |
| Medication use | 221 (39.2%) medication |
| Heart condition | 227 (40.2%) |
| Epilepsy | 9 (1.6%) |
| Thyroid disease | 110 (19.2%) |
| Coeliac disease | 17 (3.0%) |

| | Total |
| No idea | 16 |
| Illness | 11 |
| Warm environment | 8 |
| Menstruation | 7 |
| Emotion | 6 |
| Insufficient food intake | 5 |
| Standing up | 5 |
| Breath holding spell | 3 |
| Exercise | 2 |
| Venipuncture/seeing blood | 1 |

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In the studies the median age of the first episode of TLOC was 15 and 18 years, respectively. In those studies a TLOC was rarely reported before the age of ten years. In another study the mean age was around 35. The median age of our study population was low with 10 years. This could imply that an incidence of 12.9% is relatively high, as first episodes are more likely to occur at an older age. This can also explain why the recurrence rate we found is relatively low. The study population is relatively young, which can be explained by the fact that most members of the Dutch ‘Down Syndrome Foundation’ are parents of younger children. If the subjects are divided in a group under 18 years old and a group above 18, the incidence is 37% for those above 18. This is comparable with the incidence found in the population without Down syndrome.

The triggers for syncope found in this study are the same as found in other studies. The amount of people with a cardiac cause and epilepsy causing TLOC is higher compared to other young populations. This is in line with the notion that people with Down syndrome have more congenital heart defects and epilepsy than people without Down syndrome. No parents reported psychogenic disorders as cause of episodes of TLOC, although this diagnosis might be suspected in the patient with 168 reported episodes. Psychogenic pseudo syncope is difficult to diagnose in patients with syncope, and might be even more difficult to diagnose in patients with Down syndrome, as this requires a thorough history and tilt-testing with simultaneous EEG monitoring.

The results of this study might be limited by the fact that we chose to approach relatives instead of physicians of people with Down syndrome. Although we are aware that the accuracy of the medical information might be higher when approaching the physicians, in our experience relatives are very well informed of the medical situation of their child and also know information on episodes that might not have made it to the physician office. The response rate was relatively low, which could have resulted in and over- or underestimation of the incidence of TLOC for this group. To find a more accurate incidence for TLOC, and especially reflex syncope, a patient group with a higher median age should be approached. Future research should be done in an older patient group, to investigate the hypothesis that the prevalence of reflex syncope is higher among people with Down syndrome.

Conclusion
For people with Down syndrome reflex syncope is the most common cause of TLOC, though other causes are more frequent than in a normal young population.

Referenties