

Analysis of sleep and symptoms related to OSAS in a group of paediatric patients with Down syndrome



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Abstract

Aim Good sleep is fundamental for development, particularly in children. Sleep can be fragmented by obstructive sleep apnoea syndrome (OSAS). Children with Down syndrome (DS) are more likely to have obstructive sleep apnoea, due to their craniofacial characteristics. The diagnosis can be made through the administration of specific questionnaires. The purpose of the study is to analyse the results obtained from the administration of a questionnaire for the screening of OSAS in the paediatric population with DS.

Materials and methods The questionnaire chosen is a questionnaire validated in Italian and administered to 139 parents of children with DS. This questionnaire investigates the diurnal and nocturnal symptoms related to OSAS and their frequency.

Results Among the most relevant data, it has emerged more frequently the presence of snoring, respiratory breaks during sleep, the assumption of unusual positions and daytime sleepiness.

Conclusion This study wants to state the importance of the administration of questionnaires for the screening of OSAS in children with Down syndrome and the role of the dentist in the early diagnosis.

such as relative macroglossia, hypotonia, and hypoplasia of the middle third of the face increase the risk of obstructive sleep apnoea. Family dynamics, drugs, and coexistent medical conditions can also contribute to poor sleep quality [Chawla et al., 2020].

The diagnosis of OSAS is based on the use of screening questionnaires, on the clinical examination, which is however not very predictive, and on the polysomnographic examination which is instead the gold standard in the diagnostic process [Marcus et al. 2012]. Clinical suspicion of OSAS is most often raised by the reporting of parents through the use of questionnaires to investigate the symptomatology that includes snoring, apnoeic events, increased daytime drowsiness, hyperactivity, poor school performance, somatic growth rate, or nocturnal enuresis [Joosten et al., 2017]. Although the prevalence of OSAS in children with Down syndrome is estimated between 45% and 76% [Lee et al., 2018], the perception of parents is very poor: it is estimated that only 36% of parents are aware of nocturnal and diurnal symptoms [Shott et al., 2006].

The purpose of this study is to analyse the results obtained from the administration of a questionnaire validated in Italian for the screening of OSAS in a paediatric population with Down syndrome.

Material and Methods

To conduct this type of investigation, it was employed the only questionnaire in the literature that investigated the nocturnal and diurnal symptoms of OSAS in children with Down syndrome [Sanders et al., 2015]. This questionnaire was submitted to an Italian language validation process and published in the literature [Agostini et al. 2022].

The questionnaire was administered to 139 parents of children with Down syndrome, recruited through different associations. The questionnaire was administered online, in order to make it more easily accessible to all parents willing to contribute to the study.

The questionnaire investigated in particular: snoring, the presence of breathing breaks during sleep, the assumption of unusual positions during sleep, night sweating and some diurnal aspects, such as mood, hyperactivity, diurnal sleepiness and oral respiration.

Parents answered to these questions according to the

KEYWORDS OSAS, Sleep, Down Syndrome, Questionnaire.

Introduction

The importance of good quality sleep has been repeatedly affirmed in the paediatric age group, both for general health and to allow good neurocognitive development. The sleep consolidation process involves many aspects of the child's life from the first months of life: from personal development to family, from social milieu to cultural background [Bacaro et al., 2021]. Sleep in children can, however, suffer a process of fragmentation due to obstructive sleep apnoea syndrome: this syndrome is characterised by apnoeas of obstructive or central origin, which affects from 1%–5% of children [Li et al., 2016].

It has been shown that children with Down syndrome (DS) have a different sleep architecture than those without DS and have a high prevalence of sleep problems. Anatomical features

		Never	Rarely (%)	Occasionally (%)	Almost always (%)	Always (%)	I don't know (%)
1	How often does your/her son/daughter snore when she doesn't have a cold?	15,1	36	29,5	12,2	7,2	0
2	How often do you hear your/her son/snoring out of her bedroom?	41,7	27,3	18	6,5	4,3	2,2
3	How often does your/son/son struggle to breathe when he sleeps?	27,3	30,9	29,5	7,9	0 4,3	
4	How often does your son's breath stop and then gasp?	41,7	23,7	20,9	9,4	0,7	3,6
5	While your/her son/daughter is asleep, how often do you have to touch/move him to let him breathe again?	69,1	14,4	10,8	0,7	2,2	2,9
6	How often does your/her son/daughter sleep in unusual positions?	17,3	16,5	35,3	23	7,9	0
7	How often does your/her child/a have a restless sleep?	9,4	28,8	31,7	20,9	8,6	0,7
8	How often does your/son/son sweat while sleeping?	31,7	37,5	23 5	1,4	1,4	
9	How often does your/a child/a wake up at night?	18,7	34,5	20,1	16,5	8,6	1,4
10	How often does your/a son/a have trouble waking up in the morning, even if he has slept a lot?	25,9	35,3	19,4	12,9	6,5	0
11	How often is your/a son/a grumpy/y early in the morning?	32,4	32,4	23	8,6	2,2	1,4
12	How often does your/a child/a have the habit of breathing through their mouth during the day?	20,1	26,6	25,9	2,9	6,5	7,9
13	How often is your/a child/a sleepy during the day?	20,1	31,7	44,6	2,9	0	0,7
14	How often does your/a child/a appear more hyperactive or restless than his peers?	36,7	25,9	20,9	7,9	3,6	5

TABLE 1 Results as a percentage of each question

<https://www.frontiersin.org/articles/10.3389/fpsy.2015.00147>

frequency as follows.

- Never: if it had never happened in the last six months.
- Rarely: less than once a week.
- Occasionally: 1–3 times a week.
- Almost always: 4–6 times a week.
- Always: every day.
- I don't know.

All the data were collected anonymously, associating every single questionnaire to a reference email, after the request of the specific consent.

An email was sent to all parents participating in the questionnaire with a booklet on sleep with instructions for proper sleep hygiene.

Results

Full results are shown in Table 1.

The most interesting results of the analysis of the questionnaire data will be explored.

As for snoring, only 15.1% of surveyed parents stated that their child never snores, and almost 20% stated that their child always or almost always snores. In addition, 41.7% of parents said they never heard their child snore loud enough to be audible outside the bedroom, and only 10% of parents said they always (4.3%) or almost always heard it (6.5%). Therefore, 48.9% of parents reported snoring at least once a week (Fig. 1).

Questions that investigated the presence of apnoea, or the question on the interruption of breath and the question that investigated the need to move the child to make him/her breathe again, gave lower percentages. In particular, 41.7% of parents said they never observed shortness of breath and 69.1% said they never had to change their child's position during sleep to start breathing again. However, 9.4% said that they observed almost always shortness of breath the 20.9% of them observed it occasionally. The 31% of parents

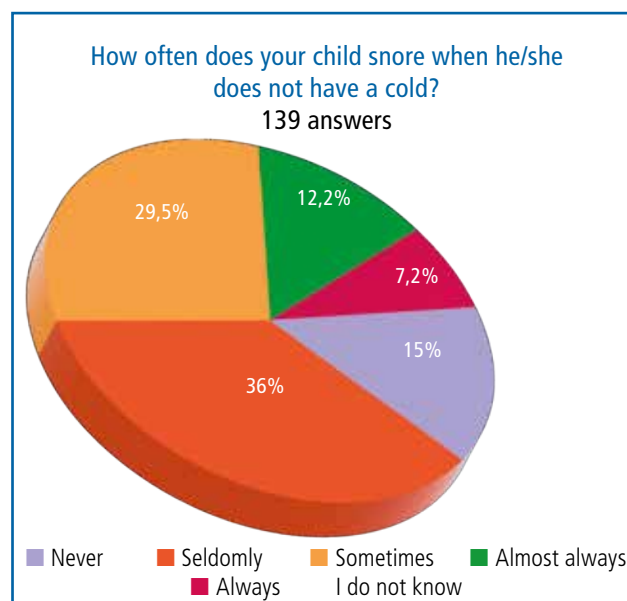


FIG. 1 Graph on the question on snoring.

observed episodes of apnoea in their child once a week. When parents responded in a positive way (that is, always, almost always, or occasionally) to one of the two questions that investigated the presence of apnoea in their children, the questionnaire was considered positive, and, therefore, reported to the patient's paediatrician. Patients presenting snoring, for which the parents had never noticed the presence of respiratory interruptions, were also considered suspect; 47% of the results were positive in this sense. Another very interesting data resulted from unusual positions assumed during sleep. As a matter of fact, 7.9% of parents responded that they always observe unusual positions, 23% almost

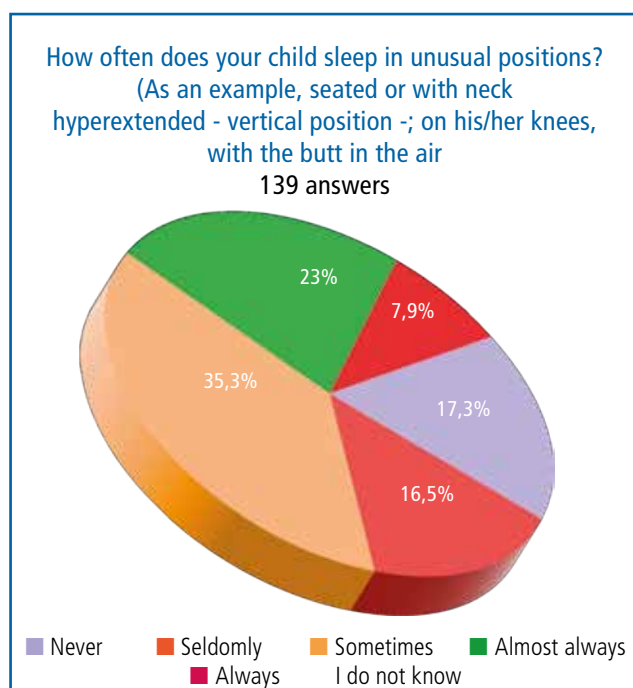


FIG. 2 Graph on the question about unusual positions taken by children with DS during sleep

always and 35.3% occasionally, therefore 66.2% at least once a week (Fig. 2).

About the diurnal symptomatology linked to OSAS, a high prevalence was found in daytime sleepiness (44.6% of parents reported occasional occurrence), and in oral respiration (6.5% of parents stated that they always noticed it, 12.9% almost always and 25.9% occasionally).

Discussion

Being the questionnaire used the first validated version of this questionnaire, it is not possible to make comparisons with the literature. Question results on nocturnal symptoms were analysed and compared to the literature. Since 48.9% of parents reported snoring of their child at least once a week, this figure is consistent with the study published by Chawla et al. [2021] that found a result of 45.2% [Chawla et al., 2021]. Parents perception on the presence of apnoea is instead underestimated compared to the data in the literature: only 31% of parents observed respiratory breaks of their child during sleep, against an estimated prevalence of 66.4% [Maris et al., 2016].

The question on unusual positions assumed during sleep offers several comparisons with literature: 66.4% of parents detected at least once a week the presence of unusual positions. The results of a study published by Senthilvel and Krishna [2011], which correlated the presence of OSAS in a paediatric population with DS and the unusual sleeping positions assumed by these patients, through a video-PSG investigation, show that some subjects assumed a body position sitting and reclining forward, with the head resting on the bed. Furthermore, they found that children with DS spend most of the night in the supine position, unlike the control group. Another study, conducted by Nisbet et al. [2014], also investigated the correlation between sleeping position and OSAS in the paediatric

population affected by DS, and reported that respiratory events in children with DS occur predominantly in REM sleep and that the Apnoea-Hypopnoea index (AHI) in the supine position during sleep no higher REM, indicating an aggravated positional effect of hypotonia in subjects with DS.

The results obtained from this questionnaire show how widespread are the symptoms related to OSAS in children with Down syndrome, and how important it can be to intercept them through the administration of simple questionnaires. As a matter of fact, early diagnosis is crucial to evaluate the correct therapeutic choice of the patient, which is based on a multidisciplinary evaluation, taking into accounts all the risk factors [Challamel et al., 2021].

As already mentioned in the introduction, parents' perception of the respiratory problems of sleep in their children is underestimated: for this reason it would be interesting to evaluate the difference in the results that would be obtained by re-administering the questionnaire 3 months later and after having properly instructed the parents about the typical diurnal and nocturnal symptoms of OSAS.

Conclusion

This study underlines the importance of the administration of questionnaires for the screening of OSAS in children with Down syndrome and the important role of the dentist in the early diagnosis.

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