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Nasal polyposis in France: impact on sleep and quality of life

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Abstract

The prevalence of nasal polyposis (NP) in France (2.11 per cent) and its epidemiology (detection, medical management, patients' characteristics, risk factors, associated diseases, etc.) were determined in a population-based, cross-sectional, case–control study of 10 033 adults carried out in 2002. The impact of this disease on daily living was also studied, by the analysis of potential sleep disorders (validated questionnaire) and quality of life (QOL, SF-36 questionnaire) of NP patients, in a comparison with a matched-control group of individuals without NP.

A quarter of NP patients (24.6 per cent) reported a feeling of general discomfort due to their nasal condition, during the day as well as the night in most of these cases (61.2 per cent). Compared with controls, NP patients have a two-fold higher risk of suffering sleep disturbance (odds ratio [OR]: 2.25, 95 per cent confidence interval [95% CI] [1.54; 3.29]). Snoring was reported by 50.5 per cent of NP patients *vs* 35.7 per cent of controls ($p < 0.001$). All scores from the SF-36 questionnaire demonstrated a significant negative impact of NP on the different aspects of QOL.

The current study underlines the negative impact of NP on QOL and sleep, two dimensions that are rarely considered in its pathology. In addition to the discomfort and lowered QOL experienced by patients with this disease, a significant increase in sleep disorders was shown, suggesting a risk of suffering further chronic diseases and complications.

Key words: Nasal Polyps; France; Epidemiology; Quality of Life; Sleep

Introduction

Nasal polyposis (NP)[1–3] is a chronic disease with a symptomatology close to that of rhinitis. Nasal obstruction is the most frequent complaint,[2] together with an olfactory impairment, which serves as the point for differential diagnosis.[4,5]

Although the aetiology of NP remains unknown, many aspects of the disease, its risk factors, and associated diseases have been extensively studied.[6–11] Other important aspects such as its impact in terms of reduced quality of life (QOL) and quality of sleep are very poorly documented and supplemental data on these points should be useful. Only one study compared QOL of NP patients to that in other groups of individuals; it has demonstrated a significantly impaired QOL in NP patients when compared with patients with perennial allergic rhinitis.[12] The quality of sleep in NP patients has been analysed mainly in children; in the paediatric population, NP has been shown to induce obstructive sleep apnoea.[13] Moreover, two studies have highlighted an increased risk of suffering arterial hypertension associated with NP, essentially in relation to NP-induced sleep disorders.[14,15]

In France, the prevalence of NP is 2.11 per cent, as has recently been established in a population-based study[16] that has considered, in addition to NP prevalence and epidemiology, further aspects of this disease such as its impact on QOL and sleep patterns of NP patients. These observations are presented in this article.

Materials and methods

This large cross-sectional, descriptive case–control study was carried out in 2002 (June–October), with the main objective of determining the prevalence of NP in the French general population.[16] Among other secondary objectives, associated sleep disorders and their impact on QOL were also studied.

The first phase of the survey was the screening

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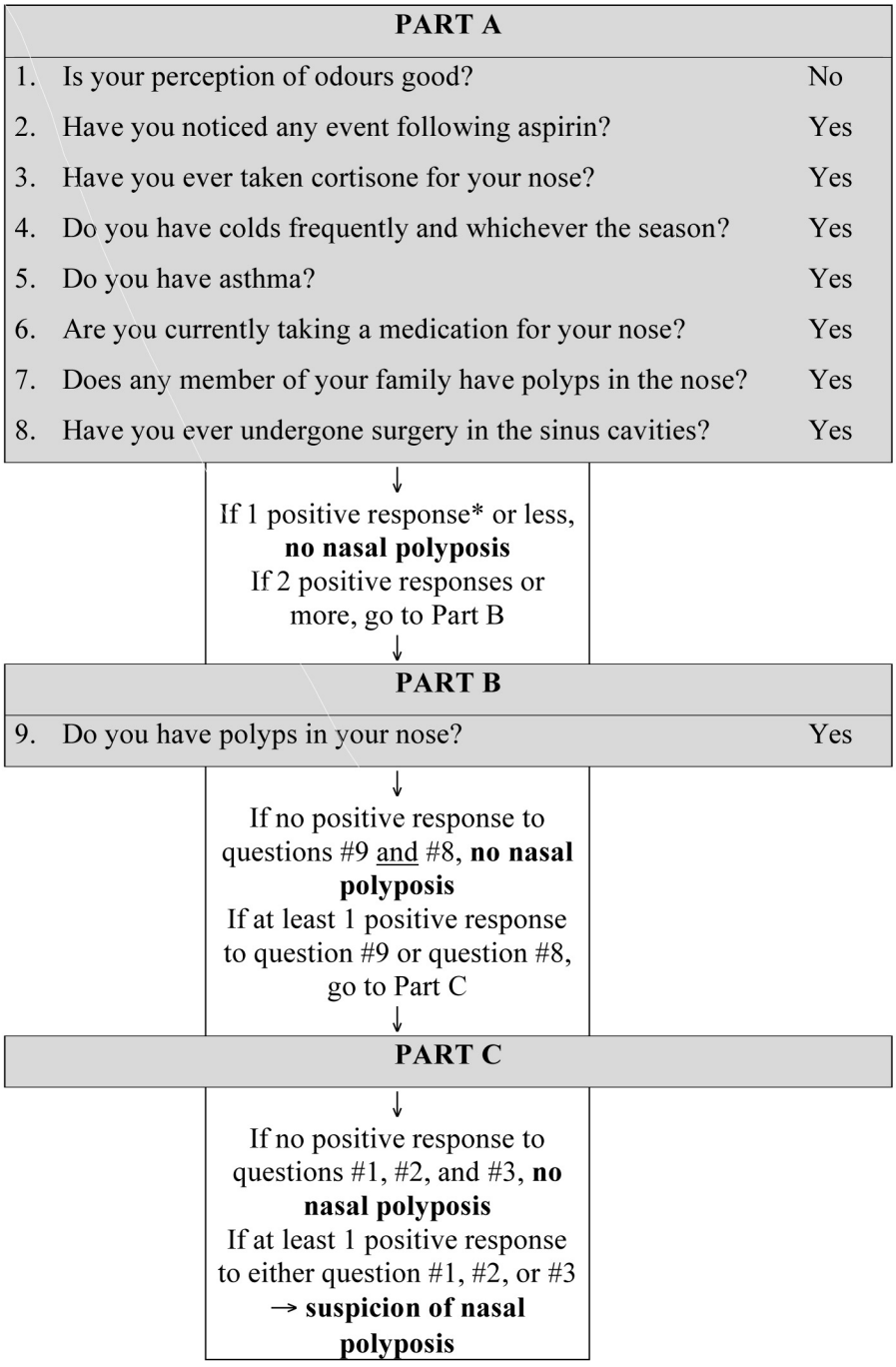

FIG. 1

The validated questionnaire/algorithm used for nasal polyposis screening (sensitivity: 88.9 per cent, specificity: 87.8 per cent).

phase,[16] conducted with a population-based random sample of 10 033 male and female subjects ≥18 years, using a questionnaire (Figure 1)[17] (face-to-face interviews) and a computerized system equipped with specific algorithms for immediate NP detection. Afterwards, patients with established NP as well as controls (patients free of NP, matched by gender and age to the NP group) were asked to complete other questionnaires.

One of these questionnaires, aimed at collecting information on the disease (history, symptoms, associated diseases, smoking status, risk factors) and its management (treatment and investigations), allowed the identification of the current symptomatology and the evaluation of the discomfort associated with the sino-nasal condition.

A part of this questionnaire was constructed to evaluate sleep disorders (the existence or absence of

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sleep disturbances, snoring, and frequency of sleep disorders), and to explore four aspects of the quality of sleep: (1) difficulties in falling asleep, (2) difficulties in falling asleep after nocturnal awakening, (3) involuntarily inadequate sleep time and (4) inefficient sleep.

Finally, the SF-36 questionnaire, a generic health-related QOL instrument of which the validity, reproducibility, and responsiveness to changes over time have been well demonstrated,[18] was used for the assessment of QOL. Its validity in specific pathological contexts such as respiratory diseases[19,20] and NP[12,21] has also been established.

Statistical analysis

Statistical analyses of the collected data were performed using SAS software, version 8 (SAS Institute, North Carolina, USA).

The demographic and main clinical characteristics of the study population are presented as descriptive statistics. Patients' answers to the items of the sleep questionnaire were analysed by descriptive statistics in both populations (NP and NP-free patients). The responses of the two groups to each item were compared using the chi-square or Fisher's exact test for qualitative variables. The relationship between NP and sleep disorders, insomnia and severe insomnia was studied by the calculation of the OR and its 95% CI. In order to precisely determine the responsibility of NP for sleep impairment and to ensure the impairment was not due to the presence of asthma or allergic rhinitis in those patients with these associated diseases, this calculation was performed using the Cochran-Mantel-Haentzel method, with an adjustment for the presence of asthma and/or allergic rhinitis. The homogeneity of this was tested using the Breslow-Day test.

The responses to the items of the SF-36 questionnaire; the scores of the eight dimensions of QOL[18] (physical function, role limitation caused by physical impairment, role limitation caused by emotional impairment, social and relational function, mental health, vitality, bodily pain, and general health); and the subscale scores, namely the Physical Component Score (PCS) and the Mental Component Score (MCS); were analysed by means of descriptive statistics in each of the two populations. The scores of the two populations were compared using Student's *t*-test or Wilcoxon's test, and evaluated with an adjustment for the presence of asthma and/or allergic rhinitis to avoid any ambiguity due to the presence of such associated pathology.

Furthermore, these scores were also evaluated in subgroups of subjects distributed according to the presence or absence of asthma or allergic rhinitis. These scores were compared using a two-way analysis of variance (NP + asthma, NP + allergy).

TABLE I

DEMOGRAPHICS AND MAIN CLINICAL CHARACTERISTICS OF THE STUDY POPULATION DISTRIBUTED AS CASES (PATIENTS WITH NASAL POLYPOSIS) AND CONTROLS (SUBJECTS WITHOUT NASAL POLYPOSIS)

	Cases (n = 212)	Controls (n = 502)	p*
Men	45.0	49.9	0.235
Women	55.0	50.1	
Mean age ± SD	49.4 ± 17.6	46.8 ± 18.0	0.075
Respiratory discomfort	42.5	12.0	<0.0001
Asthma	26.1	6.0	<0.0001
Allergies	46.6	10.9	<0.0001
Smoking	37.4	34.1	0.403

Data presented as percentages. *P value for the comparison cases *vs* controls (chi-square test)

Results

In this survey, 10 033 subjects were screened. Of them, 212 were diagnosed as having NP; of the remaining 9822 subjects free from NP, 502 constituted the control group. The main demographic and clinical characteristics of the studied populations are displayed in Table I. Age, gender distribution and smoking habits were comparable between the groups.

Current symptomatology

Following the screening phase, the patients diagnosed as having NP had to answer questions

TABLE II

SLEEP DISTURBANCE IN PATIENTS WITH (CASES) AND WITHOUT (CONTROLS) NASAL POLYPOSIS, ADJUSTED FOR THE PRESENCE OF ASTHMA AND/OR ALLERGIC RHINITIS

	Cases (n = 212)		Controls (n = 502)	
	With asthma and/or AR n = 114	Without asthma and/or AR n = 98	With asthma and/or AR n = 72	Without asthma and/or AR n = 430
Patients with sleep disorders n (%)	87 (76.5)	69 (69.8)	50 (69.4)	195 (45.4)
Adjusted OR	2.25			
95% CI	[1.54; 3.29]			
Patients with insomnia n (%)	58 (51.4)	38 (38.4)	33 (46.1)	123 (28.6)
Adjusted OR	1.43			
95% CI	[0.99; 2.05]			
Patients with severe insomnia n (%)	35 (30.9)	20 (20.6)	21 (29.2)	61 (14.2)
Adjusted OR	1.33			
95% CI	[0.87; 2.03]			

AR: allergic rhinitis, OR: odds ratio, CI: confidence interval

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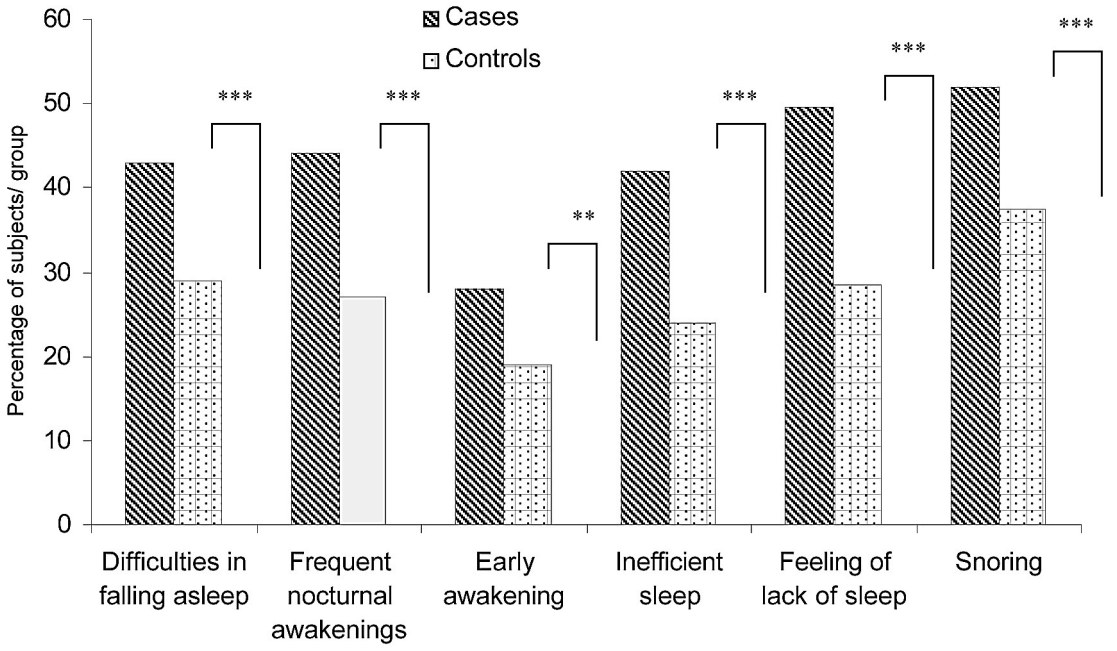

FIG. 2

Sleep disorders. ***$p < 0.001$; **$p = 0.010$ (chi-square test for the comparison between groups).

concerning their symptoms. Rhinorrhoea appeared to be the most frequent complaint (in 39.9 per cent of NP patients), followed by nasal obstruction (30.8 per cent), anosmia (28.9 per cent) and ageusia (11.6 per cent). About one-quarter of the NP population (24.6 per cent) reported a feeling of general discomfort, over all the day for most of them (61.2 per cent). Only a small proportion of the NP group (6.9 per cent) declared a feeling of discomfort or heaviness located in their face.

Sleep disorders

A significant difference was found between the cases and controls concerning the occurrence of sleep disturbance. After adjustment for the presence of asthma and/or allergic rhinitis, the risk of suffering sleep disorders was two-fold higher in patients with NP than in controls, and the risk of suffering insomnia tended to be higher in the NP population; the difference was not significant with respect to severe insomnia (Table II).

As it may be seen in Figure 2, significant differences in quality of sleep were observed between cases and controls, whichever the type of sleep disturbance. Significantly more NP subjects reported some discomfort during sleeping time compared with controls ($p = 0.0451$), and snoring was significantly more prevalent in this group. The difference between groups in frequency of sleep disorders did not reach statistical significance, although we observed some higher levels of frequency among NP subjects.

Quality of life

After adjustment for the presence of asthma and/or allergic rhinitis, significant differences between groups were found in the eight domains evaluated by the SF-36 questionnaire (Figure 3). The PCS and the MCS confirmed these results, with the mean scores in the NP subjects being significantly lower than those of the controls: 47.1 ± 10.1 *vs* 51.1 ± 9.7; $p < 0.0001$ on the PCS, and 49.1 ± 10.4 *vs* 49.8 ± 8.2; $p = 0.0024$ on the MCS.

The results of the ANOVA that was carried out to identify a potential relationship between NP and the main associate diseases (asthma and allergic rhinitis) showed a significant interaction between NP and asthma, particularly in levels of bodily pain and physical activity. Analysis of the PCS shows that asthmatic subjects with or without NP have a significantly altered physical condition. These subjects also have diminished social function and poorer general health.

Discussion

From an epidemiological point of view, our findings concerning the symptoms of NP are in accordance with some statements in the literature but not with others. Rhinorrhoea and nasal obstruction were, as expected, very frequent complaints (in about 40 per cent and 30 per cent of NP patients, respectively); but anosmia was found in less than 30 per cent of NP subjects, which appears to be a low rate.[4,5,22] However we think that, since anosmia is intermittent in some individuals, the cumulated mean prevalence of anosmia is greater.

The feeling of general discomfort reported by one-quarter of NP patients – whereas less than 10 per

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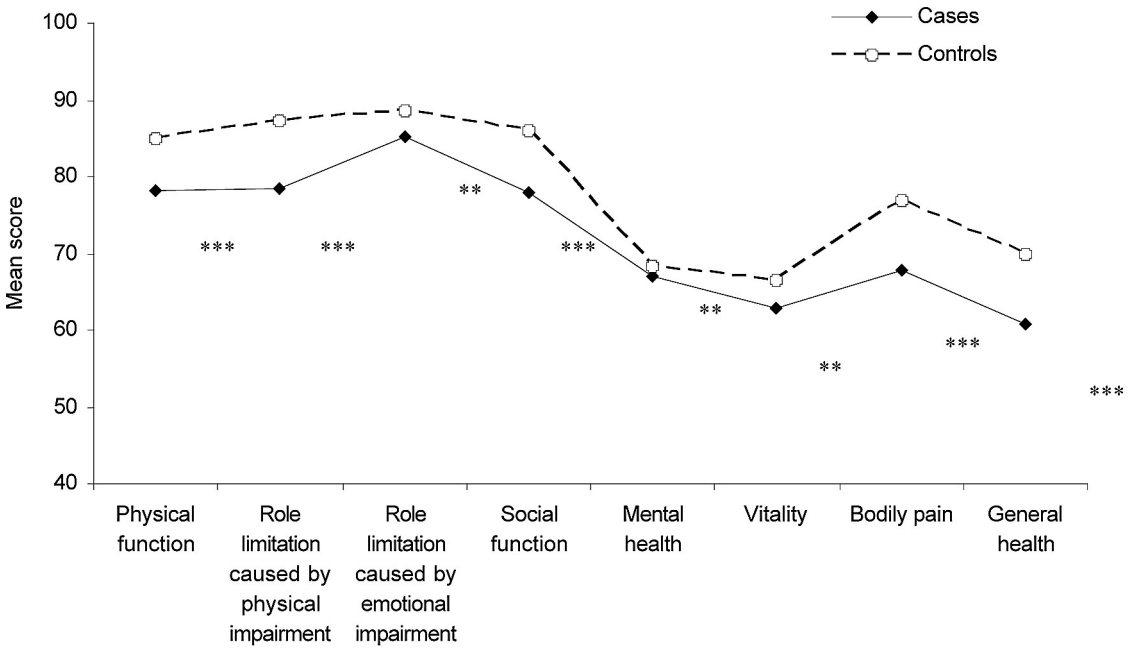

FIG. 3
Quality of life, SF-36. ***$p \leq 0.001$; **$p \leq 0.01$ (Student's *t*-test for the comparison between groups).

cent of them complained about a heaviness sensation located in the face – in addition to the very high proportion of them (> 60 per cent) who declared feeling this discomfort all through the day and night, can be explained by the duration of NP history (13 years on average) and the familiarization of NP patients with their symptomatology, which is generally experienced with less precision.

The assessments of QOL and of quality of sleep as two complementary approaches for evaluating the impact of the disease on the daily life of NP patients has allowed some issues to be highlighted which have to be taken into account while managing this disease. The tools that were employed for these assessments provide us with data of high reliability.

Since the early 1980s, the assessment of the impact of a disease in terms of QOL has been recognized as a matter of growing importance, and numerous standardized generic QOL questionnaires have been developed to measure health-related QOL for a variety of diseases, and more especially of chronic diseases.[18,23,24] We chose the SF-36 questionnaire because this test has demonstrated good validity for the general population[25] and also in a study conducted in a pathological context comparable with that of our study; in this study, the Cronbach's coefficient alpha demonstrated the high reliability and validity of the SF-36 questionnaire for patients with NP (alpha = 0.89).[12] Another argument favouring the choice of this test for QOL assessment was the fact that its French version had been validated.[26]

In our study, NP showed a significant negative impact on the patients' QOL as the eight dimensions evaluated by the SF-36 questionnaire appeared to be significantly altered by the presence of NP. Physical and social limitations were clearly evidenced. The negative impact of NP has been reported in another study where patients with NP were compared with patients with perennial allergic rhinitis; in this study, NP impaired QOL more than did perennial allergic rhinitis.[12] One of the reasons, among others, why NP negatively affects QOL could be the NP-induced olfactory impairment which was shown to be associated with a high level of disability.[27] The presence of allergic rhinitis or asthma appeared to significantly worsen QOL, even in subjects in whom these diseases were not associated with NP. Also, in the study of Radenne *et al*. the impairment of QOL was seen to be greater when NP was associated with asthma ($p < 0.05$).[12]

The analysis of sleep disturbance in NP patients provided an interesting complementary approach to evaluate the impact of the disease on patients' daily living. The relationship between sleep disturbance and QOL has already been demonstrated.[28] Furthermore, the complaint of daytime fatigue and somnolence that is frequently reported by patients with perennial nasal congestion (due to allergic rhinitis or sinusitis) and that is often attributed to causes such as the side effects of medications may instead be a result of associated sleep disturbance (poor sleep, sleep fragmentation and subsequent daytime sleepiness).[29] Although our study has not been designed to analyse the potential correlation between altered QOL and sleep disturbance in NP patients, our results suggest the existence of such a relationship. The analysis of sleep scores, adjusted for the presence of asthma and/or allergic rhinitis in order to rule out any ambiguity in the negative

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impact of NP on sleep due to the presence of another chronic condition, showed that NP patients have a two-fold higher risk of suffering sleep disturbance, and about a 50% greater risk of suffering insomnia. The rate of severe insomnia reported by about one-quarter of the NP population is noteworthy.

- **This large epidemiological study looks at the prevalence of nasal polyposis in France**
- **The impact of this disease on daily living is emphasized**
- **In particular, nasal polyposis has adverse effects on quality of life and sleep patterns**

These observations may constitute a rationale for studies designed to further analyse the relationships between NP, QOL and sleep disorders, because NP has not only been shown to badly affect the patient's quality of life and sleep as a chronic nasal condition; some studies suggest that sleep disturbance may lead, in chronic conditions, to complications such as arterial hypertension.[14,15] In a study of 27 patients with NP and hospitalized for a polypectomy, a correlation was found between the duration of obstruction and blood pressure (BP); it was also observed that patients who snored had higher BP values than those who did not, and that the mean values for nocturnal decline in BP and heart rate were less marked before surgery than after surgery. Oxygen saturation increased and catecholamines decreased only after surgery. These results suggest that hypoxia, hypercapnia, snoring, and sleep disorders may develop in cases of NP, and that persons with NP and snoring have an increased risk of hypertension and loss of nocturnal decline in BP.[14] In another study, 35 per cent of NP patients were also presenting with arterial hypertension, particularly in the age group of > 50 years.[15] In this study, in patients with an NP history of over 10 years, the incidence of hypertension was 46 per cent, and in those with the triad of asthma, aspirin intolerance and NP, the incidence was 50 per cent. In half of the NP group, hypertension developed after NP was established. In analogy with the knowledge that sleep apnoea and snoring are aetiological factors for arterial hypertension, the authors propose that long-standing nasal obstruction by NP is a risk factor for arterial hypertension.[15] This is a point to consider insofar as it is known that recurrence of NP is often seen after surgery.[30]

Conclusion

The present study presents additional information on NP in shedding light on the impact of this disease on QOL and sleep, aspects that have very rarely been considered until now. Our findings highlight the severe discomfort experienced by patients suffering from this disease, the alteration of their QOL, and the significant increase of sleep disorders which can constitute a risk of suffering other chronic diseases and complications.

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