DOI: 10.7860/JCDR/2018/32872.11694

Original Article

Ear, Nose and Throat Section

Quality of Life in Patients with Allergic Rhinitis in the North of Iran

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ABSTRACT

Introduction: Allergic Rhinitis (AR) is a chronic disease which affects the quality of life in adult patients. Fatigue, impairment of sleep quality and sexual dysfunction might be manifestations of the quality of life impairment in adults.

Aim: To evaluate different aspects of the quality of life in AR patients compared to control groups.

Materials and Methods: In a cross-sectional study, we enrolled three groups of adult individuals (18-45 years old) who visited hospitals at the Guilan University of Medical Sciences in 2014-2015. The groups included adult patients with AR, Chronic Rhinosinusitis (CRS) and healthy controls. Total 288 subjects (144 males and 144 females) participated in this study. After signing informed consent, participants completed Pittsburgh Sleep Quality Index (PSQI), Multidimensional Fatigue Inventory (MFI) and Female Sexual Function Index (FSFI) or International Index of Erectile Function (IIEF) questionnaires. A statistical analysis of the material was performed with the use of Analysis of Variance (ANOVA) and chi-square test. Data were analysed using SPSS version 22.0.

Results: The mean age (±SD) of patients with AR, CRS and healthy controls were 34.6 (±6.2), 34.7 (±8.1) and 34.2 (±7.4) years respectively (p=0.8). There was no significant difference in demographic characteristics of participants among three groups in men or women. In comprehensive evaluation of the quality of life of male subjects, patients with AR had significantly lower score in sleep quality and sexual function than CRS patients (6.9 vs. 7.9 for sleep quality, p=0.01; 49.8 vs. 56.0 for sexual function, p<0.001). However, there was no significant difference among various aspects of quality life in the female participants.

Conclusion: The present results showed impaired sleep quality and sexual function in AR patients when compared to patients with rhinosinusitis or healthy controls. The effect of AR on the various aspects of quality life in the male participants was more than females.

Keywords: Fatigue, Hypersensitivity, Sexual function, Sleep

INTRODUCTION

Allergic rhinitis is defined by the World Allergy Organisation as the group of nasal symptoms resulting from an IgE-mediated immune reaction to allergen exposure. According to national surveys, AR affects 5.9-29% of the general adult population and 40% of children. AR can induce psychological disorders such as fatigability, irritability, depression, sleep disorder and sexual impairment, significantly isolating the patient socially and diminishing the quality of life [1].

CRS is a common, chronic inflammatory disease of the paranasal sinuses [2,3]. CRS without Nasal Polyps (CRSsNP) has been attributed to mechanical obstruction of the ostiomeatal complex, whereas Chronic Rhinosinusitis with Nasal Polyps (CRSwNP) has been regarded as a diffuse eosinophilic-based mucosal disease [4]. The prevalence of CRS varies substantially with rates ranging from 1.0% to 12.1% across the world [5]. The manifestations of CRS vary from the rhinologic symptoms to central behavioral dysfunction including fatigue, depression, reduced sleep, and decreased social functioning [6].

Fu QL et al., [7] evaluated the effect of self-reported CRS on health-related quality of life using the SF-36 Health Survey. They found that persons with self-reported CRS perceived themselves as having impaired quality of life in both the physical and mental domains. In a trans-European study on patients with CRS, Lange B et al., [8] evaluated specific and generic quality of life. They indicated that CRS patients or CRSwNP had significantly reduced quality of life compared with persons without CRS.

Kirmaz C et al., [9] reported the impact of AR on sexual dysfunction in 43 sexually active AR patients and compared them with a group of non-AR controls. They noted that AR had worse scores on the FSFI or the IIED than the controls. Benninger MS and Benninger RM [10] assessed the impact of AR on sexual function, sleep and fatigue. The researchers used the Rhinosinusitis Disability Index (RSDI) which is a validated outcome tool. However, the RSDI assesses sleep, fatigue or sexual function only in one question.

Despite the substantial interest in measuring several different factors of quality of life such as sleep, fatigue and sexual function in patients with CRS or AR, few studies [11-13] have evaluated various aspects of the quality of life using valid and standard questionnaires. Also, the literature is sparse to compare the quality of life in AR patients versus patients with CRSsNP. So, the present study was aimed to compare the AR patients to control groups including patients with rhinosinusitis and healthy individuals in different aspects of quality of life (sleep quality, fatigue and sexual function).

MATERIALS AND METHODS

In a cross-sectional study, we enrolled three groups of adult individuals (18-45 years old) who met our inclusion criteria and visited hospitals at the Guilan University of Medical Sciences. The participants were invited to this study from October 2014 to January 2015. The informed consent was obtained from all participants.

Inclusion criteria were as follows: age 18-45 years, married, and secondary or higher education level. Liu C [14] showed that the cohabitation (living together before the marriage) had a negative effect on the satisfaction with marital sex. So, we included the participants with marital duration more than 6 months and not living together before marriage. Pregnant or lactating women, patients with active mental illness such as depression, presence of chronic diseases such as diabetes mellitus, chronic renal failure, asthma or other severe physical diseases and patients with history of pelvic surgery were excluded from the study.

Participants were classified into three groups: Group 1, patients with persistent AR (including 45 males and 45 females); Group 2, patients with Chronic Rhinosinusitis (CRSsNP); and Group 3, healthy controls. Matching for the age was performed with a tolerance range (±2 years). AR patients were eligible if they met all the following criteria: (1) exhibit atleast one positive result on the allergy skin prick reaction test, (2) meet the classification criteria of moderate to severe Persistent Allergic Rhinitis (PAR) according to the Allergic Rhinitis and its Impact on Asthma (ARIA) guidelines [15]. According to ARIA classification, PAR means that patients have symptoms for more than 4 days a week and for more than 4 consecutive weeks, with the understanding that patients generally suffer approximately every day [16,17]. According to the guidelines of AAO-HNS published in 2007, a combination of symptom criteria and objective findings are required for the diagnosis of CRS. A positive diagnosis of CRS was defined as complaints of 2 or more major criteria or 1 major criteria and 2 or more minor criteria lasting for 12 weeks or longer [6].

Diagnosis of CRS was confirmed with Computed Tomography (CT) of nose and para nasal sinuses. The images were obtained in axial and coronal planes. Thickness of sections was 3 mm at ostiomeatal complex and 5 mm for rest of the structures. CT scan was done for both bony and soft tissue windows. Lund-Mackay scoring system was used to assess involvement of the maxillary, anterior ethmoid, posterior ethmoid, sphenoid and frontal sinuses as follows: 0-no opacification, 1-partial opacification, 2-complete opacification. Ostiomeatal unit was scored as 0-no opacification, 2-total opacification. Each side was graded separately and the scores from each side were then added to determine the overall CT score which ranged from 0 to 24 [18]. The minimum Lund-Mackay score was 4 in this study.

In all patients, evidence of nasal polyps or purulent mucus in the middle meatus or ethmoid region were assessed with rigid nasal endoscopy and those with polyps were excluded.

After gathering demographic characteristics, the patients were asked to fill PSQI, MFI, FSFI or IIEF questionnaires for assessing sleep disorder, fatigue and sexual function, respectively. Also we assessed quality of life in our participants with Sinonasal Outcome Test 22 (SNOT 22).

The PSQI questionnaire consists of 18 items and assesses seven areas including subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medications, and daytime dysfunction over the last month. Each area has a range of 0-3 points. In all cases, a score of “0” shows no difficulty, while a score of “3” means severe difficulty. The seven component scores are then added to yield one global score with a range of 0-21 points. “0” indicates no difficulty and “21” indicates severe difficulties in all areas [19]. Farrahi Moghaddam J et al., [20] showed that the psychometric properties of the Persian version of the PSQI were acceptable. Cronbach's alpha coefficient of the PSQI was 0.52.

MFI is a 20-item questionnaire to estimate five dimensions of fatigue: general fatigue, physical fatigue, reduced motivation, reduced activity and mental fatigue. This questionnaire is ranging from 1 to 7. Higher total scores correspond with more acute levels of fatigue [21]. The validity and reliability of the Persian version of MFI were showed in study done by Ghajarzadeh M et al., [22].

FSFI evaluates six main domains of sexual functions in female including sexual desire, lubrication, sexual satisfaction, sexual arousal, orgasm and sexual pain over the previous month. Total scores range from 0 to 36. A higher score indicates better performance of sexual function [23]. Persian translate of FSFI questionnaire has been previously validated in an Iranian study. Cronbach’s alpha reliability index of FSFI has been estimated at 0.85 [24].

Men completed IIEF which included 15 questions. A score of 0-5 is given to each item. This questionnaire assesses the 4 main areas of male sexual function: erectile function, orgasmic function, sexual desire and intercourse satisfaction. The lower the score, the more severe sexual dysfunction [25]. Pakpour AH et al., showed that the alpha coefficients were acceptable for all sub-scales. The interclass correlation coefficients were ranging from 0.69 to 0.87 for the patient sample [26].

SNOT 22 questionnaire evaluates the nose and paranasal sinuses symptoms and their relationship with sleep, sexual function and fatigue. It is mainly used for follow-up of the sinusitis treatment. In the questionnaire, each item is rated from “0” to “5” in which “0” means no problem and “5” means worst problem. Total score of questionnaire indicates effect of disease on quality of life which could be between “0-110”, lower score indicates a better quality of life. Items pertain to specific sinonasal, ear/facial, sleep dysfunction and psychological domains [27]. Jalessi M et al., showed that Cronbach’s alpha coefficient of Iranian version of SNOT 22 was 0.90 [28].

STATISTICAL ANALYSIS

In this study, participants were categorised based on the gender and condition of sinus tract (AR vs. CRSsNP vs. healthy controls). The results of the Benninger MS and Benninger RM study [10] were used to perform a two-tailed sample size calculation in a level of significance of 0.05 and a power of 80, giving a required sample size of at least 45 male or female subjects in each group.

Statistical analysis of the extracted data was conducted using IBM SPSS Statistics version 22.0. All data were expressed as Mean±Standard Deviation (SD) or percentage unless otherwise stated. Comparisons between three groups were determined by ANOVA or Pearson’s chi-square test as appropriate. Bonferroni post-hoc analyses were used for the statistical comparison of more than two groups. Pearson’s test was applied to analyse correlations between improvement of the above mentioned indices and AR symptoms. Statistical significance was inferred at a two-sided p-value of <0.05.

RESULTS

In this study, 288 participants (including 144 males and 144 females) were evaluated. There was no significant difference in demographic characteristics of participants among three groups [Table/Fig-1].

Variable	Allergic rhinitis (n=96)	Chronic rhinosinusitis (n=96)	Healthy controls (n=96)	p-value*
Age (year, mean±SD)				
Male	35.4±4.6	33.4±6.9	34.9±7.2	0.27
Female	33.9±7.5	36.0±9.1	33.5±7.7	0.27
BMI (mean±SD)				
Male	25.5±2.6	25.5±3.0	26.2±3.8	0.46
Female	25.4±3.4	26.1±3.4	25.8±4.0	0.63
Marriage duration (month, mean±SD)				
Male	14.8±10.9	11.9±6.0	11.4±7.9	0.11
Female	12.4±8.1	13.8±9.2	11.7±7.9	0.46
Academic education >12 year (number, percentage)				
Male	23 (47.9%)	30 (62.5%)	22 (45.8%)	0.20
Female	17 (35.4%)	27 (56.2%)	23 (47.9%)	0.12

[Table/Fig-1]: Demographic characteristic of participants among three groups.
*with using ANOVA for age, BMI, marriage duration and chi-square for academic education

Three components of the quality life, including sleep, fatigue and sexual function, were evaluated in men and women [Table/Fig-2]. About sleep quality, analysis showed that there was a significant difference in total score of PSQI among men with AR or CRS and healthy controls (p=0.04 and p<0.001, respectively). Also,

there was significant difference in sub-scales 2 (sleep latency), 4 (habitual sleep efficiency), 5 (sleep disturbances) and 6 (use of sleeping medications) in men among three groups (p<0.05). However, the difference of PSQI scores in women among three groups was not significant.

Variable	Allergic rhinitis (n=96)	Chronic rhinosinusitis (n=96)	Healthy controls (n=96)	p-value*
PSQI (mean)				
Male	6.9	7.9	5.5	0.01
Female	6.0	6.5	6.5	0.53
MFI 20 (mean)				
Male	67.4	71.2	72.4	0.15
Female	66.6	60.2	63.0	0.09
Sexual function (mean)				
Male (IIEF)	49.8	56.0	56.6	<0.001
Female (FSFI)	26.1	24.9	25.1	0.37

[Table/Fig-2]: Various components of participants' quality of life among three groups. *with using ANOVA.

About fatigue, we did not find any significant difference between MFI scores in men or women among three groups.

Sexual function in men was evaluated by IIEF. ANOVA analysis revealed that men with AR had significantly weaker sexual function compared to men with CRS or healthy controls (p<0.001). Post-hoc analysis showed that the difference existed in all sub-scales among three groups. Based on the FSFI questionnaires for women, there was no significant difference among three groups.

In men with AR, there was only significant correlation between sleep quality and sexual function (p<0.01). It means patients who had higher PSQI scores had lower IIEF score. In men with CRS, correlation between sleep quality and fatigue was significant (p=0.04). However, there was no significant correlation between PSQI, MFI and IIEF in healthy controls.

On the other hand, there was only statistical correlation between sleep quality and fatigue in women with AR (p<0.001). There was no correlation in patients with rhinosinusitis and healthy controls between three components of quality of life.

We assessed the severity of AR with SNOT 22. Overall, men with AR had more severe symptoms than women with AR (SNOT 22 score 45.0 versus 39.2, respectively; [Table/Fig-3]. In men with AR, there was a significant correlation between the severity of AR and two components of quality of life including fatigue (p<0.01) and sexual function (p=0.05). In men with AR, a significant difference was observed only in sub-scale of general fatigue than the control groups.

Domain	Female	Male	p-value
Rhinological[a]	19.5±9.5	21.2±7.1	0.21
Psychological[b]	9.6±7.3	11.1±8.0	0.36
Ear/facial[c]	4.1±4.2	5.4±5.5	0.37
Sleep dysfunction[d]	5.9±5.6	7.0±5.0	0.24
Total SNOT 22	39.2±21.7	45.0±19.5	0.34

[Table/Fig-3]: Subset SNOT-22 Scores of Patients with allergic rhinitis (Values are mean±standard deviation).
[a]Scores range from 0 to 40. Items: need to blow nose, sneezing, cough, runny nose, postnasal discharge, thick nasal discharge, nasal obstruction, loss of smell and/or taste.
[b]Scores range from 0 to 30. Items: fatigue, reduced productivity, reduced concentration, frustration/restlessness/irritability, sadness, embarrassment.
[c]Scores range from 0 to 20. Items: ear fullness, dizziness, ear pain, facial pain and/or pressure.
[d]Scores range from 0 to 20. Items: difficulty falling asleep, waking up at night, waking up tired, lack of good night's sleep.

Post-hoc analysis showed that there were statistical relations between orgasm (p=0.05) and intercourse satisfaction (p=0.03) to severity of disease. On the other hand, in women with AR, the severity of AR was correlated with sleep quality and fatigue (p=0.03 and p=0.01, respectively). In women with AR, differences in lack of motivation, decreased activity and mental fatigue sub-scales with the control group were significant. Also, post-hoc analysis showed that women with more severe AR had more score in sleep latency sub-scale.

DISCUSSION

Consistent with prior studies, the results of the present study showed that men with AR or CRS had significantly worse sleep quality than healthy controls. However, we could not find significant difference in sleep quality among female participants. Trikojat K et al., [11] in Germany assessed 41 patients with seasonal AR and 42 healthy subjects in terms of sleep quality. In their study, there was a significant difference between patients and healthy subjects just in sub-scale 7 (sleepiness during the day). Unlike our study, men and women were not analysed separately in Trikojat K et al., study. Stuck BA et al. [29] observed that daytime sleepiness in patients with seasonal AR was increased in the pollen season. The increase in daytime sleepiness was more pronounced in patients with moderate-to-severe AR. However, they did not find a correlation between daytime sleepiness and objective sleep patterns (eg, snoring time or AHI). They noted the daytime sleepiness to be related to the condition itself rather than to an impairment of nocturnal sleep. Colas C et al., [30] showed an inverse correlation between sleep quality (assessed by PSQI) and AR severity (measured by ARIA severity classifications, either conventional or modified). Guadin RA et al., [31] showed that there is a significant association between level of control of AR and the severity of subjectively perceived sleep quality detriment using the SNOT-22.

Assessing fatigue outcomes in participants, we found significant worse scores in male or female subjects with AR compared with CRSsNP patients or healthy controls. These results were consistent with the study by Marshal PS et al., [12]. Marshal PS et al., used MFI questionnaire to assess fatigue in patients with seasonal AR. We observed that AR patients also had a significant difference with the healthy controls in some sub-scales of MFI-20 such as reduced level of motivation, decreased activity, general fatigue and mental fatigue. It seems that allergy effects are mainly on the central nervous system. In the past, it was thought that the cause of fatigue in patients with AR, was due to the impact of symptoms particularly, effect of nasal congestion on patients' sleep and reduced oxygenation to the central nervous system [32-34]. Sardana N and Craig TJ [35] mentioned that in addition to nasal congestion, other allergic symptoms (such as sneezing, rhinorrhea, and nasal pruritus) may contribute to reduced sleep quality and sleep disturbance in individuals with AR. Recently, however, studies show that other reasons such as allergic reactions due to release of inflammatory mediators including IL-1 and TNF-α, causing malaise, weakness, inability to concentrate and loss of interest in daily activities by affecting the central nervous system [12,35].

Regarding the effect of AR on male sexual performance, our results showed that all sub-scales of sexual function (including the erection, orgasm, sexual orientation, satisfactory intercourse and total satisfaction of sexual function) was significantly different compared with other groups. However, we could not find significant difference in women among three groups in total score or its sub-scales. In a study Kirmaz C et al., [9] used FSFI and IIEF questionnaires to assess sexual function in women and men, respectively. They found significant differences in total score and sub-scales of women or men with AR compared to control group. Also, Ozler GS et al., [13] evaluated sexual function in men with AR using the IIEF questionnaire. The results of this study showed that male patients in all sub-scales of the questionnaire had significantly weaker sexual function than the control group.

LIMITATION

It is worth noting some of the limitations of this study. First, some effective and uncontrollable factors such as stress, financial problems, and marital problems may be possible confounding factors in our study. Second, the severity of AR in our participants was mild to moderate. This could lessen the difference among groups. Finally, severity of CRSsNP is very important to the quality of life. Though we included only patients with Lund-Mackay score ≥4 in paranasal CT scan, little attention has been devoted to the changes in the quality of life with medical therapy of rhinosinusitis.

CONCLUSION

To conclude, the results of this study showed that AR could have negative effects on sleep quality and sexual function in men and women. Therefore, research to clarify reactions which induce biochemical changes of the central nervous system, is warranted.

ACKNOWLEDGEMENTS

We acknowledge the kind help of Prof. Hemant Jain at the JCDR Journal editorial team for the opportunity to publish this paper.

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FINANCIAL OR OTHER COMPETING INTERESTS: None.

Date of Submission: **Sep 24, 2017**
Date of Peer Review: **Dec 01, 2017**
Date of Acceptance: **Apr 27, 2018**
Date of Publishing: **Jun 01, 2018**