

Impact of COVID-19 Lockdown on Stress and Antireflux Diet Adherence of Patients with Laryngopharyngeal Reflux: Our Experience on 32 patients.

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Key points

- Lockdown related to COVID-19 pandemic has modified the stress level and diet habits of citizens.
- There is no study assessing changes in antireflux diet adherence during COVID-19 pandemic.
- During COVID-19 lockdown period, patients significantly decreased most foods and beverages associated with a high risk of reflux event.
- The adherence to antireflux diet was not negatively impacted by COVID-19 lockdown periods in 78% of cases.
- The stress of LPR patients during lockdown periods was particularly associated with increase of LPR symptoms.

Introduction

Laryngopharyngeal reflux (LPR) is an inflammatory condition of the upper aerodigestive tract tissues related to direct and indirect effect of gastroduodenal content reflux, which induces morphological changes in the upper aerodigestive tract.¹ The consumption of high-fat, high- quick-release sugar, and low-protein diet and the stress (autonomic nerve dysfunction) are both factors that may favor the occurrence of pharyngeal reflux events through impairments of esophageal sphincter functioning.^{1,2} With the recent coronavirus disease 2019 (COVID-19) pandemic, many countries imposed lockdown to reduce the virus spread in the population. Thus, many citizens were confined to home during several weeks, which may influence positively³ or negatively⁴ individual lifestyle and diet habits.

In the present study, we investigated the impact of lockdown on antireflux diet adherence and stress of patients treated for LPR disease.

Methods

Ethical considerations

The IRB approved the study protocol (n°BE076201837630). The informed consent was electronically obtained. The reporting guidelines and core practices of the committee on publication ethics have been followed in the present study.

Patients and setting

Patients with a positive LPR diagnosis at the 24-hour hypopharyngeal-esophageal multichannel intraluminal impedance pH-monitoring (HEMII-pH) prior to the COVID-19 lockdowns were followed throughout the lockdown period (March 2020 to December 2021) in the Department of Otolaryngology–Head & Neck Surgery of XX. To be included, patients had to start the antireflux diet and medical treatment just before the lockdown and were followed in consultation during one or both lockdown periods. Patients with an external important source of stress during the lockdown (other than the pandemic) or those who did not adhere to the antireflux diet were excluded.

The LPR diagnosis was based on the occurrence of >1 acid or nonacid pharyngeal reflux events at the HEMII-pH (OFF medication).⁵ The probe placement and configuration characteristics were detailed in previous publication.⁶

Clinical and therapeutic outcomes

Symptoms were evaluated with reflux symptom score-12 (RSS-12),⁷ which is a validated 12-item patient reported-outcome questionnaire including otolaryngological, digestive and respiratory symptoms of reflux pre- to post-treatment and at the end of the lockdown period. Reflux sign assessment (RSA) was used to rate oral, pharyngeal and laryngeal findings associated with LPR throughout treatment period.⁶ The stress level of patient at the end of the lockdown period was evaluated with Perceived Stress Scale (PSS), which is a 10-item validated patient-reported outcome questionnaire.⁸

According to the HEMII-pH findings of reflux, patients benefited from a 3-month personalized treatment combining antireflux diet, proton pump inhibitors (PPIs; pantoprazole 20mg once daily), alginate (Gaviscon® 3/d, Reckitt Benckiser, Slough, UK) or magaldrate (Riopan® 3/d, Takeda, Zaventem, Belgium).⁶ Patients with acid reflux benefited from pantoprazole and post-meal alginate, while those with nonacid reflux were treated with post-meal magaldrate or alginate. Individuals with weakly acid reflux received a combination of pantoprazole and post-meal alginate or magaldrate. Patients with nighttime reflux at the HEMII-pH tracing benefited from an additional alginate or magaldrate (alkaline LPR) at bedtime.⁶

The antireflux diet consisted of the consumption of high-protein, low-fat, alkaline, plant-based foods and beverages.^{6,9} The drug titration was performed regarding the pre- to posttreatment reflux symptom score (RSS-12) reduction, considering the following response definitions: mild (RSS-12 reduction from 20 to 40%), moderate (41 to 60%), high (61 to 80%) and complete (>80%) responses.

At the first consultation, patients were invited to specify ‘refluxogenic’ foods and beverages that they commonly consumed through a predefined list.⁹ At posttreatment time (the end of the lockdown), they had to specify which foods and beverages that they succeeded to decrease or stop. At this time, they were invited to evaluate the influence of the lockdown on both the diet adherence and stress level through a short patient-reported outcome questionnaire (Appendix 1).

Statistical methods

Statistical analyses were performed with the Statistical Package for the Social Sciences for Windows (SPSS version 24.0; IBM Corp, Armonk, NY, USA). The pre- to post-lockdown clinical and diet outcome evolutions were investigated with Wilcoxon rank test. The relationship between patient features, symptoms and findings, and response to the pandemic questionnaire was investigated with Spearman analysis. A level of significance of $p < 0.05$ was used.

Results :

Thirty-two patients met the inclusion criteria and completed the evaluations. The mean age of cohort was 50.5 ± 16.4 yo. There were 22 females and 10 males. The clinical features of patients are described in Table 1. The initial RSS-12 of untreated patients before the lockdown significantly improved from baseline (66.6 ± 49.1) to 3- (47.6 ± 39.2 ; $p=0.008$) and 6-month posttreatment (38.5 ± 38.6 ; $p=0.002$). The mean RSS-12 at the end of the lockdown period was 52.2 ± 55.4 . From the end of the treatment period and the end of the lockdown period, the mean RSS-12 did not statistically change. The pre-treatment RSA (24.2 ± 11.2) significantly improved at 3- (20.3 ± 9.5 ; $p=0.031$) and 6-month (17.2 ± 8.3 ; $p=0.001$) posttreatment. Twenty-five patients (78.1%) reported significant symptom reduction after 3- or 6-month posttreatment and were considered as responders (Table 1). The mean PSS at the end of the lockdown was 28.3 ± 8.8 , which corresponded to high stress level regarding normative data (threshold= 12.8 ± 6.2).⁸

The pre- to post-lockdown evolution of patient consumption of ‘refluxogenic’ foods and beverages is reported in Table 2. According to the Wilcoxon rank test, patients significantly decreased most foods and beverages associated with a high risk of reflux event.

Eleven patients (34.4%) reported that the adherence to antireflux diet was better than initially presumed thanks to lockdown period, while 14 (43.8%) believed that the lockdown did not impact the adherence to diet (Figure 1A). Three patients (9.4%) thought that the lockdown period was associated with a better decrease of stress than initially presumed thanks to lockdown period. Eleven patients (34.4%) believed that the lockdown period increased the stress level, while there was no influence of lockdown on stress in 18 patients (56.3%; figure 1B). Overall, 6 patients (18.8%) reported that the lockdown had a negative impact of their LPR.

The PSS and RSS-12 scores at the end of the pandemic were significantly correlated ($r_s=0.681$; $p<0.001$). There was a positive association between the stress increase and the lack of adherence to diet at the end of the pandemic ($r_s=0.367$; $p=0.039$)

Discussion :

The adherence to antireflux diet and the management of stress and related autonomic nerve dysfunction are both important issues in the success of LPR treatment.⁹

In the present study, we observed that LPR patients who were diagnosed just before the lockdown periods adequately adhered to antireflux diet, and mainly reported favorable or no impact of lockdown on their antireflux diet. The positive or neutral impact of lockdown on diet habits of patients corroborated the findings of some previous studies,^{3,10} while other authors reported mitigated impact of lockdown on diet habits.⁴ In a recent meta-analysis of 42 studies, Della Valle *et al* . reported that 85% of studies measuring changes in Mediterranean diet adherence before-during lockdown reported an increase rate of change of high-adherence to diet ranged from +3.3% to +21.9%.³ Similar findings were observed by Alvarez-Gomez *et al* . who found that the confinement period was associated with better healthy lifestyle and dietary habits of the Spanish population, including adequate consumption of fruits, vegetables and legumes, as well as adequate time to prepare meals.¹⁰ The pre- to posttreatment specific analysis of diet changes in the present study supports that patients had significantly decreased high-fat, high-quick-release sugar, and refluxogenic foods and beverages, which was associated with symptom relief or significant reduction in LPR patients.⁹

The occurrence of pharyngeal reflux events is related to esophageal sphincter dysfunction, which may be influenced by autonomic nerve dysfunction.¹ In that way, Wang *et al* . reported that patients with anxiety or stress may have more severe LPR symptoms compared with those without significant autonomic nerve dysfunction. In the present study, 34% of patients reported a negative impact of lockdown on stress level, while 56% did not report lockdown influence. Interestingly, the stress score was significantly associated with RSS-12 at the end of the lockdown, which supports the influence of stress on LPR disease.

The main limitation of the study remains the low number of patients, which was related to the short period of study (lockdown periods) and the need to include patients with an objective LPR diagnosis (HEMII-pH).

The lack of evaluation of stress during the consultation is an additional limitation.

Conclusion:

To the best of our knowledge, this is the first study describing lockdown influence on diet habits and stress of patient with LPR disease. The diet habits were improved or unchanged in most cases, while stress level was increased in one third of patients. Patients with a high level of stress related to the pandemic/lockdown situation reported high reflux symptom score. The management of stress during the lockdown and pandemic periods is an important issue in LPR patients and need future prospective controlled studies.

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Table 1: Cohort characteristics .

Characteristics	N=32 patients
Mean age (SD)	51.8 ± 17.7
Body mass index	25.1 ± 4.7

Characteristics	N=32 patients
Gender (N, %)	
Male	10 (31.3)
Female	22 (68.7)
Gastrointestinal endoscopy	N=21
Normal	2 (9.5)
Hiatal hernia	7 (33.3)
LES insufficiency	13 (61.9)
Esophagitis	11 (52.4)
Gastritis	10 (47.6)
Helicobacter Pylori infection	1 (4.8)
Types of LPR at the HEMII-pH	
Acid LPR	15
Weakly acid LPR	10
Nonacid LPR	7
HEMII-pH feature (m ± SD)	
Pharyngeal acid reflux episodes	34.8 ± 36.1
Pharyngeal nonacid reflux episodes	24.4 ± 18.3
Pharyngeal reflux episodes upright	22.1 ± 15.8
Pharyngeal reflux episodes supine	3.7 ± 5.3
Pharyngeal reflux episodes (total)	57.3 ± 44.2
GERD	17 (51.5)
Percentage of time with distal pH<4	6.9 ± 14.5
DeMeester score	20.4 ± 41.7
Responder rates	N (%)
No response (chronic course)	7 (21.9)
Mild response	2 (6.2)
Moderate response	7 (21.9)
High response	12 (37.5)
Complete responses	4 (12.5)

Table 1 footnotes : Abbreviations: GERD=gastroesophageal reflux disease; HEMII-pH=hypopharyngeal-esophageal multichannel intraluminal impedance-pH monitoring; LES=lower esophageal sphincter; LPR=laryngopharyngeal reflux.

Table 2: Baseline and pandemic diet habits of patients.

	Pre-treatment	Pre-treatment	Pre-treatment	Pandemic	Pandemic
Refluxogenic Diet Outcomes	Weekly	Daily	Tot (%)	Weekly	Daily
Fat fish, fish oil (sardines, cods, herrings)	23	0	23 (71.9)	13	0
Fat chicken	17	0	17 (53.1)	1	0
High-fat meat*					
<i>Kidney</i>	5	0	5 (15.6)	13	0
<i>Sheep meat</i>	13	0	13 (40.6)	3	0
<i>Lamb meat</i>	24	0	24 (75.0)	17	0
<i>Bacon</i>	17	0	17 (53.1)	7	0
<i>Beef meat</i>	25	0	25 (78.1)	18	0
<i>Porc meat</i>	18	0	18 (56.3)	10	0
<i>Ground</i>	30	0	30 (93.8)	25	0
<i>Pate</i>	13	0	13 (40.6)	1	0

	Pre-treatment	Pre-treatment	Pre-treatment	Pandemic	Pandemic
<i>Tripe</i>	4	0	4 (12.5)	12	0
<i>Charcuterie</i>	19	5	24 (75.0)	8	3
Chocolate	20	8	28 (87.5)	9	4
Chocolate cookies	20	6	26 (81.3)	9	3
Full-fat cheese	19	10	29 (90.6)	14	5
Whole milk	10	2	12 (37.5)	14	0
Ice cream	25	1	26 (81.3)	15	0
Peanut, nut, cashew, hazelnut	23	1	24 (75.0)	11	0
French fries & frying	28	1	29 (90.6)	18	0
Shallot or onion	21	6	27 (84.4)	16	3
Spicy	16	15	31 (96.9)	17	8
Chilli	16	0	16 (50.0)	1	0
Tomato (sauce or raw tomato)	28	3	31 (96.9)	20	1
Strong alcohols	12	1	13 (40.6)	14	1
Wines	15	8	23 (71.9)	10	4
Beer	12	4	16 (50.0)	6	2
Sparkling beverage (water, soda)	19	2	21 (65.6)	6	0
Coffee	8	17	25 (78.1)	8	7
Tea	14	12	26 (81.3)	12	6
Orange, grapefruit or high-sugar juices	23	1	24 (75.0)	10	0
Sauces (mayonnaise, mustard, ketchup, etc.)	30	1	31 (96.9)	20	0
Bakery	28	1	29 (90.6)	19	0
Sirup	9	2	11 (34.4)	2	0
Butter products	16	12	28 (87.5)	10	8
Sweets	18	0	18 (56.3)	2	0

Table 2 footnotes : The consumption of these refluxogenic foods and beverages significantly decreased during the lockdown period in term of daily and weekly consumptions.

Figure 1: Evolution of Stress management and Diet adherence in lockdown period.

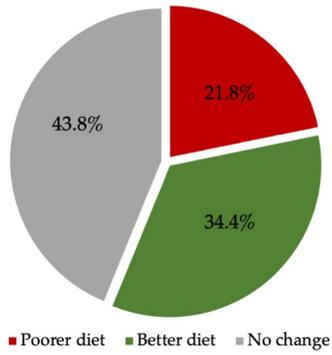
Figure 1 : -.

Appendix 1: Patient-reported outcome questionnaire .

Patient had to respond to the following question by Yes or No.

1. During the lockdown, I increased my consumption of some refluxogenic foods and beverages described as diet associated with high risk of reflux. These foods and beverages were however not recommended by my physician.
2. During the lockdown, I decreased my consumption of some refluxogenic foods and beverages described as diet associated with high risk of reflux by my physician.
3. The lockdown did not influence my adherence to antireflux diet.
4. The lockdown had a significant negative impact of my daily stress level (increase of my stress).
5. The lockdown improved my daily stress (decrease of stress level).
6. The lockdown did not influence my stress level.
7. The lockdown and the pandemic period associated with lockdown had increased my reflux symptoms.
8. The lockdown and the pandemic period associated with lockdown had decreased my reflux symptoms.
9. The lockdown and the pandemic period associated with lockdown had no influence on my reflux symptoms.

A
Influence of Lockdown on Diet adherence



B
Influence of Lockdown on Stress

