



Research Articles

Characteristics of laryngopharyngeal reflux: a retrospective descriptive study

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ABSTRACT

Laryngopharyngeal reflux (LPR) is a condition of reverse flow of gastric and duodenal fluid that reaches the aerodigestive tract, causing inflammation in the upper respiratory tract. Reflux Symptoms Index (RSI) and Reflux Finding Score (RFS) have been used as instruments to determine the symptoms and signs in LPR patients. This study aims to find out the characteristics of patients with LPR. A retrospective descriptive study was performed using medical records as a source of information to obtain the characteristics of patients with LPR in ENT Outpatient Clinic Dr. Soetomo General Academic Hospital Surabaya. The study population is all patients that have been diagnosed with LPR based on RSI >13 and RFS >7 in the period 2018-2019. Our finding shows the total number of patients diagnosed with LPR was 58. There were 45 patients diagnosed solitarily according to the results of the RSI score, while the RFS was 34 patients. The total number of patients diagnosed according to RSI and RFS was 21. In this study, 67.24% of patients with LPR were female, while the male patients were 32.76%. Most patients with LPR belonged to 50 – 59 years (25.86%). The occupation distribution shows the highest number of patients is unemployed (43.10%). In conclusion, the number of female LPR patients is higher compared to that of males. The middle age group dominated LPR. The distribution of occupation in LPR patients was dominated by housewives. The most frequent and severe complaints from LPR patients were throat clearing, the sensation of something sticking in the throat or lump, and excess throat mucus or postnasal drip. The laryngoscopy findings compiled on the RFS showed that the most common signs in LPR patients were subglottic edema, thick endolaryngeal mucus, and posterior commissure hypertrophy.



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INTRODUCTION

Laryngopharyngeal reflux (LPR) is a condition of reverse flow of gastric and duodenal fluid that reaches the aerodigestive tract, causing inflammation in the upper respiratory tract (Jerome R. Lechien, Saussez, & Karkos, 2018). Around 11% of the India population was estimated to have symptoms of LPR (Mishra, Agrawal, Chauhan, & Kaushik, 2020), research in Greece, around 18.8% (Spantideas, Drosou, Bougea, & Assimakopoulos, 2015), and research in the United Kingdom around 34.4% (Kamani, Penney, Mitra, & Pothula, 2012). LPR is commonly found in the productive age. Male and female patients show no significant difference (Kamani et al., 2012; Spantideas et al., 2015).

LPR could occur due to weakening of the upper esophageal sphincter, resulting in gastric fluid reflux more easily. If recurrent reflux occurs, the mucosa in the pharyngeal and laryngeal areas can be inflamed because these tissues tend to be sensitive to acid exposure (Johnston et al., 2016).

Symptoms caused by this condition might vary. Hoarseness, a lumpy sensation, annoying cough, thick mucus, and painful swallowing are commonly reported. Several factors might contribute to this condition, for instance, smoking habits, drinking alcohol, excess food portions, and high-fat intake. Symptoms of LPR are not specific because these can also be found in allergies, irritant exposure, and even in healthy people (Yuksel & Vaezi, 2012).

There has been no agreement on the gold standard examination. Hence it is more difficult to give a definite diagnosis of LPR. Belafsky developed Reflux Symptoms Index (RSI) and Reflux Finding Score (RFS), instruments that have been used to diagnose LPR clinically. The RSI questionnaire consists of LPR

symptoms that the patient should fill in during history taking. While RFS is a questionnaire that the doctor fills out after a laryngoscopy examination (Belafsky, Postma, & Koufman, 2001, 2002).

Studies about LPR in Indonesia are still uncommon. Therefore, the study of LPR characteristics is conducted to determine patients' frequency distribution based on demographic (i.e., age, gender, and occupation), RSI, and RFS.

METHODS

This research is a retrospective descriptive study, using medical records in the period 2018 – 2019 as a source of information to obtain the characteristics, RSI, and RFS in ENT Outpatient Clinic Dr. Soetomo General Academic Hospital Surabaya. This research has received an ethical clearance 0200/LOE/301.4.2/XI/2020 from the Research Ethics Commission of Dr. Soetomo General Academic Hospital Surabaya.

RSI was taken during history taking to assess the symptoms of the patients. There are nine questions given. Each question has a scale of 0 (no problem) to 5 (severe). The maximum total score for this assessment is 45. The patient is diagnosed with LPR if their total score is >13.

RFS is an assessment tool that contains signs in LPR patients. Findings obtained by laryngoscopy will be inserted into the RFS. The maximum total score for RFS is 26. The patient is diagnosed with LPR if the total score is >7.

An otorhinolaryngologist conducted laryngoscopy at Dr. Soetomo General Academic Hospital Surabaya, a consultant in broncho-esophagology. The procedure was carried out with fiber optic XION nasopharyngoscopy model EF-N. The laryngeal area was examined after passing the flexible scope from the nasal cavity to the throat.



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Table 1. Reflux Symptoms Index

No	Within the last month, how did the following problems affect you?	0 = No problem 5 = Severe problem					
1.	Hoarseness or problem with voice	0	1	2	3	4	5
2.	Throat clearing	0	1	2	3	4	5
3.	Excess throat mucus or postnasal drip	0	1	2	3	4	5
4.	Difficulty swallowing food, liquids, or pills	0	1	2	3	4	5
5.	Cough after eating or after lying down	0	1	2	3	4	5
6.	Breathing difficulties or coughing episodes	0	1	2	3	4	5
7.	Troublesome or annoying cough	0	1	2	3	4	5
8.	Sensation of something sticking in the throat or lump	0	1	2	3	4	5
9.	Heartburn, chest pain, indigestion, or stomach acid coming up	0	1	2	3	4	5

Source: Belafsky, Postma and Kaufman, 2002

Table 2. Reflux Finding Score

No	Lesion	RFS
1.	Subglottic Edema	0 = Absent 2 = Present
2.	Ventricular Obliteration	0 = None 2 = Partial 4 = Complete
3.	Erythema/Hyperemia	0 = None 2 = Arytenoid only 4 = Diffuse
4.	Vocal Fold Edema	0 = None 1 = Mild 2 = Moderate 3 = Severe 4 = Polypoid
5.	Diffuse Laryngeal Edema	0 = None 1 = Mild 2 = Moderate 3 = Severe 4 = Obstructing



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No	Lesion	RFS
6.	Posterior Commissure Hypertrophy	0 = None 1 = Mild 2 = Moderate 3 = Severe 4 = Obstructing
7.	Granuloma/Granulation Tissue	0 = Absent 2 = Present
8.	Thick Endolaryngeal Mucus	0 = Absent 2 = Present

Source: *Bealfsky, Postma and Kaufman, 2001*

Inclusion and Exclusion Criteria

The inclusion criteria of this research are patients with LPR that have the following data: demographic (i.e., age, gender, occupation), either or both RSI and RFS. While sample may be excluded from this research if any of the following criteria are present: incomplete data and malignancy.

RESULTS

During the period 1 January 2018 – to 31 December 2019, the total number of patients diagnosed with laryngopharyngeal reflux was 58. There were 45 patients diagnosed solitarily according to the results of the RSI score, while the RFS was 34 patients. The total number of patients diagnosed according to both RSI and RFS was 21 patients.

Demography

Thirty-nine (67.24%) patients with LPR were female, while the male patients were 19 (32.76%). In this study, most patients with LPR belonged to 50 – 59 years, which had 15 patients (25.86%). This number is followed by the age groups of 40 – 49 and 30 – 39, who had the same number of patients, i.e., 12 (20.69%). While the age group of 70 – 79 had the least number of patients, which was 4 (6.90%). No LPR patient was found in ages >80 and <20. In this study, the occupational group with the highest number of patients is unemployed, with 25 patients (43.10%) reported. Unemployed patients were dominated by the female (23 out of 25 patients).



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Table 3. Distribution and Frequency of Patients Based on Gender and Age

Characteristics of Subjects	N	%
Gender		
Male	19	32.76
Female	39	67.24
Age		
≤19	0	0
20 – 29	9	15.52
30 – 39	12	20.69
40 – 49	12	20.69
50 – 59	15	25.86
60 – 69	6	10.34
70 – 79	4	6.90
Total	100	100

Table 4. Distribution and Frequency of Patients with LPR Based on Occupation

Characteristic of Subjects Occupation	Male (n=19)	Female (n=39)	N (%)
Unemployed	2 (10.53)	23 (58.97)	25 (43.10)
Private Employee	6 (31.58)	4 (10.26)	10 (17.24)
Civil servant	3 (15.79)	3 (7.69)	6 (10.34)
Retired	5 (26.32)	1 (2.56)	6 (10.34)
Teacher	1 (5.26)	3 (7.69)	4 (6.90)
College Student	1 (5.26)	1 (2.56)	2 (3.45)
Farmer	0	2 (5.13)	2 (3.45)
Entrepreneur	0	2 (5.13)	2 (3.45)
Parking Attendant	1 (5.26)	0	1 (1.72)
Total	(100)	(100)	(100)



Reflux Symptom Index

In this study, the most common symptom is throat clearing (95.56%). This number is followed by a sensation of something sticking in the throat or lump (91.11%) and excess throat mucus or postnasal drip (84.44%). The RSI also showed that the sensation of something sticking in the throat or lump had the highest mean score of 3.64, followed by throat clearing with a mean score of 3.36 and excess throat mucus or postnasal drip with a mean score of 3.07.

Reflux Finding Score

In this study, the most common laryngeal findings were subglottic edema and thick endolaryngeal mucus, which had the same number of patients, 23 patients (67.65%). This number is followed by posterior commissure hypertrophy (64.79%). Between RFS with a range score of 0 – 4, erythema/hyperemia (2.76) has the highest mean score. While subglottic edema and thick endolaryngeal mucus have equal high mean scores (1.35) amongst RFS with a range score of 0-2.

Table 5. Distribution and Frequency of Patients with LPR Based on RSI

Symptoms Range Score RSI (0-5)	Frequency (n=45)	%	Mean Score of RSI
Hoarseness or problem with voice	29	64.44	1.87
Throat clearing	43	95.56	3.36
Excess throat mucus or postnasal drip	38	84.44	3.07
Difficulty swallowing food, liquids, or pills	32	71.11	2.36
Cough after eating or after lying down	24	53.33	1.47
Breathing difficulties or coughing episodes	21	46.47	1.29
Troublesome or annoying cough	26	57.78	1.49
A sensation of something sticking in the throat or lump	41	91.11	3.64
Heartburn, chest pain, indigestion, or stomach acid coming up	34	75.56	2.51



Table 6. Distribution and frequency of Patients with LPR based on RFS

Signs and Range Score of RFS	Frequency (n=34)	%	Mean Score of RFS	
Subglottic Edema	0 – 2	23	67.65	1.35
Ventricular Obliteration	0 – 4	3	8.86	1.71
Erythema/Hyperemia	0 – 4	13	38.26	2.76
Vocal Fold Edema	0 – 4	15	44.18	1.44
Diffuse Laryngeal Edema	0 – 4	11	32.35	1.38
Posterior Comissure Hypertrophy	0 – 4	22	64.79	1.82
Granuloma/Granulation Tissue	0 – 2	3	8.86	0.78
Thick Endolaryngeal Mucus	0 – 2	23	67.65	1.35

DISCUSSION

Demography

Table 3 shows the distribution and frequency of patients with LPR based on gender. The results showed that LPR was more common in females (67.24%) than males (32.76%). The ratio of female to male patients was found to be 2:1. This result is consistent with a previous study by Munifah *et al.* (2020); there were a higher number of female patients with LPR (64.29%) than males. A study by Widiantari and Sucipta (2019) showed there was a 1.2 times higher number of female patients than male patients. A study by Junaid (2020) also indicates LPR patients were more dominated by female patients (56.9%). Likewise, a study by Misha *et al.* (2020) showed that the number of female patients (54%) was higher than that of male patients.

To date, there is no definite reason why female dominates LPR. The hormonal factor is thought to have a role in increasing the frequency of reflux. In gastroesophageal reflux disease (GERD), which has similar pathophysiology to LPR, patients that received hormone replacement therapy (HRT), i.e., estrogen, are found to have lower the esophageal sphincter pressure. Estrogen mediates the relaxation of the esophageal sphincter, thereby increasing the frequency of reflux. However, several studies have shown that estrogen could protect the mucosa from GERD injury. This matter still needs further analysis (Kang, Khokale, Awolumate, Fayyaz, & Cancarevic, 2020; Zia & Heitkemper, 2016).

Table 3 shows the results of the distribution and frequency of LPR patients based on age. The age groups that had the highest number of patients in this study were 50 – 59 (25.86%), 40 – 49 (20.69%), and 30 – 39 (20.69%). This



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study's three age groups constituted 67% of all LPR cases. These results were also obtained in a study conducted by Spantideas *et al.* (2015), where the 50 – 64 and 35 – 49 age groups contributed the most (75%) of the total LPR cases. Likewise, Kamani's (2012) study showed high LPR patients in the 41 – 60 age group.

The percentage of up to 67% in this study's 30 – 59 age group showed that LPR was dominated by middle age. This age group is a productive age. It is suspected that stress has a role in the high number.

Furthermore, this study found no LPR patients in the age groups >80 and <20. This may be due to the small number of patients in those age groups. The absence of patients in the age group <20 might occur due to the inability of children and teenagers to visit a doctor without a guardian. As a result, it is suspected that the complaints experienced tend to be ignored if it is not intrusive. Stress levels in this age group may also not be as high as in the productive age group. While the age group of >80 years has a declining quality of life, it is suspected the patients had more severe health problems, so complaints about LPR tend to be ignored.

Table 4 shows the results of distribution and frequency of LPR patients based on occupation. The occupational group that had the highest number of LPR patients was unemployed (43.10%). These unemployed patients were dominated by women, described as housewives on medical records. Housewives amongst total female patients had a percentage of 58.97%. There has been no research on the relationship between LPR with occupation. However, several GERD studies showed that housewives had the highest prevalence (Bor, Kitapcioglu, & Kasap, 2017; Puspita, Putri, Rahardja, Utari, & Syam, 2017).

The high number of housewives experiencing LPR might be due to prolonged stress.

Housewives play an essential role in managing household finances as well as familial needs. More research is needed on this matter.

Another study shows LPR is related to work that requires the ability to use voice frequently (e.g., vocal artist). Heavy use of voice could result in weakness in the vocal fold. However, no patients in this study were found to be working as vocal artists (J. R. Lechien, Schindler, Robotti, Lejeune, & Finck, 2019).

Result of RSI

RSI is an instrument used to diagnose LPR. A study conducted in the UK by Kamani *et al.* (2012) used RSI >10 as the diagnostic criteria. Another study in Greece by Spantideas *et al.* (2015) used RSI \geq 13 as the diagnostic criteria. Meanwhile, this study uses the RSI score >13 as the diagnostic criteria following Belafsky's (2002) study, which developed RSI for the first time.

Table 5 shows the results of the distribution and frequency of LPR patients based on RSI. Throat clearing as the most common complaint was found in the study by Sirajuddin (2020), with a percentage of 86.00%. Another study by Spantideas *et al.* (2015) showed the most complaints were throat clearing with a percentage of 48.2%, and the sensation of something sticking in the throat or lump in 40.6% of patients. Meanwhile, in the study of Widiantari and Sucipta (2019), throat clearing was also the most common complaint. Still, complaints of the sensation of something sticking in the throat or lump ranked third in that study after complaints of excess throat mucus or postnasal drip.

Throat clearing, the sensation of something sticking in the throat or lump, and excess throat mucus or postnasal drip are the most severe complaints in patients with LPR. Research by Spantideas *et al.* (2015) showed throat clearing was the most severe complaint. Meanwhile, Spyridoulis's (2015) research shows sensation



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of something sticking in the throat or lump is the most common complaint, with a severity score of 5/5.

Reflux that reaches the laryngeal area could result in irritation, so that throat clearing occurs in response to relieve discomfort. Pepsin as the reflux content would irritate by damaging the gaps between the laryngeal epithelial cells. Prolonged reflux could cause inflammation of the laryngeal mucosa, which increases mucus production, causing throat clearing. Complaints that initially only in the form of discomfort can develop into excessive mucus production. When retained or thickened, the excess mucus would then result in a sensation of something sticking in the throat or lump (Kowalik & Krzeski, 2017; Jerome R. Lechien et al., 2018).

Result of RFS

RFS is an instrument for diagnosing LPR which was made based on the findings of laryngoscopy. Laryngoscopy was performed by inserting a tube that has a camera to the laryngeal area (i.e., epiglottis, aryepiglottic fold, cuneiform cartilages, vocal cords, arytenoids, postcricoid region, and piriform sinus). The examiner observed and filled in the RFS afterward. Belafsky (2001) developed RFS for the first time by assessing the results of laryngoscopy of LPR patients and stated that 95% of patients have RFS >7. Therefore, this study uses that cut-off number as diagnostic criteria.

Table 6 shows the results of the distribution and frequency of LPR patients based on RFS. The RFS results in this study showed that subglottic edema, thick endolaryngeal mucus, and posterior commissure hypertrophy were the most common findings. Previous research conducted by Sirajuddin (2020) showed that posterior commissure hypertrophy was the most common finding, with a percentage of 99.10%. Meanwhile, the study by Widiantari and Sucipta (2019) showed that thick endolaryngeal mucus was the second most common finding after

erythema/hyperemia. In addition, erythema/hyperemia, subglottic edema, and thick endolaryngeal mucus were the most severe findings due to high mean scores.

As one of the highest findings in RFS, thick endolaryngeal mucus showed a compatible result with RSI2 and RSI3, i.e., throat clearing and excess throat mucus or postnasal drip, which were the most common complaint in patients as well. The presence of thick mucus would make the patients do throat-clearing to relieve the excess throat mucus. In addition, RSI8, i.e., the sensation of something sticking in the throat, is also in accordance with the presence of posterior commissure hypertrophy. Posterior commissure hypertrophy is a finding due to chronic reflux into the larynx (Kowalik & Krzeski, 2017).

Limitation of The Study

RSI and RFS were collected on different days. RSI was performed during the history taking, while the laryngoscopy examination was scheduled after the first appointment so that several patients only have RSI data without RFS. Thus, the data were not complete due to the nonattendance of patients after being scheduled.

CONCLUSION

In conclusion, the number of female LPR patients is higher compared to that of males. The middle age group dominated LPR. Housewives dominated the distribution of occupation in LPR patients, so LPR could not be associated with the occupation.

The results of RSI in this study showed that the most frequent and severe complaints from LPR patients were throat clearing, the sensation of something sticking in the throat or lump, and excess throat mucus or postnasal drip. The laryngoscopy findings compiled on the RFS showed that the most common signs in LPR patients were subglottic edema,



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thick endolaryngeal mucus, and posterior commissure hypertrophy.

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