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A CROSS SECTIONAL STUDY ON PREVALENCE OF GASTROESOPHAGEAL REFLUX IN RECURRENT AND/OR PERSISTENT LOWER RESPIRATORY TRACT ILLNESS IN INFANTS AND YOUNG CHILDREN WITH EVALUATION OF I-GERQ GERD SCORE

Paediatrics

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ABSTRACT

Background: The aim of this study is to determine the prevalence of Gastroesophageal reflux (GER) in patients with recurrent and/or persistent lower respiratory tract illness (R/P-LRTI) and thus to possibly predict this subgroup of patients in whom Gastroesophageal reflux disease (GERD) may be an underline aggravating factor, removal of which may help in amelioration of symptom.

Methods: This was cross sectional study carried out in a tertiary care hospital in a western Maharashtra. Total of one hundred and twenty infants and young children from 6 months to 2 years of age attending OPD's, Emergency ward and Clinics in Department of Paediatrics, with pre-decided inclusion and exclusion criteria were included in the study. Those patients with I-GERQ GERD score more than or equal to 5 were further evaluated with Barium Swallow and Upper GI scopy and esophageal biopsy. Statistical analysis was done computer aided using SPSS 20. Association between two variables were studied using chi-square test & comparison between two continuous variables was done using unpaired t test. P value <0.05 was considered significant.

Results: Out of 120 cases studied 42 were observed with I-GERQ score greater than 5 which were then investigated and 31 were confirmed with positive GERD and observed prevalence of GERD was 25.83%. Out of 31 children of GERD male were predominant than female. Overall GER was higher in Recurrent Pneumonia, Reactive Airway Disease and Persistent Pneumonia. Most common symptoms observed in children were breathing problems (119 Cases, 99.17%) and regurgitation (105 cases, 87.50%).

Conclusions: Observed prevalence of GERD was 25.83%. GER was more common in Recurrent Pneumonia at different sites, Reactive Airway Disease and Persistent Pneumonia. Endoscopy with biopsy is useful in detecting most of the reflux esophagitis.

KEYWORDS

Gastroesophageal reflux, GERD, I-GERQ score, R/P-LRTI, prevalence.

INTRODUCTION

GERD is reflux associated with mucosal injury or symptoms severe enough to impair quality of life [1]. It is a physiological event which occurs particularly after meals [2]. Physiological GER is GER associated with absence of symptoms, accompanied with or without regurgitation and vomiting [2]. Gastro esophageal reflux becomes evident in the 1st few months of life, peaks at 4 months, and resolves in most by 12 months and nearly all by 24 months. Most infants have minor degree of reflux which may cause concern to the parents, but does not require extensive investigations and medications [3].

The aim of this study is to determine the prevalence of GER in patients with R/P-LRTI and thus to possibly predict this subgroup of patients in whom GER may be an underline aggravating factor, removal of which may help in amelioration of symptom.

MATERIALS AND METHOD

The Study was conducted by the Department of Paediatrics of Apple Saraswati Multi Speciality Hospital and Research Institute, Kolhapur. This was cross sectional study conducted from June 2017 to June 2019. One hundred and twenty infants and young children from 6 months to 2 years of age attending OPD's, Emergency ward and Clinics in Department of Paediatrics in Apple Saraswati Multispeciality Hospital, Kolhapur.

Inclusion Criteria: -

Children from 6 months to 2 years of age with recurrent and/or persistent lower respiratory tract illness (RPLRTI)

Exclusion Criteria: -

1. Children who are too acutely & critically ill to undergo investigation procedures required in the study.
2. Children with only Upper respiratory Tract illness.
3. Children with hyper reactive airway diseases.
4. Children with neurological disorder
5. Children already on anti-GER therapy
6. Children with known congenital malformation predisposing to respiratory illnesses. E.g. Congenital heart diseases, tracheoesophageal fistula etc.
7. Those deferred consent for endoscopy/biopsy.

METHODOLOGY:

Approval from institutional ethics committee was taken. Written informed consent from parents of children. All children between 6-24 months of age, presented with recurrent and/or persistent LRTI, meeting inclusion and exclusion criteria were enrolled for the study. Patients were recruited from OPD's, Clinics and Emergency ward of Department of Paediatrics in Apple Saraswati Multispeciality Hospital, Kolhapur. Subjects were then stratified in each of the following age group: 6-10 months, 10-13 months, 13-19 months, and 19-24 months.

After necessary exclusions, eligible children were considered and detailed history regarding the symptoms suggestive of GERD were elicited. A predefined questionnaire as suggested by Orenstein et al and was employed to determine the following in each case:

a) Demographics.
b) Symptoms suggestive of gastroesophageal reflux.
c) Presence of Provocative factors.

The questionnaire was filled in an interview method by the same observer. Preferably the primary care taker of the baby was interviewed whenever accessible.

Then the I-GERQ GERD score with a validated questionnaire (containing 11 items of total score of 25) was assigned to score each subject. Primary care taker was asked the questionnaire by an interview method and filled by the same observer. Clinical symptomatic GER was defined as a score of more than or equal to 5 as suggested by Orenstein et al themselves.

Those patients with I-GERQ GERD score more than or equal to 5 were further evaluated with Barium Swallow and Upper GI scopy and esophageal biopsy.

Statistical Analysis:

Statistical analysis was done using SPSS 20. Data was presented using frequency, percentage, mean and standard deviation. Association between two variables studied using chi-square and fisher exact test whenever necessary. Comparison between two continuous variables was done using unpaired t test. Test considered significant if P value is <0.05.

OBSERVATIONS AND RESULTS

Table 1: Age wise distribution of Children

Age in Months	GERD Positive	GERD Negative	Total
6-10	12	21	33
10-13	15	36	51
13-19	3	21	24
19-24	1	11	12
Total	31	89	120

Out of 120 children 42 were observed with I-GERD score greater than 5. Out of these 42 cases 31 cases were confirmed with positive GERD & the prevalence of GERD was 25.83%. GERD was found to be 38.70% in age group 6-10 months, 48.39% in age group 10-13 months, 9.68% in age group 13-19 months and 3.23% in age group of 19-24 months. Which conclude that GERD prevalence declines as age advances.

Table 2: Gender wise distribution of children

Gender	GERD Positive	GERD Negative	Total
Male	20	58	78
Female	11	31	42
Total	31	89	120

Out of 31 children with GERD positive 20 (64.52%) were male and 11 (35.48%) were female. Which suggest that male have predominance than female.

Table 3: Infant GERD score in the different age groups

Age at enrolment	Score<5	Score>5	Total
6-10	20 (25.64%)	13 (30.95%)	33 (27.50%)
10-13	32 (41.24%)	19 (45.24%)	51 (42.50%)
13-19	17 (21.79%)	7 (16.67%)	24 (20%)
19-24	9 (11.54%)	3 (7.14%)	12 (10%)
Total	78 (100%)	42 (100%)	120 (100%)

***Chi Square Statistic = 1.2805, P- value = 0.734, Not significant**

There is no any significant correlation between age group and GERD score. Out 120 children in age group 6-13 months 76.19% children had GERD score greater than 5 and only 23.81% children in age group 13-24 months had GERD score greater than 5. GER was more common in smaller age group than larger age group.

Table 4: GERD score V/s clinical diagnosis

Diagnosis	Score<5	Score>5	Total
Reactive Airway Disease (RAD)	29 (37.18%)	14 (33.33%)	43 (35.83%)
Recurrent Pneumonia at same site RP(S)	5 (6.41%)	2 (4.76%)	7 (5.83%)
Recurrent Pneumonia at different sites RP(D)	31 (39.74%)	21 (50 %)	52 (43.33%)
Persistent Pneumonia (PP)	6 (7.69%)	4 (9.52%)	10 (8.33%)
RAD with recurrent Pneumonia (RAD+RP)	7 (8.97%)	1 (2.38%)	8 (6.67%)
Total	78 (100%)	42 (100%)	120 (100%)

***Chi Square Statistic = 2.7927, P- value = 0.593, Not significant**

Above table 4 shows that GER was more common in Reactive Airway Disease, Recurrent Pneumonia at different sites and Persistent Pneumonia. Out of total children 83.33% children diagnosed with Recurrent Pneumonia at different sites RP(D) (21 cases, 50%) and Reactive Airway Disease (RAD) (14 cases, 33.33%) had GERD score greater than 5 and only 16.67% children diagnosed with Persistent Pneumonia (PP) (4 cases, 9.52%) , Recurrent Pneumonia at same site RP(S) (2 cases, 4.76%) and RAD with recurrent Pneumonia (RAD+RP) (1 case, 2.38%) had GERD score greater than 5.

Table 5: Regurgitation V/s GERD score

Regurgitation	Score <5	Score >5	Total
Positive	63	42	105
Negative	15	0	15
Total	78	42	120

***Chi Square Statistic = 7.5563, P- value = 0.005, Significant**

Regurgitation was significantly correlated related with GER score. Out of 105 children with regurgitation 42 (40%) cases had GERD score greater than 5 and 63 (60%) cases had GERD score less than 5 and all 15 (100%) children without regurgitation had GERD score less than 5.

Table 6: Comparison of GERD Score with clinical symptoms

Symptoms	Score <5	Score >5	Total
Breathing Problems	78	42	119 (99.17%)
Apnoea	0	15	15 (12.50%)
Regurgitation	63	42	105 (87.50%)
Inadequate weight gain	28	21	49 (40.83%)
Refusal to feed	28	35	63 (52.50%)
Crying during feed	3	32	35 (29.17%)
Fussiness	0	26	26 (21.67%)
Spells	0	17	17 (14.17%)

Most common symptoms observed in children were breathing problems (119 Cases, 99.17%) and regurgitation (105 cases, 87.50%) following to that inadequate weight gain (49 cases, 40.83%) and refusal to feed (63 cases, 52.50%). Symptom of apnoea, fussiness and spells are more related to GER score.

Table 7: GERD score V/s Children which are on Anti- GER drug

On Anti-GER drug	Score <5	Score >5	Total
Yes	8	24	32
No	70	18	88
Total	78	42	120

***Chi Square Statistic = 28.33, P- value = 0.000, Significant**

Children which are on Anti-GER drug were significantly correlated with GER score. Out of total 120 children only 32 (26.67%) patients were on anti-GER drug and out of them 24 (75%) had GERD score greater than 5. And out of remaining 88 (73.33%) who were not on anti-GER drug 18 (20.45%) children had GERD score greater than 5.

Table 8: Comparison of Barium study results

Barium Study	GERD Present		GERD Absent		Total	
	N	%	N	%	n	%
Positive	14	45.16%	2	18.18%	16	38.10%
Normal	17	54.84%	9	81.82%	26	61.90%
Total	31	100%	11	100%	42	100%

Chi square statistic =2.51, P- value=0.1134 >0.05, Not significant

Barium study results were not significantly correlated with GERD. Out of 16 cases of which had positive result on Barium study 14 cases had GERD positive and out of 26 cases of which had negative results on Barium study 17 cases had GERD positive. Sensitivity and specificity for Barium study was 42.16% and 81.82% respectively with accuracy 54.76%

Table 9: Comparison of Upper GI endoscopy results

Upper GI endoscopy	GERD Present		GERD Absent		Total	
	N	%	N	%	n	%
Positive	19	61.29%	3	27.27%	22	52.38%
Normal	12	38.71%	8	72.73%	20	47.62%
Total	31	100%	11	100	42	100

Chi square statistic =1.54, P- value=0.2146 > 0.05 Not significant

Upper GI endoscopy results were not significantly correlated with GERD. Out of 22 cases of which had positive result on Upper GI endoscopy 19 cases had GERD positive and out of 20 cases of which had negative results on Upper GI endoscopy 12 cases had GERD positive. Sensitivity and specificity for upper GI endoscopy was 61.29% and 72.73% respectively with accuracy 64.28%.

Table 10: Comparison of Esophageal biopsy results

Esophageal Biopsy	GERD Present		GERD Absent		Total	
	N	%	N	%	n	%
Present	28	90.32%	2	18.18%	30	71.43%
Absent	3	9.68%	9	81.82%	12	28.57%
Total	31	100%	11	100%	42	100%

Chi square statistic =20.71, P- value=0.000 < 0.05 Significant

Esophageal biopsy results were significantly correlated with GERD. Out of 30 cases of which had positive result on esophageal biopsy 28 cases had GERD positive and out of 12 cases of which had negative results on esophageal biopsy 3 cases had GERD positive. Sensitivity and specificity for upper GI endoscopy was 90.32% and 81.82% respectively with accuracy 88.10%.

DISCUSSION

In present study 120 children were included in the study and all children were interviewed with IGERD questionnaire and IGERD score was obtained. Out of 120 children 42 were observed with IGERD score greater than 5. For confirmation of GERD we have done Barium study, Upper GI endoscopy and esophageal biopsy of those 42 children. Out of these 42 cases 31 cases confirmed with positive GERD and observed prevalence of GERD was 25.83%. Kandaswamy E et al [4], studied prevalence of gastro esophageal reflux disease in regurgitant infant and children with evaluation of IGERQ score and in this study observed prevalence of GERD was 30.8%.

Out of 31 cases of GERD the prevalence of GERD was found to be 38.71% in age group 6-10 months, 48.39% in age group 10-13, 9.68% in age group 13-19 and 3.23% in age group 19-24. Which conclude that GERD prevalence declines as age advances. There is no any significant correlation between age group and GERD score. Kandaswamy E et al [4], studied prevalence of gastro esophageal reflux disease in regurgitant infant and children with evaluation of IGERQ score. This study shows that the prevalence of GERD was found to be 28.5% in age group of 6-11 months, 27.2% in 12-18 months and 40.7% in 19-24 months of age. Out of 31 children of GERD present 20 (64.52%) were male and 11 (35.48%) were female.

Kandaswamy E et al [4], studied prevalence of gastro esophageal reflux disease in regurgitant infant and children with evaluation of IGERQ score. In this study male predominant was observed same as our study. Vieira M C et. al [5], studied 167 cases of reflux esophagitis. Out of 167 cases 88 (52.7%) were boys and 79 (47.30%) were girls.

Out of total 120 children most common diagnosis observed were Recurrent Pneumonia at different sites RP(D) (52 cases, 43.33%) and Reactive Airway Disease (RAD) (43cases, 35.83%), preceding to that 10 (8.33%) children had Persistent Pneumonia (PP), 8 (6.67%) children had RAD with recurrent Pneumonia and 7 (5.83%) children had Recurrent Pneumonia at same site RP(S). Martin ME et al [6], studied the relationship of gastroesophageal reflux to nocturnal wheezing in children with asthma. This study suggest that GERD had association with recurrent pneumonia and reactive airway disease. Present study shows the same results. Kandaswamy E et al [4], studied prevalence of gastro esophageal reflux disease in regurgitant infant and children with evaluation of IGERQ score. This study shows that recurrent pneumonia was significantly associated with GERD.

Regurgitation was significantly correlated related with GER score. Out of 105 children with regurgitation 42 (40%) cases had GERD score greater than 5 and 63 (60%) cases had GERD score less than 5 and all 15 (100%) children without regurgitation had GERD score less than 5. S. K. Mittal et al [7] Studied the prevalence of GERD of 602 babies of age 1-24 months, Upper GI endoscopy and biopsy carried out in cases for which GER score >5. They found 112 (10%) babies with score >5 out of that 25 (22%) regurgitant infants of 1-6 month, 46% of 30 regurgitant babies of 6-12 month, 85% in 12-24 months of 20 babies with score >5. Badriul Hegar et al [8], investigated regurgitation and other symptom of gastroesophageal reflux and this study shows that regurgitation was the common symptoms of gastroesophageal reflux observed in 66% children.

Most common symptoms observed in children were breathing problems (119 Caes, 99.17%) and regurgitation (105 cases, 87.50%) following to that inadequate weight gain (49 cases, 40.83%) and refusal to feed (63 cases, 52.50%). Symptom of apnoea, fussiness and spells are more related to GER score. Orenstein et al [9] studied the prevalence of reflux symptoms in 100 normal infants and diagnostic validity of 25 points IGERQ score, in their study they found that normal infants have high incidence of reflux symptoms with daily regurgitation 40%, inadequate weight gain 26%, crying more than a hour 17%, arching 10%, daily hiccups 36% and many symptoms were significantly prevalent in GERD infants. S. K. Mittal et al [7], Studied the prevalence of GERD of 602 babies of age 1-24 months, Upper GI endoscopy and biopsy carried out in cases for which GER score >5. This study shows that 47% of children with IGERQ score > 5 had inadequate weight gain.

L DA DALT et al [10], studied accuracy of pH monitoring in gastro-oesophageal reflux. Out of 111 children 62% had vomiting, 26% had failure to thrive, 18% had feeding difficulties, 13% had recurrent pneumonia, 11% had recurrent wheezing, 10% had chronic cough, 10% had apnoeic spells, 9% had iron deficiency anaemia, 9% had epigastric pain and 6% had irritability.

Badriul Hegar et al [8], investigated regurgitation and other symptom of gastroesophageal reflux, in the study 57% had crying and irritability, 26% had food refusal, 20% had back arching and 66% had regurgitation.

Barium study results were not significantly correlated with GERD. Out of 16 cases of which had positive result on Barium study 14 cases had GERD positive and out of 26 cases of which had negative results on Barium study 17 cases had GERD positive. Sensitivity and specificity for Barium study was 42.16% and 81.82% respectively with accuracy 54.76%. Kandaswamy E et al [4], in their study found that out of 38 regurgitant children with GERD, 58% were diagnosed based on clinical grounds. Barium contrast study showed features of GERD in 8 cases (22%) and barium study had sensitivity, specificity, PPV, NPV and accuracy, 21.05%, 98.82%, 88.89%, 73.68%, 74.80% respectively.

Upper GI endoscopy results were not significantly correlated with GERD. Out of 28 cases of which had positive result on Upper GI endoscopy 19 cases had GERD positive and out of 24 cases of which had negative results on Upper GI endoscopy 12 cases had GERD positive. Sensitivity and specificity for upper GI endoscopy was 61.29% and 72.73% respectively with accuracy 64.28%. S. K. Mittal et al [7], Studied the prevalence of GERD of 602 babies of age 1-24 months, Upper GI endoscopy and biopsy carried out in cases for which GER score >5. Upper GI endoscopy was done in 31 babies >5, showed endoscopic esophagitis in 16% and histological esophagitis in 92%. Vieira M C et al [5], studied 167 cases of reflux esophagitis. This study reveals that upper gastrointestinal endoscopy was normal in 96 (57.5%) cases. Grade I esophagitis was observed in 66 patients, grade II esophagitis in 4 (2.4%) and grade III esophagitis in 1 (0.6%) case.

De S et al [7], studied gastro esophageal reflux in infants and children in north India in 602 subjects aged between 1 month to 2 year. Upper GI endoscopy was carried out in 31 babies with a score > 5 and endoscopic oesophagitis was detected in 16 (51.6%).

Mario C Vieira et al [5], studied the validation of endoscopic findings against histological feature of distal esophagus for the diagnosis of reflux esophagitis in infants. They studied retrospectively the records of 167 patients, referred for investigation of reflux esophagitis and found that the endoscopy had a sensitivity of 45%, specificity of 71%, positive predictive and negative predictive value of 89%, and 21% respectively and accuracy of 50% and concluded that there was poor correlation between endoscopic and histological findings.

Kandaswamy E et al [4], studied prevalence of gastro esophageal reflux disease in regurgitant infant and children with evaluation of IGERQ score. In this study out of 38 regurgitant children with GERD, 58% were diagnosed based on clinical grounds. Out of 38 regurgitant children with GERD, 47% (18 cases) had mucosal changes suggestive of GERD in upper GI endoscopy and upper GI endoscopy had sensitivity, specificity, PPV, NPV and accuracy, 47.37%, 92.94%, 75%, 79.80% , 78.86% respectively.

In the study of Vieira M C et al [5], of 167 cases of reflux esophagitis upper GI endoscopy had a sensitivity of 45% and specificity of 71%; a positive predictive value of 89% and a negative predictive value of 21%, with an accuracy of 50%.

Esophageal biopsy results were significantly correlated with GERD. Out of 30 cases of which had positive result on esophageal biopsy 28 cases had GERD positive and out of 12 cases of which had negative results on esophageal biopsy 3 cases had GERD positive. Sensitivity and specificity for upper GI endoscopy was 90.32% and 81.82% respectively with accuracy 88.10%.

In the study of Vieira M C et al [5], of 167 cases of reflux esophagitis esophageal biopsy results were normal in 28 patients (16.8%),

revealed grade I esophagitis in 86 (51.5%), grade II esophagitis in 45 (26.9%) and grade III esophagitis in eight cases (4.8%). De S et al [6], studied gastro esophageal reflux in infants and children in north India in 602 subjects aged between 1 month to 2 year. Out of total patients esophageal biopsies were taken in 25 of these cases and showed histological evidence of reflux oesophagitis in 23 (92%). Helena AS Goldani et al [11], studied the role of endoscopy in managing gastroesophageal reflux disease in children and they noted that esophago-gastroduodenoscopy with biopsy is useful in identification of gastroesophageal reflux disease and had high sensitivity and specificity.

CONCLUSION

Observed prevalence of GERD was 25.83%. Male predominance was more than female with respect to GER. GER was more common in Recurrent Pneumonia at different sites, Reactive Airway Disease and Persistent Pneumonia. Most common symptoms observed in children were breathing problems and regurgitation. Endoscopy with biopsy is useful in detecting most of the reflux esophagitis.

DECLARATION

No conflict of interest.

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