



## THE EFFECT OF PSYCHOLOGICAL STATUS OF PATIENT ON THE INCIDENCE OF AERODIGESTIVE TRACT FOREIGN BODY AND ROLE OF IT'S DETERMINENTS IN DEFINITIVE TREATMENT

Vashishtha M<sup>1\*</sup>, Kumar S<sup>2</sup>, Singh HP<sup>2</sup>, Verma V<sup>3\*</sup>, Mishra A<sup>3</sup> and Agarwal SP<sup>4</sup>

<sup>1</sup>Department of ENT, Rama Medical & Research Institute Mandhana, Kanpur

<sup>2,3,4</sup>Department of ENT& Head Neck Surgery, King George's Medical University, Lucknow

### ARTICLE INFO

#### Article History:

Received 20th, September, 2015  
Received in revised form 30th,  
September, 2015  
Accepted 15th, October, 2015  
Published online 28th, October, 2015

#### Key words:

Foreign Body; Psychosocial Status;  
Aero-Digestive Tract; Paediatric  
Psychology.

### ABSTRACT

Foreign body ingestion is a frequent occurrence in children, especially in their first six years of life with a peak in children older than 3 years. There are various causes for aero-digestive tract foreign bodies can be pointed out, including children's behavior, anatomical characteristics, physiological features such as immature swallowing, incoordination, improper development of chewing capacity and higher respiratory rates. In adults, foreign body aspiration is caused mostly by the failure of airway protective mechanisms such as alcoholic intoxication, poor dentition, sedative or hypnotic drug use, senility, neurological disorders with impairment of swallowing, mental retardation, trauma with loss of consciousness, seizure disorders and general anesthesia. Psychological status is one of the common factors in case of aero-digestive tract foreign bodies which can be assessed using age appropriate psychological tools i.e. Vineland Social Maturity Scale. (VSMS) and Modified Kuppaswamy Scale (MKS). In our study foreign body aero digestive tract was significantly higher in upper lower (or=8.87, 95%ci=1.23-63.87, p=0.03) and lower class (or=34.00, 95%ci=2.51-459.44, p=0.008) compared with upper class. The confirmation of disease was significantly higher in profound grade of mental retardation than normal patients (or=5.82, 95%ci=1.11-30.41, p=0.03). In this study it was found that aero digestive tract foreign body is strongly associated with the intelligence of patient.

Copyright © 2015 Vashishtha M et al., This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

### INTRODUCTION

Foreign body ingestion is a frequent occurrence in children, especially in their first six years of life (White NC 2000; Chowdhury CR *et al*, 1992) with a peak in children older than 3 years (Brayer AF *et al*, 2000; Janik JE *et al*, 2003). Various reasons for this event can be pointed out, including children's behavior, anatomical characteristics, physiological features such as immature swallowing, in coordination, improper development of chewing capacity and higher respiratory rates (Currarino *Get al*, 1991). Boys are affected more frequently than girls and all the characteristics such as age, sex, socioeconomic level and parent's influence are closely interrelated (Aktay AN *et al*, 2002). In adults, foreign body aspiration is mostly due to compromised airway protective mechanisms such as alcoholic intoxication, poor dentition, sedative or hypnotic drug use, old age, mental retardation, neurological disorders with impairment of swallowing, trauma with unconsciousness, seizure disorders and general anesthesia. Obstruction of the airway or esophagus by a foreign body is a common pediatric emergency that can lead to severe, even fatal consequences. It may produce a varying degree of clinical symptoms, from acute respiratory distress to vague respiratory symptoms presenting even months after the acute episode (Lau KF *et al*, 2001). Symptoms depend on the nature, location and degree of obstruction of the airway and

can present like croup and asthma. With regard to location, the aspirated objects tend to pass through the larynx and trachea to lodge more peripherally in a bronchus. However, the final position for any foreign body depends on several factors, including the size, surface and the number of fragments (Lau KF *et al*, 2001). Lodgment of a foreign body in the laryngeal inlet is life threatening if a complete obstruction occurs. Objects that partially obstructs larynx are usually thin and lodge between the vocal folds in the sagittal plane (Robinson PJ 2003). Diagnosis of foreign body ingestion can be delayed for a long period of time especially in young children and mentally retarded patients. The foreign body ingestion in these cases is commonly diagnosed by radiography done for respiratory problems or during endoscopy performed for gastrointestinal complaints. Generally the treatment of choice for airway foreign bodies is proper endoscopic diagnosis and removal under conditions of maximum safety and minimum trauma. Coins are the most common foreign bodies ingested by children. Other objects, include toys, toy parts, lithium ion batteries, safety pins, screws, marbles, and food boluses have been reported (Brayer AF *et al*, 2000; Lau KF *et al*, 2001). Ingestion of multiple foreign objects and repeated episodes are uncommon occurrences and usually seen in children with developmental delay (Miller RS *et al*, 2004; Ewing S *et al*, 1991). It is reported that the incidence of complications following foreign body aspiration, especially organic ones,

depends on the time lag between aspiration and diagnosis. Bronchiectasis, purulent secretions, pneumonia, lung abscess and granulation tissue are the most frequent long-term consequences in case airway foreign bodies. Complications of persistent esophageal foreign bodies are manifested as failure to thrive, mediastinal abscess or even massive hemorrhage due to erosion of a sharp point through the wall of the esophagus perforating and penetrating the mediastinum and even aorta (Mahafza TM 2002). Moreover, persistent aero-digestive foreign bodies promotes the development of granulation tissue around it leading to endoscopic removal difficult and dangerous. Early diagnosis and treatment are imperative to prevent mortality as well as complications.

As psychosocial status of the patient play very important role in occurrence of aero digestive tract foreign bodies, the aim of present study was to find out the effect of psychosocial status on aero digestive tract foreign bodies.

## **MATERIAL AND METHODS**

It was a single centred study with study population consists of all patients attending outpatient department of ENT and emergency, King George's Medical University, Lucknow. Of all the patients screened, 381 patients were studied and further analyzed. All patients fulfilling the inclusion criteria undergone detailed medical history, risk factors, physical examination with special emphasis on the complete ear nose throat examination and proper required hematological as well as radiological examination. Psychosocial assessment of patients done by using age appropriate psychological tools such as Vineland Social Maturity Scale (VSMS) and Standard Progressive Matrices (SPM). After proper informed consent patients were undergone foreign body removal with evaluation of all the preoperative, intraoperative and postoperative consequences. The data obtained were subjected to statistical analysis.

### ***Vineland Social Maturity Scale***

#### **0-1 YEAR**

1. "Crows" laughs.
2. Balances head.
3. Grasps objects within reach.
4. Reaches for familiar persons.
5. Rolls over,(unassisted).
6. Reaches for nearby objects.
7. Occupies self-unattended.
8. Sits unsupported.
9. Pulls self-upright.
10. "Talks" imitates sounds.
11. Drinks from cup or glass assisted.
12. Moves about on floor (creeping, crawling)
13. Grasps with thumb and finger.
14. Demands personal attention.
15. Sounds alone.
16. Does not drool.
17. Follows simple instruction.

#### **1-2 YEARS**

18. Walks about room unattended.
19. Marks with pencil or crayon or chalk.

20. Masticates (chews) solid or semi-solid food.
21. Pulls of clothes.
22. Transfer objects.
23. Overcome simple obstacles.
24. Fetches or carries familiar objects.
25. Drinks from cups or glass un-assisted.
26. Walks without support.
27. Plays with other children.
28. Eats with own hands (biscuits bread etc.)
29. Goes about house and yard.
30. Discriminates edible substances from non-edibles.
31. Uses names of familiar objects.
32. Walks upstairs unassisted.
33. Unwraps sweets, chocolates.
34. Talks in short sentences

#### **2-3 YEARS**

35. Signals to go to toilets.
36. Initiates own plays activates
37. Removes shirt or frock if un-buttoned.
38. Eats with spoon/hands (food)
39. Gets drink (water) unassisted.
40. Dries own hands.
41. Avoids simple hazards
42. Puts on shirt or frock unassisted.
43. Can do paper folding.
44. Relates experiences

#### **3-4 YEARS**

45. Walks downstairs, one step at a time.
46. Plays co-operatively at kindergarten level.
47. Buttons shirt or frock
48. Helps at little household tasks
49. "Performs" for other.
50. Washes hands unaided.

#### **4-5 YEARS**

51. Cares for self at toilets.
52. Washes face unassisted.
53. Goes about neighborhood un-attended
54. Dresses self except for tying.
55. Uses pencil or crayon or chalk for drawing
56. Plays competitive exercise games.

#### **5-6 YEARS**

57. Uses hoops files kites, or uses knife or uses knife
58. Prints (writes) simple words.
59. Plays simple games which require talking turns.
60. Is trusted with money.
61. Goes to school unattended.

#### **6-7 YEARS**

62. Mixes rice "properly" unassisted.
63. Uses pencil or chalks for writing.
64. Bathes self-assisted.
65. Goes to bed unassisted.

#### **7-8 YEARS**

66. Can differentiate between AM & PM.

- 67. Helps himself during meals
- 68. Understand and keeps family secrets.
- 69. Participates in pre-adolescent play.
- 70. Combs or brushes.

**8-9 YEARS**

- 71. Use tools or utensils
- 72. Does routine household tasks.
- 73. Reads own initiative.
- 74. Bathes self-unaided.

**9-10 YEARS**

- 75. Cares for self at meals.
- 76. Makes minor purchases.
- 77. Goes about home town freely.

**10-11 YEARS**

- 78. Distinguishes between friends and play mates
- 79. Makes independent choice of shops
- 80. Does small remunerative works.
- 81. Follow local current events

**11-12 YEARS**

- 82. Does simple creative work
- 83. Is left to care for self or others
- 84. Enjoys reading books, newspapers and magazines.

**12-15 YEARS**

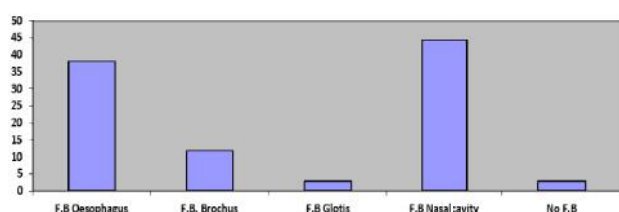
- 85. Plays difficult games
- 86. Exercise complete care of dress.
- 87. Buys own clothing accessories
- 88. Engages in adolescent group activities.
- 89. Performs responsible routine chores.

**RESULTS**

In this study out of 381 patients, majority of the patients (>80%) were below 10 years of age and males (68.2%). Incidence of foreign body was more in rural population (74.8%). 82.9% patients were presented within 24 hours of foreign body ingestion while 2.9% patients presented after 72 hours.

**Table 1** Distribution of patients according to diagnosis

Diagnosis	No.(n=381)	%
F.B. OESOPHAGUS	145	38.06
F.B. BRONCHUS	45	11.8
F.B. GLOTIS	11	2.9
F.B. NASAL CAVITY	169	44.3
NO F.B.	11	2.9



**Graph 1** Distribution of patients according to diagnosis

Out of 381 patients of foreign body of aero digestive tract, 36.5 % were of lower middle class & 30.7% were of lower class. Poor socioeconomic condition was found in 67.2%.

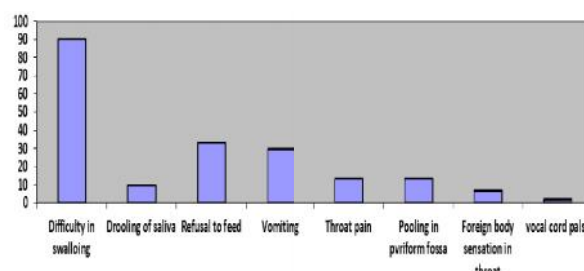
Out of 381 patients of foreign body of aero digestive tract 44.3% cases foreign body nasal cavity, 38.06% were of foreign body esophagus & foreign body bronchus found in 11.8% (Table 1 & Graph1).

**Table 2** Distribution of patients according to mode of activity before accident

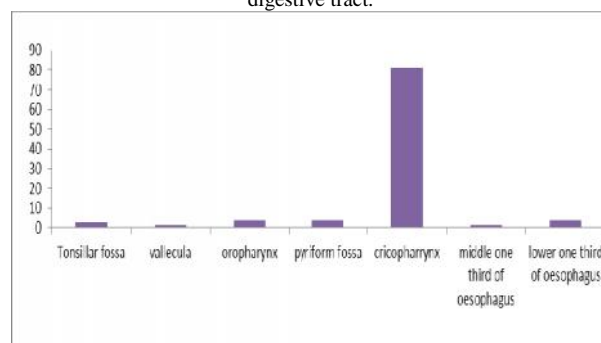
Activity before accident	No. (n=381)	%
Eating	44	11.5
Playing	277	72.7
Other	60	15.7

Playing is the most common activity (72.7%) before accident of foreign body ingestion or inhalation. (Table 2). Among airway foreign bodies organic foreign body was more common (56.4%), than inorganic foreign bodies (33.7%). Most common anatomical location of foreign body airway patient was Rt. bronchus (38.71%) as compared to left bronchus (25.8%). Patients with foreign body in airway mostly presented with respiratory distress (100%), asymmetry in breath sound (88.7%), cough (65%) followed by wheeze. Most common radiological finding in airway foreign body was normal chest x-ray (48.39%) followed by radiolucent shadow (35.4%). Cyanosis & stridor (100%) followed by respiratory distress (88.7%) were the most consistent findings with bronchoscopic confirmation. Clinical triad (cough, wheeze, asymmetry in breath sound) was the most important finding in foreign body airway patients with (83.3%) bronchoscopic confirmation. Out of 62 patients abnormal radiological findings were found only in (51.7%) cases and out of that radiopaque shadow was the most significant finding with (100%) bronchoscopic confirmation.

Out of 150 patients of foreign body digestive tract, 76.67% patient were having inorganic foreign bodies. Among inorganic foreign bodies coins were the most common (57.3%) while inorganic foreign bodies' dentures were the most common (11.3%).



**Graph 2** Clinical presentation of the patient present with foreign body in digestive tract.



**Graph 3** Anatomical location of digestive tract foreign bodies

Difficulty in swallowing was most frequent presenting symptom (90%) followed by refusal to feed (33%) & vomiting (30%) (Graph2). Most common site of foreign body lodgment was cricopharynx (80.6%), followed by oropharynx (4%) & lower one third oesophagus in (3.5%) (Graph3).

Difficulty in swallowing, vomiting & refusal to feed were the most consistent findings in foreign body digestive tract patients with 88.9%, 66.7%, 60% oesophagoscopy confirmation respectively.

Most of the digestive tract foreign body were radio opaque with (95.58%) oesophagoscopy confirmation. Most common type of foreign body in nasal cavity was pearl (23.67%) followed by rubber (11.83%). Most of the patient (96.45%) presented as foreign body in nasal cavity, followed by nasal obstruction (17.75%) and epistaxis (5.92%).

**Table 3** Distribution of patients according to procedure done

	No. (n=381)	%
Hypopharyngoscopy	130	34.12
Oesophagoscopy	39	10.2
Bronchoscopy	62	16.3
Removal of foreign body by Eustachian catheter	169	44.3

Out of 381 patients of foreign body aero digestive tract hypopharyngoscopy was done in 34.12%, foreign body removed by Eustachian catheter in 44.3% (Table 3). In most of the cases (83.5%) surgery was done in <30 minutes.

**Table 4** Distribution of patients according to IQ level (VINYLAND SOCIAL MATURITY SCALE)

IQ level	No. (n=381)	%
Mild (50-69)	58	15.2
Moderate(35-49)	21	5.5
Severe(20-34)	12	3.1
Profound(<20)	63	16.54
Normal(>70)	227	59.58

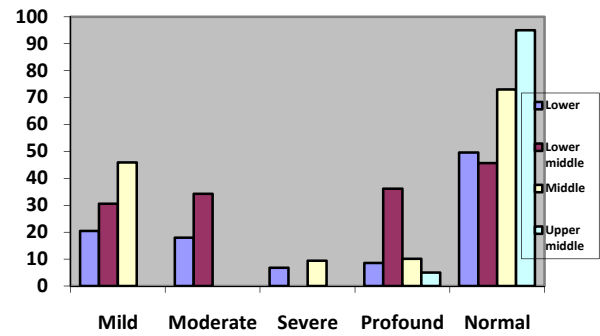
Most of the patient of foreign body aero digestive tract were of normal IQ 59.58% while Profound IQ were found in 16.54% (Table 4).

**Table 5** Comparison of Socio economic status with IQ level

SES	No. of patients	IQ level									
		Mild		Moderate		Severe		Profound		Normal	
		No.	%	No.	%	No.	%	No.	%	No.	%
Lower	117	21	17.9	8	6.8	0	0.0	10	8.54	58	49.6
Lower middle	105	36	34.3	0	0.0	13	12.4	38	36.2	48	45.7
Middle	139	0	0.0	13	9.4	0	0.0	14	10.07	102	73.0
Upper middle	20	0	0.0	0	0.0	0	0.0	1	5.0	19	95.0

p=0.0001 (Significant, Chi-square test=17.80)

Mild level of IQ was found to be 17.9% among lower class followed by 34.3% in lower middle. However, moderate level of IQ level was 6.8% in lower class and 9.4% in middle class. The severe level of IQ was 12.4% among lower middle class. The profound IQ level was seen among 8.5% in lower, 36.2% in lower middle, 10.07% in middle and 5% in upper middle class. The association between SES and IQ level was statistically significant (p=0.001) (Table 5 & Graph4).



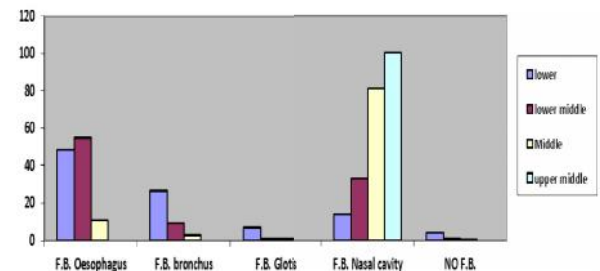
**Graph 4** Comparison of Socio economic status with IQ level

**Table 6** Comparison of Socioeconomic status with diagnosis

SES	No. of patients	Diagnosis									
		F.B. Oesophagus		F.B. bronchus		F.b. Glotis		F.b. Nasal cavity		NO F.B.	
		No.	%	No.	%	No.	%	No.	%	No.	%
Lower	117	67	48.7	31	26.5	8	6.8	16	13.7	5	4.3
Lower middle	105	68	55.2	10	9.5	1	1.0	35	33.3	1	1.0
Middle	139	15	10.8	4	2.9	2	1.4	98	80.9	5	0.67
Upper middle	20	0	0.0	0	0.0	0	0.0	20	100.0	0	0.0

p=0.0001 (Significant, Chi-square test=22.30)

The percentage of F.B. oesophagus was higher among the patients of lower middle (55.2%) than lower (48.7%) and middle (10.8%) class. However, F.B. bronchus higher among lower class (26.5%) compared with lower middle (9.5%) and middle (2.9%). The association between SES and foreign body of aero digestive tract was statistically significant (p=0.0001) (Table 6 & Graph5).



**Graph 5** Comparison of Socioeconomic status with diagnosis

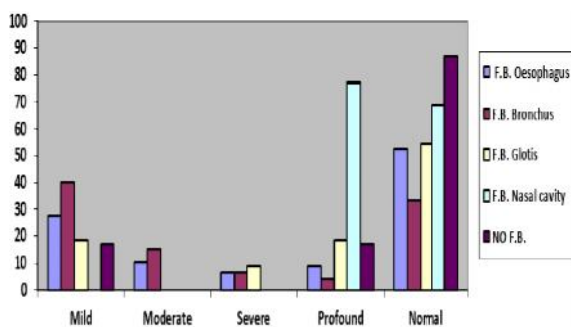
**Table 7** Comparison of Diagnosis with IQ level

Diagnosis	No. of patients	IQ level									
		Mild		Moderate		Severe		Profound		Normal	
		No.	%	No.	%	No.	%	No.	%	No.	%
F.B. Oesophagus	145	36	27.7	14	10.8	9	6.9	12	9.2	79	52.6
F.B. Bronchus	45	18	40.0	7	15.6	3	6.7	2	4.4	15	33.3
F.B. Glotis	11	2	18.2	0	0.0	1	9.1	2	18.2	6	54.5
F.B. Nasal cavity	169	0	0.0	0	0.0	0	0.0	46	77.21	115	68.8
No F.B.	11	1	16.7	0	0.0	0	0.0	1	16.7	9	86.7

p=0.0001 (Significant, Chi-square test=19.82)

The mild level of IQ was 27.7% in patients of F.B. oesophagus and 40% in F.B. bronchus. Moderate (10.8%) level of IQ was found in the patients of F.B. oesophagus followed by F.B. bronchus (15.6%) The association between foreign body of

aerodigestive tract and IQ level was statistically significant ( $p=0.0001$ ) (Table 7&Graph6).



Graph 6 Comparison of Diagnosis with IQ level

## DISCUSSION

Although paediatric foreign body ingestion is extraordinarily common, exact frequencies are difficult to pinpoint, since the large majority of cases are either unrecognized, or are managed in the home without the involvement of health care professionals. These children are at greater risk for choking since they tend to explore the surrounding world using their mouth, but they have an immature swallowing co-ordination and they have not yet fully developed neuromuscular mechanisms for airway protection. Moreover older infants develop incisor teeth before the molars, which enable them to bite and detach morsels of solid food that they are unable to crush. Older children and adults tend to swallow foreign bodies as part of risky behaviour, such as showing-off, using the mouth or teeth as tools or storage areas for objects, or in the context of alcohol use. This is more common among males. Ingestion of foreign bodies, especially bones, may also occur when they are unwittingly swallowed with food, or when relatively large swallowed food boluses lead to health problems. Fish bone ingestion is especially common in countries with heavy fish consumption. The design and shape of objects to be used by children under the age of 3 should be taken into consideration. In an attempt to prevent accidents, there are many other products with similar characteristics (peanuts, coins, buttons etc. ...) that are unsuitable for young children. At this stage, the role of education is as important as the role of psychological factors. Dangerous behaviour should be considered with enough attention from an accident prevention point of view. Moreover, in this phase of their life, children begin to conceptualise events, a process that is at the basis of their future risk appraisal. This highlights the even more relevant importance of researching those psychological factors at the basis of decisions and behaviour in the context of risk situations for children, and that can lead to the development of an accident prevention programme including the development of competences that would be adequate for risk appraisal during adulthood. In fact, in order to thrive, the child must gain knowledge of adequate strategies enabling him/her to achieve a present goal, and must know how to use them in hazardous circumstances. In our study Majority (70.8%) of the patients were between 1-6 years of age and were males (68.4%) from rural (71.7%) areas. (Steven C 1996) in their study reported that the average age of patients with foreign body of aero digestive tract was 3 years and 2 months. (Santanu Banerjee 1999), found that the incidence of foreign body below 10 years was found in 945 cases out of 1800 cases. (Mallick Mohammed Saquib 2014), told that out of 28 patients, there were 16 males and 12 females. In this study male

predilection is probably related to their higher activity.

In our study on patients of foreign body of aero digestive tract, the most common inorganic foreign body of airway was whistle (33.3%), & organic foreign body was groundnut (85.7%). In digestive tract the most common inorganic foreign body was coin (76.8%), while the most common organic foreign body was plastic objects (55.6%). In previous studies (Mackle T 2006), reported that the commonest inorganic foreign body in airway was whistle (20%) while organic foreign body was found to be ground nut (55%). (Ashok Poluriet *al*,2000), concluded that most common foreign body in airway was ground nut (30%). In a study of (Khan MA 2004), coin was the most common foreign body in aero-digestive tract. All the above results are in coalition with the results of our studies. In our study among total number of patients, 67.5% were of foreign body oesophagus, 21.2% were of foreign body bronchus. A study of 102 patients of foreign body aero digestive tract conducted by (Healy GB 1998) revealed that 30% of patients were of foreign body esophagus, 10% were of foreign body bronchus. (Mahafza TM *et al*,2000) in their study reported that 60% of patients were of foreign body esophagus & 40% were of foreign body bronchus. The difference in the result of the present study may be attributed to the fact that study was conducted in different geographical areas.

The percentage of profound level of mental retardation was 25.5% while mild level was among 27.8% of the patients. These results were similar to study done by Francois B *et al* In 2004 based on psychiatric disorder & development delay. In our study there was a significant correlation ( $p<.00001$ ) between foreign body of aero digestive tract & psychosocial status of the patient. Most of the patients of foreign body esophagus were of lower (48.7%) & lower middle (55.2%) socioeconomic status while in case of foreign body nasal cavity lower middle (33.3%) & middle (80.9%) status were more. One most important observation in our study was upper middle class patients were found only in patient of foreign body nasal cavity.

## CONCLUSION

In this study majority of the patients were below 10 years of age and were males (68.2%). Majority (74.8%) of the patients were from rural area and duration of presentation was <24 hours among 82.9% patient followed by 24-72 hours (14.2%). Out of 381 patients of foreign body aero digestive tract 44.3% cases were foreign body nasal cavity, 38.06% were of foreign body oesophagus & foreign body bronchus was found in 11.8%. Most common radiological finding of foreign body in airway patient was normal chest x-ray in 48.39%, followed by radiolucent shadow in 35.4% cases. Foreign body lodgement was more common in right bronchus (38.71%). Digestive tract foreign bodies were mostly radio opaque (80.14%) and located at crico-pharynx (80.6%). Playing was the most common activity (72.7%) before accidental ingestion or inhalation. Most of the patient of foreign body aero digestive tract was of normal IQ 59.58% followed by Profound IQ was found in 16.54% Mild level of IQ was found to be 17.9% among lower class followed by 34.3% in lower middle. However, moderate level of IQ level was 6.8% in lower class and 9.4% in middle class. The severe level of IQ was 12.4% among lower middle class. The profound IQ level was seen

among 8.5% in lower, 36.2% in lower middle, 10.07% in middle and 5% in upper middle class. The association between SES and IQ level was statistically significant ( $p=0.001$ ). The percentage of F.B. oesophagus was higher among the patients of lower middle (55.2%) than lower (48.7%) and middle (10.8%) class. However, F.B. bronchus higher among lower class (26.5%) compared with lower middle (9.5%) and middle (2.9%). The association between socioeconomic status and foreign body of aero digestive tract was statistically significant ( $p=0.0001$ ). The mild level of IQ was 27.7% in patients of F.B. oesophagus and 40% in F.B. bronchus. Moderate (10.8%) level of IQ was found in the patients of F.B. oesophagus followed by F.B. bronchus (15.6%). The association between foreign body of aerodigestive tract and IQ level was statistically significant ( $p=0.0001$ ).

## Reference

1. White NC, (2000). An analysis of 25,394 coin exposures reported to poison centers. *Clin Toxicol*, 38:526.
2. Chowdhury CR, Bricknell MC, MacIver D, (1992). Oesophageal foreign body: an unusual cause of respiratory symptoms in a three-week-old baby. *J Laryngol Otol*, 106:556-57.
3. Brayer AF, Sciera M, Connors GP, (2000). Pediatric coin ingestion: an unusual presentation. *Int J Pediatr Otorhinolaryngol*, 55:11-13.
4. Janik JE, Janik JS, (2003). Magill forceps extraction of upper esophageal coins. *J Pediatr Surg*, 38:227-29.
5. Currarino G, Nikaidoh H, (1991). Esophageal foreign bodies in children with vascular ring or aberrant right subclavian artery: coincidence or causation? *Pediatr Radiol*, 21:406-8.
6. Aktay AN, Werlin SL, (2002). Penetration of the stomach by an accidentally ingested straight pin. *J Pediatr Gastroenterol Nutr*, 34:81-82.
7. Lau KF, Jayaram R, Fitzgerald DA, (2001). Diagnosing inhaled foreign bodies in children. *MJA*, 174:194-96.
8. Robinson PJ, (2003). Laryngeal foreign bodies in children: First stop before the right main bronchus. *J Paediatr Child Health*, 39:477-79.
9. Miller RS, Willging JP, Rutter MJ, (2004). Chronic esophageal foreign bodies in pediatric patients: a retrospective review. *Int J Pediatr Otorhinolaryngol*, 68:265-72.
10. Ewing S, Miller R, (1991). Generalized nickel dermatitis in a 6-year-old boy as a result of swallowing a Canadian nickel. *J Am Acad Dermatol*, 25:855-56.
11. Mahafza TM, (2002). Extracting coins from the upper end of the esophagus using a Magill forceps technique. *Int J Pediatr Otorhinolaryngol*, 62:37-39.
12. Stevens C; Ardagh M, Abbott GD, (1996). Aerodigestive tract foreign bodies in children. One year's experience at Christchurch Hospital Emergency Department. *NZ Med J*, 109 (1024): 232-3.
13. Mallick MS, (2014). Tracheobronchial foreign body aspiration in children: A continuing diagnostic challenge. *Afr J Paediatr Surg*, 11:225-8.
14. Mackle T, Conlon B, (2006). Foreign bodies of the nose and ears in children. Should these be managed in the accident and emergency setting? *Int J Pediatr Otorhinolaryngol*, 70:425.
15. Ashok Poluri; Bhuvanesh Singh; NM Sperling; Gady Har-El; Frank E Lucente, (2000) Retropharyngeal abscess secondary to penetrating foreign bodies. *Journal of cranio-maxillo-facial surgery: official publication of the European Association for Cranio-Maxillo-Facial Surgery*, 28(4):243-6.
16. Khan MA, Hameed A, Choudhary AJ, (2004). Management of foreign bodies in the oesophagus. *J Coll Physicians Surg. Pak*, 14(4):213-20.
17. Santanu Banerjee, (1999). Concept of foreign body-its past and present. *Indian J Otolaryngol Head Neck Surg*, 51:23-30.

