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ORIGINAL ARTICLE

SEX AND AGE WISE DISTRIBUTION, PRESENTATION AND SUCCESSFUL REMOVAL AND MORTALITY OF FOREIGN BODY ASPIRATION USING RIGID BRONCHOSCOPE IN CHILDREN OF DISTRICT D.I.KHAN, PAKISTAN

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ABSTRACT

Background: Foreign body aspiration commonly occurs in young children and is associated with high degree of mortality and morbidity. The objectives of this study were to determine epidemiologic, clinical and endoscopic perspectives of foreign body aspiration in children of District D.I.Khan, Pakistan.

Materials & Methods: This descriptive study was conducted in Department of ENT, Gomal Medical College/ DHQ Teaching Hospital, D.I.Khan, Pakistan from November 2017-April 2019. 105 children with suspected foreign body (FB) aspiration were included. All patients underwent rigid bronchoscopy under GA. After check X-ray and one day observation, they were discharged. Variables were sex, age in years and age groups, successful removal, mortality, history of FB aspiration, cough, wheezing, choking, stridor, reduced air entry and location of FB. Age in years was numeric, age groups ordinal and all other variables were on nominal scale. Age in years was described by mean & SD and others by count and percentage.

Results: The sample with suspected foreign body aspiration (n=105) included 61 (58.1%) boys and 44 (41.9%) girls, with 20 (19.05%) in age group 0-2.0 years, 58 (55.24%) 2.0-5.0 years and 27 (25.71%) 5.0-14 years. Chest X-Ray was done in 98/105 (93.33%) cases. Frequency of successful FB removal by rigid bronchoscopy was 86/105 (81.90%). Mortality was none. Out of 86 confirmed cases, 51 (59.30%) were boys and 35 (40.70%) girls, with 19 (22.10%) in age group 0-2.0 years, 55 (63.95%) 2.0-5.0 years and 12 (13.95%) 5.0-14 years. Mean age was 3.57±1.78. History of FB aspiration was in 75/86 (87.21%), cough 65 (75.58%), stridor 14 (16.28%), wheezing 54 (62.79%) and choking 28 (32.56%) cases. Reduced air entry was 44 (51.16%) on right side, 17 (19.77%) on left side and 25 (29.05%) bilateral. Location of FB was larynx 6 (9.98%), trachea 20 (23.26%), right bronchus 44 (51.16%) and left bronchus 16 (18.60%).

Conclusions: Foreign body aspiration in children in not an uncommon event. The parents should try to prevent such event, and if there, should present the child to emergency department of a hospital. ENT surgeons are supposed to evaluate and plan an earlier intervention as rigid bronchoscopy for these children.

KEW WORDS: Bronchoscopy; Bronchoscope; Foreign Bodies; Cough; Stridor; Wheezing; Choking; Larynx; Trachea; Bronchus.

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1. INTRODUCTION

1.1 Background: Our problem of interest was foreign body (FB) aspiration and our population of interest was children of District D.I.Khan, Pakistan. First we will place data from global and regional literature and then from national and local literature regarding burden of the problem/ disease in those populations. Keeping in view the title, design, objectives and variables of our study, we will place the data regarding

epidemiological distribution (sex and age groups wise), clinical presentation (history of FB aspiration, presence of cough, stridor, wheezing, chocking, reduced air entry and location of FB) and endoscopic outputs (successful removal of foreign bodies & mortality) of foreign body aspiration.

Some authors have described sex, age in years and age groups for suspected cases while others have described these for confirmed cases. So we will present their data as suspected cases first and then by putting the successful removal of foreign bodies, we will separate the confirmed cases.

Gang, et al.[1] from Chongqing, China reported 1,024 suspected cases of bronchial foreign bodies (FBs) in children for the period from 1997-2011. FBs were confirmed bronchoscopically in 953 cases with diagnostic accuracy of 94.5%. FB removal was successful in 948/953 (99.47%) cases on first bronchoscopy and in three cases on second bronchoscopy. These 1,024 suspected cases included 674 boys (65.8%) and 350 girls (34.2%). The frequency of mortality was two, due to circulatory and respiratory failure, where FBs were detected by bronchoscope but could not be removed. Out of 953 cases, location of FBs were; 98 (10.28%) in the main bronchus and/or bilateral bronchi, 506 (53.10%) in the right main bronchus, and 349 (36.62%) in the left main bronchus.

Boufersaoui, et al.[2] from Algiers, Algeria evaluated 2,624 children with confirmed tracheobronchial FBs from 1989 to 2012. This sample included 1636 (62.35%) boys and 988 (37.65%) girls, with range of 4 months to 18 years with 66% cases from 1-3 years. The presentation was by cough in 1836 (70%), chocking 1706 (65%), respiratory distress 1653 (63%), wheezing 1574 (60%) and no signs in 341 (13%) cases. The location of FB was subglottic/trachea 369 (14.01%), right bronchus 1275 (48.44%), left bronchus 761 (28.91), bilateral 42 (1.89%) and undefined 185 (7.71%).

Ahmad, et al.[3] from Kano, Nigeria evaluated 35 cases with confirmed tracheobronchial FBs from January 2005 to December 2010. This sample included 18 (51.4%) boys and 17 (48.6%) girls, with mean age of 5.1 $\pm$ 3.0 years (6 months to 10 years). Their age groups were; 9 (25.71%) in 0-2 years, 11 (31.43%) in 3-5 years, 8 (22.86%) in 6-8 years and 7 (20%) in 9-11 years.

Falasi, et al.[4] from Ikeja, Lagos State, Nigeria showed 24 confirmed cases of tracheobronchial FBs from February 2008 to February 2013. This sample included 12 (50%) boys and 12 (50%) girls, with mean age of 6.6 $\pm$ 5.0 years. Their age groups were; 2 (8.3%) in 0-1 year, 8 (25%) in 2-5 years, 12 (50%) in 6-10 years, one (4.2%) in 11-16 and one (4.2%) >16 years. Foreign bodies were identified and successfully removed in 22 (91.66%) patients with mortality of two (8.33%) cases. FBs were located in trachea in 2 (8.3%), right main bronchus in 16 (66.7%) and left main bronchus in 6 (25%) cases.

Aydoğan, et al.[5] from Adana, Turkey has presented the results of 1,887 bronchoscopies for suspected foreign body aspiration in children for the period from 1973 to 2004. These included 1,106 (58.61%) boys and 781 (41.39%) girls, having median age of 2.3 years, with 74% cases having age <3 years. Foreign body was identified in 1,493 (79.12%) cases. The history of overall foreign body inhalation was in 1608 (85.2%) children. Mortality rate was 0.21%.

Panda, et al.[6] from New Delhi, India reported 196 suspected cases of bronchial foreign bodies in children for the period from 1991-2012. FB removal was successful in 173 (88.26%) cases. These confirmed 173 FB cases included 118 (68.21%) boys and 55 (31.79%) girls. Their mean age was 3.7 years (2 months to 12 years), with 39 (22.54%) in >1 year, 103 (59.54%) in 1-3 years, 22 (12.72%) in 3-5 years and nine (5.2%) in >5 years age group. The presentation of 173 confirmed cases was by cough in 131 (75.72%), dysponea 20 (11.56%), wheezing 11 (6.36%), cyanosis 4 (2.31%), chocking 3 (1.73%), stridor 2 (1.16%) and unresponsive pulmonary infection in 2 (1.16%) cases. Location of FB was carina in 17 (9.83%), right bronchus in 112 (64.74%) and left bronchus in 44 (25.43%) cases. The frequency of mortality was 4/173 (2.31%).

Shafi, et al.[7] from Hyderabad and Karachi, Pakistan reported 50 children with foreign body inhalation from April 2009 to October 2010, including 28 (56%) boys and 22 (44%) girls, aging 1-7 years. The age groups were; 10 (20%) < 2 years, 19 (38%) 2-3 years and 21 (42%) > 3 years old. The frequency of successful removal was 41 (82%), with 3 (6%) deaths. The most common symptom was dyspnea in 34 (68%) and most common sign was unilateral decreased air entry in 25 (50%) cases.

Arif, et al.[8] from Rawalpindi, Pakistan had 168 suspected cases from January 2011 to June 2013, including 102 (69%) boys and 66 (31%) girls. The mean age was 2.9 (8 months-12 years) years, including 117 (69.64%) in < 5 years and 51 (30.36%) in 5-12 years age groups. Out of 168 suspected cases, the presentation was by cough in 87 (51.78%), history of FB aspiration in 79 (47%), dyspnea in 70 (41.6%) and choking in 40 (23.8%). The common signs were decreased unilateral breath sounds in 149 (88.6%), rhonchi in 87 (51.7%) and stridor in 40 (23.8%) children. The frequency of successful removal was 151 (89.8%). The location of 151 FBs was larynx in 8 (5.29%), trachea in 16 (10.59%), left bronchus in 39 (25.82%) and right bronchus in 88 (58.27%) cases.

Asif, et al.[9] from Abbottabad, Pakistan had 81 suspected cases from January 2003 to June 2005, including 50 (61.7%) boys and 31 (38.3%) girls, with minimum age of 16 months. Their age groups were;

63 (77.8%) in <5 years, 13 (16%) in 5-15 years and 5 (6.2%) in > 15 years (upper age limit is not given). The frequency of successful removal of FB was 81 (100%). The common symptoms were choking in 67 (82.7%), stridor in 59 (72.8%) and cough in 45 (55.6%). The common signs were decreased air entry in 72 (89.9%), wheeze in 42 (51.9%) and cyanosis in 5 (6.2%) cases.

Hussain, et al.[10] from Swat, Pakistan had 42 suspected cases from March 2005 to March 2006, including 25 (59.52 %) boys and 17 (40.48%) girls. The age range was 10 months to 15 years. Their age groups were; 31 (73.81%) in < 3 years, zero in 3-6 years, 7 (16.67%) in 6-10 years and 4 (9.52%) in 11-15 years. Foreign bodies were observed in 38 cases (90.47%) on bronchoscopy. The frequency of successful FB removal was 37/42 (88.09%). The frequency of mortality was 1/42 (2.38%) due to cardiac arrest during bronchoscopy, which could not be completed. The history of foreign body inhalation was in 37/42 (88.09%) children. The location of 38 FBs was glottic 3 (7.89%) cases, trachea 5 (13.16%), right main bronchus 24 (63.16%) and left main bronchus 6 (15.79%) cases.

Wahid, et al.[11] from Peshawar, Pakistan had 23 confirmed cases of beads in airways from January 2012 to December 2013, including 16 (69.57%) boys and 7 (30.43%) girls. The mean age was 5.47± 4.38 (1-18 years). Presentation was by cough in 12 (52.17%), wheezy chest in 10 (43.47%), reduced air entry in 11 (47.82%), breathlessness in 6 (26.08%), stridor in 2 (8.69%), fever in 6 (26.08%) and cyanotic spell in 4 (17.39%) children. No death occurred. The location of FBs was right main bronchus in 13 (56.52%), left main bronchus in 5 (21.73%), trachea in 4 (17.39) and subglottic in one (4.34%) case.

Farooqi, et al.[12] from Multan, Pakistan has presented 90 cases of inhaled foreign bodies, including 65 (72.2%) boys and 25 (27.8%) girls. The age range was 7 months-12 years, with maximum cases in 3 to 6 years age group. Presentation was by cough in maximum children. The frequency of successful removal of FB was 97.8%. The mortality rate was 2.2%. The commonest location of FBs was right main bronchus, then left main bronchus, subglotiss and laryngeal inlet.

1.2 Research Problems (RPs), Knowledge Gaps (KGs) & Rationale: We are unaware of the epidemiologic, clinical and endoscopic perspectives of foreign body aspiration in children of District D.I.Khan, Pakistan. Unawareness of these three pieces of information are our three RPs. We searched online but could not find any relevant data/ information on various databases like Google, Google Scholar, MEDLINE®, Emerald Insight, ProQuest, Cochrane Database of Systematic Reviews, Pakistan Research Repository, etc. Unavailability of these information are our three KGs. To fill these three KGs is the rationale of our project.

1.3 Research Objectives:

1. To determine the epidemiologic perspective as sex and age groups distribution of foreign body aspiration in children of District D.I.Khan, Pakistan.
2. To determine the clinical presentation of foreign body aspiration in children of District D.I.Khan, Pakistan.
3. To determine the endoscopic outcome as frequency of successful removal and mortality of foreign body aspiration in children of District D.I.Khan, Pakistan.

1.4 Significance: Based on our indigenous data as per our objectives, we can reform our strategies for management of foreign body aspiration in children of District D.I.Khan, Pakistan.

2. MATERIALS AND METHODS

2.1 Design, Setting & Duration: This descriptive study was conducted in the Department of ENT, Gomal Medical College, D.I.Khan, Pakistan from November 2017 to April 2019. The sample was collected from ENT Unit, DHQ Teaching Hospital, D.I.Khan.

2.2 Population & Sampling: Our hospital covers the population of District D.I.Khan, Pakistan. The population of District D.I.Khan was 1,627,132 in 2017 census. Assuming 43.4% population of children (0-14 years), our population at risk will be 706,175. For this population, a sample size[13] of 105 was calculated through Raosoft®,[14] an online sample size calculator, with margin of error of 0.274%, confidence level of 95% and estimated prevalence of foreign body aspiration of 0.0204% (20.4/100,000)[15] in population at risk. The sampling technique was consecutive, non-probability technique.

All children (0-14 years) with suspected foreign body aspiration were eligible for inclusion. High risk informed consent was taken from the guardian (father or close relative).

2.3 Conduct of Procedure/ Rigid Bronchoscopy: All children with suspected foreign body aspiration were admitted and were usually scheduled for elective list in morning time where we have full teams of anesthesia and operation theatre. Few patients with subglottic/ laryngeal foreign bodies were taken directly to theatre due to severe airway distress.

Preoperative X-ray chest, full blood count and hepatitis serology were done. Patients were kept fasting 4-6 hours before the procedure. Intravenous dexamethasone 0.2mg/kg along with broad spectrum antibiotic and bronchodilators were given.

All patients underwent rigid bronchoscopy under general anaesthesia by AK. In the operation theatre, patients were kept supine. Pulse oximeters were attached to check the saturation. Induction was

achieved by intravenous propofol and then relaxation by suxamethoniun/ atrelax. Intubation was done by suitable size portex endotracheal tube, which was connected to anesthesia machine through a circuit with continuous supply of oxygen/ flurane. Patients were ventilated and oxygenated well.

Rigid bronchoscope (8210.70) (Richard Wolf GmbH, Knittlingen, Germany) attached with light source (Richard Wolf 4016 Light projector) was passed just above the larynx to visualize endotracheal tube (ETT). The anesthetist was asked to remove the ETT. Larynx was under direct vision. The bronchoscope was passed through the larynx into the trachea. The anesthesia circuit was connected to the bronchoscope via local made connector. The scope was passed gently down in the trachea till identification of carina. Then right and left bronchi were examined. Foreign body was located, identified, grasped well with the FB forceps and removed usually as a unit with few exceptions. The patients were re-scoped to see any residual or another FB or tear/ blood. When sure that nothing is left, the scope was removed and the anesthetist re-intubated, ventilated and made reversal of the anesthesia.

After extubation, the patients were monitored well for cyanosis or desaturation in recovery till satisfaction of the anesthesia team. The patients were shifted to ward. IV broad spectrum antibiotics and steroids were continued. With check x-ray chest, patients were usually discharged after 24 hours observation.

2.4 Data Collection Plan: The data was collected for the following variables on a pre-designed Performa. The demographic variables (attributes) were sex (boys/ girls), age in years and age groups (0-2.0 years/ 2.1-5.0 years/ 5.1-14 years). The research variables (attributes) were history of FB aspiration (yes/ no), cough (yes/ no), wheezing (yes/ no), choking (yes/ no), stridor (yes/ no), reduced air entry (right side/ left side/ bilateral), location of FB (larynx (subglottis)/ trachea/ right bronchus/ left bronchus), successful removal of FB (yes/ no) and mortality (yes/ no). Age in years was a ratio (numeric) data. Age groups were ordinal data and all other variables were on nominal data.

2.5 Data Analysis Plan: Age in years was described by mean, SD, minimum, maximum and range with confidence interval (CI) for mean at 95% confidence level (CL) for population. As we don't know the population's standard deviation, so we have used the sample standard deviation (S) and the t distribution through an online statistical calculator.[16]

All other nominal and ordinal data were described by count and percentage with confidence interval (CI) for proportion at 95% or 80% confidence level (CL) for population using normal distribution approximation for the binomial distribution through an online statistical calculator.[17]

3. RESULTS

3.1 Sample Description: A sample of 105 children with suspected foreign body (FB) aspiration was enrolled in the study. It included 61 (58.1%) boys and 44 (41.9%) girls, with 20 (19.05%) children in age group 0-2.0 years, 58 (55.24%) in 2.0-5.0 years and 27 (25.71%) in 5.0-14 years. Patients presented directly to ENT department were 79 (75.24%), while patients referred from pediatric department were 26 (24.76%).

3.2 Successful removal of foreign body & Mortality: Chest X-Ray was done in stable 98/105 (93.33%) cases. The frequency of successful removal of FB by rigid bronchoscopy was 86/105 (81.90%, 95%CI, 74.54-89.26). There was no mortality.

As we are interested in distribution of confirmed cases of FB aspiration by sex and age groups and their presentation (symptoms and signs), so our sample size would be 86 confirmed cases of FB aspiration for further analysis.

3.3 Mean age & distribution of foreign body aspiration by sex & age groups: The mean age of the sample (n=86) was 3.57 ± 1.78 (0.75-8, range 7.25) years (95% CI 3.18-3.95).

The distribution of 86 confirmed cases of foreign body aspiration by sex is given in Table 3.3.1, showing sample statistics and 80%CI for proportion for population. Boys have higher frequency in sample and higher estimated prevalence for population than girls.

The distribution of 86 confirmed cases of foreign body aspiration by age groups is given in Table 3.3.2, showing sample statistics and 80%CI for proportion for population. The highest frequency in sample and

Table 3.3.1: Distribution of foreign body aspiration in children of District D.I.Khan, Pakistan by sex (n=86)

Variable	Attributes	Sample Statistics		80% CI for Proportion	
		Count	Percentage	Lower	Upper
Sex	Boys	51	59.30 %	52.51	66.09
	Girls	35	40.70 %	33.90	47.48
Total		86	100 %	Population Parameters	

highest estimated prevalence for population is for 2.1-5.0 years age group.

3.4 Presentation of foreign body aspiration in children of District D.I.Khan, Pakistan

The frequency of various presentations in 86 confirmed cases of foreign body aspiration in sample with 80%CI for proportion for population is given in decreasing order in Table 3.4.1, with the history of FB aspiration as the commonest presentation in 75 (87.21%) cases.

The frequency of various presentations in 86 confirmed cases of foreign body aspiration in sample with 80%CI for proportion for population is given in Table 3.4.2. The reduced air entry on right side has highest frequency 44 (51.16%) and location of FB in right bronchus has highest frequency 44 (51.16%).

Table 3.3.2: Distribution of foreign body aspiration in children of District D.I.Khan, Pakistan by age groups (n=86)

Variable	Attributes	Sample Statistics		80% CI for Proportion	
		Count	Percentage	Lower	Upper
Age groups	0-2.0 years	19	22.10 %	16.35	27.82
	2.1-5.0 years	55	63.95 %	57.31	70.58
	5.1-14 years	12	13.95 %	09.16	18.74
Total		86	100 %	Population Parameters	

Table 3.4.1: History of FB aspiration, cough, wheezing, choking & stridor in foreign body aspiration in children of District D.I.Khan, Pakistan (n=86)

Variable	Attributes	Sample Statistics		80% CI for Proportion	
		Count	Percentage	Lower	Upper
History of FB aspiration	Yes	75	87.21 %	82.58	91.82
	No	11	12.79 %	08.17	17.40
Cough	Yes	65	75.58 %	69.64	81.51
	No	21	24.42 %	18.48	30.35
Wheezing	Yes	54	62.79 %	56.11	69.47
	No	32	37.21 %	30.52	43.88
Choking	Yes	28	32.56 %	26.08	39.03
	No	58	67.44 %	60.96	73.91
Stridor	Yes	14	16.28 %	11.17	21.38
	No	72	83.72 %	78.61	88.82
Total		86	100 %	Population Parameters	

Table 3.4.2: Reduced air entry & location of FB in foreign body aspiration in children of District D.I.Khan, Pakistan (n=86)

Variable	Attributes	Sample Statistics		80% CI for Proportion	
		Count	Percentage	Lower	Upper
Reduced air entry	Right side	44	51.16 %	44.25	58.07
	Left side	17	19.77 %	14.26	25.27
	Bilateral	25	29.07 %	22.79	35.34
Location of FB	Larynx	06	06.98 %	03.45	10.49
	Trachea	20	23.26 %	17.41	20.09
	Right bronchus	44	51.16 %	44.25	58.07
	Left bronchus	16	18.60 %	13.22	23.98
Total		86	100 %	Population Parameters	

4. DISCUSSION

4.1 Innovative strengths of our study

Research addresses a problem for a population and never for a sample. We have identified our population at risk by count and drawn a sample from it. The data was collected from this sample, analyzed for the sample (descriptive statistics) and inferred on to the population (estimation of parameter; inferential statistics) from where it was drawn to describe the characteristics of that population. Ten studies cited here and many more in global literature on this and many more titles in different disciplines have no mention of their population.

In discussion, one has to compare the data for populations and not sample data to sample data. As estimated data for populations are not given by these cited ten studies, so we have compared the data from these samples (sample statistics) to our population data (population parameters) given as confidence intervals (CI) at given confidence levels (CL). Any study/ sample data which comes within our CI is considered as similar to our study, otherwise higher or lower to our study as the case may be.

We have not given explanations for dissimilarities of the cited studies data from our study data as no meaningful explanations could be retrieved from those studies for not having enough information.

We have organized our manuscript as per format of "Marwat's Logical Trajectory for Research Process",[18-20] giving this work an intellectual flow and including to identify our research problems, knowledge gaps and research objectives and conducting relevant data collection, data analysis and data interpretation. Research questions and hypotheses were not included.

4.2 Prevalence of successful removal of foreign body & Mortality: In our study, with 105 suspected cases, the frequency of successful removal of FB by rigid bronchoscopy was 81.90% (86/105) in sample with estimated prevalence in population between 74.54-89.26% (95% CI).

Similar frequency was noted by Aydoğan, et al.[5] from Adana, Turkey 79.1% (1,493/1,887) for 1973-2004, Panda, et al.[6] from New Delhi, India 88.26% (196/173) for 1991-2012, Shafi, et al.[7] from Hyderabad & Karachi, Pakistan 82% (41/50) for 2009-2010 and Hussain, et al.[10] from Swat, Pakistan 88.09% (37/38) for 2005-2006.

Higher frequency was shown by Gang, et al.[1] from Chongqing, China 99.48% (948 out of 953 'confirmed cases' and 92.58% with 948 out of total 1024 'suspected' cases) for 1997-2011, Falasi, et al.[4] from Ikeja, Lagos State, Nigeria 91.66% (22/24) for 2008-2013, Arif, et al.[8] from Rawalpindi, Pakistan 89.8% (151/168) for 2011-2013, Asif, et al.[9] from Abbottabad, Pakistan 100% (81/81) for 2003-2005, Wahid, et al.[11] from Peshawar, Pakistan 100% (23/23) for 2012-2013 and Farooqi, et al.[12] from Multan, Pakistan 97.78% (88/90).

In our study, there was no mortality. Wahid, et al.[11] also showed no mortality. Increasing mortality rate was observed by Gang, et al.[1] 0.21% {(2/953 confirmed cases) and 0.20% (2/1024 suspected cases)}, Aydoğan, et al.[5] 0.21% (4/1,887), Farooqi, et al.[12] 2.22% (2/90), Hussain, et al.[10] 2.38% (1/38), Shafi, et al.[7] 6% (3/50) and Falasi, et al.[4] 8.33% (2/24) respectively.

4.3 Mean age & distribution of foreign body aspiration by sex & age groups: The mean age of our sample for 86 cases of foreign body aspiration was 3.57±1.78 (0.75-8, range 7.25) years (95% CI 3.18-3.95).

Similar mean age was shown by Panda, et al.[6] 3.7 years. Higher mean age was reported by Ahmad, et al.[3] 5.1±3.0 years, Falasi, et al.[4] 6.6±5.0 years and Wahid, et al.[11] 5.47±4.38 years. Lower mean age was reported by Arif, et al.[8] 2.9 years. Aydoğan, et al.[5] reported median age of 2.3 years.

Our population (n=86) showed higher prevalence of foreign body aspiration in boys 59.30% (80% CI, 52.51-66.09) than girls 40.70% (80% CI, 33.90-47.48). Ten other studies showed similarly (within confidence interval) higher prevalence in boys than girls.[1,2,5-12] Dissimilar to our study, two studies showed similar prevalence for boys and girls.[3,4] (Table 4.3)

Our population (n=86) showed highest prevalence for age group 2.1-5.0 years 63.95% (80%CI, 57.31-70.58). Highest prevalence was reported by Boufersaoui, et al.[2] 66% from 1-3 years, Ahmad, et al.[3] 31.43% (11/35) in 3-5 years, Falasi, et al.[4] 50% (12/24) in 6-10 years, Aydoğan, et al.[5] 74% cases in < 3 years, Panda, et al.[6] 59.54% (103/173) in 1-3 years, Shafi, et al.[7] 42% (21/50) in > 3 years, Arif, et al.[8] 69.64% (117/168) in < 5 years, Asif, et al.[9] 77.8% (63/81) in <5 years and Hussain, et al.[10] 73.81% (31/42) in < 3 years.

4.4 Prevalence of presentation of foreign body aspiration in children of District D.I.Khan, Pakistan

Our population showed prevalence of history of FB aspiration in 75/86 confirmed cases as 87.21% (80%CI 82.58-91.82). Similar prevalence was shown by Hussain, et al.[10] as 88.09% (37/42); 88.09 coming within our confidence interval (CI). Lower prevalence was noted by Arif, et al.[8] as 47% (79/151).

Our population showed prevalence of cough in 65/86 confirmed cases as 75.58% (80%CI 69.64-81.51). Similar prevalence was shown by Boufersaoui, et al.[2] 70% (1836/2624) and Panda, et al.[6] 75.72% (131/173). Lower prevalence was shown by Arif, et al.[8] as 51.78% (87/168), Asif, et al.[9] 55.6% (45/81) and Wahid, et al.[11] 52.17% (12/23). (Table 4.4.1)

Our population showed prevalence of wheezing in 54/86 confirmed cases as 62.79% (80%CI

Table 4.3: Distribution of foreign body aspiration in children of District D.I.Khan, Pakistan by sex

Reference	Sample Size	Boys Count (%)	Girls Count (%)	Interpretation
Our Study	86 confirmed (80% CI)	51 (59.30%) (52.51-66.09)	35 (40.70%) (33.90-47.48)	Prevalence of FB aspiration in boys is higher than girls.
Gang, et al.[1]	1,024 suspected	674 (65.8%)	350 (34.2%)	Similar to our study, the prevalence of foreign body aspiration in boys in these ten studies is higher than girls.
Boufersaoui, et al.[2]	2,624 confirmed	1,636 (62.35%)	988 (37.65%)	
Aydoğan, et al.[5]	1,887 suspected	1,106 (58.61%)	781 (41.39%)	
Panda, et al.[6]	173 confirmed	118 (68.21%)	55 (31.79%)	
Shafi, et al.[7]	50 confirmed	28 (56%)	22 (44%)	
Arif, et al.[8]	168 suspected	102 (69%)	66 (31%)	
Asif, et al.[9]	81 suspected	50 (61.7%)	31 (38.3%)	
Hussain, et al.[10]	42 suspected	25 (59.52 %)	17 (40.48%)	
Wahid, et al.[11]	23 confirmed	16 (69.57%)	7 (30.43%)	
Farooqi, et al.[12]	90 confirmed	65 (72.2%)	25 (27.8%)	
Ahmad, et al.[3]	35 confirmed	18 (51.4%)	17 (48.6%)	Prevalence of FB aspiration in boys is similar to girls.
Falasi, et al.[4]	24 confirmed	12 (50%)	12 (50%)	

Table 4.4.1: Prevalence of history of FB aspiration, cough, wheezing, choking & stridor in foreign body aspiration in children of District D.I.Khan, Pakistan

Reference	Sample Size	Cough Count (%)	Wheezing Count (%)	Chocking Count (%)	Stridor Count (%)
Our Study	86 confirmed cases (80%CI)	65 (75.58%) (69.64-81.51)	54 (62.79%) (56.11-69.47)	28 (32.56%) (26.08-39.03)	14 (16.28%) (11.17-21.38)
Boufersaoui, et al.[2]	2,624 confirmed	1836 (70%)	1574 (60%)	1706 (65%)	
Panda, et al.[6]	173 confirmed	131 (75.72%)	11 (6.36%)	3 (1.73%)	2 (1.16%)
Arif, et al.[8]	168 suspected	87 (51.78%)		40 (23.8%)	40 (23.8%)
Asif, et al.[9]	81 suspected	45 (55.6%)	42 (51.9%)	67 (82.7%)	59 (72.8%)
Wahid, et al.[11]	23 confirmed	12 (52.17%)	10 (43.47%)		2 (8.69%)

56.11-69.47). Similar prevalence was shown by Boufersaoui, et al.[2] 60% (1574/2624). Lower prevalence was shown by Panda, et al.[6] 6.36% (11/173), Asif, et al.[9] 51.9% (42/81) and Wahid, et al.[11] 43.47% (10/23). (Table 4.4.1)

Our population showed prevalence of chocking in 28/86 confirmed cases as 32.56% (80%CI 26.08-39.03). Higher prevalence was shown by Boufersaoui, et al.[2] 65% (1706/2624) and Asif, et al.[9] 82.7% (67/81). Lower prevalence was shown by Panda, et al.[6] 1.73% (3/173) and Arif, et al.[8] as 23.8% (40/168). (Table 4.4.1)

Our population showed prevalence of stridor in 14/86 confirmed cases as 16.28% (80%CI 11.17-21.38). Higher prevalence was shown by Arif, et al.[8] 23.8% (40/168) and Asif, et al.[9] 72.8% (59/81). Lower prevalence was shown by Panda, et al.[6] 1.16% (2/173) and Wahid, et al.[11] as 8.69% (2/23). (Table 4.4.1)

Dyspnoea was reported by Shafi, et al.[7] in 68% (34/50), Arif, et al.[8] in 41.6% (70/168) and Wahid, et al.[11] in 26.08% (6/23) cases. Cyanosis was reported by Asif, et al.[9] in 6.2% (5/81), rhonchi by Arif, et al.[8] in 51.7% (87/168) and unresponsive pulmonary infection by Panda, et al.[6] in 2 (1.16%) cases. There was no case with dyspnea, cyanosis, rhonchi or unresponsive pulmonary infection in our study.

Our population showed prevalence of reduced air

Table 4.4.2: Prevalence of location of FB in foreign body aspiration in children of District D.I.Khan, Pakistan

Reference-sample size of confirmed cases	Prevalence of location of foreign body			
	Larynx	Trachea	Right bronchus	Left bronchus
Our Study (n=86) (80% CI)	6 (06.98 %) (03.45-10.49)	20 (23.26 %) (17.41-29.09)	44 (51.16 %) (44.25-58.07)	16 (18.60 %) (13.22-23.98)
Gang, et al.[1] (n=953)			506 (53.10%)	349 (36.62%)
Boufersaoui, et al.[2] (n=2,624)		369 (14.01%)	1275 (48.44%)	761 (28.91%)
Falasi, et al.[4] (n=24)		2 (8.3%)	16 (66.7%)	6 (25%)
Panda, et al.[6] (n=173)		17 (9.83%)	112 (64.74%)	44 (25.43%)
Arif, et al.[8] (n=151)	8 (5.30%)	16 (10.60%)	88 (58.28%)	39 (25.82%)
Hussain, et al.[10] (n=38)	3 (7.89%)	5 (13.16%)	24 (63.16%)	6 (15.79%)
Wahid, et al.[11] (n=23)	1 (4.34%)	4 (17.39)	13 (56.52%)	5 (21.73%)

entry in 44 (51.16%, 80%CI 44.25-58.07) cases on right side, 17 (19.77%, 80%CI 14.26-25.27) on left side and 25 (29.07%, 80%CI 22.79-35.34) bilaterally. Boufersaoui, et al.[2] has noted prevalence of reduced air entry as 62.35% (1636/2,624) on right side and as 37.65% (988/2,624) on left side, with no bilateral case.

Our population showed prevalence of location of FB in larynx as 6.98% (80%CI 03.45-10.49). Similar prevalence was noted by Arif, et al.[8] 5.3%, Hussain, et al.[10] 7.89% and Wahid, et al.[11] 4.34%. (Table 4.4.2)

Our population showed prevalence of location of FB in trachea as 23.26% (80%CI 17.41-29.09). Lower prevalence was noted by Boufersaoui, et al.[2] 14.01%, Falasi, et al.[4] 8.3%, Panda, et al.[6] 9.83%, Arif, et al.[8] 10.60%, Hussain, et al.[10] 13.16% and Wahid, et al.[11] 17.39%. (Table 4.4.2)

Our population showed prevalence of location of FB in right bronchus as 51.16% (80%CI 44.25-58.07). Similar prevalence was noted by Gang, et al.[1,] 53.10%, Boufersaoui, et al.[2] 48.44% and Wahid, et al.[11] 56.52%. Higher prevalence was noted by Falasi, et al.[4] 66.7%, Panda, et al.[6] 64.74%, Arif, et al.[8] 58.28% and Hussain, et al.[10] 63.16%. (Table 4.4.2)

Our population showed prevalence of location of FB in left bronchus as 18.60% (80%CI 13.22-23.98). Similar prevalence was noted by Hussain, et al.[10] 15.79% and Wahid, et al.[11] 21.73%. Higher prevalence was noted by Gang, et al.[1,] 36.62%, Boufersaoui, et al.[2] 28.91%, Falasi, et al.[4] 25%, Panda, et al.[6] 25.43% and Arif, et al.[8] 25.82%. (Table 4.4.2)

Prevalence of location of FB in bilateral bronchi is given by Gang, et al.[1] as 10.28% and Boufersaoui, et al.[2] as 1.89%. Prevalence of location of FB as undefined is given by Boufersaoui, et al.[2] as 7.71%.

CONCLUSION

Foreign body aspiration in children in not an uncommon event. It is more common in boys than girls and more common in age group 2-5 years. Usual presentation is with any combination of cough, wheezing, choking & stridor with or without the history of foreign body aspiration. Public health awareness is needed to prevent such event, and when it is there, then to present such children urgently and the ENT surgeons are supposed to evaluate at earliest and plan an earlier intervention as rigid bronchoscopy.

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REFERENCES

1. Gang W, Zhengxia P, Hongbo L, Yonggang L, Jiangtao D, Shengde W, et al. Diagnosis and treatment of tracheobronchial foreign bodies in 1024 children [abstract]. J Pediatr Surg 2012 Nov; 47(11):2004-10. https://doi.org/10.1016/j.jpedsurg.2012.07.036
2. Boufersaoui A, Smati L, Benhalla KN, Boukari R, Smail S, Anik K, et al. Foreign body aspiration in children: experience from 2624 patients. Int J Pediatr Otorhinolaryngol 2013 Oct; 77(10):1683-8. https://doi.org/10.1016/j.ijporl.2013.07.026
3. Ahmed AO, Shuiabu IY. Inhaled foreign bodies in a paediatric population at AKTH Kano-Nigeria. Niger Med J 2014 Jan; 55(1):77-82. https://doi.org/10.4103/0300-1652.128178
4. Falase B, Sanusi M, Majekodunmi A, Ajose I, Oke D. Preliminary experience in the management of tracheobronchial foreign bodies in Lagos, Nigeria. Pan Afr Med J 2013 May 25; 15:31. https://doi.org/10.11604/pamj.2013.15.31.2710
5. Aydoğan LB, Tuncer U, Soylu L, Kiroğlu M, Ozsahinoglu C. Rigid bronchoscopy for the suspicion of foreign body in the airway [abstract]. Int J Pediatr Otorhinolaryngol 2006 May; 70(5):823-8. https://doi.org/10.1016/j.ijporl.2005.09.010

6. Panda SS, Bajpai M, Singh A, Baidya DK, Jana M. Foreign body in the bronchus in children: 22 years' experience in a tertiary care paediatric center. Afr J Paediatr Surg 2014; 11:252-5. https://doi.org/10.4103/0189-6725.137336
7. Shafi M, Suhail Z, Ashrafi SK, Sajjad SM. Frequency of tracheobronchial foreign bodies and their management in urban population of Sindh. J Pak Med Assoc 2012 Sep; 62(9):896-9.
8. Arif N, Ashfaq AH, Ajmal M, Mahmood K. Rigid bronchoscopy for tracheobromchial foreign bodies in children at Holy Family Hospital, Rawalpindi. Gomal J Med Sci 2014 Apr-Jun; 12(2):101-5.
9. Asif M, Shah SA, Khan F, Ghani R. Analysis of tracheobronchial foreign bodies with respect to sex, age, type and presentation. J Ayub Med Coll Abbottabad 2007; 19(1):13-15.
10. Hussain G, Iqbal M, Khan SA, Iqbal M, Zaman J. An experience of 42 cases of bronchoscopy at Saidu Group of Teaching Hospitals, Swat. J Ayub Med Coll Abbottabad 2006; 18(3): 59-62.
11. Wahid F, Khan MR, Javaid M, Khan Q, Haq N, Khan IA. Efficacy of rigid bronchoscopy for extraction of beads from airways. Gomal J Med Sci 2014 Oct-Dec; 12(4): 213-7.
12. Farooqi T, Hussain M, Pasha HK, Bokhari K, Hassan S. Foreign body aspiration in children: an experience at Nishtar Hospital Multan [abstract]. Pak J Paed Surg 1999 Dec; 1-2:16-24.
13. Hamburg H. Basic Statistics: A Modern Approach, 3rd ed. Orlando, United States: Harcourt Brace Jovanovich Inc.; 1985.
14. Raosoft® sample size calculator [internet]. Seattle, WA, USA: Raosoft Inc.; 2004. [accessed 2018 Jun 01]. Available at: http://www. raosoft.com/samplesize.html
15. Gotsch K, Annest JL, Holmgreen P,Gilchrist J; Centers for Disease Control and Prevention (CDC). Nonfatal choking-related episodes among children-United States, 2001. MMWR Morb Mortal Wkly Rep.2002; 51(42):945-48.
16. Statistics Kingdom. Confidence interval calculator [internet]. Statistics Kingdom; Melbourne, Australia 2007. [accessed 2019 May 27]. Available at: https://www.statskingdom.com/40_confidence_interval.html
17. Statistics Kingdom. Proportion confidence interval calculator [internet]. Statistics Kingdom; Melbourne, Australia 2007. [accessed 2019 May 27]. Available at: http://www.statskingdom.com/41_proportion_confidence_interval.html
18. Shah S, Basharat A, Shah M, Marwat M, Billah M, Ali SM. Frequency, distribution and presentation of hypocalcemia in ß-thalassemia major. Gomal J Med Sci 2018 Jan-Mar; 16(1): 2-8. https://doi.org/10.46903/gjms/16.01.1446
19. Shah HU, Gul H, Khan R, Marwat M. Urethrocutaneous fistula following Snodgrass versus two stage Aivar Bracka repair of distal penile hypospadias in male children: a randomized control trial. Gomal J Med Sci 2018 Apr-Jun; 16 (2): 54-8. https://doi.org/10.46903/gjms/16.02.1284
20. Ain N, Khan S, Marwat M, Khan N, Ahmad I, Ramzan F, et al. Frequency, distribution and determinants of hypertension in adult stroke population of D.I.Khan Division, Pakistan. Gomal J Med Sci 2019 Jul-Sep; 17 (3):81-9. https://doi.org/10.46903/gjms/17.03.2076

CONFLICT OF INTEREST
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Acquisition, Analysis or Interpretation of Data:	AK, MIK, MAA, AH, MI, TM
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All the authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.