



St. Paul's Hospital Millennium Medical College

Magnitude and Associated Factors of Upper Airway Obstruction among Pediatric Patients in St. Paul's Hospital Millennium Medical College.

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Addis Ababa, Ethiopia

July, 2024



St. Paul's Hospital Millennium Medical College

Graduate Study Program

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Abstract

Background: Upper airway obstruction is one of the most challenging acute emergencies. Unless promptly diagnosed and managed, it rapidly progresses to hypoxia and cardiac arrest. Severe upper airway obstruction accounted for 3.3 % of all pediatric intensive care unit admissions; however, there is limited information about upper air way obstruction in pediatrics and its cause particularly in the public hospitals of Addis Ababa.

Objective: To assess magnitude and associated factors of upper airway obstruction among pediatric age group visited in Saint Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia, 2024.

Methods: An institutional-based cross-sectional study was conducted at SPHMMC from March 2023 to June 2024. A random sampling technique was used to select the charts of pediatric age group who attended the SPHMMC. Data were collected by three data collectors using a pre-tested structured questionnaire. The data were collected via a questionnaire developed using the Google forms web application and analyzed using SPSS version 23. Descriptive statistics were carried out and presented with narration, tabulation, and graphical presentation. Binary logistic regressions were computed to determine the association between variables. The association was determined using an adjusted Odds ratio (AOR) with a 95% confidence interval (CI) at a p-value of < 0.05 .

Result: Our study revealed that the Magnitude of Upper air way obstruction in the pediatric age group was 2.5 %. more than half of (57%), the participants were Male. The mean age of the participants was 5.3 years. Many of the patients (88%) had come from urban area, Age and duration of stayed in hospital were factors significantly affecting upper air way obstruction among pediatrics.

Conclusion: The magnitude of upper air way obstruction among pediatrics are common in SPHMMC and the major cause was foreign body aspiration followed by Epiglottitis, Bacterial tracheitis, Hyperthyroidism. Therefore, increasing awareness and education on the signs and symptoms of upper air way obstruction and ensure a safe environment for children to prevent accidental ingestion of foreign objects to minimize problems.

Key words: Magnitude, pediatrics, upper airway obstruction, Emergency.

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Acronyms and Abbreviations

ATS	American Thoracic Society
ERS	European Respiratory Society
FB	Foreign body
ICD	International Classification of Diseases
SPHMMC	Saint Paul's Hospital Millennium Medical College
SPSS	Statistical Package for Social Science
UAO	Upper Airway Obstruction
UNECA	United Nations Economic Commission for Africa
URTI	Upper Respiratory Tract Infection
WHO	World Health Organization

1. Introduction

1.1. Background

The airway is a complex system of tubes that transmits inhaled air from your nose and mouth in to lungs(1). An airway obstruction is a blockage in any part of the airway(2). The differential diagnosis for acute airway obstruction in infants and children can be divided anatomically into conditions affecting the upper portion of the respiratory tract and those affecting the lower portion of the respiratory tract (3).

Acute airway obstruction is a challenging clinical situation mandating rapid diagnosis and appropriate airway management(4, 5).Upper airway obstruction is defined as blockage of any upper portion of the airway which lies above the thoracic inlet(1, 6).

It is a common and serious problem in children who often will present with acute respiratory distress associated with stridor, apnea or even pulmonary edema (3, 7). In these children, stridor, restlessness, cyanosis, confusion, suprasternal retractions, intercostal and subcostal recessions, change in voice are common clinical signs seen. Lower airway obstruction by a wheeze when the infant/child breathes out(4)

Causes of upper airway obstruction (UAO) can be divided into inflammatory, neoplastic, and iatrogenic. Inflammatory processes such as croup, acute epiglottitis, exudative tracheitis, and retropharyngeal cellulitis and abscess are more common (8).Upper airway obstruction accounts for up to 15% pediatric emergency visits. The major causes are infection and foreign body aspiration (FBA). Failure to manage the airway is the leading cause of preventable pediatric deaths(9).

One of indications for surgery were mainly obstructed airway (88%) while prolonged assisted intubation accounted for four cases(10). The etiology of upper air way obstruction varies from simple nasal blockage in a newborn to near fatal epiglottitis in a child (3).

Most of the common causes among children presenting to emergency department are of acute infectious etiology. Among these, croup is the commonest while diphtheria remains the most

serious life-threatening cause. Recent reports indicate that bacterial tracheitis has become increasingly common(11).

Foreign body (FB) aspiration remains a public health problem in many countries as tested by the recent publications Children with croup are often frightened, miserable, and uncomfortable. In croup children Crying increases their oxygen demand, accelerates respiratory muscle fatigue, and may increase laryngeal swelling so supportive management with nebulized epinephrine and steroid are treatment (12).

1.2. Statement of the Problem

Upper airway obstruction (UAO) is a critical condition that can lead to significant morbidity and mortality among pediatric patients (4, 5). It is characterized by a blockage in the upper respiratory tract, which can impede airflow and result in severe respiratory distress. The causes of UAO in children can vary widely, including congenital anomalies, infections, foreign body aspiration, trauma, and inflammatory conditions.

Upper airway obstruction accounts for up to 15% pediatric emergency visits. The major causes are infection (viral croup 80%, epiglottitis 5%) and foreign body aspiration (FBA)(13). Aspiration of foreign bodies is a very serious condition during childhood and may result in acute respiratory distress, chronic and irreversible lung injury or even death(14).

Studies revealed that Upper airway obstruction has bad consequences of life threatening conditions like respiratory failure; intraoperative complications, tracheal intubation, nasotracheal intubation, and tracheostomy and death (15-17).

In Ethiopia, the magnitude and determinants of UAO among pediatric patients are not well-documented, and there is a lack of comprehensive data on the prevalence, etiology, and outcomes of this condition in the pediatric population.

St. Paul's Hospital Millennium Medical College (SPHMMC), a major tertiary care center in Addis Ababa, Ethiopia, provides critical care to a large number of pediatric patients. However, there is limited research focusing on the specific burden of UAO among children treated at this institution. Understanding the magnitude and associated factors of UAO in this setting is essential for developing targeted interventions, improving clinical management, and enhancing health outcomes for affected children.

Therefore, this study aims to determine the magnitude of upper airway obstruction and identify the associated factors among pediatric patients at St. Paul's Hospital Millennium Medical College. The findings from this research will provide valuable insights for healthcare providers and policymakers to formulate evidence-based strategies to reduce the incidence and improve the management of UAO in pediatric patients, ultimately contributing to better pediatric healthcare services in Ethiopia.

1.3. Significance of the study

Upper airway obstruction is one of the most challenging acute emergencies, requiring immediate diagnosis and proper management to prevent serious outcomes. To the best of my knowledge, there is only one single-center and outdated study on this topic in my study area. This highlights the need for updated and comprehensive research. This study will serve as a foundation for future research on UAO in this region.

By identifying the causes and treatment outcomes of UAO, this study will provide valuable recommendations for improving clinical care and preventive measures. These recommendations will be useful for clinicians, policymakers, and public health professionals. Therefore, this study aims to assess the magnitude and associated factors of upper airway obstruction among pediatric patients at St. Paul's Hospital Millennium Medical College in Addis Ababa, Ethiopia

2. Literature Review

2.1. Magnitude of Upper Respiratory Obstruction

A retrospective Study conducted in Washington DC showed that 16% of patients had extra thoracic upper-airway obstruction (18).

A study among pediatrics visited the pediatric emergency OPD due to different problem revealed that 6.9% children were presented with acute upper airway obstruction(19).

Cross sectional conducted in America on the prevalence, diagnosis, and repercussions of upper airway obstruction in children under 5 years-old and their impact in public health revealed that Upper airway obstruction is prevalent in about 20% of children(20).

Study done in Tikur Anbessa specialized hospital shows 6.9% of children was presented with acute upper airway obstruction.(19)

2.2.Causes of Upper Air Way Obstruction

Acute upper airway obstruction is a life-threatening emergency and the causes are varied, most cases of obstruction occur in young children. Inflammatory processes such as croup, acute epiglottitis, exudative tracheitis, retropharyngeal cellulitis and abscess are more common(4).Viral croup which is an acute infection of the larynx, trachea and bronchi. It is the most common cause of upper airway obstruction in children aged 6 months to 6 years (12).

A study among pediatrics visited the pediatric emergency OPD due to different problem showed that Croup was found to be the most common cause of acute upper airway obstruction (75.8%) followed by foreign body aspiration (9.9%). The causes of acute upper airway obstruction were varied although infectious diseases (croup, bacterial tracheitis, retropharyngeal abscess, and peritonsillar abscess) were responsible for the majority of the cases (82.6%)(19).

The majority of childhood choking-related injuries are associated with food items, including nuts, beans, hot dogs, candies, grapes, carrots, and popcorn. Aspirated pen caps account for 3–8% of all non-food-related aspirations (21). FBA is the most likely cause of accidental fatalities in children under 1-year-of-age. In the group of children up to 3 years, presence of foreign body in the respiratory tract accounts for 7% of sudden death(22). Most of foreign body cases occur in

low socio-economic background and uneducated and ignorant parents, educating the parents can be a major step in preventing the foreign body aspiration (23).

From 35 patients admitted to the pediatric intensive care unit in Vermont Children's Hospital with potentially life-threatening upper airway infections, fifteen patients (75%) had bacterial tracheitis, 3 patients (15%) had viral croup, and 2 patients (10%) had non classic epiglottitis(24). Acquired subglottic stenosis (SGS) is caused by either infection or trauma; the most common cause is endotracheal intubation, especially in low birth weight infants who require prolonged intubation and ventilation (25). Subglottic cysts are a rare, but increasingly encountered, cause of stridor in children representing 7% of the airway pathologies identified at direct laryngotrachea bronchoscopy (DLTB)(26).

The study done in Northern Ireland pediatric emergency shows the most common conditions are acute viral laryngotracheobronchitis (croup), acute epiglottitis and bacterial tracheitis (27). Ludwig's angina leads to obstruction at the pharyngeal and supraglottic levels and can be life-threatening(28). Peritonsillar abscess one of the cause for upper air way obstruction is the commonest deep space infection of the head and neck (3). Pen caps, coins, balloons, marbles, little particles of various toys and pins are the usual aspirated foreign material. Balloon aspirations are killers for children (23).

Study in Nigeria on indication and outcome of pediatric tracheostomy shows the indications were upper airway obstruction (63%), craniofacial trauma (15.2%) (29). Study done at University Hospital Kuala Lumpur Malaysia in severe upper air way obstruction need ICU admission, viral croup (29%) was the most common diagnosis, followed by mediastinal malignancy (13%), bacterial tracheitis (11%) and Pierre Robin syndrome (11%) (30)

Study conducted in Hawassa showed that croup was the most common cause of upper airway obstruction which accounted for 56.2% followed by foreign body aspiration which was 31.1% and laryngomalacia 6.6%. Most commonly aspirated material was maize, coin and others like bone and plastic materials(31).

Vocal cord palsy is a relatively common cause of airway obstruction in children that may be idiopathic, iatrogenic, as a result of a neurological abnormality or birth trauma (26).

In retrospective record review study done in TikurAnbessa specialized hospital pediatric emergency over one year of 2327 children upper air way obstruction account 6.9% and croup is the most common cause followed by foreign body aspiration (19). The diagnosis of upper airway obstruction is made in a child with any degree of respiratory difficulty with or without associated stridor arising from lesions above the thoracic inlet(32).

Study done in TikurAnbessa specialized hospital shows the causes of acute upper airway obstruction were varied although infectious diseases (croup, bacterial tracheitis, retropharyngeal abscess, and peritonsillar abscess) were responsible for the majority of the cases (82.6%)(19)

2.3.Factors Associated with Upper Air Way Obstruction

A cross sectional study conducted in Po Delta area in North Italy revealed that a higher number of significant associations with known risk factors for airways obstruction according to clinical and ATS criteria than ERS criterion (33).

Study conducted on upper air way obstruction due to goiter in Great Britain showed factors such as body mass index, neck circumference, and limb weakness were independently predicted the occurrence of upper airway obstruction(34).

Another studies also showed that duration of infection, age, body surface area ,weight of the patients adjunctive use of dexmedetomidine or vecuronium remained independently associated with upper-airway obstruction(18, 35).

Study done in TikurAnbessa specialized hospital that croup was found to be the most common cause of Acute upper airway obstruction (75.8%) followed by foreign body aspiration (9.9%) The causes of acute upper airway obstruction were varied although infectious diseases (croup, bacterial tracheitis, retropharyngeal abscess, and peritonsillar abscess) were responsible for the majority of the cases (82.6%)(19).

2.4. Conceptual frame work of the study

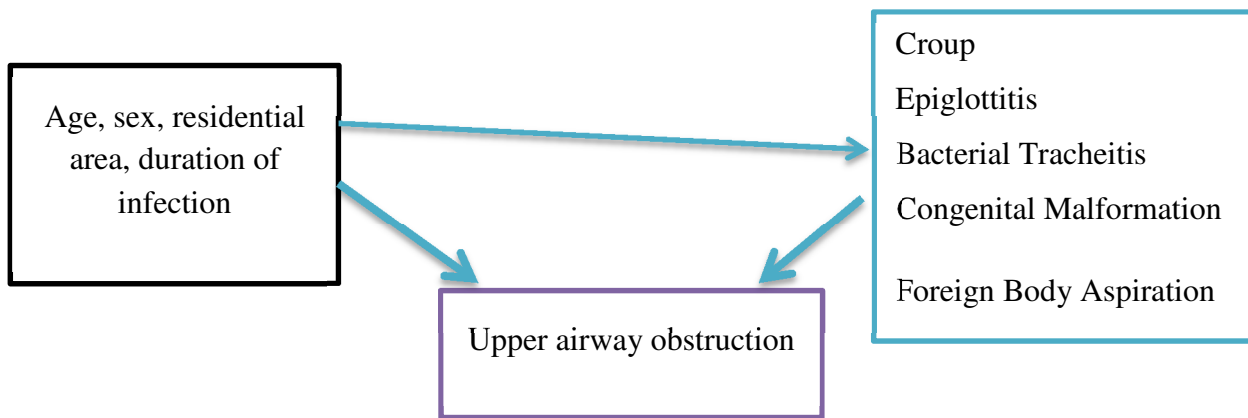


Figure 1 Diagram showing conceptual frame work of the study which developed after reviewing different literatures

3. Objective

3.1 General objective

To assess magnitude and associated factors of upper airway obstruction in pediatric patients visited in St. Paul's hospital millennium medical college, Addis Ababa, Ethiopia, 2024.

3.2. Specific objective

- To determine magnitude of upper airway obstruction in pediatric patients in St. Paul's hospital millennium medical college, Addis Ababa, Ethiopia, 2024.
- To identify Cause of upper airway obstruction in pediatric patients in St. Paul's hospital millennium medical college, Addis Ababa, Ethiopia, 2024.
- To identify associated factors of upper airway obstruction in pediatric patients in St. Paul's millennium medical college Addis Ababa, Ethiopia, 2024.

4. Materials

4.1 Study Area

Addis Ababa is the capital city of Ethiopia and Seat of African Union and the United Nations World Economic Commission for Africa. It covers an area of 527 square kilometers and has 11 sub-cities with 116 woredas. Based on the 2007 Census conducted by the Central Statistical Agency of Ethiopia (CSA), Addis Ababa city has a total population of 3,384,569 and Addis Ababa is the diplomatic capital of Africa(36). The study was conducted at St Paul's hospital millennium medical college (SPHMMC)in Addis Ababa city. SPHMMC is the second largest referral hospital in the country, located in Gullele sub-city. It is also a medical college with the first of its kind in its integrated modular curriculum and its provides referral health service on34 inpatient and 24 outpatient service units. There are 7 units found in pediatrics department, Pediatrics OPD, Pediatrics ward, Pedyhemato oncology ward, NICU, PICU, Pediatric emergency room.

4.2 Study Period

From March 27/2023 to June/ 30/2024, This study was completed within 12 months, divided into data collection, analysis, interpretation, and dissemination time periods.

4.3 Study design

A hospital-based cross sectional retrospective study was conducted during the study period.

4.4 Population

4.4.1 Source Population

All pediatric patients visited in SPHMMC from 1st January 2023 to 31 December 2024 in Addis Ababa, Ethiopia.

4.4.2 Study Population

All pediatric patients diagnosed with upper airway obstruction from 1st January 2023 to 31 December 2024 of SPHMMC in Addis Ababa, Ethiopia.

4.5 Inclusion Criteria and Exclusion Criteria

4.5.1 Inclusion criteria

All pediatric patients who diagnosis upper airway obstruction and attended to SPHMMC during study period.

4.5.2 Exclusion Criteria

- ✚ Those who have incomplete documentation
- ✚ Missing charts
- ✚ Improper hand writing

4.6 Sample Size Determination

A single population proportion formula is used to calculate the sample size with considering population proportion (magnitude of upper airway obstruction) which was (69%) from previous study(19),95% level of confidence and 5% margin of error then the sample size of the study is calculated as follow

$$\text{Sample size (n)} = \frac{(Z_{\alpha/2})^2 pq}{d^2}$$

$$n = \frac{(1.96)^2 \times 0.69 (1-0.69)}{(0.05)^2}$$

$$n = \frac{3.8416 \times 0.2139}{0.0025} = \frac{0.82171824}{0.0025} =$$
$$n = 329$$

4.7 Sampling Procedure and Technique

Simple random sampling technique was used to select the chart of pediatric patients attended to SPHMMC from 1st January2023 to 31 December 2023.

4.8 Study Variables

4.8.1 Dependent variables- upper airway obstruction

4.8.2 Independent variables:

- **Socio-demographic factors:** Age, sex, residential area, duration of hospital stays,

- **Cause of Upper air way obstruction:** Croup, epiglottitis, bacterial tracheitis, congenital malformation, foreign body aspiration,
- **Clinical characteristics:** Congenital anomalies, Antibiotics treatment, chief complain, Oxygen Saturation Level.

4.9. Operational definition and measurement

Upper airway obstruction: - in this study it was referred that a participant having partial or complete blockage of the upper respiratory tract that cause by Foreign body aspiration, Croup, Epiglottitis, Bacterial tracheitis and other that impedes the flow of air into and out of the lungs, resulting in difficulty breathing, stridor (high-pitched sound during inhalation), and potential respiratory distress.

Pediatrics : in this study it was referred that age less than 18 year of age (37)

Respiratory problems: -any condition or event that affects the normal functioning of the respiratory system, leading to symptoms such as shortness of breath, coughing, wheezing, chest pain, or difficulty breathing.

4.10. Data collection tools

Data was collected using a structured questionnaire developed from different literature sources. The questionnaire included questions about socio-demographic characteristics such as age, sex, and residential area. Clinical presentation was assessed by reviewing about symptoms like stridor, drooling, cough, choking, and fever. and other available modalities were also included. Pharmacological treatments with antibiotics and dexamethasone, as well as surgical management with intubation and mechanical ventilation, were recorded. The collected data was checked for completeness.

4.11. Data collection methods

Three level IV nurses, who served as data collectors, and one BSc nurse supervisor with relevant experience in data collection were recruited. The data collectors and supervisor received one-day training on the research objectives, data collection tools, and sampling procedures. Selection of participants was conducted according to the inclusion and exclusion criteria.

4.12. Data Quality Assurance

To ensure the validity of the study, pre-testing was conducted at Zewuditu Memorial Hospital (ZMH) on 5% (21) of the total sample size before data collection. Based on the results, the questionnaires were revised and edited. Continuous supervision of the data collectors and the data they collected was provided by the supervisor. The principal investigator checked the data for completeness and missing information during the data collection process. Before analysis, the investigator cross-checked and corrected the data.

4.13. Data analysis and interpretation

The data were collected via a questionnaire developed using the google forms web application (<https://docs.google.com/forms>) and exported to SPSS version 26 for analysis. Descriptive statistics were computed using cross-tabulations and summary tables were generated. Bivariate and multivariable logistic regression analyses were conducted to identify predictor variables significantly associated with the outcome variables. The odds ratio with a 95% confidence interval was used to determine the strength of association between predictor and outcome variables. All variables with a p-value ≤ 0.2 were included in the multivariable logistic regression model to adjust for possible confounders, and their strength of association was measured using the odds ratio (OR). Variables with a p-value < 0.05 in the final analysis (multivariable logistic regression model) were considered indicative of a significant association.

4.14. Ethical considerations.

Ethical approval was obtained from the Ethics Review Board of SPHMMC. The proposal was submitted to the Institutional Review Board and the Head of St. Paul's Hospital Millennium Medical College. Confidentiality was maintained at all stages of the study. All data used were appropriately cited for their sources.

4.15. Dissemination of the Findings:

The results of the study will be submitted to St. Paul's Hospital Millennium Medical College for review and record-keeping. Additionally, copies of the study findings will be disseminated to the Addis Ababa Regional Health Bureau and the Ministry of Health to inform regional and national

health policies and practices. Detailed reports will be prepared and shared with these institutions to facilitate the integration of the study's insights into their respective health programs.

Furthermore, the research findings will be prepared for publication in various scientific journals. The manuscripts will be carefully written to include comprehensive data analysis, discussion of results, and implications for future research and practice. This effort will ensure that the study's insights reach a broader scientific community, contributing to the body of knowledge in the field and promoting further research and collaboration. Disseminating the findings through these channels aims to maximize the impact of the study and encourage the adoption of evidence-based practices in healthcare

5. Results

5.1 Socio-Demographic Characteristics of Participants

Total number of patients with upper airway obstruction within the period under study was 142 from the total sampled charts of 329 Pediatrics patients. Therefore, the Magnitude of upper airway obstruction in the pediatric age group among those with upper airway obstruction is 43.16%. However, the magnitude among all the 5656 pediatric age group patients with different problems which visited in Addis Ababa city at St Paul's hospital millennium medical college during the period from January 2023 to December 2023 was 2.5%. Among participants, more than half of (57%) were Male. The mean age of the participants was 5.3 years. The majority of the patients (88%) were came from urban area (Table 1)

Table 1 Socio-demographic characteristics of Upper Airway Obstruction among Pediatrics in St Paul's Millennium Medical College, Addis Ababa, Ethiopia. (n=142).

Variables	Frequency	Percent(%)
Sex		
Female	61	43.0
Male	81	57.0
Age(years)		
0-3	65	45.8
4-7	42	29.6
8-11	19	13.4
12-15	16	11.3
Place of residence		
Urban	125	88.0
Rural	17	12.0

5.2 Cause of upper air way obstruction

Out of the 142 cases of upper airway obstruction, the primary cause was foreign body aspiration, which accounted for 61 cases (43%). The second most prevalent cause was croup, responsible

for 44 cases (31%). The remaining cases of upper airway obstruction were attributed to other causes such as epiglottitis, bacterial tracheitis, and hyperthyroidism.

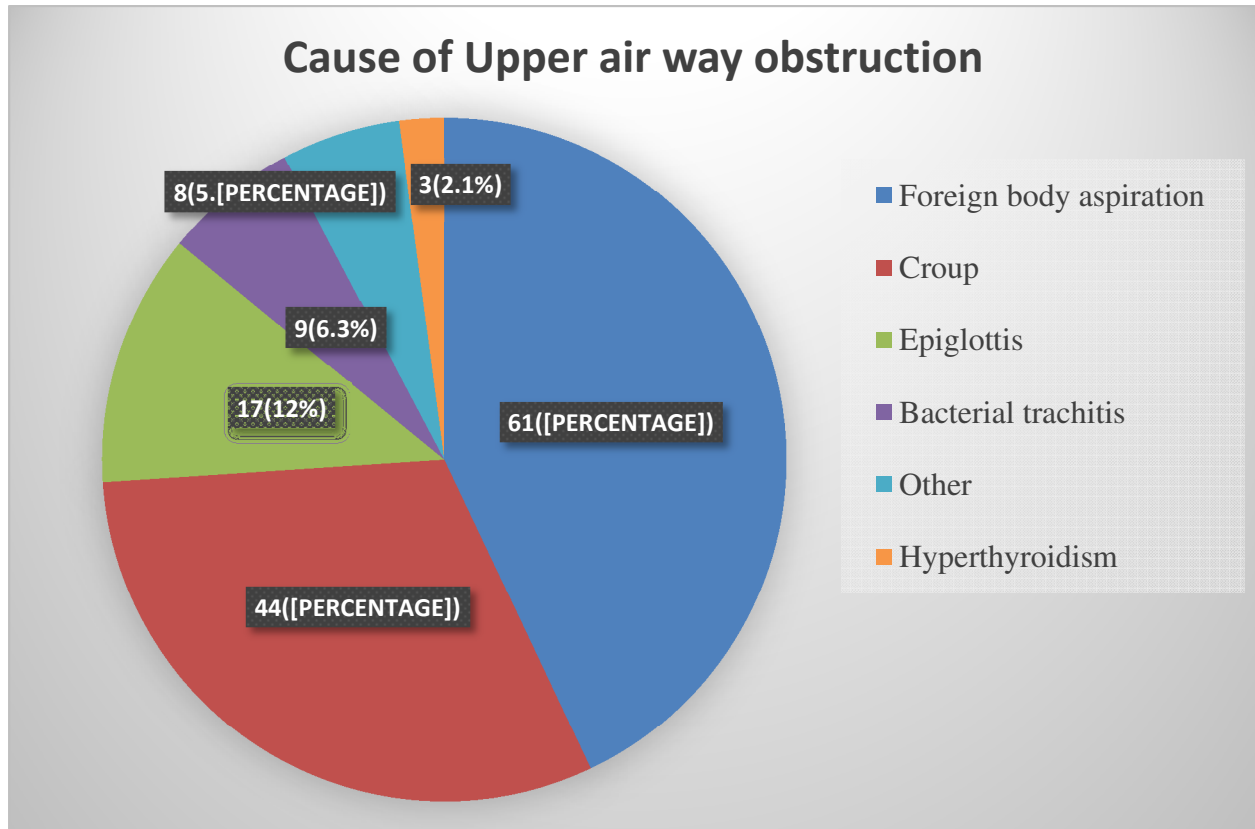


Figure 2 Causes of Upper Airway Obstruction among Pediatrics patients in Saint Paul's Millennium Medical College, Addis Ababa, Ethiopia. (n=142)

Regarding the types of foreign bodies aspirated by pediatric patients, beans were the most frequently aspirated, comprising 47.5% of the cases. Plastic materials were the second most common, making up 14.8% of the cases. Other aspirated foreign bodies included coins, maize, pieces of metal, and peanuts, each contributing to the remaining cases. The majority of these foreign bodies were found lodged in the Pharynx (Throat) causing significant obstruction.

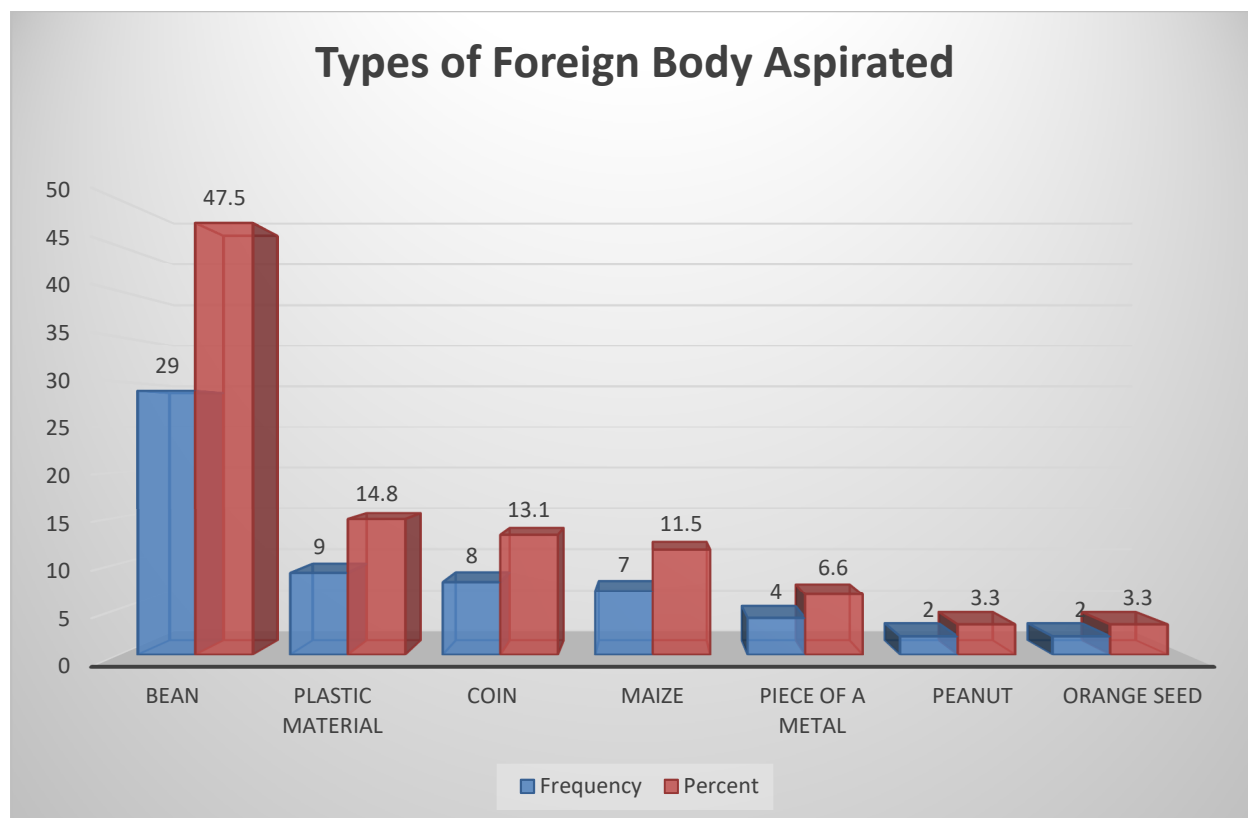


Figure 3 Types of foreign body aspirated among Pediatrics age groups in Saint Paul's Millennium Medical College, Addis Ababa, Ethiopia. (n=61)

5.3. Clinical Characteristics of the Study Population

The majority of the patients, 117 out of 142 (82.4%), were treated at the Pediatrics Emergency Department and subsequently discharged with improvements. Among the pediatric patients with upper airway obstruction, 7% had congenital anomalies. The primary complaint for 30.3% of the patients was breathing difficulties, followed by stridor and fever as the second most common complaints. Most of the patients (89.4%) maintained normal oxygen saturation levels. However, among all the patients with upper airway obstruction, two developed respiratory failures and required supplemental oxygen through mechanical ventilation.

Table 2 Clinical characteristics of Upper Airway Obstruction patients among Pediatrics in Saint Paul's Millennium Medical College, Addis Ababa, Ethiopia. (n=142).

<i>Variables</i>	<i>Frequency</i>	<i>Percent(%)</i>
Congenital anomalies		
Yes	132	93.0
No	10	7.0
Admission ward		
Pediatric Emergency	117	82.4
Pediatric ward	25	17.6
Status during discharge		
Alive	137	96.5
Dead	5	3.5
Chief complain		
Difficulty of breathing	43	30.3
Stridor	35	24.6
Fever	32	22.5
Choking	16	11.3
Cough	8	5.6
Drooling	5	3.5
Other	3	2.1
Oxygen Saturation Level		
Normal	127	89.4
Abnormal	15	10.6

Developed Respiratory failure		
Yes	140	98.6
No	2	1.4
Treated with oxygen		
Yes	34	24
No	108	76

The upper airway obstruction improved after treatment in the majority of the study subjects, with 96.4% being successfully treated and sent home. The mortality rate in this study was 3.5% (5 patients). Croup and bacterial tracheitis were the primary causes of these deaths. The youngest patient who died was 1 months and 2 weeks old and the oldest was 4 years old, with the mean age being 1.4 years. The mortality rate was higher among females compared to males, with a ratio of 1:0.6. Croup was the leading cause of mortality. The majority of the patients who died were from urban areas.

Table 3 Profile of patients who died of Acute upper airway obstruction among Pediatrics patients in Saint Paul's Millennium Medical College, Addis Ababa, Ethiopia. (n=5)

No	Age	Sex	Residence	Diagnosis	Duration stayed in hospital(Days)	Chief Complain	Medical Management
1	24 Month	Male	Urban	Croup	6	Stridor	Dexamethasone
2	1 Month and 15 days	Female	Urban	Bacterial tracheitis	12	Cough	Ceftriaxone and Vancomycin
3	2 Month and one week	Male	Rural	Croup	10	Difficulty of breathing	Adrenaline nebulization
4	9 Month and 5 days	Female	Urban	Croup	1	Difficulty of breathing	Dexamethasone
5	48 Month	Female	Urban	Bacterial tracheitis	3	Difficulty of breathing	Clindamycin and Vancomycin

5.4 Factors associated with Upper Air way obstruction

During bi-variable binary logistic regression analysis we found that Age, Sex, Admission ward and Duration stayed in hospital were associated with Upper air way obstruction among pediatrics at ($p < 0.2$). However, in multivariable binary logistic regression analysis, only Age, and duration stayed in the hospital to be significantly associated with Upper air way obstruction. Pediatrics age range from 0-3 years were 82 % (0.181, 95% CI: 0.061, 0.54) more likely to develop upper air way obstruction as compared to other 12-15 age groups. Pediatrics who stayed less than 3 days had 1.268 (AOR= 1.268 CI: 0.612-2.628) times more likely to develop upper air way obstruction. (Table 4).

Table 4 Bi-variable logistic regression analysis for upper airway obstruction among Pediatrics age groups in Saint Paul's Millennium Medical College, Addis Ababa, Ethiopia. (n=329).

Variables	Upper Respiratory		COR with 95% CI	P-value
	Obstruction			
	Yes	No		
Sex				
Female	61	96	1.401(0.903-2.173)	0.132*
Male	81	91	1	
Age (years)				
0-3	64	125	6.250(2.191-17.832)	0.001*
4-7	43	38	2.828(0.946-8.452)	0.063*
8-11	19	19	3.20(0.975-10.504)	0.055*
12-15	16	5	1	
Admission ward				
Pediatric Emergency	117	129	0.475(0.279-0.8093)	0.006*
Pediatric ward	25	58	1	
Duration stayed in Hospital (Days)				
< =3 Days	130	136	4.062(2.072-7.965)	0.000*
>4 Days	12	51	1	

Keys: 1=reference category COR=crudes odds ratio, CI= confidence interval, *=statistically significant at $p < 0.2$.

Table 5 Multivariable logistic regression analysis for upper airway obstruction among Pediatrics age groups in Saint Paul's Millennium Medical College, Addis Ababa, Ethiopia. (n=329).

Variables	Upper Respiratory		AOR with 95% CI	P-value
	Obstruction			
	Yes	No		
Age in years				
0-3	64	125	0.181(0.061-0.54)	0.002**
4-7	43	38	0.339(0.109-1.054)	0.062
8-11	19	19	0.323(0.093-1.120)	0.075
12-15	16	5	1	
Duration stayed in Hospital (Days)				
< =3 Days	130	136	1.268(1.12-2.628)	0.008**
>4 Days	12	51	1	

Keys: 1=reference category, CI= confidence interval, AOR=Adjusted odds ratio,

**=statistically significant at $p < 0.05$.

6. Discussion

The main aim of this study was to determine Magnitude and associated factors of Upper Airway Obstruction among Pediatrics age groups in Saint Paul's Millennium Medical College, Addis Ababa, Ethiopia, 2024. Our study revealed that the Magnitude of Upper air way obstruction in the pediatric age group was 2.5 %. Age and duration of stayed in hospital were the determining factors of UAO.

The Magnitude of upper air way obstruction found in this study is consistent with previous studies conducted in Malaysia prevalence of UAO is 3.3% (30). On the contrary, the finding of our study is higher than the study conducted in Nigeria prevalence of upper airway obstruction was 1.87%(32). Possible explanations for such differences might be due to variations in study population, study settings and methods of data collection. On the other hand, in comparison to the current Magnitude report, a retrospective study conducted among patients under the age of 18 revealed that 16% of patients had upper-airway obstruction(18); a cross-sectional study conducted in America among children under the age of five revealed that 20% of children had upper-airway obstruction (33); and a study conducted in Tikur Anbessa specialized hospital revealed that 6.9% of children were presented with acute upper-airway obstruction (31). These findings are higher than the current Magnitude report. The reported variations between different studies may be influenced by different in sociodemographic feature among the different population groups.

The commonest cause of obstruction of the pediatrics airway seen in this study was foreign body aspiration similar to the finding of in study conducted in Nigeria(28, 38). While respiratory papilloma as the commonest cause in an earlier study(39) and some other studies had viral croup as the commonest cause (28, 29) the variation between different studies may be study population differences in age distribution or environmental exposures in rural versus urban areas can lead to variations in the prevalence of specific causes of airway obstruction. This study relied on medical records for data collection, which may not capture all cases of airway obstruction or provide detailed information on underlying causes. In comparison, studies that involve direct observation or patient interviews may yield different results based on the accuracy and completeness of data collection methods.

The mortality rate among our study participants was 3.5%, lower than the study conducted in Nigeria 11% (29). In contrast, our study showed a higher mortality rate compared to the study conducted in Nigeria, which reported a mortality rate of 0.0625% (32). Possible explanations for such differences in mortality rates could be influenced by variations in the characteristics of the study populations. Differences in healthcare infrastructure and resources between the study settings could have contributed to differences in mortality rates. Additionally, differences in mortality rates may also be influenced by changes in medical practices, advancements in healthcare technologies, and improvements in overall healthcare delivery over time.

This study revealed that Age of the patients and duration stayed in hospital was risk factor to develop upper air way obstruction, Other studies have supported this finding a study conducted among Pediatric after Cardiac Surgery and airway obstruction in patients with asthma after antiasthma treatment strongly associated factor was age and duration in hospital (21, 35).

7. Limitations of the study

- I. Limitation of the study is that it is a single institution report, the sample size studied maybe inadequate to make conclusions that should affect the general population
- II. Poor recording and documentation of patient information may have affected the accuracy of the data collection process.
- III. Cross-sectional nature of the data; it does not show a temporal relationship between independent variables and the outcome variable.

8. Conclusion and Recommendation.

8.1 Conclusion

This study revealed the upper air way obstruction among pediatrics are common and the major cause in our study was foreign body aspiration followed by Epiglottitis, Bacterial tracheitis, Hyperthyroidism were found to be causes of upper airway obstruction., the mortality rate due to upper air way obstruction was 3.5% of study population. Age of the pediatrics and duration stayed in the hospital were to be factors significantly associated to upper air way obstruction.

8.2. Recommendation

Based on the results of these thesis findings the following recommendations are forwarded to the following respective bodies.

Healthcare Providers:

- I. Increase awareness and education on the signs and symptoms of upper airway obstruction in pediatrics.
- II. Implement protocols for timely and appropriate treatment of upper airway obstruction to reduce mortality rates
- III. Consider age and duration of hospital stay as important factors in assessing the risk of upper airway obstruction

Parents and Caregivers:

- I. Educate parents and caregivers on the importance of monitoring children for signs of upper airway obstruction
- II. Encourage parents to seek medical attention immediately if they suspect their child may be experiencing upper airway obstruction
- III. Ensure a safe environment for children to prevent accidental ingestion of foreign objects

Future Research:

- I. Conduct further studies to explore additional risk factors and causes of upper airway obstruction in pediatrics
- II. Investigate interventions and strategies to reduce mortality rates associated with upper airway obstruction

- III. Evaluate the effectiveness of current treatment protocols and guidelines in managing upper airway obstruction in children.

Policy Makers

- I. Developing policies and guidelines for healthcare providers to increase awareness and education on upper airway obstruction in pediatrics,
- II. Allocating resources for timely treatment, considering age and duration of hospital stay in risk assessment, and
- III. Supporting research initiatives to reduce mortality rates.

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10. Annex

10.1 Data extraction tools

Part 1. Socio-demographic data			
Code	Questions	Response (circle the appropriate option)	Skip
101	Age of the child	_____Yrs.	
102	Sex of the child	1. Female 2. Male	
103	Place of residence	1. Urban 2. Rural	
104	Have any congenital anomalies	1. Yes 2. No	
105	Admission ward	1. Pediatric emergency 2. Pediatric ward	
106	Date of admission	_____days	
107	Date of discharge	_____days	
108	Duration of stay in hospital	_____days	
109	Status during discharge	1. Alive 2. Dead	

Part 2 Health related characteristics of respondents

No	Variables	Category	Remark
201	Case of admission	1. Pneumonia 2. Asthma 3. Upper air way obstruction 4. HF 5. Tb 6. Other specify _____	
202	Have upper air way obstruction	1. Yes 2. No	
203	If your answer was yes on	1. croup	

	question No 2 what were causes	2.hyperthyroidism 3. inflammatory infection 4. FB 5. Epiglottitis 5. bacterial tracheitis 4.other specify	
204	If the causes were FB ,what it was	1.Maize 2. Bean 3. coin 4.Plastic material 5. other	
205	Place of obstruction	1.Rt bronchi 2. Lt bronchi 3. Both bronchi 4. trachea 5. Other	
206	Chief complain	1. Stridor 2. Cough 3. Drooling 4. Difficulty of breathing 5. Fever Choking	
207	Partial saturation of oxygen during admission	_____ %	
208	Medical Management	1. ceftriaxone 2. vancomycin 3. Metronidazole 4. Other	
209	Developed respiratory failure	1. Yes 2. No	
210	Treated with oxygen	1. Yes 2. No	
211	Mode of oxygen administration	1. IN 2. Face mask 3. Other	
212	Got respiratory resuscitation at Pedi Emergency	1.Yes 2.No	
213	Does the child treated with MV during his/her stay	1.Yes 2.No	

10.2 Research approval sheet

Assurance of Principal Investigator

I, the undersigned, agree to accept all responsibilities for the scientific and ethical conduct of the research project. I will provide a timely progress report to my advisor and seek the necessary advice and approval from my primary advisors in the course of the research. I will communicate timely with my advisors and all stakeholders involved in the study, including any source of funding for this research.

The name of the student is Chaltu Teshome

Signature: -----

Date: -----

Approval of the primary advisor

Name: -----

Signature: -----

Date: -----

Approval of the co-advisor

Name: -----

Signature: -----

Date: -----

Approval of examiner

Name of examiner-----

Signature: -----

Date: -----