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RESEARCH ARTICLE

SYSTEMATIC REVIEW OF FOREIGN BODY INGESTION

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Abstract

Background: Foreign body ingestion is a predominant worry in pediatric population, with up to 75% of cases happening in childrenyounger than 4 years of age. Pediatric population consume a wide scope of foreign bodies, some of which are more perilous and hazardous than others.

Objective: A growing number of research on foreign body ingestion in children; nevertheless, there is no clear consensus on signs, symptoms, complications and management of foreign body ingestion among pediatric population. The goal of this systematic review was to determine the significance of foreign body ingestion in pediatric population as far as impaction site, signs and symptoms, and techniques for expulsion.

Methods: Authors began with recognizing the important examination proof that spots light on the significance of foreign body ingestion in pediatric population as far as impaction site, signs and symptoms, and techniques for expulsion. We led electronic writing look in the accompanying data sets: Ovid Medline (2015 to present), Ovid Medline Daily Update, Ovid Medline in process and other non-filed references, Ovid Embase (2015 to present), The Cochrane Library (latest issue) and Web of Science. Just examinations in English language will be incorporated. The precise selection was acted in close collaboration with a clinical examination curator.

Results: A total of 3503 children with foreign body aspiration were identified from 11 studies (Table in supplementary document). Studies were reported from different places around the world. One study were from Kingdom of Saudi Arabia. Among study participants, there were 2040 males (58.23%) and 1463 females (14.77%). The most common

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common site for impaction of foreign body was esophagus as reported in five studies. Endoscopy was used in as a method of extraction.
Conclusion: Children are prone to ingesting foreign bodies. Depending on the type of foreign body, location, and length of impaction, patients may appear asymptomatically or symptomatically with a wide range of symptoms.

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Introduction:-

Foreign body ingestion is a predominant worry in pediatric population, with up to 75% of cases happening in childrenyounger than 4 years of age [1-4]. Pediatric population consume a wide scope of foreign bodies, some of which are more perilous and hazardous than others. Normal family things, for example, little toys, stones, batteries, erasers, etc. are usually eaten foreign bodies. Coins, then again, are assessed to be the most common type of item eaten by children, representing up to 70% of examples of pediatric foreign body ingestion [5-9].

Most ingested foreign bodies either go through the gastrointestinal system suddenly and without difficulties [10,11], or they get affected, most commonly at one of the anatomic tightening focuses in the throat [12]. The upper throat, at the level of the cricopharyngeus muscle, is the most predominant area of impaction, representing over 75% of all events of foreign body impaction [13]. Items might become affected in the mid throat at the level of the aortic arch or left main bronchus, or in the lower throat at the gastroesophageal intersection on a less customary premise [14]. Foreign bodies that pass past the gastroesophageal intersection typically travel through the alimentary tract safe [14]. Foreign bodies might include an impact inside the digestion tracts in under 10% of cases [15].

Foreign body impaction can cause gastrointestinal mucosal scraped areas, dying, gastric outlet blockage, esophageal or gastrointestinal hole, and resulting mediastinitis, peritonitis, boil, or fistula advancement [16-19]. Therefore, impaction is a solid marker that anforeign body ought to be taken out.

An assortment of methods for distinguishing and eliminating an affected coin, including unbending and adaptable esophagoscopy, McGill's forceps, Foley catheter extraction, and esophageal bougienage [1,6,20,21], have been explored and announced.

The current review objective was to determine the significance of foreign body ingestion in pediatric population as far as impaction site, signs and symptoms, and techniques for expulsion.

Methods:-

Review Question

This review seeks to evaluate and point out significance of foreign body ingestion among pediatric population with regard to site of impaction, signs and symptoms and removal technique. The specific review questions to be addressed are:

(1) What is the site of impaction of foreign bodies ingested by children?
(2) What are the signs and symptoms of foreign body ingestion among pediatric population?
(3) What is the state of art management for foreign body ingestion among pediatric population?

Searches

We began with recognizing the important examination proof that spots light on the characteristics of foreign body ingestion among pediatrics. We led electronic writing look in the accompanying data sets: Ovid Medline (2015 to present), Ovid Medline Daily Update, Ovid Medline in process and other non-filed references, Ovid Embase (2015 to present), The Cochrane Library (latest issue) and Web of Science. Just examinations in English language will be incorporated. The precise selection was acted in close collaboration with a clinical examination curator.

Also, the bibliographies of any qualified articles recognized was checked for extra references and reference look were done for all included references utilizing ISI Web of Knowledge.

We considered “published” articles to be compositions that showed up in peer-reviewedjournals. Articles present in grey literaturewere excluded from our review.

Types of studies to be included
We included articles covering how to coordinate different review plans in orderly review of signs, symptoms, complications and management of foreign body ingestion among pediatric population. We did exclude articles only depicting case reports only.

We concentrated on the signs, symptoms, complications and management of foreign body ingestion among pediatric population. We included articles depicting sample sizes and articles that planned to sum up their outcomes to the populace which test was drawn from. Case series and case reports were excluded from our search. Studies from all area all over the world were incorporated with focus around studies from Kingdom of Saudi Arabia

Participants
The systematic review included examinations with tests of population<18 years who had an accident of foreign body ingestion.

Searching key words
For every data set, looking through was led by utilizing a mix of the accompanying keywords: (Foreign body OR ingestion OR pediatric OR children OR battery OR coin OR complications OR signs and symptoms OR Kingdom of Saudi Arabia OR systematic review).

We included examinations enrolling members in everyone as well as clinical settings. Studies were incorporated assuming they revealed signs, symptoms, complications and management of foreign body ingestion among pediatric population. No comparator or control test size is required in the review to be incorporated.

Studies selection process
All list items were brought into an EndNote record. Two analysts evaluated titles and abstracts for their likely pertinence.

One reviewer freely screened titles and abstracts from the search and any articles that report signs, symptoms, complications and management of foreign body ingestion among pediatric population. We gained the full text of articles that possibly meet the eligibility criteria.

There was no geographical limit on the included studies. Just published articles in the English language will be incorporated.

Outcomes
Primary outcome
To determine the signs, symptoms, complications and management of foreign body ingestion among pediatric population.

Secondary outcome
None.

Information extraction, (choice and coding)
Information was extracted from the included articles utilizing an electronic information extraction structure on Microsoft Access programming. Two reviewers freely extracted information, utilizing a standard information extraction structure which was created by the survey creators with the end goal of the review. The extraction structure incorporated the accompanying data:

1- Publication subtleties: title, authors, journal name and year and city, of distribution, country in which the review was led, sort of distribution, and wellspring of financing.
2- Study subtleties: concentrate on plan (cross-sectional, cohort, case-control), settings (clinical or population based), concentrate on transience (planned or review), patients' enlistment techniques (successive or non-continuous), the geographical area, year of information assortment and reaction rate, qualification (consideration and avoidance rules), name of appraisal tool(s), approval of evaluation tool(s).

3- Study members' subtleties: number of people reviewed/examined, population qualities including mean age (SD), and gender distribution, relationship status, demographic data.

Data management

A descriptive statistics is employed and relevant data are extracted from eligible studies and presented in tables. We then presented a narrative synthesis of the summary of the signs, symptoms, complications and management of foreign body ingestion among pediatric population.

Results:-

A total of 552 studies were identified in the search, all of them were assessed for eligibility, and 16 articles were included in this review (Figure 1). Of the 16 articles, all of them were published as peer-reviewed journal articles. Studies that were published in peer-reviewed journals were eligible for screening. However, 124 studies were excluded at the beginning of screening because all of them were addressing foreign body ingestion as an emergency trauma among other presentations to the emergency. Among the screened 63 studies, only 22 studies met the criteria to be included in this review. Finally, 16 studies were included that authors could extract all required data from abstracts or full texts. The excluded study that met our criteria were because two studies were case series, one study was case report, one study addressed management only, three studies addressed pediatric injury in general,two studies with text in French and Spanish languages, one study that assessed urgent endoscopy among children due to various reasons including foreign body ingestion and one study beyond search dates.

A total of 3503 children with foreign body aspiration were identified from 11 studies (Table in supplementary document). Studies were reported from different places around the world. One study were from Kingdom of Saudi Arabia [22]. There were 7 studies from Asia [22-24, 26-27, 29, 31] (1884 participants). There were two studies from North America [25, 28] (156 participants). There were one study from Europe (1000 participants) [30] and one epidemiological review (463 participants) [32].

Among study participants, there were 2040 males (58.23%) and 1463 females (14.77%). The most common ingested foreign body was coin in six studies [22-23, 25, 28, 30-31]. Other reported foreign body materials were buckyballs [24], seeds [26], magnets [27], cigarettes [29] and button batteries [32].

The most common site for impaction of foreign body was esophagus as reported in five studies [23, 27-28, 30, 32]. There was one study that did not report the most common site for foreign body impaction [29]. Other common sites of impaction were right main bronchus in [26], cricopharynx [31] and stomach [22, 25, 28]. Endoscopy was used in [22-25, 27-28, 31] as a method of extraction. While bronchoscopy was used by [26]. On the other hand, studies [29-30, 32] didn't report the management method for foreign body ingestion among their study samples.

The presenting complaint to emergency room at the included studies was vomiting in two studies [23, 25]. Other symptoms were abdominal pain [24], dyspnea [26], dysphagia [32]. On the other hand, asymptomatic children were the most common in the studies of [22, 27, 29]. The rest of studies did not report the most common presentation among children with foreign body aspiration [28, 30-31]. Hazard ratio was reported among 4 studies [22, 28-29, 32]. The forest plot in figure 2 shows the hazard ratios among the studies.

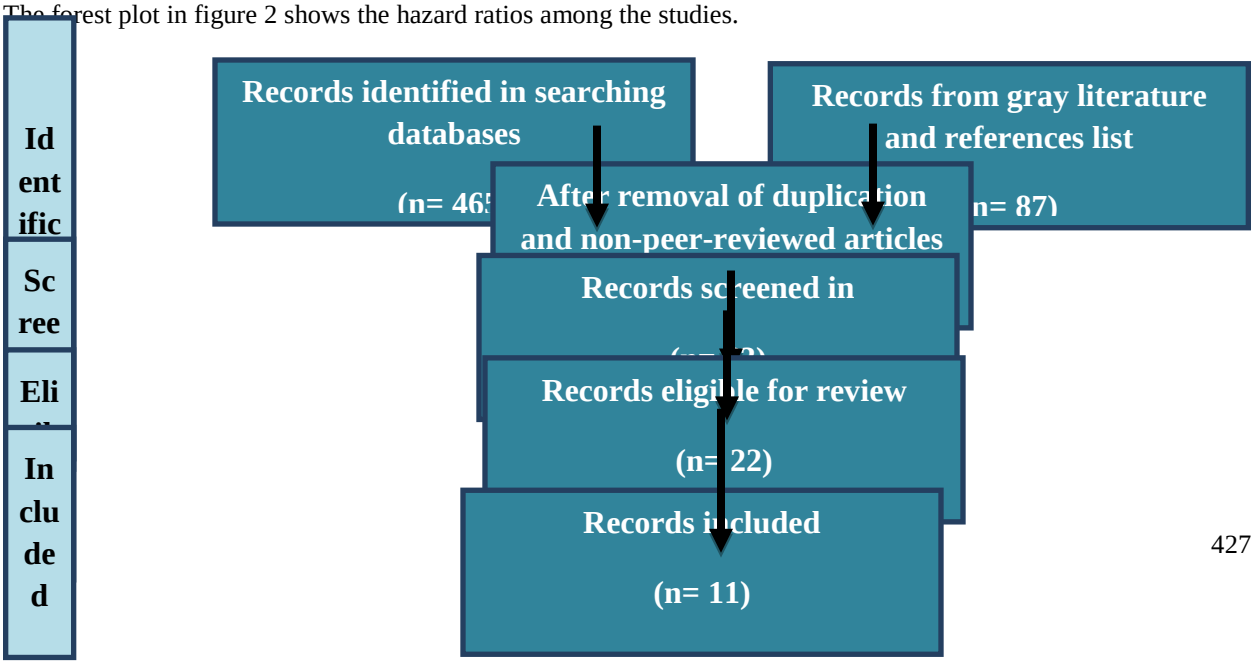

Figure 1:- Flow chart of selection process.

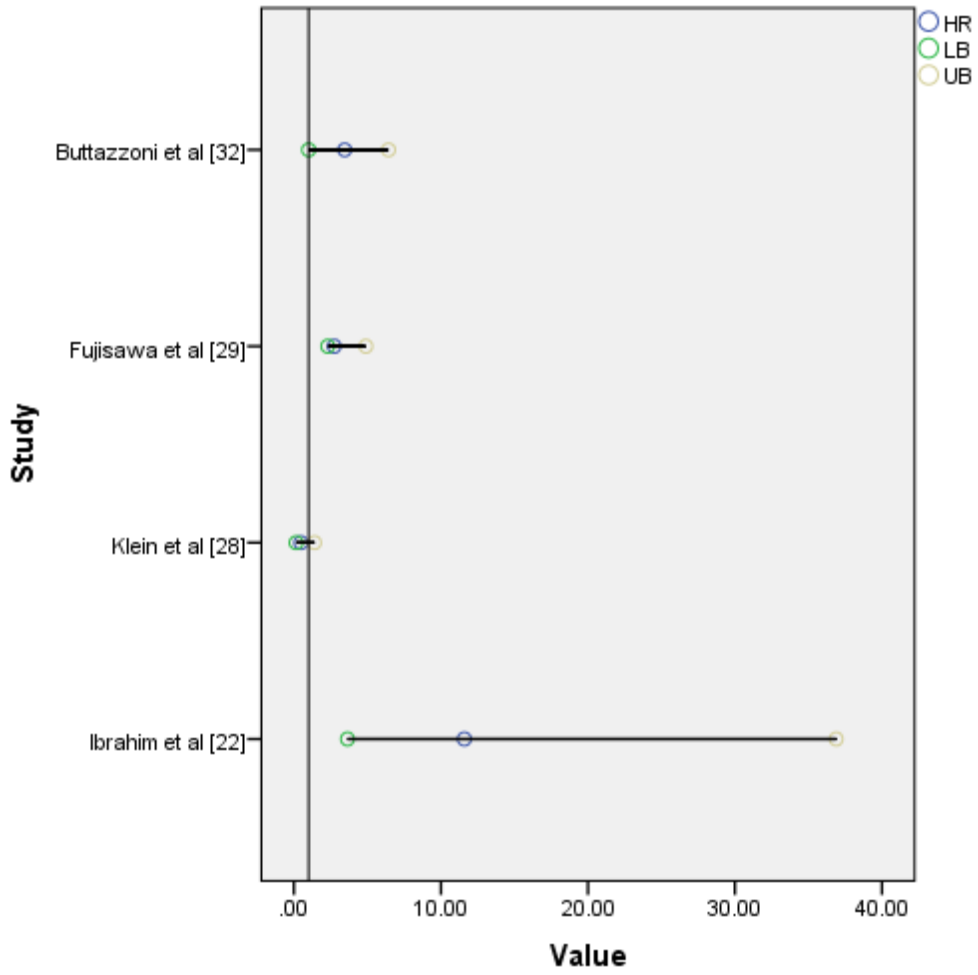

Figure 2: Forest plot.

HR: Hazard Ratio; LB: Lower Border of 95% Confidence Interval; UB; Upper Border of 95% Confidence Interval

Discussion:-

Foreign body ingestion is a sensibly pervasive worry in pediatric pathology. Children frequently examine their environmental elements by placing objects in their mouths; a portion of these things are unavoidably ingested. Foreign body ingestion is additionally a significant wellspring of parental concern. The event offoreignbody ingestion is a worldwide issue. As per the American Association of Poison Control, around 125,000 foreign body ingestions happen among people matured 19 years, and comparative numbers are accessible in European countries, as tended to in the speciality writing [1]. The orientation circulation is about equivalent: male:female = 1 : 1, and the most noteworthy rate happens between the ages of a half year and 4 years.

As indicated by Klein [2], the admission of foreign bodies in adolescents raises doubts of mental infection or perilous direct. Radiopaque things are the most normally eaten by children: coins, screws, batteries, or toy pieces [3]. Most of hardships are brought about by foreign body impaction in the throat, especially in circumstances of physical irregularities or hidden messes, albeit the writing additionally incorporates instances of a ruptured appendix brought about by foreign bodies caught in the cecum [3-5].

Foreign body ingestions are a general wellbeing worry because of their high recurrence, especially in adolescents and the older. Most of ingested foreign things go through the gastrointestinal lot without truly hurting; in any case, Louie and Bradin gauge that 10-20% will require nonsurgical intercession and under 1% will require a medical procedure [6]. The creators of the Diaconescu et al. examination found a middle period of years, with the greater

part of the patients (55.73 percent) being younger than 6 years [7]. There was a little male larger part in the orientation dissemination. These discoveries are comparative with prior research on age and orientation dispersion, for example, those of Adhikari and others [7, 8].

As indicated by conversations, the high event of foreign body ingestions in more youthful children is inferable from these children curious ways of behaving, and orientation cooperation isn't significant in this turmoil. As far as clinical appearances, Diaconescu et al. [7] tracked down that a significant larger part of patients (55.73 percent) gave stomach uneasiness, trailed by regurgitating in 34.42 percent and asymptomatic children in 29.50 percent. These discoveries contrast from those of working gatherings and creators like Arms, Abbas, and Conners, who found asymptomatic adolescents in changing rates of 25%, half, and 55%, separately [8-11].

These errors, as indicated by Diaconescu et al. [7], may be inferable from the kind of the ingested things. The creators of the Diaconescu et al. [7] series played out a numerous relapse investigation, which uncovered that the state of the foreign body (sharp molded objects being related with clinical side effects) (halfway = 0.56,), trailed when between the occasion and the show (side effects happening in patients who introduced inside the principal hours after ingestion) (incomplete = 0.45,), and the last prescient component is the ag Other specialists found a connection between area, size, and time slipped by after inadvertent admission [12].

Albeit the creators anticipated a solid connection between the size of the foreign body and clinical qualities, this couldn't be externalized, doubtlessly because of the heterogeneous age appropriation across Diaconescu et al. [7] case series (teens ingesting little foreign bodies had less clinical side effects than babies ingesting little pieces). The exploration by Diaconescu et al. [7] incorporates a wide scope of ingested things, from pennies to magnets and unidentifiable plastic items. Diaconescu et al. [7] found that the most frequently consumed things were coins, which were accounted for in 26.23 percent of the patients, while Rybojad et al. [12] tracked down comparable outcomes. More modest pennies did easily, but greater coins caused regurgitating and stomach torment in 7 cases.

4 youths (6.55 percent) had consumed soluble plate batteries from toys, far off regulators, and watches. Diaconescu et al. [7] found that ingestion of circle batteries and plastic toys was more normal in children; this may be made sense of by age-explicit inclinations for various sorts of toys: acoustic and moving toys in children younger than three, and development games in more seasoned children. Plain X-beams are a fundamental analytic apparatus, filling in as the essential first imaging work-up. Just 42 of the patients in the Diaconescu et al. [7] dataset had anforeign body found utilizing this methodology. In the leftover cases, the patients had either eaten or passed a nonradiopaque thing past to affirmation.

The X-beam recognizable proof rate in Diaconescu et al[7] .'s review was 68.85 percent, which is tantamount to rates detailed by working gatherings' examinations and the exploration of Litovitz et al. also, Shastri et al., which shifted from 64% to 96.04 percent [8, 13, 14]. Diaconescu et al. [7] concur with different creators who express that the ideal methodology for eliminating the foreign body is generally subject to an assortment of variables, including the patient's age, clinical condition, the size, shape, and kind of the foreign body, the anatomic area, specialized potential outcomes, and endoscopist abilities [15]. As indicated by Waltzman et al. [16], upper gastrointestinal endoscopy is the most frequently used strategy for recovering gulped foreign materials. In the past review, 31.14 percent of patients were effectively taken care of with endoscopic evacuation; this rate is more noteworthy than in Yang's review (23%) however lower than in Pokharel et alstudy .'s (98.06 percent) [17, 18]. These varieties may be credited to the shifting time elapsed among hospitalization and show, the size and sort of things ingested, or the different mechanical assets accessible in pediatric foundations. Just two of the patients who had endoscopic evacuation experienced issues like little and self-restricted dying.

Aside from two children recently determined to have esophageal stenosis, Diaconescu et al. [7] observed no fundamental esophageal infection in their partner of children giving foreign body ingestions. Eosinophilic esophagitis, esophageal stenosis, or diverticula, as Kramer et al. found, may energize esophageal impaction [19]. Diaconescu et al. [7] announced just a single instance of ominous advancement in a 2-year-old child female who had a circle battery affected in the upper cervical throat and extricated in the otorhinolaryngology administration; the patient later given complexities like tracheal-esophageal fistula and bronchopneumonia, as well as high esophageal stenosis that necessary endoscopic There were no passings, which is reliable with the low casualty rates connected with foreign body ingestions reported in past investigations all through the world. [1].

Notwithstanding, the creators of the Diaconescu et al. [7] series had an enormous number of ineffective endoscopic expulsions that were for all intents and purposes indistinguishable from the fruitful endeavors (27.86 percent versus 31.14 percent). Beside this, 11 things that were not found during the first endoscopic assessment were therefore found in quite a while's excrement by guardians, bringing the complete number of taken out foreign bodies to 28. (45.90 percent). Regardless of parental reports of steady perception, 14 things (22.95 percent) were rarely recuperated. Dissecting this information, Diaconescu et al. [7] report rather troublesome outcomes, in light of the fact that the extent of expulsions is lower than the small portion of unconstrained ends. Late show, joined with an absence of early endoscopy, assumes a huge part in resulting complexities and the powerlessness to track down foreign bodies; in around half of the situations where the foreign body was not found, upper stomach related endoscopy identified erosive gastric mucosal injuries, demonstrating that the item had passed. By far most of patients (60 children, 98.36 percent) were released in great wellbeing; all guardians were offered data on plausible advance notice hints flagging a blockage or hole, as well as exhortation on everyday stool assessments for their children.

Diaconescu et al. [7] agree with Cheng and Tam's prompt that guardians examine their children's defecation ordinarily for foreign bodies [20]. Clinical treatment for things that can't be reached with endoscopic instruments is reliant upon the sort of show and results; prokinetic medications and diuretics might be an elective procedure with a 100% achievement rate before to any careful mediation [6]. Early recognition and the executives of foreign body ingestions can incredibly limit horribleness attributable to inconveniences. Diaconescu et al. [7] concur with Palta et alreport .'s that expanded attention to guardians and individuals engaged with institutional consideration settings (nurseries, kindergartens, habitats for children with neuromotor incapacities, and children psychiatry administrations) as well as dynamic observation during everyday exercises are important to lay out defensive guidelines that assistance to keep unsafe materials out of the children range [21]. Simultaneously, among children less than three, the best safeguard strategy is to stay away from plays with little pieces that might be promptly eaten or inhaled; yet, this exhort is generally overlooked by parents.

Conclusion:-

Children are prone to ingesting foreign bodies. Depending on the type of foreign body, location, and length of impaction, patients may appear asymptomatically or symptomatically with a wide range of symptoms. Foreign bodies are most commonly affected at the cricopharyngeus level in the upper portion of the esophagus. When the item is placed beyond the distal esophagus, spontaneous passage is more possible. A threatened airway, ingestion of sharp items, button batteries, numerous magnets, and animal bones, and a prolonged period of impaction are all indications for immediate foreign body removal (over 24 h). Certain foreign bodies, such as button batteries and magnets, have a high complication rate and must be removed immediately, but others, such as coins, seldom cause issues.

However, coin ingestion still causes serious morbidity and death. There have been just a few large-scale investigations on coin ingestion, specifically on coin denomination and spontaneous passing. Finally, numerous extraction procedures are utilized to remove foreign materials, and no single approach is applied consistently throughout care centers. Endoscopy looks to be the most often utilized procedure with good success rates, and flexible endoscopy in particular tends to have reduced complication rates and better patient comfort in eliminating swallowed foreign materials.

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