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# The Efficiency of Auscultation Method in Determining the Position of Feeding Tube for Children

**Nabaa S. Malik**
Department of Nursing University of Baghdad, Iraq
Faculty of Nursing, University of Baghdad, Iraq Address, Babylon Hilla City Iraq

**Zaid W. Ajil, PhD**
Pediatric Nursing, Department of Nursing, University of Baghdad, Iraq

**Abstract: Background**: Nasogastric tube (NGT) is an important means of delivering food and medicine to patients who are unable to meet their daily needs. It is used to care for patients around the world who suffer from many diseases, such as falling into a coma or having an increased frequency of breathing, as well as those who are placed on a ventilator. Premature babies, as well as children who suffer from weight loss and dehydration, and in other pathological conditions that require its use for the purpose of giving food and medicine However, in addition to its positive aspects, there are many problems related to it, such as its entry into the respiratory system and other problems that lead to death. Therefore, the correct position of the feeding tube must be ensured in several ways before giving food to the child.

**Purpose**: The aim of the study is to determine the efficiency of the auscultation method in determining the position of the feeding tube.

**Methods**: The study was carried out from September 15, 2023 to April 15, 2024. Fifty children under the age of five who were admitted to the Babel Maternity and Children's Teaching Hospital were included. A quantitative descriptive design was used in this study.

**Results**: auscultation method indicating that the feeding tube was inside the stomach, meaning that 96% were inside the stomach. The agreement between the auscultation method and X-rays was very weak.

**Conclusion**: The auscultation method is inaccurate in determining the position of the feeding tube in children and the results of the auscultation method are also affected by many external environmental factors, as well as the patient's condition and the skill of the nurses.

**Keywords:** feeding tube; auscultation; X-ray.

## 1. Introduction

Nasogastric intubation (NGT) is a very common procedure performed by doctors and nurses in critical places. They may face many difficulties in the process of inserting and verifying it. Although it may seem an easy process, many cases of errors have been recorded in many pediatric and adult patients[(1),] where this method is used in children who are unable to meet their daily food needs due to problems in the process of chewing and swallowing, as well as in cases of unconsciousness or damage to the mouth as well as in cases of stomach cancer or injury in the abdomen as well in children who need additional nutrition, as the feeding process is very

important for the process of growth and building tissue for humans as well as for the functions of the body (2), as the benefit of using a nasogastric tube (NGT) to give treatment and food to patients as well as to reduce pressure on the stomach[3]. When the process of incorrect insertion of the nasogastric tube (NGT) into the stomach is accompanied by many complications and problems such as pneumothorax, or insertion of the nasal tube into the skull, inflammation of the respiratory system as well as pulmonary hemorrhage, and the error rate ranges from 0.5-89%(4), It is also possible that the feeding tube is inserted into the digestive system, causing perforation of the esophagus, Gastroesophageal Reflux Disease GERD, diarrhea, and dyspepsia, and the wrong insertion often occurs in newborns and in the case of general anesthesia, as well as in patients who have neurological diseases and serious diseases[3].

To avoid these problems, several methods must be used to confirm the location of the feeding tube, and one of these methods is the auscultation method is one of the methods used in the process of determining the location of the feeding tube, as it is used continuously and widely by health workers, especially nurses. X-ray method, which is the most accurate method as it is considered one of the reference methods in the process of determining the location of the feeding tube [5]. It works to photograph the path of the tube as it enters the stomach and thus explains the incorrect entry of the nasogastric tube and its settling outside the stomach. However, in addition to its advantages, It carries many disadvantages, including delaying the patient's appointment for nutrition or treatment[6], as well as increasing costs and the X-rays must be read and interpreted by the doctor[7]. The auscultation method is applied to verify the correct position of the NGT tube inside the stomach, which is one of the most used methods by nurses, which is done by using a syringe and pushing a quantity of air into the tube, and in the meantime, using a stethoscope, you must listen to gurgling sounds or bubbles and moaning In the epigastric region, however, even if the tube is in the respiratory system or in the digestive system, sounds can be heard, which leads to confusion with stomach sounds [1].

The feeding tube must be checked at least once to ensure its correct location inside the stomach and to avoid serious complications that result from changing its location due to movement or during sleep[8]. Food works to provide the body with energy from the stage of being a fetus until after puberty, and provide the body with energy that is important in the processes of physical development and intellectual[6]. Food is also considered a basic support against many diseases, such as malnutrition and many other diseases, especially serious ones. It helps to achieve good results for patients, and it must be prescribed to patients and provided to them by nutritionists or nurses to avoid errors that occur as a result of incorrect feeding[9], nurses may also face difficulties in the process of placing a feeding tube and verifying its location. It was found that the error rate resulting from inserting 2000 feeding tubes is about 1.3% - 2.4% [10], following up on needs nutritional deficiencies in children, treating their deficiencies, and providing instructions and guidance to avoid nutritional errors is one of nursing responsibilities [11], as well as providing instructions about the nature of the food that should be taken, instructions about adequate hours of sleep, and general information such as about exercise and hygiene[12], especially taking care of oral and dental hygiene. In children [13]. The World Health Organization conducted a study in 2014 in which it proved that 20% of deaths that occur in children are due to congenital malformations. They also cause many side problems that are also a cause of death, as the death rate due to side effects ranges from 12.3% - 32% [14], as well as the birth of premature babies is among the reasons that contribute to deaths. It also causes many problems, including respiratory diseases[15], or psychological problems due to congenital deformities that affect their external appearance[16], As feeding problem commen in pediatric age group and increase with some disease[17].

## 2. Methods

### *2.1 Research design*

A quantitative descriptive design was implemented and this type of design is applied to compare the two methods of auscultation and the X-ray method to determine their efficiency in determining the position of the feeding tube in children under five years of age.

### *2.2 Setting and samples*

The study was carried out from September 15, 2023 to April 15, 2024. The patient's demographic information was taken, an auscultation test, and an X-ray test were performed, taking into account the basic conditions of the research. A sample of fifty children under the age of five who were lying in the hallway and had feeding tubes placed for them was included, as this group is considered the largest percentage of children in the neonatal intensive care unit (NICU) and the pediatric intensive care unit (PICU) within Babylon Teaching Hospital. For birth and children.

Children, patients with facial or skull fractures, those taking stomach acid inhibitors, and patients with tracheoesophageal fistula were excluded.

### *2.3 Measurement and data collection;*

The study tool used from the previous Portuguese study. Permission was obtained from the author to translate and adapt it to the current study. It consisted of a part that included the patient's demographic information, such as the patient's age, age at admission, height, type of natural or cesarean delivery, and the patient's sex, as well as a part that included the procedure. Auscultation and X-ray methods are considered the gold standard.

The sample consisted of fifty pediatric patients who were placed on a feeding tube and whose ages ranged from 1 day to 5 years and who were hospitalized in the PICU and NICU. Permission was obtained from the child's family on the subject's consent paper. Auscultation was performed by blowing a quantity of air through the feeding tube using a syringe, and performing the auscultation process using a stethoscope to determine the position of the feeding tube. The reading was recorded using the word "yes" or "no" on the questionnaire sheet. After that, an X-ray was taken of the patient, which showed the tube entering the stomach. The auscultation method is then evaluated by radiographic imaging, which is considered the gold standard in determining the position of the feeding tube

### *2.4 Data analysis;*

SPSS V.27 in data analysis and management. Statistics were descriptive including number, percentage of frequency, mean, and standard.

Use standard deviation and inferential statistics to fit the distribution of the data. It will also use K-S to determine the normal distribution of the data. Pearson correlation test, analysis of variance, paired sample t-test, and single-sample t-test were used.

Non-parametric equations were used: Spearman correlation test, Mann-Whitney test and Kruskal-Wallis test, respectively, and regression analysis was used to estimate the relationship between variables in case of non-normal data.

### *2.5 Ethical considerations.*

Official permission was obtained from the University of Baghdad, College of Nursing, and the Research Ethics Committee, where the study protocol was presented. Permission was also obtained from the Iraqi Ministry of Health, the Central Planning Bureau for Statistics, and the questionnaire form was approved.

Final administrative approvals were taken from the Iraqi Ministry of Health, the Babylon Health Department, the Governorate Training and Development Center, and the approval of the Babylon Maternity and Children Teaching Hospital.

## 3. Results

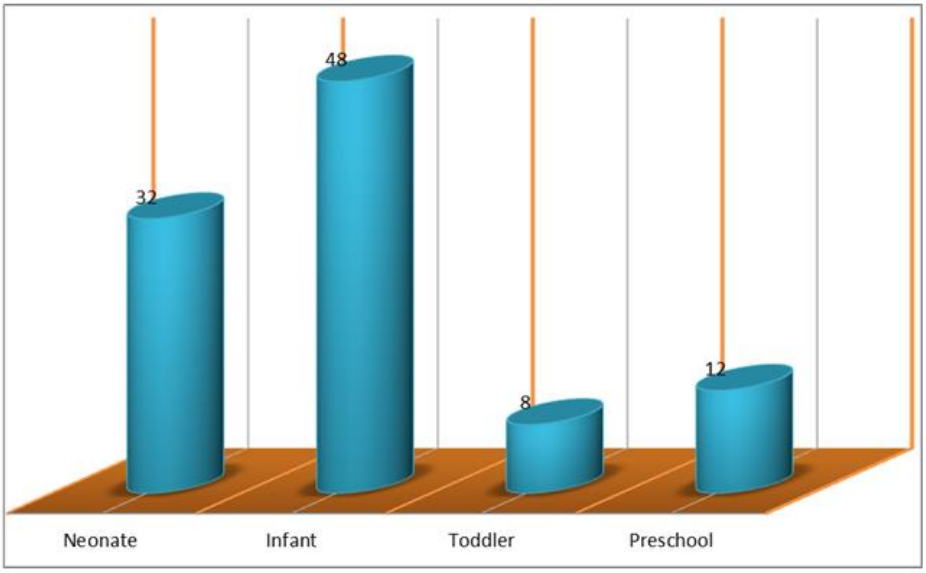


**Figure (1): Percentage of sex for the children .**

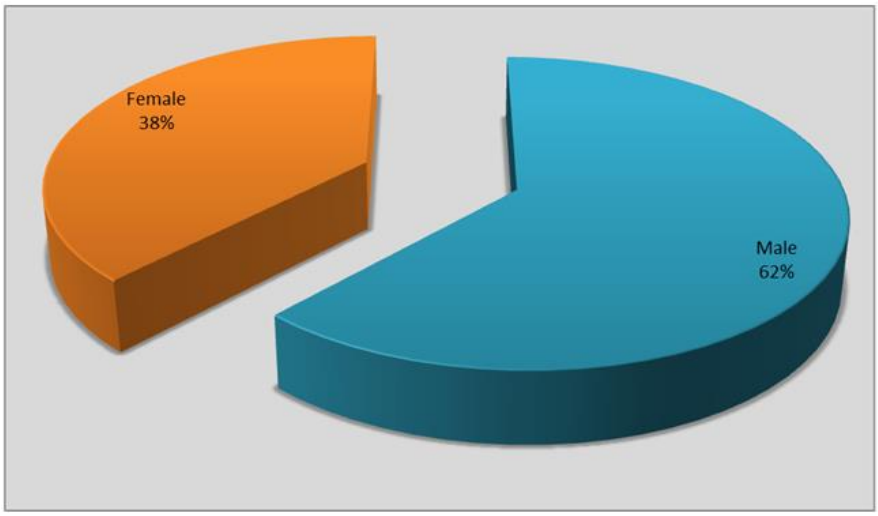


**Figure (2): Percentage of age group for the samples.**

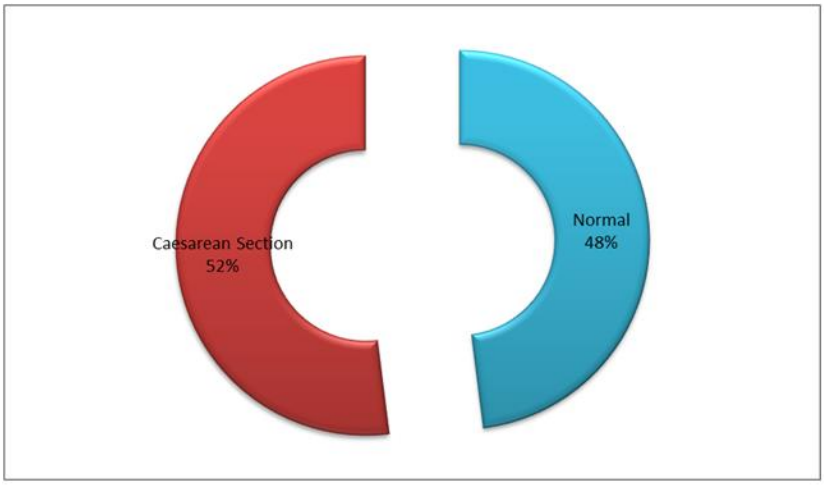


**Figure (3): Percentage of type of birth for the participants.**

**Table 1: -Methods of verifying the position of the feeding tube:**

| Method | | f. | % |
|---|---|---|---|
| Chest X-ray method to determine the position of feeding tubes | In | 45 | 90.0 |
| | Out | 5 | 10.0 |
| | Total | 50 | 100.0 |
| Auscultation method/ Was it possible to perform auscultation ? | In | 48 | 96.0 |
| | Out | 2 | 4.0 |
| | Total | 50 | 100.0 |

**f= frequencies, %=Percentages**.

The results in table 2 showed the 90% was successful when used Chest X-ray method to determine the position of feeding tubes and 96% Was possible to perform auscultation.

## 4. Discussion

The study sample consisted of fifty pediatric patients. According to figure (1), the number of infants was less than half of the sample included in the study, followed by newborns.

According to a study conducted in 2022 in the United States, which confirmed that infants who are lying in the intensive care unit often require the use of feeding tubes for the purpose of breastfeeding due to the incomplete development of their digestive system as well as their weak immunity, and this may cause them many problems, such as Infection and bacterial colonization, as the feeding tubes are in direct contact with the stomach and work to deliver milk directly to the infant's stomach[18].

The reason, in my opinion, is that the sample was taken from this age, which represents the largest age percentage among children, and newborns are always susceptible to issues related to breastfeeding or other health issues that impact their nutritional status. As a result, the treating physician substitutes nasogastric tube feeding for oral feeding. In figure(2) showed that the percentage of male participants was higher than the percentage of female participation. Figure(3) showed that type of birth, the percentage of cesarean sections was slightly higher than the percentage of natural births for pregnant mothers. One of the studies conducted in 2015 in Germany confirmed the increase in births by caesarean section, which attributed the reason to the mother's choice of caesarean section instead of natural birth, as well as the changes occurring in society from a scientific and cultural standpoint, all of which contributed to the increase in caesarean section [19]. From the researcher's point of view and his interpretation of this increase is due to cultural and social reasons among the population.

Table (1) showed that when using the X-ray method, the results were that a large percentage of feeding tubes were safe for feeding, and a small percentage of them were in the wrong location, which made them considered dangerous during use. Research by Stephen Taylor, 2021, at the tertiary care hospital, which described the feeding tube's location inspection, supports this outcome. According to the study, a significant portion of feeding tubes are positioned correctly, or in the area close to the stomach, indicating that they are safe for feeding; nevertheless, a smaller percentage are outside the stomach, indicating that breastfeeding is not recommended. It also demonstrated the drawbacks of X-ray use, such as postponing the patient's appointment for care and meals. In addition to the misreading it is subjected to, experts should read it[6]. According to the researcher's opinion, X-rays are the most accurate method in determining the correct position of the feeding tube because they visualize the path of the tube.

The result, according to Table (2), which showed the results of the auscultation method, was that the largest percentage of feeding tubes were in their safe place, as the researcher was able to hear the sound of air flow through the tube using a stethoscope.

According to a study conducted in 2023, she tested 178 samples of feeding tubes and compared the two auscultation methods with the pH method using the X-ray method. She found that the

auscultation method was inaccurate, as its specificity was sixty-one percent and its sensitivity was seventy-nine percent [(1)]. From the researcher's point of view, the X-ray method is highly accurate because it takes a picture of the tube path as it enters the stomach, but the auscultation test is accurately affected by a variety of external factors, including the patient's age and health, the quality of the speaker used, and the expertise of the person conducting the hearing test

## 5. Conclusion

The auscultation method is considered to have low accuracy when compared to X-rays to determine the position of the feeding tube.

**Recommendation:**

More accurate methods must be found to determine the position of the feeding tube in children and The continuing education unit must conduct many training workshops for nurses working in the hospital.

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