

Comparison of Respiratory Status between Semi-Fowler and Elevated Prone Position among Under 5 Years Old Children with Acute Respiratory Tract Infection in Ibrahim Malik Hospital Sudan

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Abstract

Acute respiratory tract infections (ARI), diarrhea and malnutrition, are the common causes of death in under-five children. Four million of them die from ARI every year, and two-thirds of them are under one year of age. ARI include acute upper and acute lower respiratory tract infection. Signs and symptoms vary from child to other. Management of ARI has both medical and nursing care. The nursing parts such as steam esteem inhalation and nursing positioning. This study aims at assessing the respiratory rate (RR) with elevated prone position compared with the semi-fowler position. Ultimately, to improve children respiratory status, it is a prospective comparative hospital-based study conducted at Ibrahim Malik Hospital Sudan (2015-2017), done at the pediatrics department short stay emergency ward in Khartoum State. The data was collected using observation checklist from a sample of 401 children. Data were analyzed using Statistical Packages for Social Sciences-Version 20 (SPSS). There were significant differences found in respiratory rate between the two positions, i.e., the traditional position semi-fowler, and a new position, elevated prone position ($P < 0.000$). The elevated prone position is better than the semi-fowler in normalizing heart rate compared with the traditional semi-fowler position. The elevated prone position had a significant impact related to the respiratory improvement status in children under five years' old and very efficient in infants than old children.

Keywords: Elevated prone position, semi-fowler position, and respiratory rate.

INTRODUCTION

Acute respiratory tract infection management requires both medical and nursing intervention the intervention such as therapeutic positioning and steam inhalation, as well as an invasive physical therapy intervention, medical intervention such as medication nebulization and oxygen therapy. However, the medical treatment followed by

nursing management enhances effective cure (Keene *et al.*, 2000). Body positioning helps to improve oxygen transport by different ways such as increasing inner oxygen volume, lung compliance, and respiratory rate. So, positioning of patients and children became the focus of research during the last decade (Keene *et al.*, 2000).. Providing proper positions for children suffering from respiratory tract infection have many benefits like regional ventilation-perfusion ratio aids airway clearance (Keene *et al.*, 2000). Also, helps in reduction of nosocomial

infection, decreasing the use of oxygen therapy and medication. Moreover, leads to few hospitals stay and minimize the cost of management. Prone position was found more efficient regarding oxygen saturation, the partial pressure of oxygen, oxygenation index and episodes of desaturation, (Curley *et al.*, 2000; Dimitriou *et al.*, 2000).

However, children whose age between 18 months to 16 years with acute respiratory tract infection the upright position is recommended. While in children suffering from burns with chemical has a severe side effect. Also, allow the child to sit in different therapeutic position, (Curley *et al.*, 2000).

Based on the researcher's experience positioning has an improving effect on children respiratory distress. This experience motivated the researcher to compare the effect of two different positions, the traditional semi fowler and prone elevated position, also the researcher review the literature and found many comparison studies reported the elevated prone position is better than other positions such as (supine and semi-fowler).

In Muller Medical College Hospital, Mangalore a randomized clinical trial was done in 17 infants with tachypnea. The results showed lower respiratory rate in 20 to 30-degree elevation ($p=0.001$) and prone position ($p=0.031$) as compared to supine with no significant difference in heart rate, (Murdoch and Storman, 1994). Other studies conducted in 20 convalescent infants in 3 different postures, supine, supine with head up and prone; the result prone on is best. Moreover, little use of oxygen therapy and medication and a few of hospitals stay and these leading to minimizing the cost. The most common clinical conditions in under five were asthma, chronic obstructive pulmonary disease (COPD), TB, cystic fibrosis, respiratory failure and other pulmonary diseases, (Wells *et al.*, 2005).

MATERIAL AND METHODS

Study area

The Study conducted at Ibrahim Malik Hospital located in the South of Khartoum. At the Pediatrics section which consists of general wards and outpatient clinics. The hospital has many other sections of different specialties as well.

Sample population

Children between one to five years admitted with acute respiratory tract infections to Ibrahim Malik Hospital during May 2015-May 2017.

Study Design

It is a prospective hospital-based study to investigate the

respiratory status of children whose ages range one year to less than five years; with acute respiratory tract infection.

Study Population

The study population is the admitted children between one to five years with acute respiratory tract infection there is a tow group of population to the age the first(1year less than 2 years) and the second is (2 years less than 5) at Ibrahim Malik hospital.

Techniques of Data Collection

An observation checklist used to collect data from the study population. It contained demographic data, e.g. (child name, age, sex, hospital name and date of admission and diagnosis) and standardized respiratory rate, pulse rate, and oxygen saturation. The data were collected once only from the study population.

Intervention

The intervention was carried out using an observation checklist which contains standardized respiratory rate, the children' age ranges from one year to less than five years with acute respiratory tract infection. Each child was exposed to the two different positions interchangeably. The first position is the semi – Fowler's position, i.e., placing a child on the back elevated at 45 degrees angle on the bed with the support of a firm surface. While the second position is the Elevated prone position which is placing a child on the abdomen and back raised at 45-degree angle, head turned to one side, with the help of pillow, each position lasts five minutes and was made and there is an intentional break of ten minutes in between tow position.

Sample Procedure

A Simple Random sample technique used to assign the study population the selection of patient randomly using software done by computer (if there are ten patients the computer selected five of them).

Sample Size

The researcher used software to select the study sample (the children with acute respiratory tract infections admitted in Hospital and their ages range from one year to less than five). The study sample consists of 401 patients selected randomly according to this formula:

$$N = (z p q)^2 / (n-1) d^2 + z (2pq)$$

N= Total population.

P2 = 6

1-P s.g.

D= desire margin

Inclusion Criteria

Hospitalized or admitted children to Ibrahim Malik hospital with acute respiratory tract infections.

- Children their ages between 1 to less five years
- Acceptance of parents to participate in the study

Exclusion Criteria

- The severe respiratory distress Children.
- Children on ventilator support and continues oxygen supplementation
- Refused parents who refused to be part of the study.

Instruments Used

- A checklist to assess the respiratory status.
- A pulse oximeter to check the oxygen saturation.

Disruptions of Pulse oximeter

- Bitomssatpuls
- Made in Germany 2007
- Used environment finding
- Serial number 0607010.

Data Collection Methods

The data was collected by observation checklist, which consist the stander of children respiratory rate according to stander there is a tow stander the first was (1> 2), second (2>5) years.

DATA ANALYSIS PLAN

Descriptive Statistics

The collected data analyzed to obtain frequency, percentage, mean and standard deviation.

Analytical Statistics

Ethical consideration

- The researcher obtained written permission from the Head Directors of the Hospital and the parents. Parents were aware of the purpose of the study, and their cooperation sought for the investigation.
- Written approval from Head Directors of the Hospital.
- Verbal consent obtained from the children' parents.
- Self-determination, privacy, possible physical and psychological effects considered.

RESULT

Table 1. Distribution of the study group (according to their standard respiratory rate)

Age group (Yrs.)	Frequency	Percent
1 > 2	160	39.9
2 > 5	241	60.1
Total	401	100.0

Mean \pm SD = 2.74 \pm 1.11

Table 2. The Assessment of respiratory rate in the two positions at age (1 > 2 yrs.)

	Semi-fowler	elevated prone
N	160	160
Mean	32.79	24.37
SD	12.24	7.60

Mean SD= 12.24 +7.60

Table 3. Assessment of respiratory rate in the two positions at age (2 > 5 yrs.)

	Observation - semi flower	Observation elevated prone
N	241	241
Mean	29.78	20.11
SD	17.90	3.65

Mean \pm SD = 17.90 \pm 3.65

Table 4. The Comparison of the Respiratory rate between the two positions

	Respiratory rate /minute (1 > two years)				Respiratory rate /minute (2 > five years) Mean \pm SD = 17.90 \pm 3.65			
				Lower	Upper			
semi flower - elevated prone	8.4188	9.49377	0.75055	6.9364	9.9011	11.217	159	0.000

Mean \pm SD = 8.4 \pm 9.5, P value = 0.000

DISCUSSION

This study is primarily concerned with the assessment of the children who suffer severely from acute respiratory rate or distress. It assesses the respiratory rate among children one to less than five years old. The researcher examined the positions of each child among the same group. Firstly, each child is exposed to the (semi- fowler's position) then to the elevated prone position. After that, the data of each position recorded accurately.

The variable assessed was the respiratory rate according to a standardized checklist. There were two different age subgroups. The Firestone is from one less than two yrs.; N= 160. For the semi-fowler position, the mean was (33.79), and the elevated prone mean (24.37), and the p-value was (P = 0.000). There was highly statically significant, so there was a decrease in (R.R) in a new position rather than in traditional one. Whereas the second subgroup is two-less than five yrs.); N was 241. The semi-fowler positions mean 29.8 and 20 for the elevated prone position, and the p-value was (P = 0.000). There is a decrease in the respiratory rate in a new position than the traditional one.

According to the comparison of the two age subgroups, we find out that the decrease in R.R in the first subgroup is much better than in the second one, this means that the new position is more efficient for young children than for the older ones, the difference is (Statically significant).

CONCLUSIONS

We found that there is a statistically significant relationship between the two positions. There is an improvement in the respiratory rate in elevated prone position than in semi-fowler position. Hence, causes improvement in respiratory status in patients with

elevated prone positions. The improvement was better in young children than in the old ones not only in respiratory status but also helps with airway clearance. Most of the incidences occur among males' more than in females, and the clinical conditions are pneumonia and malnutrition associated with pneumonia.

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