

# Utilization And Conservation Of Oxygen: Knowledge And Attitude Among Nursing Officers

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## Abstract:

**Background:** Oxygen plays a pivotal role in medical treatment to preserve life and promote well-being of human beings. The COVID-19 pandemic has emphasized the role of medical oxygen as a lifesaving therapy. Nurses have an important role to implement various strategies for proper utilization and conservation of oxygen in health care settings. This study aim to evaluate the knowledge and attitude regarding utilization and conservation of oxygen among Nursing Officers working in pediatric units and to develop an E-educational booklet.

**Material and methods:** This study was done using a descriptive design among 210 Nursing Officers working in pediatric units at AIIMS, New Delhi. They were quantitatively assessed using structured knowledge questionnaire and a Likert scale with five points regarding utilization and conservation of oxygen. Total enumerative sampling technique was attempted. Data was analyzed using descriptive and inferential statistics. P value of <0.05 was considered as statistically significant.

**Results:** More than half of the Nursing Officers 125(59.52%) had moderately adequate knowledge and majority of them 172 (81.9 %) had highly favorable attitude regarding utilization and conservation of oxygen. There was a statistically significant association between Nursing Officer's educational status and their knowledge regarding utilization and conservation of oxygen with p value of < 0.05. The study also showed that there was a weak positive correlation between knowledge and attitude level of Nursing Officers on utilization and conservation of oxygen.

**Conclusion:** Majority of the Nursing Officers had moderately adequate knowledge and the E-educational booklet developed will address nurse's knowledge regarding utilization and conservation of oxygen.

**Key words:** Knowledge, Attitude, Oxygen utilization, Oxygen conservation

Date of Submission: 20-07-2023

Date of Acceptance: 30-07-2023

## I. Introduction

Oxygen is a physiological requirement for normal cellular function and it is vital to sustain human life. Oxygen is listed as a core item on the WHO Model List of Essential Medicines and List of Essential Medicines for children since 2017 for treatment of hypoxemia. Oxygen therapy is a medical treatment which is prescribed to prevent or treat hypoxemia.(1) The Oxygen treatment has been used in medicine for almost 100 years and it is impossible to practice modern medicine without the support of adequate oxygen supplies(2). Medical oxygen is required across many levels of health care system. It is used for managing different health problems such as pneumonia, bronchial asthma, cystic fibrosis etc. The vulnerable groups such as elderly, pregnant women, newborn and people with respiratory and cardiac disorders need oxygen therapy in regular basis. The appropriate utilization and conservation of therapeutic oxygen is important as scarcity leads to loss of lives. So oxygen is given in most efficient and least wasteful manner and regular monitoring has to be done to ensure judicious and rational utilization.

Based on a WHO report every year at least 1.4 million deaths occur due to the lack of supplemental oxygen therapy and inappropriate administration of oxygen(3). The COVID-19 pandemic has augmented global demand for oxygen and made the delivery of oxygen supplies more urgent than ever and the need for oxygen has increased to 1.1 million cylinders(4). The access of oxygen is limited due to cost, infrastructure and logistical barriers. Health facilities often cannot access the oxygen they require, resulting in the unnecessary loss of lives.(5) During the second wave of COVID-19 the entire country has been affected with lack of oxygen supplies as well as resources. India required about 8000 metric tons of medical oxygen per day, COVID-19 has made abundantly clear that, the supplies of medical oxygen must be managed with advanced planning and rigorous monitoring.(6)

Oxygen is a lifesaving drug. So oxygen administration should be considered in the same way as other drugs. The inadequate administration of oxygen leads to hypoxemia and excessive administration leads to oxygen toxicity. The improper use of oxygen is extremely harmful to the patients. So it should be used only when indicated and accurate monitoring also important. Oxygen is considered as a complex product. So, access to oxygen meets many challenges on availability, quality, affordability, management, supply, human resources capacity and

safety(5). The lack of awareness about using different oxygen delivery devices, unclear prescription, unavailability of proper functioning equipment, absence of oxygen therapy protocol may leads to wastage of oxygen and which may affect the health care outcome also. The various measures taken to prevent wastage of oxygen while providing care to the patient is known as oxygen conservation. The COVID 19 pandemic has increased the demand of oxygen and lots of people died because of the oxygen shortage. This indicates that oxygen should be utilized properly as well as certain measures has to be taken for the conservation of oxygen. The vital measure to incorporate in health care setting is judicious use of oxygen according to the target level oxygen saturation(7).

According to research studies conducted in various countries found that there was an oxygen therapy knowledge and attitude gap among practicing nurses in hospitals. For example, the study conducted in Masih Daneshvari Hospital, Iran showed that nurses had moderate level of knowledge regarding oxygen therapy (**Maryam Hassanzad, Hosseinali Ghaffaripour,2022**)(8). Another cross sectional study conducted at University of Gondar comprehensive specialized hospital revealed that more than half of the nurses were found to have adequate knowledge, attitude, and practice about oxygen administration(**Kennean Abitew,2022**)(9). The study conducted by **Fanuel Ghebremeskel Ghebremichael et al ,2019** (10) in Orotta national referral hospital (ONRH) showed that there was a gap in knowledge, attitude and practice among the participants. Some of the possible factors were also identified which includes lack of oxygen therapy training and guideline and work load. A cross sectional study conducted by **Olufemi O Desalu et al (2022)**(11) reported that a significant proportion of doctors and nurses had poor knowledge of acute oxygen therapy. Another study conducted by **Dede Tisei, Theresa (2019)**(12) among nurses working at three selected hospitals in the Tarkwansuaem municipality demonstrated that participants had knowledge, attitude and practice gap on oxygen therapy. A study carried out by **Amairah Fahad Aloushan, et al (2017)**(13) reported that there was a gap in emergency health care workers knowledge, attitude and practice regarding oxygen therapy due to work load and lack of guidelines. **Grace Wu et al (2017)**(14) reported that ongoing titration can conserve oxygen, even performed once daily during oxygen therapy.

**Significance of the study:** Being a primary care provider, nurses plays a crucial role in careful monitoring of patients with oxygen therapy. The nurses can implement various strategies for proper utilization and conservation of oxygen in order to prevent wastage of oxygen and to improve the quality of care in clients. In the current study the researcher intends to evaluate the knowledge and attitude of Nursing Officers regarding the utilization and conservation of oxygen in pediatric settings. The researcher also intends to develop an E-educational booklet to address the gaps identified. This booklet will enhance the knowledge level of Nursing Officers as well as an impact on the patient care outcome also.

**Aim of the study:** To evaluate the knowledge and attitude regarding utilization and conservation of oxygen among Nursing Officers working in pediatric units and to develop an E-educational booklet.

**Research question:**

1. What is the knowledge and attitude of Nursing Officers regarding the utilization and conservation of oxygen?

## **II. Material and Methods**

### **Study design and setting**

A descriptive research design was used. The current study was conducted among Nursing Officers working in different pediatric units at All India Institute of Medical Sciences, New Delhi from September 2022 to December 2022. A total of 210 Nursing Officers participated for this study.

### **Sample, Type and size**

The total enumerative sampling technique was attempted for the present study .This study includes the Nursing Officers who are involved in care of children and willing to participate in the study. The Nursing Officers unavailable during the study period were excluded from the study. All Nursing Officers who were working in the pediatric units were selected which consist of 265 Nursing Officers. In that, 17 Nursing Officers were not available during the study period, 13 Nursing Officers were not given the consent and 25 Nursing Officers were taken for the pilot study. Finally, a total of 210 Nursing Officers agreed to participate in the study.

### **Data collection tools:**

Three tools were used based on the objective of the study.

**Tool I: Demographic Profile:** To assess the highest educational qualification of Nursing Officers, total years of experience in nursing profession, number of years of experience in pediatric unit, designation and previous training on oxygen therapy.

**Tool II: Structured knowledge questionnaire:** It was developed by the researcher to evaluate the knowledge of Nursing Officers regarding utilization and conservation of oxygen. It consist of 30 multiple choice questions with

one correct answer. The content of the knowledge questionnaire includes indication of oxygen therapy, contraindications of oxygen therapy, oxygen delivery devices, oxygen utilization, oxygen conservation, oxygen safety, complications of oxygen therapy and nurse’s responsibilities. Each correct answer carries 1 mark and incorrect answer carries 0. The overall Knowledge of the Nursing Officers were evaluated using sum of scores of each outcome. The overall knowledge was categorized using Bloom’s cut off point, as adequate if the score was between 80-100%, moderately adequate if the score was between 60-79% and inadequate if the score was less than 60%.

**Tool III: Attitude scale:** It is related to Nursing Officer’s self-perception regarding the utilization and conservation of oxygen. A five point Likert scale consisting of 10 items was used to evaluate the attitude of Nursing Officers regarding utilization and conservation of oxygen. The level of respondent’s agreement with the statement is grouped into five categories. i.e., strongly agree, agree, neutral, disagree and strongly disagree. Maximum score is 50 and minimum score is 10. The overall attitude score was categorized as highly favorable attitude if the score was between 80-100%, moderately favorable attitude if the score was between 60-79% and unfavorable attitude if the score was less than 60%.

**Validity of the tool:** Tools were given to experts (4 nursing faculty and 3 medical faculty) for content validity. The content validity index (CVI) scores for tool I, tool II, tool III were 1, 0.98 and 0.85 respectively.

**Reliability of the tool:** Split half method was used to check the reliability of structured knowledge questionnaire and the score was 0.782 which shows good reliability. Internal consistency of the attitude scale was done by using Cronbach alpha test and the score was 0.72 which indicates good reliability.

**Ethical clearance:** Ethical clearance obtained from Institute Ethics Committee AIIMS, New Delhi (Ref No: IECPG-237/24.03.2022). Participant information sheet (PIS) and participant informed consent form (PICF) were developed. Informed consent was taken from Nursing Officers. Confidentiality and anonymity of information provided by the Nursing officers was also maintained. Trial was registered in Clinical Trials Registry India, CTRI Number: CTRI/2022/12/047867.

**Pilot study:** Pilot study was conducted among 25 Nursing Officers in June 2022 and the study was found to be feasible. Pilot study data not included in main study.

**Data collection:** Data were collected by the researcher from the first of September 2022 to the end of December 2022. The researcher introduced herself to the Nursing Officers at the beginning of the study. Then, Participant information sheet (PIS), a letter explaining the purpose of study was provided to the Nursing Officers and they were asked to sign a consent form to confirm their acceptance to participate in the study. In addition, the Nursing Officers were ensured about the confidentiality of their data, the researcher assured them that participation in this study was voluntary and they were informed that they have the right to withdraw from the study at any time without giving any reason, and data collection tools will be tested anonymously. The researcher informed that, there will be no harmful effect and it will be beneficial for the Nursing Officers and hospital also. Then, research tools including demographic profile, knowledge questionnaire and attitude scale were distributed to the Nursing Officers. A total of 210 Nursing Officers participated from all pediatric units. Approximately, 15-20 minutes taken to complete the data collection procedure from each Nursing Officers.

**Data Management and Statistical Analysis:** The collected data was coded and summarized into a Microsoft Excel spreadsheet and all entries were checked for errors. Analysis was done by using SPSS version 26 and descriptive statistics like frequency, percentage, mean and standard deviation were used to describe demographic profile of Nursing Officers. Inferential statistics like chi-square test and fisher’s exact test was used to assess the association between the study variables with Nursing Officer’s knowledge and attitude. The p value of < 0.05 was taken as statistically significant.

### III. Results

**Table 1:** Demographic profile of Nursing Officers  
N=210

Demographic variable	Frequency (%)
Highest educational qualification	GNM 46 (21.91)
	B.Sc. Nursing 138 (65.71)
	M.Sc. Nursing 26 (12.38)
Total years of experience in nursing profession(years)	<5 60 (28.57)
	5-10 71 (33.81)
	11-15 43 (20.48)
	16-20 23 (10.95)
	>20 13 (6.19)
Total years of experience in pediatric unit(years)	<1 37 (17.62)
	1-5 93 (44.29)
	6-10 42 (20.00)
	>10 38 (18.10)
Designation	Senior Nursing officer 30 (14.29)

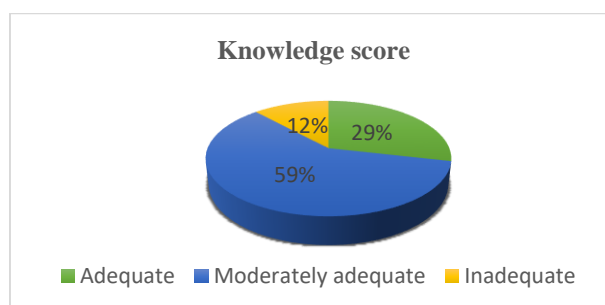
	Nursing officer	180 ( 85.71)
Previous training on oxygen therapy	Yes	40 (19.05)
	No	170 ( 80.95)

Table I shows that most of the Nursing Officers (65.71%) had the educational qualification of B.Sc. Nursing. Majority of the Nursing Officers (33.81%) had 5-10 years of experience in nursing profession. Almost 44.29% of the Nursing Officers had 1-5 years of experience in pediatric unit. Majority of the participants (80.95%) do not undergone any training on oxygen therapy.

**Table 2:** Knowledge level of Nursing Officers regarding utilization and conservation of oxygen  
N=210

Level of knowledge	Frequency (%)	Mean ± SD score	Range
Adequate (24-30)	60 ( 28.57)	21.5 ± 3.60	10-29
Moderately adequate(18-23)	125 (59.52)		
Inadequate (<18)	25 (11.90)		

As shown in table 2 , Mean (±SD) knowledge score of the Nursing Officers was 21.5± 3.6 with range of 10-29. More than half of the Nursing Officers (59.52%) had moderately adequate knowledge, 28.57 % had adequate knowledge and 11.9% of Nursing Officers had inadequate knowledge regarding utilization and conservation of oxygen.



**Figure 1:** Pie chart showing knowledge score (percentage) of Nursing Officers

As shown in figure 1, majority of the Nursing Officers had moderately adequate knowledge and 29% of the Nursing Officers had adequate knowledge whereas 12% of the Nursing Officers had inadequate knowledge regarding utilization and conservation of oxygen.

**Table 3:** Attitude level of Nursing Officers regarding utilization and conservation of oxygen  
N=210

Level of Attitude	Frequency (%)	Mean ± SD	Range
Highly favorable (40-50)	172( 81.90)	42.8 ± 3.7	33-50
Moderately favorable(30-39)	38 (18.10)		
Unfavorable(<30)	Nil		

As shown in table 3, Mean (± SD) attitude score of the Nursing Officers was 42.8 ± 3.7 with range of 33-50. Majority of the Nursing Officers (81.90%) had highly favorable attitude, 18.1 % had moderately favorable attitude and none of the Nursing Officers had unfavorable attitude regarding utilization and conservation of oxygen.

**Figure 2:** Pie chart showing attitude score (Percentage) of Nursing Officers

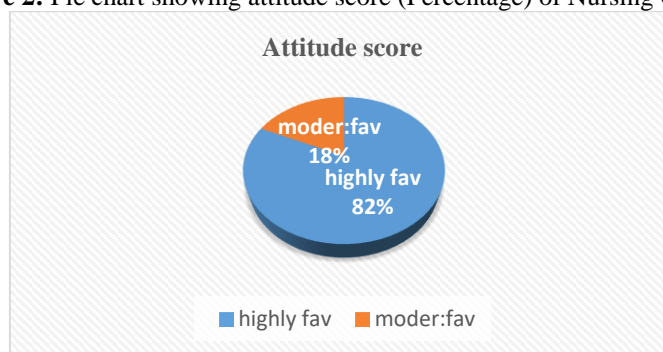


Figure 2 depicts that majority of the Nursing Officers (82%) had highly favorable attitude whereas 18% of the Nursing Officers had moderately favorable attitude regarding utilization and conservation of oxygen.

**Table 4:** Association between Nursing Officer’s knowledge regarding utilization and conservation of oxygen with selected demographic variables  
N=210

Demographic variable		Knowledge score Frequency (%)			p value
		Adequate	Moderately adequate	Inadequate	
Educational qualification	GNM	17(36.96)	23(50)	6(13.04)	0.032*
	B.Sc. Nursing	31(22.46)	92(66.67)	15(10.87)	
	M.Sc. Nursing	12(46.15)	10(38.46)	4(15.38)	
Total years of experience in nursing profession (years)	< 5	9 (15)	41(68.33)	10(16.67)	0.13
	5-10	22(30.99)	40(56.34)	9(12.68)	
	11-15	18(41.86)	22(51.16)	3(6.98)	
	16-20	7(30.43)	15(65.22)	1(4.35)	
	>20	4(30.77)	7(53.85)	2(15.38)	
Total years of experience in Pediatric unit (years)	< 1	8(21.62)	18(48.65)	11(29.73)	0.041*
	1-5	25(26.88)	61(65.59)	7(7.53)	
	6-10	13(30.95)	26(61.90)	3(7.14)	
	>10	14(36.84)	20(52.63)	4(10.53)	
Designation	Senior nursing officer	10(33.33)	17(56.67)	3(10)	0.84
	Nursing officer	50(27.78)	108 (60)	22(12.22)	
Prior training on oxygen therapy	Yes	17 (42.5)	18 (45)	5(12.5)	0.07
	No	43(25.29)	107(62.94)	20(11.76)	

Chi square (Fisher exact test), \*p<0.05

As illustrated in table 4, it was found that there was a statistically significant association between Nursing Officer’s educational status and their knowledge regarding utilization and conservation of oxygen with p value of <0.05. It was also found that there was a statistically significant association between Nursing Officer’s total years of experience in pediatric unit and their knowledge regarding utilization and conservation of oxygen with p value of < 0.05. But there was no association between total years of experience in nursing profession, designation of Nursing Officers as well as prior training on oxygen therapy with their knowledge regarding utilization and conservation of oxygen.

**Table 5:** Association between Nursing Officer’s attitude regarding utilization and conservation of oxygen with selected demographic variables  
N=210

Demographic variable		Attitude score Frequency (%)		p value
		Highly favorable	Moderately favorable	
Educational qualification	GNM	35(76.09)	11(23.91)	0.46
	B.Sc. Nursing	116(84.06)	22(15.94)	
	M.Sc. Nursing	21(80.77)	5(19.23)	
Total years of experience in nursing profession (years)	< 5	48(80)	12(20)	0.40
	5-10	58(81.69)	13(18.31)	
	11-15	39(90.7)	4(9.3)	
	16-20	17(73.91)	6(26.09)	
	>20	10(76.92)	3(23.08)	
	< 1	30(81)	7(18.92)	

Total years of experience in pediatric unit (years)	1-5	77(82.80)	16(17.20)	0.98
	6-10	34(80.95)	8(19.05)	
	>10	31(81.58)	7(18.42)	
Designation	Senior nursing officer	25(83.33)	5(16.67)	0.53
	Nursing officer	147(81.67)	33(18.33)	
Previous training on oxygen therapy	Yes	32(80)	8(20)	0.44
	No	140(82.35)	30(17.65)	

Chi square (Fisher exact test), \*p<0.05

As shown in table 5, it was found that there was no statistically significant association between Nursing Officer's attitude towards utilization and conservation of oxygen with educational qualification, total years of experience in nursing profession, total years of experience in pediatric unit, designation and prior training on oxygen therapy.

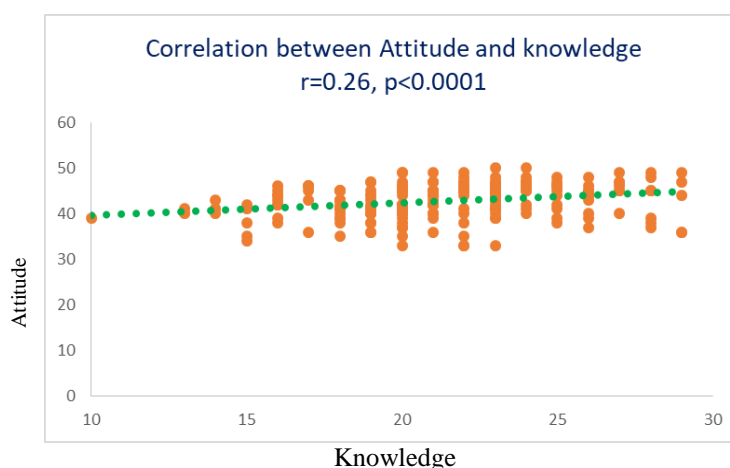
**Table 6:** Correlation between knowledge and attitude of Nursing Officers regarding utilization and conservation of oxygen.

N=210

Variables	r value	p value
Knowledge	0.2616	0.0001*
Attitude		

Pearson correlation, \*p <0.0001

Table 6 shows that there was a weak positive correlation between knowledge and attitude of Nursing Officers regarding utilization and conservation of oxygen



**Figure 3:** Scatter plot showing the correlation between knowledge and attitude of Nursing Officers regarding utilization and conservation of oxygen.

**Table 7:** Frequency and percentage distribution of Nursing Officer's knowledge regarding utilization and conservation of oxygen.

Sl.No	Content	No of questions	Evaluation	Frequency	Percentage
1	Goal of oxygen therapy	1	Correct response	193	91.90
			Incorrect response	17	8.10
2	Indication of oxygen therapy	1	Correct response	134	63.81
			Incorrect response	76	36.19
3	Contraindications of oxygen therapy	2	Correct response	169	80.6
			Incorrect response	41	19.52
4	Source of oxygen	1	Correct response	157	74.76
			Incorrect response	53	25.24
5	Oxygen delivery devices	2	Correct response	153	72.85
			Incorrect response	57	27.14
6	Oxygen utilization	5	Correct response	115	54.76
			Incorrect response	95	45.24
7	Oxygen conservation	5	Correct response	131	62.38
			Incorrect response	79	37.62

8	Oxygen safety	3	Correct response	146	69.52
			Incorrect response	64	30.48
9	Complications of oxygen therapy	3	Correct response	176	83.80
			Incorrect response	34	16.19
10	Nurse's responsibilities	7	Correct response	169	80.47
			Incorrect response	41	19.53

As shown in table 7, Almost 54.76% of Nursing Officers had adequate knowledge regarding utilization of oxygen whereas 45.24% of the Nursing Officers had inadequate knowledge regarding oxygen utilization. Almost 62.38% of the Nursing Officers had adequate knowledge regarding conservation of oxygen whereas 37.62% of the Nursing Officers had inadequate knowledge regarding oxygen conservation. It was also found that majority of the Nursing Officers had adequate knowledge regarding indication, contraindication, source of oxygen, oxygen safety, complication of oxygen therapy and nurse's responsibilities while using oxygen.

A comprehensive E-educational booklet on "utilization and conservation of oxygen" explaining oxygen delivery methods and devices, conservation of oxygen in health care settings and safety consideration while using oxygen. It was developed based on suggestions from various experts. The E-educational booklet was validated by three medical and three nursing experts. The necessary changes were made in the E-educational booklet as per suggestions from experts.

#### IV .Discussion

Oxygen is considered as a life sustaining element on earth. Nurses and other health care providers should take efficient measures to prevent the wastage of oxygen while providing nursing care to patients requiring oxygen therapy. So the nurses should have an adequate knowledge and attitude regarding oxygen therapy as well as utilization and conservation of oxygen.

The study was conducted using a descriptive design on 210 Nursing Officers who were working in various pediatric units at AIIMS, New Delhi by using self-structured knowledge questionnaire and attitude scale.

The finding of the study revealed that the mean knowledge scores of Nursing Officers regarding utilization and conservation of oxygen was  $21.5 \pm 3.6$  with range 10-29. More than half of the Nursing Officers 125 (59.52%) had moderately adequate knowledge, 60(28.57 %) had adequate knowledge whereas 25 (11.9 %) Nursing Officers had inadequate knowledge regarding utilization and conservation of oxygen.

In the present study, 59.52% of the Nursing Officers had moderately adequate knowledge whereas the study conducted by **Fanuel Ghebremeskel et al**(10) at Orotta National Referral hospital found that 43.3% of the nurses working in the Emergency department and ICU had good knowledge about oxygen therapy. The study conducted by **Tesfu Kahsay**(15) at selected public hospitals of Mekelle town, Tigray Ethiopia reported that 57.8% of nurses had sufficient knowledge toward oxygen therapy. But the study conducted by **Basazinew Chekol Demilew et al**(16) reported 68.7% of nurses had a good level of knowledge. The study conducted by **Hindu Argeta et al**(17) and **Zelege and Kefale**(3) reported the knowledge scores of nurses 55.60% and 52% respectively.

In the present study, 11.9% of Nursing Officers had inadequate knowledge regarding utilization and conservation of oxygen. But this result was lower when compared to the study done by **Shegaw Zelege and Domewoz Kefale**(3), **Fanuel Ghebremeskel et al**(10) and they had reported the knowledge scores 48% and 56.7 % respectively. It was also revealed that the study conducted by **Arif Jamie**(18) **Tesfu Kahsay**(15), **Basazinew Chekol Demilew et al**(16) had reported poor knowledge scores 38.51%, 42.2% and 31.3% respectively.

This study finding showed that mean attitude scores of Nursing Officers regarding utilization and conservation of oxygen was  $42.8 \pm 3.7$ . Majority of the Nursing Officers 172(81.9 %) had highly favorable attitude and 38 (18.1 %) of Nursing Officers had moderately favorable attitude whereas none of the participants had unfavorable attitude regarding utilization and conservation of oxygen.

The study done by **Fanuel Ghembreskel** (10) reported that 63.3 % of the nurses had positive attitude towards oxygen therapy which was lesser than the present study. The study done by **Girma Lema**(19) revealed that 53.3 % of the nurses had positive attitude towards oxygen therapy which was also lesser when compared to the present study. Another study done by **Basazinew Chekol Demilew**(16) reported 54. % of the nurses had positive attitude whereas the study conducted by **Tesfu Kahsay**(15), **Yosef Beey Bizuneh**(20) had reported the attitude score of 67.4% and 53.8% respectively. It was also found that the study done by **Hindu Argeta**(17) and **Kennean Abitew**(9) had reported the attitude scores 60.80% and 56.1 % respectively which was also lower when compared to the present study.

The study finding also revealed that there was a statistically significant association between Nursing Officer's educational status as well as total years of experience in pediatric unit on their knowledge regarding utilization and conservation of oxygen with p value of <0.05. The result in this study is consistent with the study conducted by **Mona Mohamed Mayhob**(21) in the educational hospitals of Cairo in different intensive care unit which found that there were statistically significant association between level of knowledge of nurses with their educational qualification with p value of 0.001. The study conducted by **Yosef Beley Bizuneh et al**(20) at the

University of Gondar Comprehensive Specialized Hospital also reported that there were significant association between level of knowledge with their educational qualification.

Finding of this study showed that, there was a statistically significant association between the level of knowledge and the working experience of Nursing Officers in pediatric unit at a p value of 0.041. This result is in concordance with the study conducted by **Maryam Hassanzad**(8) at Masih Daneshvari hospital, Iran which showed that there was a statistically significant relationship between nurses' related work experience and their knowledge of the proper use of oxygen (p = 0.03). But contrary to our findings, the study conducted by **Basazinew Chekol Demilew et al**(16) explained that participants having work experience of  $\leq 4$  years are around twice more likely to have good level of knowledge regarding oxygen therapy.

There was no statistically significant association between Nursing Officer's level of attitude with educational qualification, total years of experience in nursing profession, total years of experience in pediatric unit, designation and prior training on oxygen therapy.

In the present study 170 (80.95%) of Nursing Officers reported they have never received any continuing professional education training on oxygen therapy. This result is comparable with the study conducted by **Tesfu Kahsay**(15) in which they reported that 160(84.2%) of the nurses never received any training regarding oxygen therapy.

The finding of this study showed that there was a weak positive correlation between knowledge and attitude of Nursing Officers regarding utilization and conservation of oxygen. Similarly **Fanuel Ghebremeskel (2019)** (10) also reported there was a positive correlation between knowledge and attitude of Nursing Officers.

## V. Conclusion

This study concluded that, majority of the Nursing Officers had moderately adequate knowledge and highly favorable attitude regarding utilization and conservation of oxygen. This study has strengthened the need for an E-educational material regarding oxygen utilization and its conservation. So an E-education booklet on oxygen utilization and conservation helps to enhance the knowledge and attitude of Nursing Officers which will improve the patient care outcome also.

### Limitation of the study:

This study was conducted in the tertiary health care center, so it cannot be generalized in peripheral hospital and health care center. The direct oxygen administration practices of Nursing Officers were also not observed in the present study.

## VI. Recommendations

We recommend that similar studies can be conducted on large sample size and multicenter approach can be used. A qualitative study can be done to assess the perceived barriers of oxygen therapy among nurses working in pediatric units. A study can also be conducted to assess the effectiveness of E- educational booklet on knowledge and attitude regarding utilization and conservation of oxygen among nurses working in pediatric units. It is also recommended that a mixed method study can be conducted to assess the knowledge, attitude and perceived barriers regarding utilization and conservation of oxygen among healthcare providers.

### Declaration of conflicting interests

The authors declared no potential conflicts of interest with respect to the research.

### Acknowledgement

Authors would like to thank all the Nursing Officers who were participated in the study.

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