nosocomial pneumonia is a frequent complication in critically ill patients on mechanical ventilation and is responsible for a significant in-hospital morbidity and mortality. According to data from the National Nosocomial Infection Surveillance System, ventilator associated pneumonia (VAP) is the second most common nosocomial infection after urinary tract infection affecting approximately 27 percent of all critically ill patients.

Ventilator-associated pneumonia refers specifically to nosocomial bacterial pneumonia that has developed within 48 to 72 hours after tracheal intubation in patients who are receiving mechanical ventilation. Oropharyngeal colonisation with potentially pathogenic microorganisms, a wide range of gram-negative and gram-positive microorganisms, is pivotal in the pathogenesis of VAP.

The pathogenesis of ventilator-associated pneumonia involves microaspiration of oropharyngeal or gastric secretions contaminated with the organisms like pseudomonas aeruginosa, Eschericha coli, Klebsiella pneumonia, Acinetobacter species.

**Need for the study**

Grap & Munro (2004) have presented supporting evidence indicating that critically ill patients who are intubated for more than 24 hours are at higher risk for VAP, and therefore, mouth care and oral health should be an important part of nursing care. Evidence-based protocols for oral care of critically patients are not available and oral hygiene measures are generally directed toward patients’ comfort rather than removal of microbes. Lack of published protocols for oral care in intubated patients has been noted in the clinical nursing literature.

**Objectives**

The objectives of the study were:

- To assess the effect of oral decontamination with (i) 0.2% chlorhexidine gluconate solution and (ii) H$_2$O$_2$ solution on the incidence of ventilator-associated pneumonia and oropharyngeal colonisation.
- To compare the effect of oral decontamination with 0.2% chlorhexidine gluconate solution and H$_2$O$_2$ solution on the incidence of VAP and oropharyngeal colonisation.
- To develop a protocol for oral hygiene practices in the hospital for critically ill patients.

**Methodology**

The research approach adopted was Quantitative type. The study had prospective, randomised, controlled trial, time series design.

**Variables**

*Independent variable:* (i) 0.2% chlorhexidine gluconate solution and (ii) H$_2$O$_2$ solution in normal saline in the ratio of 1:8.

*Dependent Variable:* (i) Primary Endpoint - Development of ventilator-associated pneumonia, and (ii) Secondary Endpoint - Oropharyngeal colonisation.

*Population:* Adult patients (>18 years) admitted in ICU on mechanical ventilation for <24 hours.

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Ujjwal Dahiya*

Abstract

Ventilator-associated pneumonia is a major source of nosocomial infection affecting about 27 percent of all critically ill patients. In this study, an attempt was made to assess the effect of oral decontamination with 0.2% chlorhexidine gluconate solution and hydrogen peroxide solution on the incidence of ventilator-associated pneumonia and oropharyngeal colonisation. Seventy patients above 18 years of age admitted in AIIMS, New Delhi were included as subjects. It was concluded that incidence of ventilator-associated pneumonia was higher in patients given oral care with hydrogen peroxide than those on 0.2% chlorhexidine, which was more effective in reducing oropharyngeal colonisation.

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Sample: Adult patients (>18 years) admitted to ICU on mechanical ventilation for <24 hours who met the inclusion criteria and gave informed consent were enrolled for the study.

Sampling technique: Convenient sampling technique was adopted for selecting subjects.

Random assignment was done for assigning the subjects in the experimental and control groups by using numbered sealed envelope method.

Sample Size: The total sample size was 70. The experimental group was the chlorhexidine group (CHX) with 35 subjects. The control group was the H\textsubscript{2}O\textsubscript{2} group with 35 subjects.

Setting: The study was conducted at AB8 ICU, C2 ICU and NSICU of All India Institute of Medical Sciences (AIIMS), New Delhi, India.

Intervention

- Oral decontamination was done for both the groups twice daily at 8.00 a.m. and 7.00 p.m. for three consecutive days by the investigator.
- 0.2% chlorhexidine gluconate solution (15 ml) was used for the experimental group.
- H\textsubscript{2}O\textsubscript{2} with normal saline in a ratio of 1:8 (16 ml) was used for the control group.

Results & Discussion

Both the groups (experimental and control) were comparable (p>0.05) with respect to demographic characteristics like age (p=0.433), sex (p=0.329), marital status (p=0.06), religion (p=0.469), educational qualification (p=0.262), occupation (p=0.438) and family income per month (p=0.171) when chi square test was applied.

Fig. 1 depicts that 20 percent of patients in control group (oral decontamination with H\textsubscript{2}O\textsubscript{2} solution) developed VAP as compared to 5.71 percent in the experimental group (oral decontamination with chlorhexidine gluconate solution); using the chi square test, this difference was found to be not significant (p=0.074).

It was therefore inferred that 0.2% chlorhexidine gluconate solution and H\textsubscript{2}O\textsubscript{2} solution when used for oral decontamination are equally effective in reducing the incidence of VAP.

It is evident from Table 1 that on comparing the oropharyngeal colonisation by throat swab between control and experimental group 80.0 percent of subjects had developed oropharyngeal colonisation with gram negative bacteria in control group as compared to 20.0 percent of patients in experimental group at 72 hours, showing a significant difference (p=0.0001) when chi square test was applied.

0.2% chlorhexidine gluconate solution was more effective in reducing the oropharyngeal colonization as compared to H\textsubscript{2}O\textsubscript{2} in normal saline in a ratio of 1:8 and the difference was found to be significant (20% vs 80.0%; p=0.0001).

Therefore a protocol was prepared for oral hygiene practices in ICU for mechanically ventilated patients with 0.2% chlorhexidine gluconate solution.

Conclusion

Based on the scientific evidence it is concluded that:

- The incidence of VAP was more in the patients who had received oral care with H\textsubscript{2}O\textsubscript{2} in normal saline solution in a ratio of 1:8 than in those who received oral care with 0.2% chlorhexidine gluconate solution (20% vs 5.71%). This difference was remarkable though statistically insignificant.

- 0.2% chlorhexidine gluconate solution is more effective in reducing the oropharyngeal colonisation as compared to H\textsubscript{2}O\textsubscript{2} in normal sa-
line in a ratio of 1:8 and the difference is found to be significant (20% vs 80.0%; p=0.0001).

- Oropharyngeal colonisation is of paramount importance in the pathogenesis of VAP, and modulation of oropharyngeal colonisation with 0.2% chlorhexidine gluconate solution reduced the colonisation in adult intubated patients.

**Implication on Nursing Practice:**

- Standardised protocols for oral care need to be made mandatory.
- Nurses play a key role in preventing VAP. Many of the interventions are part of routine nursing care which needs to be followed and documented accurately.

**On Nursing Education:**

- Education plays a key role in the management of patients with VAP. Use of self study education modules on the nursing care of patients can decrease the incidence of VAP.

- Emphasising the role of oral decontamination to prevent VAP that will improve outcomes for critically ill patients.

**Limitation of the study:**

The size of sample was small and it was a single centred study.

**References**


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