## **ORIGINAL ARTICLE**

# **Effectiveness of Huffing Manoeuvre on Fentanyl Induced Cough**

FAISAL<sup>1</sup>, MUJEEB AHMED KHAN<sup>2</sup>, NADIR NAZIR<sup>3</sup>, ARSALAN JAMIL<sup>4</sup>, ADNAN ALI BALOCH<sup>5</sup>, ZAID BIN NASIR<sup>6</sup>

<sup>1</sup>Consultant Anesthetist, Tabba Heart Hospital, Karachi

<sup>2</sup>Consultant Anesthetist, The Kidney Centre, Karachi

<sup>3</sup>Consultant Anesthetist, Jhalwan Medical College Khuzdar

<sup>4</sup>Fellow Anesthesia, Aga Khan University Hospital, Karachi

<sup>5,6</sup>Specialist Anesthesia, Sindh Institute of Urology & Transplantation Karachi

Correspondence to Dr. Mujeeb Ahmed Khan, E-mail: mujeebnangraj@gmail.com Cell: 0334-3045518

### ABSTRACT

Aim: To determine the effect of huffing manoeuvre to preventing cough caused by intravenous administration of fentanyl during induction of anaesthesia.

Study Design: Cross-sectional study

**Place and duration of study:** General Anaesthesia Department, SICU and Pain Management, Civil Hospital Karachi from 1<sup>st</sup> June 2019 to 30<sup>th</sup> November 2019.

**Methodology:** One hundred and sixty four patients meeting were enrolled. Every patient was taught to perform huffing manoeuvre by primary investigator visiting patient in ward at night before surgery. The act of huffing manoeuvre was lasts within 5 seconds. Any episode of cough within 60 seconds of fentanyl administration was classified as fentanyl induced cough. All patients were received Propofol (2mg/kg) for induction of anaesthesia.

**Results:** The mean age was 46.42±8.92 years. Incidence of fentanyl induced cough was observed in 4.3% cases and huffing manoeuvre was effective in 95.7% cases.

**Conclusion**: Huffing manoeuvre is an effecting method of reducing fentanyl induced cough in patients undergoing surgery, especially the manoeuvre prevents developing of severe fentanyl induced cough.

Keywords: Fentanyl, Cough, Huffing manoeuvre, Analgesic opioids

### INTRODUCTION

Surgery-related anxiety and pain can be reduced with the help of opioids. Fentanyl, an opioid agonist that causes cough when administered intravenously during anaesthesia induction, is known as fentanyl induced cough.<sup>1-5</sup> About 35% of people will experience a fentanyl-induced cough<sup>6</sup> which is usually mild but can be explosive and life-threatening<sup>7</sup> and may cause an increase in intracranial pressure, intraocular pressure, or both. These conditions may necessitate rapid medical attention.<sup>1,4</sup>

The incidence of fentanyl-induced cough has been reduced using various pharmacological methods, such as pre-treatment with morphine<sup>2</sup>, terbutaline<sup>3</sup>, salbutamol baclomethasone and sodium chromoglycate<sup>4</sup>, lidocaine<sup>5</sup>, ephedrine<sup>8</sup> and pentazocine<sup>9</sup>, different primary doses of propofol<sup>10</sup>, clonidine<sup>11</sup>, ketamine<sup>12</sup> and dexamethasone.<sup>13</sup> However, these procedures are time consuming and expensive, they have only limited clinical acceptance.

The huffing manoeuvre is used in nonpharmacological approaches<sup>6</sup>. The huffing manoeuvre is gentle cough or expiration against an open glottis that is performed voluntarily. Fentanyl-induced cough was found to be more common in the controlled group (32%) than in the huffing manoeuvre group (4%), with 18 patients in the controlled group reporting moderate to severe cough while none of the huffing manoeuvre group's patients had experienced this level of severity prior to the study.

An important goal of this research is the effectiveness of non-pharmacological methods like huffing on fentanylinduced cough, which are less expensive and have fewer side effects than pharmacological methods like the ones mentioned above. This study hopes to learn more about the effectiveness of non-pharmacological methods like huffing in the future.

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# MATERIALS AND METHODS

This cross-sectional study was conducted after approval from IRB in General Surgical Operation Theatres at Department of Anaesthesia, SICU and Pain Management, Civil Hospital Karachi, Dow University of Health Sciences from 1<sup>st</sup> June 2019 to 30<sup>th</sup> November 2019 and comprised 164 patients. Patients with a body weight not exceeding 20% of their ideal body weight, a chronological age between 16 and 60 years, an ASA status I or II, either genders and elective general surgical procedures requiring anaesthesia, such as general laparotomy, open cholecystectomy, laparoscopic cholecystectomy, hysterectomy, and other procedures, were included in the study. Exclusion criteria included having a body weight greater than 20% of one's ideal body weight, having asthma, chronic coughing, having an upper respiratory tract infection in the previous two weeks, smoking, taking bronchodilators or steroids, and having a history of treatment with angiotensinogen converting enzyme inhibitor. Every patient was instructed to do the huffing movement by the principal investigator, who came to the ward the night before surgery to see the patients. When the patient arrived in the operating room, he was subjected to continuous lead II ECG monitoring, noninvasive blood pressure monitoring, and pulse oxygenation. The dorsum of the non-dominant hand was used to gain access to the vena cava. Within 60 seconds of fentanyl administration, an impartial observer counted the number of coughing fits generated by fentanyl (incidence) and the severity of the coughing fits (number of coughing fits). The act of huffing manoeuvre was lasts within 5 seconds. 2.5 µg/kg of fentanyl was given immediately after huffing manoeuvre in 5 seconds. Any episode of cough within 60 seconds of fentanyl administration was classified as fentanyl induced cough and severity of cough were graded on the basis of number of coughs. All patients were received propofol (2mg/kg) for induction of anaesthesia. The data was entered and analyzed through SPSS-16.

### RESULTS

The average age of the patients was 46.42±8.92 years similarly the average height was 165.35±8.45 cm and weight was 67.45±7.54 kg of the patients. Incidence of fentanyl induced cough was observed in 7 (4.3%) cases (Table 1). Among 7 fentanyl induced cough cases, mild cough were observed in 5 patients and moderate was in 2 cases (Fig. 1).Huffing manoeuvre was effective in 95.7% cases and ineffective in 4.3% (Fig. 2).

Table 1: Demographic information of the patients (n=164)

Variable	No.	%
Age (years)		
16 – 20	15	9.2
21 – 30	14	8.5
31 – 40	45	27.4
41 – 50	60	36.6
51 – 60	30	18.3
Weight (kg)		
50 - 60	29	17.7
61 – 70	75	45.7
71-80	60	26.6
Height (cm)		
150 – 160	32	19.5
161 – 170	70	42.7
> 170	62	37.8
Fentanyl induced co	ugh	
Yes	7	4.3
No	157	95.7





Fig. 2: Effectiveness of huffing manoeuvre to preventing cough caused by intravenous administration of fentanyl



### DISCUSSION

During the induction of general anesthesia, intravenous infusion of fentanyl is commonly employed. Fentanyl-induced cough has been commonly recorded, but has not been recognized as a potentially life-threatening anesthetic consequence during anesthesia induction.<sup>14</sup> Lin and colleagues<sup>15</sup> discovered that a 65% incidence of cough occurred in patients after intravenous injection of fentanyl 2.5  $\mu$ gkg<sup>-1</sup> via a freely running peripheral venous catheter within 2 seconds of receiving the medication. Following administration of fentanyl 7  $\mu$ gkg<sup>-1</sup> through a central venous catheter, Böhrer and colleagues<sup>16</sup> observed that 45.9% of the patients coughed. In contrast, only 2.7% of the patients coughed after receiving an intravenous dose of fentanyl 7  $\mu$ gkg<sup>-1</sup> administered through a peripheral cannula.

Shen and colleagues<sup>17</sup> reported that a bolus of fentanyl 2  $\mu$ gkg<sup>-1</sup> administered via a peripheral venous route within 5 seconds elicited cough in 28% of the patients. Phua et al<sup>1</sup> demonstrated that the injection of fentanyl 1.5  $\mu$ gkg<sup>-1</sup> administered via a peripheral venous line elicited cough in a similar incidence of cough (33%). The discrepancies in the incidence of cough among these trials may be explained by the differences in the dosages, delivery routes, and rates of fentanyl used in each study.

Patients with pre-existing disorders such as cerebral aneurysms, brain trauma, brain hernia, open-eye damage, dissecting aortic aneurysm, pneumothorax and hypersensitive airway disease may have fentanyl-induced cough, which is not always beneficial. In an attempt to lower the incidence of fentanyl-induced cough during anesthesia induction, a number of approaches have been tried.<sup>18-21</sup>

Some of the most effective medications for suppressing this cough are lidocaine, caffeine, ephedrine, beta2-receptor agonists, ketamine, and clonidine. All of these drugs have bronchorelaxant effects on the smooth muscle of the airway. Propofol has also been shown to cause bronchodilation<sup>22,23</sup>; as a result, we hypothesizedthat an appropriate dose of propofol would be effective in suppressing fentanyl-induced cough.

In the present study, mean age was  $46.42\pm8.92$  years. Incidence of fentanyl induced cough was observed in 7 (4.3%) cases in which mild cough were observed in 5 patients and moderate was in 2 cases (Table 1). The results found that the effectiveness of huffing manoeuvre was found to be 95.7% (Fig. 2).

Preinduction coughing is associated with IV fentanyl bolus administration in 28–65% of patients. Fentanyl-induced coughing (FIC) is not always benign, and it can be

particularly bothersome during the most important stage of anaesthesia induction, when the airway reflex is no longer functioning. The huffing procedure, which is a forced expiration against an open glottis performed soon before IV fentanyl administration, was hypothesized to be effective in suppressing this unwelcome spasmodic cough. Using a randomized controlled trial, Pizov et al<sup>24</sup> discovered that the incidence of cough was 32% in the control group and 4% in the huffing technique group (P0.00).

In addition, our research revealed a very low rate of fentanyl-induced coughing after performing the huffing maneuver. As previously stated, no patient experienced severe coughing in the huffing manoeuvre group (P=0.049); similarly, we reported only 5 patients with mild coughing and only 2 patients with moderate coughing after performing the huffing manoeuvre (P=0.049). In our study population, there were no reports of severe fentanyl-induced coughing. A puffing maneuver performed immediately before IV fentanyl (2.5  $\mu$ g kg<sup>-1</sup>) has been shown to greatly lessen the occurrence and severity of FIC in the vast majority of patients who received.<sup>25</sup>

Patients in the clonidine group had a considerably lower incidence of cough than those in the control group, according to Ambesh et al<sup>25</sup> (17.3% vs. 38.7%, P=0.01) respectively. After receiving intravenous clonidine (2µg/kg<sup>1</sup>), the reflex cough caused by fentanyl could be controlled without causing significant hemodynamic abnormalities. As a result, intravenous clonidine may prove to be a clinically beneficial technique of controlling fentanylinduced cough in some patients.

### CONCLUSION

The huffing manoeuvre is an effecting method of reducing fentanyl induced cough in patients undergoing surgery, especially the manoeuvre prevents developing of severe fentanyl induced cough. **Conflict of interest:** Nil

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