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Dextromethorphan Role on Cough Suppression and Patient Procedure Tolerance in Flexible Bronchoscopy

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ABSTRACT

Objective: To determine the role of Dextromethorphan on cough suppression and patient procedure tolerance in flexible bronchoscopy.

Study Design: Quasi-experimental study.

Place and Duration of Study: Pulmonology Department, District Head Quarters Hospital, Faisalabad Pakistan, from Oct 2019 to Mar 2020.

Methodology: Patients were divided into Group-1 and Group-2. Group-1 was given syrup Dextromethorphan 20miligram one hour before bronchoscopy and Group- 2 was given a placebo one hour before procedure. During procedure, oxygen saturation and blood pressure were recorded continuously by monitor. 10cm Visual analogue scale was used to chart their cough perception where 0 taken as no cough and 10 as incessant cough. Patients recorded their tolerability of procedure after 2 hours on 10cm visual analogue scale.

Results: Mean age of whole study population, Group-A and Group-B was 48.80+11.24, 46.63+11.70 and 47.72+11.43 respectively. Females were 25(41.7%) and males were 35(58.3%). Both groups have same mean SpO2 with supplemental oxygen. Four patients had an oxygen saturation below 90% during flexible bronchoscopy in both groups (*p*-value 0.647). Similar doses of Midazolam were used in the Dextromethorphan and placebo groups (*p*-value 0.879). The perception of cough by the patient, assistant staff and bronchoscopist in Dextromethorphan group 1 was significantly low (*p*-value 0.041, 0.0001, 0.037 respectively). Duration of procedure was also significantly lower in Dextromethorphan group *p*-value 0.0001.

Conclusion: Dextromethorphan use in addition to Midazolam and local anesthetic during flexible bronchoscopy results in significant cough suppression, decrease in total procedure time and Midazolam dose.

Keywords: Cough, Dextromethorphan, Flexible bronchoscopy, Premedication.

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INTRODUCTION

Bronchoscopy is most important diagnostic investigation to visualize respiratory passages and to obtain tissue samples for histopathology.[1] Nevertheless, being minimally invasive and relatively safe procedure, it still poses a lot of discomfort for the patient such as cough, breathing difficulties, throat irritation, and fear of the procedure.

Several regimens are being used to alleviate these apprehensions and discomfort to these patients but no ideal premedication has been found for flexible bronchoscopy (FB). Guidelines by current British thoracic society(BTS) suggest incremental doses of sedation should be given to patients who undergo diagnostic flexible bronchoscopy, except when contraindicated.[2] Sedation improves patient comfort by providing amnesia to the procedure and reducing pain.[3] Although, mild sedation is usually used for carrying out flexible bronchoscopy to facilitate bronchoscopist, there is a room for improvement in this regard.[4] Despite of sedation, patients experience discomfort, limb movements and cough which is sometimes violent during the procedure.[5] There is a need for premedication to suppress cough being the major disruptive factor in performance of bronchoscopist.[6]

Midazolam is usually given to patients undergoing bronchoscopy along with local Xylocaine 4% throat spray. This combination provides fair decrease in movements and discomfort.[7] However, cough being a reflex phenomenon does not reduce proportionately and remains a major disruptive factor to procedure.[3] In some centers, a cough suppressant is being used as a combination with premedication to flexible bronchoscopy with good results.[8] According to a study by Stolz D *et al*.[9] midazolam plus hydrocodone

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combination significantly decrease cough during flexible bronchoscopy without significant desaturation events, when invasive diagnostic procedures are performed. Another study was conducted using Dextromethorphan to suppress cough during flexible bronchoscopy, and concluded that patient anxiety, and Midazolam use during flexible bronchoscopy were significantly less marked with Dextromethorphan premedication.[10] We intend to conduct this study to validate these findings whether Dextromethorphan is effective in suppressing cough and improving patient tolerance during flexible bronchoscopy.

METHODOLOGY

A Quasi experimental study was conducted in Pulmonology department, DHQ hospital, Faisalabad. A total of 60 patients were included in study, 30 patients in each group. Sample size was calculated by using WHO sample size calculator for 2 mean taking anticipated population mean = 1.95, test value of population mean = 4.13, Pooled standard deviation = 0.84, Power of study = 80%, Level of significance = 5%, which turned out to be 60 (30 in each group).[10]

inclusion criteria: Patients of both genders with ages between 16 and 70years requiring flexible bronchoscopy were included in the study.

exclusion criteria: Pregnant, Hypoxemic patients with SpO2 below 90%, Intubated patients, unconscious patients, Recent myocardial infarction within past 6 weeks, hemodynamically unstable patients, history of bleeding diathesis and history of hypersensitivity to Dextromethorphan were excluded from study.

Ethical approval was taken from institutional review committee of Faisalabad Medical University, Faisalabad. Written consent was taken from each participant of the study. Patients were divided into two groups randomly (Group-1 and Group-2) using computer generated random number table. Premedications were administered by an independent nurse without knowledge of bronchoscopist or assistant nurse. Both groups were given Midazolam 2mg intravenously (IV) and further 1–2 mg IV Midazolam boluses given during the procedure on direction of bronchoscopist, 4 ml of 4% Xylocaine throat spray 4 times in nasopharynx and 3 times in oropharynx and 1 ml of 4% Xylocaine instillation on the vocal cords (given just before the procedure). In addition, 3 ml of 2% Lignocaine was instilled in tracheal and bronchial tree by "spray as you go" method. Supplemental local anesthesia dose given to each patient was recorded.

Group-1 was given syrup Dextromethorphan 20mg one hour before bronchoscopy while Group-2 was given a placebo one hour before the procedure. Flexible bronchoscopy was performed by a consultant pulmonologist. During procedure oxygen saturation was recorded continuously and blood pressure was monitored by monitor after every 5 minutes. Supplemental oxygen was given to all patients at 4 L/min with nasal cannula and was increased upto 6 L/min when required to keep oxygen saturation greater than 90%. Bronchoalveolar lavage (BAL), endobronchial and transbronchial biopsies (TBB) were done. Duration and diagnostic procedure type were documented for every patient at the end of flexible bronchoscopy. Bronchoscopist and nursing staff charted their cough perception during procedure on 10 cm visual analogue scale (VAS) where 0 means no cough and 10 presents incessant cough. After two hours, patients recorded their tolerability of procedure on 10 cm visual analogue scale VAS. Higher score shows greater discomfort during procedure.

Data was analyzed by using Statistical Package for Social Sciences (SPSS) version 22.00. Quantitative data was represented using Mean±standard deviation. Qualitative data was represented by using percentage and frequency. Chi square test (for qualitative variables and Student t-test (for normally distributed variables) were applied and *p*-value of ≤0.05 was considered as statistically significant".

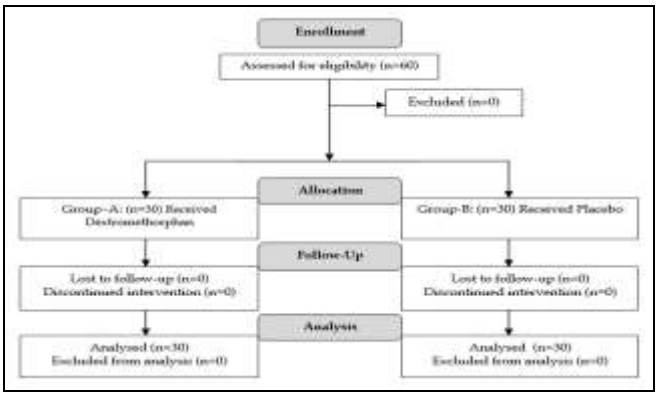

Figure: Patient flow diagram

RESULTS

Total 60 patients were included in the study who underwent flexible bronchoscopy among which 35(58.3%) were male and 25(41.7%) were female. Mean age of study population, Group-A and Group-B was 48.80+11.24 years, 46.63+11.70 years and 47.72+11.43 years respectively. There was no significant difference

noted between two groups of Dextromethorphan and placebo regarding age and gender when flexible bronchoscopy was performed. (*p*-value 0.342, 0.432 and 0.592 respectively). Both groups showed similar mean lowest SpO2 under oxygen supplement. Four patients in both groups had oxygen saturation less than 90% during flexible bronchoscopy (*p*-value 0.647) Table- I.

Table-I: Demographic Features of Both Groups (n=60)

Parameters		Groups		*p*-value
		Group-1 (Dextromethorphan) (n=30)	Group-2 (placebo) (n=30)	
Age (years)	20 or less	1%	0%	0.342
	21-40	4%	9%	
	41-60	21%	17%	
	61 or more	4%	4%	
Gender	Male	19%	16%	0.432
	Female	11%	14%	
Bronchoscopy Indication	Bronchoscopic Biopsy	20%	18%	0.592
	Bronchoalveolar Lavage	10%	12%	
Serum Arteria Oxygenation	Normal SaO2	26%	26%	0.647
	Low SaO2	4%	4%	

Similar doses of Midazolam were used in the Dextromethorphan group and placebo groups (*p*-value 0.879); however, the perception of cough by the patient, assistant staff and bronchoscopist was markedly lower in Dextromethorphan group (*p*-value 0.041, 0.0001, 0.037 respectively). Duration of procedure was also significantly lower in Dextromethorphan group *p*-value 0.0001 Table-II.

Table-II: Comparison of Effect of Dextromethorphan Premedication and Placebo on Perception of Cough by Patient, Assistant Staff and Bronchoscopist and Midazolam Dose and Duration of Procedure (n=60)

	Groups	Mean±SD	*p*-value
Duration of Procedure	A	16.47±2.64	0.001
	B	21.80±4.03	
Cough recorded by Patient	A	4.17±1.23	0.041
	B	5.00±1.80	
Cough recorded by Assistant staff	A	3.30±0.70	0.001
	B	4.50±1.61	
Cough recorded by Bronchoscopist	A	3.17±0.83	0.037
	B	4.03±2.05	
Midazolam Dose	A	1.17±0.83	0.879
	B	1.13±0.86	

DISCUSSION

Patients' tolerance and comfort has become the things of prime importance in modern day medicine.[11] its importance increases while carrying out invasive procedures like flexible bronchoscopy as these poses a significant risk of discomfort[12] and sometimes even harm to patients undergoing these procedures. 95% of FB (flexible bronchoscopy) examinations are done in sedation and with help of local anesthesia.[13] Agitation resulted by insufficient sedation plus cough can lead to hypoxemia during flexible bronchoscpy.[14,15] Adequate sedation results in better patient tolerance during bronchoscopy and allows bronchoscopist to perform invasive procedures.[16,17]

In this study, Dextromethorphan showed a significant decrease in duration of procedure, and cough perception by patient, assistant staff and bronchoscopist. However, there was no significant difference of Midazolam dose and oxygen saturation between Dextromethorphan and placebo groups.

Dextromethorphan premedicated group showed less complained scores in a study by Amini S *et al.*, also less cough and stress were recorded by doctor and the patients. Midazolam doses and time duration of bronchoscopy was short in Dextromethorphan premedicated group. Similar results were shown by our study like better tolerance by the patients; assistant staff and bronchoscopist perception regarding "cough" with Dextromethorphan use, decrease procedure duration. However, dose of Midazolam remained same in each group in our study in contrast to Amini S *et al.* study that conferred less dose of midazolam.[10]

A study by Schwarz Y *et al.*, also showed that DM patients required less lidocaine instillations and significant less Midazolam dosage, achieved good analgesia, had less complaint scores, significantly less coughing, less stress, were more cooperative and found that the procedure was much less unpleasant than they had expected, and produced less sputum at end of the procedure. Similar results were shown by our study like better tolerance by the patients; assistant staff and bronchoscopist perception regarding "cough" with Dextromethorphan use, decrease procedure duration.[18]

There is scarcity of data on Dextromethorphan effect as premedication for flexible bronchoscopy. These are the only studies conducted on cough suppression during flexible bronchoscopy using dextromethorphan. That is why this study provides us with crucial information for comfort of patients undergoing flexible bronchoscopy.

Limitations of this study include small sample size and bias of the bronchoscopist as he decides dose

of local anesthetic and Midazolam as the study progresses.

CONCLUSION

It is concluded from findings of this study that Dextromethorphan use in addition to Midazolam and local anesthetic during flexible bronchoscopy results in significant cough suppression, decrease in total procedure time and Midazolam dose. It is recommended to use a combination of Midazolam along with Dextromethorphan in addition to local anesthetic to increase patient comfort in terms of cough suppression.

Conflict of Interest: None.

Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

MA & MMI: Data acquisition, data analysis, critical review, approval of the final version to be published.

UU & SM: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

ZA & AH: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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