Journal of American Science

Websites:
http://www.jofamericanscience.org
http://www.sciencepub.net

Emails:
editor@sciencepub.net
sciencepub@gmail.com

MARSLAND PRESS
Multidisciplinary Academic Journal Publisher

Effect of endobronchial gentamycin and dexamethasone after air way clearance by bronchoscopy in patients with bronchiectasis

Afnan M. Abdel Halim, Assem F. El Essawy, Radwa A. El Hefny, Enas S. Farhat*

Chest Diseases Department, Faculty of Medicine, Fayoum University, Egypt
e mail: esf11@fayoum.edu.eg

Abstract: Background: Patients with bronchiectasis often experience a low quality of life, recurrent chest infections, and a persistent daily expectoration. Bronchial airway clearance therapy (ACT) has demonstrated a positive prognosis for patients with acute exacerbation of bronchiectasis. Gentamycin is a viable treatment choice for bronchiectasis since it lowers the amount of bacteria in the airways and reduces inflammation. One of the most often used glucocorticoids is dexamethasone, which can lessen mucus secretion from the airways and decrease the expression of inflammatory proteins. **Aim of study:** to assess the effect of endobronchial therapy with dexamethasone together with gentamicin after bronchoscopic clearance of airways in improvement of symptoms and sputum bacteriology in patients with bronchiectasis. **Methods:** A randomized–controlled trial was conducted in chest department of Fayoum University hospital during April 2022- Septemper 2023. This study included 60 patients of bronchiectasis (Case group: included 30 patients that underwent bronchoscopy with topical intrabronchial injection of a mixture of saline, gentamicin and dexamethasone after bronchoscopic air way clearance, Control group: included 30 patients with air way clearance by bronchoscopy only at admission and 3 months later). Follow up data including cough score, mMRC score, FEV1, FACED score, sputum bacteriology within 3 and 6 months. **Results:** There was statistical significant improvement in (case group) regarding morning, night cough score, mMRC dyspnea score, FACED score and FEV1 within 6 months post bronchoscopy. No reported post bronchoscopy serious complications among our 60 studied patients. **Conclusion:** Endobronchial injection of dexamethasone and gentamicin after bronchoscopic ACT significantly improved cough and dyspnea, lung function and FACED score within 6 months.
[Afnan M. Abdel Halim, Assem F. El Essawy, Radwa A. El Hefny, Enas S. Farhat **Effect of endobronchial gentamycin and dexamethasone after air way clearance by bronchoscopy in patients with bronchiectasis** *J Am Sci* 2024;20(6):73-83]. ISSN 1545-1003 (print); ISSN 2375-7264 (online). http://www.jofamericanscience.org 04. doi:10.7537/marsjas200624.04.

Key words: Bronchiectasis, Bronchoscopy, Airway clearance, Gentamicin, Dexamethasone

Introduction

A chronic suppurative and inflammatory lung illness, bronchiectasis is characterized by aberrant and persistent bronchial dilatation on radiological examination, as well as a syndrome of cough, expectoration, and bronchial infection. [1]

Chronic airway inflammation impairs mucociliary clearance, which can lead to sputum retention, long-term colonization, and recurring exacerbations that worsen quality of life. [2]

Increased airway inflammation, systemic inflammation, and increasing lung injury are linked to exacerbation. The goals of bronchiectasis treatment are to lessen symptoms, avoid flare-ups, and enhance quality of life. [1]

According to bronchiectasis guidelines, removing a lot of purulent sputum from the lung is one of the most effective ways to prevent recurrent exacerbations of the condition. Patients with a weakened mucociliary escalator or impaired expectoration of airway secretions can benefit from ACT, a type of airway physiotherapy. [3]

A common procedure for identifying and treating airway disorders is bronchoscopy. [4] ACT should be administered regularly to bronchiectasis patients in order to aid with secretion clearance and lessen cough symptoms. [5] In patients with acute aggravation of bronchiectasis, B-ACT has demonstrated a good outcome. [6]

Direct treatment of the injured airways is made possible by nebulizing antibiotic therapy, which also minimizes systemic side effects such nephrotoxicity and ototoxicity. Gentamicin was chosen because it is affordable, and has a broad spectrum of activity against the bacteria associated with bronchiectasis. [7]

Nebulized gentamicin used over an extended period of time can lower sputum production, lower the amount of germs in the airways, and lessen acute pulmonary exacerbations. [8]

However, some patients may not be able to tolerate long-term nebulized antibiotics and instead have dyspnea, chest discomfort, and bronchospasm. [9]

One of the most widely used glucocorticoids, dexamethasone can decrease the amount of mucus secreted from the airways and limit the production of inflammatory markers. When applied topically, it can help lessen systemic side effects. [10]

Aim of the study

To assess the effectiveness of endobronchial injection of dexamethasone and gentamicin after bronchoscopic clearance of airways in improvement of symptoms and sputum bacteriology.

Patients and methods

A randomized–controlled trial was conducted in chest department of Fayoum University hospital throughout the period (April 2022- Septemper 2023). This study included sixty patients admitted at chest department, Fayoum university hospital by exacerbation of bronchiectasis.

They will be divided into 2 groups through sealed envelope method to ensure randomization:

1: Case group: includes 30 patients that underwent bronchoscopy with topical intrabronchial injection of a mixture of saline, gentamicin and dexamethasone after bronchoscopic air way clearance at admission and 3 months later.

2: Control group: includes 30 patients with air way clearance by bronchoscopy only at admission and 3 months later.

Inclusion criteria:

Patients with bronchiectasis confirmed by chest HRCT, and admitted at the hospital by exacerbation.

Exclusion criteria:

1- Patients with contraindication for bronchoscopy [11]**:**

- Sever bleeding disorder like marked thrombocytopenia, raised PT and PTT.
- Malignant cardiac arrhythmia.
- Severe congestive heart failure and acute myocardial infarction.
- Severe refractory hypoxemia.
- Hemodynamic instability.

2- Patients with active tuberculosis of lung.

3- Patients waiting surgery as those who had interventional treatment for hemoptysis.

Methods:

This study was approved by the ethical committee in Faculty of Medicine, Fayoum University (approval number M583).

All participants gave informed consent before sharing in the study.

Every person included in the study was submitted to the following:

1: Complete history taking especially history of comorbidities: hypertension, diabetes mellitus, COPD and rheumatological disease

2: Complete physical examination: General examination and chest examination

3: oxygen saturation.

4: Laboratory evaluation: complete blood count (CBC), coagulation profile, ESR, CRP, liver and kidney function tests.

4: Radiology: high resolution CT chest without contrast using 160 MSCT Toshiba Aquilion Prime Machine, and the bronchiectasis severity was graded by using modified Reiff score.

A grading system called the Modified Reiff score is used to indicate the degree and severity. Because of its ease of use and ability to evaluate both the number of lobes implicated and dilatation degree, it has been widely employed in research. The bronchial lumen diameter and the nearby vessel diameter are the bases for this score. (zero points≤1; one point=1–2; two points=2–3; three points≥3) in each of the six lung lobes (the lingula was considered as independent lobe). The total range of the score is from 0-18, was classified into mild (1-6); moderate (7-12) and severe (13-18)**.** [12]

5: Lung function assessment of FEV1 by spirometry (Spirobank II)

6: Assessment of FACED score (table 1), cough score (table 2) and mMRC dyspnea scale (table 3).

Table (1): FACED score**.** [13]

	FACED score	
FEV1 predicted	>50 <50	0 point 2 points
Age	<70 years >70 years	0 point 2 points
Chronic bacterial colonization	No Yes, p. aeruginosa	0 point 1 point
Number of lobes with BE	<2 >2	0 point 1 point
Dyspnea, mMRC score	<2 >2	0 point 1 point

Table (2): Cough score [14]

Score	**Day time**	**Night time**
0	No cough	No cough
1	Mild cough in the day time	Mild cough prior to sleep or cough at the night
2	Frequent cough with mild daily Life affection	Mild Cough with night sleep affection
3	Frequent cough with severe daily Life affection	Severe Cough with night sleep affection

Table (3): The modified Medical Research Council (mMRC) scale. [15]

Grade	
0	No breathlessness except on severe exercise
1	I get shortness of breath when walking up a slight hill or hurrying on the level
2	I walk slower than people of same age On level ground or I stop to catch breath with walking at my own place on the level due to breathlessness
3	Stops for breath after few minutes on the level or after walking about 100 m
4	I am too breathless to leave the house, or I am breathless when dressing or undressing

7: All patients received routine treatment according to ERS bronchiectasis guide lines. [16]

8: Bronchoscopy: brochoscope used in the study is OLYMPUS EVIS EXERA II BF-Q180

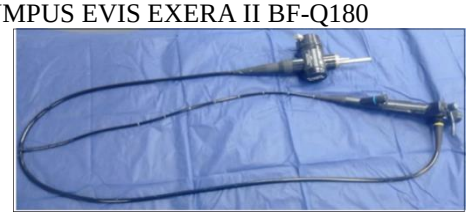
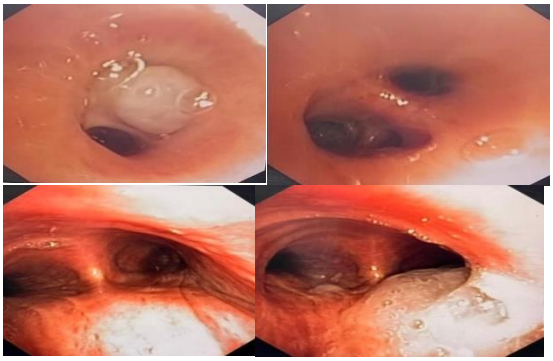


Figure (1): Bronchoscope used in the study

Prior to the bronchoscopy, each patient gave the informed consent form. Prior to the bronchoscopy, the nasal cavity was treated with lubricant gel, laryngeal spray, or atomized inhalation with 2% lidocaine solution. determining if the patient is wearing a denture, and removing it to stop aspiration. One side of the nostrils received oxygen, and throughout the process, the oxygen saturation, pulse, and ECG were tracked. Depending on the situation, use either conscious sedation or general anesthesia (benzodiazepines such as propofol and midazolam). Prior to the procedure, -ve pressure suction device was set up and attached to the bronchoscope.

Both the case and control groups had airway clearance during the bronchoscopy. by continuously suctioning the respiratory tract's complete visible secretions from trachea to sub segmental bronchi. The bronchoscope then moved into the lavage segments. 120 to 200 ml of normal saline were used for lavage (the exact amount varying based on the mucus amount in the airway). Appropriate irrigation was then repeated, and suction was performed right away following each lavage. For culture and sensitivity testing, an appropriate volume of lavage fluid was obtained (using standard microbiological procedures).



A **B**

Figure (2): Large sputum amount retained in the airway before the bronchoscopic air way clearance therapy shown in panel a), and clearance in the same place after the B-ACT shown in panel b).

A combination of dexamethasone, gentamicin, and saline was infused based on the lesion location in the case group, such as the bronchus bifurcation in cases of localized bronchiectasis and in the bifurcation of the upper or lower lobe bronchus on one or both sides, regarding either bilateral or unilateral bronchiectasis. This was done after a bronchoscopic airway clearance procedure.

The mixture is composed of 5 ml of 0.9% normal saline with 2 ml gentamicin sulfate (80mg) and 2 ml dexamethasone sodium phosphate injection (8mg).

9- Follow-up data 3 months and 6 months after discharge for both case and control group: clinical chest symptoms including mMRC dyspnea scale and cough score, spirometry (FEV1), sputum culture result, FACED score.

Statistical analysis of data:

Data gathered and coded for data manipulation easily and entered twice into Microsoft Access and data analysis performed using the Statistical Package of Social Science (SPSS) software version 22 in windows 7 (SPSS Inc., Chicago, IL, USA). Simple descriptive analysis as percentages and numbers of qualitative data, and arithmetic means as central tendency measurement, standard deviations as a measure of dispersion of quantitative data. Quantitative data were tested for normality by One-Sample Kolmogorov-Smirnov test in each study group then inferential statistic tests selected.

- For quantitative parametric data:
  - Independent samples t test performed for comparison of quantitative measures between two independent groups
  - One-way ANOVA test performed to compare quantitative measures between more than 2 independent groups of quantitative data with the benferroni Post- HOC to test the significance

between each 2 groups.

- Paired t-test used for comparison of 2 dependent quantitative data.
- For quantitative non parametric data
- The kruskal Wallis test performed to compare more than 2 independent groups.
- The Mann-Whitney test used to compare 2 independent groups.
- For qualitative data
- Chi square test used to compare between 2 or more than 2 qualitative groups.
- MC-Nemar test used for paired dependent qualitative data.
- Spearman correlation to measure the association between 2 non-parametric quantitative data.
- The P-value< 0.05 was considered as statistical significant

Results

The study included 60 hospitalized patients admitted at chest department of Fayoum university hospital who were diagnosed with bronchiactasis exacerbation. They were divided into 2 groups: case group which included 30 patients that underwent bronchoscopy with topical intrabronchial injection of a mixture of saline, gentamicin and dexamethasone after bronchoscopic air way clearance therapy and control group which included 30 patients with bronchoscopic air way clearance only.

Regarding demographic characteristics of study population, the main age was 43.8±16.3 in case group versus 48.16±15.8 in control group. The study included 14 males and 16 females in the case group versus 10 males and 20 females in the control group with no statistical significant difference as shown in (table 4)

Table (4): Comparisons of different study groups regarding age and sex.

Variables	Cases (N=30)		Control (N=30)		P-value	Sig.
Age (years)						
Mean ± SD	43.8±16.3		48.16±15.8		0.29	NS
Sex						
Male	14	46.7%	10	33.3%	0.43	NS
Female	16	53.3%	20	66.7%		

Comparisons of risk factors in different study groups revealed that no statistical significant difference between cases and controls regarding risk factors distribution (smoking, comorbidities as DM, HTN, COPD, RA, and BMI as shown in (table 5).

Table (5): Comparisons of risk factors in different study groups.

Variables	Cases (N=30)		Control (N=30)		P-value	Sig.
	No.	%	No.	%		
Smoking						
Yes	10	33.3%	4	13.3%	0.12	NS
No	20	66.7%	26	86.7%		
Comorbidities						
No comorbidity	14	46.7%	14	46.7%	0.42	NS
DM	1	3.3%	5	16.7%		
HTN	4	13.3%	2	6.7%		
Rheumatoid arthritis	0	0%	1	3.3%		
COPD	2	6.7%	1	3.3%		
Mixed	9	30%	7	23.3%		
BMI						
Underweight	2	6.7%	7	23.3%	0.13	NS
Normal	10	33.3%	13	43.3%		
Overweight	9	30%	4	13.3%		
Obese	9	30%	6	20%		
Mean ±SD	25.7±5.6		23.2±5.9		0.09	NS

Comparisons of bronchoscopy and radiology in different study groups, there was no statistical significant difference between cases and controls regarding bronchoscopic findings and radiological findings. Regarding bronchoscopic findings, 10 patients had mucus plug versus 8, 19 patients has secretions versus 20, 1 patient had hemoptysis versus 2 in case and control respectively. Regarding modified reiff score as radiological assessment, 7 patients had mild score versus 10, 16 had moderate score versus 18 and 7 had severe score versus 2 patients in case and control groups respectively as shown in (table 6)

Comparisons of clinical assessment at admission in different study groups, there was a statistical significant higher score of night cough and number of exacerbation in last year among cases. On the other hand, there was no statistical significant difference between cases and controls regarding other clinical assessment at admission time as shown in (table 7)

Table (6): Comparisons of bronchoscopy and radiology in different study groups.

Variables	Cases (N=30)		Control (N=30)		P-value	Sig.
	No.	%	No.	%		
Bronchoscopy findings						
Mucus plug	10	33.4%	8	26.6%	0.41	NS
Secretion	19	63.3%	20	66.6%		
Hemoptysis	1	3.3%	2	6.9%		
Modified Reiff score severity						
Mild	7	23.3%	10	33.3%		

Moderate	16	53.3%	18	60%		
Sever	7	23.3%	2	6.7%	0.18	NS
	Mean ±SD		**Mean ±SD**			
Modified Reiff score	9.6±3.5		8.7±3.5		0.31	NS
Number of CT lobes	3.3±1		2.9±1		0.18	NS

Table (7): Comparisons of clinical assessment at admission in different study groups.

At admission	**Cases** (N=30)		**Control** (N=30)		**P-value**	**Sig.**
Oxygen saturation at room air:						
No		**%**	**No**	**%**		
Normal	13	43.3%	13	43.3%		
Mild hypoxia	12	40%	12	40%		
Moderate hypoxia	5	16.7%	5	16.7%	0.99	NS
Mean ±SD	92.9±3.9		93.1±4.6		0.83	NS
Symptoms	**Mean ±SD**		**Mean ±SD**			
Morning Cough score	2.4±0.49		2.2±0.71		0.29	NS
Night cough score	**2.76±0.50**		2.46±0.63		**0.04**	**S**
mMRC score	3.5±0.57		3.3±0.65		0.21	NS
Spirometry (FEV1)	**No.** **%**		**No.** **%**			
Mild	2	6.7%	2	6.7%		
Moderate	9	30%	9	30%		
Sever	9	30%	12	40%	0.81	NS
Very sever	10	33.3%	7	23.3%		
Mean ± SD	4.3.8±17.7		44.7±19.2		0.85	NS
FACED score						
Mild	10	33.3%	5	16.7%		
Moderate	8	26.7%	13	43.3%	0.24	NS
Sever	12	40%	12	40%		
Mean ± SD	3.73±1.6		3.7±1.4		0.93	NS
Bacteriology						
No growth	13	43.3%	12	40%		
Pseudomonas aeruginosa	7	23.3%	6	20%		
Klebsiella	4	13.3%	6	20%		
Acinetobacter	4	13.3%	1	3.3%	0.63	NS
Staph aureus	1	3.3%	3	10%		
Ecoli	0	0%	1	3.3%		
Mixed	1	3.3%	1	3.3%		
	Mean ±SD		**Mean ±SD**			
Number of Exacerbation in last year	3.1±0.73		2.7±0.74		**0.03**	**S**
Number of hospital admission in last Year	1.4±0.76		1.1±0.68		0.22	NS

Comparisons of clinical assessment at 3months follow up in different study groups, there was a statistical significant lower score of morning cough among cases. There was no statistical significant difference between case and control groups regarding other clinical assessment after 3 months follow up as shown in (table 8).

Table (8): Comparisons of clinical assessment at 3months follow up in different study groups.

3 months follow up	**Cases** (N=30)		**Control** (N=30)		**P-value**	**Sig.**
	Mean ±SD		**Mean ±SD**			
Symptoms						
Morning Cough score	1.1±0.60		1.4±0.68		**0.03**	**S**
Nigh cough score	1.6±0.73		1.7±0.59		0.44	NS
mMRC score	2.5±0.68		2.8±0.67		0.09	NS
Spirometry (FEV1)	**No.**	**%**	**No.**	**%**		
Mild	2	6.7%	3	10%		
Moderate	10	33.3%	8	26.7%		
Sever	11	36.7%	12	40%		
Very sever	7	23.3%	7	23.3%	0.93	NS
Mean ± SD	48.9±21.03		44.6±19.6		0.41	NS
FACED score						
Mild	13	43.3%	8	26.7%		
Moderate	12	40%	15	50%		
Sever	5	16.7%	7	23.3%	0.39	NS
Mean ± SD	2.9±1.7		3.1±1.6		0.66	NS
Bacteriology						
No growth	23	76.7%	23	76.7%		
Pseudomonas	2	6.7%	2	6.7%		
Klebsiella	2	6.7%	2	6.7%		
Acinetobacter	1	3.3%	1	3.3%		
Staph	1	3.3%	1	3.3%	0.92	NS
Ecoli	0	0%	0	0%		
MRSA	0	0%	1	3.3%		
Mixed	1	3.3%	0	0%		

Comparisons of clinical assessment at 6 months follow up in different study groups, there was a statistical significant lower score of morning cough among cases. There was no statistical significant difference between cases and controls regarding other clinical assessment after 6 months follow up as shown in (table 9)

Comparisons of percent change from admission to 3month in different variables follow up between cases and controls, there was a statistical significant more

decrease in median value of percent change in morning cough, mMRC scores, and increase in FEV1 after 3 months follow up among cases than controls with no statistical significant difference in change percent follow up in night cough and FACED scores as shown in (table 10)

Between 3and 6 months, FACED score show significant less increase in median value of percent change among cases than controls. No statistical significant difference in change percent follow up in other variables as shown in (table 11)

Table (9): Comparisons of clinical assessment at 6 months follow up in different study groups.

6 months follow up	**Cases** (N=30)		**Control** (N=30)		**P-value**	**Sig.**
	Mean ±SD		**Mean ±SD**			
Symptoms						
Morning Cough score	1.3±0.78		1.8±0.67		**0.01**	**S**
Nigh cough score	1.7±0.84		2.03±0.71		0.07	NS
mMRC score	2.5±0.82		2.9±0.73		0.06	NS
Spirometry (FEV1)	**No.**	**%**	**No.**	**%**		
Mild	2	6.7%	2	6.7%	0.71	NS
Moderate	11	36.7%	7	23.3%		
Sever	10	33.3%	13	43.3%		
Very sever	7	23.3%	8	26.7%		
Mean ± SD	49.1±31.3		43.2±20.2		0.28	NS
FACED score						
Mild	14	46.7%	6	20%	0.08	NS
Moderate	11	36.7%	18	60%		
Sever	5	16.7%	6	20%		
Mean ± SD	2.7±.9		3.4±1.5		0.17	NS
Bacteriology						
No growth	26	86.6%	20	66.7%	0.40	NS
Pseudomonas	2	6.7%	5	16.7%		
Klebsiella	2	6.7%	2	6.7%		
Acinetobacter	0	0%	0	0%		
Staph	0	0%	1	3.3%		
Ecoli	0	0%	0	0%		
MRSA	0	0%	1	3.3%		
Mixed	0	0%	1	3.3%		

Table (10): Comparisons of percent change from admission to 3month in different variables follow up between cases and controls.

Percent change %	**Cases** **Median/range**	**Control** **Median/range**	**P-value**	**Sig.**
Change from admission to 3month				
Morning Cough score	-50 (-100/0)	-33.3 (-100/0)	0.005	**HS**
Nigh cough score	-33.3(-100/0)	-33.3(-66.7/0)	0.06	NS
mMRC score	-29.2 (-66.7/0)	-25 (-33.3/0)	0.002	**HS**
FEV1	11.2 (32.2/70.6)	0 (-32.8/67.4)	0.002	**HS**
FACED score	-22.5(100/100)	-7.1(100/66.7)	0.26	NS

Table (11): Comparisons of percent change from 3month to 6month in different variables follow up between cases and controls**.**

Percent change %	**Cases** **Median/range**	**Control** **Median/range**	**P-value**	**Sig.**
Change from 3month to 6month				
Morning Cough score	0(-100/200)	0(-50/200)	0.17	NS
Nigh cough score	0(-50/100)	0(-50/200)	0.20	NS
mMRC score	0(-33.3/50)	0(-33.3/50)	0.37	NS
FEV1	0(-20.7/43.9)	0(-25.8/0)	0.06	NS
FACED score	0(-100/33.3)	0(-100/300)	0.01	**S**

From admission time to 6 months, follow up cases show statistical significant much decrease in median value of percent change in morning, nigh cough, mMRC and FACED scores and much increase in FVE1 when compared with controls as shown in (table 12)

Table (12): Comparisons of percent change from admission to 6 month in different variables follow up between cases and controls.

Percent change %	Cases Median/range	Control Median/range	P-value	Sig.
Change from admission to 6 month				
Morning Cough score	-50(-100/0)	0(-100/100)	<0.001	**HS**
Nigh cough score	-33.3(-100/0)	0(-50/)	0.006	**HS**
mMRC score	-33.3(-66.7/0)	0(-66.7/100)	<0.001	**HS**
FEV1	11.2(32.2/70.6)	-6.7(-32.8/67.4)	<0.001	**HS**
FACED score	-26.8(-100/50)	0(-100/100)	0.008	**HS**

Percent change in bacterial growth showed no statistically significant difference as shown in (table 13).

Table (13): Comparisons of percent change in bacterial growth follow up between cases and controls.

Change in bacterial growth	Cases	Control	p-value	Sig.
From admission to 3m	-10(33.4%)	-11(36.7%)	0.78	Ns
From 3m to 6m	-3(10%)	+3(10%)	0.06	Ns
From admission to 6m	-13(43.3%)	-8(26.7%)	0.17	Ns

Discussion

A chronic suppurative and inflammatory lung illness, bronchiectasis impairs quality of life by sputum retention, long-term colonization, and recurring exacerbations caused by failure of mucociliary clearance. [2]

Increased airway inflammation, systemic inflammation, and increasing lung injury are linked to exacerbation. The goals of bronchiectasis treatment are to lessen symptoms, avoid flare-ups, and enhance quality of life. [1]

B-ACT should be administered regularly to patients with bronchiectasis in order to aid with secretion clearance and lessen cough symptoms. [5] In patients with acute aggravation of bronchiectasis, B-ACT has demonstrated a good outcome. [6]

Nebulized gentamicin used over an extended period of time can lower sputum production, lower the amount of germs in the airways, and lessen acute pulmonary exacerbations. [8]

One of the most often used glucocorticoids is dexamethasone, which can lessen mucus secretion from the airways and decrease the expression of inflammatory proteins in the airways. The systemic side effects may also be lessened by topical treatment. [10]

In the present study, the aim is assessment of the effectiveness of endobronchial therapy with dexamethasone and gentamicin after bronchoscopic air way clearance in improvement of symptoms and decrease in incidence of exacerbation in patients with bronchiectasis.

This is the second study demonstrating the benefit of endobronachial injection of gentamycin and dexamethasone mixture in patients with bronchiectasis exacerbation after B-ACT. The first is belonged to **Li Q et al.** [17] which demonstrate the efficacy of endobronchial therapy with dexamethasone and gentamicin after clearance of airways by bronchoscopy in exacerbation of bronchiectasis. **Liu Y et al.,** [3] also explore the benefits of B-ACT therapy for management of hospitalized bronchiectasis patients in acute flare up. A total of 60 hospitalized patients admitted at chest department of Fayoum university hospital and were diagnosed with bronchiactasis exacerbation. They were classified into 2 groups: case group which includes 30 patients that underwent bronchoscopy with topical intrabronchial injection of a mixture of saline, gentamicin and dexamethasone after B-AC and control group which includes 30 patients with B-AC only.

Regarding age and sex there was no statistical significant difference with p-value >0.05 between cases and controls regarding age and sex distribution**.**

Regarding past medical history, smoking, comorbidity and BMI in both study groups; there was no statistical significant difference with p-value >0.05 between case and control groups.

The chest HRCT during admission was assessed in the two study groups including number of lobes affected and modified Reiff score. There were no statistical significant differences in the severity classifications of modified Reiff score and number of lobes affected for all 60 patients. The same as **Liu Y et al.** [3] **and Li Q et al** [17] show no significant differences in radiological assessment between their two study groups.

Regarding the bronchoscopy image, the patient had a large amount of purulent sputum before the B-ACT therapy; 39 (65%) patients were found with secretions with no significant difference between 20 patients in the control group and 19 patients in the case group (P-value 0.41). The mucous plug was found in the bronchoscope in 18 patients (30%), with no significant difference was found between the case and control groups (p value 0.41). A mild degree of hemorrhage was recorded in 1 case patient and 2 control patients in

the bronchoscope. It was the same as **Li Q et al** [17] which has no significant difference between both patients' groups in bronchoscopic findings.

As regarding oxygen saturation for both case and control group on admission there was no statistical significant difference with p-value 0.99 as 13 patients have normal saturation, 12 have mild hypoxemia and 5 have sever hypoxemia with the mean value is 92.9 % ±3.9 for case group and 93.1 % ± 4.6 for control group. This is in concordant with **Li Q et al.,** [17] and **Liu Y et al.,** [3] both studies found no statistical significant difference between the two groups regarding previous medical history, smoking, comorbidity, BMI and blood oxygen saturation.

The primary clinical signs of bronchiectasis aggravation including cough, copious and viscous sputum, and dyspnea. [18]

In the study, the night score of cough in case patients was significantly higher than that of control patients with p value 0.04, rather than that there was no significant difference between case and control groups regarding morning cough score and dyspnea mMRC score assessment during admission which is in concordant with **Murray M et al., [8], Liu Y et al., [3]** and **Li Q et al., [17]** which all show no significant difference in cough and mMRC scores assessment.

Lung function assessment using spirometry and measure FEV1. It shows obstructive pattern with no statistical significant difference in any obstruction classification between case and control groups with p-value >0.05. The same as **Liu Y et al., [3]** and **Murray M et al., [8]** which show no significant difference in FEV1 at baseline between two study groups.

Several guidelines currently advise using the FACED score in clinical practice to help patients with bronchiectasis be categorized according to their risk. [19]

In this study the FACED score was evaluated at admission and patients were classified into mild, moderate and severe, with predominance of severe classification for both groups with no significant difference between both groups.

Even in cases where the patient's condition appears to be stable, the majority of bronchiectasis patients have persistent infections with harmful bacteria in their airways. [20]

In this study, there was no statistically significant difference in BAL pathogenic organisms between the two study groups at baseline and the most predominant isolated pathogen in this study is P. aeruginosa (n=13/60 (21.6%)).

In case group BALC&S: no growth in 13(43%) patients, 17(56%) patients are pathogenically colonized; the rate of isolation of P. aeruginosa is 23% (n=7) and other pathogenic bacteria are 33%.

In control group BALC&S: (no growth in 12 patients (40%), 18(60%) patients are pathogenically colonized; the rate of isolation of P. aeruginosa is 20% (n=6), and other pathogenic bacteria are 40%.

This is the same as **Murray M et al., [8]** which show no significant difference in sputum infecting pathogens between the two study groups at baseline and the rates of isolation of P. aeruginosa in the two groups were 48.1% and 36.7% respectively, the second is Haemophilus influenza with 40.7% and 50% respectively and the isolation rates of other pathogenic bacteria were only 3 for each group.

Li Q et al., [17] which show no significant difference in BAL pathogens between two study groups at baseline and the rates of isolation of P. aeruginosa in the two groups were 28.18% and 19.89% respectively and the rates of isolation of other pathogenic bacteria were 6.63% and 8.06% respectively.

The symptoms of patients were reevaluated 3and 6 months after discharge and by comparing clinical assessment data at admission with 3 and 6 months follow up data (cough, mMRC, FEV1, FACED scores and sputum c&s) we found that:

There was a statistical significant lower score of morning cough after 3 and 6 m among cases with p-value 0.03, 0.01 respectively. On the other side, there was no statistical significant difference with p-value >0.05 between cases and control as regards other clinical assessment (night cough score, mMRC, FEV1, FACED score and sputum c&s) after 3 months follow up.

In comparison with 3months follow up assessment of **Li Q et al., [17],** there were significant improvement in morning and night cough, LCQ and total symptom score (P value < 0.05).

Murray M et al., [8] there were no significant difference between nebulized gentamycin and saline groups at 3 and 6 months follow up assessment of FEV1 and sputum c&s. Also, there was no significant difference in exercise capacity between study groups (3, 6 and 9 months) until 12 months when exercise capacity had improved significantly in gentamycin group (P value 0.03).

Median value of percent change in different clinical assessment data at admission and different time points were compared in both groups of the study:

The morning cough, mMRC dyspnea score and FEV1 showed significant improvement in case group .There was a high statistical significant more decrease in the median value of percent change of morning cough between admission and 3 m (55% decrease in cases Vs 33% decrease in controls, P value 0.005), mMRC score (29.2% in cases Vs 25% in controls, P value 0.002) and more increase in FEV1 (11.2% in cases Vs 0% in controls, P value 0.002) but no difference statistically in percent change of night cough score and FACED score.

After 6 months only FACED score shows significant change, as it shows more decrease in median percent change value between 3 and 6m than that between admission and 3m (0% decrease ranged between 100% and 33.3% among cases and 0% decrease ranged between 100% and 300% among controls with p-value 0.01).

From admission time to 6 months follow up cases show high statistical significant much decrease in percent change median value of morning cough (50% in cases Vs 0% in controls), nigh cough (0% in cases Vs 0% in controls), mMRC (33% in cases Vs 0% in controls), FACED scores (increase by 11.2% in cases Vs 6.7% in controls) and much increase in percent change of FVE1 median value (26.8% in cases Vs 0% in controls) when compared with controls with P value <0.05

These results are corroborated by the fact that bronchoscopic airway clearing can quickly and effectively remove harmful microorganisms, induce a cough response, encourage the removal of mucous plugs and large amounts of intratracheal viscous sputum under direct eye. [21]

Gentamicin was locally infused into the bronchiectatic lesion, changing the bacterial living conditions and increasing the local drug concentration. This immediately functioned as a bacteriostatic and bactericidal agent, preventing adverse responses associated with inhalation. Long-acting glucocorticoids like dexamethasone have potent topical anti-inflammatory properties that are beneficial for symptom management. [8]

By comparison with **Liu Y et al.,** [3] there is recorded improvement in clinical symptom of B-ACT group, as it shows significant more increase in changes of CAT score between admission day and day 3 post bronchoscopy, but no significant increase in changes of CAT cough score and 6 minutes' walk test at any time point. LQC score percent change shows significant improvement of B-ACT group between day 3 and 7 and admission day, but this study was not assessing if the improvement of clinical symptom will be sustained for months or not.

In this study there is no statistical significance in follow up culture within different time points.

In controversy with **Murray M et al., [8],** by 1 year in the gentamicin group, 30.8% (4 of 13 patients) infected with P. aeruginosa showed eradication and 3.7% (1 of 13 patients) cultured a different pathogen. A total of 92.8% (13 of 14 patients) infected with other pathogens showed eradication. In those not showing eradication, there was a significant decrease in bacterial density.

In comparison with **Twiss J et al.,** [22] which assess the efficacy of 12 week of nebulized gentamicin in bronchiectasis of children. It shows no significant difference in FEV1 between placebo and gentamicin (P value 0.38), but it shows significant improvement in symptom severity score with gentamicin, compared to placebo (P value 0.012) group and significant improvement in H. influenza bacterial density (P value 0.001), but these effects were transient as H. influenzae density returned to baseline levels following washout.

No reported post bronchoscopy serious complications among our 60 studied patients such as airway spasm, massive hemoptysis and severe arrhythmia. Endobronchial therapy with dexamethasone and gentamicin after AC is safe.

Limitations:

- ✓ This study not taking in consideration changes in different assessment variables between cases and controls in relation to aetiology of bronchiectasis, comorbidity, age, sex, disease duration and disease severity through FACED score and radiology scores.
- ✓ Limited patients number included in the study
- ✓ Conclusions of this study can be presented to bronchiectasis exacerbations.
- ✓ Not including assessment of changes in sputum volume, purulence, inflammatory marker and bacterial density and health-related quality of life scores (LCQ and SGRQ scores) between case and control group

Conclusion:

Our results revealed that, topical instillation of dexamethasone and gentamicin improved cough and dyspnea, lung function and FACED score within 6 months compared to bronchoscopic air way clearance only. Proving that endobronchial gentamycin and dexamethasone after B-ACT is effective and safe treatment method for bronchiectasis exacerbation that can perfectly eleminate airway secretions with direct vision then the local instillation of dexamethasone and gentamicin has a direct anti- infective and local anti-inflammatory effects that help in symptoms control .

Recommendations:

- ✓ Taking into consideration changes in different bronchiectasis assessment tools in relation to etiology of bronchiectasis, age, sex, comorbidity, disease duration, severity scores as FACED, BSI and radiology scores which will has great value to clinicians in putting different therapies for patients with bronchiectasis
- ✓ The results should be confirmed by further randomized trials.
- ✓ Taking into consideration assessment of changes in sputum volume, purulence, inflammatory marker and bacterial density and health-related quality of life scores (LCQ and SGRQ scores)

between case and control groups

- ✓ Increase patients number evaluated in the study
- ✓ Study the effectiveness of endo bronchial injection of other antibiotic as tobramycin in bronchiectasis exacerbation

Conflict of interest:
The authors declare no conflict of interest

Funding: This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Authors contributions: Afnan M. Abdel Halim and Enas S. Farhat share in collection of cases. Assem F. El Essawy and Radwa A. El Hefny have given substantial contributions to the conception and the design of the manuscript. Author 1 and author 4 to acquisition, analysis and interpretation of the data. All authors have participated to drafting the manuscript. All authors read and approved the final version of the manuscript. All authors contributed equally to the manuscript and read and approved the final version of the manuscript.

Abbreviations:

B-ACT	Bronchoscopic airway clearance therapy
BAL	Bronchoalveolar lavage
BSI	Bronchiectasis Severit Index
COPD	Chronic obstructive pulmonary diseas
HTN	hypertension
DM	diabetes mellitus
RA	rheumatoid arthritis
CRP	C- reactive protein
CT	Computed tomography
ESR	Erythrocyte sedimentation rate
FEV1	Forced expiratory volume 1
MSCT	Multi-slice computer tomography
QoL	Quality of live
MMRC	modified medical research council
FEV1	forced expiratory volume in 1st second
BMI	body mass index
LCQ	Leicester Cough Questionnaire
SGRQ	St. George's Respiratory Questionnaire

References:

[1]. Polverino E, Dimakou K, Hurst J, Miravitlles M., et al. The overlap between bronchiectasis and chronic airway diseases: state of the art and future directions. Eur Respir J **2018**; 52: 1800328.

[2]. Flume PA, Chalmers JD, and Olivier KN. Advances in Bronchiectasis: Endotyping, Genetics, Microbiome, and Disease Heterogeneity. Lancet **2018**; 392: 880–890.

[3]. Liu Y, Lu HW, Gu SY, Wang WW., et al. Bronchoscopic airway clearance therapy for acute exacerbations of bronchiectasis. EBioMedicine **2021**; 72: 103587.

[4]. Du Rand I A, Blaikley J, Booton R, Chaudhuri N., et al. British Thoracic Society Guideline for Diagnostic Flexible Bronchoscopy in Adults: Accredited by NICEThoacic Society Guideline for Diagnostic Flexible Bronchoscopy in Adults: Accredited by NICE. Thorax **2013**; 68: i1–i44.

[5]. Lee AL, Burge AT, and Holland AE. Airway Clearance Techniques for Bronchiectasis. Cochrane Database Syst. Rev **2015**; 11:CD008351.

[6]. Choi JY. Exacerbation Prevention and Management of Bronchiectasis. Tuberc Respir Dis **2023**; 86: 183-195

[7]. Crowther Labiris NR, Holbrook AM, Chrystyn H., et al. Dry powder versus intravenous and nebulized gentamicin in cystic fibrosis and bronchiectasis. A pilot study. Am J Respir Crit Care Med **1999**; 160: 1711–1716.

[8]. Murray MP, Govan JR, Doherty CJ., et al. A randomized controlled trial of nebulized gentamicin in non-cystic fibrosis bronchiectasis. Am J Respir Crit Care Med **2011**; 183: 491–9.

[9]. Haworth CS, Bilton D, Chalmers J D and Davis A M. Inhaled Liposomal Ciprofloxacin in Patients with Non-cystic Fibrosis Bronchiectasis and Chronic Lung Infection with Pseudomonas aeruginosa (ORBIT-3 and ORBIT-4): Two Phase 3, Randomised Controlled Trials. Lancet Respir. Med **2019**; 7: 213–226.

[10]. Chan S C, Shum D K, Tipoe G L, Mak J C., et al. Upregulation of ICAM-1 Expression in Bronchial Epithelial Cells by Airway Secretions in Bronchiectasis. Respir. Med **2008**: 102; 287–298.

[11]. Wahidi MM, Rocha AT, Hollingsworth JW., et al. Contraindications and safety of transbronchial lung biopsy via flexible bronchoscopy. A survey of pulmonologists and review of the literature. Respiration. **2005**; 72(3): 285-95.

[12]. Reiff DB, Wells AU, Carr DH., et al. CT findings in bronchiectasis: limited value in distinguishing between. Eur Respir Mon. **2011**; 52: 44–67.

[13]. Faverio P, Zucchetti SC, Simonetta E, Amati F., et al. Phenotyping in bronchiectasis: Are we moving toward a personalized medicine? Community Acquir Infect **2016**; 3: 96-103.

[14]. Wang Z, Wang M, Wen S, Yu L, Xu X. Types and applications of cough- related questionnaires. J Thorac Dis **2019**; 11(10):4379-4388.

[15]. Munari AB, Gulart AA, Santos K., et al. Modified Medical Research Council Dyspnea

Scale in GOLD Classification Better Reflects Physical Activities of Daily Living. Respiratory Care **2018**; 63 (1): 77-85.
[16]. Chang AB, Fortescue R, Grimwood K, Alexopoulou E., et al. European Respiratory Society guidelines for the management of children and adolescents with bronchiectasis. Eur Respir J **2021**; 58: 2002990.
[17]. Li Q, Huang B, Gu H, Zhou Y., et al. Endobronchial Therapy With Gentamicin and Dexamethasone After Airway Clearance by Bronchoscopy in Exacerbation of Non-Cystic Fibrosis Bronchiectasis: A Real-World Observational Study. Front. Pharmacol **2021**; 12: 773241.
[18]. Sheehan RE, Wells AU, Copley SJ., et al. A comparison of serial computed tomography and functional change in bronchiectasis. Eur Respir J **2002**; 20: 581–587.
[19]. Dhar R, Singh S, Talwar D, et al. Clinical outcomes of bronchiectasis in India: data from the EMBARC/Respiratory Research Network of India registry. Eur Respir J **2023**; 61: 2200611
[20]. Angrill J, Agusti C, De Celis R, Filella X., et al. Bronchial inflammation and colonization in patients with clinically stable bronchiectasis. Am J Respir Crit Care Med **2001**; 164: 1628–1632.
[21]. Kreider ME, and Lipson DA. Bronchoscopy for Atelectasis in the ICU: a Case Report and Review of the Literature. Chest **2003**; 124: 344–350.
[22]. Twiss J, Stewart A, Gilchrist CA., et al. Randomised controlled trial of nebulised gentamicin in children with bronchiectasis. Journal of Paediatrics and Child Health **2022**; 58: 1039–1045

6/11/2024