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Article

Assessment of The Effect of Niacin-*Hedra helix* Extract Combined Treatment on Some Biochemical Parameters in Induced-Asthma Male Mice

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Abstract

The point of the present work was intended to think about the impacts of Niacin, *Hedera helix* on the asthma. Related parameters after enlistment of asthma for 28 days and in Balb/c mice, notwithstanding research a plausibility of accomplishing a joined advantage of niacin and *Hedera helix* treatment on cytokines, total protein and the histological examination of lung. The white and differential blood count in BAL (Eosinophil infiltration) is the Asthma marker. The activity level of GSH in the tissue of lung of mice recorded significant increases ($p \leq 0.05$) and that the level of GSH was significantly decreased in asthma group compared to control group. The group which was treated by a combination increased by 39.9% compared to the asthma group. The total thiol in lung tissue of mice recorded significant increases in level of T-thiol in all the treated groups compared to asthma group and the group which was treated by niacin, *Hedera helix* and the group of combination recorded 60.8%, 60.6%, 68.3%; respectively, while the asthma group recorded a significant decreased. There were significant decreases ($p \leq 0.05$) in the level of SOD activity in the tissue of mice in niacin, Hedera and niacin –Hedera combination groups as compared to control group, while recording increases of 121.3%, 54.7% and 130.7% when compared with asthma treated group, the results showed significant decreases in asthma group the data showed the difference between asthma group and niacin group by 0.001, while with Hedera group 0.602 and combination group 0.001 as compared to asthma group. There was huge increment in TNF-α in asthma group while, in other treated groups there were huge diminished contrasted with asthma niacin, Hedera, niacin-Hedera blend 0.999, 0.920 and 0.812; respectively.

Key words: Environment-Niacin-*Hedra helix* -Biochemical Parameters-Asthma- Mice.

1. Introduction

Parts of air contamination incorporate nitrogen dioxide and ozone (D'Amato et al., 2013). Asthma is portrayed by factor and repeating indications, reversible wind stream deterrent, and bronchospasm (NHLBI, 2007). Manifestations incorporate scenes of wheezing, hacking and shortness of breath (Martinez, 2007). Asthma is believed to be brought about by a mix of hereditary and ecological components. Natural components incorporate presentation to air contamination and allergens (WHO, 2013; Horne, 2006). *Hedera helix* is known as ivy plant or English ivy and is an individual from the Araliaceae family. Preclinical investigations demonstrated that ivy leaf has a spasmolytic, broncho-enlarging and antibacterial impact which is fundamentally owing to the triterpene saponins contained in them (Trute et al., 1997). Ivy leaves extracts display pain relieving, anthelmintic, against mutagenic (Ganji et al., 2009). Niacin is a water-dissolvable nutrient. In human aortic endothelial cells in vitro, niacin fundamentally smothered the bond and gathering of monocytes/macrophages and LDL oxidation (Kuvin et al., 2006). The point of the present work was intended to look at the impacts of Niacin, *Hedera helix* and their joined treatment on asthma. Related parameters after enlistment of asthma for 28 days and in Balb/c mice.

Asthma

Advancement of asthma goes through three stages; A mid the enlistment stage, Activation of T- cells prompts the creation of different cytokines, as tumor necrotic factor-alpha (TNF-α), interleukins and interferon's (Bradding and Holgate, 1999; Bloemen et al., 2007). Early-stage asthmatic response (EAR) is portrayed by narrowing of aviation route smooth muscle (ASM) cells, vascular spillage (Mainardi et al., 2009). Late stage asthmatic response (LAR) is described by sub-epithelial fibrosis, ASM and epithelial cells hypertrophy (Aulak et al., 2001). ROS can result in lung damage because of direct oxidative harm to epithelial cells and cell shedding (Zheng et al., 2004). ROS have been appeared to be related with the pathogenesis of asthma by inspiring, bronchial hyper reactivity (Nadeem et al., 2005).

1.2. Eosinophil

In asthma, eosinophils are thought to assume a basic job in the fiery reaction, as they are available in expanded numbers in broncho-alveolar lavage (BAL) and blood that relates with bronchial hyper responsiveness (Cluzel et al., 1987). Eosinophil activation in vivo outcomes in eosinophil per oxidase (EPO) discharge and oxidative harm to proteins through bromination of tyrosine deposits (Wardlaw et al., 1988; Mitra et al., 2000). Neutrophil- and monocyte-derived myeloperoxidase (MPO), which is expanded in smokers, produces 3-chlorotyrosine (Mitra et al., 2000). Alveolar macrophages, and neutrophils from asthmatic patients produce more ROS (H2O2), than do those from typical subjects (Wu et al., 2000). Comhair et al. (2000); Radwan et al., (2017), Radwan et al., (2018); Radwan et al., (2019) have distinguished that debilitated SOD action has been observed to be related with wind current hindrance alongside aviation route hyper responsiveness and renovating. This inactivation of SOD in asthmatics, which has been accounted for in different examinations (Comhair et al., 2000) was because of ROS.

1.3. In the pulmonary tissue

There is a distinction between these two ideas since oxygen is available in the alveoli amid lung ischemia. Under this condition, alveolar oxygen keeps up vigorous digestion, deferring hypoxia (Gillissen et al., 1997a). At the point when oxygen is reintroduced into the earth through reperfusion or ventilation, the O - radical is shaped by the impact of xanthine oxidase on hypoxanthine (Gillissen et al., 1997b). The nonattendance of blood stream

in the lungs may cause lipid peroxidation and oxidative harm (Lapenna et al., 1995). This kind of harm isn't identified with ATP exhaustion and subsequently can't be obstructed by xanthine oxidase inhibitors (Gillissen et al., 1997b). The endothelium is by all accounts one of the significant oxidant sources in non-hypoxic lung ischemia brought about by the enactment of nicotinamide adenine di-nucleotide phosphate (NADPH)- oxidase and of the NF-kB factor, just as by calcium/calmodulin-subordinate nitric oxide synthase (Yasui et al., 2000; IAG, 2002). Oxidants actuate expanded apoptosis of bronchial epithelial cells from asthmatic subjects (Sieben et al., 2009; CHMP, 2009). In vitro introduction of auxiliary and provocative cells of the lungs to oxidants actuates the arrival of master fiery go in between including cytokines, chemokines and attachment atoms associated with incendiary cell enlistment in asthma (Stauss-Grabo and Atiye, 2009).

In vitro oxidative pressure can initiate enactment of (NF-kB) and activator protein 1 (AP-1), two vital controllers of incendiary procedures (Zeil et al., 2014). Dimensions of EPO and additionally MPO are expanded in the instigated sputum, and broncho alveolar lavage (BAL) liquid from patients with stable asthma (Fario et al., 2009). The expanded levels of many direct and backhanded markers of oxidative pressure (counting malondialdehyde, thiobarbituric corrosive receptive items (TBARs), and H2O2) have been found in the plasma, sputum and lung tissues of patients with asthma. Their dimension is frequently identified with the seriousness of the sickness and is conversely identified with the level of strength (Stauss-Grabo and Atiye, 2009). Peroxynitrite inhibitory action is diminished in the sputum of patients with stable asthma and its dimension is emphatically identified with aviation route responsiveness and adversely identified with constrained expiratory volume in 1 second (FEV1) and the level of sputum eosinophilia. Treatment with breathed in glucocorticoids likewise standardizes the decreased bronchial epithelial CuZn-SOD explicit action (Gaillard et al., 2003).

1.4. NF-kB

Rhinovirus contamination of respiratory epithelial cells causes intracellular oxidant age which is a significant advance in the initiation of NF-kB and in the accompanying generation of expert incendiary attachment atoms and cytokines. Decreasing specialists restrain both rhinovirus actuated oxidant age and provocative go between creation and discharge (Hedayati et al., 2001). Oxidants incite expanded apoptosis of bronchial epithelial cells from asthmatic subjects (Sieben et al., 2009). In vitro introduction of basic and incendiary cells of the lungs to oxidants instigates the arrival of professional provocative go between including cytokines, chemokines, development factors, arachidonic corrosive metabolites, and attachment atoms engaged with fiery cell enlistment in asthma (Fario et al., 2009). Inside the core, oxidants prompt changes in quality articulation (Radwan et al., 2016; Radwan et al., 2017; Radwan et al., 2018; Radwan et al., 2019). Curiously, in vitro oxidative pressure can actuate enactment of (NF-kB) and activator protein 1 (AP-1), two significant controllers of incendiary procedures (Zeil et al., 2014, Cwientzek et al., 2011).

Increased levels of many direct and indirect markers of oxidative stress have been found in the sputum, BAL liquid, and lung tissues of patients with asthma. Their dimension is frequently identified with the seriousness of the sickness and is conversely identified with the level of stability (Fario et al., 2009). The investigation of breathed out breath and breathed out condensate has as of late permitted direct evaluation of H2O2 and nitric oxide and estimation of a few aberrant results of oxidation in those examples. The last are impressions of oxidation on various substrates, for example, proteins (nitrotyrosine), lipids (isoprostanes and ethane), and DNA (hydroxyl deoxy guanosine). The outflow

of nitrotyrosine is expanded likewise in bronchial and bronchiolar epithelial cells, in smooth muscle cells, and in eosinophils of bronchial aviation routes and lung parenchyma of patients with stable asthma (Bolbot et al., 2004;Veit, 2014). Regardless of whether per oxidases essentially reflect granulocytic aggravation or whether they effectively add to tissue harm in asthma stays to be resolved. Taken together, these information show that oxidative pressure is upgraded in asthma, and that such redox awkwardness isn't bound to the lungs. Many controlled examinations propose that there is a lack of cancer prevention agents with few investigations showing an initiation of the pathways shielding lung cells from oxidant intervened harm in the lungs or flow of asthmatic subjects (Stauss-Grabo and Atiye, 2009).

1.5.SOD

In stable conditions, CuZn-SOD action is lower in steroid innocent asthmatics than in typical subjects (Gaillard et al., 2003). The cell antioxidants vitamin E inhibits IgE reactions to unfavorably susceptible upgrades in creatures and dietary nutrient E levels are contrarily identified with the occurrence of asthma (Aylward, 1979).

There are more than thirty known seleno-proteins, numerous with obscure capacities (Chang-Man et al., 2001; Barnes, 2000; Li et al., 2003). Corticosteroids, the most powerful non-explicit calming operators, produce considerable improvement in target lung elements of patients with asthma (Sahin et al., 2001; Calikoglu et al., 2002). There has been a surge in interest in herbal medicine, possibly because they have fewer side effects than current therapy (Radwan et al., 2019).

1.6. Hedera helix

It is known as normal ivy, is a plant having a place with the Araliaceae family. Ivy leaf separate has been utilized to treat provocative bronchial ailments (Message and Johnston, 2002). It is a notable plant as ivy plant or English ivy and is an individual from the Araliaceae family. Preclinical examinations demonstrated that ivy leaf extricates have a spasmolytic, bronchodilating and antibacterial impact (Aldridge et al., 2002). The patients treated with the ivy leaves remove profit by the extra broncho spasmolytic impact (Ganji et al., 2009; Kharitonov and Barnes, 2001). Antioxidants have the capacity to shield the body from harms brought about by free radicals initiated oxidative stress (Richardson and Benjamin, 2002).

1.7. Niacin

It is a water-dissolvable nutrient. Numerous examinations showed niacin has the calming properties. In human aortic endothelial cells in vitro, niacin fundamentally stifled the grip and collection of monocytes/macrophages and hindered angiotensin II-actuated responsive oxygen species (ROS) creation and LDL oxidation (Cookson, 1999; Holt et al., 1999). Niacin is the nutrient B3 and has central jobs as a component of decrease/oxidation coenzymes engaged with vitality digestion, amino corrosive digestion, and detoxification responses for medications and different substances. Niacin (B3) is essential to cell digestion, mainly through its job in the coenzymes, nicotine-adenine dinucleotide (NAD) and nicotine-adenine dinucleotide phosphatate (NADP), in oxidation-decrease responses. Niacin is principally processed in the liver to niacinamide (nicotinamide) and different subsidiaries (Villani et al., 2001).

2. Material and methods:

All chemical and reagent utilized were of scientific evaluation, ova egg whites, niacin, aluminum hydroxide (Alum) was acquired from sigma-Aldrich concoction co (St. Louis, Mo, USA.). *Hedera helix* extract was acquired from EGY pharmaceutical (EGY Pharma) as syrup.

2.1. Experimental animals:

Pathogen free 22 days, male BALB/c mice (Mus musculus), gauging 25-30 gm, were gotten from test animals house of Alexandria University, Alexandria, Egypt. They were kept in clean cages put in a well-ventilated animal house. There were similarly and haphazardly separated into five gatherings each comprising of seven mice for every confine and kept on basal eating regimen and faucet water not indispensable and kept up at 25±1 °C with 12hrs dark and light cycle.

2.2.Experimental design:

2.2,1. Induction of asthma and treatment:

After two weeks of acclimation mice, were randomly divided into five equal groups as follow:

Group I, Control group: Mice of this group were orally received 0.5 ml saline as vehicle by gavage, for 28 days. **Group II, (OVA- group):** Mice were received orally Ovalbumin dissolved into saline as asthmatic group. **Group III, (OVA+niacin group):** On day 14, asthmatic mice were treated with niacin (40 mg/kg dissolved in saline) to 27 days (the last day of challenge). **Group IV, (OVA+*Hedra helix* extract group):** On day 14, asthmatic mice were treated daily with *Hedera helix* extract (100 mg/kg) to day 27 of experiment (the last day of challenge). **Group V, (OVA+niacin and *Hedera helix* extract group):** Asthmatic mice were treated with *Hedera helix* extract (100 mg/kg) and niacin (40 mg/ kg).

2.3.Ovalbumin induced Asthma model in mice:

The mice were sensitized by means of two intra-peritoneal infusions, on day 0 and day 14 of the test, with with 0.2 ml saline containing 20 µg ovalbumin adsorbed in 0.4 mg aluminum hydroxide (Alum.) as adjuvant. On days 25-27, mice were anesthetized with 0.2 ml i.p. of ketamine (0.44mg/ml) before accepting an intranasal dose of 100 µg ova albumin in a 50 µl volume of saline. OVA-tested group got 40 mg/kg *Hedera helix* leaf powder extract as *Hedera helix* syrup. The concentrate was given by intra peritoneal administration at 1h before OVA challenge on days 25-27. Mice without OVA exposure (control-*Hedera helix*) received got a similar portion of *Hedera helix* received on days 25-27 BALB/c mice were utilized for this investigation as they are high IgE responders.

2.4.Measured parameters:

2.4.1. Blood sample:

After 24 hours from the finishing of exploratory period on day 28, 24 hours after last injection, organization, mice were anesthetized with diethyl either and yielded by cervical dislocation. The initial part of blood was taken by the heart puncture utilizing sterile syringe. The blood samples were set in weatherman tubes containing EDTA. For differential count, the other part of the blood was centrifuged at 4000g for 10 min (Hettich zentrifugen, widespread 320R, Germany) and the serum was gathered for the determination of the biochemical parameters at 20°C. The lung tissue was promptly confined from the mice after their scarification and washed with cold saline arrangement. Pieces from lung tissues were fixed in formaldehyde for the histological examinations. Likewise, one fourth lung tissue was minced and homogenized independently in 5 ml of 5% trichloroacetic corrosive, containing 0.003 M disodium salt of ethylene diamine tetra acidic corrosive (TCA/EDTA). The homogenate was centrifuged at 4000g for 10 min. at that point the supernatants were put away at - 80 °C for determination of the required parameters.

2.5.Biochemical parameters:

Estimation of total and differential leukocytes count; for total leukocytes count was determined according to Coles (1980). The differential leukocytes count was done according to Coles (1980). Estimation of

oxidative stress biomarker (MDA) malondialdehyde formation in the tissue was done according to the method of Yoshioka et al. (1979). Estimation of superoxide dismutase (SOD) activity was assayed by the method of Misra and Fridovich (1972). Estimation of reduced glutathione concentration (GSH) was measured by the method of Jollow et al. (1974). Estimation of total thiol content (T. thiol) was carried out by the method of Sedlak and Lindsay (1968). Total protein concentration (TP) in serum and protein contents in brain regions were assayed by the method of Lowry et al. (1951). Quantitative detection of interleukin-6 by ELISA kit was estimated by the method of Ferguson-Smith et al. (1988). Estimation of Tumor necrosis factor alpha by ELISA kit was estimated by the method of Hedayati et al. (2001). Histo-pathological examinations were done according to Bancroft and Steven (1996).

Immuno-histochemistry:

Immuno-histochemistry utilizes antibodies to recognize tissue segments of intrigue. It very well may be utilized to recognize both cell types and extracellular lattice segments. The two proteins based and fluorescently based resistant recoloring procedures exist. Protein marked examples are seen in a splendid field after a progression of steps. Fluorescent recoloring will in general be more delicate than catalyst based recoloring, which ought to be viewed as while choosing the recoloring strategy. The initial phases in immunohistochemistry are to segment and mount the tissue. This recoloring method is reliant on the fixative utilized, on the grounds that the immune response epitope might be covered amid obsession. Cryo - sectioning is generally a superior alternative, however numerous labs use paraffin implanted segments. In the wake of mounting, the example is brooded with a blocking specialist, for example, ox-like serum egg whites (BSA), so as to avert non-explicit official. In the wake of hindering, the example is hatched with an essential counter acting agent, chose to tie to the antigen of enthusiasm on the tissue, and washed. The example is then hatched with an auxiliary neutralizer, which ties to the essential counter acting agent, going about as an enhancer of the visual flag. On the off chance that fluorescence recoloring is utilized, the optional counter acting agent is commonly marked with a fluorescent tag, and the neutralizer restricting can in this way be pictured after this progression. For catalyst based immune-staining, the optional counter acting agent is labeled with biotin, and extra advances must be completed before representation. It is conceivable to name the essential immunizer; notwithstanding, there is commonly insufficient essential counter acting agent bound to the example to be noticeable. Steptavidin connected to horseradish peroxidase is connected to the tissue area. Diaminobenzidine (DAB) is then included, bringing about a darker shaded hasten shaping where the immune response has bound. Catalyst named areas are frequently further counterstained with hematoxylin to improve perception before survey under a light magnifying lens.

2.7. Strategy for NF-KB:

Staining convention (unit segments in strong):

1. Deparaffinize and rehydrate tissue area. 2. Wash multiple times in cradle. 3. Whenever required, brood tissue in stomach related catalyst (or fitting pretreatment). 4. Wash multiple times in support. 5. To decrease nonspecific foundation recoloring because of endogenous peroxidase, hatch slide in Hydrogen Peroxide Block for 10-15 minutes. 6. Wash multiple times in buffer.7. Apply Ultra V Block and hatch for 5 minutes at room temperature to square nonspecific foundation recoloring. 8. Wash (Optional). 9. Apply essential immune response and brood as indicated by producer's suggested convention. 10. Wash multiple times in support. 11. Apply Primary Antibody Enhancer and hatch for 20 minutes at room temperature. 12. Wash multiple times in support. 13. Apply HRP

Polymer and hatch for 30 minutes at room temperature. 14. Wash multiple times in cushion. 15. Apply prepared to-utilize AEC Single Solution to tissue. Hatch for 10 minutes. Alter brooding time to enhance recoloring in your lab. 16. Wash multiple times in DI water. 17. Counterstain and spread slip utilizing a fluid mounting media. The explicitness and affectability of antigen discovery is reliant on the particular essential immune response utilized.

2.8. Statistical analysis:

The outcomes acquired in the present examination were measurably dissected utilizing one way ANOVA. Measurable introduction and examination of the present investigation were communicated as Mean ± S.E. utilizing segment measurements with Newman-Keuls Multiple Comparison Test as a posttest utilizing the PC insights Prism 3.0 bundle (Graph Pad Software, Inc, San Diego, CA, USA). The base dimension of measurable essentialness was set at $p<0.05$.

3. Results:

3.1. Effects of treatment with niacin or potentially *Hedera helix* and their mix on oxidative stress biomarkers in asthma mice model: The oxidative stress biomarkers, for example, malondialdehyde (MDA) was estimated to assess the oxidative damage happened by ova-albumin and treatment impact brought about by niacin as well as *Hedera helix* extract.

Table (1): Effect of niacin and/or *Hedera helix* co-treatment on malondialdehyde (MDA) level in lung tissue (n mol/ ml) of male mice:

MDA (nmol/g tissue)	Control (n=5)	Asthma (n=5)	Asthma +			F	P
			Niacine (n=5)	Hedera (n=5)	Niacine+Hedera (n=5)		
Min. – Max.	7.29 – 10.42	13.99– 20.80	8.19 – 10.87	7.29 – 10.20	7.65 – 10.30	26.295*	<0.001*
Mean ± SD	1.16 ± 8.59	2.67 ± 16.90	1.08 ± 9.48	1.14 ± 8.74	1.06±9.06		
SEM.	0.52	1.19	0.48	0.51	0.47		
Median	8.63	16.70	9.70	8.80	8.90		
$p_{Control}$		<0.001*	0.894	1.000	0.989		
p_{Asthma}			<0.001*	<0.001*	<0.001*		
Significance			p_1=0.941, p_2=0.993, p_3=0.997				
% Ch. from asthma			↓43.9	↓48.3	↓46.4		

Data expressed as mean ±SEM. Number of mice per group (n)=5 mice . The significant difference between different groups. using ANOVA, F, p: F and p values for ANOVA test, Sig. was done using Post Hoc Test (Tukey). $p_{Control}$: p value for comparing between control and each other groups. p_{Asthma}: p value for comparing between Asthma and each other groups. p_1: p value for comparing between Asthma + Niacine with Asthma + Hedera. p_2: p value for comparing between Asthma + Niacine with Asthma + Niacine + Hedera. p_3: p value for comparing between Asthma + Hedera with Asthma + Niacine + Hedera. *: Statistically significant at $p \leq 0.05$.

As regards to MDA activity level in the tissue of mice, the data in table (1) indicated that, there were a significant increase in MDA activity level in asthmatic mice compared to control group ($p<0.001$) and that the percentage of MDA were 43.9%, 48.3% and 46.4% after treated with niacin, *Hedera helix* extract and their combination; respectively.

3.2. Effects of treatment with niacin and/ or *Hedera helix* and their combination on antioxidant enzymes activity in asthma mice model:

The antioxidant biomarker such as; superoxide dismutase (SOD), reduced glutathione concentration (GSH) and total thiol (T. thiol) activity levels were measured to assess the antioxidant activity of co-treatment on asthma mice model. Effect of niacin and /or *Hedera helix* co-treatment on reduced glutathione activity level in the tissues.

Table (2): Effect of niacin and/or *Hedera helix* co-treatment on GSH (µmol/g tissue) level in lung tissue of male mice:

GSH (µmol/g tissue)	Control (n=5)	Asthma (n=5)	Asthma +			F	P
			Niacine (n=5)	Hedera (n=5)	Niacine+Hedera (n=5)		
Min. – Max.	50.0 – 62.0	29.20– 45.60	40.61– 61.22	41.23 – 52.0	49.0 – 55.10	6.563*	0.002*
Mean ± SD	4.96±53.26	7.29± 37.25	7.44±50.37	4.35 ± 48.35	2.35±52.10		
SEM.	2.22	3.26	3.33	1.95	1.05		
Median	51.43	39.80	50.0	49.60	52.20		
$p_{Control}$		0.002*	0.924	0.645	0.997		
p_{Asthma}			0.011*	0.038*	0.004*		
Sig. bet. Grps			p_1=0.978, p_2=0.988, p_3=0.826				
% Ch. from asthma			↑35.2	↑29.8	↑39.9		

F,p: F and p values for ANOVA test, Significance between groups was done using Post Hoc Test (Tukey).$p_{Control}$: p value for comparing between control and each other groups. p_{Asthma}: p value for comparing between Asthma and each other groups. p_1: p value for comparing between Asthma + Niacine with Asthma + Hedera. p_2: p value for comparing between Asthma + Niacine with Asthma + Niacine + Hedera. p_3: p value for comparing between Asthma + Hedera with Asthma + Niacine + Hedera. *: Statistically significant at $p \leq 0.05$.

As illustrated in table (2), the activity level of GSH in the tissue of lung of mice recorded significant increases ($p \leq 0.05$) and that the level of GSH was significantly decreased in asthma group compared to control group. Administration of group treated with niacin showed a significant increase by 35.2% and which was treated with Hedera increase by 29.8 %. The group which was treated by a combination increased by 39.9% compared to the asthma group.

Table (3): Effect of niacin and/or *Hedera helix* co-treatment on Total thiol (T. thiol) level in lung tissue (µmol/g tissue) of mice asthma model:

T.Thiol (µmol / gr. tissue)	Control	Asthma	Asthma +			F	P
			Niacine	Hedera	Niacine + Hedera		
Min. – Max.	17.04– 23.76	10.50– 15.36	15.92 – 23.0	17.0 – 22.0	17.60– 23.54	10.378*	<0.001*
Mean±SD.	2.70± 20.94	1.97± 12.19	3.35± 19.60	1.96± 19.58	2.28± 20.52		
SEM.	1.21	0.88	1.50	0.88	1.02		
Median	21.20	11.40	20.24	19.20	20.0		
$p_{Control}$		<0.001*	0.912	0.907	0.999		
p_{Asthma}			0.001*	0.001*	<0.001*		
Sig.			p_1=1.000, p_2=0.977, p_3=0.974				
% Ch. from asthma			↑60.8	↑60.6	↑68.3		

F,p: F and p values for ANOVA test, Significance between groups was done using Post Hoc Test (Tukey). $p_{Control}$: p value for comparing between control and each other groups. p_{Asthma}: p value for comparing between Asthma and each other groups. p_1: p value for comparing between Asthma + Niacine with Asthma + Hedera. p_2: p value for comparing between Asthma + Niacine with Asthma + Niacine + Hedera. p_3: p value for comparing between Asthma + Hedera with Asthma + Niacine + Hedera. *: Statistically significant at $p \leq 0.05$.

As indicated in table (3); T. Thiol in lung tissue of mice recorded significant increases in level of T.Thiol in all The Treated groups compared to asthma group and the group which was treated by niacin, *Hedera helix* and the group of combination recorded 60.8%, 60.6%, 68.3%; respectively, while the asthma group recorded a significant decreased.

Table (4): Effect of niacin and/or *Hedera helix* co-treatment on SOD activity level inhibition level in lung tissue (U/mg protein) of mice asthma model:

SOD (U/mg protein)	Control	Asthma	Asthma +			F	P
			Niacin	Hedera	Niacin + Hedera		
Min. – Max.	1.75 – 1.93	0.67 – 0.83	1.60 – 1.74	1.03 – 1.20	1.59 – 1.85	198.299*	<0.001*
Mean ± SD.	1.86 ± 0.07	0.75 ± 0.06	1.66 ± 0.06	1.16 ± 0.07	1.73 ± 0.10		
SEM.	0.03	0.03	0.03	0.03	0.04		
Median	1.87	0.74	1.64	1.18	1.74		
$p_{Control}$		<0.001*	0.003*	<0.001*	<0.001*		
p_{Asthma}			<0.001*	<0.001*	<0.001*		
Sig. bet. Grps			p_1<0.001*, p_2=0.602, p_3<0.001*				
% Ch. from asthma			↑121.3	↑54.7	↑130.7		

F,p: F and p values for ANOVA test, Significance between groups was done using Post Hoc Test (Tukey). $p_{Control}$: p value for comparing between control and each other groups. p_{Asthma}: p value for comparing between Asthma and each other groups. p_1: p value for comparing between Asthma + Niacine with Asthma + Hedera. p_2: p value for comparing between Asthma + Niacine with Asthma + Niacine + Hedera. p_3: p value for comparing between Asthma + Hedra with Asthma + Niacine + Hedera. *: Statistically significant at $p \leq 0.05$.

As shown in table (4), the results indicated that, there was significantly decreased ($p \leq 0.05$) in the level of SOD activity in the tissue of mice in niacin, Hedera and niacin –Hedera combination groups as compared to control group recording 121.3%, 54.7% and 130.7%, the results showed significant decreases in asthma group the data showed the difference between asthma group and niacin group by 0.001, while with Hedera group 0.602 and combination group 0.001 as compared to asthma group.

3.3. Total Protein (Tp):

Table (5): Effect of treatment with niacin and/or *Hedera helix* on serum total protein (TP) (g/dL) in asthma mice model:

TP (g/dL)	Control (n=5)	Asthma (n=5)	Asthma +			F	P
			Niacine (n=5)	Hedra (n=5)	Niacine + Hedra (n=5)		
Min. – Max.	5.31 – 6.20	2.87 – 5.0	4.99 – 6.20	4.98 – 6.0	5.03 – 6.10	7.940*	0.001*
Mean ± SD.	8.83 ± 0.35	4.01 ± 0.96	5.49 ± 0.53	5.32 ± 0.46	5.79 ± 0.45		
SEM.	0.16	0.43	0.24	0.20	0.20		
Median	5.83	4.0	5.31	5.04	5.96		
$p_{Control}$		0.001*	0.897	0.667	1.000		
p_{Asthma}			0.006*	0.017*	0.001*		
Sig. bet. Grps			p_1=0.990, p_2=0.928, p_3=0.721				
% Ch. from asthma			↑36.9	↑32.7	↑44.4		

F,p: F and p values for ANOVA test, Significance between groups was done using Post Hoc Test (Tukey). $p_{Control}$: p value for comparing between control and each other groups. p_{Asthma}: p value for comparing between Asthma and each other groups. p_1: p value for comparing between Asthma + Niacine with Asthma + Hedera.p_2: p value for comparing between Asthma + Niacine with Asthma + Niacine + Hedera. p_3: p value for comparing between Asthma + Hedera with Asthma + Niacine + Hedera. *: Statistically significant at $p \leq 0.05$.

The concentration of serum total protein (T.P.) was significantly ($p \leq 0.05$) decreased in OVA-treated group compared to control group table (5), the niacin treated group caused significant ($p \leq 0.05$) increase in T.P. compared to asthma group 36.9%. The other two groups showed that 32.7 and 44.4 Hedera and co-treatment

respectively. The treated groups showed increases compared to asthma group while, compared to control group showed significant increase.

3.4. Tumor Necrosis Factor-α (TNF-α):

Table (6): Effect of treatment with niacin and/or *Hedera helix* on TNF-α (pg/mL) in serum of asthma mice model:

TNF-α (pg/mL)	Control	Asthma	Asthma +			F	p
			Niacine	Hedra	Niacine + Hedra		
Min. – Max.	0.79 – 0.86	1.5 – 1.63	0.86 – 1.20	0.88 – 1.10	0.88 – 1.0	58.468*	<0.001*
Mean ± SD.	0.83 ± 0.03	1.57 ± 0.06	0.98 ± 0.13	1.0 ± 0.11	0.94 ± 0.05		
SEM.	0.01	0.03	0.06	0.05	0.02		
Median	0.84	1.55	0.95	1.00	0.92		
$p_{Control}$		<0.001*	0.067	0.040*	0.292		
p_{Asthma}			<0.001*	<0.001*	<0.001*		
Sig. bet. Grps			p_1=0.999, p_2=0.920, p_3=0.812				
% Ch. from asthma			↓37.6	↓36.3	↓40.1		

F,p: F and p values for ANOVA test, Significance between groups was done using Post Hoc Test (Tukey). $p_{Control}$: p value for comparing between control and each other groups. p_{Asthma}: p value for comparing between Asthma and each other groups. p_1: p value for comparing between Asthma + Niacine with Asthma + Hedra. p_2: p value for comparing between Asthma + Niacine with Asthma + Niacine + Hedra. p_3: p value for comparing between Asthma + Hedra with Asthma + Niacine + Hedra. *: Statistically significant at $p \leq 0.05$

As illustrated in table (6), the result showed that, there were significant increase in TNF-α in asthma group while, in other treated groups there were significant decreased compared to asthma group niacin , Hedera, niacin- Hedera combination 0.999, 0.920 and 0.812; respectively on other hand administration of niacin alone showed significant $p \leq 0.05$ decrease of TNF-α.

3.5. Interleukin-6 (IL-6):

Table (7): Effect of treatment with niacin and/or *Hedera helix* on IL-6 (pg/g tissue) in serum of lung tissue of mice model:

IL6 in-Tissue	Control (n=5)	Asthma (n=5)	Asthma +			F	p
			Niacine (n=5)	Hedra (n=5)	Niacine+Hedra (n=5)		
Min. – Max.	107.1–113.4	115.6–189.2	102.9–112.8	108.6–113.4	108.7–112.0	2.832	0.052
Mean ± SD.	110.42±2.34	133.74±31.14	108.88±3.72	111.02±1.88	109.98±1.29		
SEM.	1.04	13.92	1.67	0.84	0.58		
Median	110.30	121.50	110.0	111.0	109.6		
$p_{Control}$		0.105	1.000	1.000	1.000		
p_{Asthma}			0.075	0.119	0.096		
Sig. bet. Grps			p_1=0.999,p_2=1.000,p_3=1.000				
% Ch. from asthma			↓18.6	↓17.0	↓17.8		

F, p: F and p values for ANOVA test, Significance between groups was done using Post Hoc Test (Tukey). $p_{Control}$: p value for comparing between control and each other groups. p_{Asthma}: p value for comparing between Asthma and each other groups. p_1: p value for comparing between Asthma + Niacine with Asthma + Hedra. p_2: p value for comparing between Asthma + Niacine with Asthma + Niacine + Hedra. p_3: p value for comparing between Asthma + Hedra with Asthma + Niacine + Hedra. *: Statistically significant at $p \leq 0.05$.

As illustrated in table (7), the result showed that, there were significant increase in IL-6 in asthma group while, in other treated groups there were significant decreased compared to asthma group

niacin, Hedera, niacin- Hedera combination18.6%,17.0% and 17.8% respectively. The levels of IL-6 more or less near to control value in treated groups. The level of IL-6 in the treated group when administration of niacin alone showed significant decreased by 0.999 compared to asthma group while, in Hedera group showed slightly decreased compared to niacin group while when compared to asthma group recorded 1.00, the co-treatment of niacin-Hedera recorded 1.00 as same of Hedera group.

3.6. Total Leukocytes Count:

Table (8): Comparison between the different studied groups according to total leukocytes count:

Total leukocyte	Control (n=7)	Asthma (n=5)	Asthma +			F	p
			Niacine (n=5)	Hedra (n=5)	Niacine+Hedra (n=5)		
Min. – Max.	0.41 – 0.47	5.8 – 6.51	3.1 – 3.4	4.1 – 4.5	2.7 – 3.0	676.203*	<0.001*
Mean ± SD.	0.44 ± 0.03	6.16 ± 0.33	3.21 ± 0.12	4.26 ± 0.15	2.86 ± 0.11		
SEM.	0.01	0.15	0.05	0.07	0.05		
Median	0.43	6.10	3.21	4.20	2.90		
$p_{Control}$		<0.001*	<0.001*	<0.001*	<0.001*		
p_{Asthma}			<0.001*	<0.001*	<0.001*		
Sig. bet. Grps			p_1<0.001*, p_2=0.045*, p_3<0.001*				
% Ch. from asthma			↓47.9	↓30.8	↓53.6		

F,p: F and p values for ANOVA test, Significance between groups was done using Post Hoc Test (Tukey). $p_{Control}$: p value for comparing between control and each other groups. p_{Asthma}: p value for comparing between Asthma and each other groups. p_1: p value for comparing between Asthma + Niacine with Asthma + Hedra. p_2: p value for comparing between Asthma + Niacine with Asthma + Niacine + Hedra. p_3: p value for comparing between Asthma + Hedra with Asthma + Niacine + Hedra. *: Statistically significant at $p \leq 0.05$.

3.7. Lung Weight:

Table (9): Comparison between the different studied groups according to lung weight:

Lung weight	Control (n=4)	Asthma (n=4)	Asthma +			F	p
			Niacine (n=4)	Hedra (n=4)	Niacine+Hedra (n=4)		
Min. – Max.	0.11 – 0.19	0.22 – 0.33	0.16 – 0.20	0.17 – 0.21	0.16 – 0.24	12.066*	<0.001*
Mean ± SD.	0.15 ± 0.03	0.28 ± 0.05	0.18 ± 0.01	0.19 ± 0.01	0.20 ± 0.03		
SEM.	0.01	0.02	0.01	0.01	0.01		
Median	0.15	0.28	0.18	0.20	0.20		
$p_{Control}$		<0.001*	0.627	0.260	0.106		
p_{Asthma}			<0.001*	0.002*	0.006*		
Sig. bet. Grps			p_1=0.957, p_2=0.751, p_3=0.985				
% Ch. from asthma			↓35.7	↓32.1	↓28.6		

F,p: F and p values for ANOVA test, Significance between groups was done using Post Hoc Test (Tukey). $p_{Control}$: p value for comparing between control and each other groups. p_{Asthma}: p value for comparing between Asthma and each other groups. p_1: p value for comparing between Asthma + Niacine with Asthma + Hedra. p_2: p value for comparing between Asthma + Niacine with Asthma + Niacine + Hedra. p_3: p value for comparing between Asthma + Hedra with Asthma + Niacine + Hedra. *: Statistically significant at $p \leq 0.05$.

Table (10): Correlation between different studied parameters in control:

		GSH (µmol/g tissue)	T.Thiol (µmol/gr. tissue)	SOD (U/mg protein)	TP (g/dL)	TNF-α (pg/mL)	IL6 in-Tissue	Total leukocyte	Lung weight
GSH (µmol/g tissue)	r		-0.173	-0.862	00.705	00.313	00.793	-0.558	-0.404
	p		00.781	00.060	00.184	00.608	00.110	00.328	00.499
T.Thiol (µmol / gr. tissue)	r			00.133	00.333	-0.102	00.435	-0.366	-0.706
	p			00.831	00.584	00.871	00.465	00.544	00.183
SOD (U/mg protein)	r				-0.738	00.049	-0.602	00.587	00.186
	p				00.154	00.938	00.282	00.298	00.764
TP (g/dL)	r					-0.296	0**0.807**	-0.343	-0.416
	p					00.629	00.099	00.572	00.486
TNF-α (pg/mL)	r						00.297	-0.497	-0.526
	p						00.627	00.394	00.362
IL6 in-Tissue	r							-0.648	**-0.825**
	p							00.237	00.086
Total leukocyte	r								0**0.732**
	p								00.160

r: Pearson coefficient

Table (11): Correlation between different studied parameters in asthma:

		GSH (µmol/g tissue)	T.Thiol (µmol/gr. tissue)	SOD (U/mg protein)	TP (g/dL)	TNF-α (pg/mL)	IL6 in-Tissue	Total leukocyte	Lung weight
MDA (nmol/g tissue)	R	00.582	00.069	**-0.814**	-0.473	00.694	00.142	-0.271	-0.143
	P	0.303	0.912	0.094	0.421	0.194	0.819	0.659	0.819
GSH (µmol/g tissue)	R		0.553	-0.373	0.092	-0.067	0.299	0.342	0.712
	P		0.334	0.536	0.882	0.915	0.625	0.573	0.178
T.Thiol (µmol / gr. tissue)	R			-0.416	0.716	-0.614	**0.913***	0.789	0.726
	P			0.487	0.174	0.270	0.030	0.113	0.165
SOD (U/mg protein)	R				0.084	-0.426	-0.619	-0.031	0.150
	P				0.893	0.475	0.265	0.961	0.810
TP (g/dL)	R					-0.733	0.594	**0.964***	0.604
	P					0.159	0.291	0.008	0.280
TNF-α (pg/mL)	R						-0.433	-0.657	-0.723
	P						0.467	0.228	0.167
IL6 in-Tissue	R							0.611	0.386
	P							0.274	0.521
Total leukocyte	R								**0.726**
	P								00.165

r: Pearson coefficient.

Table (12): Correlation between different studied parameters in Asthma + Niacine group:

		GSH (µmol/g tissue)	T.Thiol (µmol/gr. tissue)	SOD (U/mg protein)	TP (g/dL)	TNF-α (pg/mL)	IL6 in-Tissue	Total leukocyte	Lung weight
MDA (nmol/g tissue)	r	**-0.945***	00.742	-0.146	00.255	-0.171	00.114	000.344	0.310
	p	0.015	0.151	0.815	0.679	0.783	0.855	0.571	0.611
GSH (µmol/g tissue)	r		-0.601	-0.102	-0.181	-0.147	-0.123	-0.189	-0.403
	p		0.284	0.870	0.771	0.814	0.843	0.761	0.501
T.Thiol (µmol / gr. tissue)	r			-0.276	**0.811**	-0.512	-0.227	0.333	-0.403
	p			0.653	0.096	0.378	0.713	0.584	0.501
TP (g/dL)	r					-0.374	-0.427	0.059	**-0.827**
	p					0.535	0.473	0.925	0.084
IL6 in-Tissue	r							-0.656	0.474
	p							0.229	0.420

r: Pearson coefficient.

Table (13): Correlation between different studied parameters in Asthma + Hedra:

		GSH (µmol/g tissue)	T.Thiol (µmol/gr. tissue)	SOD (U/mg protein)	TP (g/dL)	TNF-α (pg/mL)	IL6 in-Tissue	Total leukocyte	Lung weight
MDA (nmol/g tissue)	r	-0.402	-0.614	00.427	00.293	00.927	-0.114	-0.031	-0.353
	p	0.503	0.271	0.474	0.633	0.024	0.856	0.961	0.561
GSH (µmol/g tissue)	r		-0.035	-0.558	-0.362	-0.384	0.242	0.313	**0.978***
	p		0.955	0.328	0.550	0.523	0.695	0.608	0.004
T.Thiol (µmol / gr. tissue)	r			-0.622	0.001	-0.725	-0.631	0.199	0.080
	p			0.263	0.999	0.166	0.254	0.748	0.898
SOD (U/mg protein)	r				0.538	0.680	0.631	-0.041	-0.656
	p				0.350	0.206	0.253	0.947	0.229
TP (g/dL)	r					0.522	0.175	0.738	-0.289
	p					0.367	0.778	0.155	0.638

r: Pearson coefficient. *.

Table (14): Correlation between different studied parameters in Asthma + Niacine + Hedra:

		GSH (µmol/g tissue)	T.Thiol (µmol/gr. tissue)	SOD (U/mg protein)	TP (g/dL)	TNF-α (pg/mL)	IL6 in-Tissue	Total leukocyte	Lung weight
MDA (nmol/g tissue)	r	00.147	00.498	00.296	0**0.816**	00.259	00.190	**-0.788**	-0.282
	p	0.813	0.393	0.628	0.092	0.675	0.759	0.113	0.646
GSH (µmol/g tissue)	r		0.628	0.290	0.252	-0.124	-0.563	-0.411	0.013
	p		0.256	0.636	0.682	0.842	0.323	0.491	0.983
T.Thiol (µmol / gr. tissue)	r			**0.896***	0.841	0.347	-0.238	-0.223	0.394
	p			0.039	0.074	0.567	0.700	0.718	0.511
SOD (U/mg protein)	r				0.782	0.434	-0.057	0.169	0.656
	p				0.118	0.465	0.927	0.786	0.229
Total leukocyte	r								0.693
	p								00.194

r: Pearson coefficient. *

Histo-pathological analysis:

Animals were sacrificed by an overdose of ketamine (500 mg/kg, intraperitoneally) 24 hours after the last inhalational exposure and histopathological specimens were collected. Tissue specimens were taken from the mid zone of the left lung of mice. Histo-pathological samples were fixed in 10 % formalin for light microscopic evaluation. After fixation, slice from the mid zone of the left lung was embedded in paraffin. Serial sections cut at 5 µm were stained with Haematoxylin and Eosin (for routine Histo-pathological examination), with Toluidine Blue (for enumeration of mast cells) and with Periodic Acid Shiff (PAS) (for enumeration of goblet cells).

In asthma group, light microscopic findings revealed irregular respiratory epithelium; some of the cell nuclei were necrotic and degenerative. Increased thickness of epithelium and high numbers of goblet cells were remarkable. Sub-epithelial smooth muscle was markedly thickened. *Hedera helix* group: In light microscopy, degeneration and abnormality in a portion of the epithelial cells were recognized. Co-treatment group: In light microscopy, degeneration and abnormality in a portion of the epithelial cells were distinguished. H&E stain, X; 400 .

Fig. A

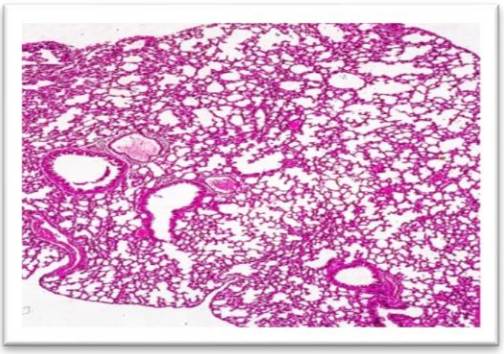

Fig. B

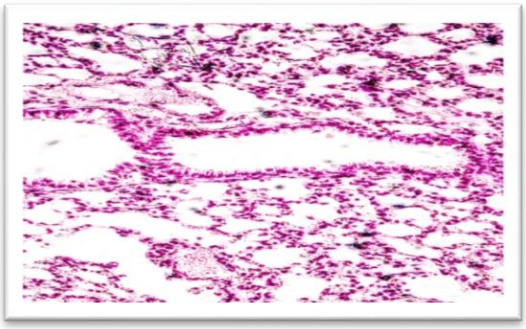

Fig.(1). Light micrographs of lung section of control mice (A) and (B) which received saline only, showing normal nuclei & blood vessel. H&E stain, X 400.

Fig. A Fig.B

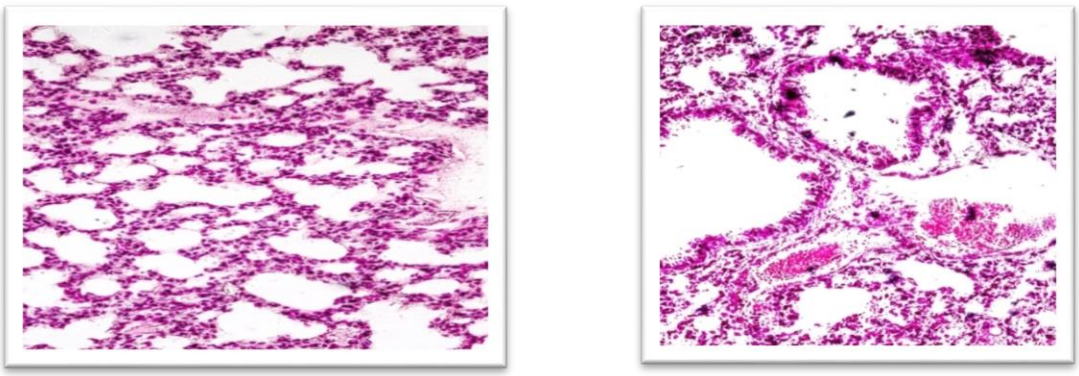

Fig.(2). Light micrographs of lung section of Athma group (A,B)

Fig. A Fig. B

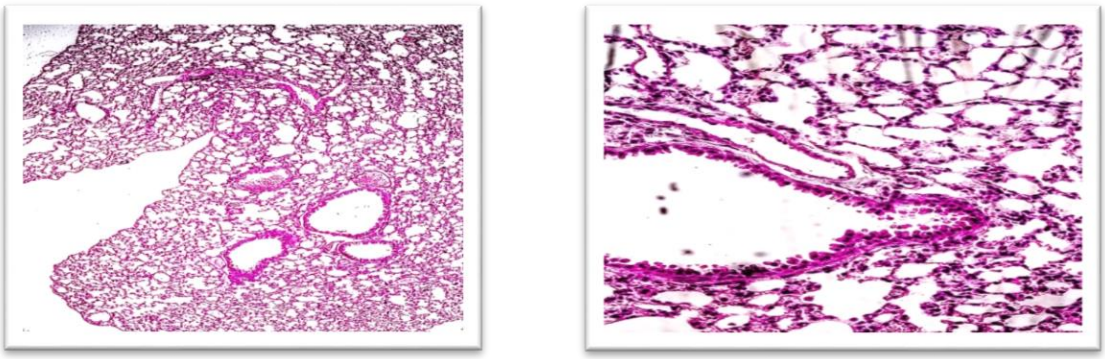

Fig. (3). Light micrographs of lung section of Naiacin group (A,B)

Fig. A Fig. B

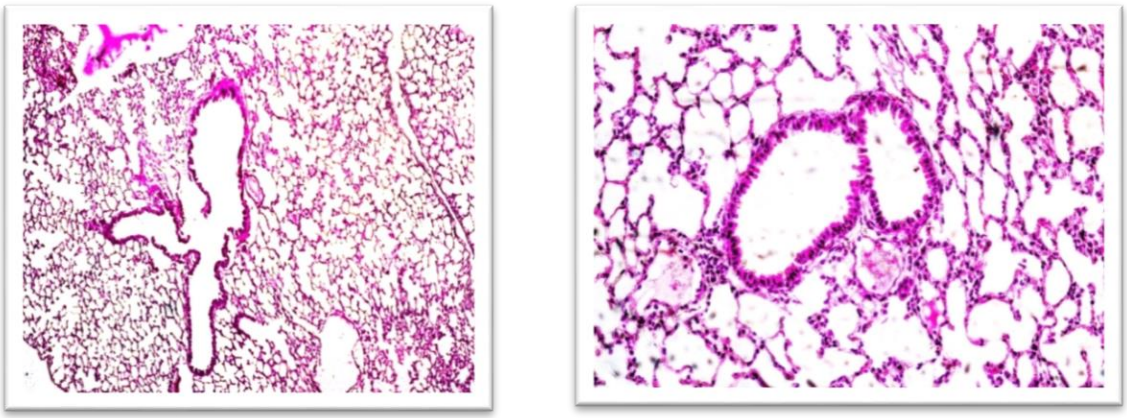

Fig.(4). Light micrographs of lung section of Hedera group (A,B)

Fig. A Fig. B

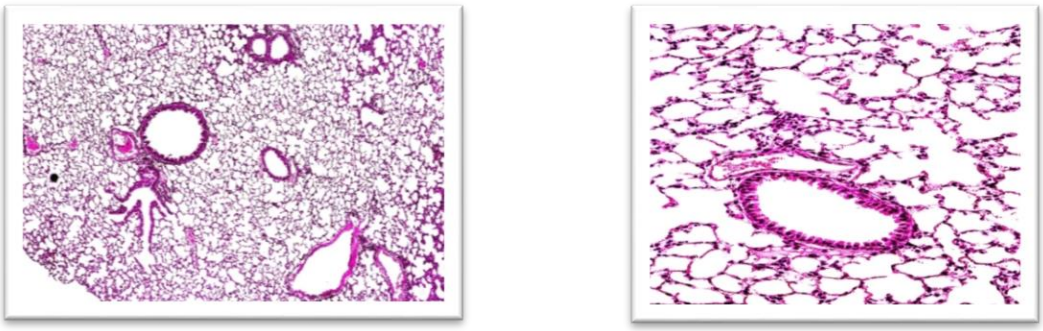

Fig.(5). Light micrographs of lung section of Co-treatment group (A,B)

Figures of Immuno-histochemistry

Fig.A Fig.B

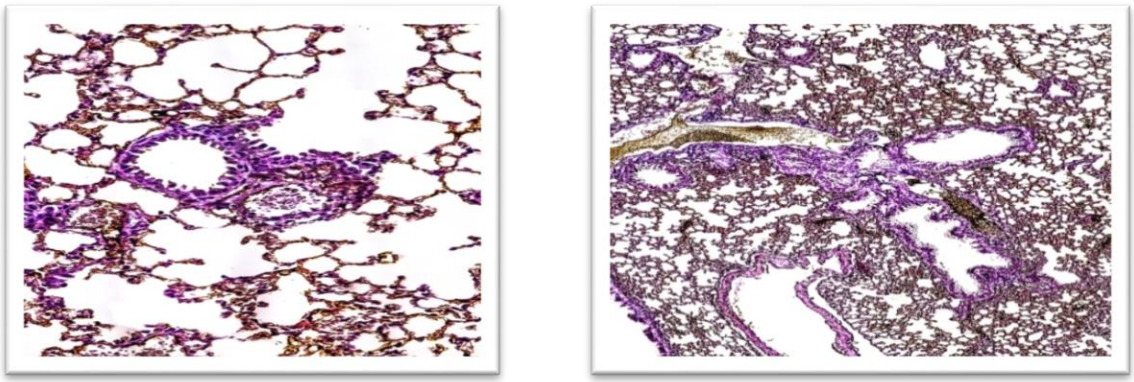

Fig.(6). Light micrographs of lung sections in the control group showing showing normal size and structure of cells

Asthma Niacin

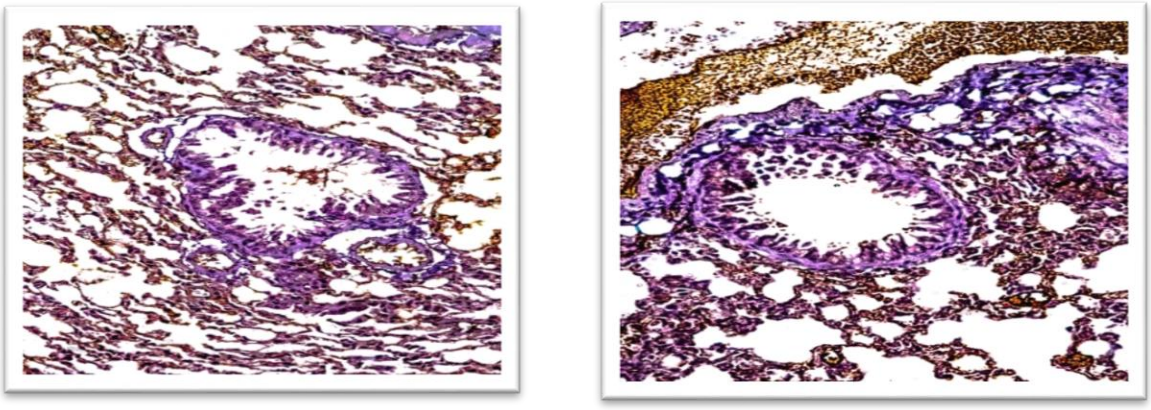

Fig.(7). Light micrographs of lung sections in Asthma group.

Fig.(8). Light micrographs of lung sections in Niacin group

Fig. A Fig. B

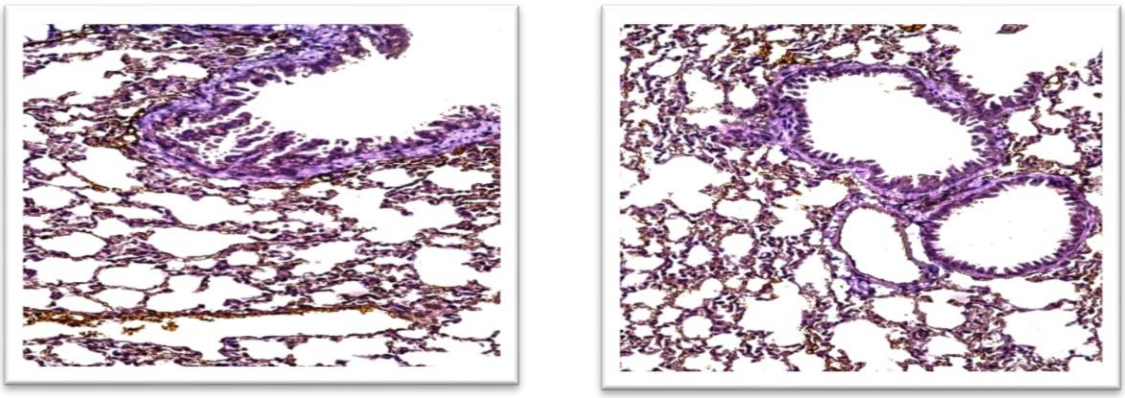

Fig. (9). Light micrographs of lung sections in *Hedera helix* group(A,B)

Fig. A Fig. B

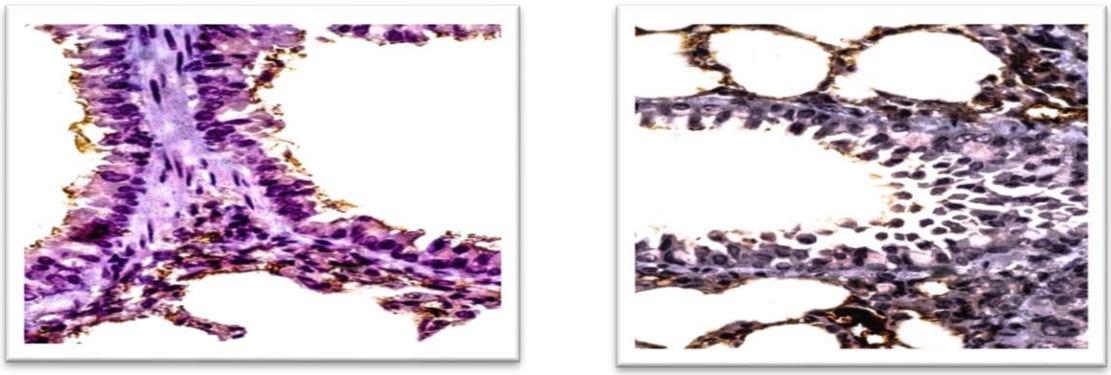

Fig.(10). Light micrographs of lung sections in Co-treatment group (A,B)

4. Discussion

Asthma is one of the few chronic diseases in the developed world that is expanding in predominance regardless of better comprehension of its pathogenesis and improved medications (Davies *et al*., 1997). It is a standout amongst the most well-known clutters experienced in clinical prescription in the two kids and grown-ups (Holt *et al*., 1999). Pathophysiology of asthma is ineffectively comprehended. Numerous logical reports propose that, it includes the initiation of numerous provocative cells like pole cells, macrophages/monocytes, eosinophils, basophils, neutrophils and platelets. It is now increasingly recognized that structural cells may also be important sources of mediators in asthma. Aviation route epithelial cells, smooth muscle cells, endothelial cells and fibroblasts are for the most part fit for integrating and discharging provocative middle people (Barnes *et al*., 1999). Professional provocative cytokines, for example, TNF-α, IL-6 . They might be significant in sickness seriousness and protection from calming treatment in asthma (Hirala *et al*., 1998) .

TNF-α being a cytokine is available liberally in asthmatic aviation routes. There is proof that IgE activating in sharpened lungs prompts expanded articulation in epithelial cells in both rodent and human (Ohkawara *et al*., 1992). TNFα is available in the BAL liquid of asthmatic patients (Albuquerque *et al*., 1998). It is accounted for that TNFα is likewise discharged from alveolar macrophages of asthmatic patients after allergen challenge (Gosset *et al*., 1992). The two monocytes and alveolar

macrophages show expanded quality articulation of TNFα after IgE activating in vitro that is upgraded by INF-γ (Yates *et al*., 1993). Characteristic and elective medicines for asthma incorporate breathing activities, needle therapy, knead treatment, natural prescriptions, and dietary enhancements. Certain blends of Chinese herbs have additionally appeared, however these are not institutionalized and are in this manner not generally accessible. A portion of these elective medicines may in truth be useful, however until there are concentrates to demonstrate an advantage, specialists are hesitant to endorse them and insurance agencies are hesitant to pay for them. Subsequently, numerous patients that they are free to attempt elective medicines alongside standard treatments, yet specialists can't suggest explicit medications. Advancement of more secure and viable enemy of asthmatic medications with extraordinary systems of activity is a significant territory of research (Ribeiro Filho *et al*., 2013).

The results of the present study showed that both Niacin and ivy leaf extract, effectively suppressed allergic inflammation in a mouse model of asthma. In the present study it was found that these effects of two tested treatments were related to decreased activity of NF-kB. NF-κB is found in practically all animal cell types and is involved with cell reactions to stimuli, for example, stress, cytokines, free radicals, substantial metals, and bacterial or viral antigens NF-κB assumes a key job in controlling the resistant reaction to disease. Inaccurate guideline of NF-κB has been connected to malignant growth and immune system ailments (Gilmore, 2006). In the present examination, niacin diminished lung aggravation and improved cell reinforcement framework brokenness actuated by ova-in mice through down directing the NF-κB pathway. The present discoveries are in concurrence with Kwon *et al*. (2011) who announced that Niacin weakens lung aggravation and improves survival amid sepsis by down directing the factor-kappa-B pathway. Niacin, is entrenched for the treatment of dyslipidemia, as it has an intense impact in bringing down plasma LDL-cholesterol and raising HDL-cholesterol. Various clinical examinations have exhibited a critical decrease in heart occasions and in cardiovascular ailment related mortality with Niacin treatment (Brown and Zhao, 2008) .

Previous studies in vitro have uncovered that Niacin has properties that are free of its consequences for lipid guideline (Wu *et al*., 2012). GPR109AG-protein-coupled receptor that quandary and be actuated by Niacin. The calming action of Niacin was recently recorded in a few in vivo and in vitro investigations in which Niacin was appeared to diminish TNF-α expression and production by means of down-controlling factor (NF)- κB initiation signaling pathway. The inhibitory impact of Niacin on TNF-α creation was observed to be interceded by GPR109A (Si *et al*., 2014). In present study, administration of Niacin resulted in the attenuation of NF-kB activation, decrease in IL-6 level, these discoveries affirm the calming properties of Niacin as appeared by Ganji *et al*. (2009) in vascular tissue. *Hedera helix* is normally known as ivy or English ivy, and an individual from the Araliaceae family. It is known to cause contact dermatitis (Ozdemir *et al*., 2003).

The present examination demonstrated that the dimensions of cytokines were fundamentally expanded by OVA injection. After treatment, ivy extricate diminished TNF-α and IL-6. Co-adminestration with Niacin dose contrasted and ivy treatment alone. Results demonstrated more restraint in these cytokines, and may be in charge of the synergistic increment in calming movement by Niacin. The present outcomes are in concurrence with Gepdiremen *et al*. (2005) detailed that few noteworthy constituents of ivy extricate purportedly applying mitigating impacts, and are reliant on restraining the development of certain provocative middle people. The expansion in ROS amid an asthma fuel may overpower endogenous cancer prevention agent guards. Glutathione (GSH) is a key cancer prevention agent in the coating liquid of the respiratory tract.

Improving intracellular GSH can likewise diminish the arrival of cytokines from lung cells by diminishing NF-κB initiation (Antonicelli *et al*., 2002). GSH has as of late been accounted for to IL-13 actuated asthma in mice (Lowry *et al*., 2008). Asthmatic subjects have higher plasma centralizations of isoprotanes; improved generation of ROS in blood monocytes, neutrophils, and eosinophils (Wood *et al*., 2000).

Numerous investigations have exhibited that Niacin has mitigating impacts in various tissues including kidney (Cho *et al*., 2009), lung (Kwon *et al*., 2011) and vascular endothelial cells (Wu *et al*., 2012). Niacin administration has been appeared to lessen TNF-an, and IL-6 articulation and NF-kB initiation in kidney and lung of rat models (Kwon *et al*., 2011). Niacin treatment smothers the NF-kB signaling pathway, bringing about diminished emission of the genius fiery cytokines and chemokine TNF-alfa, IL-6 in secluded human monocytes and retinal color epithelial cells (Gambhir *et al*., 2012). Niacin restrains monocyte chemo taxis (Digby *et al*., 2010). A large number of these mitigating properties of Niacin have been connected to actuation of the Niacin receptor (Gambhir *et al*., 2012). The past clarifications are as per the present outcomes which exhibited that Niacin had concealment impact on provocative arbiters initiated by OVA. The present outcomes demonstrated that niacin successfully stifled the movement of NF-kB, a redox-delicate translation factor, in the lung tissues through decreased oxidative pressure. NF-kB action is expanded in asthmatic aviation routes (Blesa *et al*., 2003) and numerous boosts engaged with unfavorably susceptible aggravation have been appeared to enact NF-kB. Numerous provocative proteins communicated in asthmatic aviation routes are directed by NF-kB, including the cytokines IL-6, and TNF-alfa; which are all firmly engaged with the pathogenesis of asthma. Along these lines the improvement of an oxidant-cancer prevention agent unevenness in the lungs of asthmatic patients might be the upgrade that initiates redox-touchy translation factors, for example, NF-kB. A small molecular inhibitor of redox-controlled NF-kB interpretation altogether blocked unfavorably susceptible aviation route aggravation in a mouse model of asthma, recommending that redox-touchy translation variables could be a valuable remedial focus in asthma (Henderson *et al*., 2002). In the present examination diminished NF-kB movement was joined by a decrease in the dimensions of significant incendiary go between of unfavorably susceptible asthma, for example, IL-6 and TNF-These discoveries are in concurrence with past outcomes from a creature asthma model demonstrating that a reactant cancer prevention agent and N-acetyl cysteine, which act as a free radical scavenger and a precursor of reduced glutathione, could suppress NF-kB, DNA-restricting action, lessen articulation of bond atoms and mucin explicit mRNA in aviation routes, and hinder generation of cytokines, for example, IL-4, IL-5 (Blesa *et al*., 2003).

5. Conclusion

The present investigation showed that Niacin and ivy separate, diminished the provocative arbiters, and enhanced cell reinforcement resistance. Besides, Goblet cells hyperplasia and NF were likewise controlled. These results suggest that two drugs exhibit inhibitory activities not only for allergen-induced inflammatory mediators but also for oxidant system, probably due to the down regulation of allergen sensitization. The present results suggest that two drugs might offer a new therapeutic approach to allergic airway diseases probably Niacin is more potent than *Hedera helix* extract.

The authors declare that there is no conflict of interest

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