WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

A Study on the Dual Antihistaminic and Anti-Inflammatory Effects of Ocimum tenuiflorum Leaf Extracts

Sinni Rathore*[1], Nikhil Singh[2], Karunakar Shukla[3], Ragini Bundela[4]

College of Pharmacy, Dr. A.P.J. Abdul Kalam Universirtry, Indore

ABSTRACT :

This study investigates the dual antihistaminic and anti-inflammatory effects of Ocimum tenuiflorum (Tulsi) leaf extracts. The plant, widely recognized in traditional medicine, was evaluated for its pharmacological potential using animal models. The extract demonstrated significant inhibition of histamine-induced contractions and anti-inflammatory activity in carrageenan-induced paw edema models. The findings suggest that Ocimum tenuiflorum possesses therapeutic value in managing allergic and inflammatory conditions.

Introduction

Herbal medicines play a crucial role in traditional and modern therapeutic practices. Ocimum tenuiflorum (Tulsi), a sacred medicinal herb in India, is known for its wide spectrum of pharmacological activities including antimicrobial, antioxidant, and anti-inflammatory properties. Asthma and inflammation are major health concerns globally, often linked with histamine release and immune dysregulation. This study was designed to evaluate the dual antihistaminic and anti-inflammatory effects of Tulsi leaf extracts to validate its therapeutic potential.

Materials and Methods

Fresh leaves of Ocimum tenuiflorum were collected, authenticated, and subjected to extraction using hydroalcoholic solvent. Experimental models included:

1. Antihistaminic activity: Isolated tissue preparations were used to evaluate inhibition of histamine-induced contractions.
2. Anti-inflammatory activity: Carrageenan-induced paw edema in rats was used to assess the anti-inflammatory effect.

Phytochemical screening of the extract was performed to identify active constituents such as eugenol, ursolic acid, and rosmarinic acid.

Results

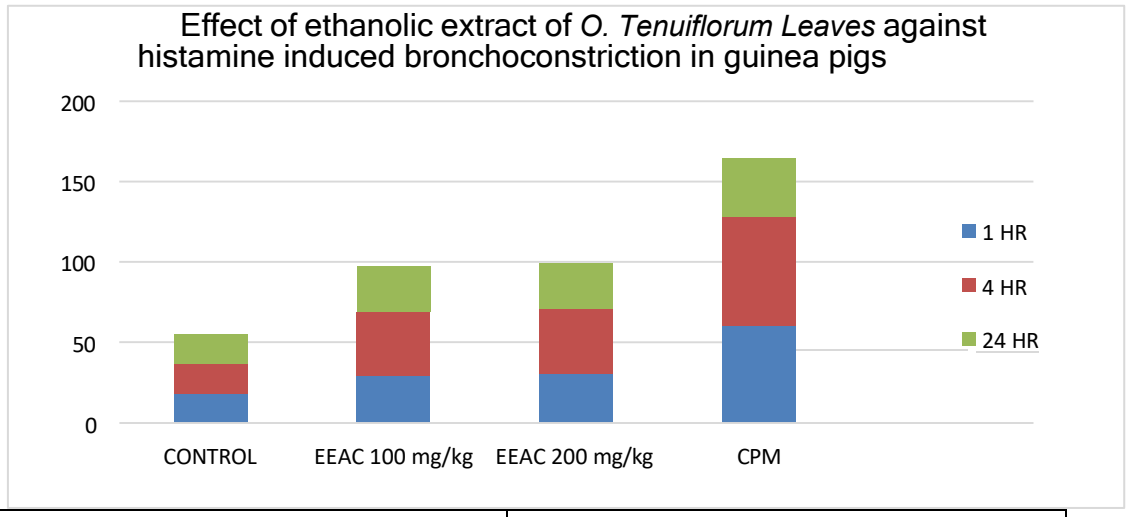
The Ocimum tenuiflorum extract showed significant antihistaminic activity by reducing histamine-induced contractions. In the carrageenan-induced paw edema model, the extract demonstrated a dose-dependent reduction in paw volume. Phytochemical analysis confirmed the presence of flavonoids, tannins, and essential oils which may contribute to the observed pharmacological effects.

Figure 1. Anti-inflammatory activity of Ocimum tenuiflorum extract in carrageenan-induced paw edema model.

Group	Latent period of convulsion			
	Before	1 hour	4 hour	24 hour
Control	16.3±2.23	18.36±0.183	18.63±0.186	18.4±0.12
on O. Tenuiflorum Ethanolic extract(100 mg/kg)	16.71±1.31	29.65±.82	39.38±0.05*	28.2±0.23
on O. Tenuiflorum Leaves Ethanolic extract(200 mg/kg)	15.71±0.77	30.5±3.08	40.36±1.04*	28.4±.35
Standard (CPM) (1 mg/kg)	18.46±0.89	60.25±0.03**	68.26±1.01**	36.5±0.55

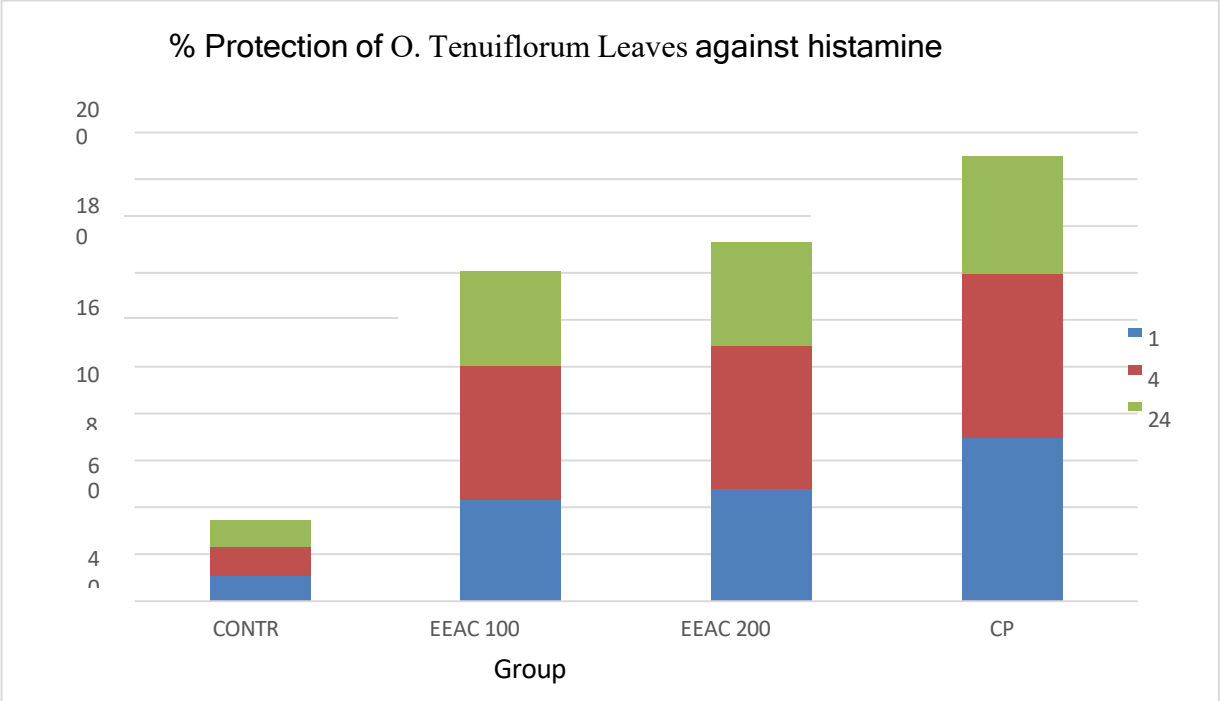
Values are Mean± S.E.M., where n=6 in each group, P< 0.05 *, P< 0.01 ** (significant) compared with control. Statistical analysis was done by one-way analysis of variance (ANOVA) followed by Dunnett's multiple comparison test.

Figure No.2: Effect of ethanolic extract of *O. Tenuiflorum Leaves* against histamine induced bronchoconstriction in guinea pigs



Group	%protection		
	1 hour	4 hour	24 hour
Control (carboxy methyl cellulose)	10.9	12.3	11.4
O. Tenuiflorum Leaves ethanolic extract (100 mg/kg)	43.2	57.2	40.2
O. Tenuiflorum Leaves ethanolic extract (200 mg/kg)	48	60.79	44.3
Standard(CPM)	69.76	78.3	50.1

Figure No.4: % Protection of the plant *O. Tenuiflorum Leaves* against histamineinduced bronchoconstriction in guinea pigs



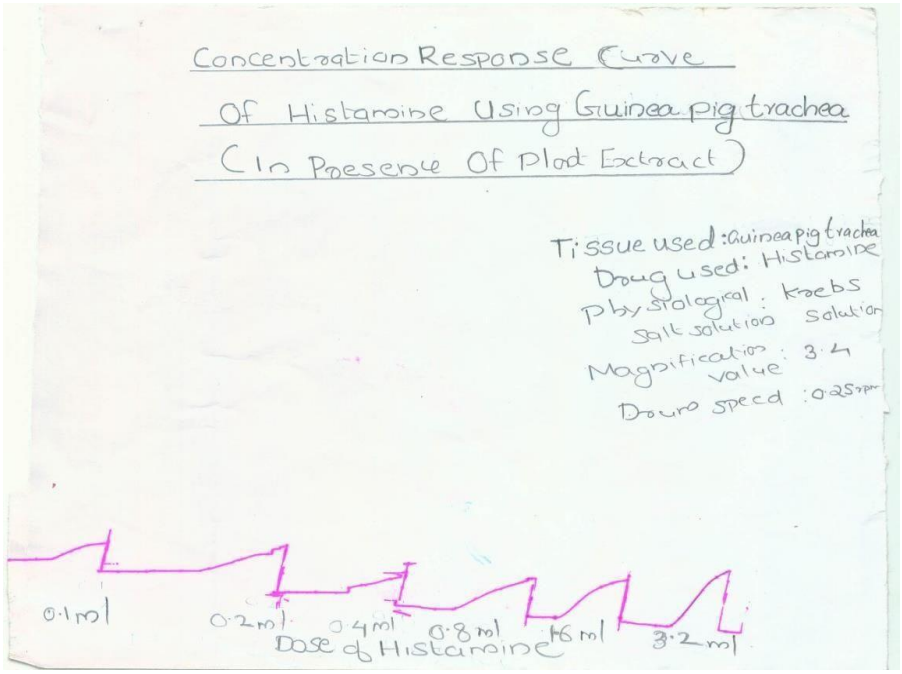


Figure No.5: Concentration Response Curve of Histamine using Guinea pig trachealpreparation (In Absence of Plant Extract).

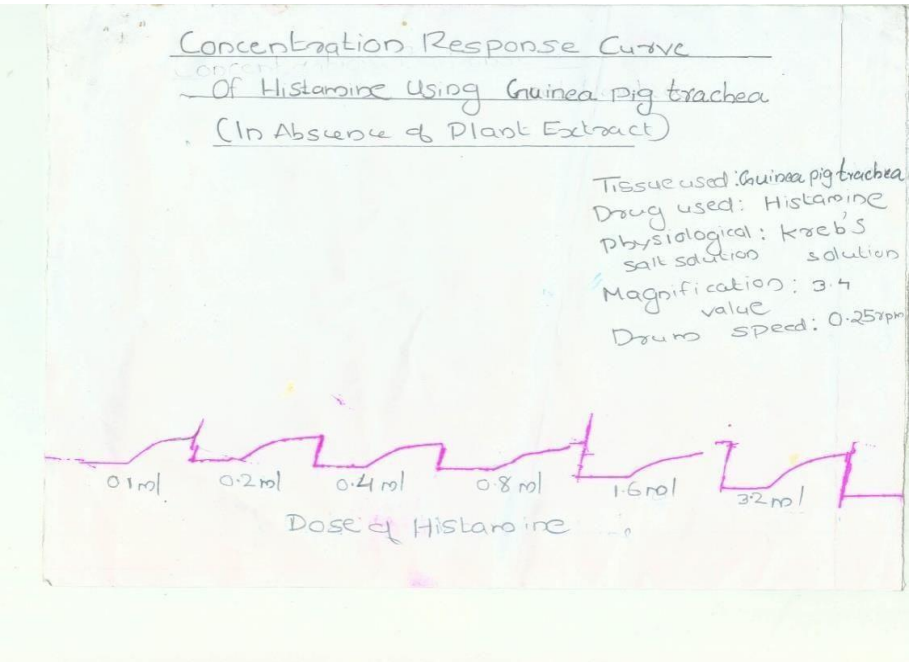


Figure No.6: Concentration Response Curve of Histamine using Guinea pig trachealpreparation (In Presence of Plant Extract).

The results were expressed in table number 8 and the effect of ***O. Tenuiflorum Leaves*** on histamine induced contraction on isolated guinea pig tracheal is shown in figure number 9

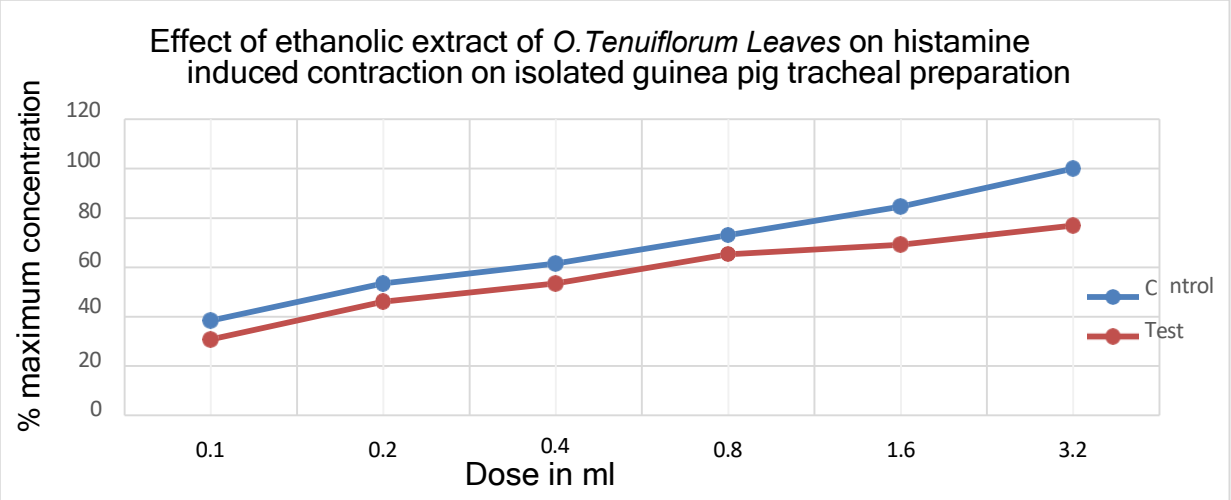
Table No.7: Effect of ethanolic extract of *O. Tenuiflorum Leaves* on histamine induced contraction on isolated guinea pig tracheal preparation

Sl n o	Dose of histamine (10µg/ml) in ml	Control (Histamine 10 µg/ml) % maximum contraction	TestHistamine (10µg/ml)+EEAC (1mg/ml) % maximum contraction
1	0.1	38.46 ± 1.58	30.76 ± 1.32**
2	0.2	53.48 ± 4.23	46.15 ± 2.91**
3	0.4	61.5 ± 3.89	53.48 ± 3.31**
4	0.8	73.07 ± 2.32	65.3 ± 1.76**

5	1.6	84.6 ± 2.13	69.2 ± 1.09**
6	3.2	100 ± 1.07	76.92 ± 2.11*

Values are Mean± S.E.M., where n=6 in each group, P< 0.05 *, P< 0.01 ** (significant) compared with control. Statistical analysis was done by one-way analysis of variance (ANOVA) followed by Dunnett's multiple comparison test.

Figure No.8: Effect of ethanolic extract of *O.Tenuiflorum Leaves* on histamine induced contraction on isolated guinea pig tracheal preparation



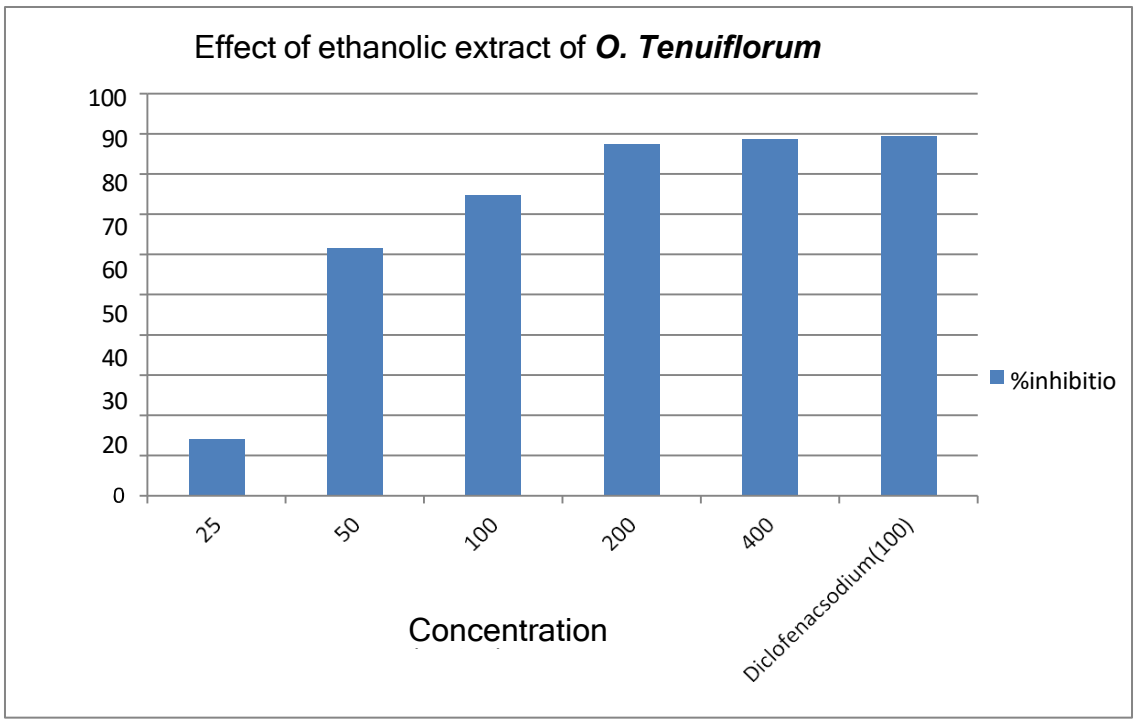
IN VITRO ANTIOXIDANT ACTIVITY

Hydrogen peroxide scavenging

The hydrogen peroxide scavenging activity of ethanolic extract of ***O. Tenuiflorum Leaves*** was determined. The percentage hydrogen peroxide scavenging ability of the test extract increased in a dose dependent manner and the reference standard, ascorbic acid (100 µg/ml) exhibited 60.23% hydrogen peroxide scavenging activity. The maximum hydrogen peroxide scavenging activity shown by ethanolic extract of ***O. Tenuiflorum Leaves*** rhizomes was found to be 53.3 % at 400 µg/ml.

The hydrogen peroxide scavenging effect of ethanolic extract was shown in table number 9.

Figure No 9: Effect of ethanolic extract *of O. Tenuiflorum Leaves* protein denaturation.



Rabbit red blood cell membrane stabilization method

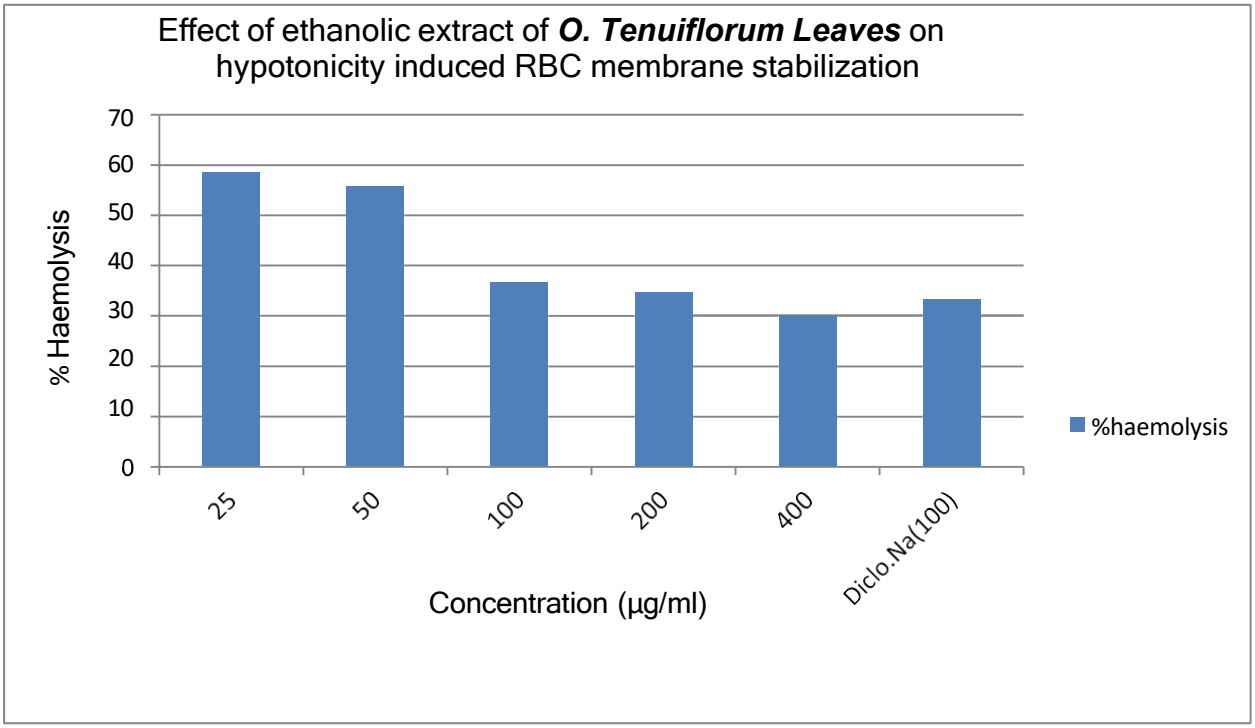
The ethanolic extract of ***O. Tenuiflorum Leaves*** had shown significant inhibition of haemolysis or the active RBC membrane stabilization comparing todiclofenac sodium the reference standard. The maximum percentage protection shown by test extract was 69.82% at 400 µg/ml and minimum percentage protection was found to be 41.4 at 25 µg/ml. The reference standard diclofenac sodium possesses 66.75% at concentration 100 µg/ml.

Table No.12: Effect of ethanolic extract of *O. Tenuiflorum Leaves* on hypo tonicity induced RBC membrane stabilization.

Sl no	Concentration(µg/ml)	Absorbance [A]	%Protection	%Haemolysis
1	25	0.61±0.03	41.4	58.6
2	50	0.58±0.002	44.3	55.7
3	100	0.382±0.004	63.3	36.7
4	200	0.36±0.009	65.3	34.7
5	400	0.32±0.007	69.82	30.18
6	Diclofenac sodium (100 µg/ml)	0.34±0.008	66.75	33.25

(Values are Mean±S.E.M., where n=6) in each group, P< 0.05 *, P< 0.01 **(significant)compared with control. Statistical analysis was done by one-way analysis of variance (ANOVA) followed by Dunnett's multiple comparison test.

Figure No.13: Effect of ethanolic extract of *O. Tenuiflorum Leaves* on hypo tonicity induced RBC membrane stabilization



Discussion

The results demonstrate that Ocimum tenuiflorum possesses both antihistaminic and anti-inflammatory effects. The presence of active phytochemicals such as eugenol and ursolic acid is likely responsible for stabilizing mast cells, reducing histamine release, and inhibiting inflammatory mediators. These findings are in agreement with previous studies highlighting Tulsi's pharmacological potential in managing respiratory disorders and inflammation.

Conclusion

Ocimum tenuiflorum extract exhibited significant dual activity against histamine-mediated responses and inflammatory processes. Thus, it holds promise as a natural therapeutic agent in the treatment of asthma, allergies, and inflammatory conditions.

REFERENCES

1. Mathew S et al., Antimicrobial activity of Ocimum tenuiflorum. (2022).
2. Arambewela L et al., Antinociceptive activities of Ocimum tenuiflorum extracts. (2021).
3. Rahman M et al., Anti-inflammatory activity of Ocimum tenuiflorum oil. (2012).
4. Rathore S., Thesis on Dual Antihistaminic and Anti-Inflammatory Effects of Ocimum tenuiflorum Leaf Extracts. (2022).
5. Charles R. Craig and Robert E. Stitzel, Modern pharmacology with clinical applications 5th ed. United states of America, Library of congress cataloguing publication data. P. 423-441.
6. Rutkowski K. Sowa P, Rutkowska-Talipska J. Allergic diseases: the price of civilisational progress. PostepyDermatolAlergol. 2014: 2(2):77-83.
7. Cookson WO, Moffatt MF. Genetics of asthma and allergic disease. Hum Mol Genet 2000; 9: 2359–2364.
8. Barnes KC. Evidence for common genetic elements in allergic disease. J Allergy ClinImmunol 2000; 106: S192–S200.
9. Dunnill MS. The pathology of asthma, with special reference to the changes in the bronchial mucosa. J ClinPathol 1960; 13: 27–33.
10. Akers IA, Parsons M, Hill MR. Mast cell tryptase stimulates human lung fibroblast proliferation via protease-activated receptor-2. Am J Physiol LungCell MolPhysiol 2000; 278: L193–L201.