significant antibacterial and anti-inflammatory activities[32]. Further, one of the ingredients of *Triphala* viz., *Terminalia chebula* possesses antitussive, activity against sulphur dioxide gas evoked cough in mice thus validate the popular use of this herb in cough related to numerous respiratory diseases[33]. Further, the principle anti-inflammatory ingredients of *Piper longum* are dihydrokawain, yangonin and methysticin.[34] *Piper longum* inhibits the lipid peroxidation process effectively by its ability to scavenge free radicals involved in initiation and propagation steps.[35] *Piper longum* retards the macrophage recruitment and suppress cytokines production.[36] Inhibition of TNF-α release was observed using isolated kawapyrones of *Piper longum*.[37]

The principle ingredients of *Emblica officinalis* are tannoids (emblicanin A and B, punigluconin, and pedunculagin).[38] In addition to the antitussive activity, it was observed that *Emblica officinalis* has anti-inflammatory, antispasmolytic and antioxidant efficacy and it reduces the mucus secretion in the airways.[39] *Emblica officinalis* also possesses superoxide-scavenging and prolyl endopeptidase inhibitory activity. Also this herb significantly inhibits the free radical production, restores the anti-oxidant status,[40] inhibits apoptosis and DNA fragmentation, relieves the immunosuppressive effects on lymphocyte proliferation and even restores the IL-2 and γ-IFN production.

Terminalia belirica possess anti-peroxidative activity[41] *and* inhibits lipid peroxide formation by scavenging hydroxyl and superoxide radicals.[42] Antioxidant potential of *Terminalia belerica* (stronger than alpha-tocopherol) is attributed to hydroxybenzoic acid and hydroxycinnamic acid derivatives, flavonol aglycones and their glycosides.[43]

Ocimum sanctum has an immunostimulatory effect on the humoral immunologic response (an increase in antibody titer), as well as of the CMI response (E-rosette formation and lymphocytosis).[44] Another study documented a decrease in histamine release from mast cells (humoral immune response) and a decrease in leucocyte migration inhibition (CMI response). This immunomodulatory effect was postulated as mediated by GABAergic pathways.[45] Significant inhibition of leucocyte migration in the pleural exudates, which suggest that the *Ocimum sanctum* inhibits the enhancement of the vascular permeability and leucocyte migration following inflammatory stimulus.[46] Analgesic action of *Ocimum sanctum* is exerted both centrally as well as peripherally.[47] Free radical scavenging potential of ursolic acid isolated from *Ocimum sanctum* against lipid peroxidation was observed *in vitro*.[48] Also *Ocimum sanctum* possess potent free radical scavenging activity[49] and antioxidant activity.[50]

Adhatoda vasica possess potent antiallergic activity[51]**.** The widely used mucolytics, namely benzylamines (bromhexine and ambroxol) are the semi-synthetic derivatives of vasicine, extracted from *Adhatoda vasica* and these benzylamines enhance lysozyme levels in the respiratory-tract secretions and clear bacilli-laden mucus.[52] Results of the study showed that the potent antiinflammatory activity of *Adhatoda vasica* was equivalent to that of hydrocortisone.[53]
The principle ingredients of *Cyperus rotundus* are sesquiterpenes (beta-selinene, isocurcumenol, nootkatone and aristolone) and a triterpene (oleanolic acid).[54] Inhibition of NO and O_2- production *in vitro* by *Cyperus rotundus was* observed in a study and the inhibition was found to be due to the suppression of iNOS protein and iNOS mRNA expression.[55]

Embelin, a benzoquinone-derivative isolated from *Embelia ribes*, when tested for its antibacterial potential exhibits significant inhibition against five and moderate activity against three stains of 12 bacteria tested.[56] Embelin and its 2, 5-isobutylmine salts have been reported to possess anti-inflammatory activity in carrageenan-induced paw edema and cotton pellet granuloma formation.[57]

The bark of *Cinnamomum zeylanicum*, showed a very low inhibitory concentration value ranging from 0.14 to 0.26 mg/ml, efficiency concentration value from 6.1 to 11.6 mg/mg DPPH and reducing power value from 0.6 to 2.8 ascorbic acid equivalents (ASE/ml), and reasonably high values (8.5–16.2) of anti-radical power (ARP), indicating their strong Free radical scavenging activity. They also showed better inhibition of hydroxyl radical induced deoxyribose degradation.[58] The anti-inflammatory effect of these plants was determined by xylene-induced ear oedema in mice and cotton pellet granuloma test in rats.

Leaves of *Cinnamomum tamala* inhibited significantly and dose dependently edema induced by carrageenan in rats and also reduced significantly acetic acid induced vascular permeability in mice. When tested in vitro, it exhibited significant membrane stabilizing property.[59]
Elettaria cardamomum significantly increased WBC count. Similarly bone marrow cellularity and Alpha esterase positive cells which are lowered by radiation, were partly restore by *Elettaria cadimomum*.[60]

The xanthones of *Mesua ferrea* namely, dehydrocycloguanandin , calophyllin-B, jacareubin 6-desoxy jacareubin mesuaxantbone-A mesuaxanthone-B and euxanthone produced varying degrees of C.N.S. depression and also exhibited anti-inflammatory activity both by intraperitoneal and oral routes in rats as tested by carrageenin induced hind paw oedema, cotton pellet granuloma and granuloma pouch techniques, in normal and adrenalectomised rats.[61] The antibacterial efficacy of the methanol extract of flowers of *Mesua ferrea* could inhibit a large number of Gram-positive and Gram-negative bacteria at concentration ranges of 100 to 50 µg/ml, or even lower, as against vibrios and *Escherichia coli*. In *in vivo* tests, used at concentrations of 100 and 200 µg/g of body weight, it offered significant protection to Swiss strain of albino mice when challenged with 50 MLD of a virulent strain *Sulmonella typhimurium*.[62]

5. Conclusion

Increasing prevalence of AR is a global health issue and AR has a severe impact due to associated long-term compromises in the quality of life. The available treatment options for AR have major limitations due to fewer efficacies and associated adverse events. This study observed a highly significant reduction in the mean scores for sneezing, nasal congestion, itching of nose, postnasal

drip and rhinorrhea. The increased levels of TLC, DLC (polymorphs, lymphocytes, monocytes, eosinophil), ESR, and AEC reduced significantly at the end of the study. The significant results might be due to the synergistic activities of the ingredients of Bresol tablets. There were no clinically significant adverse reactions during the entire study period. The overall compliance to the treatment was good and no treatment discontinuations were reported. Therefore, it may be concluded that Bresol tablets and syrup are effective and safe in the management of AR.

Bresol tablets significantly reduced the symptoms of AR namely sneezing, nasal congestion, itching of nose, postnasal drip and rhinorrhea and also significantly reduced elevated TLC, DLC (polymorphs, lymphocytes, monocytes, eosinophil), ESR and AEC levels without causing clinically significant adverse reactions. The observed effect might be due to the synergistic effect of the ingredients of Bresol tablets. Thus it can be concluded that the Bresol tablets are effective and safe in the management of AR and can be effectively used in allergic rhinitis patients.

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Tables:

Table 1: Demographic data

	Drug	Placebo
Age	25.68±10.59	28.72±9.84
Males	18	23
Females	32	27

Table 2: Daily individual symptoms of rhinitis

		Drug	Placebo	Significance
Sneezing	Baseline	7.16±1.15	6.96±1.12	NS
	1 week	6.46±1.34	6.52±1.27	NS
	2 weeks	5.48±1.31	5.90±1.06	NS
	3 weeks	4.18±1.22	5.56±1.20	P<0.0001
	4 weeks	3.42±0.91	4.98±1.39	P<0.0001
Nasal congestion	Baseline	7.50±1.06	7.46±0.97	NS
	1 week	6.78±0.95	6.82±0.94	NS
	2 weeks	5.82±1.02	6.18±0.98	NS
	3 weeks	4.48±0.99	5.68±1.17	P<0.0001
	4 weeks	3.58±1.09	6.08±1.41	P<0.0001
Itching of the eyes	Baseline	0.30±1.07	0.32±1.00	NS
	1 week	0.28±0.99	0.30±0.99	NS
	2 weeks	0.22±0.76	0.22±0.76	NS
	3 weeks	0.18±0.66	0.20±0.73	NS
	4 weeks	0.14±0.50	0.18±0.60	NS
Itching of the Nose	Baseline	0.24±1.26	0.24±1.26	NS
	1 week	0.24±1.26	0.24±1.26	NS
	2 weeks	0.20±1.07	0.20±1.07	NS
	3 weeks	0.14±0.76	0.18±1.02	NS
	4 weeks	0.12±0.63	0.18±1.02	NS
Post-nasal drip	Baseline	3.94±3.14	3.96±3.12	NS
	1 week	3.46±2.78	3.48±2.76	NS
	2 weeks	2.90±2.37	3.08±2.42	NS
	3 weeks	2.42±2.08	3.20±2.57	NS
	4 weeks	1.96±1.68	3.42±2.81	P<0.0041
Rhinorrhea	Baseline	7.28±1.58	7.26±1.54	NS
	1 week	6.44±1.46	6.58±1.43	NS
	2 weeks	5.44±1.45	5.94±1.35	NS
	3 weeks	4.56±1.33	5.78±1.45	P<0.0001
	4 weeks	3.56±1.15	5.94±1.45	P<0.0001
Watery Eyes	Baseline	1.82±3.09	1.88±3.10	NS
	1 week	1.56±2.67	1.60±2.72	NS
	2 weeks	1.40±2.38	1.56±2.66	NS
	3 weeks	1.10±1.87	1.58±2.70	NS
	4 weeks	0.94±1.62	1.58±2.73	NS
Statistical Test: Mann Whitney test, NS: Not Significant				

Table 3: Laboratory Investigations

		Baseline	After treatment.	Significance
Drug	Total WBC Count	7202.00±1518.00	6460.00±1366.00	P<0.0001
	Neutrophils	67.82±4.56	69.24±4.22	P<0.0001
	Lymphocytes	26.78±1.54	28.02±0.98	P<0.0001
	Eosinophils	4.60±1.20	1.94±0.87	P<0.0001
	Monocytes	1.42±0.61	1.40±0.73	NS
	ESR	8.66±1.81	8.66±1.61	NS
	Absolute eosinophil count	339.90±123.00	126.70±67.59	P<0.0001
Placebo	Total WBC Count	7192.00±1528.00	6960.00±1498.00	P<0.0184
	Neutrophils	67.82±4.56	68.02±4.64	P<0.0399
	Lymphocytes	26.78±1.54	26.86±1.59	NS
	Eosinophils	4.58±1.23	4.48±1.15	NS
	Monocytes	1.38±0.53	1.36±0.60	NS
	ESR	8.84±1.28	8.72±1.39	NS
	Absolute eosinophil count	339.90±123.00	321.70±130.20	P<0.0489
Statistical Test: Paired t test NS: Not Significant				