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RESEARCH ARTICLE

Zeta Potential of Lantadene Post Alcoholic Reflux Method

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ABSTRACT:
Lantadene, a pentacyclic triterpenoid, is a hydrophobic bioactive compound exhibiting wide array of therapeutic applications. It's high molecular weight and structure plays an important factor for using this as drug. Zeta potential value -17.96 meV indicates it's stability in the colloidal dispersion. Proper drug delivery system may focus on feasible therapeutic action.

KEYWORDS: *Lantana camara linn*, Lantadene, Zeta potential, colloidal dispersion, drug delivery system.

INTRODUCTION:
Lantana camera L. provides a huge amount of biomass that is interest to exploit for natural product. Some pentacyclic tri-terpenoids are known to have anti-inflammatory.[1,2] antitumor[3] or anti-AIDS activity. Lantadene isolated from L. Camera belong to the oleanane series which have attracted considerable interest mainly because of their toxicity and antitumor activity. Leaf extracts exhibits tumor inhibitory activity in a two stage carcinogenesis model in mice. It was also found that compound induces apoptosis in human leukemia HL- 60 cells[4]. These compounds differ in the structure of the group attached C- 22 and there are indication that the structural variations involving C-22, C-17 in the antitumor activity of Lantadene A.[7] The cytotoxicity profile at different derivatives showed that with removal of the ester at C-22. There was significant decrease in the activity whereas methylation of C-17 carboxyl group resulted in some activity. An increase in the activity and branching decreased the activity. An aromatic ester at C-22 also resulted in decreased activity. These results indicate the importance of the C-22 and C-17 position in the antitumor activity[5]. The results interference the importance of the group attached to C-22 and C-17 in relation to the antitumor activity of Lantadene molecule.

A tumor is a disease state characterized by uncontrolled proliferation and absence of apoptosis. During apoptosis, the cell experiences a cascade of events that ultimately result in nuclear condensation and DNA Fragmentation. Thus induction of apoptosis is an efficient method of treating cancer.[8] Lantadene A is the most abundant in the *Lantana camera* var. aculeate (Red). However the molecular mechanism responsible for its tumour activity inhibitory potential is not well understood.

As Lantadene is bioactive molecule showed antitumor activity, considering its molecular weight, hydrophobic nature and inter molecular hydrogen bonding; this pentacyclic triterpenoids showed very much stability. Hence if this molecule used in drug delivery system, its Zeta potential value focused on it's state of dispersion or aggregation.

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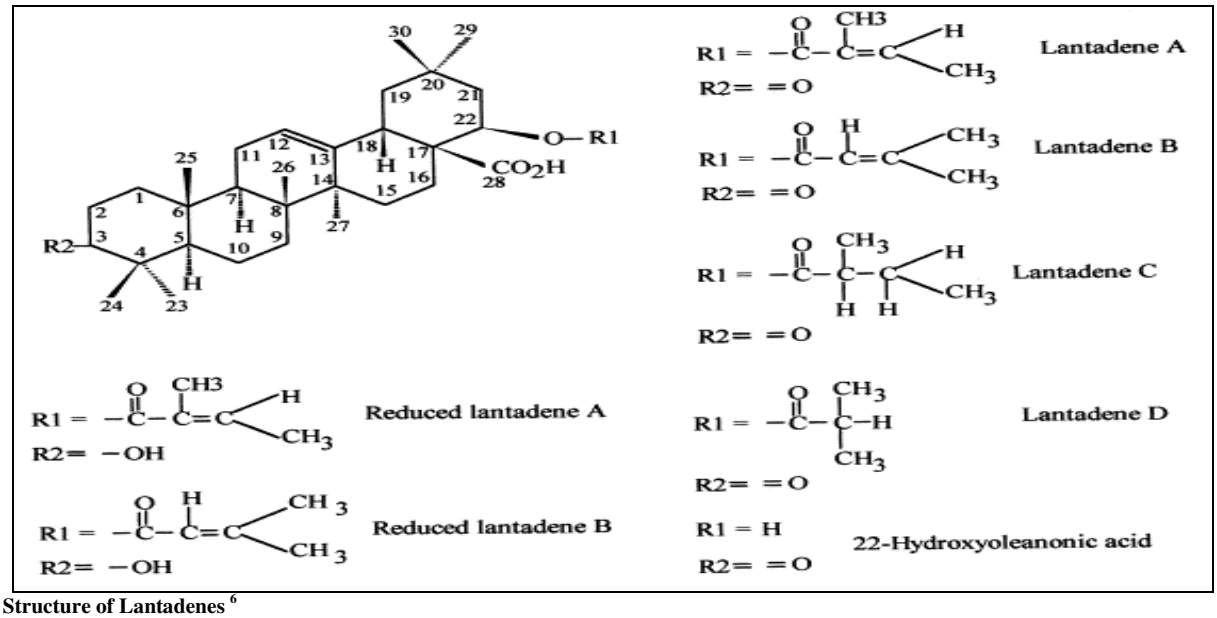

Structure of Lantadenes [6]

MATERIALS AND METHODS:

Extraction and Isolation of Lantadenes:

Lantana leaf powder (100 g) and (500 ml) methanol was refluxed for 3hrs. Methanol was removed under vaccum (13-14 mm/Hg and Distillation temperature upto 58°C) to get concentrated residue which was suspended in 500 ml distilled water. After filtration, the residue was suspended in a methanol–water (1:7) mixture and extracted with ethylacetate (2 X 25 mL)and with n-butanol ((2 X25 mL) The ethylacetate layer was concentrated under reduced pressure and loaded on silica gel column (30 g, 60–120 mesh) using chloroform and chloroform–methanol (9:1) as eluting solvent. The enriched fractions were re-chromatography on a silica gel column with n-Hexane by increasing amount of acetone. The pure fraction after HPLC were characterised for Zeta potential.

RESULT AND DISCUSSION:

The extraction of Lantadene was carried out by aqueous and methanolic reflux method. Aqueous reflux method has not produced reproducible result to study Zeta potential. Hence paper focuses on lantana leaves for the characterisation of drug particles. After confirmations of pure Lantadene in enriched fractions from gel chromatography; was subjected to HPLC which demonstrated single peak for isolated Lantadene (figure 1). It also exhibited red colouration when test of terpenoid was conducted. Sample from HPLC were subjected to zeta potential.

Zeta potential indicates charges carried by particles suspended in a liquid mostly water. The threshold region of either coagulation or dispersion exists from about -14 mv to -30 mv. Lantadene bioactive molecule shows **-17.96mv** Zeta potential. (Figure 2; Table 1) This value may focus on the drug delivery system. The significance of zeta potential is that its value can be related to the stability of colloidal dispersions. It indicates the degree of repulsion between adjacent, similarly charged particles in dispersion. For molecules and particles that are small enough, a high zeta potential was confer stability or dispersion was resist aggregation. When the potential is low, attraction exceeds repulsion and the dispersion was break and flocculate. So, colloids with high zeta potential (negative or positive) are electrically stabilized while colloids with low zeta potentials tend to coagulate or flocculate as outlined in the table.[9]

Zeta potential [mV]	Stability behavior of the colloid
From 0 to ±5,	Rapid coagulation or flocculation
From ±10 to ±30	Incipient instability

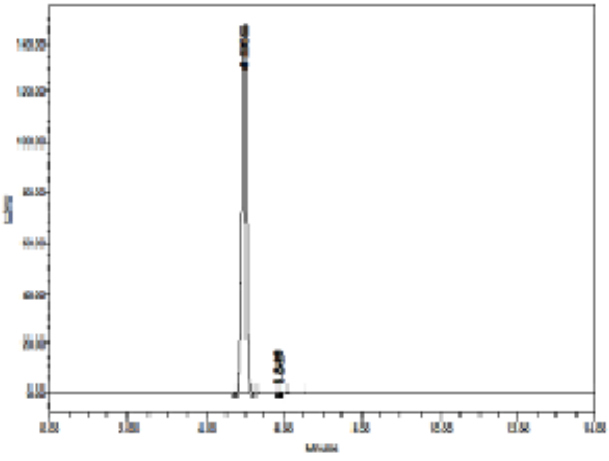

Figure1 -Lantadene single peak obtained on HPLC for leaves ethylacetate extract.

Table 1:Measurement results

Zeta potential	**-17.96**	**(mV)**	**Doopler shift**	**9.71**	**(Hz)**
Mobility	-1.400e-.004	(cm^2/Vs)	Base frequency	147.8	(Hz)
Conductivity	14.667	(ms/cm)	Temerature	25^0c	
Cell type	Flow cell		Refractive index	1.3328	
Average electric field	-14.36	(V/cm)	Viscosity	0.8878	
Average current	-10.50	(mA)	Dielectric constant	78.3	
Disdtribution Graph					
Peak frequency	9.71 (Hz)	Intensity	5.30	Zeta potential	-17.96

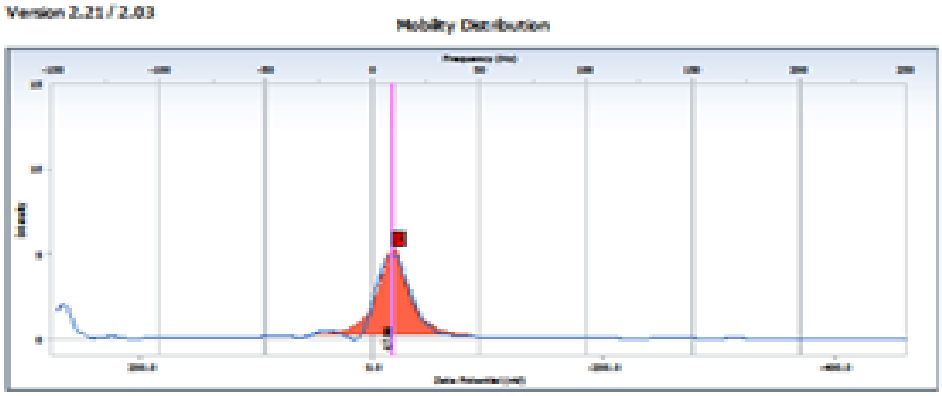

Figure 2 Zeta potential of pure Lantadene obtained from lantana leaves using methanolic reflux method.

A prerequisite to achieve an enhancement of the oral bioavailability with drug nanocrystals is that the crystals are finely dispersed in the gut liquid and do not aggregate. In case they start aggregation, the bioavailability decreases with increasing aggregate formation. This is attributed to the fact that they lose special properties of nanoparticles such as their adhesive property to the mucosal wall. Therefore it is necessary to prepare nanosuspensions with a physical stability as high as possible, of the present study. Optimum stabilisers/stabiliser combinations were identified in a systematic screening based on zeta potential measurements.

CONCLUSION:

Lantadene is isolated by reflux method followed by gel chromatography. The enriched fraction showed single pure peak on HPLC. The aliquot from HPLC were subjected to zeta potential indicating stability of colloidal dispersions. This knowledge can provide superiority of drug delivery.

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