Leishmaniasis constitutes a complex of diseases with clinical and epidemiological diversity. Visceral Leishmaniasis (VL) commonly called Kala-azar is caused by intracellular protozoan parasite *Leishmania donovani*. This parasite reside in mononuclear phagocytes and cause wide spectrum of clinical manifestations resulting in substantial morbidity and mortality in an estimated 12 million people worldwide.

The visceralized form of kala-azar is fatal if left untreated. It is observed that the increase in unresponsiveness to sodium antimony gluconate, the first line of treatment in visceral Leishmaniasis patients in the Indian subcontinent, a major endemic area of visceral Leishmaniasis. The traditional treatment includes pentavalent antimonial such as sodium stibogluconate and Meglumine antimoniate. Resistance is common in India and rates of resistance between shown be as high as 60% in part of Bihar India (Thakur C.P. 2004).

Amphoterecine B and Miltifosine used for treatment of Leishmaniasis but due to side effect and resistant by the parasite, the new therapies are needed to supplement as replace currently available therapy.

The medicinal plant have been using in the treatment of human disease since long time. This trends has received more attention during last few decades. Herbal treatments are cheap, convenient, easily available with less side effects and more popular in rural area in comparison to modern medicine. The *Aloe vera* (family Xanthorrhoeaceae) is used widely as traditional herbal medicine for treatment of many diseases like skin disease, sun burns, cold sores, frostbite, and it also acts as an anti microbial agent in many countries. The extract of *Aloe vera* contain saponins, a chemical compound that act as antileishmanial agent. The saponins inhibit the growth of *Leishmania* promastigotes by acting on the membrane of the parasite with induction of a drop in membrane potential.

**MATERIAL AND METHODS**

*Parasite culture:* The sample of parasite (promastigote of *Leishmania donovani*) obtained from Balaji Utthan Sansthan, kala-azar research centre, Patna and parasite were routinely cultured in Laboratory at 24 ± 1°C in schneider's insect tissue culture medium supplemental with 10-20% heat-inactivated fetal bovine serum and 100 U penicillin, 50 mg gentamicin and 100 mg streptomycine / Lt and subculture every 72 hrs. These maintained promastigotes were used for bio assay testing.

*Plant material:* The plant *Aloe vera* were collected from Patna, (Bihar) region and was processed and its Methanolic (AVM), Ethylacetate(AVE), chloroform (AVC) & Benzene extract (AVB) of *Aloe vera* obtained from Balajee Utthan Sansthan, kala-azar research centre, Patna.

*Anti Leishmanial Assay:* 20 µg of each extract (Ethylacetate (AVE), Methanolic (AVM), Benzene (AVB) & chloroform, (AVC) of *Aloe vera* dissolved in 1ml dimethyl sulphoxide DMSO separately. The antileishmanial activity was then tested against *Leishmania donovani* (promastigotes) by using culture vials. For in vitro assay, stock solution of extract was exposed in increasing concentration of *Aloe vera* (0-600 µg) of media containing 3.6x10⁶ parasite/ml for 24 hrs, 48 hrs and 72 hrs at 24 ± 1°C, the experiment done in culture vials. A control was
used in separate culture vials. All experiments were performed in 5 times. At the end of incubation time parasite of *Leishmania donovani* counted by using a 0.1 Neubauer chamber (Fein optic JENA, Germany) at 24 hrs, 48 hrs and 72 hrs. Each assay was performed in 5 times. The IC$_{50}$ & IC$_{90}$ value (concentration that it required to inhibit the growth of *Leishmania donovani* promastigote by 50% & 90%) was calculated by microscopy with Neubauer chamber.

RESULTS AND DISCUSSION

Among all extracts, Ethylacetate (AVE), & Chloroform (AVC), extract showed potential anti-leishmanial activity. 3.6x10$^6$ parasite /ml with Schneider insect media was taken in each culture vials for the effect of various doses of Aloe vera extract as well as control. Aloe vera extracts were tested against promastigote form of *Leishmania donovani* of 12.5, 25, 50,100,200,300,400,500,600, µg/ml. Among these Ethylacetate (AVE) & Chloroform (AVC), extract of Aloe vera showed anti leishmanial activity with IC$_{50}$ dose of 400 µg/ml and complete inhibition (IC90) at 500 µg/ml obtained result have been given in Table-1.

In the present study, it was observed that the Ethylacetate (AVE), and Chloroform (AVC), extract of Aloe vera showed potent anti-leishmanial activity against promastigotes form of *Leishmania donovani* but at high dose. Many plants extract, fruit of *Asparagus racemosus*, and leaves of the vietnamese plant *Maes balansae* a source of saponins has been evaluated against drug- sensitive visceral Leishmania strain. The extract of Aloe vera also contain the saponins which show the anti leishmanial activities and caused morphological alterations including cell shrinkage, an aflagellated ovoid shape and chromatin condensation. This compound exerts its leishmanicidal effect through the induction of programmed cell death$^{12}$.

Present study showed that the Ethylacetate (AVE), & Chloroform (AVC), extract of Aloe vera has anti-leishmanial potency against promastigote form of *Leishmanial donovani*. The IC$_{50}$ and IC$_{90}$ indicates that the ethyl acetate & chloroform extracts of Aloe vera have anti leishmanial activity at very high concentration.

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REFERENCES


Table 1: In vitro effect of Aloe vera extracts on *Leishmania donovani* promastigotes.

<table>
<thead>
<tr>
<th>Dose of AV Extract</th>
<th>AVB</th>
<th>AVC</th>
<th>AVE</th>
<th>AVM</th>
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<tr>
<td>0 µg (control)</td>
<td>3.6x10$^6$</td>
<td>3.6x10$^6$</td>
<td>3.6x10$^6$</td>
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<td>12.5 µg</td>
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<td>25 µg</td>
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<tr>
<td>50 µg</td>
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</tr>
<tr>
<td>100 µg</td>
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<tr>
<td>200 µg</td>
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<tr>
<td>300 µg</td>
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<td>3.6x10$^6$</td>
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<tr>
<td>400 µg</td>
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<tr>
<td>500 µg</td>
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<tr>
<td>600 µg</td>
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</table>

**Fig.-1:** Evaluation of IC$_{50}$ and IC$_{90}$ of various extracts of Aloe vera against the promastigotes of late log phase (3.6x10$^6$ ml) after incubation with different concentration of extracts.

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