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Benefiting From a Pest- Paraupsylla Tuberculate Infested Alstonia Scholaris Latex Cross-Reactivity To HCV, Plasmodium

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Abstract

Astonia scholaris is well known for its medicinal properties. Its bark is used for anti-malarial compounds and its leaf is used for treatment of dysentery. It is infested by the insect pathogen causing leaf gall namely *Paraupsylla tuberculate*. In this article we show for the first time that the latex of *Alstonia scholaris* has cross-reacting proteins with human pathogens namely HCV, Malaria and these cross-reacting proteins react differentially when infested by the insect pest Paraupsylla tuberculate causing leaf gall. Taking into consideration that plant galls are consumed by certain population, this finding could be important for underlying factor for resistance to certain diseases in certain group of people.

Introduction

Consumption of indigenous food and different variety of food is linked to combating chronic disease conditions (1) and also significant to combat food security issues (2). Consumption of at least 65 species of insects in known among the tribal people of Arunachal Pradesh (3). It is also known that plant with gall disease is used for medicinal properties (4,5,6). Folklore medicine is known to use plant galls (7). One such disease is the leaf gall disease in the wide spread tree found in India *Alstonia scholaris* also called as the devil's tree. It is known to be infested with *Paraupsylla tuberculate* that causes leaf galls which can be correlated to air quality index (8).

Supposedly consumption of leafgall renders immunity to disease as it is known that leaf galls are used for medicinal property, then characterising the proteins in that is the next step. One such report on zymogram of leaf gall of *Alstonia* has been reported (but the proteins have not been characterised (9). Taking into account, the rise in anti-microbial resistance with conventional antibiotics, novel drugs are being explored

(10,11,12), as well as novel candidate for vaccine. To study in depth any biological fluid in vivo, LASER methods have been described as for mouse blood, lesions (13).

Recently it has been shown that lateral flow assays coated with specific antigen or antibody of pathogens could be used as to screen the presence of cross-reactive plant proteins (14). Following that principle, the latex of *Alstonia* has been screened for HCV, Plasmodium with and without leaf gall disease as described in this article.

Materials and Methods

Lateral flow assay:

1.Rapid diagnostic kits were purchased for Plasmodium (Med source for Pf, Pv) and for HCV, HBV (Med source). The plant latex or sap were dropped at sample points of the lateral flow assay and the results were noted within 1-10' as soon as the control line turned positive. In case of HCV of Med source, the test line has recombinant antigens of HCV for detection of anti HCV antibodies.

2. Bioinformatic analysis: The phytochemical compound identified through IMPPAT database (https://cb.imsc.res.in/imppat) for a particular medicinal plant.

Results

The latex tested from leaves of *Alstonia scholaris* with leaf gall showed reactivity to HCV but latex from healthy leaves did not show (Figure 1). Contradictingly, the latex from leaves of *Alstonia scholaris* showed reactivity with *Plasmodium (Pf, Pv)* but the leaves with galls did not (Figure 1).

Discussion

Alstonia scholaris is known to have antimalarial compounds like Echitamine, tubotaiwine, akuamicine, picrinine, echitamidine, strictamine (15, 16) also indexed in the Indian medicinal plants, phytochemicals and therapeutics. Another compound detected through the IMPPT database is sinapic acid and this compound has shown to be antiviral as for SARS virus (17). As seen in figure 1, leaves that were un infested displayed cross-reactivity to Plasmodium and it was absent in the infested leaf. The novelty is to screen the potential cross reacting protein present in the plant latex with the lateral flow assay. This indicates that the insect infestation alters the mimicry present either it introduces or eliminates mimicry.
In case of HCV lateral flow, the plant latex indicated there was no cross-reactivity but after infestation with the *Paraupsylla tuberculate* resulted in cross-reactivity indicating the insect protein could have cross-reactivity or any new pathway in the leaf gall absent in a healthy leaf could have resulted in cross-reactivity with HCV.

Conclusion

Leaf extracts and Leaf galls are used for medicinal purposes but the molecular basis of it is unexplored. This article shows an example of cross-reactivity of leaf gall latex to human pathogen HCV and the leaf to Plasmodium.

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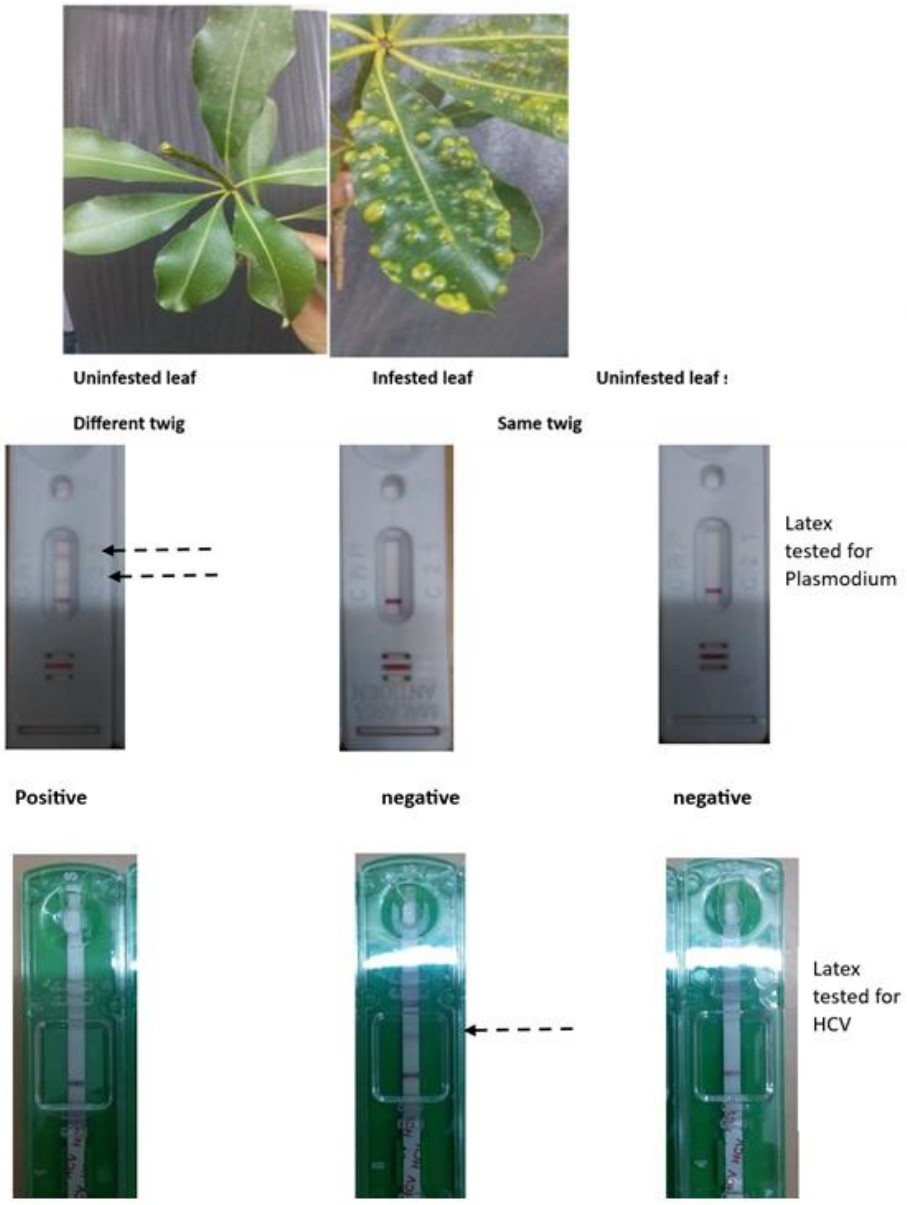

Figure 1 Lateral flow assay on infested and un infested leaves
Representative image of lateral flow assays (Med source) with the latex of infested and uninfested latex from leaf of *Alstonia*