Antiviral activity of *Cassia alata* extracts against cardiac coxsackievirus B3 infections *in vitro* and *in vivo*

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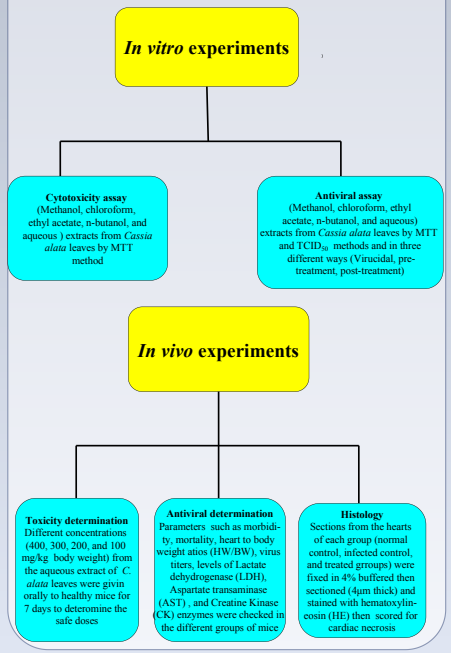
1- Introduction:

Coxsackievirus B3 (CVB3) is a common pathogen associated with human acute myocarditis. CVB3 is responsible for more than fifty percent of all viral myocarditis cases (Shen *et al.,* 2009). However up to now, there are no specific drugs or vaccines available for clinical treatment of CVB3 infection.

2- Objectives

Determination of the antiviral activity of different extracts from *Cassia alata* leaves against coxackievirus B3 infection *in vitro* and *in vivo*.

3- Materials and Methods



4- Results

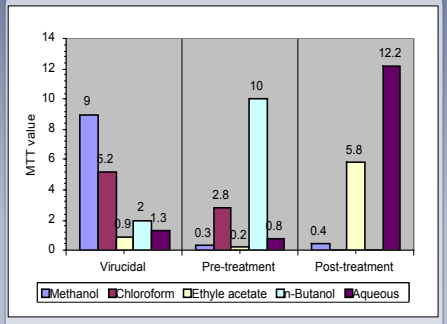


Fig 1. Histogram showing the antiviral activity of *C. alata* plant extracts against CVB3 *in vitro* determined by MTT.

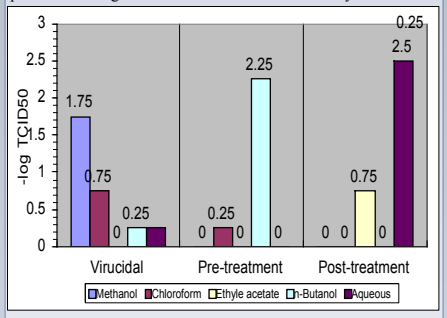


Fig 2. Virus titers in the heart tissues of different groups of mice by $TCID_{50}$ method.

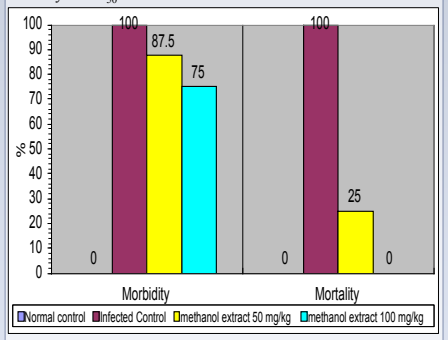


Fig 3. The percent of morbidity and mortality in the different groups of mice, n=8 for each group.

Table 1. Effect of of aqueous extract of *C. alata* on the heart index, virus titers, pathologic scores, and the activities of AST, LDH, and CK enzymes after 7 days from inoculation of BALB/mice with CVB3.

Group	HW/BW Ratios (Mean ± SD)	Virus Titration (log10PFU/ml)	Pathologic Scores (Mean ± SD)
Normal control	4.21 ± 0.02	0	0
Infected control	6.12 ± 0.03	6.42 ± 0.01	3.25 ± 0.10
Methanol extract at 50 mg/kg	5.47 ± 0.02**	3.28 ± 0.02**	2.25 ± 0.01 **
Methanol extract at 100 mg/kg	4.94 ± 0.03**	3.17 ± 0.02**	2.0± 0.03 **

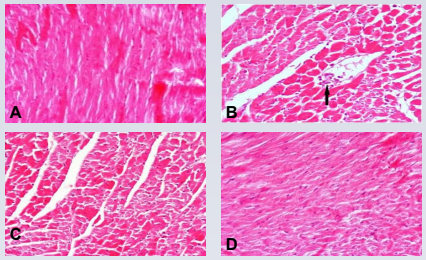


Fig 4. Histogram showing the pathologic appearance of heart tissues of BALB/c mice: H&E stained sections (magnification 200 X) of hearts from normal control group (A); the viral infected mice (B); Aqueous extract at 50 mg/Kg body weight (C); Aqueous extract at 100 mg/Kg body weight (D).

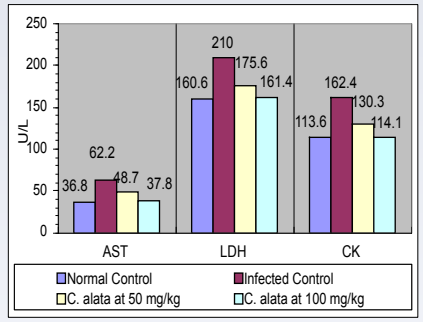


Fig 5. Histogram showing the effects of aqueous extract of *C. alata* leaves on the activities of AST, LDH, and CK in different groups of mice. Serum levels of LDH and CK were measured at day 7. n = 4 for each group. ** $P < 0.01$ versus the CVB3-infected group.

5- Discussion

Our results demonstrated that all extracts of *C. alata* showed antiviral activity against CVB3 *in vitro* with threputic index (TI) ranged from 0.2 to 12.2 and reduction in virus titers ranged from 0 $\log_{10}$ to 2.5 $\log_{10}$ where the aquoeus extract was the most effective against CVB3 infection *in vitro*. *In vivo*, the aquoeus extract was found to be safe at 100 mg/kg body weight and therefor for antiviral evaluation we used 100 and 50 mg/kg body weight as safe doses. Our results suggest that the aquoeus extract significantly reduced the morbidity, mortality, HW/BW, virus titers, necrosis and mononuclear cell infiltration of heart tissues at the both dosages studied by us. Also the extract showed the ability to maintain levels of LDH, AST, and CK enzymes at normal level in the treated infected mice compared with those untreated infected mice.

6- Conclusions

our results suggest that the aqueous extract of *C. alata* may represent a potential antiviral agent to treatment CVB3 myocarditis.

7-Acknowelgement

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8- References

Shen Y., Kanl Q.C., Xu W., Chu Y.W., Xiong S.D. (2009). Coxsackievirus B3 Infection Induced Viral Myocarditis by Regulating the Expression Pattern of Chemokines in Cardiac Myocytes . Iran J Allergy Asthma Immunol. 8, 1-9.

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