S.I.Fit. Young Researchers Project (SYRP)

Acacia catechu Willd Extract and gastrointestinal disorders: a network based approach

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Introduction

Tree heart wood and bark are used in Folk Medicine. The wood extract called catechu is used in traditional medicine for sore throats and diarrhea. [1] The water extract, named khayer gum or cutch, is traditionally used as an antiodiarrhoeal. In Ayurveda, it is used for rasayana (rejuvenation treatments). Folk Medicine claims other activities such as anti-dyslipidemic, anthelminthic, anti-inflammatory, anti-diuretic, anti-pruritic, coolant, taste promoting, enhancing digestion and curing skin disorders.[2] In this study we determined the chemical composition of *Acacia catechu* Willd. extract (ACE) and evaluated its effect on spontaneous and induced contractility in isolated guinea pig ileum and proximal colon. Preliminary data about its antimicrobial effect against some pathogens agents vs some microbiota intestinal strain, have been also investigated.

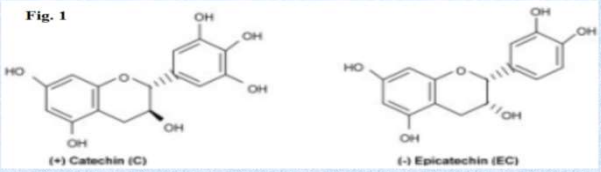
Materials and methods

ACE was supplied by BIO-LOGICA S.R.L. The chemical profile of ACE was assessed by capillary electrophoresis analysis in particular by focusing on the content of (–)-EC and (–)-C, being the most important and represented polyphenols. Spontaneous and induced contractility was investigated through in vitro biological assays, using tissues from guinea pigs organs. The antimicrobial activity of all isolates was exerted through Kirby-Bauer disc diffusion methods

Results and Discussion

ACE was shown to contain a variety of catechins , with Epicatechin [(–)-EC] and (+)-Catechin [(+)-C] Fig. 1 being the most abundant. The found amounts of (–)-EC was 10.8 mg/g (± 0.31; n = 3), whereas that of (+)-C, the native catechin, was 15.76 mg/g (± 0.38; n = 3). The non–native (–)-C, reasonably obtained by epimerization of (–)-EC, was approximately found to be at the same content level of (+)-C.

Fig. 1



Induced contractility

In guinea pig ileum, AC E reduced the maximum response to carbachol in a concentration-dependent manner with an IC50 value of 0.98 mg/mL (c.l. 0.73–1.14) and behaved as a non-competitive antagonist since it caused a decrease of the maximum response to agonist. In guinea pig proximal colon (Fig. 3c, d, e) ACE produced a non-competitive reversible antagonism similar to that shown in ileum. In proximal colon the potency was similar than that shown in the ileum [IC_{50} value of 0.74 mg/mL. (c.l. 0.47–0.88)]

Fig. 3

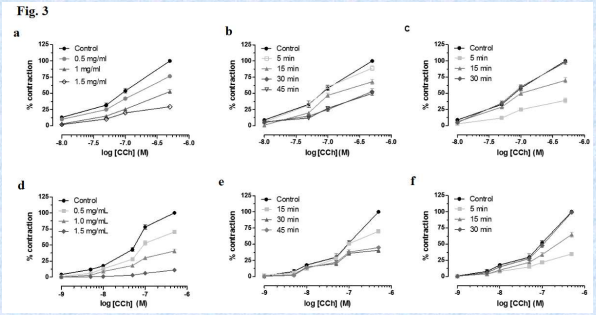


FIG. 3 Effect of AC extract on carbachol-induced contraction in isolated guinea pig ileum (a) and proximal colon (d). Cumulative concentration-response curves were obtained before and after exposure to AC extract for 30 min. Each point is the mean ± S.E.M. (n = 5–6). Time course of ACE effect on carbachol-induced contraction in isolated guinea pig ileum (B) and proximal colon (E) (100%, values are mean ± S.E.M., n = 5–6). Cumulative concentration-response curves were obtained before and after exposure to AC extract (1 mg/mL)

	MIC[a]	
Microrganism strain	***AC* Willd.**	**Cyprofloaxacin**
Gram + bacteria		
Bifido	inactive	5 µg/mL
Lactobacillus	inactive	5 µg/mL
Staphylococcus aureus	inactive	5 µg/mL
Gram – bacteria		
Campilobacter jejuni	50 mg/mL	5 µg/mL
Escherichia coli	50 mg/mL	5 µg/mL
Salmonella spp	50 mg/mL	5 µg/mL
Fungus		
Candida albicans	inactive	5 µg/mL

[a]Minimal Inhibition Concentration (MIC) values.
Results were expressed as means ± standard deviations. Differences between the control group and the AC extract groups were the criteria for the anti-microbical activities. The t-test (paired tests) was used to detect differences between the treatment group and the control group. A value of P < 0.05 was considered as significant

Spontaneous contractility

ACE induced relaxation in guinea pig ileum and colon contractility (Fig. 2a). Qualitative analysis of spontaneous contractility in ileum showed that the AC E determined an alteration of basal contractility pattern (Fig. 2b). AC extract reduced the tone, in particular at low and high frequency waves (Fig. 2a). In particular, it did not affect low frequency waves (0-200 mHz) while it reduced the high frequency waves

Fig. 2 a

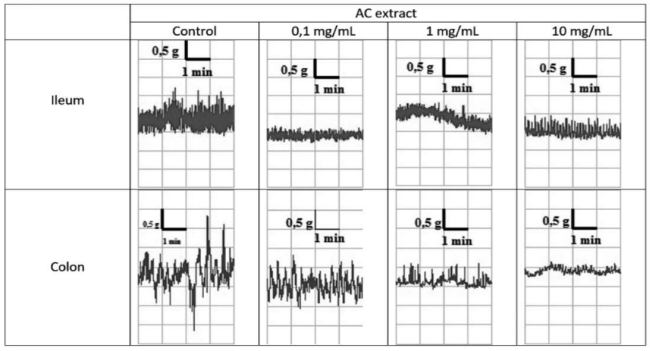


Fig. 2 b

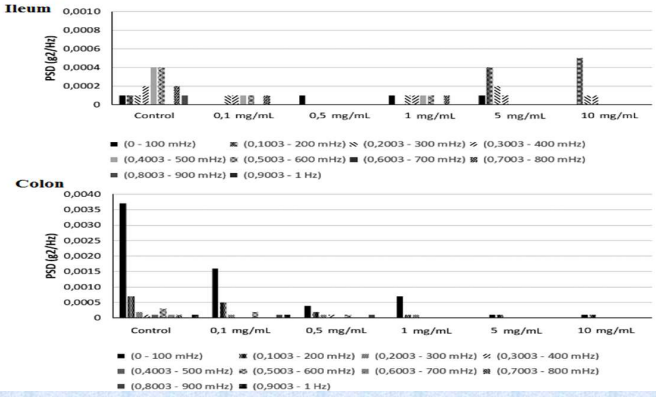


FIG. 2. (a) Original recording of concentration-response effects of AC extract on relaxations of spontaneous ileum and colon contractility. (b) Ileum and colon spontaneous contractility absolute powers.: Each datum is the power mean ± S.E.M.percentage band powers during control and after addition of each AC extract concentration. Each datum is the mean ± S.E.M.; when the error is not shown, it is covered by the point.

Conclusions

ACE extract can be a useful integrative approach in diarrhea management. Nutraceuticals carry out their clinical actions interacting with the same biological systems of drugs. ACE exerts spasmolytic and antispastic activities, in vitro, through the interaction with calcium channels and muscarinic receptors, thus it may determine benefits in patients suffering from diarrhea. Other ACE mechanisms of action responsible for the effects towards intestinal smooth muscle are to be investigated

Referencees

1. Dubey N, Mehta R, Saluja A., *J AOAC Int.* 2009; 92(4): 1021-6
2. Kumar M1, Sheikh MA, Bussmann RW., *J Ethnobiol Ethnomed.,* 2011; 19;7:32