NEXT GENERATION CHEMISTRY

Abstracts PLANTCOVID

Título:
Extraction of bioactive compounds from plants as promising agentes against SARS-CoV-2

Citation:
Pedrosa, Mariana C.; Rodrigues, Cláudia; Heleno, Sandrina A.; Carocho, Márcio; Abreu, Rui M.V.; Ribeiro, Tânia; Machado, Manuela; Pinto, Miguel M.; Simas, João P.; Pintado, Manuela; Barros, Lillian (2021). Extraction of bioactive compounds from plants as promising agentes against SARS-CoV-2. In 4th International Congress of Biochemistry and Microbiology Applied Technologie: book of abstracts. Hammamet

Abstract:
Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a pathogenic virus with high transmissibility and infectivity, which began to spread across the globe in late 2019, which soon became the COVID-19 pandemic, causing social and economic impacts. In response to this situation, the scientific community started the development of effective substances against this virus. Bioactive molecules present in plants, mainly phenolic compounds, are promising alternatives to combat pathological disorders. Therefore, the objective of this work was to use the aqueous extract of a mountain plant as an antiviral substance to neutralize COVID-19. Materials I Methods: The mountain plant extract was obtained by dynamic maceration in water for I hour (twice). After obtaining the extracts, they were evaluated for their phenolic profile by high performance liquid chromatography coupled to a diode array detector and a mass spectrometer detector (HPLC-DAD-MS). Cytotoxicity was determined by the sulphorhodamine B assay in Vero cells, as well as the evaluation of the antiviral activity. Results: Regarding the phenolic profile, the main compounds found were trigalloyl-HHDP glucoside; pentagalloyl glucose, quercetin 3-0-glucuronide and quercetin O-hexoside. The GI50 (concentration able to inhibit 50% of cell proliferation) and the MNCC (maximum concentration without toxicity) were between 100 and 180.3 J.lg/rnL and between 85 and 120 J.lg/rnL, respectively. The MNCC value was obtained considering the concentration that allowed 90% of cell proliferation of Vero cells. In relation to the viral activity screening, the results achieved for the viral titre were between 5000 and 9000 PFU/mL, while for the antiviral activity ranged between 0.5 and 3.0 Mv, being the percentage of reduction in a range of85-95 %. • Conclusion: The mountain plant extracts showed in its composition bioactive compounds and consistent results of antiviral activity. Moreover, it presents itself as a potential substance for protection applications against the COVID-19 virus. However, further studies in specific products are required for validation and implementation.

Título:
Antioxidant activity, phenolic profile, cytotoxicity and genotoxicity of plant extracts
Citation:
Adma N. F de Melo, Tiago B. Afonso, Tânia Ribeiro, Manuela Machado, Marta Carvalho, Márcio Carocho, Freni Tavaria, Paula Teixeira, Lillian Barros, Manuela, Pintado

Abstract:
The outbreak of COVID-19 disease caused by SARS-CoV-2 forced the scientific world to search for new alternatives to help control the virus. Plant extracts have natural compounds that might provide a starting point for the research on the use of plants as an excellent source of new antiviral agents against viruses, including COVID-19 to be included in disinfectants, fabrics or other materials. In this study, the polyphenols content (Folin-Ciocalteu), antioxidant capacity (DPPH, ABTS and ORAC) and the phenolic profile (HPLC) of different hydroethanolic (ethanol:H2O 50:50 v/v) extracts of medicinal plants cultivated under controlled conditions in Portugal (echinacea, rosemary, laurel, thyme and rock rose) were determined, as well as the cytotoxicity effect against a keratinocyte cell line using cell viability assay by PrestoBlue and genotoxicity effect using the AMES test. According to the results, total phenolic content ranged from 204.54 ± 1.78 /

274.20 ± 3.14 (mg EAG/g extract) with the rock rose extract presenting the highest content ($p < 0.05$). The extracts showed a good antioxidant capacity demonstrated by the high values found for ORAC, which ranged 2855.03 ± 9.75 / 5285.35 ± 60.04 µMol Trolox/mg extract. HPLC analysis revealed the presence of different compounds in the extracts such as the kaempferol-O-glucuronide, catechin, protocatechuic acid and galloyl glucoside, representing a potential source of bioactive components with antioxidant capacity. No toxicity was observed towards the keratinocyte cells and none of them showed mutagenic effects. Based on the results of safety and high polyphenols content of the extracts they demonstrate a great potential as antimicrobial agents. This will allow the design of new experiments aimed at evaluating the antiviral activity of these extracts, especially against SARS-CoV-2.

Título:
Predominant phenolic compounds in Mountain plants with possible antiviral potential against SARS-CoV2

Citation:
Mariana C. Pedrosa, Sandrina Heleno, Márcio Carocho, Maria Inês Dias, Rui M.V. Abreu, Tânia Ribeiro, Adma N. F de Melo, Manuela Machado, Manuela Pintado, Lillian, Barros

Abstract:
The COVID-19 pandemic caused by a pathogenic virus and responsible for the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) highly transmissible, emerged by the end of 2019. This disease has infected about 240 million people globally, according to the World Health Organisation (WHO), impacting the lives of the world's population in many ways. Considering the urgent need to combat the virus, the scientific community has proven to be of great importance in the search for new solutions to the fight against COVID-19. Plants are important sources of phenolic compounds, namely secondary metabolites recognised for their bioactive action. Therefore, the main objective of this work was to identify the main phenolic compounds present in plants of the mountain ecosystem, as well as to evaluate their cytotoxic effect on normal kidney epithelial cells extracted from an African green monkey (Vero), for further use against COVID-19. Five plants from the mountain flora were chosen according to previous work of the authors' research group, based on their bioactive potential, namely antioxidant, antimicrobial and cytotoxic. The extracts were obtained by dynamic maceration and ultrasound assisted extraction, using purely aqueous or hydroethanolic solutions. After obtaining the dry extracts, they were evaluated for their phenolic profile by high performance liquid chromatography coupled to a diode array detector and a mass detector (HPLC-DAD- MS). In relation to the phenolic content of the analysed samples, the predominated compounds were phenolic acids (rosmarinic, ellagic, and chlorogenic acids), flavonoids (quercetin O-hexoside and kaempferol O-glucuronide), hydrolysable tannins (galloyl-glucose, trigalloyl- HHDP-glucoside, and pentagalloyl-glucoside) and flavan-3-ols (catechin). Regarding the cytotoxic potential in Vero cells, the five plants presented GI50 (concentration that causes 50% of inhibition) values in a range of 69 to 185 µg/mL and MNCC (maximum concentration without toxicity) values ranging from 50 to 120 µg/mL. Therefore, these findings turn these matrices in interesting research focus within the combat against several serious diseases, including COVID-19 virus.

Título:
Plant extract with bioactive potential against SARS-CoV-2
Citation:
Melo, Adma N.F.; Afonso, Tiago B.; Carvalho, Marta; Rodrigues, Cláudia; Ribeiro, Tânia; Carocho, Márcio; Pinto, Miguel M.; Tavaria, Freni K.; Teixeira, Paula; Simas, J Pedro; Barros, Lillian; Pintado, Maria Manuela (2021). Plant extract with bioactive potential against SARS-CoV-2. In 4th International Congress of Biochemistry and Microbiology Applied Technologie: book of abstracts. Hammamet

Abstract:
The novel disease caused by SARS·CoV-2 has been causing chaos worldwide due to its high mortality, morbidity and contagiousness nature, and therefore forced the scientific world to develop n'ew alternatives

to combat and assist the fight against this virus. Plant extracts have bioactive molecules that might provide a starting point for the research on the use of plants as an excellent source ofoew antiviral agents able to inhibit or neutralize COVID-19. Therefore, the objective ofthis study was to obtain an extract ! Tom a Plant cultivated under controlled conditions in Portugal to be used as ao antiviral substance to be applied against COVID-19. Materials Methods: The plant extract obtained !Tom plant cultivated under controlled conditions in Portugal was extracted by maceration in a hydroethanolic solution under optimised conditions and submitted to freeze drying. The extracts were evaluated for their phenolic profile by high performance liquid chromatography coupled to a diode array detector and a mass spectrometer detector (HPLCDAD- MS). Antioxidant activity was also measured, and antiviral properties were measured for SARSCoV- 2 in Vero cells. Remlts. HPLC analysis revealed the presence of different phenolic compounds in the extracts with relevance for caftaric acid, cis-chicoric acid and trans-chychoric acid. The extract showed a good antioxidant capacity demonstrated by the high value found for aRAC of3202,82 ± 32,52 Troloxl mg extrac. Regarding the antiviral activity, the results achieved for the viral titer was 20 PFU/mL, and the antiviral activity for SARS-CoV-2 was 4.02 ± 0.00 Mv and the percentage of reduction was > 99.99%. Conclusion: The results showed that the obtained extract demonstrated consistent results of antiviral activity presenting a potential for applications against the SARS-CoV-2. Further studies are required for validation and application of this extract.

Título:
Evaluation of minimum inhibition concentrations of plant against environmental fungi and dermatophytes

Citation:
Afonso, Tiago B.; Melo, Adma N.F.; Carvalho, Marta; Ribeiro, Tânia; Pinto, Miguel M.; Barros, Lillian; Carocho, Márcio; Tavaria, Freni; Teixeira, Paula; Pintado, Manuela (2021). Evaluation of minimum inhibition concentrations of plant against environmental fungi and dermatophytes. In 4th International Congress of Biochemistry and Microbiology Applied Technologie: book of abstracts. Hammamet

Abstract:
The outbreak of COVID-19 disease caused by SARS-CoV-2 has led the scientific community to search for new alternatives to help control the virus. In this context, the use of face masks has been recommended as a preventive measure against the spread of SARS-CoV-2. The application of antimicrobial agents in the tissues used to produce masks would be an additional hurdle on the prevention of other respiratory infections and secondary fungal infections that occur from touching contaminated masks. In this context, impregnation of the fabrics with plant derived extracts is an attractive approach since they are potential1y safe, free of adverse side effects, and powerful antimicrobials. The objective of this work was to study fifteen plant extracts to select the most efficient against environmental fungi and some dermatophytes. Materials Methods: The minimum inhibitory concentration (MIC) of each plant derived extract was determined by broth micro-dilution in 96-wells microtiter plates. Concentrations ranging from 50 mg/mL to 1.5625 mg/mL were tested against lhe different fungi. Briefly, 100 mL of a 105 spores/mL solution were added to 100 mL of each extract concentration. After 48 h, 10 mL of each well were plated onto Seaboard Dextrose Agar. Cultivation was carried out at 25 °C for 3 days for the environmental fungi and 7 days for the dermatophytes. The MICs were regarded as the lowest concentrations that did not allow any visible growth when compared with the control sets. Results: The results for the fifteen plant extracts tested against nine environmental fungai species revealed that only one extract was able to inhibit fungai growth of two of these fungi (Cladosporium sp. and F. verticillioides) at a concentration of 50 mg/mL. The results against the two filamentous fungi dermatophytes (T. mentagrophytes and M canis) revealed these fungi to be the susceptible to the extracts tested. Most of the extracts inhibited dermatophyte growth at concetrations < 50 mg/mL with the lowest MIC being registered at 3.125 mg/mL. Results for the yeast M. furfur revealed that only three plant derived extracts inhibited its growth with concentrations between 30 and 50 mg/mL. Conclusion: The plant extracts tested against environmental fungi and dermatophytes revealed to be more efficient against filamentous fungi dermatophyte growth. Environmental fungi followed by lhe dermatophyte yeast, showed the highest resistance to these plant extracts.