



## Antiviral activities of Phytochemical compounds of Herbal Medicine used by HIV patients; A Case of Six Composing Plants of Centre of Awareness: Food Supplement Herbal Medicine

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The use of traditional herbal medicine for treatment and management of diseases is increasing not only in Africa, but also in developing and developed countries. These herbal medicines range from phytochemical compounds and other natural products of plant origin to treat diseases. These diseases include viral diseases such as human immunodeficiency syndrome (HIV), Zika virus and many more. This review examined the antiviral phytochemical compounds from plant components of COA<sup>+</sup>-FS Herbal Medicine used by HIV-positive individuals in Africa, and their modes of actions. Pubmed, Google Scholar and web of science databases were searched without any time limit using specific keywords related to the study. 76 articles were selected and analysed based on the criteria of antiviral phytochemical compounds in the study. The findings from the study showed that many phytochemical compounds have been used not only *in vitro* and *in vivo* studies but also in clinical studies to test their antiviral activities against viral infections. For example, Caffeine was reported to be used in clinical, *in vitro* and *in vivo* studies and was reported to possess inhibitory activities against HIV-1 replication and increase CD4 cell counts. This study have shown that plant phytochemical compounds could be potential and promising antiviral agents but, there are still need to conduct researches on the effects of these phytochemical compounds or herbal medicines when concurrently used with conventional antiviral drugs, as well as looking at the interactions between them, drug metabolising enzymes and transporters. Researchers now focus on antiviral agents from plants such as phytochemical compounds to combat the scourge of viral diseases. Phytochemical compounds are chemical compounds produced by plants and help plants fight against pathogens. These phytochemicals have been reported by studies to have antiviral activities. Flavonoids, phenols, tannins, terpenoids, proanthocyanidins, lignins, thiosulfonates, steroids and polysaccharides were reported to have biological activities. This review focused on the phytochemical compounds with antiviral activities

present in the plants present in FSherbal medicine and their modes of actions against viral infections. Phytochemical compounds present in plants composing FS herbal medicine. Flavonoids such as quercetin and its derivatives were reported to be present in different parts of *Perseaamericana*, *Carica papaya* and *Spondiasmombin*. Rutin is another flavonoid reported to be present in peels of *Perseaamericana*, leaf of *Carica papaya* and leaf of *Spondiasmombin*. Kaempferide was only reported to be present in seeds and pulps of *Perseaamericana*. Epicatechin, Naringenin, Epicatechin Gallate, Apigenin, catechin were also reported to be present in all the plants. These flavonoids are synthesized from phenylalanine, they are found in parts plants including seeds, fruits, leaf and present in human diets. These are important phytochemicals with numerous biological activities, such as antimicrobial, antidiabetics, anticancer and many more. Rutin and naringenin have been reported to have antiviral activities against Parainflunza virus type-3 and Dengue virus type 2 respectively. Phenols are also phytochemical compounds present in the six plants. Phenolic compounds from plants possess potent antiviral activities. Compounds including Caffeine in the Seeds and leaves of *Perseaamericana*, theophylline in the seeds and leaves of *Perseaamericana*, leaves of *Carica papaya*,caffeoyl esters in *Vernonia amygdalina*, *Carica papaya*, *Spondiasmombin*. Studies reported that phenolic phytochemicals exert inhibitory activities by preventing virus entry into the host cell through the modulation of viral surface structure and subsequently affect the expression of viral proteins on cell surface. Phytochemical compounds such as Thymol, Eugenol, Ursolic acid were only reported to be found in *Ocimumviride*. Limonoids, a lignin was reported to be present in the leaves, fruits and seeds of *Azadirachtaindica* as well as a novel compound, Irab, was present in the leaves. Benzyl isothiocyanate, a dithiolthiones compound was reported to be present in ethanolic and aqueous extracts of seeds and leaves of *Carica papaya*.  $\beta$ -pinene and Limonene are monoterpenoids present in pulps and leaves of *Perseaamericana* and *Ocimumviride* respectively.

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