Traditional uses, phytochemistry and pharmacological activity of *Carpobrotus edulis*: A global perspective

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**ABSTRACT**

*Carpobrotus edulis* has widely been used in South Africa as a traditional medicine for a wide range of ailments and its pharmacological activities has been widely studied. The present review aims to provide a comprehensive literature overview regarding phytochemistry, traditional use, pharmacology and toxicology of different *Carpobrotus edulis* extracts. The review was compiled through a thorough literature search from authentic resources using data bases such as Google Scholar, PubMed, Web of Science, Scopus and Science Direct, peer reviewed articles, books and thesis. *Carpobrotus edulis* is an important medicinal plant used in ethno medicine for the treatment of tuberculosis and other respiratory infections, toothache and earache, facial eczema, wounds, burns, hypertension, and diabetes mellitus. Pharmacological studies performed on the fresh plant materials, crude extracts and various solvent extracts of *Carpobrotus edulis* validates the traditional medical use of the plant. Studies performed evaluate the use of *Carpobrotus edulis* extracts in antimicrobial, antiproliferative, and antioxidant therapy. *Carpobrotus edulis* also has proved to have anticholinesterase activity against acetylcholinesterase and butrylcholinesterase. Information on therapeutic validation in wound healing, diabetes mellitus, hypertension, analgesia and gastrointestinal motility is scanty. To substantiate the traditional use of *C. edulis* in the aforementioned area, there is need for further experimental studies to validate its pharmacological use. The information on toxicology was also scanty however the available literature suggests that *C. edulis* extracts are non-toxic. The review article supports the folkloric use of the medicinal plant. However, in-depth studies evaluating the safety profile of *C. edulis* extracts are highly recommended.

**Keywords:** *Carpobrotus edulis*, phytochemistry, pharmacology, toxicology, traditional medicine.

**INTRODUCTION**

Traditional medicine is the most affordable and easily accessible treatment method in the primary healthcare system in developing countries. More so, traditional medicines are culturally acceptable in various societies [1]. Studies have revealed that about half of the African population regularly uses traditional medicine [2-3]. Traditional medicine in developing countries therefore contributes directly to the socioeconomic status of the rural communities, as well as urban communities as of late. Africa has an extraordinary richness in its flora, amounting to several thousands of species. Researchers suggest that about 10% of Africa’s flora is of medical importance and some of the plant species have been studied in biomedical research [4]. The genus *Carpobrotus* (*Aizoaceae*) has about 12 to 20 species which are very similar in appearance and their correct identification must be done by a taxonomist [5]. Most of these are endemic to South Africa but there are at least four Australian species and one South American species [6, 7]. Some species from this genus have important validated medicinal properties that can provide leads to drug development. Most of the species native to South Africa are used in traditional medicine and some of their pharmacological activities have been studied [8]. *Carpobrotus mellei* has antimicrobial activities against *Pseudomonas aeruginosa* and *Staphylococcus aureus*. A study by Springfield et al. [9] showed the antimicrobial activity of *Carpobrotus muirii* and *Carpobrotus quadrifidus* extracts against *Staphylococcus aureus* and *Mycobacterium smegmatis*. This paper reviews the traditional uses, phytochemical composition and pharmacological activities of *Carpobrotus edulis*.

The succulent plant *Carpobrotus edulis* commonly known as sea fig is a perennial ground creeping species native from South Africa that invades coastal habitats in many parts of the world. The plant was originally called *Mesembryanthemum edule* and it was renamed by Brown in 1926 and by Bolus in 1927 to *Carpobrotus edulis* [10]. *Carpobrotus* mainly inhabits sandy coastal habitats and can also be found inland in sandy to marshy places [11]. There is a continued significant risk of deliberate introduction as the plant is propagated for their ornamental properties.
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Taxonomic Tree

Domain: Eukaryota

Kingdom: Plantae

Phylum: Spermatophyta

Subphylum: Angiospermae

Class: Dicotyledonae

Order: Caryophyllales

Family: Aizoaceae

Genus: Carpobrotus

Species: Carpobrotus edulis

Figure 1: The flowering Carpobrotus edulis plant. The picture was taken in Mount Pleasant, Harare in Zimbabwe and authentication done from Zimbabwe National Herbarium.

The current paper reviews traditional uses, phytochemical composition and pharmacological activities of Carpobrotus edulis. The databases used for literature search include; Google Scholar, Web of Science, Scopus, Science Direct, Springer Link, Sci Finder and PubMed. The terminologies used in the review articles consists of Keywords such as “Carpobrotus edulis”; “Ethnomedicinal”; “Ethiopharmacological”; “Phytochemical”; “Antibacterial”; “Antifungal”; “Antioxidant”; “Cytotoxicity”; and “toxicity’. The literature searched is categorized under headings with detail explanation under individual section as well as respective tables for summarization of data as follows;

Traditional uses

Carpobrotus edulis has widely been used in South Africa as a traditional medicine for a wide range of ailments. The fruits, leaves and flowers are medicinally used in different forms. Mostly the plant’s leaves, fruits or flowers are chewed raw or boiled in water and orally taken as a medicine for various bacterial and fungal infections [12]. In Sub Saharan Africa, the boiled leaves of Carpobrotus edulis are used in treatment of tuberculosis and other respiratory infections [13]. Carpobrotus edulis leaves may have analgesic effect; the leaves are boiled in water for toothache and earache treatments. However, their antimicrobial effect may be responsible because most toothaches or earaches are caused by various colonizing microbes. The leaf juice, however, has traditionally proved to be effective in soothing pain caused by spider and tick bites [14]. Facial eczema, wounds, burns and various skin conditions are treated by chewing Carpobrotus edulis leaves or by drinking boiled leaves [15]. Topical use of Carpobrotus edulis extracts in traditional medicine is not very common. The Xhosa-speaking people in the coastal areas of the Eastern Cape Province commonly administer aqueous and alcohol extracts to patients for the management of HIV/AIDS associated diseases [16, 17]. This plant also seems to be important in the treatment of chronic non-communicable diseases like hypertension and diabetes mellitus [18, 19, 20]. The leaves also have an acerbic antiseptic fluid orally taken as mouth gags for sore throat and mouth infection treatments [8]. The leaf is also boiled for treatment of intestinal worms, dysentery, diarrhea and different stomach aches [21, 22]. In Tunisia, the leaves are boiled in water for treatment of sinusitis, chillblains and vaginal thrush [24].

PHYTOCHEMISTRY

Phytochemical screening

Eman [23] performed the phytochemical screening of various succulent plants found in Egypt and Carpobrotus edulis was one of them. Carpobrotus edulis flowers were found to be the richest organ containing the highest amounts of all the measured phytochemicals except the leaf which had higher levels of tannins, anthraquinones and sulphates than the flowers (Table 1).

Table 1: Phytochemical screening of Carpobrotus edulis plant parts from Egypt [23].

| Phytochemical group | Levels of phytochemicals in different plant parts |
|---------------------|-----------------------------------------------|
|                     | stems | leaves | flowers |
| Saponins            | ++    | +      | ++      |
| Chlorides           | +     | +      | +       |
| Sulphates           | +     | ++     | +       |
| Coumarins           | +     | +      | +       |
| Flavonoids          | ++    | +++    | +       |
| Alkaloids           | +     | +      | ++      |
| Anthraquinones      | ++    | ++     | +       |
| Iridoids            | -     | -      | -       |
| Cyanogenic glycosides| +    | +      | +       |
| Cardiac glycosides  | ++++  | +++    | ++++    |
| Carbohydrates and / |       |        |         |
| or Glycosides       | +     | +      | +       |
| Unsaturated sterols and / | +  | +++    | +       |
| or Triterpenoids    |       |        |         |
| Tannins             | ++    | +++    | +++     |

Very highly present++++, highly present++, moderately present ++, lowly present, not detected -

The stems were found to be rich in polyphenols and contained the highest total flavonoid content. As per the phytochemical screening findings of Eman [23], Van der Watt and Pretorius [24] reported that the leaves of C. edulis had high tannin content. Qualitative phytochemical screening of the C. edulis leaf extracts revealed the presence of secondary metabolites in aqueous, ethanol, acetone and hexane extracts.

Quantitative phytochemical analysis

The total polyphenol content found within the leaves of C. edulis varied significantly between other plant parts. Quantitatively, the leaf extract showed a significantly higher concentration of phenolic compounds compared to the stems and especially the roots [25]. There is no particular solvent that is known to extract all the compounds on its own from the plant because of the huge differences in the nature of phytochemical constituents found in a plant. Four solvents hexane, ethanol, acetone and water were used to extract C. edulis leaves to accommodate the range of polarities of the compounds present. The extracts were quantitatively analysed for phytochemicals. The acetone extracts had a high percentage of phenolic compounds and a considerable amount of alkaloids and proanthocyanidins in the aqueous extract [16].
Tannins and saponins were major constituents in the ethanol extract and flavonoids and flavonols were at a higher concentration in the hexane extract (Table 3).

Table 3: Quantitative analysis of the phytochemical evaluated from the leaf of *C. edulis* [14].

| Phytochemicals | Aqueous | Ethanol | Acetone | Hexane |
|----------------|---------|---------|---------|--------|
| Phenolics      | +++     | +++     | +++     | ++     |
| Flavonoids     | +       | +       | +       | +      |
| Flavonols      | +       | +       | +       | +      |
| Proanthocyanidins | +++  | +++     | +++     | +++    |
| Tannins        | +++     | +++     | +++     | ++     |
| Saponins       | ++      | ++      | ++      | +      |
| Alkaloids      | ++      | ++      | ++      | +      |

Values are expressed as mean±standard deviation of the mean (n=3).

In Comparison to *Mesembryanthemum crystallinum*, a plant in the same family with *Carpobrotus edulis*, the determination of the flavonoids in the plant extracts revealed a higher content in *C. edulis* (116.16 ± 3.34 μg/mg) in comparison with *M. crystallinum* (4.85 ± 0.9 μg/mg). *C. edulis* extract (104.69 ± 0.48 μg/mg) also had higher phenol content than *M. crystallinum* (23.89 ± 0.27 μg/mg) [14]. Seasonal variation in the phytochemical composition of *Carpobrotus edulis* extracts were evaluated by Chooeke *et al.* [28]. The prevalence of phytochemicals within the autumn leaf debris samples, regardless of the extracting solvent used, suggests that there is a higher concentration of phytochemicals within the leaf tissue of the plant during autumn and less of them are being circulated around the plant.

**Phytochemical identification**

Martins *et al.* [27] used a 1D, 2D NMR and MS investigations to identify compounds known as triterpenes (β-amyrin, uvaol and oleanolic acid), monogalactosylacylglycerol, catechin, epicatechin and procoyanidin B5 from methanol *C. edulis* extracts. Phenolic composition was also analysed and revealed the presence of sinapic acid, luteolin7-α-glucoside, hyperoside, ferrulic acid isorhamnetin-ο-rutinoside, allergic acid and isocoumaric acid from hydroethanolic and aqueous extracts of *C. edulis* [24, 28]. Omoruyi *et al.* [29] using the GC-Ms analysis investigated the chemical composition of *C. edulis* in hexane, acetone and ethanol. The identified phyto-constituents are displayed in tables 4, 5 and 6 below.

Table 4: Phyto-constituents identified in the hexane extract of *C. edulis* [29].

| Retention-time | Compounds                                           | Formula                |
|----------------|-----------------------------------------------------|------------------------|
| 5.9            | 2-Pentadecane, 6,10,4- trimethyl                   | C_{17}H_{32}O          |
| 4.5            | 7-Methyl-Z-tetradec-1-ol acetate                   | C_{17}H_{32}O          |
| 5              | Heptacosane                                         | C_{17}H_{36}           |
| 5.3            | 1-Heptatriacontanol                                 | C_{37}H_{76}O          |
| 5.54           | n-Octyl-5-oxohostadecanamide                       | C_{25}H_{49}NO         |
| 5.75           | Dodecanoic acid                                     | C_{12}H_{24}O          |
| 7.78           | Phytol                                              | C_{20}H_{42}O          |
| 8.6            | Dibutyl phthalate                                   | C_{16}H_{22}O          |
| 8.67           | α-hexadecanoic acid                                 | C_{14}H_{28}O          |
| 8.93           | 2-tertbutyly cyclohexylproplyphosphonofluoridate    | C_{13}H_{26}O2F        |
| 10.55          | 2-Pyridylidine, 1-(9-octadeceny)                    | C_{22}H_{41}N8O        |
| 11.47          | Pyrollidine, 1-(1-oxo-7,10-hexadecadeinyl)         | C_{20}H_{35}NO         |
| 13.96          | Nonacosane                                          | C_{29}H_{66}           |
| 4.331          | 4,8,12,16-Cis-tetramethylheptadecan-4-oxide         | C_{21}H_{42}O2         |
| 18.09          | 2,6,10,14,18,22-Tetraocoaxaheacene, 2,6,10,15,19-23-hexamethyl | C_{30}H_{50}          |
| 19             | Octadecanoic acid                                   | C_{18}H_{36}O          |
| 19.87          | cis-13-Octadecenoic acid                           | C_{18}H_{34}O          |
| 8.6            | Tetradecanoic acid                                  | C_{14}H_{28}O          |
| 20.6           | Tetratriacontane                                    | C_{34}H_{47}O          |
| 21.62          | 9,12-Octadecadien acid (Z,Z)-2-3- didehydropropyl ester | C_{18}H_{32}O4         |
| 24.07          | 9,12,15-Octadecatrien acid, 2,3- didehydropropyl ester. (Z,Z) | C_{21}H_{36}O4         |
| 27.08          | Eicosenoic acid                                     | C_{20}H_{42}O          |
| 32.4           | α-Amyrin                                            | C_{30}H_{50}O          |
| 34.87          | 1-Heptatriacontanol                                 | C_{37}H_{76}O          |
| 40.57          | 9,19-Cyclostan-24-en-3-ol, acetate, (3β)             | C_{32}H_{52}O2         |
| 48.09          | Luponol                                             | C_{30}H_{50}O          |
| 56.05          | 17-(1,5-Dimethylhexyl)-10,13-dimethyl-2,3,4,7,8,9,10,11,12,13,14,15,16,17-tetradehydro-1Hcyclopenta[alphanthranthen-3-ol | C_{27}H_{46}O          |
| 57.35          | Vitamin E                                           | C_{29}H_{50}O2         |
| 58.06          | 17-(1,5-Dimethylhexyl)-2,3-dihydroxy-10,13-dimethyl-1,2,3,4,7,8,9,10,11,12,13,14,15,16,17-tetradehydro-1Hcyclopenta[alphanthranthen-6-one | C_{27}H_{46}O          |
| 59.83          | 4,4,6a,6b,8a,11,11,14b-Octadecyl-1,4,4a,5,6,6a,6b,7,8,8a,9,10,11,12,12a,14,14a,14b-octadecahydro-2H-picen-3-one | C_{30}H_{48}O          |
Table 5: Phyto-constituents found in the acetone extract of *C. edulis* [29].

| Retention Time | Compounds                        | Formula                  |
|----------------|----------------------------------|--------------------------|
| 4.51           | 7-Methyl-Z-tetradec-1-ol acetate | C17H32O2                 |
| 5.113          | 6,6-Dimethyl-10-methylene-1-oxa-spirodecane | C12H20O                  |
| 5.3            | 1-Heptatriacatanol                | C17H76O                  |
| 6.09           | Dodecanoic acid                   | C12H24O2                 |
| 6.286          | 17-Pentatricontene                | C35H7O                   |
| 7.78           | Phytol                           | C20H40O                  |
| 8.6            | Tetradecanoic acid                | C14H28O2                 |
| 8.67           | n-Hexadecanoic acid (dibutyl ester) | C14H28O2                 |
| 12.86          | n-Hexadecanoic acid (bis-2-ethylhexyl ester) | C16H32O2                 |
| 13.96          | Nonacosane                        | C29H60                   |
| 43.5           | α-Amyrin                          | C30H50O                  |
| 48.09          | Lupeol                            | C30H50O                  |

Table 6: Phyto-constituents found in the ethanol extract of *C. edulis* [29].

| Retention time | Compounds | Formula                  |
|----------------|-----------|--------------------------|
| 32.4           | β-Amyrin  | C30H50O                  |
| 42.918         | α-Amyrin  | C30H50O                  |
| 48.09          | Lupeol    | C30H50O                  |

PHARMACOLOGICAL ACTIVITY

Antimicrobial activity

Antibacterial activity

The antimicrobial activity of *C. edulis* extracts has been extensively researched. The phytochemicals have shown considerable activity against various microbes. The compounds isolated by Van der Watt and Pretorius [24] demonstrated remarkable antibacterial activity against the gram negative *Moraxella catarrhalis* as well as gram positive cocci, *Staphylococcus epidermidis* and *staphylococcus aureus*. A phenolic compound, hyperoside and a flavonone glycoside called neohesperidin also demonstrated activity against *Pseudomonas aeruginosa*. The growth of *Bacillus subtilis* and *Streptococcus pneumonia* colonies were only inhibited by a phenolic compound called ferrulic acid.

Methanol extracts of *C. edulis* however revealed no antibacterial activity against the methicillin resistant *Staphylococcus aureus* or against the multidrug resistant *Mycobacterium tuberculosis* [30]. These extracts however are able to impede bacterial growth once phagocytosed by monocyte derived human macrophages. Seasonal variation in the antimicrobial activity of *C. edulis* against *Pseudomonas aeruginosa, Enterococcus faecalis, Escherichia coli* and *Staphylococcus aureus* was also evaluated [26]. The minimum inhibitory concentration values for the spring extracts were lower than those of the autumn extracts suggesting that the spring extracts were more effective against all the test organisms. When the total activity was taken into account, the autumn extracts however revealed higher efficacy than the spring extracts. *Carabrotus edulis* aqueous leaf extract demonstrated noteworthy antibacterial activity against *Mycobacterium aurum*. The ethanolic extract showed significant activity against *staphylococcus aureus, Bacillus cereus, S and Mycobacterium aurum* but showed weak activity against Klebsiella pneumoniae and Escherichia coli [11]. Among the solvents evaluated, the ethanolic extract showed the weakest antibacterial activity in comparison to both the dichloromethane and water extracts. Meddeb et al. [28] also confirmed the reports that *C. edulis* leaf extracts have high antibacterial properties, particularly against the Gram positive *Staphylococcus aureus* and *Bacillus cereus* strains.

Martins et al. [27] isolated numerous compounds from *C. edulis* and evaluated them for antibacterial activity against multidrug-resistant (MDR) bacteria. Oleanolic acid, a pentacyclic triterpenoid demonstrated strong activity against several bacterial strains. Another pentacyclic triterpene, Uvaol displayed the most effective modulation of efflux activity by multidrug-resistant Gram-positive strains. The activities of numerous compounds isolated from *C. edulis* were evaluated against multidrug-resistant (MDR) bacteria [27]. Oleanolic acid displayed good antibacterial activity against several bacterial strains with uvaol displaying the most effective modulation of efflux activity by MDR Gram positive strains. *C. edulis* found on the Tunisian coast also displayed notable antibacterial activity against *Pseudomonas aeruginosa, Escherichia coli* and *Staphylococcus aureus* [14].

Antifungal activity

Essential oils were extracted from fresh leaves of *C. edulis* for antifungal activity evaluation. Four solvents: hexane, acetone, water and ethanol were also used to extract fresh *C. edulis* leaves that were also tested for antifungal activity. The essential oils proved to be more effective in inhibiting fungal growth compared to extracts from the four listed solvents. These essential oil extract revealed antifungal activity against *Candida krusei, Candida albican, Candida glabrata Candida rugosa*, and *Cryptococcus neoformans* with minimum inhibitory concentration ranges of 0.02–0.31 mg/ml [29]. The antifungal activity of the isolated essential oils was comparable to standard antifungal agents, nystatin and amphoteriycin B which were used as controls in the experiment. Hexane extracts were also effective against all the five fungal isolates while acetone extracts were only effective against *C. krusei* at 0.04mg/ml. The results are consistent with those of Wilfred et al. [17] when the effects of the acectone extracts of *arctotis arctotoides* on the growth of some opportunistic fungi associated with HIV/AIDS were evaluated. Ethanol and aqueous extracts had no considerable antifungal activity. Aqueous extracts could not inhibit the growth of the five fungi isolates, even at the highest concentration of 5mg/ml [29].

Antioxidant activity

Chokoe et al. [26] evaluated the seasonal variation in the antioxidant activity of *C. edulis* extracts. The ethyl acetate, acetone and methanol extract reportedly had an antioxidant compound which was more evident in the autumn extracts. The antioxidant activity of *C. edulis* growing in the Tunisian coast was also evaluated [14]. A higher *C. edulis* antioxidant activity, concentration of up to 2mg/ml, in the DPPH assay compared to *Mesembyranthemum crystallinum* was reported [14]. A higher proportion of flavonoids and phenols may be responsible for such an outstanding antioxidant activity. *Carabrotus edulis* had even a higher antioxidant activity than that of butylated hydroxyanisole, a synthetic antioxidant. The antioxidant activity of *C. edulis* was also evaluated by Onoruiy et al. [16] and found out that the ethanol and aqueous extracts demonstrated the best antioxidant activity.

Falleh et al. [25] extensively evaluated the antioxidant activity of *C. edulis*. The antioxidant properties and phenolic compounds of *C. edulis* were characterized in the root, stem and the leaf. The aerial parts of the plants were reported having higher antioxidant activity than the roots. The aerial parts had the highest polyphenolic content compared to the roots, explaining the higher antioxidant activity. All studied organs had a significantly higher activity of butylated hydroxytoluene, with maximal efficiency for stems followed by leaves then roots. In the characterization of polyphenols responsible for the strong antioxidant properties of *C. edulis* using LC/ESI-MS/MS, the methanol extract from the leaf, root and stem showed the highest scavenging activity against ABTS and DPPH radicals [31]. The leaf extract mainly contained procyanidins and the stem extracts mostly had propegalagloridins responsible for the potent antioxidant activity. Despite methanol extracts being richer in total polyphenol content compared to the ethanol, the latter had higher antioxidant activity than the former.
Antiproliferative activity

Carpobrotus edulis extracts are purportedly reported to have antiproliferative activity. Compounds isolated from the C. edulis leaf extracts using methanol water and hexane were evaluated for their antiproliferative effects on mouse lymphoma parental cells and human MDR1-transfected mouse lymphoma cells. All the compounds isolated reduced the proliferation of both cell lines. Catechin, Oleanolic acid and Uvaol were some of the isolated compounds and their antiproliferative effect was more significant in the parental cell lines. The multidrug resistant cell line was sensitive to epi catechin and monogalactosydiacylglycerol (MGDG) [32]. In all the isolated compounds, Uvaol had the most efficacious antiproliferative activity and is a potential lead in the reversal of multidrug resistance. Alkaloids from the family Aizoaceae have purported anticancer activity, even though the species of this family have invited minimal attention. Ordway et al. [35] revealed that C. edulis extract is non-toxic at concentrations that inhibit a verapamil sensitive efflux pump of LS178 mouse T cell lymphoma cell line thereby making these multidrug resistant cells sensitive to anticancer drugs.

Hydroethanolic and aqueous extracts of C. edulis were also reported to have cytotoxic effects against HCT116 cells, a human colon cancer cell line [34]. The ethanol-water extracts were more effective with substantial reduction in cell viability after 24 hours of incubation.

Neurological activity

The results from Custódio et al. [35] reveal that C. edulis has anticholinesterase activity against acetylcholinesterase and butyrylcholinesterase. Carpobrotus edulis is thus considered a potential lead in future research and alternative therapy for the management of neurological conditions associated with decreased acetylcholine levels in the brain.

Toxicology of C. edulis

A selected number of Carpobrotus species with medicinal properties were tested for cytotoxicity using the brine shrimp lethality test. The aqueous extract of Carpobrotus mellei and the methanol extract of Carpobrotus quadrifidus showed the highest activity than Carpobrotus edulis and other species tested [36]. Akhalwaya et al. [35] investigate the cytotoxicity of indigenous South African medicinal plants used to treat oral infections. Carpobrotus edulis is one of the medicinal plants tested and was considered non-toxic with percentage mortality rate of 47.43% at 24 hour and 48.06% at 48 hours. Cock and Van Vuuren [38] also found that aqueous and methanol extracts of C. edulis are either non-toxic, or of low toxicity in the brine shrimp lethality bioassay.

Dugesia sicula Lepori, 1948, a freshwater planarian was used to investigate the effect of aqueous-acetone C. edulis extracts on regeneration. Morphological changes were evident on microscopic analysis of Dugesia sicula Lepori in ordinary medium containing phenolic extracts at non-toxic concentrations. The study suggests that C. edulis polyphenols can have harmful effects on the development of stem cells [28]. Carpobrotus edulis polyphenols can therefore have ecotoxicological impact on the planarians’ physiology in the environment.

CONCLUSIONS AND PERSPECTIVES

An extensive literature survey has revealed that Carpobrotus edulis is an important medicinal plant used in ethno medicine for the treatment of tuberculosis and other respiratory infections, toothache and earache, facial eczema, wounds, burns, hypertension, and diabetes mellitus. Pharmacological studies performed on the fresh plant materials, crude extracts and various solvent extracts of Carpobrotus edulis validates the traditional medical use of the plant. Studies mainly focused on evaluation of the antimicrobial, antiproliferative, antioxidant and neurological activity of the plant extracts. State of the art pharmacological and toxicological methods have been used to evaluate the activity of C. edulis as reported in the current review. A significant proportion of studies also focused on phytochemical evaluation of the plant extract using different solvent systems and methods. The majority of the reported pharmacological studies aimed at validating its traditional uses. It is evident that the antibacterial properties have been extensively studied by various research groups globally. However, experimental evidence in wound healing, diabetes mellitus, hypertension, analgesia and gastrointestinal motility is greatly missing. To substantiate the traditional use of C. edulis in the aforementioned area, there is need for further experimental studies to validate its pharmacological use. There is little information reported on the safety profile of C. edulis extracts. The extensive use of C. edulis in traditional medicine may be posing a toxicological hazard to the exposed population. Studies evaluating the safety profile of C. edulis extracts are highly recommended.

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