

Phytochemistry and antimicrobial activity of selected medicinal plants commonly used for the management of skin disorders in Uganda

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1. Introduction

- Medicinal plants have been used in the management of skin disorders like abscesses, acne, burns, boils, ringworm, rashes, scabies, sores, wounds, warts, eczema and psoriasis (Tugume et al., 2019).
- However, due to the increasing antimicrobial resistance to the current drugs for skin disorders, scientists are in search for alternatives solutions.
- Ethnobotanical surveys have documented medicinal plants used for skin disorders and ranked them by the number of mentions by respondents and their user value.
- Although phytochemical and anti microbial activities of these medicinal plants against *S. aureus*, *E.coli* and *C. albican* have been established, these information has not been utilized fully in drug development due to lack of their potential ranking.
- This study evaluated the phytochemical ingredients and antimicrobial activity potential of selected medicinal plants used for management skin disorders in Uganda

2.Materials and Methods

- The study was conducted on ten medicinal plants; *Albizia coriaria* Welw, *Psorospermum febrifugum* Spach, *Acacia hockii* De Wild, *Momordica foetida* Schumach, *Biddens pilosa* L., *Lannea barteri* Engl., *Entada abyssinica* Steud, *Aloe vera* L., *Erythrina abyssinica* L. and *Vernonia amygdalina* Dl collected from herbalist in Uganda
- The plants were dried, ground and extracted with petroleum ether, 96% ethanol and water
- The extracts were analysed for phytochemical ingredients, and GC-MS (Harbourne, 2001)
- The antimicrobial activity of the extracts against *Staphylococcus aureus* ATCC29213 and *Escherichia coli* ATCC25922 and *Candida albicans* was also determined (Werkneh, 2015).
- Antibiotic standards; chloramphenicol (10µg/ml) and ampicillin (10µg/ml), streptomycin (10µg/ml), and erythromycin (10µg/ml); for bacteria and Ketoconazole 10mg/ml and Fluconazole 10mg/ml for fungi were used.
- The data analysis was conducted using descriptive statistic (frequencies, histograms and means); and grouping of plants base on chemical and antimicrobial activity was done using hierarchical cluster analysis

3. Results & Discussion:

3.1 Extraction yields and phytochemical screening

- Extractive values of the plants showed a decrease order of water>ethanol> petroleum ether.
- Phytochemical analyses of aqueous, ethanol and petroleum ether extracts indicated a diverse range of secondary metabolites with *A. coriaria*, *E. abyssinica*, *L. barteri*, *A. hockii* and *P. febrifugum*

Fig 2: Number of compounds identified by GC-MS in methanol extracts of ten medicinal plants

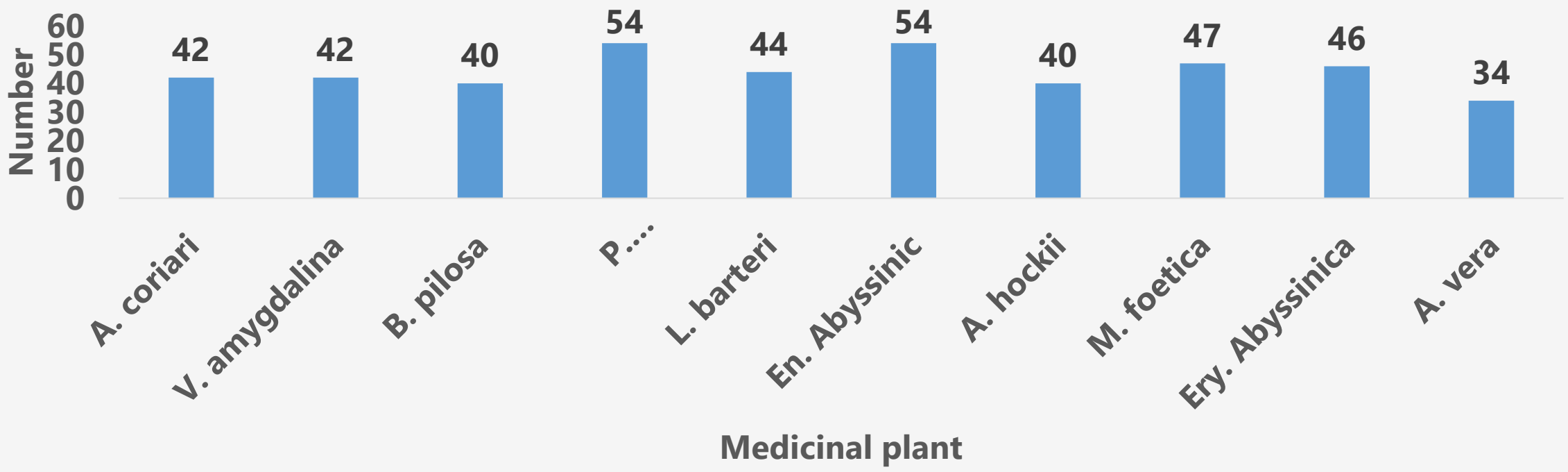
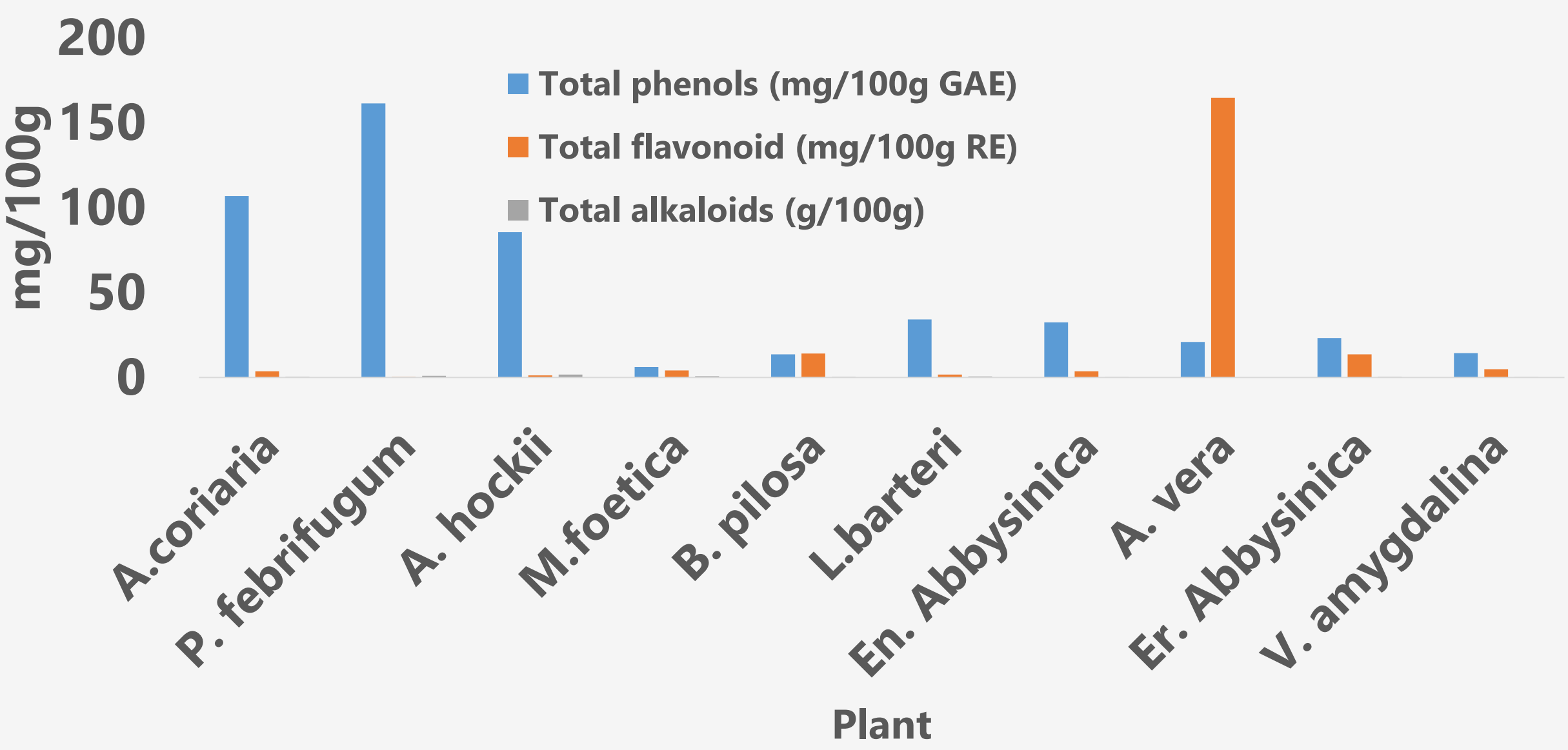


Fig 2: Phytochemicals in ten medicinal plants used in the management of skin disorders

3.2 GC-MS analysis

- The plants, *A. coriari*, *P. febrifugum*, *L. barteri*, *A. hockii* and *A. vera* and *Entada abyssinica* registered the largest number of phytochemical compounds by GC-MS (Fig 1).
- The highest number of compounds were registered by *P. febrifugum* and *Entada abyssinica* and the lowest by *A. vera*.
- The compounds that were common in all plant extracts were; Gamma-sitosterol, Stigmasterol, Eicosanoic acid, Hexadecanoic acid, methyl ester and caryophyllene
- However, the most dominant compound in *A. vera*, *A. hockii*, *Entada abyssinica* and *V. amygdalina* was Methyl 18-Methylnonadecanone while that in *L. barteri* and *M. foetica* was Hexacosanoic acid, methyl ester.
- Lanosta-8,24-dien-3-one, emodin, 3,3,5,5'-tetramethyl-4,4-dimethoxy 1 and 1-heptacosanol were the most dominant compounds in *P. febrifugum*, *A. coriari*, *B. Pilosa*. and *E. abyssinica* respectively.

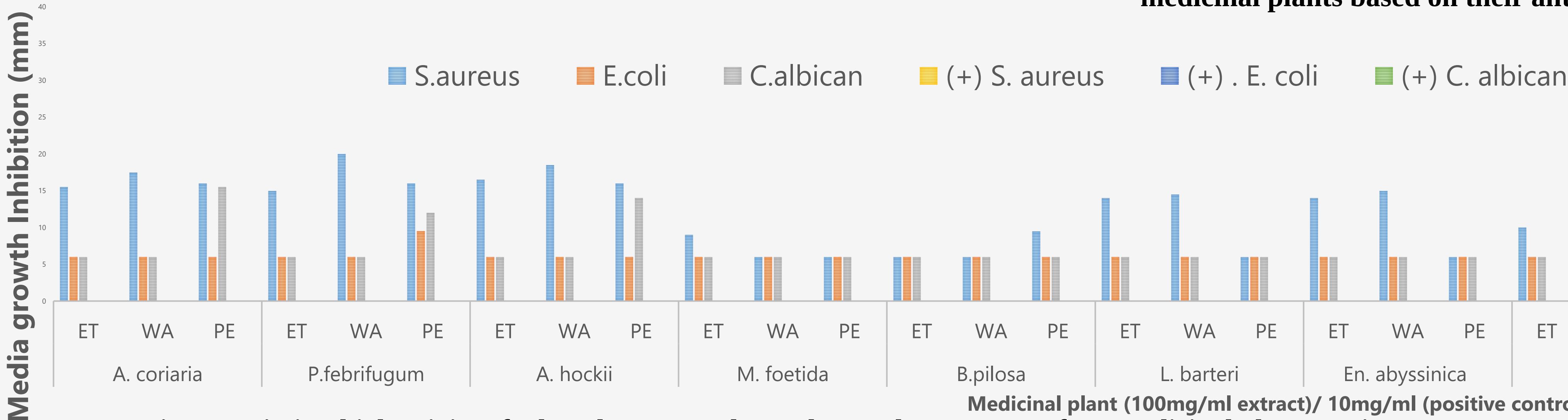


Fig 3: Antimicrobial activity of ethanol, water and petroleum ether extracts of ten medicinal plants against *S. aureus*, *E. coli* and *C. albican*. ET- Ethanol, WA- Water, PE- Petroleum ether, Amp.- Ampicillin, Ch.Ph- chloramphenicol, Ery.My- Erythromycin, St.My- Streptomycin, Ket.Na Ketoconazole and Fl.Na- Fluconazole

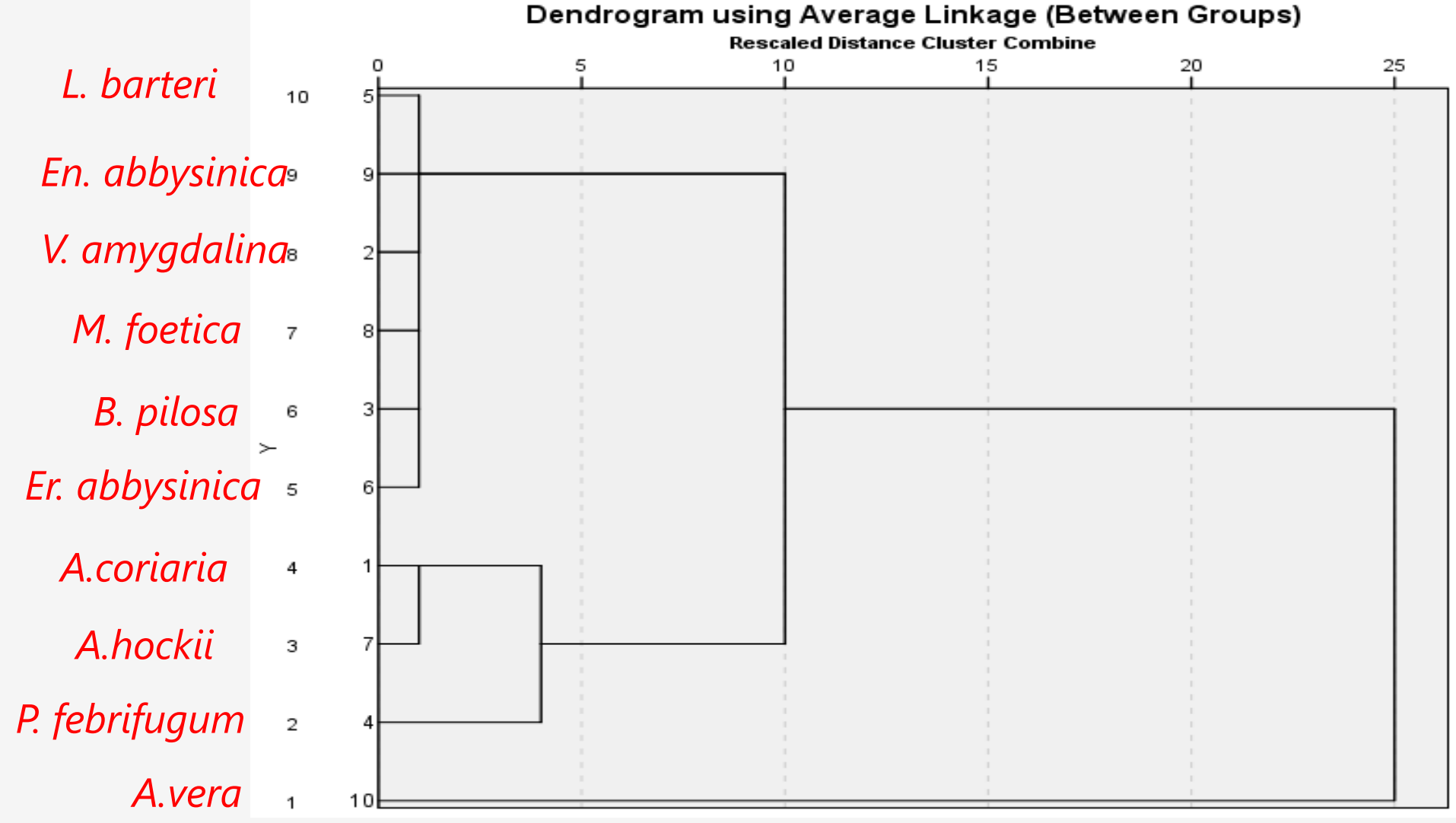


Fig 4: Dendrogram hierarchical clustering of medicinal plants based on their phytochemical ingredients

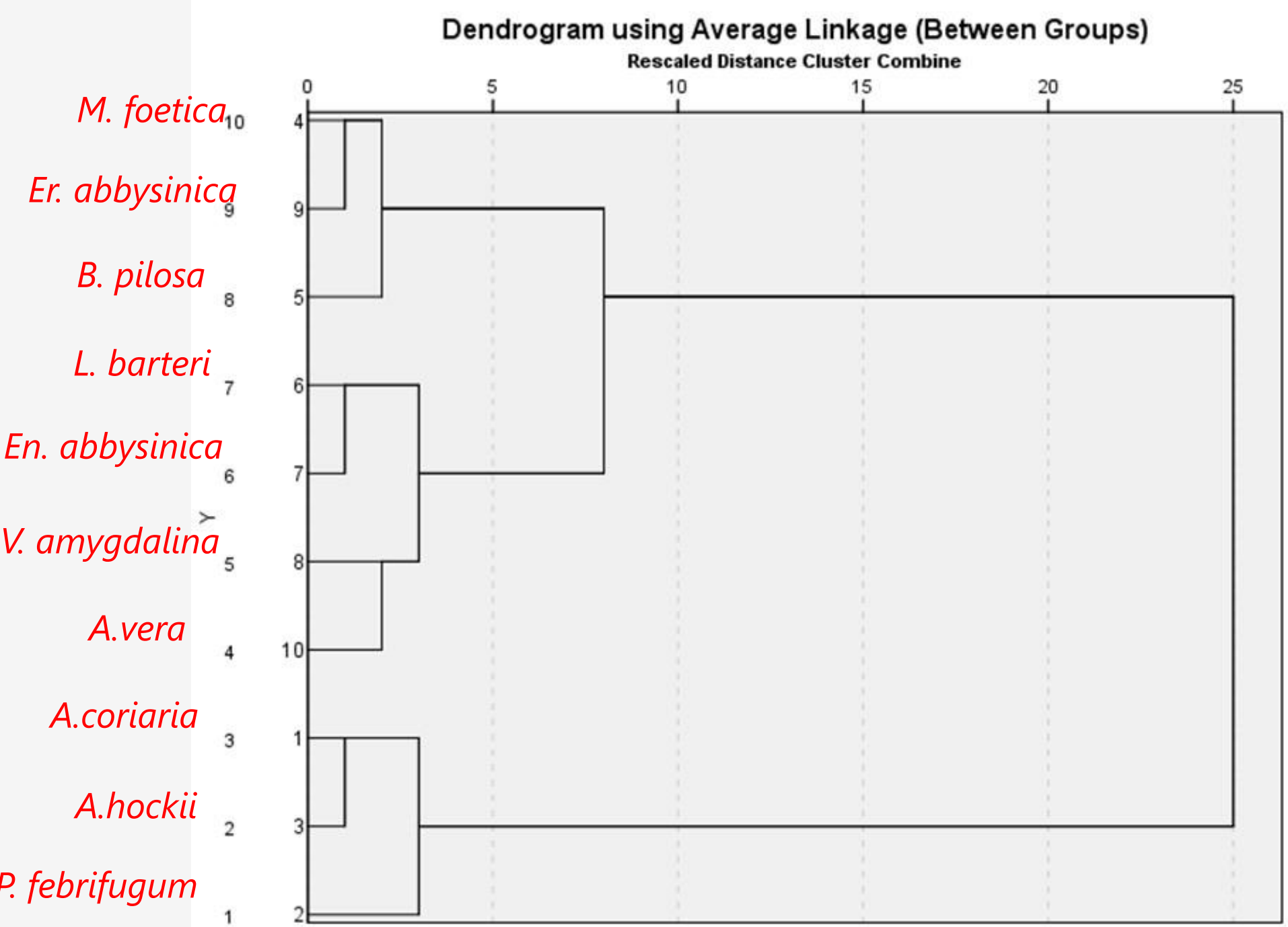


Fig 5: Dendrogram hierarchical clustering of medicinal plants based on their antimicrobial activity

3.3 Quantitative phytochemical analysis

- In fact *P. febrifugum* registered the highest concentration of total phenol and alkaloids while *A. vera* had high concentrations of flavonoids in *A. vera* (Fig 2).

3.4 Antimicrobial activity

- At concentrations of 100mg/ml, aqueous and ethanol extracts of *P. febrifugum*, *A. coriaria*, *L. barteri*, *Entada abyssinica* and *A. hockii* showed antibacterial activity against *S. aureus* and no activity against *E.coli* and *C. albican* (Fig 3).
- Similarly, at concentration of 100mg/ml, petroleum ether extracts of *A. coriaria*, *A. hockii* and *P. febrifugum* exhibited an activity against *C. albican* (Fig 3).
- However, anti microbial activities exhibited by the extracts was lower than those of standard drugs (Fig 3).

3.5 Plant clustering and grouping

- Based the chemical compounds, *A. vera* was separated from the nine other plants at linkage distance 25 and *P. febrifugum*, *A. hockii* and *A. coriaria* from the rest at linkage distance 10 (Fig 4).
- Similarly, *P. febrifugum*, *A. hockii* and *A. coriaria* were separated from the rest of the plants at linkage distance 25 based on their antimicrobial activity (Fig 5).

4.0 Conclusion & Recommendation

- Based on the phytochemical ingredients and antimicrobial activities, *P. febrifugum*, *A. coriaria*, *A. hockii*, *L. barteri* and *Entada.abyssinica* should be investigated further for development of potential drugs for skin disorders.

References

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