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Phytopharmaceutical and Impacts of Utilizing *Piper betle* leaf in Treating Leucorrhoea: Literature Review

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01 INTRODUCTION

Phytopharmaceuticals, derived from plants, have garnered increasing attention for their therapeutic potential in modern medicine. Among these, *Piper betle* leaf stands out for its rich historical use in traditional medicine across various cultures, especially in Indonesia. Known for its antimicrobial, anti-inflammatory, and antioxidant properties, *Piper betle* leaf has piqued scientific interest as a potential treatment for leucorrhea—a condition characterised by abnormal vaginal discharge. Leucorrhea affects many women worldwide, often signalling underlying infections, hormonal imbalances, or reproductive tract disorders. Traditional practices have long utilised Piper betle leaf for its believed efficacy in treating gynaecological issues, including leucorrhea. Its active components, such as phenols, tannins, and essential oils, are thought to contribute to its therapeutic effects by combating pathogens, reducing inflammation, and promoting vaginal health. Recent scientific studies have begun to validate these traditional claims, exploring the biochemical mechanisms through which *Piper betle* leaf exerts its effects. Research indicates its potential as a natural alternative or complement to conventional treatments, offering a promising avenue for safe and effective management of leucorrhea.

02 METHODOLOGY

The type of research carried out is a literature study using a narrative review method through various accredited scientific databases such as PubMed, Google Scholar and Scopus, published in the year 2014-2024.

03 RESULT

Fresh green betle leaves contain water, protein, fat, minerals, fibre, chlorophyll, carbohydrate, nicotinic acid, vitamin A and C, Thiamine, Riboflavin, tannin and essential oils that contribute to majority of important biological effects and made up to 4%. A phytochemical analysis on betle leaf essential oils showed that it consists of hydroxycavikol, kavikol, methyl eugenol, karvakrol, terpenes and sesquiterpenes. Gas chromatography-mass spectrometry (GC-MS) is a popular technique for identifying and quantifying concentrations of organic substances, GC-MS revealed valuable compounds like hydroxychavicol, chavibetol, 4-chromanol and eugenol function as antifungal by inhibiting the adherence mechanism of the fungal cell to host tissues which crucial for fungal virulence and successful colonization and infection. Phenol such as carvacrol and kavikol in essential oils of betle leaf serves as a very strong bactericide and fungicide by damaging and penetrating the bacterial cell wall.

The antibacterial property of betle leaves were studied and found that 4-chromanol was the compound responsible for the antibacterial and antibiofilm properties of betle leaf extract. Eugenol is a main component found in betle leaf essential oil, eugenol was also reported to suppress aflatoxin secretion and disrupting fungal cell wall. Hydroxychavicol isolated from betel leaf was also reported to demonstrate fungicidal effect by preventing biofilm formation and biofilm eradication.

Since leucorrhea is caused by fungal or bacterial infection, with the antibacterial and antifungal effects of *Piper betle* leaf components, table below shows the impact of utilising betle leaves as a non-pharmacological treatment in treating leucorrhea.

Author	Method	Result
Mustika et al., 2014	7-10 fresh betle leaves are boiled in 2.5 liters of water. The boiled water is used to wash the vagina 2 times a day for 5 consecutive days.	95% did not have vaginal discharge and 5% still experienced vaginal discharge in the following 1 month menstrual period.
Widayati and Wulandari, 2021	Decoction of betle leaves which is used for douching periodically for 6 days, 100 cc in the morning and 100 cc in the afternoon	In all respondents, it was found that the amount of leucorrhoea had decreased and no more symptoms of itch.
Baety et al., 2019	Boiled green betle leaf water is used for 6 days in the morning and evening	There is a significant influence on the level of vaginal discharge, 77% did not experience vaginal discharge.
Novelia and Carolin, 2023	7-10 fresh betle leaves are boiled in 2.5 liters of water, filtered and used to wash the vagina 2 times a day for a week.	There is an effect in giving betle leaf boiled water on leucorrhea in female students.

04 CONCLUSION

Piper betle contains strong phytochemicals that work as an antibacterial and antifungal agent against pathogens that causes leucorrhea without influencing the normal flora of the vagina such as *Lactobacillus species.* The effectiveness of *Piper betle* leaf decoction can be maximized by administering it with the right dose, method, and duration. *Piper betle* leaf's perceived safety profile and its antimicrobial properties make it a potential incorporation into common healthcare practices in treating leucorrhea. As healthcare systems worldwide seek sustainable and accessible healthcare solutions, the role of phytopharmaceuticals of Piper betle leaf continue to expand, offering patients alternatives that are both effective and culturally resonant.



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