Peperomia pellucida (L.) Kunth is a herb belonging to the family Piperaceae. In this review, an extensive literature survey was carried out to compile information available on medicinal uses, phytochemistry and pharmacological properties of P. pellucida. The plant is used as food, flavoring agent and as medicine. The plant is used as medicine for treating various ailments or disorders such as asthma, rheumatism, wound, fever, stomach problems, kidney infection, hemorrhoid pain, joint pain, hypertension, diarrhoea, snake bite and measles. The plant contains phytochemical groups such as alkaloids, flavonoids, saponins, terpenoids, steroids and glycosides. Compounds such as dillapiole, phytol, stigmasterol, sitosterol, secolignans, tetrahydrofuran lignans, highly methoxylated dihydronaphthalenone, peperomin, sesamin and isoswertisin have been identified in the plant. Studies have shown that the plant exhibited several pharmacological activities such as antimicrobial, antioxidant, anti-angiogenic, anti-inflammatory, analgesic, antipyretic, neuropharmacological, anticancer, enzyme inhibitory, antiallergic, hypnotic, immunostimulatory, fracture healing and antidiabetic activities which support the traditional use of the plant. Purified chemicals from the plant have also shown to exhibit certain pharmacological activities such as antiulcer, anticancer and antimicrobial activity. By this extensive literature review, it can be concluded that P. pellucida can be utilized as a promising candidate for developing newer drugs with potent pharmacological activities.

Keywords: Peperomia pellucida (L.) Kunth, Ethnomedicine, Traditional medicine, Phytochemical, Pharmacological activities
The plant *P. pellucida* is used ethnomedically as medicine, food and flavoring agent in various parts of the world. Aerial parts, young shoots, leaves and whole plant are used in the form of decoctions, juice, paste etc. to treat several diseases such as fever, cold, cough, viral diseases, rheumatic pain, asthma, vaginal infections and kidney infections. The Sumu (Ulwa) of southeastern Nigeria [17]. Juice made from leaves and roots are used to treat athletes foot, decoction prepared from leaves is used in the treatment of hemorrhoid pain and kidney infection in Rondônia, Western Amazon, Brazil [18]. In Nigeria, the whole plant is used in haemorrhoids, hypertension, convulsion and bone fracture [19]. The whole plant is boiled and used to treat kidney infection and to lower hypertension in Mindanao, Philippines [20]. Table 1 depicts ethnomedical (medicinal and non-medicinal) uses of *P. pellucida* in various parts of the world.

### Table 1: Ethnobotanical uses of *P. pellucida* in various parts of the world

| Region | Part used | Uses | Reference |
|--------|-----------|------|-----------|
| Malappuram district, Kerala, India | Whole plant | Decoction prepared from whole plant is taken internally for treating rheumatism. | Chithra and Geetha [21] |
| Barpeta district, Assam, India | Plant juice, leaf paste | Plant juice is used in stomach problems, leaf paste is applied on cuts and wounds. | Kalita et al. [22] |
| East Sepik, Papua New Guinea | Leaves, whole plant | Leaves are used as antidepressant and in the treatment of pimples. | Koch et al. [23] |
| Bangladesh | Aerial parts | Dizziness, headache, fever, stomachache. | Waty et al. [24] |
| Greater Khulna division, Bangladesh | Whole plant | Whole plant is used in the treatment of diarrhoea. | Rahmatullah et al. [25] |
| Ragerbhat district, Bangladesh | - | Tribal community uses plant for medicinal purposes | Mollick et al. [26] |
| Tinsukia district, Assam, India | Whole plant | Paste made from the whole plant is applied on burns for quick relief. | Burugobain [27] |
| Assam, India | Young shoots | Young shoots are used as flavoring agents. | Bharali et al. [28] |
| Morigaon district, Assam, India | Aerial parts | Aerial part of the plant is used to treat stomach pain, joint pain and headache. | Bordoloi et al. [29] |
| Jalpaiguri district, West Bengal, India | Whole plant | Paste made from whole plant is used against boils. | Bose [30] |
| Kanda community, Bangladesh | Whole plant | Paste made from the whole plant is applied by the side of the bitten place (poisonous snake, insect or reptile bites). | Rahmatullah et al. [31] |
| Saramaccan Maroons in Suriname | Whole plant | Used as herbal bath for children for general health promotion and to get rid of evil. | Russchaert et al. [32] |
| Dominican Republic and New York city (Dominican traditional medicine) | Aerial parts, leaf | Aerial parts are used in the treatment of flu, leaves are used to treat vaginal infections and asthma/chest congestion. | Vandebroek et al. [33] |
| Assam, India | Leaves, leaf and stem | Leaves are used to treat athletes’ foot and wound. | Uzodimma [34] |
| Trinidad, Dominica | Whole plant | Infusion or decoction made from whole plant is used to treat cold and cough and as cooling/cleansing agent. | Clement et al. [35] |
| Tshopo district, DR Congo | Leaves | Leaves are cooked and used as leafy vegetable. | Termote et al. [36] |
| Mouhimbazar district, Bangladesh | Leaves, whole plant | Paste made from leaves and whole plant is used in the treatment of fever in children and adults respectively. | Das et al. [37] |
| Kamrup district, Assam, India | Leaves, stem | Leaves and stem are used in the treatment of fever. | Bora and Das [38] |

### Table 2: Phytochemical groups identified in *P. pellucida*

| Plant part | Phytochemical group | Reference |
|------------|---------------------|-----------|
| Whole plant | Tannins, saponins, flavonoids, terpenoids, phytosterols, alkaloids, phenolics | Gini and Jothi [46] |
| Leaf | Alkaloids, tannins, saponins, terpenoids, flavonoids, cardiac glycosides | Ojo et al. [47] |
| Leaf | Alkaloids, flavonoids, saponins, tannins, steroids, triterpenoids | Majumder and Kumar [48] |
| Leaf | Alkaloid, cardiac glycoside, terpene, saponin, tannin | Oмотayo and Borokini [49] |
| Whole plant | Alkaloids, saponins, tannins, flavonoids, anthraquinones, glycosides | Idris et al. [50] |
| Leaf | Alkaloids, tannins, flavonoids, saponins and cardiac glycosides | Abare and Okpalukiyegu [51] |
| Leaf | Alkaloids, flavonoids | Ibiba [52] |
| Stem | Alkaloids, tannins, flavonoids, steroids, triterpenoids | Majumder [53] |
| Whole plant | Alkaloids, flavonoids, glycosides, saponins | Sheik et al. [54] |
| Leaf | Alkaloids, tannins, saponins | Egwu et al. [55] |
| Aerial parts | Alkaloids, flavonoid, tannins, saponins, steroids, glycosides | Raina and Hassan [56] |

### Phytochemistry of *P. Pellucida*

Plants produce a range of primary and secondary metabolites. The study of chemical compounds present in plants (phytochemistry) is known as phytochemistry. The therapeutic potential of plants is ascribed to the presence of a wide range of phytochemicals, mainly secondary metabolites. Significant advancements in the technology, mainly chromatographic and spectral analyses, led to the discovery of many types of phytochemicals from plants and the pharmacological studies revealed their potential role. Techniques...
such as column chromatography, Thin layer chromatography (TLC), Gas chromatography–mass spectrometry (GC-MS), Fourier-transform infrared spectroscopy (FT-IR) and Nuclear magnetic resonance (NMR) spectroscopic techniques are routinely used to identify phytochemicals present in plants [39-45]. Various researchers have identified phytochemical groups and chemical compounds in leaves and whole plant by standard phytochemical procedures and various analytical techniques.

Table 2 and 3 provides information on various phytochemical groups and chemicals identified in different parts of the plant by standard phytochemical tests and GC-MS analysis respectively.

Table 3: Chemical compounds identified in *P. pellucida* by GC-MS analysis

| Sample              | Compounds identified                                           | References       |
|---------------------|----------------------------------------------------------------|------------------|
| Essential oil       | Dillapiole, trans-caryophyllene                                 | da Silva et al.  |
| Leaf extract        | phytol, 2-Naphthalenol, Hexadecanoic acid and 9,12-Octadecadienoic acid | Wei et al.       |
| Essential oil       | Dillapiole, myristicine                                        | Francois et al.  |
| carotol, dillapiole, pygmaein, (E)-caryophyllene, germacrene D, β-elemene, camphor, daucene, apiol, β-bisabolene and bicyclogermacrene | Verma et al.     |
| Whole plant         | Apiol, Phytoil, n-Hexadecanoic acid, E-2-Tetradecen-1-ol, Stigmasterol, Campesterol, and Sitosterol | Narayanamoorthi et al. |
| Leaf extract        | Phytol, 2-Naphthalenol, Hexadecanoic acid and 9,12-Octadecadienoic acid | Wei et al.       |
| Essential oil       | γ-gurjunene, 1,10-di-epicubenol, (E)-caryophyllene, dillapiole, carotol, trans-β-guaiene | de Oliveira et al.|
| Essential oil       | Phytol, α-terpineol, β-caryophyllene, d-limonene, linalool      | Okoh et al.      |

Ragas et al. [39] isolated dill-apio1, aurantiamide acetate and pachypophyllin from leaf extract of *P. pellucida* and elucidated their structure by NMR studies. Pellucidin A, a novel dimeric ArC2 compound, along with dill-apio1 has been isolated by Bayma et al. [64] from the aerial parts of *P. pellucida*. The structure of pellucidin A was established by spectral analyses. The study carried out by Xu et al. [65] revealed isolation of compounds such as secolignans, tetrahydrofuran lignans, highly methoxylated dihydro-naphthalenc, peperonins, sesamin and isoswertisin from the whole plant of *P. pellucida*. Khan et al. [66] recovered a xanthone glycoside from leaves of *P. pellucida* and characterized the compound as vitexin by chromatographic and spectral analyses. The study carried out by Hartati et al. [41] identified compounds viz. stigmasterol, analogue of phophytin and β-sitosterol-D-glucopyranoside in the solvent extract of *P. pellucida*. Susikwati et al. [68] isolated a compound namely 8,9-dimethoxy ellagic acid from the ethyl acetate fraction of leaf of *P. pellucida* by column chromatography and the structure was elucidated by chromatographic and spectral analyses. A compound by name 3',4',5,7-tetrahydroxy-3-5-dimethoxy flavone-7-O-β-rhamnose was isolated from ethyl acetate fraction of crude methanolic extract of aerial parts of *P. pellucida* and the structure was elucidated by the spectral data [43]. The study carried out by Ahmad et al. [69] revealed a total alkaloid content of 29.59 mg/g piperine in the dichloromethane fraction of plant material. Fig. 2 shows the structure of some of the compounds identified in the plant.

**Pharmacological activities of *P. Pellucida***

Many studies have been carried out to investigate pharmacological properties of *P. pellucida*. The plant is reported to exhibit several bioactivities such as hypotensive, immunostimulatory, antioxidant, antimicrobial, analgesic, anti-inflammatory, fracture healing, gastroprotective and anti-diabetic activity.

Concise information on pharmacological activities of extracts and purified compounds of *P. pellucida* is discussed below.
Hypotensive activity

Nwokocha et al. [70] evaluated hypotensive activity of aqueous extract from whole plant of *P. pellucida* in rat model. Intravenous administration of extract showed a dose dependent reduction in systolic and diastolic blood pressure, heart rate and mean arterial pressure. It was shown in the study that the extract induces bradycardia and hypotension in normotensive rats via mechanisms that are nitric oxide dependent. The study carried out by Fassola and Adeboye [71] also revealed anti-hypertensive activity of *P. pellucida* in normotensive rats. Intravenous administration of methanol extract resulted in marked decrease in mean arterial blood pressure and heart rate.

Neuropharmaceutical activity

The study carried out by Khan et al. [72] indicated that the petroleum ether and ethyl acetate fractions of ethanol extract of leaves of *P. pellucida* possess central nervous system depressant effect as the fractions were shown to possess dose dependent effects on duration of diazepam-induced sleep, nikethamide-induced toxicity, light-dark test and force swimming test.

Immunostimulatory activity

In a study, Lee et al. [73] revealed the potential of leaf extract of *P. pellucida* (mixed with fish pellets) as an immunostimulator in controlling motile Aeromonad septicemia caused by *Aeromonas hydrophila* in Oreochromis spp. (red hybrid tilapia). It was observed that the mortality rate was considerably lesser in fishes that were fed with diet which was mixed with leaf extract.

Antimutagenic activity

Ragasa et al. [39] evaluated antimutagenic activity of dill-apioil and pachyphyllin isolated from leaf extract of *P. pellucida* by micronucleus test. The compounds were not effective as the study did not indicated significant reduction in micronucleated polychromatic erythrocytes induced by mitomycin C.

Anti-angiogenic activity

The study carried out by Camposano et al. [74] revealed anti-angiogenic activity of methanol extract of *P. pellucida* in terms of inhibition of angiogenesis in chorioallantoic membrane assay. The extract was shown to inhibit angiogenesis with an activity of 26%.

Fracture healing activity

Nguegua et al. [75] evaluated the potential of ethanol extract of *P. pellucida* on bone regeneration following bone and marrow injury in rats, and determined the mode of action. The extract dose-dependently induced bone regeneration at the fracture site and significantly increased mineral deposition. The extract was also found to improve microarchitecture of the regenerating bone. It was shown that the extract accelerates fracture repair via stimulatory effects on osteoblast differentiation and mineralization. Recently, Florence et al. [76] revealed the potential of aqueous extract of *P. pellucida* to accelerate fracture healing in Wistar rats. Radiological tests revealed a dose dependent formation of callus at the level of the fracture gap and was evidenced by formation of a highly dense and compact fibrocartilaginous callus.

Antiulcerogenic/gastroprotective activity

Rosilda and Aini [77] evaluated gastroprotective (antiulcerogenic) activity of ethanolic extract of aerial parts of *P. pellucida* in indomethacin and necrotizing agent induced models in rats. The result revealed that the extract at all doses produced significant inhibition of gastric mucosal damage induced by necrotizing agents and indomethacin. Rojas-Martinez et al. [78] determined gastroprotective activity of solvent extracts and Dillapiole from *P. pellucida*. Dichloromethane extract of leaf and stem displayed marked gastroprotective activity in rats with ethanol induced gastric ulcer. Dillapiole also exhibited marked gastroprotection.

Analgesic activity

Azipa et al. [79] determined analgesic activity of methanol extract of aerial parts of *P. pellucida* by acetic acid induced writhing in mice. It was observed that oral administration of extract (70-210 mg/kg) exhibited a significant analgesic activity in mice. Arrigoni-Blank et al. [80] evaluated analgesic activity of aqueous extract prepared from aerial parts of *P. pellucida* by abdominal writhing and hot plate tests. The extract displayed significant analgesic activity at extract concentration of 400 mg/kg and 100 mg/kg in abdominal writhing and hot plate test respectively. The study carried out by Sheikh et al. [54] revealed analgesic potential of ethyl acetate extract of whole plant by acetic acid-induced writhing in mice.

Antipyretic activity

The study carried out by Khan et al. [81] revealed the antipyretic potential of petroleum ether and ethyl acetate soluble fractions of ethanol extract of leaves of *P. pellucida* in boiled milk induced pyrexia in albino rabbits. Administration of solvent fractions at a dose of 80 mg/kg body weight showed a significant reduction in elevated body temperature in albino rabbits.

Anti-inflammatory activity

Arrigoni-Blank et al. [82] evaluated anti-inflammatory activity of aqueous extract of leaves of *P. pellucida* by carrageenan induced paw edema test in rats. It was observed that the extract obtained from plants in all seasons displayed antiedematogenic activity with significant activity observed in phenophases of winter and spring. Arrigoni-Blank et al. [80] evaluated anti-inflammatory activity of aqueous extract prepared from aerial parts of *P. pellucida* by paw edema induced by carrageenan and arachidonic acid. It was observed that oral administration of 200 and 400 mg/kg of the extract showed an anti-inflammatory activity in the carrageenan test, which was based on interference with synthesis of prostaglandin, as confirmed by the arachidonic acid test. The study carried out by Mutee et al. [83] indicates the anti-inflammatory potential of petroleum ether, chloroform and methanol extract of *P. pellucida* in carrageenan induced rat paw edema. Among extracts, petroleum ether extract displayed significant activity when compared to chloroform and methanol extracts.

Antimicrobial activity

Ragasa et al. [39] isolated dill-apioil and pachyphyllin from leaf extract of *P. pellucida* and determined their antimicrobial activity. These compounds were selectively effective against *Trichophyton mentagrophytes* while other test microbes were not affected. In a study, Khan and Omoloso [84] screened antimicrobial activity of crude methanolic extract and petrol, dichlormethane, ethyl acetate and butanol fractions of methanolic extract of *P. pellucida*. Crude extract and fractions displayed broad spectrum antibacterial activity. Butanol fraction of crude extract was more active. Patuloside A isolated from leaves of *P. pellucida* was shown to display concentration dependent inhibition of Gram positive and Gram negative bacteria. Patuloside A was shown to display weak activity against *Aspergillus flavus* and *Candida albicans* while *A. niger* and *Rhizopus oryzae* were unaffected [66]. Further details on the antimicrobial potential of *P. pellucida* described by other researchers are shown in table 4.

Antidiabetic activity

Humzah et al. [93] showed that diet containing *P. pellucida* (10% and 20%) possess antidiabetic effect in alloxan-induced diabetes in rats. A considerable reduction in the blood glucose level was observed in the study. The levels of aspartate transaminase (AST), alanine transaminase (ALT) and alkaline phosphate (ALP) were lower in rats fed with diet containing *P. pellucida*. Moreover, the concentration of total cholesterol, triglycerides (TG), high-density lipoprotein (HDL) and low-density lipoprotein (LDL) content were also lesser in rats fed with diet containing *P. pellucida*. The levels of superoxide dismutase (SOD), catalase and glutathione were also increased. Sheikh et al. [54] evaluated antidiabetic activity of ethyl acetate extract of whole plant of *P. pellucida* in alloxan-induced diabetic mice. A significant hypoglycemic effect was observed in mice administered with extract. 8.9-dimethoxy ellagic acid, isolated from leaf extract of *P. pellucida*, was evaluated for antidiabetic activity by alloxan-induced hyperglycemia in mice [68]. The compound was shown to exhibit 33.74% blood glucose lowering in normoglycemic model at 100 mg/kg dose. 

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Acaricidal activity

In a study, de Oliveira et al. [62] evaluated the activity of the essential oils from leaf and stem against Tetranychus urticae. They observed that the stem oil was four-fold more toxic than the leaf oil however the activity of essential oils was less than eugenol, the positive control.

Anticancer/cytotoxic activity

Peperomia E, isolated from whole plant of *P. pellucida*, was found to exhibit cytotoxicity against cell lines viz. HL-60, MCF-7 and HeLa cell lines [65]. Khan et al. [66] determined cytotoxic activity of Patuliside A, isolated from leaves of *P. pellucida*, against brine shrimp nauplii. The compound exhibited cytotoxicity with an LC₅₀ value of 18.24μg/ml and the activity observed was lesser when compared to standard drug. Wei et al. [58] determined cytotoxic potential of methanolic extract of *P. pellucida* leaf against MCF-7 cell line by 3-(4,5-dimethylthiazole-2-y)-2,5-diphenyltetrazolium bromide (MTT) assay. The extract displayed concentration dependent cytotoxicity with an IC₅₀ value of 10.4±0.06μg/ml. Oloyede et al. [87] screened cytotoxicity of crude methanol extract and fractions such as hexane, ethyl acetate, butanol and aqueous fractions of leaves of *P. pellucida* by brine shrimp lethality assay. Crude extract, hexane and ethyl acetate fractions were shown to be effective while butanol and aqueous fractions were not effective in causing mortality of brine shrimp larvae.

Antioxidant activity

Mutee et al. [83] determined antiradical activity of chloroform, petroleum ether and methanol extract of *P. pellucida* by 2,2-diphenyl-1-picrylhydrazyl (DPPH) assay. Methanol extract was shown to display marked scavenging of free radicals when compared to other extracts. Wei et al. [58] screened methanolic extract of *P. pellucida* leaf for radical scavenging potential by DPPH assay. The extract was shown to display concentration dependent scavenging of radicals but the activity observed was considerably lesser than that of quercetin. Oloyede et al. [87] determined antioxidant potential of crude methanolic extract and hexane, ethyl acetate, butanol and aqueous fractions of leaves of *P. pellucida* by DPPH scavenging, hydrogen peroxide scavenging and ferric thiocyanate method. Extract and fractions were shown to exhibit marked activity in all methods. The study carried out by Beltran-Benjamin et al. [94] revealed an increase in the levels of antioxidant enzymes viz. superoxide dismutase and catalase on administration of crude methanolic extract of *P. pellucida* in rats. Phongtongpasuk and Poadaeng [95] evaluated antioxidant potential of butanol, ethyl acetate and methanol extracts of *P. pellucida* obtained by maceration and reflux method. Extracts obtained by reflux method displayed marked DPPH scavenging activity and reducing power. Phenolic content was also higher in extracts obtained by reflux method. The study carried out by Okoh et al. [63] showed the antioxidant potential of essential oil of leaf and stem of *P. pellucida*. The essential oils exhibited concentration dependent scavenging of DPPH, 2,2'-azino-bis(3-ethylbenzothiazoline-6-sulphonic acid (ABTS) and nitric oxide radicals.

Enzyme inhibitory activity

In a study, Ong et al. [96] evaluated porcine pancreatic lipase inhibitory activity of methanolic extract of leaves of *P. pellucida* and observed lesser potential of leaf extract to cause inhibition of lipase activity when compared to standard. Kurniawan et al. [43] isolated a compound by name 3’,4’, dihydroxy-3,5-dimethoxy flavone-7-O-β-rhamnose from aerial parts of *P. pellucida* and evaluated its inhibitory activity against Angiotensin converting enzyme (ACE). The compound was found to inhibit ACE dose dependently with an IC₅₀ value of 7.72μg/ml. Ethyl acetate fraction was more potent than the compound. The study carried out by Parawansha et al. [97] showed the potential of ethanol extract of leaves of *P. pellucida* to inhibit the activity of xanthine oxidase. Extract was shown to exhibit inhibition of xanthine oxidase with an IC₅₀ value of 19.5 ppm.

Antisickling activity

Abere and Okpalaoyagu [51] evaluated antisickling activity of leaves of *P. pellucida* on the inhibition of sodium metabisulphite-induced sickling of the HbSS red blood cells. Leaf extract was found to significantly inhibit sickling of red cells with maximum inhibition of sickling (57.5%) at 500 mg/ml of the extract.

Anti-ostioporesis activity

The study carried out by Putri et al. [98] revealed the potential of ethanol extract of *P. pellucida* (100 mg/kg body weight [b. w]) to prevent osteoporosis in ovariectomized (O VX)-induced osteoporotic rats. At 100 mg/kg concentration, the extract treated rats showed improvement on three-dimensional image of the trabecular bone compared with the OVX-control group. Also, the trabecular cavity formation in 100 mg/kg-extract-treated group was minimal.

Fibrinolytic activity

The study of Ebenezer et al. [99] showed a weaker fibrinolytic activity of *P. pellucida* extract. The *in vitro* clot lysis activity was

### Table 4: Antimicrobial potential of *P. pellucida*

| Extract                  | Part                  | Activity against                                      | References               |
|--------------------------|-----------------------|-------------------------------------------------------|--------------------------|
| Aqueous and ethanol      | Leaf                  | Gram negative bacteria                                 | Akinnibosun et al. [85]  |
| extract                  |                       |                                                       |                          |
| Methanol extract         | Whole plant           | Bacillus subtilis and Candida albicans                 | Wiert et al. [86]        |
| Methanol extract         | Leaf                  | Gram positive and Gram negative bacteria               | Wei et al. [58]          |
| Methanol extract, solvent| Leaf                  | Gram positive and Gram negative bacteria; Fungi namely Aspergillus, Rhizopus, Candida and Penicillium | Oloyede et al. [87] |
| Solvent extracts         | Leaf                  | Pseudomonas aeruginosa, Salmonella typhi and Shigella dysenteriae and Aspergillus niger | Ibia et al. [52] |
| Aqueous and organic      | Leaf                  | Gram positive and Gram negative bacteria               | Ojo et al. [47]          |
| extracts                 |                       |                                                       |                          |
| Alcohol extract          | Leaf                  | Gram positive and Gram negative bacteria               | Mensah et al. [88]       |
| Essential oil            | Leaf                  | Fusarium moniliforme, Rhizopus stolonifer              | Francois et al. [59]     |
| Ethanol extract          | Leaf                  | Gram positive and Gram negative bacteria               | Igwe and Mgbemena [89]   |
| Solvent extracts         | Leaf                  | Shigella dysenteriae                                   | Uddin et al. [90]        |
| Essential oils           | Aerial parts          | Gram positive and Gram negative bacteria               | Zubair et al. [91]       |
| Solvent extracts         | Whole plant           | Gram positive and Gram negative bacteria               | Raina and Hassan [56]    |
| Essential oils           | Leaf and stem         | Gram positive, Gram negative bacteria, Mycobacterium smegmatis | Okoh et al. [63] |
| Ethanol extract          | Leaf                  | Candida albicans                                       | Hastuti et al. [92]      |

**References**

[58] Wei et al., [59] Francois et al., [60] Igwe and Mgbemena, [61] Zubair et al., [62] Kurniawan et al., [63] Okoh et al., [64] Raina and Hassan, [65] Khan et al., [66] Oloyede et al., [67] Ojo et al., [68]<WebElementet al., [69] Wei et al., [70] Oloyede et al., [71] Akinnibosun et al., [72] Ibia et al., [73] Ojo et al., [74] Ong et al., [75] Putri et al., [76] Putri et al., [77] Parawansha et al., [78] Wahid et al., [79] Akinnibosun et al., [80] Oloyede et al., [81] Wei et al., [82] Akinnibosun et al., [83] Wei et al., [84] Ong et al., [85] Putri et al., [86] Putri et al., [87] Wahid et al., [88] Akinnibosun et al., [89] Oloyede et al., [90] Wei et al., [91] Oloyede et al., [92] Wei et al., [93] Wahid et al., [94] Wei et al., [95] Putri et al., [96] Putri et al., [97] Wahid et al., [98] Putri et al., [99] Putri et al.
considerably lesser when compared to extracts from other plants. In another study, Zubair et al. [91] revealed the potential of ethyl acetate, hexane, chloroform and aqueous soluble fractions of P. pellucida to cause lysis of clot indicating thrombolytic activity. Marked activity was displayed by ethyl acetate soluble fraction.

### Antidiarrhoeal activity

The ethanolic extract of P. pellucida leaves was evaluated for antidiarrhoeal activity in castor oil-induced diarrhoea in mice. The extract was shown to display concentration dependent anti-diarrhoeal activity [91].

### Hair growth promotion activity

The study carried out by Kanedi et al. [100] revealed the potential of crude extract of P. pellucida in a topical gel formulation to promote hair growth in rabbits dose dependently. The mean hair length increased on increasing the concentration of extract in the gel.

### Proximate and nutritive attributes of P. Pellucida

Egwuche et al. [55] evaluated nutritive attributes of P. pellucida leaves from Nigeria. The leaves were shown to contain carbohydrates (38.97%), proteins (7.68%), crude fibre (22.35%) and fat (1.08%). The leaves were also shown to contain appreciable quantity of calcium, magnesium, potassium and sodium. The study carried out by Ooi et al. [101] revealed the nutritive composition of P. pellucida from Malaysia. The plant was shown to contain an appreciable quantity of carbohydrates (about 45%) and proteins (about 10%) however the lipid content was low (about 3%). The plant is also shown to possess considerable quantity of potassium, calcium, iron and sodium.

### CONCLUSIONS

The plant P. pellucida is a well-known medicinal plant being used ethnomedicinally for treatment of various diseases worldwide. In vitro and in vivo studies have shown many pharmacological activities of the plant which supports the traditional use of the plant. Literature has shown the potential of isolated compounds to exhibit bioactivities such as antimicrobial, anticancer, gastroprotective and antidiabetic activities. The presence of phytochemicals such as alkaloids, flavonoids, saponins, tannins and glycosides in the plant could be responsible for the pharmacological activities of the plant. The plant P. pellucida appears to be suitable for developing drugs that can be used to treat several diseases or disorders. Utilization of the plant in suitable form can be beneficial in terms of promotion of health and disease therapy.

### SOURCES OF SUPPORT

None

### AUTHORS CONTRIBUTIONS

Both the authors namely Dr. Prashith Kekuda T. R and Dr. Raghavendra H. I. were involved equally in literature survey, framing contents, writing draft paper and finalizing the review paper.

### CONFLICTS OF INTERESTS

Authors declared that there are no potential conflicts of interest

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