International Journal of Advanced Chemistry, 10 (2) (2022) 46-49

International Journal of Advanced Chemistry

Website: www.sciencepubco.com/index.php/IJAC

Research paper

Bioactive composition and TLC profile data on PAX herbal health tea and PAX herbal diatea

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Abstract

Background: The phytoconstituents of herbal drugs are largely influenced by the quality control system used during and post-production processes including the handling of such products. Thin Layer Chromatography is one of such quality control parameters that demonstrate uniqueness and uniformity between various substances, serving as an identity for such substances. Pax Herbal Health tea (PHT) and Pax Herbal Diatea (PDT) are polyherbal drugs, PHT is used as a tonic for general wellness, while, PDT is used in the management and treatment of diabetes. This study evaluated the different phytoconstituents present and developed Thin-layer chromatography (TLC) fingerprint profiles for PHT and PDT to serve as quality control checks during the production for consistency and market uniqueness after production.
Material and Methods: Qualitative phytochemical and chromatographic analyses were carried out using standard methods.
Results: The phyto-screening revealed the presence of Alkaloid, Flavonoid, Tanin, Terpenoids, Reducing sugar, Steroid, and Cardiac glycoside in PHT while, Saponin, Tanin, Steroids, Reducing sugar, Flavonoid, and Terpenoids were observed in PDT. The TLC finger-print chromatograms of PHT after development with n-Hexane:Ethyl acetate (3:2) showed four distinct components under ultraviolet light at 365 nm, and three spots when sprayed with 20% methanolic sulphuric under visible light, while, PDT developed in n-Hexane:ethyl acetate:methanol (2.5:2:0.5) revealed three fluorescent components at 365 nm and four components after sulphuric acid treatment.
Conclusion: From this present study, identity cards have been designed for PHT and PDT through bioactive composition and TLC profiles which can be used in accessing the quality and consistency of the herbal drugs.

Keywords: *Bioactive Composition, Thin Layer Chromatography (TLC) Fingerprint Profile, Herbal Medicine, Quality Control, PAX Herbal Health Tea and PAX Herbal Diatea.*

1. Introduction

The supportable functioning of herbal remedial industries is consequential, not exclusively because of their worth as an unspoken fountain of substitute medications but due to dependence on traditional medicinal companies for wellness. The vast majority (70-80) of people in Africa confabulate with traditional medical interpreters for healthcare (Ekor, 2014). Traditional drug-producing companies have been reckoned to be truly flourishing in handling several infections and habitual contingencies with the bulge of being fully natural (NNMDA, 2009). A handful of researches have been done in the field of medicinal plants (Owolabi et al., 2019a; Owolabi et al., 2019b; Amodu et al., 2020). Plants have multitudinous bioactive ingredients like tannins, alkaloids, steroids, glycoside, fixed oils, phenols e.t.c that are bored in distinct regions of the plant. The remedial effects of plants generally betided from one or a fusion of these bioactive components (Owolabi and Ayinde, 2021).
The escalating public requisition for natural drugs has redounded in amplified marketable exertion and product of these drugs. This has piloted raising interest in icing the consistency and quality of herbal medications (Renato et al., 2012). To effectively harmonize the quality of raw materials, processing of materials, and the ultimate outputs, it has turned imperative to unfold dependable, precise, and sharp quality control. therefore, thin-layer chromatography (TLC), has bunches of utility. The method is plain, cost-effective, and adaptable. The usages of TLC in quality control of plant materials entail fingerprint profiling for the appraisement of chemical ingredients of an extract, and quantitative assay of markers in plant medicaments (Mohammad et al., 2010).
Pax Herbal Health tea and Pax Herbal Diatea, are poly- herbal drugs evolved by Pax- herbals, of the Benedictine monastery in Nigeria, Pax Herbal Health tea is a Light brown powder teabag in filter paper, in a lucent nylon envelop. It has an acrid taste and aromatic scent and generally gives golden- brown color in hot water. Packaged as 25 teabags in a customized square tinderbox box, it's registered by NAFDAC, with REG. NO. A7- 0451L is used as alcohol for general wellbeing. While Pax Herbal Diatea is used as an anti-diabetes medicine with NAFDAC REG. NO. A7 - 0196L packaged in a box of thirty teabags, sells and distributed across Nigeria and abroad for over 25 years. It's presented as a tea bag (2.2 g) with a paper envelope contained in a tinderbox square box of 25 teabags. It's characterized by an aromatic scent and bitter taste. The drugs consist of well-delved medicinal plants of which the most active ones

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involve but aren't restricted to Persea Africana (Avocado), Mangifera indica (Mango), Morinda lucida, Carica papaya (Pawpaw) for Pax Herbal Health tea, while, Mangifera indica (Mango), Zingiber officinalis (Ginger), Viscum album (Mistletoe) for Pax Herbal Diatea.
It has been established that the exerted natural activity of any plant is the tracts of the phytochemicals bore in such a plant (Owolabi and Ayinde, 2021). This current study is directed at establishing phytoconstituents and TLC fingerprints profiles of Pax Herbal Health tea and Pax Herbal Diatea as a measure of their uniqueness and quality control measure.

2. Materials and methods

2.1. Chemicals

All chemicals and reagents used were of analytical grade and the water used was double glass distilled.

2.2. Extraction of the drugs for phytochemical screening

One pack of Pax Herbal Health tea and Pax Herbal Diatea each from five distinct production batches were collected from the finished goods store of Paxherbal Clinic and Research Laboratories, each batch was treated independently as follows; 10 Teabags were stint open and the powder medicine was poured into a fair desiccated beaker, weighed and processed following the manufacturers ' instructions. Compactly, 10 g of the powder material was extracted in heated water (40°C) for 45 minutes with steady agitation, this was strained to utilize a muslin fabric, and the filtrate was permitted to cool and utilized for the assay.

2.3. Qualitative phytochemical screening

The extracted filtrate was sampled for the presence and absence of bioactive composition by applying the standard techniques (Harborne JB (1973), Trease GE & Evans WC (2002) as streamlined by Owolabi TA & Edobor Salome (2021).

2.4. Extraction for TLC

Five tea bags of Paxherbals Health tea and Diatea (5 g) each from five distinctive production batches were extracted independently with 50 mL of absolute ethanol in a water bath preserved at 50°C for 15 mins, the admixture was strained through a cheese fabric. The consequent filtrate was partitioned with 50 mL of chloroform. The chloroform phase was discarded and the aqueous layer was re-partitioned with dichloromethane, the dichloromethane phase was re-collected for the TLC assay for the five distinct batches of Pax Herbal Diatea, while the second partition was between aqueous and n-Hexane for Pax Herbal Health tea, the n-Hexane fraction was re-collected for the TLC assay for the five distinct batches of Pax Herbal Health tea and coded 1, 2, 3, 4, and 5 independently.

2.4.1. Thin-layer chromatography

The TLC was carried out on an analytical pre-coated TLC plate (silica gel, 60 F254, Sigma Aldrich, Germany). Samples (1 - 5 depicting distinct production batches) were loaded with a micro-capillary tube on the TLC plate and developed in a tank (Shandon SouthernT.L.C Chromatank, Unikit) with mobile phase; n-Hexane:Ethyl acetate:methanol (2.5:2:0.5) for Pax Herbal Diatea and n-Hexan:Ethyl acetate (3:2) for Pax Herbal Health tea.

2.4.2. Observation of separation

Plates were viewed under 350 nm UV light (ZF-1, niusiwen UV lamp, China) sprayed with 20% methanolic sulphuric acid, heated at 105°C for 30 mins, and like-wise iodine vapor was used for derivatization.

2.4.3. Recording chromatograms

Luminescence and non-fluorescence under UV light were reported with a digital camera and visualization was enhanced by modifying discrepancy, intensity, and/ or brilliance by applying image editing software like Microsoft Picture Editor.

3. Results and discussion

3.1. Phytochemical screening results and discussion

Out of the ten arrays of phytoconstituents that were screened for in the filtrate of the medicines, and results realized are staged in the tables below.

Table 1: Results of the Qualitative Phytochemical Screening of Pax Herbal Health Tea

Parameter	(Batches)				
	1	2	3	4	5
Cardiac Glycoside	+	+	+	+	+
Saponin	-	-	-	-	-
Tannin	+	+	+	+	+
Phlobatannin	-	-	-	-	-
Flavonoid	+	+	+	+	+
Steroid	+	+	+	+	+
Alkaloid	+	+	+	+	+
Reducing sugar	+	+	+	+	+
Terpenoid	+	+	+	+	+
Polysaccharide	-	-	-	-	-

Table 2: Results of the Qualitative Phytochemical Screening of PAX Herbal Diatea

Parameter	(Batches)				
	1	2	3	4	5
Cardiac Glycoside	-	-	-	-	-
Saponin	+	+	+	+	+
Tannin	+	+	+	+	+
Phlobatannin	-	-	-	-	-
Flavonoid	+	+	+	+	+
Steroid	+	+	+	+	+
Alkaloid	-	-	-	-	-
Reducing sugar	+	+	+	+	+
Terpenoid	+	+	+	+	+
Polysaccharide	-	-	-	-	-

Key:
+ = Present
- = Absent

Phytochemicals are the essentiality of any medicinal plant, the presence of these ingredients has a firsthand link to the pharmacological exertion of such plant that contains them. numerous experimenters have described the significance of phytochemicals and their pharmacological possession (Sasidharan et al., 2011). The reported phytochemicals narrated in this study (Table 1 & 2) include terpenoids and steroids, these classes of ingredients have been recounted to exhibit a broad range of activities including anti-diabetics and adaptogenic (Panossian et al. 2020) which are the activities pointed by the manufacturer of the medicines delved (Paxherbal Health tea and Pax Herbal Diatea).

3.2. Thin layer chromatography results and discussion

For Pax Herbal Health tea, five fluorescent ingredients were observed at a wavelength of 365 nm as depicted in plate 1a with their respective Rf pointed in table 3, when the plate was treated with 20% methanolic sulphuric acid, only three ingredients were observed (plate 1b) with their separate Rf values (Table 4). As for the Pax Herbal Diatea, three fluorescent constituents were observed under UV light at a wavelength of 365 with separate distinct colors (Plate 2a), and Rf values are presented below (Table 5). Still, four constituents were noted after treatment with 20% methanolic sulphuric acid under visible light (plate 2b).

Table 3: Chromatograms of PAX Herbal Health Tea under UV Lamp (365 Nm)

Components	Colour	Rf
1	Sky blue	0.8125
2	Pink	0.75
3	Pink	0.6875
4	Pink	0.5875
5	Pink	0.1125

Table 4: Chromatograms of PAX Herbal Health Tea under Visible Light (Sprayed with 20% Methanolic Sulphuric Acid)

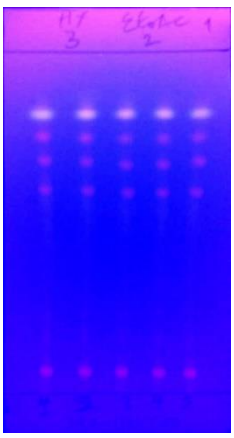
Components	Colour	Rf
1	Brown	0.9125
2	Brown	0.8125
3	Brown	0.7125

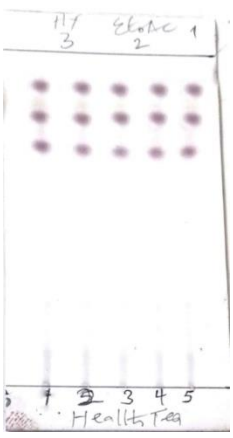
Table 5: Chromatograms of PAX Herbal Diatea under UV Lamp (365 Nm)

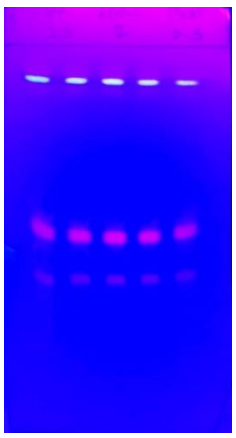
Components	Colour	Rf
1	Sky blue	0.9
2	Pink	0.45
3	Pink	0.325

Table 6: Chromatograms of PAX Herbal Diatea under Visible Light (Sprayed with 20% Methanolic Sulphuric Acid)

Components	Colour	Rf
1	Brown	0.925
2	Brown	0.35
3	Brown	0.25
4	Brown	0.1625







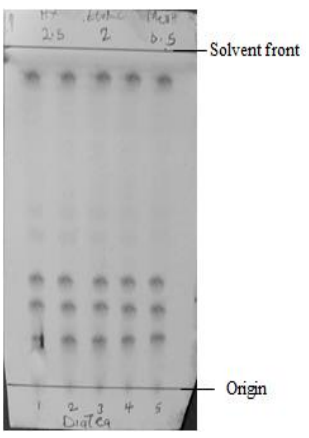


Plate 1b:
Pax Herbal Health Tea
Adsorbent–Silica gel GF_{254}
Solvent systems:
n-Hexane:ethylacetate (3:2)
Sprayed with 20% methanoli
Viewed under visible light.

Plate 2b: Pax Herbal Diatea
Adsorbent–Silica gel GF_{254}
Solvent systems:
n-Hexane:ethylacetate:methanol (
Sprayed with 20% methanolic H_2S0_4
Viewed under visible light.

Plate 2a:
Pax Herbal Diatea
Adsorbent–Silica gel GF_{254}
Solvent systems:
n-Hexane:ethylacetate:methanol (2.5:2:0.5)
Viewed under 365 nm.

Plate 1b:
Pax Herbal Health Tea
Adsorbent–Silica gel GF_{254}
Solvent systems:
n-Hexane:ethylacetate (3:2)
Sprayed with 20% methanolic H_2S0_4
Viewed under visible light.

The utility of TLC in the quality control of herbal drugs can not be overemphasized (Azebaze et al. 2015). Its merit includes but is not limited to low cost, plainness, and reproducibility. The appearance of chromatograms in ubiquitous and distinct bands can be functional for the identification and authentication of the medicinal condiment. The TLC biographies of the medicine studied (Paxherbal Bitter tea) shown in plates 1a & b showed that the medicine delved has some fluorescent and non-fluorescent ingredients with aligned bands and the same Rf values for all the different product batches. All identifications in the TLC are predicated on a comparison of the migration distances (Rf values), and the color of the spots between the sample when the TLC plate is sprayed with a specific chromogenic reagent. The quality of the assay depends on the accurate positioning of the samples exploited in the TLC (Durón et al. 2009).

4. Conclusion

Phytoconstituents of Paxherbals Health tea are limited to Alkaloids, Flavonoids, Reducing sugar, Tanin, Cardiac glycosides, Steroids, and Terpenoids, and its TLC finger-prints are five fluorescent ingredients. Pax Herbal Diatea, phyto-components are confined to Flavonoids, saponin, Cardiac glycosides, Reducing sugar, Steroids, and Terpenoid and contained only three fluorescent and four non-fluorescent on TLC plate under the said conditions as markers for the delved medicines and established the identity of the medicines. therefore the uniqueness and consistency of the herbal medicines can be watched through qualitative phytochemical screening and TLC profiling.

5. Acknowledgments

We wish to admit the support of Pax Herbal Clinic and Research Laboratories operation for providing the medicine (Pax Herbal Health tea and Ditea) for the study.

6. Conflict of interest

The authors declare no conflicts of interest.

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