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Research Article

Proximate composition, phytochemical screening and mineral content studies of leaves extract of Adenanthera pavonina

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In this article

Abstract

Adenanthera pavonina belongs to the leguminous non-climbing plant, with a very prominent value in food chain and therapeutic medicine of traditional origin. The purpose of this study was to evaluate GC-MS analyzed methanolic leaf extract for proximate analysis, phytochemical screening and mineral content determination in order to authenticate its nutraceutical propensity. The leaves were collected, washed with distilled water, dried under shed and powdered. The phytochemical screening revealed the presence of alkaloids, saponin, flavonoids, carbohydrates, anthocyanin and betacyanin, quinones, cardiac glycoside, terpenoids, triterpenoids, coumarin, steroids, and acids while oxalates, phenol and tannins were absent. The results of a proximate analysis revealed that the plant possessed a significant amount of protein (8.050 ± 0.15% %), crude fiber (11.088 ± 0.07%), moisture content (7.135 ± 0.18%), crude fat (0.8459 ± 0.34%), carbohydrates (67.7911 ± 0.85%), ash contents (5.09 ± 0.11%), organic matters (94.91 ± 0.93%) and vitamin A (0.196). Quantitative analysis on mineral content revealed the presence of Mn (125.350 mg/kg), Fe (878.450 mg/kg), Ni (15.850 mg/kg), Cr (15.850 mg/kg), Cu (11.950 mg/kg), Zn (24.500 mg/kg), K (0.721%), Na (0.074%), Ca (0.988%), Mg (0.988%), Magnesium (0.9 (0.730%). The study also showed that cobalt, cadmium, and lead could not be detected due to the detection limits of the instrument. Physicochemical and spectral analysis were carried out using FT-IR and GC-MS to identify the content of each extract and the hypothesized structures were correlated from spectroscopic data.

Keywords:

- Adenanthera pavonina L
- phytochemicals
- nutraceutical
- proximate analysis

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1. Introduction

Medicinal plants are considered the rich source of nutraceuticals which play commanding role in world health (Oladeji, Citation2016). The stem-bark of Adenanthera pavonina L. is utilized for the treatment of diverse kind of diseases in trado-medical practice. It is a tree of moderate size which average dimension of 15 meters high and 45 centimeters of circular diameter. It belongs to the Leguminosae family and Mimosoideae sub-family (Souza, Brandão-Costa, Albuquerque, & Porto, Citation2016). The bark colour is dark brown to grey. It exists primarily in continent such as Asia, Africa, and Caribbean (Geronço et al., Citation2020) as well as south-east region of India and Bangladesh (Ara, Saleh-E-In, Hashem, Ahmad, & Hasan, Citation2019). Various components of this plant are utilized in orthodox therapeutic medicine to cure a variety of ailments. The trado-medical practitioners reported that the stem-bark and leaf extracts of A. pavonina are useful for the treatment of diarrhea (Pandhare, Balakrishnan, Bangar, Dighe, & Deshmukh, Citation2017), cancer (Kuruppu, Paranagama, & Goonasekara, Citation2019), gout, hematuria (Ara et al., Citation2019), hematemesis, and chronic rheumatism (Moniruzzaman, Khatun, & Imam, Citation2015).

Nutraceutical is a term derived from “nutrition” and “pharmaceutics.” The term is applied to products that are isolated from herbal products, dietary supplements (nutrients), specific diets, and processed foods such as cereals, soups, and beverages that other than nutrition are also used as medicine (Kalra, Citation2003).

A. pavonina is one of the first-liners among the plants used in phytoremediation. It serves as adsorbent for the removal of copper from an aqueous solution (Sen, Sarma, & Bhattacharyya, Citation2015). There are about 30,000 edible plants known, yet just 300 have been domesticated, thereby providing more than 95% of plant for human sustenance. Ethnobotanical survey and experimental validation showed that this plant exhibits antimalarial (Adedapo et al., Citation2014), anti-inflammatory (Koodalingam, Manikandan, Indhumathi, & Kaviya, Citation2015), antimicrobial (Adeyemi, Adedapo, Adepapo, & Moody, Citation2015), antioxidant (Melo et al., Citation2018; Partha & Rahaman, Citation2015), antiproliferative (Araujo et al., Citation2019), antidiabetic (Kolhe, Chaudhari, & Patil, Citation2021), α-amylase inhibitory (Wickramaratne, Punchihewa, & Wickramaratne, Citation2016) activities among others.

Moreover, inadequate amounts of daily intake of balance diet have been linked to downward population growth experienced in developing countries (Have, Owolabi, Steijns, Kudla, & Melse-Boonstra, Citation2020). They are experiencing issues such as increased population pressure, depletion of natural sources of amino acids, fats, and protein (Tan et al., Citation2020). Poverty and limited agricultural productivity are all factors in their everyday diet. Low agricultural productivity and poverty have exacerbated the situation, as they have been unable to satisfy the proper nutritive requirements for sufficient improvement of status of growth and development of the populace in such regions (Adebayo & Balogun, Citation2018). The overall negative impact of protein deficiency is demonstrated by the emergence of a variety of protein calorie illnesses. Some of such illnesses are: kwashiorkor (Atassi, Citation2022), marasmus and other nutritional problems which lead to overt loss of adipose tissue and muscle (Titi-Lartey & Gupta, Citation2022). Given the current food security problems, researchers might look at the nutritional composition of under-utilized seed oil and their plants in order to improve the country's food profile and status.

In addition, exploration of the therapeutic potential of A. pavonina have received substantial efforts from medicinal plant scientists as unveiled in a published review by George, Joseph, and Venugopal (Citation2017). Thus, traditional medicine uses several parts of this plant to treat inflammation and rheumatism (George et al., Citation2017). In another study, Mujahid, Siddiqui, Hussain, and Hussain (Citation2013) expatiated on the anti-oxidant and anti-inflammatory activities of it, while Godoi et al. (Citation2014) reported on its hepato-protective action. This is because this plant contains a variety of secondary metabolites that could have added to its medicinal propensity. It has a long history of traditional applications and proven pharmacological activities. As a result, the aim of this study is to experimentally provide relevant data for nutraceutical propensity of GC-MS analyzed leaf extract of A. pavonina. This is executed through expeditious assessment of its phytochemical screening, proximate composition and mineral content determination in order to determine the present potentiality and future prospects to humanity.

2. Materials and method

2.1. Instrument and measurement

Oven was used for moisture determination, Muffle furnace for ash content determination, heating mantle was used for controlled heating with temperature regulator. After the extraction, the solvents were evaporated using an IKA® RV 10 Rotary evaporator. Other equipment and instrument used are water bath, ultraviolet light flame photometer, uv-visible spectrophotometer Buck Scientific AAS model 210, Nicolet FT-IR. The extract was GC-MS analyzed using an Agilent 6890 A GC/5973 MS. All chemical used were of analytical grade and used without further purification.

2.2. Sample collection and preparation

Leaves of Adenanthera pavonina Linn were harvested from the early hours of 6—8 am of March 7, 2022 at Covenant University campus in Ota, Ogun State, Nigeria. Authentication and identification of the plant species were carried out at the Biological Sciences Department of our institution and a voucher specimen was available there for reference purposes. Leaves of this plant were cleaned and air-dried at room temperature for 5 days, and then under the influence of Thermofisher Vacuum oven at reduced temperature until they reached a consistent weight. The pulverization of the dried leaves was achieved with the help of a mechanical blender. The powdered leaves were then soaked in methanol for seven days with intermittent stirring for homogeneity and effective extraction. Prior to extraction period, the pulverized leaf materials were protected from rays of light, dust, and other particulate matter. The powdered leaves samples were likewise secured from microbial contamination.

2.3. Preparation for leaves extraction

The dried powder of Adenanthera pavonina was extracted with pet-ether, diethyl ether, chloroform, acetone, ethanol, methanol and distilled water. The extracts were then concentrated in vacuo by IKA® RV 10 rotary and the semi-solid extract obtained was concentrated by gentle heating at a reduced temperature over water bath. The sample was kept in the refrigerator after the extraction procedure was completed.

2.4. GC-MS analysis condition

The 6890 A gas chromatograph was used in conjunction with a 5973 C inert mass spectrometer. The detailed description of the condition can be found in the supplementary material section.

2.5. Proximate determination

Proximate analysis was determined through standard methods using 10 g of the extract. For instances, determination of protein and carbohydrate was carried out using Owoeye, Ajani, Akinlabu, and Ayanda (Citation2017); Molisch's test by Owoeye et al. (Citation2017); Akinlabu et al. (Citation2019); Biuret test by Ajani et al. (Citation2016); moisture content by Akinlabu et al. (Citation2019); Ajani et al. (Citation2016) and total ash content Ajani et al. (Citation2016).

2.6. Mineral content analysis

Pre-treatment of the sample in acceptable standard solution in readiness for spectrometric analysis was carried using acid digestion. Afterwards, the minerals content analysis was carried out according to a known procedure (Owoeye et al., Citation2017). The elements which include Ca, Mg, Zn, Fe, Cd, Co, Pb, Ni and Mn were analyzed using atomic absorption spectrometer with serial No GE71211B (S4 AA System, USA). Two metals namely K and Na were analyzed with a flame photometer (PFP7, Jenway, UK).

3. Results and discussion

3.1. Phytochemical screening

Over the years, natural products have been source for health and vitality to man. It has been source of food and curative medicine to man (Oladeji, Citation2016). Ethnobotanical surveys have unveiled the undeniable use of the medicinal plant in the treatment various infectious diseases in human could be dated back to antiquity. In the continuation of our research effort on the nutritional chemistry and pharmaceutical diversity of Adenanthera pavonina (Owoeye et al., Citation2017), we herein report the nutraceutical endowment (i.e. nutritional properties and pharmaceutical potential) of its leaf extract. Standard techniques were used to evaluate the phytochemical screening of Adenanthera pavonina linn leaves extract (Owoeye et al., Citation2017). The results of qualitative phytochemical screening of Adenanthera pavonina leaf extract is as shown in Table 1. Alkaloids were found in petroleum ether, chloroform, diethyl-ether, distilled water, and ethanol fractions, but not in methanol or acetone fractions, according to phytochemical screening of the leaves. Alkaloids are core framework in many pharmaceuticals and are documented to be bioactive agents used as anti-inflammatory substances (Heinrich, Mah, & Amirkia, Citation2021).

Table 1. Phytochemical screening result of Adenanthera pavonina leaf extract.

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Furthermore, saponin availability was noted in ethanol, methanol, acetone and water extract, but absent in petroleum ether, diethyl-ether and chloroform extract. Flavonoids are present in the chloroform extract and distilled water, but absent in the petroleum ether, acetone, diethyl-ether, methanol and ethanol extracts. Flavonoids wage war against free radicals to arrest oxidative stress in the body. It also regulates the cellular activity for effective metabolism (Ullah et al., Citation2020). Anthocyanin and betacyanin as well as quinones were only present in distilled water sample but absent in the remaining six solvents. Cardiac glycosides were found in ethanol and methanol, as well as acetone extracts but absent in the extracts of the remaining four solvents. Cardiac glycosides are naturally occurring phytochemical with potential for inhibition of Na^{+}/K^{+}-ATPase and treatment of congestive heart failure. Terpenoid was present only in methanol extract which indicated that the terpenoid might contain highly polar side chains and polar functional moieties attachment. Triterpenoids were present in petroleum ether, methanol, acetone and ethanol but absent in chloroform, diethyl-ether and distilled water extracts. All the solvent fractions were void of phenols. Coumarins was found in distilled water extract but not in methanol extract and the rest. Steroids was found in all the solvent extracts, except distilled water or petroleum ether extracts. Only acetone extract included the acids. Oxalate and tannins were absent in all seven solvent fractions. The absent of oxalate in the extract of A. pavonina connotes its medicinal advantage because oxalate binds with mineral in the gut by forming complex which makes it difficult for the body to absorb such mineral/Oxalate can cause circulation of monocyte and CaOx kidney stone formation (Kumar et al., Citation2021) (Figure 1).

Figure 1. The pictorial view showing the processing stages for the sample.

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3.2. Proximate determination of Adenanthera pavonina leaves

Proximate determination was carried out using a well-established procedure methods and the result is as shown in Table 2. A total of 10 g of the extract was utilized while the value of each parameter was reported in %. Leaf organic matter was calculated from the determined parameters aforementioned. The moisture content was 7.14 ± 0.18%. The crude fiber content of Adenanthera pavonina leaves was 11.09 ± 0.07%. Diets high in fiber, such as cereals, nuts, fruits, and vegetables, are beneficial to one's health since they have been linked to a lower incidence of various illnesses. Various functional meals, such as bread, drinks, beverages, and animal products, can all benefit from dietary fiber (Ajani et al., Citation2016). Protein was found to be 8.05 ± 0.15% in Adenanthera pavonina leaves. Using total nitrogen measurement multiplied by a particular conversion ratio as indicated in the Kjeldahl technique, the protein content was calculated (Akinlabu et al., Citation2019; Owoeye et al., Citation2017). Protein is required for the formation and maintenance of all cells in the body. Protein is an important part of any diet because it gives your cells energy and allows you to stay active Adenanthera pavonina leaves have a carbohydrate content of 67.79%. Carbohydrates are macronutrients that are one of our body's three basic sources of energy. Carbohydrates are named from the three chemical elements that they contain: carbon, hydrogen, and oxygen. Carbohydrates are a group of nutrients that include simple sugars and starches. The cells, organs, and tissues of our body use this sugar as a source of energy. The excess energy or sugar is converted to glycogen through the instrumentality of insulin and it is stored under the adipose tissue, in the muscles and liver (Athyros et al., Citation2020). Vitamin A is required for growth and development, immune system function, and good vision, among other things (Huang, Liu, Qi, Brand, & Zheng, Citation2018). Vitamin A in the form of retinal combines with the protein opsin to generate rhodopsin, a light-absorbing molecule (Kim & Sparrow, Citation2021) necessary for both scotopic and color vision. The amount of ash in the leaf extract of A. pavonina is 5.09 ± 0.11%. According to a prior study, the ash level of a sample was 3.05%, which is an indication of mineral richness. The kind as well as the quantity of ions and nutrients present within a particular soil may alter the ash level of the plant sample grown on such soil. The amount of ash in this study is within the permissible range (Ajani et al., Citation2016; Akinlabu et al., Citation2019) and it is a strong indication that the leaf is rich in minerals. The proximate analysis yielded a total organic matter value of 94.91% for Adenanthera pavonina leaf extract (Figures 2 and 3).

Figure 2. Comparative study of crude fiber of A. pavonina leaf to other vegetables.

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Figure 3. Comparative study of %Protein of A. pavonina leaf to other vegetables.

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Table 2. Proximate determination of Adenanthera pavonina leaf extract in % of 10 g.

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3.3. The mineral content determination

Qualitative and quantitative determination of mineral contents in food sample is a crucial component of nutraceutical profiling and salient prerequisite for oil quality evaluation and authentication. It also serves as means of monitoring of level of adulteration and pollution. In view of the aforementioned, the mineral content determination of the A. pavonina leaf extract was carried out with the aid of AAS (Table 3). The leaf extract of Adenanthera pavonina contained 15.850 ± 0.035 mg/kg of Nickel. Although, there is no evidence denoting nutritional benefit of this micronutrient to man; but it is salient in the proper growth and effective development in organisms, animal and plant (Genchi, Carocci, Lauria, Sinicropi, & Catalano, Citation2020). It is also used to treat iron deficiency anemia (a lack of healthy red blood cells), as well as weak and brittle bones (osteoporosis), Adenanthera pavonina leaves had 878.450 ± 4.003 mg/kg of iron. It might be of great benefit in the prevention and treatment anemia, which is caused by a lack of iron in the body. It could also be used to treat anemia brought on by a chronic illness, pregnancy, or renal issues (Ajani, Owoeye, Owolabi, Akinlabu, & Audu, Citation2019). Adenanthera pavonina leaves have a manganese content of 125.350 ± 1.021 mg/kg. Manganese is involved in a variety of biological activities, including amino acid, cholesterol, glucose, and carbohydrate metabolism. It also aids in bone growth, blood coagulation, and inflammation reduction. Manganese is not produced by the human body, although it can be stored in the liver, pancreas, bones, kidneys, and brain. Manganese is generally obtained from one's food. Copper supplements are available, and the leaves of Adenanthera pavonina contained 11.950 ± 0.027 mg/kg. However, it is important to try to absorb vital vitamins and minerals from diet first to avoid the possibility of an imbalance. The leaves of Adenanthera pavonina contained 24.500 ± 0.053 mg/kg Zinc. Zinc is an important nutrient, which means you must obtain it through your diet. If you can't acquire it from natural whole-food sources, fortified foods are a wonderful alternative. Zinc is required for enzymatic activities, immunological function, wound healing, and DNA synthesis. It also ensures that you can taste and smell things. The following element are absent in the leave of Adenanthera pavonina Chromium, Cobalt, Cadmium and lead proved that the leave is edible while these elements Sodium, Calcium, Magnesium and Potassium are present in minute quantities. It is noteworthy to compare the concentrations of these metals with that of the safe limit according to WHO/FAO standards (Bawwab et al., Citation2022). According to Table 3, all these metals are present within safe limits for human consumption except for Fe (878.45 mg/kg) which was above the safe limit (500 mg/kg).

Table 3. The mineral content determination of A. pavonina linn leaves.

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3.4. FT-IR and GC-MS characterization

The result if the FT-IR spectral analysis was extracted from the spectrum (See supplementary material) and presented in data form (Table 4). The absorption band at 3457 cm^{-1} depicted the presence of carboxylic acid, OH (broad band). This established the presence of numerous fatty acid which was further corroborated by the GC analysis of Adenanthera pavonina leaf extract. The broad band of OH indicated the presence of strong intermolecular interactions (hydrogen bonding) it exhibits. This accounts for carboxylic acid being dimeric in nature (Smith, Citation2018). The absorption band at IR frequency of 2950 cm^{-1} revealed the C-H in aliphatic band which is in tandem with the range earlier quoted for aliphatic CH in a previous study (Audu, Jooste, Malan, Ajani, & October, Citation2021). This accounted for the methyl, methylene and methine aliphatic chain in most of the GC components. The absorption band at IR frequency of 1640 cm^{-1} depicted the presence of C = C. The C = C we observed at a high wavenumber (1640 cm^{-1}) was as a result of the direct link of the assigned C = C to highly electronegative moieties like CO_2H (i.e. C = C–CO_2H) or OCOR (i.e. -C = C–OCOR) which provided -I inductive effect to the C = C. This was further validated by the bending vibrational frequency at 1052 cm^{-1} for CH of alkene (=C-H). The bending mode at 459 cm^{-1} IR frequency depicted the existence of aryl disulfide in the leaf extract of A. pavonina. Aryl disulfide is a valuable compound found in supplements and garlic-like substances (Nandiyanto, Oktiani, & Ragadhita, Citation2019). The bending vibrational frequency at 799 cm^{-1} was for C-Cl functionality representing the presence of haloalkane or chlorinated aliphatic.

Table 4. FT-IR spectroscopic characterization of leaf extract of A. pavonina.

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According to the result of GC-MS analysis which run based on the condition in the experimental, the leaf extract chromatogram of A. pavonina is presented in Figure 4 with the retention time varied from 3.387 to above 21.00. The chromatogram granted easy access for convenient comparison of the signal peak of each composition to that of the NIST library for excellent molecular identification. The structural authentication of the molecular constituents is as presented in Figures 5 and 6. Structural identity of GC-analyzed components 1-14 of A. pavonina leaf extract were as drawn in Figure 5 while components 15-25 of A. pavonina leaf extract were given in Figure 6. The structures were drawn using ChemBioDraw Ultra 12.0. The major constituents include organic acids, polymeric alkanol, aliphatic alkanol while the rest are present in small quantity. The acid constituents alone account for 75.69% of Adenanthera pavonina leave composition with 9-octadecenoic acid (oleic acid) being 49.11% and n-hexadecanoic acid (palmitic acid) being 26.58%. The rest of the compositions which added up to 24.31% were stigmastan-3,5,22-triene, stigmasterol, cholesta-7,14-diene, (5alpha)-, ergosta-4,7,22-trien-3.beta.-ol. 1H-Indene, 2-butyl-5-hexylocta hydro-, dihydrotachysterol, 1,22-docosanediol, 2-heptafluorobutyroxydodecane, 1,3-cyclopenta diene, 1,2,3,4-tetramethyl-5-methylene-,1-iodo-1-methylcyclohexane, trichloroacetic acid, undec-2-enyl ester, myristic acid, nonyl tetradecyl ether, 4-(1-methylpiperidin-4-yl)benzene-1,2-diol, pentadecanoic acid, methyl hexadec-9-enoate, 9-cycloheptadecen-1-one, (Z)-heptadecanoic Acid, ergost-4,7,22-trien-3alpha-ol, (E,E)-10,12-hexadecadien-1-ol acetate, (Z,Z)-10,12-hexadecadien-1-ol acetate, naphthalene, 1,2,3,4-tetrahydro-5-(1-phenylethyl).

Figure 4. GC-MS chromatogram of the of A. pavonina leaf extract.

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Figure 5. Structural identity of GC-analyzed components 1–14 of A. pavonina leaf extract.

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Figure 6. Structural identity of GC-MS analyzed components 15–25 of A. pavonina leaf extract.

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Furthermore, only 9-octadecenoic acid also known as oleic acid made up the largest percentage (49.11%) of the total composition. It is an unsaturated fatty acid having one degree of unsaturation at carbon-9 position. It is the most abundant and widely dispersed in nature. It is non-essential fatty acid because the human system can synthesize it through endogenous approach. It is useful for the enhancement of mitochondrial oxidation of saturated fatty acid (SFA) and provides anti-inflammatory efficacy for cell protection (Peng et al., Citation2011; Piccinin et al., Citation2019). Hexadecanoic acid (palmitic acid, PA) is a well-known SFA which provides about 20–30% of total fatty acids in the human body (Carta, Murru, Banni, & Manca, Citation2017). Hence, all the benefits of palmitic acid to infants have been well articulated according to a review by Innis (Citation2016). Stigmastan-3,5,22-triene and Stigmasterol are isomers, Stigmasterol, a plant sterol (phytosterol), is a highly prevalent plant sterol, and it plays an important role in the construction and functioning of cell membranes (Rogowska & Szakiel, Citation2020). It is a food additive with the E number E499 in the European Union, and it can be used in food manufacturing to boost phytosterol content, potentially decreasing LDL cholesterol levels. A useful human hormone that acts as an intermediary in the production of androgens, estrogens, and corticoids (Handelsman, Citation2022), as well as playing a key physiological function in the control and biochemical regulations associated with estrogen actions. It is also employed as a vitamin D3 precursor. Dihydrotachysterol is a vitamin D, a hydroxy secosteroid, and a seco-ergostane. These compounds Ergost-4,7,22-trien-3alpha-ol, Trichloroacetic acid, Nonyl tetradecyl ether, 1,3-Cyclopentadiene, 1,2,3,4-tetramethyl-5-methylene-2-Heptafluorobutyroxydodecane made up the lowest percentage of Adenanthera pavonina leave composition (Mordi et al., Citation2016).

Furthermore, a pictorial view of the general publication trend on A. pavonina from 1972 to 2022 is presented in Figure 7 according to the data mined from the Scopus database. It showed that the first publication on A. pavonina was recorded in 1972 after which there was no other publishable research effort until 1997. The awareness that was re-awakened in 1997 has been consistently sustained in an upward trend to date. This implies that all the secondary metabolites and phytochemicals provide great insight into the pharmaceutical diversity of the leaf extract of A. pavonina. The percentage of publications on Adenanthera pavonina according to the subject area from 1972 to 2022 is presented in Figure 7 (Scopus Database, Citation2022). Although, the first set of publications on Adenanthera pavonina was recorded in 1972, no record was there from 1973 to 1996. The remaining record that completed the data information in Figure 7 are from 1997 till date. The result of the data mining from the Scopus database gave a clear-cut corroboration and vivid agreement between the subject area publications data on A. pavonina and our experimentally reported finding on nutraceutical potential of leaf extract of A. pavonina in this present study. The two topmost-ranked subject areas in A. pavonina publications are agriculture (25.7%) and pharmaceutical (17.6%) (Scopus Database, Citation2022). This implies that A. pavonina publications in agriculture field validated the nutritional value as shown in the data obtained from proximate analysis and mineral content determination (Scopus Database, Citation2022). In a similar manner, A. pavonina publications in pharmacological/pharmaceutical field validated pharmaceutical potential as shown in the data obtained from phytochemical screening and GC-MS identified bioactive metabolites. This provides theoretical framework for the validation of nutraceutical potential of leaf extracted of A. pavonina reported herein.

Figure 7. General publication trend on A. pavonina from 1972 to 2022 (Scopus Database, Citation2022).

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This unveils the dual purpose nature recognizable through the nutritional and pharmaceutical/medicinal values of the leaf extract of A. pavonina.

Based on the definition of a nutraceutical by Kalra (Citation2003), the leaf extract of A. pavonina was herein confirmed to exhibit nutraceutical properties. Thus, the nutritional value was unveiled through the result from the proximate determination and the mineral content enrichment information which were experimentally acquired in this present study. It was shown to be rich in protein which is corroborated by the earlier report of Nwafor, Egonu, Nweze, and Ohabuenyi (Citation2017). It was also rich in vitamin A and others. The biological potential in the pharmaceutical profile was validated through the presence of various secondary metabolites in the leaf as experimentally authenticated in this study (phytochemical screening). This medicinal importance of A. pavonina was further substantiated by the findings of other studies that confirmed the medicinal and therapeutic efficacy of this plant. For instance, A. pavonina has been widely used in traditional medicine to treat a range of diseases including hypertension, diarrhea, gout, rheumatism, and cancer (Gerônço et al., Citation2020). Pharmacological studies have demonstrated antinociceptive, cytoprotective, anti-inflammatory, antihyperglycemic, and hypolipidemic effects of leaf and seed extracts (Pandhare et al., Citation2017).

4. Conclusions

Adenanthera pavonina leaf extract was herein analyzed for the identification of its phytoconstituents, proximate composition and physico-chemical parameters. Diverse standard scientific approaches have been successfully utilized to gather the array of data reported herein. the study revealed that the plants have many useful nutritional and mineral content that could be used as a supplement in the future formulation. Hence, it has sufficient merit to be used in dietary formulation based on its proximate data and nutrient composition. Adenanthera pavonina plant could be of high benefit to the population with nutritional deficiencies. Scientific evidence obtained herein shows that Adenanthera pavonina plant might be an excellent pathfinder and open door of opportunities for the development of phytomedicines and edible products with functional properties for future research endeavour.

Supplemental material

Supplemental Material

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Acknowledgement

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Disclosure statement

No potential conflict of interest was reported by the authors.

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