AMDHS ADVANCES IN MEDICAL, DENTAL AND HEALTH SCIENCES

e-ISSN: 2581-8538

RESEARCH ARTICLE OPEN ACCESS

Pharmacognosy and Phytochemistry: Bridging the Knowledge Gaps for the LMICs

Ridwan A Olawale *

A Ph.D. Research fellow at African College of Health. An Independent Biomedical Researcher, Nigeria

Received: 14-December-2022, Manuscript No. amdhs-22-83385; **Editor assigned:** 19-December-2022, PreQC No. amdhs-22-83385 (PQ); **Reviewed:** 27-December-2022, QC No. amdhs-22-83385 (Q); **Revised:** 28-December-2022, Manuscript No. amdhs-22-83385 (R); **Published:** 31-December-2022;
DOI: 10.5530/amdhs.2022.4.14

Correspondence to:

Ridwan A Olawale,
A Ph.D. Research fellow at African College of Health. An Independent Biomedical Researcher, Nigeria.

Published by : OZZIE PUBLISHERS

Abstract

This study reiterates further on the educational needs for plant derivatives as a source for Nutritional/ Pharmaceutical (Nutraceutical, Cosmetics and endless) products in our ever-changing world of Research and Development (R&D). The study is focused mainly on the Lower and Middle Income Countries (LMICs) peculiarities, in terms of how mobile applications (APPs) has influenced access to the pharmaceutical knowledge databases, taking work and life into consideration for synchronous & asynchronous online learning experiences. Not disregarding the fact that the Pedagogical methods tends to appeal more to the technical hands-on (practical) skill learners, especially in the field(s) of Pharmacognosy and Phytochemistry that involves a lengthy logistic moving rounds, coupled with staffing issues. Be that as it may, whoever oversees food and medicine in between the farm and the supermarket shelf deserves to be adequately trained. Uni (app) in pockets of health care personnel for Standard Operating Procedures (SOP) around Activities of Daily Living (ADL) is for the healthier world. **Results:** Today, unlike days before the COVID-19 Pandemic, almost all tutors and trainees of Life Sciences agreed that the online module tutored and assessed through 'Mobile Applications' was useful for new topic learning and revising, provided relevant content (and flexibility), and thus facilitated their understanding. **Conclusion:** The study concluded that the results obtained can be used to inform policymakers, educational institutions, mobile app developers and stakeholders for policy adjustment, incentives, skills updates and universal internet coverage for the LMICs, thereby promoting Universal Health Coverage (UHC), as well as food sustainability, while at the same time substantiating a much-needed restructuring to the pedagogical methods, of importance to the practical and intuition in Pharmaceutical education.

Keywords: Pharmacognosy, Phytochemistry, Lower and Middle Income Countries (LMICs), Mobile Apps, Standard Operating Procedures (SOP)

Introduction

Pharmacognosy is the study of those natural substances, principally plants that find a use in medicine [1]. Phytochemistry is the study of chemicals derived from plants (including the identification of new drug candidates derived from plant sources). These two specialties are of immense importance to biological scientists and pharmaceutical researchers alike.

Life scientists and Biomedical researchers are striving to inform as many as possible, in this instance about how we can rest assured that the quality, safety, efficacy, and nutrients of what gets to the bedsides (as well as dining desks), are of natural materials that were hygienically prepared and compounded to formulations (food and medicine respectively), using the up-to-date Standard Operating Procedures (SOP).

According to the World Health Organization (WHO), more than 80% of the world's population relies on herbal product(s) for one reason or the other, not just that, risen health problems amid the COVID-19 pandemic has changed the whole statistical data to the uptrend for the Pharmaceutical (Nutraceutical inclusive) industries.

Previous findings suggest that the main barriers to the global use of technology in medical/pharmaceutical education include geographical disparities, negative attitudes, and lack of technical know-how, while internet access difficulties account for the reason 6 out 10 Sub-Saharan are not subscribing to the so-called Natural Science resources (see bar chart below), although, that itself is likely to be a direct or an indirect impact of economic deprivation, but this study address internet access difficulties as a component of "limits of technology" rather.

Low to Middle Income Countries (LMICs) in general tends to face greater health challenges, largely due to their decreased resources in comparison to Higher-Income Countries (HIC). Sub-Saharan Africa in comparison to the Middle East and North Africa (MENA) and Southeast Asia within the so-called LMICs, experiences the highest disease burdens, as a result of many factors among which health education is of considerable importance. There are different reports on digital resources that include online global health courses being available for worldwide use that has been recommended as effective tools to address the shortage of qualified health workers in LMICs and low-resource settings [2]. Doing goodness to online healthcare learnings, in general, will expand the health workforce's capacity to deal with disease burdens within the LMICs and beyond.

An independent web-based study conducted for the subject in question at the African College of Health (an online institution of health care learning) in 2021 further substantiates the fact that the main barrier to Medical Education Online in Sub-Saharan Africa is internet accessibility issues (6 out of 10). Other factors are socioemotional, lack of motivation, doubtable quality of online content, limits of technology, and busy schedules **(FIGURE 1).**

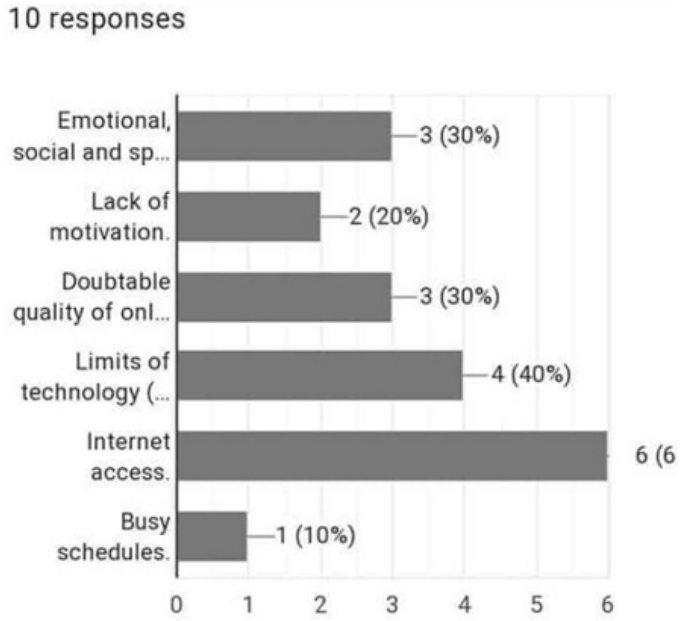

FIGURE 1. The main barrier to medical education online in sub-Saharan Africa is internet accessibility (6 out of 10)

As previously mentioned, a study of plants and their constituents is of great importance to human existence, people are being displaced for natural and man-made reasons than ever before, not just that, thinkers have suggested that "Mobile Apps" may assume places of traditional classrooms one day. Whether those arguments are true or not, E-learning (learning conducted via electronic media, typically on the internet) is already a way out.

Method/Design

▪ Identification of the cause(s) of knowledge gaps

An independent reviewer equipped with only a handheld device came up with an idea that could do a facelift to the sketch of things that needed to be done in addressing the root cause(s) of knowledge gaps in Pharmacognosy and Phytochemistry education, as identified (see **FIGURE 1** for the identified barriers for the Sub-Saharan Africa as a geographical segment of the LMICs).

A postgraduate degree curriculum was structured in the most basic format, in furtherance to the mechanization of the implementation processes for most guidelines as laid down by the Pharmacopeia authorities, Food and Agriculture Organization (FAO), Food and Drug Administration (FDA), WHO and various other evidence-based articles, all collected from the scratch using mobile Apps (Google searches primarily, pre-structured keywords employed includes "Pharmacognosy", "Phytochemistry" & "E-learning").

▪ Sources of Articles on the Standard Operating Procedures (SOP)

The articles on the standard operating procedures for "Medicinal Plants" Collection, Processing, Extraction, Isolation Purification, Identification, Formulation Packaging, Labeling, and Storage were grafted from the "WHO Guidelines and Supplementary articles on Herbal Medicines". The bulk of other evidenced-based articles on the technological aspects of Pharmacognosy and Phytochemistry were sourced from various peer review journals (in between PharmaXChange & PubChem). The food and Agriculture Organization (FAO) of the United Nations article were edited for Guidelines on Good Agricultural and Collection Practices (GACP) for Medicinal Plants [3].

The extracted articles were selected based on specified inclusion & exclusion criteria and trimmed using various editing techniques, in conformity with Learning Management Systems (LMS) pliability.

▪ Mobile Applications (App) Employed

Apps like: Zoho Writer, Google Docs, Microsoft Word, Adobe Acrobat Reader, and various other Editor Apps were called into play for texts. Audiovisual presentations were made using Pmly Photo Video Maker with Music, Picsart, and T2S: Text to Voice/Read Aloud Apps was employed for the photo plates and voices respectively.

Final paper drafts were kept in Gmail App, while audiovisuals were uploaded onto the YouTube App. Web-Based inquiries about Medical Education Online were obtained using G-Forms: Manage Google Forms **(FIGURE 1).**

▪ Learning objective structure

SMART (Specific, Measurable, Achievable, Realistic, and Timely) learning objective structure was employed [4]. The study plan was organized using a multidisciplinary approach to plant (and other natural substances) identification, extraction, analysis (and more).

Modules are phased into weekly pieces, all totaling 48 weeks, covering 12 main themes selected across all strata of food and herbal medicinal product from Pharmaceutical Management Information Systems 'PMIS' to Nutraceutical analytical & processing technologies (TLC: Thin Layer Chromatography; MS: Mass Spectroscopy; HPLC and more). The Master's Degree Program was versioned out in a way that ensured flexibility of possible integration with Artificial intelligence (AI), Machine Learning (ML), and Learning Management Systems (LMS) Apps.

How Specific?

The course is aimed at shedding light on the fundamentals of Pharmacognosy and Phytochemistry and is accessible yet affordable for all interested parties globally, LMIC professionals, and specifically for the Sub-Saharan. Pharmacognosy plays a major role in herbal drug studies in its entirety, while Phytochemistry is the study of phytochemicals which are chemicals derived from plants.

Selections from the Plant Resources of the Tropical Africa (PROTA), as well as Plant Resources of the World (PROW) were employed for the practical aspects (Macroscopic, Microscopic and morphological identifications &, etc.)

How Measurable?

Assessment of the level of E-learning understanding is as paramount as it is to the pedagogical method. The following evaluation approaches were fashioned out for the measurably of the course progress;

1. Quizzes
2. Essay questions
3. Drag-and-drop activities
4. Online interviews
5. Dialogue simulations
6. Online polls
7. Peer evaluation and review

How Achievable?

The Pharmacognosy and Phytochemistry Master's Degree (M. Pharm 'P&P') Online was carved out based on the best available evidence. Selected analytical methods, phytochemical tests, industrial processes, and managerial skills of importance to (the) R & D and pharmaceutical industries were highlighted. The articles selected were previously tested for training purposes, putting busy professionals in mind, aimed at issues related to quality, safety, efficacy, and nutritional constituents of end products.

Thereby equipping prospective enrolls with the fundamentals of,

1. Pharmacognosy (201)
2. Phytochemistry (202)
3. Spectroscopic identification of Organic Compounds (203)
4. Screening Methods in Pharmacology (204)
5. Industrial and Research aspects of Pharmacognosy (205)
6. Chromatographic Separation Technology (206)
7. Herbal Drug Technology (207)
8. Pharmaceutical Management Information Systems 'PMIS' (208)
9. Good Herbal Processing Practices 'GHPP' for herbal medicines (209)
10. Ethics, Research, Training, and Intellectual Property Issues; Herbal Medicinal Materials (210)
11. Good Manufacturing Practices 'GMP' for the Manufacture of Herbal Medicines (211)
12. Hazard Analysis Critical Control Point 'HACCP' (212)

How Realisable?

It is essential to have knowledge of phytochemistry for defining the chemical profiles of medicinal herbs and an understanding of analytical tests for the identification of the herbs and the quantitative assessment of any known active ingredients [5].

An independent web-based learning module was developed for a module on basic patient counseling skills for pharmacy students of a Malaysian public university. Out of a total of 124 students, 120 (96.8%) students participated in the study and completed an assessment and feedback survey. Students' knowledge scores were found to have significantly improved after completing the online learning activity, with a 47.9 ± 25.1% ($p<0.001$) improvement. Overall, more than 90% of students agreed that the online module was useful for new topic learning and revising, provided relevant content, which was arranged clearly and logically, and thus facilitated their understanding. The majority of students reported having enjoyed and were satisfied with online learning. More than half of them agreed that online learning was time-saving, allowed self-paced learning, and improved their confidence level [6].

How Timely?

The Pharmacology Masters (Pharmacognosy and Phytochemistry) Degree Program is phased out over 12 months of self-directed learning. Making it time and cost-effective for everyone, especially busy professionals.

Result

Today, unlike days before the COVID-19 Pandemic, almost all tutors and trainees of Life Sciences agreed that the online module tutored and assessed through 'Mobile Applications' was useful for new topic learning and revising, provided relevant content (and flexibility), and thus facilitated their understanding.

Discussion

The reviewer maintains that Medical and Pharmaceutical education online, as well as other areas of digital teaching, should be taught hand in hand with the traditional classroom student-teacher Interactions, even though this study was wholly conducted using a handheld device, pedagogical approaches are still the key to the technical know-how in Pharmacognosy and Phytochemistry training.

Conclusion

The study concluded that the results obtained can be used to inform policymakers, educational institutions, mobile app developers, and stakeholders for policy adjustment, incentives, skills updates, and universal internet coverage for the LMICs, thereby promoting Universal Health Coverage (UHC), as well as food sustainability, while at the same time substantiating a much-needed restructuring to the pedagogical methods, of importance to the practical and intuition in Pharmaceutical education.

Funding

Self-Funding covers the design of the study, collection, analysis, and interpretation of data.

Availability of data and materials

All relevant data are included in the article.

Ethics approval and consent to participate

Not Applicable.

Conflict of Interest

None

References

1. Evans WC. Trease and Evans' pharmacognosy. *Elsevier Health Sci*. (2009).
2. Clair V, Rossa-Roccor V, Mokaya A, *et al*. Peer- and Mentor-Enhanced Web-Based Training on Substance Use Disorders: A Promising Approach in Low-Resource Settings. *Psychatr Serv*. 70(11), 1068-1071 (2017).
3. World Health Organization. WHO guidelines on good agricultural and collection practices (GACP) for medicinal plants. *World Health Organ*. (2003).
4. Doran GT. There's a S.M.A.R.T. way to write management goals and objectives. *Manag rev*. 70(11), 35-36 (1981).
5. Phillipson JD. Phytochemistry and pharmacognosy. *Phytochemistry*. 68(22-24), 2960-2972 (2007).
6. Lean QY, Ming LC, Wong YY, *et al*. Validation of online learning in pharmacy education: Effectiveness and student insight. *Pharm Educ*. 18, 135-142 (2018).

Cite this article as: Olawale RA. Pharmacognosy and Phytochemistry: Bridging the Knowledge Gaps for the LMICs. Adv. Med. Dental Health Sci. 2022;5(4):64-66.