# EPPAD Bulletin

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## Official Biannual Publication of the Ethiopian Pharmacists and Pharmaceutical Scientists Association in the Diaspora (EPPAD)



**Manuscripts to the Bulletin can be sent to our email address: @ info@eppad.org**

# In This Edition

# Editor's Note

EPPAD Bulletin is hereby bringing Volume 2, Number 1 to its readership. It is the second issue following the inaugural edition that was published in September 2021. The maiden issue was printed in hard copies and distributed among the 2021 conference participants. Since then, EPPAD Board and the Editorial Team felt the need to go on-line to reach a wider readership.

Despite the constraints of COVID-19, the 2021 Conference was held successfully in downtown Silver Spring, Maryland on September 4, 2021. In this issue, pictorial highlights of the meeting are presented, including the opening session, award presentations in various areas of pharmacy, and poster session, just to mention some of the actvities.

Various articles are included in this issue. In the Pioneers of Ethiopian Pharmacy section, Ato Aklile writes about the illustrious career of Ato Eshetu Wondemagegnehu, who was in the early third group of pharmacists who were ever trained at the-then University College of Addis Ababa (now Addis Ababa University and in-between Haile Selassie I University). His career path is indeed exemplary and inspiring to a generation of pharmacists. Dr. Tesfaye Biftu and co-authors provide useful insights on the health benefits of selected Ethiopian foods, coffee, food supplements and spices. They provide not only the nutritional values and pharmacologic activities of the products, but also their major chemical profiles. The article reinforces the beneficial aspects of these items, which are commonly overlooked.

In the Clinical Highlights section, Basil Mohamed and Dr. Bisrat provide a summary of three oral antiviral agents which have secured Emergency Use Authorization (EUA) status from the FDA. Two of the products are single agents, while Paxlovid™ manufactured by Pfizer Inc is a combination product. These products will come handy for treating COVID-19 patients who can swallow and have GI integrity. It is to be recalled that the maiden issue (Volume 1, Number 1, 2021) carried an article by Dr. Tesfaye Biftu regarding updates on various COVID-19 preventive and treatment modalities.

In closing this note, the Editorial Team appeals to readers of this issue who are in the profession and allied fields to contribute timely and relevant articles. Until we make better arrangements, please send manuscripts via email to Fekadu.Fullas53@gmail.com. Together, we will make EPPAD Bulletin grow.

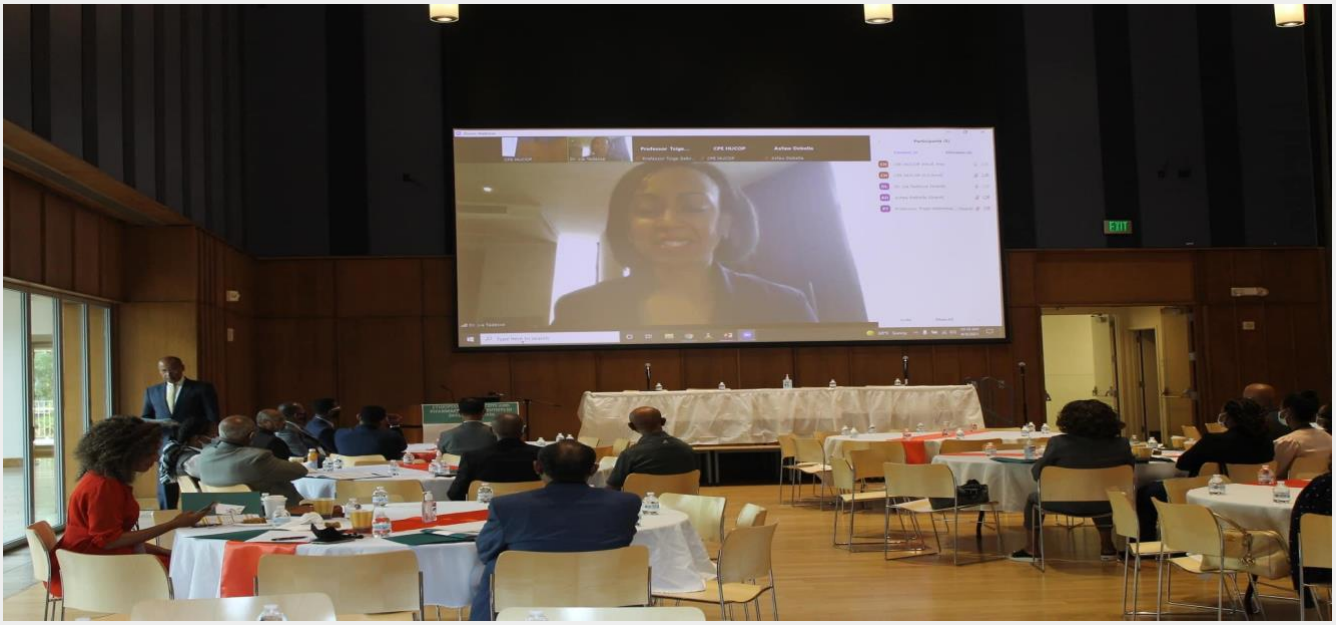
Fekadu Fullas, PhD

Editor- in-chief, ***EPPAD Bulletin***

(Senior editors: Profs Tesfaye Biftu, Bisrat Hailemskel and Ato Aklile G. Giorgis; Layout editor: Dr. Pawlose Ketema)

# Highlights of the 2021 Annual Conference and Other Recent Activities

## 1. Opening Session




## 2. Poster Session

## 3. EPPAD Board Members


## 4. Networking Session

## 5. EPPAD recognized outstanding pharmaceutical professionals in five categories in 2021

**Pharmacy faculty achievement**
**Professor Bisrat Hailemeskel**

**Leadership Achievement**
**Mesfin Tegenu**


**Pharmacy Practice Achievement Award**
**Ato Daniel Waktole**

**Research and Development Achievement**
**Professor Tesfaye Biftu**

**Social Responsibility Achievement**
**Mr. Gabriel Daniel**

## 6. EPPAD Board Members During Diaspora Homecoming in Ethiopia

## 7. EPPAD Philanthropy:

- EPPAD mobilized ~ $12,000 from its members to respond to the current emergency needs in Ethiopia.
- Support is on its way to reach the affected people, healthcare facilities and communities with emergency and rehabilitation needs

8. EPPAD would like to Recognize and appreciate the following members for their major contribution to EPPAD Philanthropy:
   - Ms. Fenteziya Zewdie
   - Dr. Ambaw Belete
   - Dr. Tesfaye Biftu
   - MR. Gabriel Daniel
   - MR. Zergabachew Zewdie

# Pioneers of Ethiopian Pharmacy: Ato Eshetu Wondemagegnehu

## Contributed by Gabriel Daniel (aka-Aklile G Giorgis)

This second issue of EPPAD Bulletin is featuring Mr. Eshetu Wondemagegnehu, of the third batch of Ethiopian graduate pharmacists, whose lifelong contribution in the history of pharmacy policy and regulation in Ethiopia represents the lion's share.

Mr. Eshetu Wondemagegnehu, was one of the six graduates in the class of the third batch. He got his Bachelor of Science degree in Pharmacy from the then University College of Addis Ababa (UCAA) in 1967, and then continued his higher studies at the American University of Beirut (AUB) in Lebanon graduating with a Master of Science degree in Pharmaceutical Quality Control in 1972.

After his first degree in Pharmacy, Mr. Eshetu started his professional career as chief pharmacist of the then Princess Tsehai - ልዕልት ፀሓይ - Hospital (now Armed Forces General Hospital). He then became the head of the pharmacy technician school at Menilik II Hospital in Addis Ababa which was established in 1961 as a Pharmacy Technicians Training School.

It was in April 1943 that the attempt of modern education in the field of pharmacy was made to train pharmacy personnel at the certificate level and the first training program was started at the same Menilik II Hospital.

After returning from Beirut, he joined the Quality Control laboratory Ministry of Health located at the then Pasteur Institute (now the Ethiopian Public Health Institute complex) at Gullele, Addis Ababa in 1973.

In addition to his position as head of the national QC laboratory, he assumed leadership position of the Pharmacy and Laboratory Department of the MOH in 1976.

Mr. Eshetu was the third head of the Pharmacy and Laboratory Department of the MOH, following in the footsteps of Mr. Hailu Guade and Mr. Baro Tumsa.

After the fall of the Dergue (the Military rule in Ethiopia), Mr. Eshetu stopped working for the Ministry of Health in 1991 and was replaced by Mr. Haileselassie Bihon.

His next chapter in his professional life started as a freelance consultant which got him into the World Health Organization (WHO) Essential Drugs Program in Geneva.

In 1993, Mr. Eshetu started working at WHO Headquarters for about ten years where he provided technical assistance and guidance to WHO regional and country offices in pharmacy policy and medicine regulatory matters in over 70 countries in Africa, Asia, East & West Pacific, and Europe.

While at WHO, Mr. Eshetu played a lead role in the planning and realization of the African Medicines Regulatory Harmonization (AMRH) initiative and developed the concept proposal for the establishment of the African Medicines Agency (AMA), which was accepted by the African Union and now ratified by member countries, making it the second specialized health agency of the AU after the African CDC.

Mr. Eshetu is also credited for helping in the planning/design/instrumentation phases of the construction of the Quality Control Laboratory of the

current EFDA building on Bole (Africa) Road in Addis Ababa, shown in the photo.

In 2009, Mr. Eshetu joined USP/PQM as chief of party for Ethiopia. He established the USP/PQM office in Addis Ababa as the first field office for USP outside the US. During his tenure as chief of party, Promoting the Quality of Medicines (PQM) helped Ethiopia develop and implement national regulations, directives, and guidelines that support quality assurance of medical products by working with the government regulatory body, local manufacturers, and other stakeholders. Mr. Eshetu provided technical assistance in policy review and implementation including mobilization of needed resources to strengthen the regulatory landscape to meet international standards.

Mr. Eshetu was one of the early founders and executive officers of the Ethiopian Pharmaceutical Association (EPA) where he served in different positions for about a decade between1975 and 1989. He has also served in several editorial committees of the Ethiopian Pharmaceutical Journal, including in the first issue published in June 1975.

Mr Eshetu enjoys his well-deserved retirement days in Addis Ababa/Ethiopia and Maryland/USA.

**Background to Regulatory Pharmacy in Ethiopia**

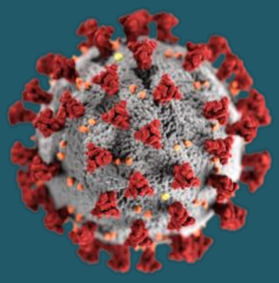
The 1942 proclamation - "The Pharmacists and Druggists Proclamation No 43/1942" of Ethiopia - was the first legal instrument used to regulate both pharmaceutical professions and the facilities where they were practiced.

The 1964 *"Pharmacy Regulation No. 288 / 1964",* a comprehensive regulation of the pharmaceutical market, formed the legal basis for official establishment of modern drug regulation in the history of Ethiopia. This started in earnest the regulation of the practice of pharmacists, druggists and pharmacy technicians, manufacturing, distribution, and sale of medicines.

In June 1999, a new regulation called the *"Drug Administration and Control Proclamation No. 176/1999"* repealed most parts of the regulation 288/1964. The law established an independent Drug Administration and Control Authority (DACA) with further mandate of setting standards of competence for licensing institutions/facilities.

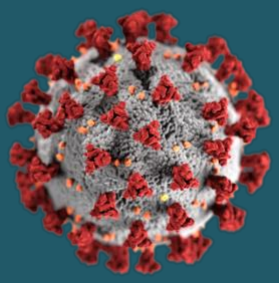
In 2009, DACA was re-structured as Food, Medicine and Health Care Administration and Control Authority (EFMHACA) of Ethiopia by the *"Proclamation No. 661/2009"* with added responsibilities of regulation of food, health care personnel and settings.

In 2019, the latest iteration of the regulatory transformation in Ethiopia came with the establishment the Ethiopian Food and Drug Administration, EFDA cited as *"A Proclamation to Provide for Food and Medicine Administration 1112/2019"*. This new regulatory administration is limited to the control of foods, drugs, cosmetics, and tobacco products.



# Clinical Insights
# COVID-19 and Oral Antiviral Medications

**Basil Mohamed, BSc, Senior Doctor of Pharmacy Student**
**Bisrat Hailemeskel, PharmD, RPh, ABAAHP, Professor**
**Howard University, College of Pharmacy, Washington, D.C**



**Paxlovid™ (nimatrelvir tablets, ritonavir tablets)**

**Indications: Mild-Moderate COVID-19 With Risk of Progression to Severe Illness**

Covid-19 is the syndrome that results due to infection by the SARS-CoV-2 virus. Although the exact origins of the virus are currently unknown, the first reports of its spread can be traced back to the city of Wuhan, China in late 2019. Shortly after this, the virus quickly sparked a global pandemic with over 400 million Covid cases and almost 6 million deaths reported worldwide. All individuals are at risk for SARS-CoV-2 infection, but those greater than 60 years of age are especially vulnerable to serious disease, as are those in long term care facilities, and those with chronic medical conditions. Preventative measures that have been used to curb the spread of the virus include quarantining, masking, social distancing, and vaccination. Notably, the COVID-19 vaccination campaign is by far the largest vaccination campaign in history with more than 10 billion doses given.

SARS-CoV-2 has an incubation period of up to 2 weeks and clinical presentation can be highly variable. Some patients are asymptomatic, while others present with respiratory failure or multi-organ dysfunction. In general, most cases present with fever, cough, shortness of breath, and including other symptoms emblematic of acute viral infection such as dizziness, vomiting and runny nose. Those with underlying comorbidities such as cardiovascular disease, chronic lung diseases, sickle cell disease, diabetes, cancer, obesity, CKD, being pregnant, being a smoker or age greater than 65 are at a heightened risk of progressing to severe disease.

Management of COVID-19 depends on the severity of the patient's illness and weather they are hospitalized or not. Mild illness is defined as the presence of symptoms typical of acute viral infection, but with the absence respiratory symptoms such as shortness of breath, dyspnea, or respiratory infiltrates. Moderate illness is defined as the presence of lower respiratory disease, but with oxygen saturation ≥94%.

Three drugs have currently been granted emergency use authorization (EUA) by the FDA and are now recommended for the treatment of mild-moderate COVID-19 in those at risk of progression to severe disease. These include:

| Manufacturer | Drug Name | Route of Administration |
|---|---|---|
| Pfizer Inc. | Paxlovid (nirmatrelvir/ ritonavir) | Oral tablets |
| Merck & Co. | Molnupiravir | Oral tablet |
| GlaxoSmithKline /Vir Biotechnology | Sotrovimab | Intravenous infusion |

In addition to these, fluvoxamine, a drug typically used to treat OCD, has displayed some efficacy and is under evaluation for possible EUA.
Prior to the EUA for these drugs, only monoclonal antibodies treatments were recommended for this indication. Monoclonal antibodies are very costly and must be administered by a health professional, therefore the availability of oral treatments provides

the benefit of improved cost and convenience compared to the old standard of care.
Paxlovid™ is indicated for the treatment of mild-moderate COVID-19 in individuals who are at risk for progression to severe illness.

**Mechanism of Action:**
Paxlovid™ is comprised of the SARS-CoV-2 protease inhibitor nirmatrelvir, co-packaged with the CYP3A inhibitor ritonavir.
The assembly of new viral particles depends on the ability of proteases to appropriately cleave viral proteins into their final functional structures. Nirmatrelvir directly binds to the SARS-CoV-2 main protease, inhibiting its catalytic ability and, likewise, the formation of new viral particles within the host cell. Ritonavir is a CYP3A inhibitor that reduces the rate of nirmatrelvir metabolism, thereby making its pharmacokinetic parameters more favorable. While ritonavir does inhibit HIV proteases, it does not have any effect on SARS-CoV-2 proteases and is therefore only used in its capacity as a PK-enhancer.

**Administration:**
Oral tablet

| **Dosing** | | | | |
|---|---|---|---|---|
| eGFR | Nirmatrelvir | Ritonavir | Frequency | Duration |
| ≥ 60 | 300 mg | 100 mg | BID | 5 Days |
| ≥30 to <60 | 150 mg | 100 mg | BID | 5Days |
| <30 | Avoid | Avoid | NA | NA |

**Dosage forms and Strengths**:
Nirmatrelvir 150 mg Tablet
Ritonavir 100 mg Tablet

**Administration notes**:
- Nirmatrelvir and ritonavir doses should be taken together at the time of administration
- Treatment with Paxlovid™ should be initiated as soon as a COVID diagnosis is made or within 5 days of symptom onset.

**Pharmacokinetics:**

| **Parameter** | **Nirmatrelvir** | **Ritonavir** |
|---|---|---|
| $T_{max}$ | 3.00 hours | 3.98 hours |
| $C_{max}$ | 2.21 mcg/ml | Not Reported |
| AUC | 23.01 mcg*hr/ml | Not Reported |
| Vd | 104.2 L | 112.4 L |
| Half-Life | 6.05 hours | 6.15 hours |
| Clearance | 8.99 | 13.92 |
| Metabolism | Minimal when taken with RTV | Hepatic (CYP3A & CYP2D6) |
| Elimination | Renal/Fecal | Hepatic |

Note**:** High fat meals were found to increase nirmatrelvir maximum plasma concentration by 15% and AUC by 1.6%

**Drug Interactions/contraindications:**
Drugs that inhibit or induce CYP3A or that are dependent on CYP3A for metabolism may interact with Paxlovid™. See University of Liverpool for full list of drug interactions.

**Pregnancy and Lactation**:
Animal studies revealed an increased risk of reduced fetal birth weight with nirmatelvir systemic exposures 10-times greater than clinical exposure. Ritonavir exposures 3-times greater than clinical exposure did not produce any adverse fetal effects. No other fetal effects were observed. A temporary decrease in the body weight of the nursing offspring of rats with 8-times the clinical exposure of nirmatrelvir was observed.

**Adverse Reactions**:
Diarrhea (3%), Taste sense altered (6%), hypertension, myalgia, Hepatitis and increased transaminases

**Additional precautions**:
Paxlovid™ is not recommended for those with severe hepatic impairment (Child-Pugh Class C).
In patients with uncontrolled HIV, Paxlovid™ may contribute to the development of protease inhibitor resistant HIV. Those taking an anti-HIV regimen containing ritonavir should continue their regimen as usual in addition to Paxlovid™.

Efficacy:
**EPIC-HR trial:**

**Study Design**: Randomized, double-blind placebo-controlled trial
N = 2,246

**Primary Endpoint**: Proportion of subjects with Covid-19 related hospitalization or death by day 28.

**Results**: The relative risk reduction for the primary endpoint in the Paxlovid™ group compared to the placebo group was 88% (95% CI = 75%-94%)

**Considerations for Recommendation:**

- Paxlovid™ provides the greatest efficacy among authorized treatments for mild-moderate COVID-19, with an 88% reduction in the risk of hospitalization or death compared to placebo.
- Unlike monoclonal antibodies or remdesivir, does not require clinical setting for administration.
- The abundance of drug-drug interactions warrant caution in some patients.

**References:**


1. Product Information: PAXLOVID (TM) Oral Tablets, nirmatrelvir oral tablets and ritonavir oral tablets. Pfizer Inc. (per manufacturer), New York, NY, 10017.
2. Paxlovid (2022). In Micromedex (Columbia Basin College Library ed.) [Electronic version]. Greenwood Village, CO: Truven Health Analytics. Retrieved February 5, 2022, from http://www.micromedexsolutions.com/
3. COVID-19 Treatment Guidelines Panel. Coronavirus Disease 2019 (COVID-19) Treatment Guidelines. National Institutes of Health.Available at https://www.covid19treatmentguidelines.nih.gov/. Accessed [2/5/2021].
4. Price of COVID treatments from Pfizer, Merck, GSK align with patient benefits. [online] Available at: <https://www.reuters.com/business/healthcare-pharmaceuticals/price-covid-treatments-pfizer-merck-gsk-align-with-patient-benefits-report-2022-02-03/> [Accessed 5 February 2022].

# Health Benefits of Select Ethiopian Foods and Beverages*

Tesfaye Biftu#, Daniel Kibret,** and Lemessa Debella**

[#] Edited by Beniam and Moa Biftu

*This review is not meant to advice or suggest the use of products described in this manuscript as medicine. The consent of a medical expert is required.

** PhD candidates in the Food Science and Clinical Nutrition Department of Addis Ababa University.

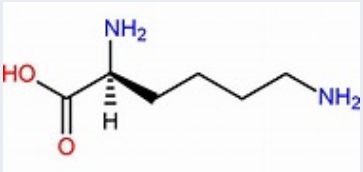
Ethiopia is an ancient country with diverse nationalities. Each nationality has its own distinct foods and beverages. Through years of integration, certain dishes and beverages have become national dishes and, in some cases, consumed internationally. For example, coffee which originated from Ethiopia, is consumed all over the world. Teff, an endogenous staple in Ethiopia, is now classified as a superfood. Similarly, Moringa, a traditional side dish consumed in the southern region of Ethiopia, has gained international prominence after recent discoveries of its health benefits.

Ethiopian cuisine is comprised of vegetarian and non-vegetarian dishes. The former has some similarity to the highly acclaimed Mediterranean Diet. Both dietary ways contain vegetables and whole grains with high fiber, high protein, and low saturated fats, all of which are important for healthy diet choices and the prevention of many diseases including cardiovascular and immune related health issues.

In this brief article, we will identify certain Ethiopian foods and beverages and describe their health benefits.

## TEFF

Teff, *Eragrostis tef*, is a superfood that is becoming popular internationally including in the US, Europe, and China. The grain is native to Ethiopia and it has been a staple since ancient times. In Ethiopia, it is used to make a flat bread called injera. It is gluten-free and therefore highly beneficial for people with Celiac disease. It has a high content of iron, calcium, copper, zinc, and magnesium. These are minerals essential for healthy bone growth, anemia, circulation, and the health of other parts of the body. It is low in calories compared to other cereals. Teff contains the rare amino acid Lysine. For vegetarians who consume most of their dietary protein from plants, Teff is one of the best ways to do that. It is also rich in fiber, which is known to be beneficial to modulate diabetes by slowing insulin release and the absorption of sugar to the blood stream. The fiber also helps smooth bowl movements.

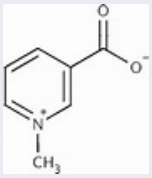



**Lysine**

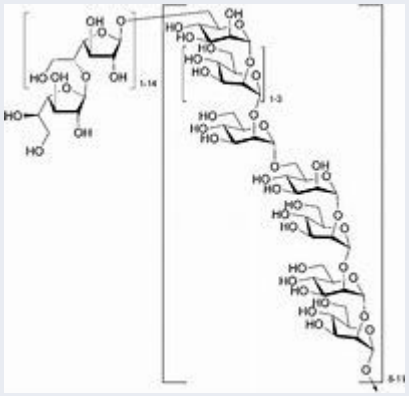
## FENUGREEK

Fenugreek, *Trigonella foneum*, is a common food additive in Ethiopia. Nutrition therapy for diabetes is rapidly changing (1). In view of the large body of evidence and promising results in comparison with standard pharmacotherapy, the active substances derived from fenugreek have the potential to become a source of new antidiabetic supplements. Antidiabetic efficacy of trigonelline is reported to be comparable to glipalamide and sitagliptin therapy (2). Galactomannan and diosgenin, available in fenugreek, are also identified as antidiabetic agents. Galactomannan, a soluble fiber available in fenugreek, reduces intestinal absorption of glucose and benefits blood glucose management (3). After conducting a comparative study, Shtriker and his colleagues concluded that galactomannan reduces fasting blood glucose levels (4). In addition, fenugreek promotes adipocyte differentiation and

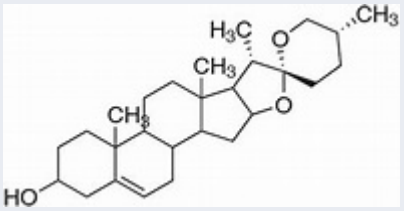
inhibits inflammation in adipose tissues. These effects are mediated by diosgenin. Fenugreek containing diosgenin may be useful for ameliorating the glucose metabolic disorder associated with obesity (5).



**Trigonelline**



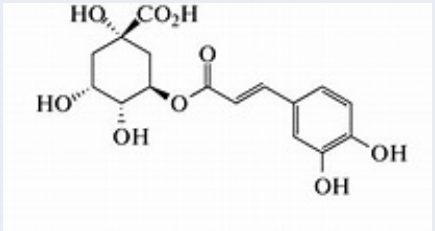
**Galactomannan**



**Diosgenin**

**COFFEE**

Coffee originates in Ethiopia. A study conducted in South Korea using prediabetes subjects confirmed that drinking coffee without sugar and creamer at least three times a day has the greatest preventive effect on diabetes onset (6). In a systematic review and meta-analysis, coffee consumption is found to be inversely related with the risk of type II diabetes (7). The positive effect of coffee on diabetes relates the effect to chlorogenic acid and caffeine (8).



**Chlorogenic acid**

**MORINGA**

*Moringa stenopetala,* a smooth barked deciduous tropical plant, is a traditional medicinal and nutritional plant in Ethiopia (9a). It is widely grown in the southwestern part of Ethiopia at an altitude of 1100 to 1600 meters above sea level. The major growing areas are Arbamich, Negelle, and Wellayta Sodo; it extends as far as Konso and the surrounding areas. *Moringa stenopetala* belongs to the family Moringaceae which comprises many species, most of which are also used as traditional medicines in various countries. It is known as a folk remedy and is often referred to as the African Moringa Tree because it is native only to Ethiopia and northern Kenya.

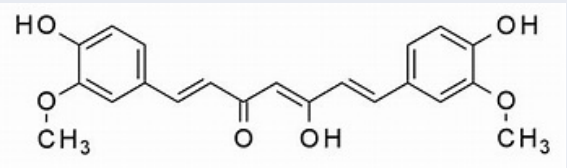
The leaves of *Moringa stenopetala* Cufodontis, is reported to contain rutin,4-(4'-0-acetyl-L-rhamnosyloxy)-benzylisothiocyanate and 4-(4'-0-acetyl-L rhamnosyloxy) -benzaldehyde (9b) and 0-(rhamnopyranosyloxy) benzyl glucosinolate (9c).

*M.stenopetala* has high nutritional value. This is supported by the study conducted to (10a) investigate the nutritional composition of the plant. The leaves of *M. stenopetala* contain significant amounts of protein, carbohydrate, crude fiber and calcium. Additionally, analytical studies (10b) indicated additional nutrients such as vitamins A, C, E, B-vitamins, folate, carotenoids such as β-carotene, β-cryptoxanthin, zeantin and lutein. The leaves of this plant are also known to contain phytochemicals, unsaturated fatty acids, selenium, and multivitamins, which are characterized in having neuroprotective effects. In addition to its nutritional value, *M. stenopetala* is reported to possess medicinal value. For example, *Moringa stenopetala* is widely used for antidiabetic purposes as demonstrated by a study conducted by (11a) for its hypoglycemic effect. Previous studies confirmed that the aqueous crude extract of the leaves of *Moringa stenopetala* plant and fractions isolated from these extracts have both hypoglycemic and antihyperglycemic effects (11b). The dried leaflet aqueous extract of *M. stenopetala* has also been shown to have a significant role in the reduction of glucose and cholesterol levels (12). According to the study done later on the activities of *Moringa stenopetala*, the dried leaflet aqueous extract of the plant has also played a crucial role in reduction of blood pressure.

A recent observation indicates that in those areas of Ethiopia where Moringa is consumed as a staple food, the elderly is less prone to Alzheimer's disease and memory issues. A study is now initiated at AAU to confirm this hypothesis.

**TURMERIC**

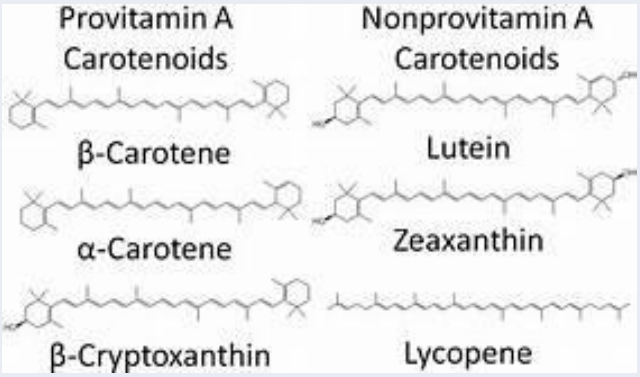
Turmeric is a spice used commonly in Ethiopia to prepare Alicha, which is prepared both as vegetarian and non-vegetarian dishes. It bestows its brilliant golden yellow color. The botanical name of the plant is *Curcuma longa.* The plant is known since ancient times. In 560 BC, clay tablets depict turmeric as a brewing spice and stomach tonic. In 1280 AD, Marco Polo mentioned turmeric in his travel notes to China. In 1815 the French Chemist, Vogel, isolated the yellow ingredient, curcumin, from turmeric. In the early 1970s pharmacological studies showed its anti-inflammatory activities. Recent studies also show its potential in stopping beta amyloid plaque buildup in the brains of people with Alzheimer's disease. Studies also show its use in the treatment of Crohn's disease and ulcerative colitis, generally known as IBS (irritable bowel syndrome).



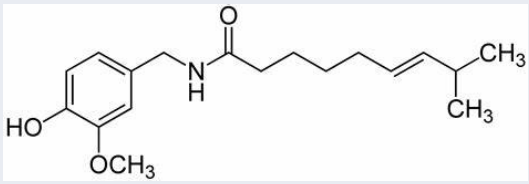

**Curcumin**

**RED PEPPER**

Red pepper is the other most common spice used commonly in Ethiopia to prepare vegetarian and non-vegetarian dishes. It bestows its brilliant red color due to its high content of carotenoids. The botanical name of the plant is *Capsicum annum.* Red pepper comes in several shapes and forms. Some are spicier and more pungent than others. Sizes could be small, mitmita, or large. They are rich in Vitamins C and B6, folates, and other antioxidants. It supports healthy vison due to its high content of carotenoids. Recently, there are reports that some of the ingredients in red pepper stimulate metabolism. Is that why most Ethiopian are fit? Red hot peppers contain capsacinois, which are pungent. They are reported to release a substance called substance P which causes the burning sensation.




**Carotenoids**




**Capsaicin**

The above brief manuscript covers only a glimpse of the hundreds of Ethiopian traditional foods and beverages consumed over the last several centuries. There are other healthy staples, which were not included in the current short summary, such as kale, flax, false bananas, and lentils many of which are rich in healthy proteins, carbohydrates and fatty products such as omega acids. We hope, those with expertise in this field will expand on this subject.

**REFERENCES**


1. YAMADA, S. 2017. Paradigm Shifts in Nutrition Therapy for Type 2 Diabetes. *Keio J Med,* 66**,** 33-43.

2. KOUPY, D., KOTOLOVA, H. & RUDA KUCEROVA, J. 2015. [Effectiveness of phytotherapy in supportive treatment of type 2 diabetes mellitus II. Fenugreek (Trigonella foenum-graecum)]. *Ceska Slov Farm,* 64**,** 67-71.

3. SRICHAMROEN, A., THOMSON, A. B., FIELD, C. J. & BASU, T. K. 2009. In vitro

intestinal glucose uptake is inhibited by galactomannan from Canadian fenugreek seed (Trigonella foenum graecum L) in genetically lean and obese rats. *Nutr Res,* 29**,** 49-54.

4. SHTRIKER, M. G., HAHN, M., TAIEB, E., NYSKA, A., MOALLEM, U., TIROSH, O. & MADAR, Z. 2018a. Fenugreek galactomannan and citrus pectin improve several parameters associated with glucose metabolism and modulate gut microbiota in mice. *Nutrition,* 46**,** 134-142 e3.

5. UEMURA, T., HIRAI, S., MIZOGUCHI, N., GOTO, T., LEE, J. Y., TAKETANI, K., NAKANO, Y., SHONO, J., HOSHINO, S., TSUGE, N., NARUKAMI, T., TAKAHASHI, N. & KAWADA, T. 2010. Diosgenin present in fenugreek improves glucose metabolism by promoting adipocyte differentiation and inhibiting inflammation in adipose tissues. *Mol Nutr Food Res,* 54**,** 1596-608.

6. LEE, J. H., OH, M. K., LIM, J. T., KIM, H. G. & LEE, W. J. 2016. Effect of Coffee Consumption on the Progression of Type 2 Diabetes Mellitus among Prediabetic Individuals. *Korean J Fam Med,* 37**,** 7-13.

7. CARLSTROM, M. & LARSSON, S. C. 2018. Coffee consumption and reduced risk of developing type 2 diabetes: a systematic review with meta-analysis. *Nutr Rev*.

8. SANTOS, R. M. & LIMA, D. R. 2016. Coffee consumption, obesity and type 2 diabetes: a mini-review. *Eur J Nutr,* 55**,** 1345-58.

9. MEKONNEN, Y (1999). Effects of ethanol extract of *Moringa stenopetala* leaves on guinea pigs and mouse smooth. PHYTOTHERAPY RESEARCH; Phytother. Res. 13, 442–444; (2000). Chemical investigation of the leaves of *Moringa Stenopetala*. Bulletin of the chemical Society of Ethiopia 14(1):51-56; 2003). Glucosinolates from *Moringa stenopetala*. Planta Medica; 69: 380-382

10. ABUYE C., Urga, K., Knapp. H., Selmar, D., Omwega, A.M., Imungi, J.K. and Winterhalter, P. (2003). A compositional Study of *Moringa Stenopetala* leaves. East African Medical Journal 80 (5): 247-252.

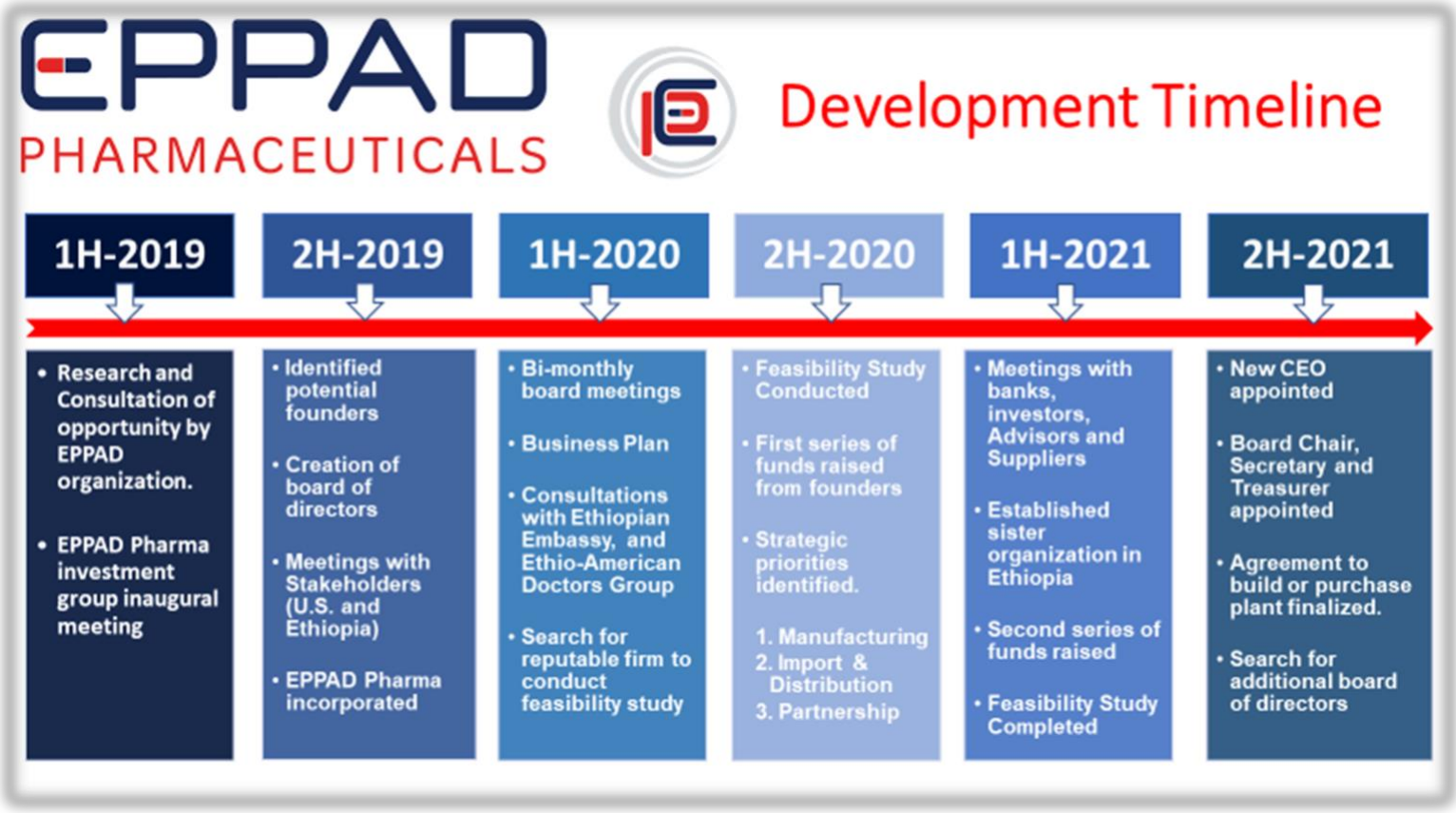
11. MUSSA A, Makonnen E, Urga K (2008). Effects of the crude aqueous extract and isolated fraction of *Moringa stenopetala* leave in normal and diabetic mice. Pharmacology online, 3: 1049-1055.

12. GHERBRESELASSIE,,D., Mekonnen , Y., Gebru , G., Ergete, W., and Huruy , H .(2011). The effects of Moringa *stenopetala* on blood parameters and histopathology of liver and kidney in mice. Ethiopian Journal of Health Development, 25 (1):51-57.

# EPPAD Pharmaceuticals Inc.

**About EPPAD Pharmaceuticals Inc.**
EPPAD Pharmaceuticals Inc. is a Delaware incorporated company. It's board of directors consist of dedicated group of Ethio-American pharmacists and pharmaceutical allies who share a common purpose of developing, manufacturing, and distributing quality-assured, affordable medicines**.** The group also plans to build a pioneering import, export and internal drug distribution supply chain to improve access where it makes sense.
The company is in the process of establishing a Pharmaceutical Manufacturing Plant in Ethiopia. With estimated imports comprising as much as 70 to 90 percent of drugs consumed in most countries in sub-Saharan Africa, EPPAD Pharma's dedicated to local productions to narrow the gap.

EPPAD Pharma has studied the market including local measures of feasibility, demand, and investment attractiveness. EPPAD Pharma sponsored EPPAD organization's annual conference in 2021 and presented an update to the business development. Currently EPPAD Pharmaceuticals Inc. has formed a Joint Venture Company with Pharma Ethiopia PLC an Ethiopian PLC under the name of EPPAD Pharmaceuticals Manufacturing Ethiopia PLC and secured an Investment License from the Ethiopian Investment Commission.



## 1H-2022

- Four additional directors added to board.
- Article of incorporation, Legalization of Documents and Investment Certificate.
- EPPAD Pharma Formation of Local Entity/Joint Venture in Ethiopia.
- Finalization of manufacturing site and plan.

**Our Vision is to be a Valued & Trusted Pharmaceuticals Company and change the standard for the industry.**

**Our goal is to make a meaningful impact to improve the health of the pubic and others we serve.**

EPPAD Pharma's Board of Directors Chair Ambaw Bellete at the conference.

EPPAD Pharma's CEO Brehane Mewa and Board members Mesfin Tegenu, Melat Debela and Alex Akalu also attended the conference.