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ORIGINAL

Between legacy and science: exploring traditional medicine in Panama used for management of acute and chronic pain

Entre el legado y la ciencia: explorando la medicina tradicional en Panamá utilizada para el abordaje del dolor agudo y crónico

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ABSTRACT

Panamanian herbalism is based on the ancestral knowledge of communities, who made use of native species, thus achieving remedies for different illness of each system in the body. This investigation article provides an overview of the most commonly used medicinal plants in Panama, as well as their uses related to pain and other uses. Some of the plants mentioned have properties attributed by the country's population. Also, we will present the mixture of various plants used in poultices, plasters, and infusions turned into remedies, specifically the most used ones in the national territory. To a lesser extent, we will briefly mention the drugs of utility in Panama, main molecules, and generalities. Of course, the relationships between pharmacological and traditional therapy will be established, analyzing the active principles and studies carried out.

Keywords: Traditional Medicine; Pharmacology; Acute Pain; Medicinal Plants; Alternative Therapies; Public Perception; Panama.

RESUMEN

El herbalismo panameño se basa en los conocimientos ancestrales de las comunidades autóctonas, quienes hicieron un aprovechamiento de las especies nativas, logrando así remedios para distintas dolencias de cada sistema en el organismo. El presente artículo de investigación cuenta con un vistazo de las plantas medicinales más utilizadas en Panamá, así como sus usos relacionados al dolor y usos varios. Algunas de las plantas mencionadas cuentan con propiedades atribuidas por la población autóctona del país. De igual manera presentaremos la mezcla de diversas plantas utilizadas en cataplasma, emplastos e infusiones convertidos en remedios, específicamente los más utilizados en el territorio nacional. A una menor proporción se mencionará brevemente los fármacos de utilidad en Panamá, moléculas principales y generalidades. Por supuesto se establecerán las relaciones entre la terapia farmacológica y tradicional analizando los principios activos y estudios realizados.

Palabras clave: Medicina Tradicional; Farmacología; Dolor Agudo; Plantas Medicinales; Terapias Alternativas; Panamá.

INTRODUCTION

Over the years, traditional medicine in Panama has left us with an endless array of remedies that have remained in use to this day. In addition to contributing an important cultural legacy, passed down from generation to generation, pharmacological treatments have displaced it. However, the natural and ancestral remedies used by Panamanians endure.[1,2,3]

Through an exhaustive review of the literature and fieldwork in various regions of Panama, we document the traditional substances and methods that have historically been used to relieve pain in different demographic groups. We will also evaluate perspectives on the perceived effectiveness of such remedies for acute injuries and episodes of pain.[4,5]

The results of this dual research approach will uncover connections between modern pharmacological treatments and the wealth of ancestral knowledge.

It is important to note that this section will not provide detailed instructions on how to use these plants, as it is always advisable to consult a healthcare professional or herbalism expert before using any natural remedy.[6]

Objectives

General Objective

To analyze traditional medicine in Panama to evaluate its effectiveness in the treatment of acute and chronic pain, and to explore its relationship with pharmacological medicine.

Specific Objectives

a) Conduct comprehensive research on traditional practices in Panama, as well as the substances and methods used in the treatment of acute and chronic pain.

b) Measure perceptions of effectiveness by investigating the use of traditional medicine in Panama to relieve acute and chronic pain.

c) Establish connections between traditional and pharmacological medicine in Panama, specifically in the treatment of acute and chronic pain.

DEVELOPMENT

The richness of Panama's flora has contributed to an extensive collection of medicinal plants, many of which contain active constituents and properties that modern science is only now systematically studying. Below, you can learn about medicinal plants, home remedies, commonly used drugs, and the relationship between the worlds of traditional medicine and pharmacological medicine, all in the context of pain management.

Medicinal plants commonly used in Panama for the treatment of pain

Anacardium occidentale L. (Cashew)

Used for pain and inflammation in the extremities, the affected area is covered with the leaves of the tree, which contain menthol or a cold ointment. It has various uses, such as for hypertension, diarrhea, throat conditions, and diabetes. It is also used as a diuretic. For hypertension and diarrhea, an infusion is prepared from three leaves of the tree; for throat conditions, the fruit is eaten on an empty stomach; the hypocarpium refreshment is used as a diuretic; and tea made from the inner bark is used for diabetes.[1] It is found throughout the country.

Asclepias curassavica (Mal casada, niño muerto, pasorín)

It treats headaches when prepared as an infusion and taken orally. The latex of this species is used to relieve toothache and is sometimes ingested as an emetic and purgative. The entire plant is believed to have anti-inflammatory properties. Other uses and properties: constipation, fever, intestinal infection, gonorrhea, and antihemorrhagic properties.[1] It is distributed in Coclé, Chiriquí, Colón, Darién, Herrera, Los Santos, Panama, Guna Yala, Veraguas, and the Canal area.

Bidens pilosa L (Arponcito, cadillo, sirvulada)

Used for rheumatic pain and rheumatism. The plant is boiled and rubbed on the back, and a newspaper is placed on top. In Darién, the flowers are used, and a bath with this infusion relieves pain from rheumatism. Other uses include treating colds, and the dried roots are used to treat prostate tumors.[1] It is distributed in Bocas Del Toro, Chiriquí, Coclé, Panama, and the Canal area.

Chaptalia nutans (Lechuguilla, pipita)

About pain, it is used to relieve childbirth and toothaches. Other uses: pulmonary catarrh, asthma, bronchitis, convulsions, cough, gonorrhea... It is attributed with antimicrobial, antiparasitic, healing, anti-inflammatory, diuretic, emmenagogue, and sedative properties.[1] It is found in Bocas Del Toro, the Canal area, Coclé, Colón, Darién, Herrera, Los Santos, Panama, Guna Yala, and Veraguas.

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Begonia glabra (Begonia)

Used by the *Ngäbe people* to treat pain from boils, using the flower topically.[1] Found in Bocas Del Toro, Coclé, Chiriquí, Veraguas, Guna Yala, and Panama, at a latitude ranging from 0 to 1000 m.

Crescentia cujete L. (Calabazo, palo de calabaza, palo totumas). Region where it is found

Mainly used for gastrointestinal ailments (colic, constipation, hepatitis), inflammation, urethritis, and earache. Properties: analgesic, antiseptic, anti-inflammatory, emmenagogue, emetic, and laxative.[1] The species is distributed in Bocas Del Toro, Chiriquí, Darién, Los Santos, Panama, Guna Yala, Veraguas, and the Canal area.

Bursera simaruba (L.) Sarg. (Almácigo, carate, cholo pelao, indio desnudo)

It is recognized for its use in treating general pain, urinary tract infections, mumps, swelling, colic, rheumatism, and gout. Other uses: in Panama, it is used to treat wounds and is applied to the navel of newborns.[1] It is found in all provinces.

Equisetum giganteum L (Canutillo)

It is mainly used for arthritis, back pain, diverticulitis, cystitis, and hemorrhoids. Among its various uses not related to pain are asthma, catarrh, flu, and tuberculosis.[1]

Jatropha curcas (coquillo)

An infusion of the bark is used to treat colic, toothache, neuralgia, and rheumatism.[1] It is found in Bocas Del Toro, Coclé, Chiriquí, Colón, Darién, Herrera, Los Santos, Panama, and Veraguas.

Ocimum campechianum (wild basil)

An infusion of the branches is used for headaches, colds, to regulate menstruation, and as a diuretic. It has antispasmodic and digestive properties.[1]

Byrsonima crassifolia (Nance)

In Panama, the fresh bark is used for chronic colitis and pyorrhea. The bark is believed to have antineuralgic, anti-inflammatory, and digestive properties.[1] In Panama, it is widespread and found in highly variable environments.

Traditional Panamanian herbalism for pain management

Traditional Panamanian herbalism represents a valuable cultural heritage that has been passed down from one generation to the next, from past to present. This extensive ancestral knowledge is based on the use of various medicinal plants found in different regions of our country for the treatment and/or management of multiple pains. Panama, with its rich biodiversity and multicultural heritage, offers a vast repertoire of herbal resources that both indigenous and rural communities have used for centuries.

Pain is one of the most irritating sensory and emotional experiences, which is why it is one of the most common reasons why people seek help to improve their ailments. In traditional Panamanian medicine, the use of medicinal plants to relieve pain has been a common practice, offering a natural and accessible alternative to local communities.

Despite the tremendous advances in modern medicine, traditional Panamanian herbalism remains an important component in pain management, particularly in rural areas and among ethnic groups that maintain a close connection with nature. The use of herbal remedies not only provides physical relief but is also closely linked to the worldview and spirituality of these communities, reflecting a holistic view of health and well-being.

Below is a table (table 1) listing medicinal plants that have been traditionally used, either individually or in infusions and ointments, for their analgesic and therapeutic properties to relieve pain naturally.

Table 1. Traditional Herbalism in Panama for Pain Management

Appearance	Common/Scientific Name	Use	Other Properties
	Peppermint / Mentha spicata	Stomach Pain	Antispasmodic Carminative Antiseptics Analgesics Anti-inflammatory Treats hypertension Treats altitude sickness Flu

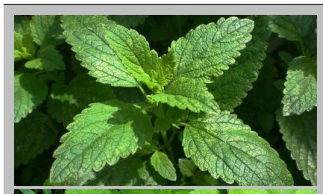
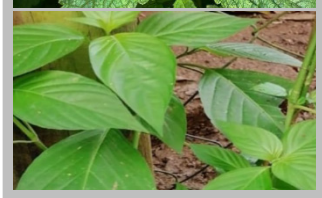
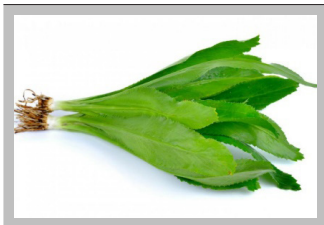
	Mastranthoe Leaf / Mentha suaveolens	Migraine	Liver disease Iron deficiency anemia Intestinal Infections Improves Sleep Quality Combats Gas and Flatulence Relieves nausea and vimiting
	Lemon balm / Melissa officinalis	Intestinal Colic	Diuretic Antiretroviral Effect on Herpes Symptoms.
	Soursop Leaf / Annona muricata	Stomach Pain	Anticancer (Induces Apoptosis) Helps with Chemotherapy Treatment Strengthens the immune system Cell Regeneration
	Mastrantho Leaf / Mentha suaveolens		Anti-inflammatory Properties against Microorganisms Expectorant Nervous Sedative Anti-inflammatory Healing
	Desbaratadora / Drymonia serrulata		Lowers uric acid Kidney stones Prostate Disease Uterine fibroids
	Altamisa / Peruvian Ambrosia	Arthritis Pain Headache and Migraine	Fever Reducer Menstrual Disorders Treatment for parasites
	Sage / Salvia officinalis	Headache and Migraine Powerful Anti-Inflammatory Stomach Pain Sore Throat	Reduces high cholesterol Vomiting Treats Depression, Insomnia, and Memory Loss Strengthens the Immune System

Table 2. Traditional Herbalism in Panama for Pain Management

Appearance	Common/Scientific Name	Use	Other Properties
	Fennel / Foeniculum vulgare	Joint/Muscle Pain Gastrointestinal Colic	Diuretic Carminative Relieves irritation in tired eyes Conjunctivitis Spasmolytics

	Coriander root / Eryngium foetidum	Menstrual cramps Joint pain	Diarrhea – Dysentery – Bloating Appetite stimulant Amenorrhea Accelerates labor and recovery from childbirth Relieves asthma symptoms
	Nettle Leaf / Laportea aestuans	Toothache Menstrual pain	Anti-anemic Disinfectant Acne and baldness Diarrhea Kidney problems
	Square-leaved Cornutia / Cornutia pyramidata L.	Menstrual cramps Muscle pain	Kidney pain. Body aches Gastrointestinal Infections.
	Ginger / Zingiber officinale	"Liver pain" Toothache.	Acute migraine Aids digestion Reduces nausea Improves circulation Reduces muscle pain Reduces inflammation Eliminates bad breath
	Clove / Syzygium aromaticum		Antibacterial properties Anti-inflammatory and anesthetic properties Anti-inflammatory Muscle relaxant Antioxidant
	Black Pepper / Piper Nigrum		Antiseptic properties Thyroid stimulant Reduces cholesterol

Most commonly used drugs for pain management

Paracetamol or Acetaminophen

It is an analgesic and antipyretic, inhibiting peripheral and central prostaglandin synthesis by acting on cyclooxygenase. It blocks the generation of pain impulses at the peripheral level by acting on the hypothalamic temperature regulation center. Its anti-inflammatory action is very weak, and it does not have other actions typical of nonsteroidal anti-inflammatory drugs (NSAIDs) (antiplatelet, gastrolithic).[2]

Main Compound: Propanoic/Propionic Acid.

Nonsteroidal anti-inflammatory drugs (NSAIDs)

These are a group of drugs widely used to treat pain, inflammation, and fever. Their mechanism of action is based on the inhibition of cyclooxygenase (COX) enzymes, which are responsible for producing prostaglandins, substances involved in inflammatory and pain processes within the body.[2]

Among the most commonly used drugs are:

a) Ibuprofen. Main compound: (RS)-2-(4-isobutylphenyl) propanoic acid.

b) Ketorolac. Main compound: (±)-5-benzyl-2,3-dihydro-1H-pyrrolizine-1-carboxylic acid, 2-amino-2-(hydroxymethyl)-1,3-propanediol salt

c) Naproxen. Main compound: (S)-(+)-6-methoxy-α-methyl-2-naphthalenecetic acid

Amitriptyline (Tricyclic Antidepressants)

It is a tricyclic antidepressant and analgesic that prevents the reuptake and, therefore, the inactivation of norepinephrine and serotonin in nerve endings.

Preventing the reuptake of these monoamine neurotransmitters enhances their action in the brain, which is associated with antidepressant activity. The mechanism of action also includes blocking effects on sodium, potassium, and NMDA ion channels, both centrally and medullary.[2]

Main Compound: 3-(10,11-dihydro-5H-dibenzo[a,d]cyclohepten-5-ylidene)-N,N dimethylpropylamine.

Carbamazepine (Anticonvulsants)

They are a class of anticonvulsant and mood-stabilizing drugs used to treat a variety of neurological and psychiatric disorders, stabilizing hyperexcited neuronal membranes, inhibiting repetitive neuronal discharges, and reducing synaptic propagation of nerve impulses.[2]

Main Compound: 5H-dibenzo-[b,f]-azepine-5-carboxamide

Opioids

These are a class of drugs derived from or structurally related to opium, which act on opioid receptors in the central and peripheral nervous systems. These drugs are primarily used for the treatment of moderate to severe pain, but they can also produce euphoric effects, leading to a high potential for abuse and dependence.

Opioids bind to opioid receptors (mu, kappa, and delta) in the brain and spinal cord. Activation of these receptors reduces pain perception, alters the emotional response to pain, and produces euphoric effects. They can also cause respiratory depression, sedation, and constipation.[2]

They can be of different origins, such as natural (opium, morphine, and codeine), semi-synthetic (heroin and oxycodone), or synthetic (fentanyl or methadone).

They are also classified according to their degree of effect or potency for use in different situations or as a stepped therapeutic regimen (figure 1).

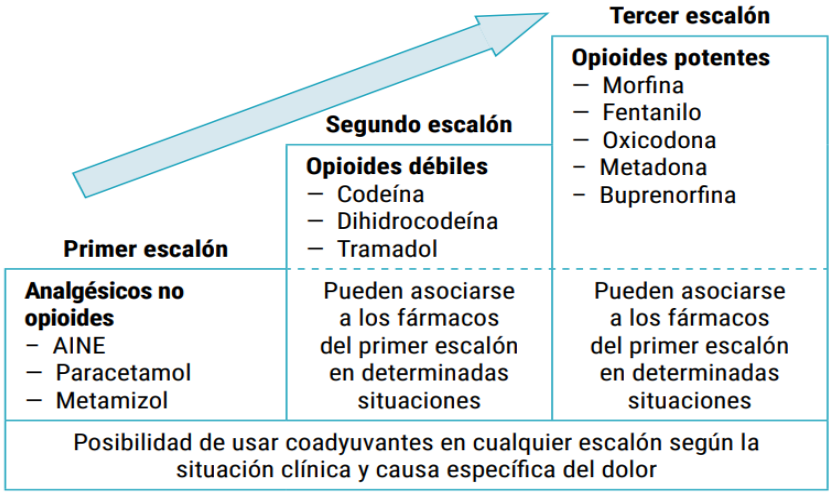


Figure 1. Analgesic scale for the treatment of chronic pain

List of active ingredients in Panamanian herbal medicine and pharmacological medicine

Anacardium occidentale L. (Cashew)

The anti-inflammatory activity of epicatechin was compared with that of phenylbutazone, a non-steroidal anti-inflammatory drug (NSAID), in studies.[1] Both have anti-inflammatory and analgesic properties and differ in that the side effects of the NSAID have a more severe profile. Cashew has promising properties that are still being studied.

Spondias mombin L. (plum)

The ethanolic extract of the dried bark showed anti-inflammatory activity, while the butanolic extract showed spasmodic activity, both studied in male rats. The aqueous extract showed relaxation of the ileum in guinea pigs and rabbits.[1] Related to naproxen (NSAID) due to the plant's tannins and terpenes.

Chaptalia nutans (Lechuguilla, pipita)

An infusion of the dried leaves has demonstrated anti-inflammatory properties in male mice.[1] Related to diclofenac (NSAID), hyoscine, and proponoxate (antispasmodics) due to the sesquiterpenes and flavonoids that act similarly to the aforementioned drugs.

Crescentia cujete L. (Calabazo, palo de calabaza)

The ethanolic extract of its leaves had anti-inflammatory properties in a rat paw inflammation model comparable to 100 mg of diclofenac sodium (NSAID).[1]

Chromatography showed that the anti-inflammatory activity is related to flavonoids such as apigenin and quercetin.

Bursera simaruba (L.) Sarg. (Almácigo, carate, cholo pelao, indio desnudo)

The 95 % ethanolic extract showed in vitro stimulatory activity of rabbit duodenal smooth muscle, as well as spasmolytic and vasodilatory activity. The hexane extract of the leaf behaved experimentally similar to phenylbutazone and indomethacin.[1] It is related to naproxen (NSAID) due to the triterpenes and flavonoids that have a similar effect to the drug.

Jatropha curcas (coquillo)

The extract with ethyl acetate has anti-inflammatory activity, compared to diclofenac (NSAID).[1] Its compounds, such as flavonoids and phenolic acid, are related to the active ingredients of this drug.

Senna occidentalis (frijolillo)

The anti-inflammatory activity of the leaf, at doses of 1000 mg/kg, was demonstrated in carrageenan-induced paw edema in rats.[1] The main pharmacological comparison is with ibuprofen (NSAID) since it contains emodin and aloe-emodin, which act similarly to this drug. Its other properties relate it to laxatives (bisacodyl), antibiotics (ciprofloxacin), and metformin.

Byrsonima crassifolia (Nance)

The aqueous extract of leaves and bark has a spasmodic effect, thus reducing motor activity, analgesia, enophthalmos, reversible palpebral ptosis, positive Robichaud, catalepsy, and hypothermia.[1]

Comparative analysis between pharmacological and herbal medicine in Panama for the management of chronic pain

Continuous exposure to drugs causes a loss of effectiveness, and this is typically the case with chronic pain. The continuous use of analgesics for chronic conditions such as rheumatoid arthritis causes resistance to these drugs, which is why traditional medicine can provide great relief in such cases.

Table 2. Comparative analysis for the treatment of chronic pain

Pharmacological Medicine	**Traditional Medicine**
Advantages	
Wide range of painkillers available.	Greater accessibility to herbal remedies.
Precise and controlled dosage.	Fewer side effects and risk of dependence.
Fast and effective pain relief (initially).	Lower risk of drug interactions.
Constant research and development testing.	Uses natural and local resources.
Scientifically proven effectiveness.	Lower long-term raw material costs.
Disadvantages	
Development of tolerance and dependence.	Variability in ingredient quality.
Reduced effectiveness due to chronic use.	Complex or laborious preparation methods.
High long-term cost.	Limited scientific evidence.
Increased risk of side effects.	Requires consistency and discipline.
Risk of drug abuse.	Imprecise quantities with risk of poisoning.

METHOD

Data collection was based on literary research and interviews with biologists, botanists, pharmacists, and doctors, who provided valuable insights and assistance in preparing this article.

A review of clinical records was conducted with patients present to assess the use of traditional medicine in Panama for relieving acute and chronic pain. The primary objective was to evaluate the effectiveness and utilization of conventional medicine throughout Panama. This information was obtained from 142 files in an alternative medicine clinic, including 94 female and 48 male patients, of whom 57 were between 16 and 35 years old and 85 were between 36 and 71 years old.

RESULTS

All of the clinical records reviewed had used medications prescribed by a doctor to relieve pain. A total of 92,2 % (131 people) of the population had resorted to a home remedy; however, 7,8 % (11 people) had not used one.

According to figure 2, 41 % of the population under 35 years of age chose pharmacological treatment as the most effective over traditional treatment. Notably, 68 % of the population over 35 years of age preferred traditional treatment due to its effectiveness.

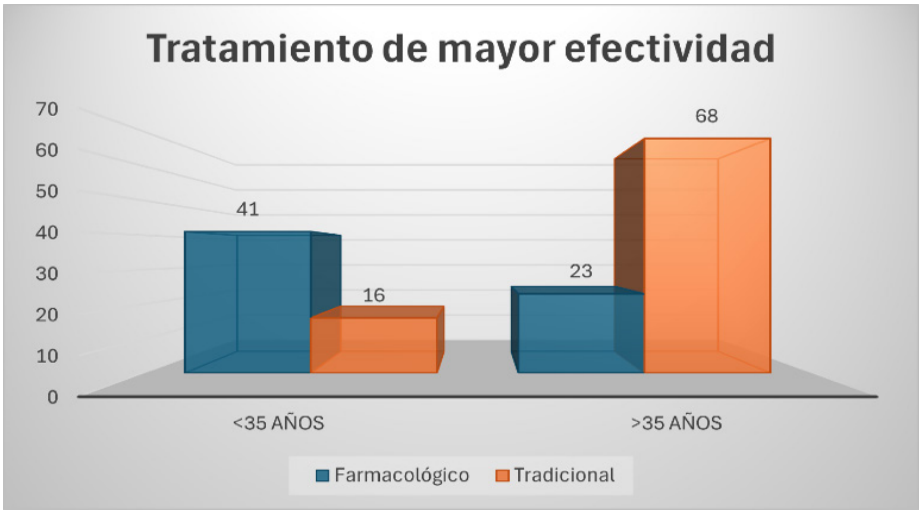


Figure 2. Most Effective Treatment

One aspect of the review with similar percentages was the belief that traditional medicine is safer than medication for pain relief. Fifty-four percent (77 people) believed that traditional medicine is safer due to the side effects of drugs, while 46 % (65 people) stated that pharmacological treatment is safer.

Figure 3. Patients willing to use traditional medicine prescribed by a health professional

According to figure 3, 74 % of patients would be willing to use traditional medicine if recommended by a healthcare professional. It is interesting to note that 26 % of those who said no were in the under-35 age group. Ninety-one percent would be willing to stop using prescription drugs if they found effective relief with traditional medicine.

CONCLUSIONS

The primary purpose of this review is to highlight the importance of traditional medicine in Panama as an invaluable resource in the treatment of pain. Through careful research examining ancestral practices and the use of medicinal plants, the wealth of knowledge that has endured over time in Panamanian society is evident. The integration of traditional knowledge with modern science offers a unique perspective for addressing pain in a comprehensive and culturally relevant manner.

By promoting understanding and appreciation of traditional medicine in Panama, this study highlights the importance of preserving and respecting the knowledge inherited from local communities. It also highlights the need for further research and collaboration in integrating traditional therapies to provide more comprehensive and personalized treatment options.

In reviewing the records, we concluded that traditional therapies are needed for the treatment of pain, specifically chronic pain, as drugs lose their effect when used chronically. It is essential to clarify that this article does not provide detailed instructions on how to use these plants, remedies, and drugs. It is always advisable to consult a healthcare professional or a botanical expert before using any natural remedy.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHORSHIP CONTRIBUTION

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Formal analysis: Anlly Añez, Daniela Alejandra Deago De León, Alex Hu Zhang.
Drafting - original draft: Anlly Añez, Daniela Alejandra Deago De León, Alex Hu Zhang.
Writing - proofreading and editing: Anlly Añez, Daniela Alejandra Deago De León, Alex Hu Zhang.