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Indigenous Knowledge of Medicinal Plants and Attainment of SDG3: A Systematic Literature Review

Bhavna Sharma [†*] and Reena Kumari[¥]

Abstract

Attainment of Sustainable Development Goals (SDGs) is a critical issue for the United Nations in the 21st Century. These 17 SDGs have specific targets to achieve these goals. To achieve a more sustainable future, 193 countries agreed to work on these 17 SDGs by 2030. Out of these 17 SDGs, this paper focuses on attaining SDG 3 through indigenous knowledge. The researchers explored previous studies by other researchers worldwide and global reports related to medical plants. They discussed the role of folk medicine in attaining the third goal of sustainable development (SDG3). Target 3.3 of SDG 3 focuses on eliminating combat hepatitis, waterborne diseases, Malaria, and other communicable diseases, and target 3.4 of SDG 3 focuses on reducing non-communicable diseases through prevention and treatment. Therefore, the focus of the study is to find out the specific plants which can be used for the treatment of various types of diseases through meta-analysis protocol and systematic reviews. Ninety articles are screened by keeping in view the set criteria. The study selected 50 scientific papers after excluding some papers due to the unavailability of full papers and duplicate copies of the articles. The researchers selected those papers whose citation is good. Previous researchers discussed that some plants and their parts—folk medicines—are often used to cure various communicable and non-communicable diseases like diabetes, cancer, Malaria, COVID-19, infections, pain, liver problems, etc., by certain groups and communities due to its lesser price, effortlessness, easy accessibility and affordability.

Keywords: Folk Medicine; Indigenous Knowledge; Sustainable Development Goal; Medical Plants; Traditional Medicine Knowledge; Systematic Literature Review

[†] Associate Professor, Department of Commerce, Bhagat Phool Singh Women's University Haryana, India
[*]Corresponding Author email: bhavnasharma.univ@gmail.com
[¥] Research Scholar, Department of Commerce, Bhagat Phool Singh Women's University, Haryana, India, email: reenasura7777@gmail.com.

Introduction

All communities in the world often use traditional medicine (TM). TM is the collection of life's knowledge, values and real experiences. Traditional medicine is used to treat various ailments (Fokunang et al., 2011). Herbal plants had been used for treating diseases long before prehistoric period. According to the National Health Portal (2020), evidence exists that *vaids*, Indian Hakims and Mediterranean cultures have been using plants for over 4000 years to cure diseases. Approximately 85% of the population uses various plants for curing various ailments (Abramov et al., 1996; Abramov, 2022). Sustainability goals have emerged as a global strategy to solve critical global problems. Therefore, to address the various global problems, the United Nations adopted 17 SDGs in September 2015 to address sustainable development across the world by 2030. Out of these 17 SDGs, SDG 3 is related to healthy life and wellbeing for everyone worldwide. We argue that herbal remedies in healthcare systems play a crucial role in attaining good health for all age peoples in all communities across the world. As reported on the website of the United Nations (UN), around the globe, 500 million people have been infected by COVID-19, and it is estimated that the death rate has increased by 15 million by the end of 2021. Plants can help cure various communicable and non-communicable diseases. Plants are essential for making new medicines and treating various ailments to extend the healthcare system. The combination of traditional medication benefits people's health (Asrat et al., 2020; Nigussie et al., 2022). TM has the potential and sustainability in treating ailment in a primary healthcare system. Medical plants deal with various kinds of diseases like headaches, coughs, and stomach pains (Eduardo et al., 2022). The potential of the botanical research on traditional knowledge about plants used by the users found that some conventional knowledge helped in the treatment of various ailments like headaches, coughs, and stomach pains (Painkra et al., 2015; Eduardo et al., 2022). Laboratories all over the universe have found thousands of photochemicals which have inhibitory effects on all kinds of microorganisms in vitro (Cowan, 1999). The World Health Organization (WHO) endorses and promotes the inclusion of home remedies in national healthcare regimens due to their easy availability. It has been proven to work and is considered much safer than modern synthetic drugs. Thus, the study of pharmacological and bioactive agents obtained by screening natural sources such as plant extracts reduced many pharmaceutically valuable agents which play a vital role in treating human diseases (Rastogi, 1990; Rastogi & Mehrotra, 2005). This review paper aims to explore and synthesise the traditional knowledge related to medicinal plants used for curing various communicable and non-communicable human diseases to achieve targets as mentioned in SDG3.

Research Methodology

As stated above, this study probes and synthesises the previous research and literature on the traditional knowledge about medicinal plants for the past 30 years, 1992-2022. Systematic reviews and meta-analyses are widely used research designs in clinical research areas (Noordzij et al., 2009). The study applies meta-analysis and systematic reviews to search and retrieve articles through various databases such as EBSCO, Web of Science (WOS), ProQuest, Science Direct, etc. Alongside, some other search techniques were also used. These were searches using keywords and the use of Boolean operators. The keywords which were used in searching terms and phrases were folk medicine, indigenous knowledge, sustainable development goals, medical plants, and traditional medicine knowledge. The study selected papers carrying good citations. Overall, 90 articles were screened by keeping in view the set criteria. In total, six articles were excluded based on abstract and title. Five of them were published by good publishing houses, but were excluded due to the unavailability of full text. Five articles were duplicate copies, while seven were editorials, extended abstracts, or book

chapters. Four articles were empirical and theoretical conference papers but inconsistent with content relevance. Therefore, only 63 articles remained left for inclusion linked to medical plants. Besides, the researchers found some medicinal plants that help cure communicable diseases, including Malaria, and eliminate tropical diseases, waterborne diseases, and non-communicable diseases, including diabetes, cancer, asthma, depression and others.

The researchers reiterate here that those scientific papers whose citations are good were selected for this study and are presented in Table 1, along with citation numbers.

Table 1: Citations of Research Papers

S.No.	Papers with more than 100 Citations	Citations
1.	A Report by the World Health Organization (1998) on Quality Control Methods for Medicinal Plant Materials	1300
2.	Liang et al. (2004); Lulekal et al. (2008)	500-1100
3.	Yineger and Yewhalaw (2007); Teklehaymanot (2009)	300-400
4.	Wondimu et al. (2007); Abera (2014); Belayneh et al. (2012); Shree et al. (2022)	200-300
5.	Fokunang et al. (2011); Tolossa et al. (2013); Tolossa and Megersa (2018); Panghal et al. (2010); Karunamoorthi et al. (2013); Reta (2013); Amenu (2007); Oliver (2013); Tadesse et al. (2007); Birhane et al. (2011)	100-200

In addition to the abovementioned papers, 42 research papers with citations of less than 100 have also been used and discussed in this research.

Source: Compiled by the Researchers

Discussion

Human diseases are divided into two basic types: congenital and acquired. This study includes treatment of acquired diseases only. The acquired diseases include communicable and non-communicable diseases. Various types of medicinal plants are explored to cure both types of diseases through traditional knowledge based on the studies of previous researchers. The details regarding the treatment of these diseases and its treatment are discussed in the following section:

Cancer

Cancer is a non-communicable disease and also a cause of death worldwide. It refers to a large group of ailments in the body of humans. According to the Ministry of Health and Family Welfare (2020), registered data on cancer estimated that 800,000 cancer cases arise in India annually. The number of cancer cases in India for 2022 was 14 61,427. The details regarding cancer treatment are discussed in Table 2.

Wound

Wound infections can result from significant tissue trauma from surgery or minor skin cuts, bites, or punctures from daily activities. Some wounds can become stagnant due to insufficient blood circulation and poor health and nutrition. Your body heals wounds with an inflammatory response. The following are the main factors most likely to infect wounds: diabetes, obesity, poor blood circulation, reduced mobility, weakened immune system, and malnutrition. The details regarding the treatment of wounds are discussed in Table 3.

Diarrhoea

Diarrhea is found to be a significant cause of death for 525,000 children (under the age group of 5 years) annually. Diarrhea is often a symptom of an intestinal infection and is caused by bacteria, viruses and parasites. The infection is transmitted through polluted foods and water and from one person to another due to poor hygiene.

Diarrhoea diseases can negatively affect physical health and intellectual development. According to the World Bank (2013) report, early childhood malnutrition, whatever the cause, reduces adult

health and productivity, and diarrhoea is also the cause of childhood malnutrition. The details regarding diarrhoea and its treatment through folk medicine are discussed in Table 4.

Table 2: Treatment of Cancer Using Medicinal Plants

Disease	The Scientific Name of the Plants	Family	Part(s) used	Authors' name
Cancer (Lung)	Aervajavanica (Desert Cotton)	*Amaranthaceae*	Roots	Teklehaymanot (2009); Abebe (2016)
	Mimusopskummel	*Sapotaceae*	Roots	Tolossa et al. (2013); Amenu (2007)
Cancer (neck)/ Tumor	Clematishirsuta	*Ranunculaceae*	Leaves/stems Barks	Awas (2007); Abebe (2016); Yineger and Yewhalaw (2007)
Cancer (skin)	Bruceaantidysenterica	*Simaroubaceae*	Leaves	Birhanu (2013); Birhanu et al. (2015)
	Euphorbiaabyssinica	*Euphorbia*	Latex	Teklehaymanot (2009); Abera (2014)
Cancer (Breast)	Asparagusafricanus(Satawari)	*Asparagaceae*	Roots	Teklehaymanot (2009); Abebe (2016); Yineger and Yewhalaw (2007)
Cancer (Tumor)	Stephaniaabyssinica	*Menispermaceae*	Roots	Tolossa et al. (2013); Amenu (2007); Abebe (2016)
	Vernoniaamygdalina	*Asteraceae*	Leaves	Abebe (2016); Teklehaymanot (2009); Bekele and Reddy (2015); Abera (2014)
	Euphorbiatirucalli	*Euphobiaceae*	Roots Latex	Tolossa et al., (2013); Tolossa and Megersa (2018); Bekele and Reddy (2015); Megersa et al. (2019)
	Verbasicumsinaiticum	*Scirophlaraceae*	Root/leaves	Teklehaymanot (2009); Yineger and Yewhalaw (2007)

Source: Compiled by the Researchers

Table 3: Treatment of Wound Using Medicinal Plants

Disease	Scientific plant name	Family	Part(s) used	Author's name
Wound	Acaciaalbida (babul, kikar)	*Fabaceae*	Latex	Birhane et al. (2011); Wondimu et al. (2007)
	Brideliascleroneura	*Phyllanthaceae*	Seeds	Awas (2007); Amenu (2007)
	Dodonaeaangustifolia	*Sapindaceae*	Roots	Tolossa et al. (2013); Amenu (2007); Birhanu (2013); Yineger and Yewhalaw (2007)
	Oleaeuropaea	*Oleaceae*	Leaves/roots	Tolossa et al. (2013); Tolossa and Megersa (2018);Amenu (2007); Teklehaymanot (2009)

Source: Compiled by the Researchers

Table 4: Treatment of Diarrhoea Using Medicinal Plants				
Disease	**The Scientific Name of the Plant(s)**	**Family**	**Part (s)used**	**Authors' name**
Diarrhoea	Amaranthus (Chaulai)	*Amaranthaceae*	Leaves	Amenu (2007); Abera (2014); Wassie et al. (2015); Reta (2013)
	Caricapapaya (Papaya)	*Cucurbitaceae*	Seeds	Awas (2007); Tolossa et al. (2013); Tolossa and Megersa (2018); Wondimu et al. (2007); Belayneh et al. (2012)
	Coffeearabica	*Rubiaceae*	Seeds	Tolossa et al. (2013); Amenu (2007); Wassie et al. (2015)
	Acacianilotica (babul, kikar)	*Fabaceae*	Fruits, Leaf	Awas (2007); Yadav (2013); Wondimu et al. (2007); Lunyera et al. (2016); Gari et al. (2015)
Source: Compiled by the Researchers				

Malaria

Malaria is a communicable disease that affects human beings. Various symptoms of Malaria include fever, vomiting, and tiredness (Caraballo & King, 2014). The details regarding Malaria and its treatment are discussed in Table 5.

Table 5: Treatment of Malaria Using Medicinal Plants				
Disease	**Name of Scientific Plants**	**Family**	**Part(s) used**	**Authors' Name**
Malaria	Opuntiaficus-indica	*Cactaceae*	Leaves	Abera (2014), Wassie et al. (2015); Mbuni et al. (2020)
	Alliumsativum (*Garlic)*	*Liliaceae*	Bulb	Bekele & Reddy (2015); Birhanu (2013); Amenu (2007); Abera (2014); Kaliyaperuma et al. (2013)
	Withaniasomnifera	*Solanaceae*	Leaves	Birhane et al. (2011); Lulekal et al. (2008)
Source: Compiled by the Researchers				

Stomach Infection

It is the most common type of disease found in every family and is almost treated through traditional medicine as home remedies. The details regarding stomach infection and its treatment are discussed in Table 6.

Table 6: Treatment of Stomach Infection Using Medicinal Plant				
Disease	**Name of Scientific Plants**	**Family**	**Part(s) Used**	**Authors' name**
Stomach Infection	Thymus Capitatus	*Lamiaceae*	Leaves	Yadav (2013); Getnet *et al.* (2016); Vujicic & Cohall (2021)
	Citrussinensis	*Rutaceae*	Fruit Bark	Tolossa et al. (2013); Amenu (2007); Painkra et al. (2015)
	Aloemacrocarpa Reynolds	*Asphodelaceae*	Leaves	Abera (2014); Doffana (2017)
	Ziziphusspina-christi	*Rhamnaceae*	Fruits	Birhane et al. (2011); Oliver (2013); Abera (2014)
	Oleaeuropaea	*Oleaceae*	Leaves/Roots	Tolossa et al. (2013); Amenu (2007); Teklehaymanot (2009); Lulekal et al. (2008); Tolossa and Megersa (2018)
Source: Compiled by the Researchers				

COVID-19

The world population is currently being challenged by the viral infection of COVID-19, which causes a number of deaths and health issues around the world (Tshilanda et al., 2020). The world needs drugs that can kill severe acute respiratory syndrome and strengthen human immunity to fight against COVID-19 for good health and well-being of people (Chikhale et al., 2021). Based on previous studies, the researchers found some plants that can help cure COVID-19. The details regarding the treatment of COVID-19 are discussed in Table 7:

Table 7: Treatment of COVID-19 using Medicinal Plants

Disease	Name of Scientific Plants	Family	Part(s) Used	Authors' name
COVID-19	Tinospora cordifolia	Menispermaceae	Stem, leaf,	Mulpuru and Mishra (2021); Subedi et al. (2022); Payyappallimana et al. (2022)
	Andrographis paniculate	Acanthaceae	Whole Plant	Intharuksa et al. (2022); Wanaratna et al. (2021)
	Ocimum basilicum	Lamiaceae	Leaf, flower	Tshilanda et al. (2020); Shree et al. (2022)
	Zingiber officinale Roscoe	Zingiberaceae	Rhizom	Jafarzadeh et al. (2021); Magzoub (2020); Mesri et al. (2021)
	Phyllanthus emblica	Euphorbiaceae	Fruit pulp.	Chikhale (2021); Islam et al. (2021)
	Glycyrrhiza glabra	Fabaceae	Root	Abraham and Florentine (2021); Panghal et al. (2010)

Source: Compiled by the Researchers

Table 8: Medicinal Plants Retrieved from Literature

Acacianilotica (babul,kikar)	Caricapapaya (Papaya)	Phyllanthus emblica
Aervajavanica (Desert Cotton)	Citrussinensis	Stephaniaabyssinica
Alliumsativum (*Garlic)*	Clematishirsuta	Thymus capitatus
Aloemacrocarpa Reynolds	Coffeearabica	Tinospora cordifolia
Amaranthus (Chaulai)	Dodonaeaangustifolia	Verbasicumsinaiticum
Andrographis paniculata	Euphorbiatirucalli	Vernoniaamygdalina
Asparagusafricanus(Satawari)	Ocimum basilicum	Withaniasomnifera
Brideliascleroneura	Oleaeuropaea	Zingiber officinale Roscoe
Bruceaantidysenterica	Opuntiaficus-indica	Ziziphusspina-christi

Source: Compiled by the Researchers

As per past evidence and Table 8, the plants mentioned above have been reported to be useful to indigenous people to cure various diseases.

Implications

This study is based on traditional knowledge and its use in the treatment of various communicable and non-communicable diseases in almost all the countries of the world so that the world can move ahead in the attainment of SDG3 and eliminate combat hepatitis, waterborne diseases, Malaria and other communicable diseases. Many people suffer from various diseases like diabetes, diarrhoea, cancer, rheumatism, jaundice, hepatic obstruction, pain, cold, cough, etc. Moreover, in the current climate COVID-19 is also one of the major problems. These plants may be useful for pharmaceutical industries for manufacturing different medicines. However, due to a lack of documentation, the traditional knowledge of local people is being lost gradually. The medicinal plants are reducing due to many reasons, such as urbanisation and modernisation of society.

Therefore, traditional knowledge must be explored, documented, protected and transmitted through the next generation for sustainable use of traditional knowledge and attainment of SDG3 through collective efforts of all the researchers, policymakers, indigenous

people, society and government of all nations in true spirit.

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Ethical Approval and Conflict of Interest

This study is primarily based on a systematic review of the literature, and we have strictly followed ethical guidelines as per the Helsinki Declaration. We also declare that we have no conflict of interest linked to any form of financial or non-financial issues related to the submission and publication of this study.

Author Contribution Statement

Bhavna Sharma: Methodology, Discussion, Policy Implications, Conclusion

Reena Kumari: Introduction, Literature Review, Writing the Draft, References

Informed Consent

The issue of informed consent does not arise in this study, as no humans were involved in the study.

Funding and Data Availability Statement

The researchers did not receive any funding to conduct the study. However the data used in this study is based on a systematic literature review.

About the Authors

Dr Bhavna Sharma holds a doctorate from the prestigious Haryana School of Business, Guru Jambheshwer University of Science & Technology, Haryana. She obtained her Master of Commerce and Master of Business Management from Kurukshetra University, Kurukshetra and MD University, Rohtak, respectively. She has over 16 years of experience teaching courses in both undergraduate and postgraduate levels and supervised 20 MCom dissertations, 4 MPhil and 6 PhD theses have been successfully awarded and 6 PhD theses are in progress. Dr Sharma has edited and co-authored two books on the Progress and Performance of the Kisan Credit Card Scheme in India and Measuring Service Quality in the Retail Banking Sector. She has published over 40 articles in peer-reviewed journals.

Reena Kumari obtained her Undergraduate and Postgraduate degrees in Commerce from Bhagat Phool Singh Women's University. Her research interests include indigenous knowledge, sustainable development, and in the health and education sectors. She has published several articles, one book, and book chapters and presented papers in National and International journals.