CONSUMER AWARENESS AND ATTITUDE TOWARDS PLANT-BASED ALTERNATIVES FOR PHARMACEUTICALS IN HYDERABAD

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Abstract

Plant-based pharmaceuticals are increasingly being explored as a complementary and alternative approach in diabetes management due to their potential advantages in sustainability, affordability, cultural acceptance, and holistic care. In countries like India, where traditional medicine systems coexist with modern healthcare, plant-based diabetes treatments hold significant promise. However, despite growing market availability and historical use, consumer scepticisms persist regarding their clinical efficacy, safety, standardization, and compatibility with conventional allopathic medicine. Addressing these concerns is essential for their broader acceptance and integration into mainstream diabetes care. This study investigates consumer awareness, perceptions, and attitudes toward plant-based pharmaceutical alternatives for diabetes management among 400 respondents. A quantitative, cross-sectional research design was employed using a structured questionnaire administered through online platforms. The survey captured demographic characteristics, awareness levels, perceived efficacy and safety, prior usage, and willingness to adopt plant-based treatments. Data were analysed using descriptive statistics and chi-square tests in IBM SPSS to examine relationships between awareness, perception, and adoption behaviour. The findings indicate that a majority of respondents possess moderate to high awareness of plant-based diabetes treatments, and a substantial proportion have previously used plant-based ingredients or formulations. While most participants perceive plant-based pharmaceuticals as an effective complementary therapy and acknowledge their affordability, fewer respondents consider them equally effective as conventional anti-diabetic medicines. Importantly, willingness to adopt plant-based treatments increases significantly when recommendations are provided by qualified medical professionals. Chi-square analysis revealed a statistically significant association between consumer awareness and willingness to use plant-based pharmaceuticals ($p < 0.05$), and an even stronger relationship between perceived efficacy and safety and actual adoption behaviour ($p < 0.05$). Conversely, no significant relationship was observed between diabetes status and actual usage, indicating a trust gap among diagnosed patients. Overall, the study concludes that although awareness of plant-based pharmaceuticals is rising, consumer acceptance is strongly dependent on scientific validation, physician endorsement, and perceived safety. Strengthening clinical evidence, improving healthcare professional engagement, and implementing targeted educational initiatives are crucial to enhancing trust and expanding the adoption of plant-based pharmaceuticals in diabetes management.

Keywords:

Plant-based pharmaceuticals, Diabetes management, Consumer awareness, Perceived efficacy, Safety, Physician recommendation, Consumer adoption, SPSS analysis, Complementary medicine, Healthcare trust

Introduction

The global burden of diabetes necessitates continuous innovation in treatment options. Plant-based pharmaceuticals, rooted in ancient medicinal systems like Ayurveda, offer a sustainable and often more accessible alternative to synthetic drugs. These treatments, derived from plant extracts with proven therapeutic properties, are gaining renewed interest due to rising healthcare costs and a growing consumer preference for natural products. Plant-based substitutes have a lot of promise in India, a nation with a long history of using herbal treatment and a high rate of diabetes.

Despite this potential, consumer adoption is hindered by significant barriers, including misconceptions about effectiveness, safety concerns, lack of standardization, and insufficient endorsement from healthcare professionals. Previous literature highlights that consumer awareness, perceived quality, and the influence of doctors are critical in shaping attitudes.

This study investigates awareness levels, perceptions, and adoption patterns of plant-based pharmaceutical alternatives for diabetes in India. It analyses the relationship between demographic factors, awareness, trust, and willingness to use, providing evidence-based insights for policymakers, healthcare professionals, and pharmaceutical companies to strengthen the integration of plant-based medicines into mainstream diabetes care.

Review of Literature

1.1Historical Use of Plant-Based Medicines

Humans have depended on plants for health, housing, and sustenance for thousands of years. 75–90% of rural residents receive primary treatment from herbal preparations, which are referred to as their "toolkit." Because they provide the basic components for roughly 25% of prescription medications, plants continue to play a significant role in modern medicine (Fowler, 2006).

Numerous plants have been associated with the treatment of particular illnesses through a lengthy process of trial and error. Many plants have medicinal qualities that other primates are also aware of and utilize. Their actions highlight the close bond between people and the therapeutic powers of nature. These customs are a reflection of a long-standing, widespread knowledge of plant-based medicine (Halberstein, 2005a).

Traditional medicine in India began when people used herbs to treat ailments during the Buddhist era, which lasted from 6,000 to 4,000 BCE. The great biodiversity of the Indian subcontinent is demonstrated by the fact that it is home to over 45,000 species, or around 20% of all species globally. Approximately 3,500 of them are known to have therapeutic qualities, and 500 of these are currently being actively utilized in contemporary medicine. Ancient systems like Ayurveda have been greatly impacted by this abundant natural resource. Around the world, such old knowledge still serves as inspiration for modern medicine development and natural cures (Pan et al., 2014).

Regarding production costs, scalability, safety, environmental preservation, and consumer acceptability, plant-made medicines (PMP) hold enormous promise. In the 1990s, the first PMP were antigens and antibodies generated in transgenic plants that had undergone stable transformation (Fukuzawa et al., 2024).

The science and regulations around plant-derived medications have changed over the last 21 years, moving from home cures to controlled, refined goods. With advantages including cheaper prices, simpler distribution, scalable production, and fewer contamination risks, transgenic plants were suggested as an alternate method of producing therapeutic proteins (Thomas et al., 2011).

1.2 Consumer Awareness Levels on Plant Based Medicines

- **Understanding of Plant-Based Pharmaceuticals**

Plant genetic transformation made it possible for plants to express foreign genes and make proteins that were not native to them in the 1980s, which led to the development of "plant molecular farming." This idea sees crops as means of generating useful proteins that were first obtained from microorganisms or animals. The absence of substantial markets for plant-derived proteins, however, caused plant molecular farming to stop by the middle of the 1990s (Davies, n.d.).

Misconceptions about dietary adequacy and a lack of training to talk to patients about nutrition may prevent physicians from recommending PBDs. These findings demonstrate how teaching PBDPs to physicians should enhance their graduate medical education and training. A clinician's ability to successfully and confidently counsel pregnant patients in this area of treatment will be enhanced as a result.

(Landry et al., 2024).

After absorbing contaminants, the plant transpires and subsequently evaporates them in a changed form. This is particularly true for aquatic environments and soils that have been tainted by selenium, arsenic, or mercury. Atrazine, phenol, nitrobenzene, benzene, trichlorethylene, and other organic molecules, however, may also go

through the evaporation process. Because components present in high amounts are poisonous, phytoremediation is viewed as a risky technique (Galwa-Widera, 2019).

1.3 Influences on Consumer Attitudes on Plant Based Medicines

In this context, a variety of issues pertaining to acquisition, utilization, and management impact consumer behaviour, resulting in choices about the acquisition, possession, or use of plant based medicines to satisfy their demands. Demographic and socioeconomic status have been linked to consumers' views and actions about aromatic and therapeutic plants (Al-Saadi et al., 2024).

- **Cultural Influence:**

The relationships between human populations and plant foods and medicines that have historically been important for preserving human nutrition and health are the subject of another current movement in ethnobotany. An expanding list of edible medications is being found and listed by ethnobotanists (Nolan & Turner, 2011).

More individuals than ever before are purchasing medicinal plants and learning about their applications. Dissatisfaction with the exorbitant prices and sometimes dangerous side effects of factory-made medications can help to explain this trend.
The destruction of rainforests and associated land "development," increased levels of soil and water pollution caused by the byproducts of urbanization, and the overharvesting of narcotic plants are some of the recent developments that have threatened the world's phytochemical resource base.

(Halberstein, 2005b).

- **Behavioural Influence:**

The extensive use of holistic and natural healing methods, feelings about the quality of care, sickness perceptions and aetiology, personal philosophies, cultural standards, and health beliefs all contribute to the healing process of conventional therapeutics. Personal belief constructs intricacies highlight alteration in behaviour regarding the use of traditional medicine (Gyasi et al., 2016).

1.4 Barriers to adoption of Plant Based Medicines

Pharmacists' practice is reportedly hindered by their lack of understanding of herbal medications. The general public believes that pharmacists are not currently permitted to provide these remedies, have not received any more training in their production, and have little access to information about herbal medications (Asmelashe Gelayee et al., 2017).

Biopiracy, industrialization, abuse of medicinal plants, and biodiversity loss all impede the progress of herbal medicine. Its development is also constrained by inadequate infrastructure and lax regulations. The sustainability of herbal treatments is under risk due to these issues. Resolving these problems is essential to protecting plant species and guaranteeing their long-term survival.
In the case of herbal medications, quality testing and manufacturing regulations are typically less complicated or structured, and even practitioners of traditional remedies are occasionally unlicensed or unregistered. As a result, both the general population and the country's medical specialists began to prioritize the safety of herbal and traditional therapies (Saggar et al., 2022).
Using herbal remedies was hampered by the notion that they didn't work as quickly as pharmaceutical medications. The following three main themes were found to represent attitudes and beliefs toward herbal medicines and therapeutic decision-making:
1) herbal medications differing from pharmaceuticals
2) proof and efficacy
3) obstacles to using herbal medicines (McIntyre et al., 2015).
Non-users of plant-based pharmaceuticals (PBD) cited a number of obstacles to their usage in a study titled "Perspectives on COVID-19 prevention and treatment using herbal medicine in Vietnam: A cross-sectional study." Lack of personal experience with these therapies, ignorance of PBD, and a lack of professional guidance to use them were the primary challenges mentioned. These difficulties show how much more knowledge and instruction about herbal remedies are needed. By filling in these gaps, PBD may become more widely accepted and used in public health initiatives. The significance of incorporating traditional medicine into contemporary healthcare systems is highlighted by this study (Tran et al., 2022).

1.5 Demographic and Psychographic Insights

- **Role of Age:**

As people age, they utilize prescription drugs more frequently, while the converse is true for PBDs.

According to a study on "Use of herbal medicines and food supplements among the elderly," those over 90 years old use them far less frequently. Daily life impairments, financial limitations, dependence on caretakers, prolonged healthcare use, traditional medicine use, or a lack of exposure to product promotion could all be contributing factors to this decline (Stjernberg et al., n.d.).

- **Role of Gender:**

In a study on "Attitudes toward complementary and alternative medicine influence its use", PBD use was observed to be higher among women than men. The survey also found that women are more satisfied with traditional medicine and more philosophically aligned with PBD. These elements probably play a part in their increased use of PBD (McFadden et al., 2010).

- **Influence of Geography:**

  According to survey results in a study titled "Usage and Attitudes Towards Natural Remedies and Homeopathy in General Paediatrics: A Cross-Country Overview," Despite certain geographical differences, there is a global trend toward increased interest in and usage of homeopathic treatments and natural remedies for children.

(Beer et al., 2016).

- **Role of Lifestyle:**

  Modern developments have improved our understanding of life and health. Cancer and other once-incurable diseases can now be healed..On the other hand, diseases linked to bad lifestyle choices are becoming more prevalent. These illnesses can be avoided and managed by reviving traditional dietary and health practices (Singh et al., 2020).

As more individuals adopt a health-conscious lifestyle, the use of natural remedies, like herbs, to improve one's health is becoming more and more popular. This development highlights the importance of traditional treatments and demonstrates an increasing interest in holistic approaches to well-being. Working together, practitioners of traditional herbal medicine and mainstream medical experts can close healthcare gaps and promote respect and understanding between them. These collaborations guarantee that patients receive a thorough treatment program that capitalizes on the advantages of both systems. Healthcare professionals may provide safer, more efficient, and patient-centered treatment by fusing traditional knowledge with contemporary science
(Krsnik & Erjavec, 2024).

A study on "The Influence of Trust, Price and Lifestyle on Purchasing Decisions for Herbal Products in the New Normal Era with Buying Interest as an Intervening Variable" showed that Through buying interest, lifestyle is the only factor that significantly influences purchase decisions indirectly. However, through buying interest, the Price and Trust variables did not demonstrate a substantial indirect impact on purchase decisions (Sofiana et al., 2024). PBD users had a lifestyle that was obviously more focused on their health and were more likely to have a chronic illness than nonregular or non-users. PBD patients were more likely to be physically active, abstain from smoking, and practice preventative health behaviours (Welz et al., 2019).

1.6 Current Market of Plant Based Medicines

Many well-known pharmaceutical corporations have recently begun manufacturing a variety of herbal treatments. The industry based on medicinal plants is expanding between 7-15% a year. India accounts for 0.1 billion of the global market for safe and effective phytomedicine, which is worth between 60 and 100 billion US dollars (Subramoniam, n.d.).

The increasing reliance on plants for medical molecules is reflected in the fact that approximately 25% of all medications produced globally now contain plant-based substances. Many businesses with molecular farming portfolios are currently expanding the large-scale synthesis of therapeutic proteins as the sector develops. This change opens up new possibilities for the synthesis of complicated, high-value proteins and represents a major step toward the commercial release of plant-based medications. The development of molecular farming also holds promise for resolving issues with medicine affordability and accessibility worldwide (Ma et al., 2005).

The Indian natural medicine industry generates about Rs. 2,300 crores a year, while the pharmaceutical industry, which is expanding at a 15% rate, makes Rs. 14,500 crores. India has exported a large quantity of medicinal plants and herbs in recent years.

(A. Sharma et al., 2008).

Natural, traditional remedies are becoming more and more popular because of their shown efficacy and low cost. Pharmaceutical companies are increasingly relying on the active components in traditional herbal treatments as the cost of creating new chemical entities (NCEs) keeps rising. These components provide a less expensive option than creating new compounds. Growing interest in accessible, sustainable remedies is reflected in the move toward plant-based medications. This approach also emphasizes how historic knowledge and contemporary pharmacological research can be used to satisfy the demands of global healthcare (David et al., 2015).

The quick industrial production of biologics could be completely transformed by plant molecular farming, which provides a scalable way to make therapeutic proteins and vaccines. By facilitating the quicker development of vaccinations and therapies, this technology can help solve pressing global issues like the COVID-19 pandemic. In particular, plant-based vaccines have the potential to revolutionize the vaccination landscape by providing accessible, affordable substitutes for conventional vaccine manufacturing techniques. Future needs for vaccines and biologics, particularly in response to newly emerging infectious illnesses, may be satisfied via plant molecular farming. This invention has the potential to improve pandemic preparedness and world health (Dhama et al., 2020).

Unpackaged and unlabeled, raw or semi-processed traditional cures are commonly sold in open street markets and muthi shops in developing countries. Commercial plant collectors harvest plants all year round to satisfy the steady demand, which usually results in inconsistent plant material of the same species being available in markets for the selling of medicinal plants.
(van Wyk & Prinsloo, 2020).

1.7 Regulation on Plant Based Medicines

Herbal remedies, used for millennia, are governed by varying laws across different nations, with some countries only recently implementing regulations. These remedies often carry cultural and emotional significance, deeply rooted in traditional customs and practices. Many herbal products and dietary supplements leverage this traditional knowledge, often promoting health benefits based on long-standing beliefs. However, their commercialization is complicated by the lack of uniform regulation and the challenge of verifying their efficacy and safety. Despite these hurdles, the demand for these products continues to grow, as they are marketed with specific health claims aimed at consumers seeking natural alternatives (Thakkar et al., 2020).

The perception that herbal treatments, which are derived from plant parts or extracts, are "natural" and safe causes misunderstandings regarding their application and safety measures. Since many nations view them as traditional medicines, they are regulated slowly and are treated more like foods than medications. Maintaining their efficacy, safety, and quality is still difficult (Rousseaux & Schachter, 2003).

The "Management of Product License Applications (PLA)" policy for Natural Health Products requires varying levels of evidence based on risk categories:

- **Class I (low risk)** requires clearance through monograph attestation**.**
- **Class II (medium risk**) needs support from monographs and other information, such as phase 2 studies.
- **Class III (high risk)** need solid proof, such as data from controlled clinical trials

(Li et al., 2018).
For the foreseeable future, the majority of people on the planet will mostly obtain their medical care from plants, either in their raw or extracted form. These essential nutrients are being depleted by contemporary ways of gathering medicinal plants. To guarantee safety and effectiveness, both wild and cultivated medicinal herbs should be gathered at periods established by science. Long-term healthcare sustainability depends on striking a balance between resource usage and conservation (Cordell, 2011).

1.8 Strategies for Enhancing Consumer Awareness

- **Education Campaigns and Public Health Initiatives:**

In the context of the Farm to Fork Strategy, it is imperative to continue educating the public and stakeholders about the threats to plant health. Through its competent Working Group on Social Research Methods and guidance, the European Food Safety Authority (EFSA) can provide technical guidance on this issue. This guidance is supported by social science research and methodologies about risk communication concepts and implementation.
(Lourenço et al., 2023).

- **Role of Healthcare Providers in Advocacy:**

One of the numerous ways that medical professionals and other allied health professionals support planetary health is by advocating for sustainable dietary standards and laws that prioritize the sustainability and well-being of food systems. As a result, it is increasingly essential to guarantee sustainable food systems and promote sustainable nutrition in healthcare systems.
(Prosen et al., 2023).

- **Collaboration with Pharmaceutical Companies:**

Many plant species, such as diosgenin from Dioscorea nipponica and the analgesic aspirin from willow bark (Salix sp.), have been used for a variety of medicinal purposes. Because of these plants, pharmaceuticals with significant commercial value have been produced.
The tremendous biodiversity of the plant kingdom offers enormous unrealized potential for the development of novel therapies. Researchers can discover novel remedies for health issues by investigating plant-based chemicals. For the advancement of pharmaceuticals and medicine in the future, this biodiversity presents a valuable resource (V. Sharma & Sarkar, 2013).

1.9 Future Growth and Opportunities of Plant Based Medicines

With about half a million plants in the globe, the majority of which have not yet been used for medical purposes, medicinal herbs have a bright future. Research into their characteristics, both present and prospective, may help treat illnesses. Even with a wealth of traditional knowledge, scientific research on active ingredients can lead to the development of natural products and uncover new therapeutic advantages (Sahoo et al., 2010).
New lead compounds from plants will be found with the aid of bioprospecting and contemporary drug discovery techniques. Cooperation between fields like as pharmacology, chemistry, and botany is crucial. Technological developments will make it easier to identify and develop chemicals derived from plants. The creation of novel drugs can be greatly aided by this strategy (Jachak & Saklani, n.d.).
Complacency in conservation efforts is posing a threat to the future of medicinal plants, despite their growing use and crucial role in drug discovery. Medicinal plant and herb reserves are quickly depleting, especially in emerging nations. Numerous species are in danger of going extinct due to the demands of increasing industrialization, which also jeopardizes the sustainability of these priceless natural resources (Prakash Rout et al., 2009).

- **Innovations in Plant-Based Drug Development:**

The five main areas of study for plant-based innovations are:
(1) crop genome engineering and environmental applications
(2) plant-based food innovations, such as nutritional products and meat alternatives
(3) plant-derived ingredients for cosmetics and medicine
(4) advanced production technologies
(5) consumer market trends and preferences.(Krzywonos & Piwowar-Sulej, 2022)

- **Integration with Modern Medicine:**

There is a need for safer alternatives because many modern drugs have major adverse effects. An invaluable source of information for creating novel, less hazardous medicines is provided by traditional plant-based remedies. These treatments, which have been used for centuries, can be used as a basis for current medication research. Investigating plant-based remedies could result in the development of safer and more efficient treatment alternatives (Khan et al., 2021).

- **Potential for Market Growth in Future:**

The global market for over-the-counter herbal products was valued at USD 59.45 billion in 2017, according to the BCC market research report. This market is anticipated to reach USD 104.78 billion by 2026, growing at a Compound Annual Growth Rate of 6.5%.
(Bareetseng, 2022).
The global market for trade related to medicinal plants is growing at a rate of 7% annually, according to Export Import Bank. India only has a $1 billion share in the global herbal market, compared to China's $6 billion share. India exports 1200 million rupees worth of medicinal plants every year. (Herbal Medicines, n.d.).

2. Objectives of the Study

- To assess the level of consumer awareness regarding plant-based pharmaceutical alternatives for diabetes.
- To evaluate consumer attitudes toward these alternatives in terms of perceived effectiveness, safety, and affordability.
- To identify key influencing factors and barriers to adoption.
- To analyze the relationship between awareness, demographic factors, and willingness to use.
- To examine the role of doctors and pharmacists in influencing consumer adoption.
- To provide recommendations for improving consumer trust and uptake of plant-based pharmaceuticals.

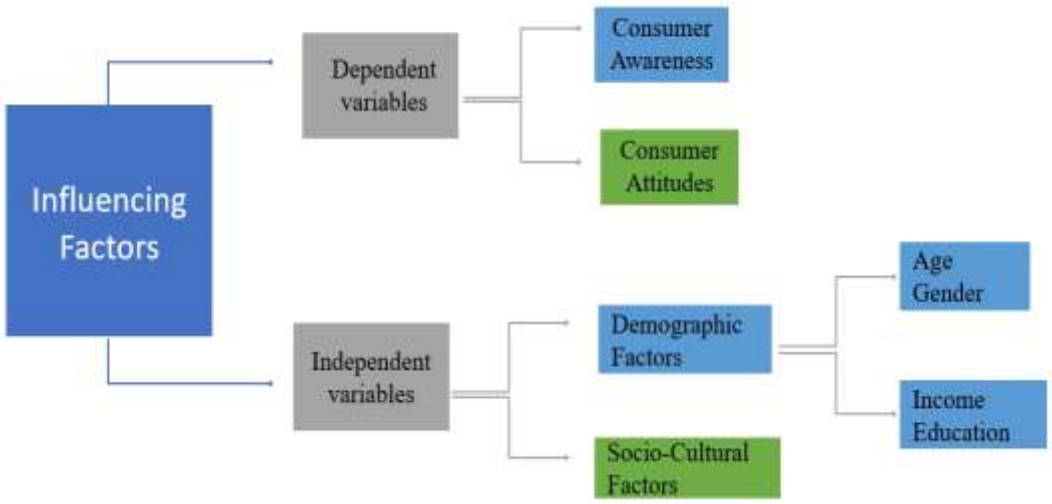
2.1 Hypotheses

- H_0 (Null Hypothesis): There is **no significant relationship** between **consumer awareness, attitudes,** and their **willingness** to use plant-based medicines for diabetes management.

- H_1 (Alternative Hypothesis): There is a **significant** relationship between consumer awareness, positive attitudes, and their willingness to use plant-based medicines for diabetes management.

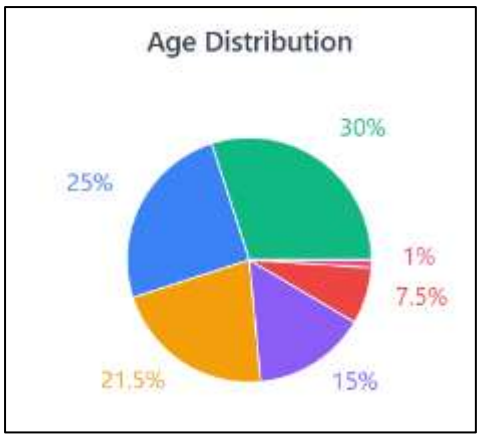
3.Methodology

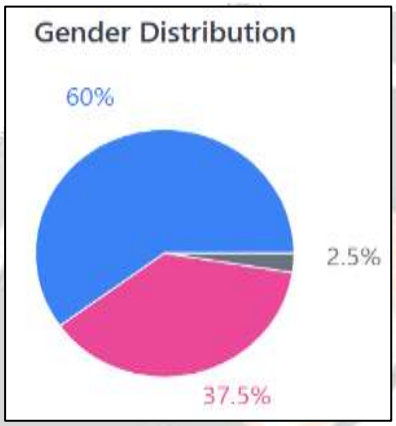
- Research Design: Quantitative, cross-sectional survey.
- Sample Size: 400 respondents.
- Sampling Technique: Non-probability, convenience sampling.
- Data Collection Tool: Structured questionnaire distributed via Google Forms.
- Questionnaire Sections: Demographics, Awareness, Attitudes & Perceptions, Barriers, Willingness to Adopt.
- Independent Variables: Age, gender, education, income, diabetes status, awareness level.
- Dependent Variables: Perceived efficacy, perceived safety, willingness to use.
- Data Analysis: Descriptive statistics and chi-square tests using IBM SPSS.
- Ethical Considerations: Informed consent, anonymity, and voluntary participation were ensured.



3.1Demographic Profile of Respondents (n=400)

Variable	Category	Frequency	Percentage
Age	41-50	100	25.0%
	51-60	120	30.0%
	Above 60	86	21.5%
	31-40	60	15.0%
	21-30	30	7.5%
	Below 20	4	1.0%
Gender	Male	240	60.0%
	Female	150	37.5%
	Prefer not to say	10	2.5%
Diabetes Status	Diagnosed	300	75.0%
	Pre-diabetic	80	20.0%
	No	20	5.0%





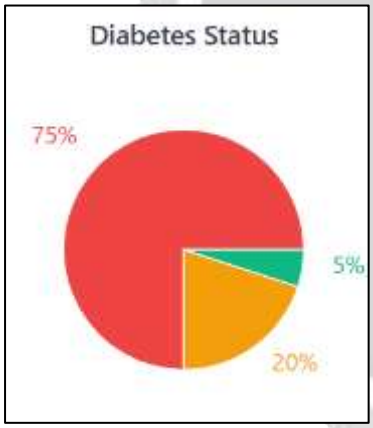


Figure 1

Figure 2

Figure 3

3.2Awareness of Plant-Based Alternatives

Variable	Category	Frequency	Percentage
Awareness of plant-based products	Moderate	160	40.0%
	High	100	25.0%
	Low	70	17.5%
	Very High	40	10.0%
	Very Low	30	7.5%
Used plant-based ingredients	I've heard of them but never used	180	45.0%
	Yes, I have used them	180	45.0%
	No, I'm not familiar with them	40	10.0%

Distribution of Awareness Levels

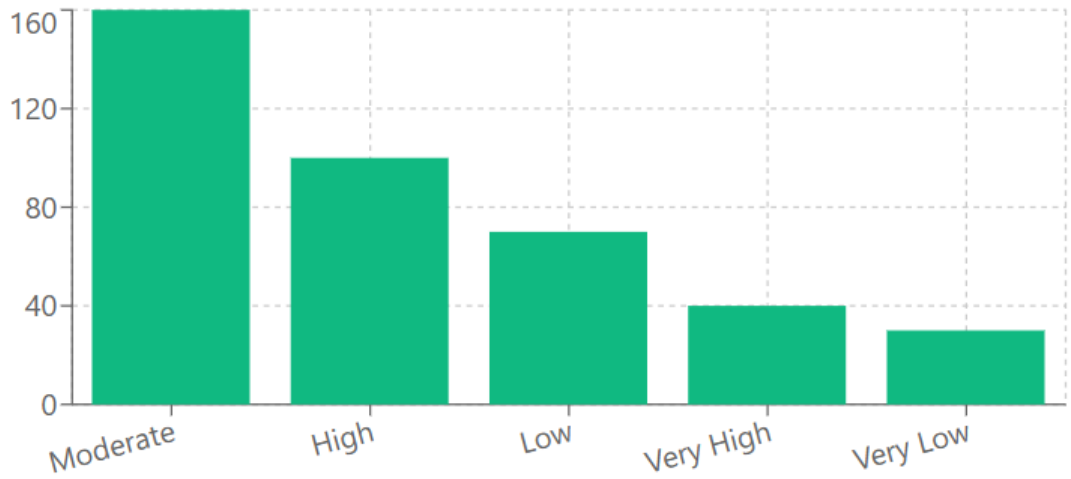


Figure 4

3.3Perceptions and Willingness to Adopt

Perception / Attitude	Agree (n)	Percentage
Equally Effective as Conventional Medicine	280	70%
More Affordable	320	80%
Safe & Reliable	232	58%
Willing to use if recommended by a doctor	300	75%

Agreement Levels by Perception

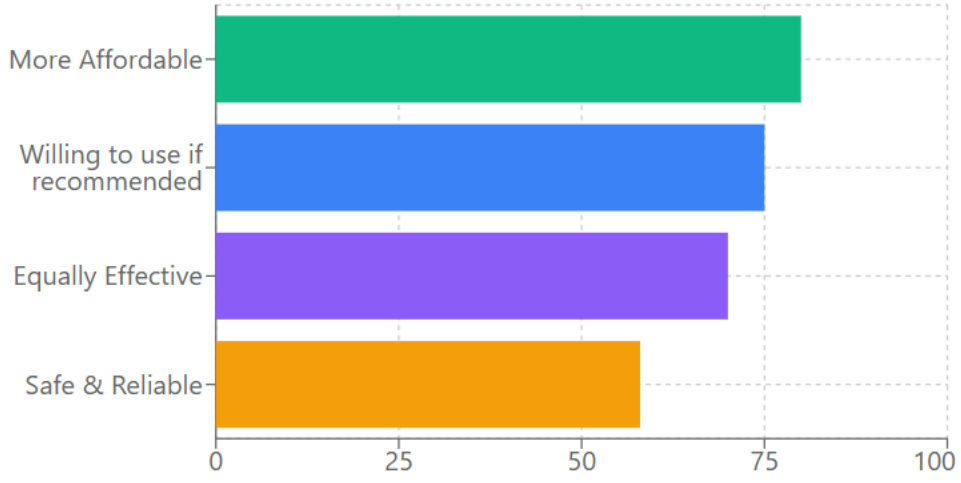


Figure 5

3.4Chi-square Test Results

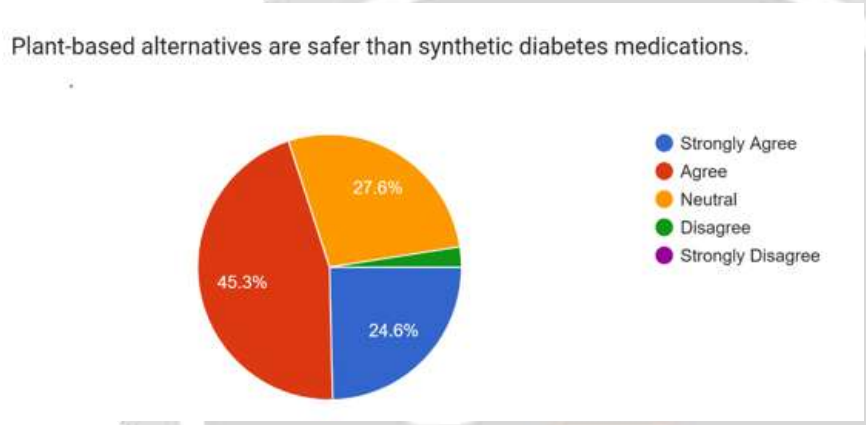
Variable A	Variable B	Chi-square Value (χ^2)	p-value	Interpretation
Awareness Level	Willingness to Use	24.85	0.000055	Significant

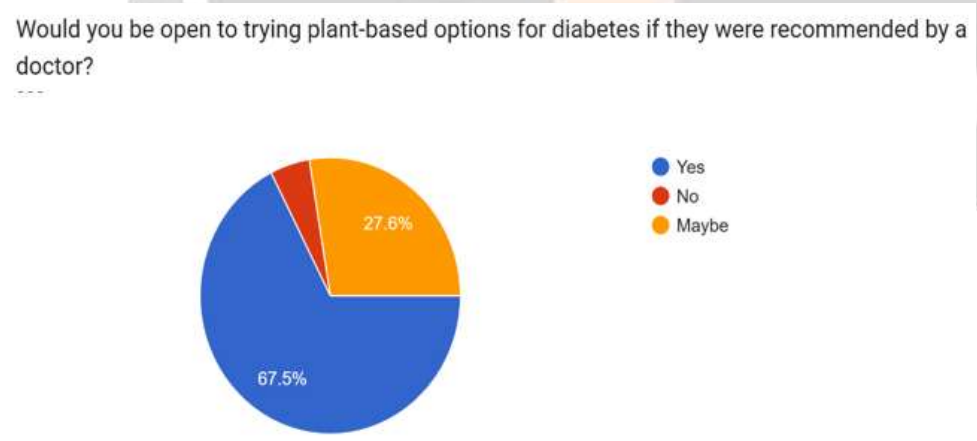
Perceived Efficacy & Safety	Adoption Behavior	31.72	0.0000012	Significant
Diabetes Status	Usage of Plant-Based Ingredients	4.091	0.3939	Not Significant
Doctor Recommendation Acceptance	Usage of Plant-Based Ingredients	5.137	0.2735	Not Significant

4.Findings and Discussion

The study reveals a strong baseline awareness of plant-based alternatives for diabetes, with a significant number of respondents having tried them. The high recognition of their affordability aligns with global trends in plant-based medicine. However, the primary findings highlight a critical gap between awareness, positive perception, and actual adoption driven by trust.

The highly significant p-values for the relationship between Awareness and Willingness ($p<0.05$) and Perceived Efficacy/Safety and Adoption ($p<0.05$) confirm that these are the core drivers of consumer behaviour. This underscores that consumers are rationally evaluating these products based on their perceived benefits and risks.

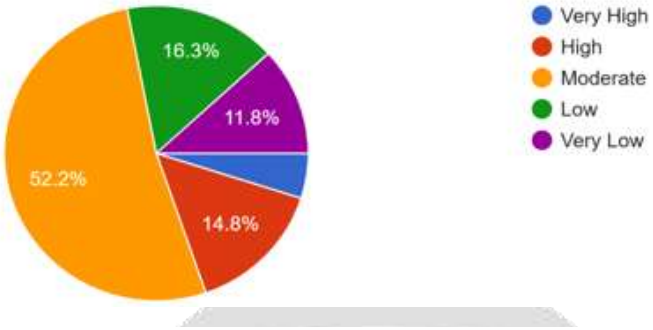




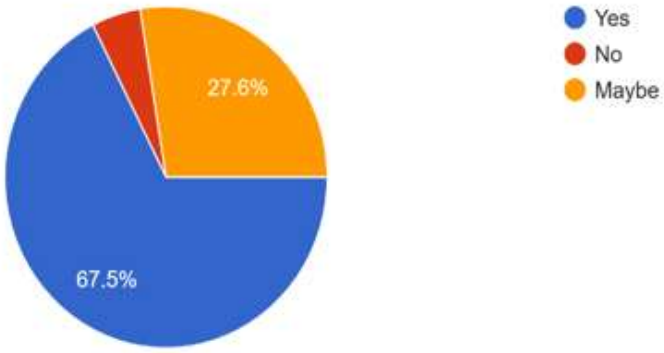
The most revealing insight is the non-significant relationship between diabetes status and usage ($p=0.3939$). This indicates that the primary target demographic - those diagnosed with diabetes—are not adopting these alternatives at a higher rate than pre-diabetic or non-diabetic individuals, pointing to a failure in market penetration and a critical trust deficit among those who need the treatment most.

Furthermore, the non-significant result for doctor recommendation ($p=0.2735$), despite 75% of respondents stating they would follow a doctor's advice, suggests a severe lack of active recommendation from healthcare providers. This creates a major barrier to adoption and highlights the pivotal role of the medical community as gatekeepers.

How aware are you of the availability of plant-based products or supplements specifically marketed for diabetes management?



Would you be open to trying plant-based options for diabetes if they were recommended by a doctor?



5.Recommendations

- Scientific Validation and Transparency: Increase investment in clinical trials and pharmacological studies to generate robust, published data on the efficacy and safety of specific plant-based treatments for diabetes.
- Healthcare Professional Engagement: Develop targeted Continuing Medical Education (CME) programs for doctors and pharmacists to educate them on the scientific evidence supporting plant-based alternatives and encourage active recommendation.
- Targeted Awareness Campaigns: Launch public health campaigns that move beyond general awareness to specifically address the safety and efficacy concerns of diabetic patients, featuring endorsements from trusted medical bodies.
- Standardization and Quality Assurance: Advocate for and implement strict quality control protocols and visible certification marks (e.g., ISO, GMP) on product packaging to build consumer confidence in product quality and consistency.
- Policy Integration: Work with government bodies to integrate validated plant-based pharmaceuticals into national treatment guidelines and formularies, such as the Pradhan Mantri Bhartiya Janaushadhi Pariyojana (PMBJP), to enhance accessibility and legitimacy.

6.Limitations

- Convenience sampling restricts the findings' applicability to a larger population.
- Because the study is cross-sectional, it only records sentiments at one particular moment in time and is unable to monitor how perceptions evolve over time.
- Because the information is self-reported, it could be skewed by social desirability and memory.

- Due to the study's regional focus, findings may differ in different parts of India.

7.Conclusion

This research demonstrates that the market for plant-based diabetes pharmaceuticals is at a critical juncture. While consumer awareness and a foundational level of interest exist, conversion into widespread adoption is hampered by a trust gap. This gap is characterized by lingering doubts about efficacy and a critical lack of advocacy from healthcare professionals. The path forward requires a concerted effort to build credibility through scientific evidence, empower doctors and pharmacists as champions, and assure quality. By bridging this trust gap, plant-based pharmaceuticals can realize their potential as a valuable, accessible, and trusted component of diabetes care, contributing significantly to public health and treatment sustainability.

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