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Market Survey of Antifungal Drugs in Context to India

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Abstract

The Indian pharmaceutical market has witnessed a significant rise in demand for antifungal drugs due to increasing cases of fungal infections, particularly among immunocompromised individuals and those with chronic diseases. This market survey explores the current landscape of antifungal drug usage, availability, pricing, prescription trends, and major players in the Indian context. It analyzes various categories of antifungal agents including azoles, polyenes, echinocandins, and allylamines, with a focus on commonly used medications such as fluconazole, itraconazole, amphotericin B, and terbinafine. Data was collected through retail pharmacy visits, doctor interviews, and online pharmaceutical portals. The findings indicate a growing reliance on generic formulations due to affordability and accessibility, with urban centers showing higher demand for systemic antifungals. Challenges such as self-medication, drug resistance, and lack of awareness in rural areas are also addressed. The study concludes with recommendations for rational use, need for public health education, and better regulatory control to enhance the efficacy and accessibility of antifungal treatment in India.

Keywords: Antifungal Drugs, Indian Pharmaceutical market, Fluconazole, generic formulations, Market Survey.

1. Introduction

Fungal infections have emerged as a significant global health challenge, antifungal drugs playing a important role in their treatments. However, the increasing resistance of fungi to these treatments poses a serious threat, necessitating ongoing innovation in drug development. Unlike bacteria, fungi share close evolutionary ties with human cells, making it challenging to design drugs that selectively target fungal components without harming the host. Recent studies highlight promising advancements in this field,These efforts reflect a dynamic and evolving landscape, driven by the urgent need to protect human health from resilient fungal pathogens. For instance, (Hoenigl et al. 2024) explores novel antifungal agents and treatment strategies, emphasizing the importance of addressing resistance to improve outcomes in invasive fungal diseases. Their work underscores the development of drugs with new mechanisms of action to combat multidrug-resistant fungi. Similarly, (Fisher et al. 2024) provide insights into the rapid emergence of antifungal-resistant fungi, advocating for innovative approaches to stay ahead of evolving pathogens. Additionally, a study by (Denning et al. 2024) estimates the global burden of severe fungal diseases, reinforcing the need for advanced diagnostics and therapeutics to

tackle this growing problem. These recent findings illustrate the exciting progress and creative solutions being pursued to ensure effective treatments.

1.2. Mechanism of Action:

Antifungal agents work by targeting specific components unique to fungal cells. Azoles, such as miconazole, fluconazole, and ketoconazole, inhibit an enzyme known as lanosterol 14α-demethylase. This enzyme plays a crucial role in converting lanosterol into ergosterol—a vital component of the fungal cell membrane (Odds et al., 2003). By disrupting ergosterol synthesis, these drugs compromise cell membrane integrity, leading to cell death or inhibited growth (fungistatic activity) (Sheehan et al., 1999). Understanding these mechanisms is critical for developing new antifungal therapies that can overcome resistance issues.

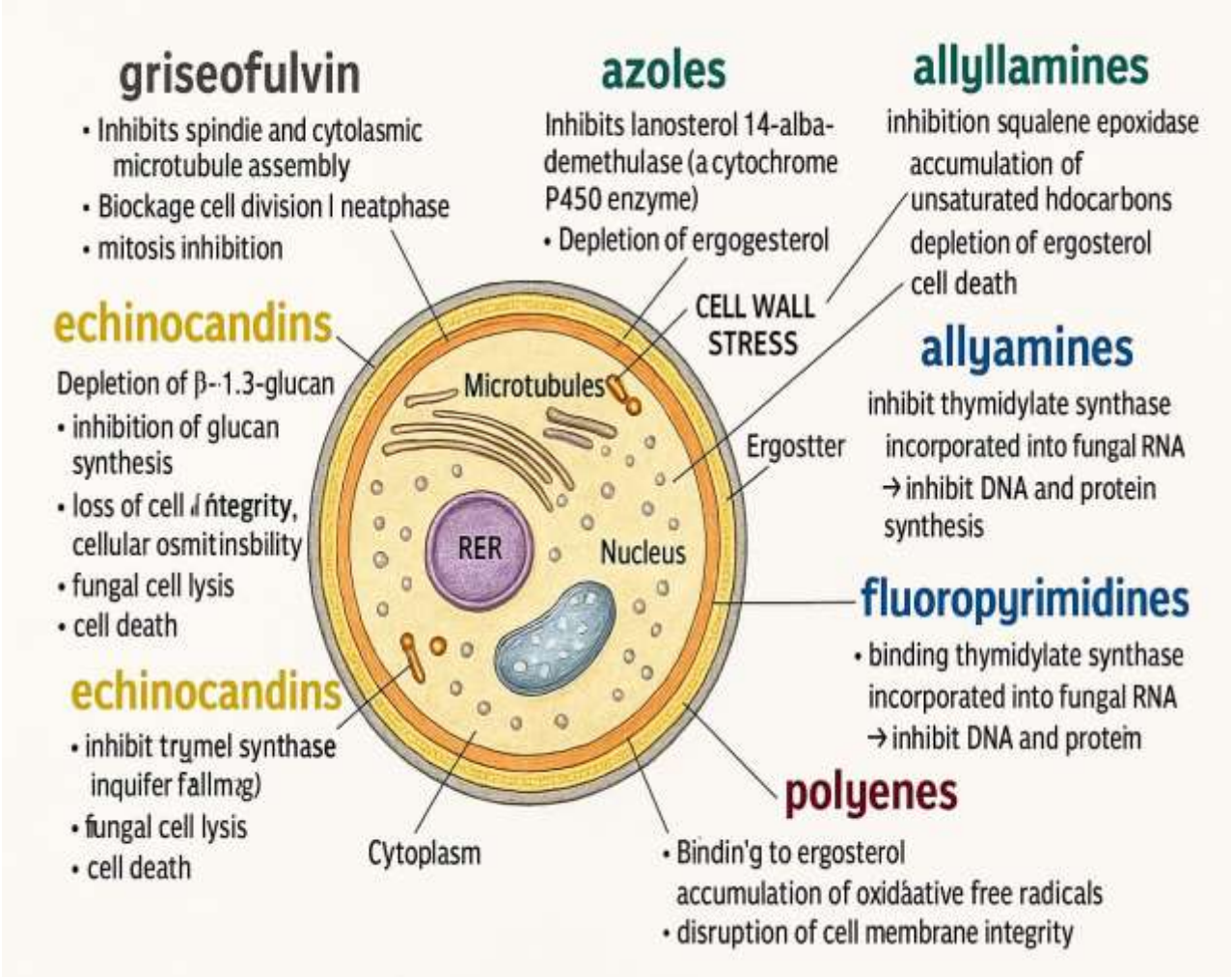


Fig 1.1 Mechanism of Action of Antifungal Drugs.

1.3 Advancements in Antifungal Therapy

The introduction of azole antifungals marked a significant advancement in medical treatment for fungal infections. Unlike older agents such as amphotericin B—which is effective but associated with severe side effects—azoles provide safer alternatives with fewer adverse effects (Rex et al., 2000). Triazoles like fluconazole offer broad-spectrum efficacy against various fungi while maintaining a favorable

safety profile (Pfaller et al., 2006). These advancements have made it possible for healthcare professionals to manage fungal infections more effectively than ever before.

2. Global Statistics

The Indusial value of Antifungal Drugs in 2023 15.5 billion estimated. is anticipated to witness growth at a CAGR of 3.7% to reach USD 21.2 billion by 2032. Fungal infections are becoming more common because more old people, more people with chronic diseases, and more people with weak immune systems exist. This would helping in the market grow [Wani G et al . 2024]

For instance, as per the National Institute of Health (NIH), fungal infections are a significant health concern globally, with over 150 million severe cases occurring annually, leading to approximately 1.7

million deaths per year. (Bongomin . et al. 2017b) (Denning, D. W. 2024) Thus, this substantial number of patients with fungal infections drives the adoption of the antifungal drugs. Additionally, advancements in diagnostic techniques leading to improved identification of fungal infections are driving the demand for antifungal drugs [4]. (Seagle et al. Furthermore, the development of novel antifungal therapies with improved efficacy and safety profiles, along with the expanding applications of antifungal drugs in prophylaxis, are expected to fuel market growth. (Bongomin et al. 2017)

2.2 Market Report Attributes [Wani G et al . 2024]

Attribute	Details
Base Year	2023
Market Size (2023)	$15.5 Billion
Forecast (2024-2032)	$ 21.2 Billion (3.7% CAGR)
Historical Data	2018 – 2023
Segments Covered	Drug Class, Indication, Infection Type, Route, Medication, Type, Distribution, Region
Growth Drivers	Rising fungal infections, increased drug adoption, R&D advancements
Challenges	Drug resistance, product recalls

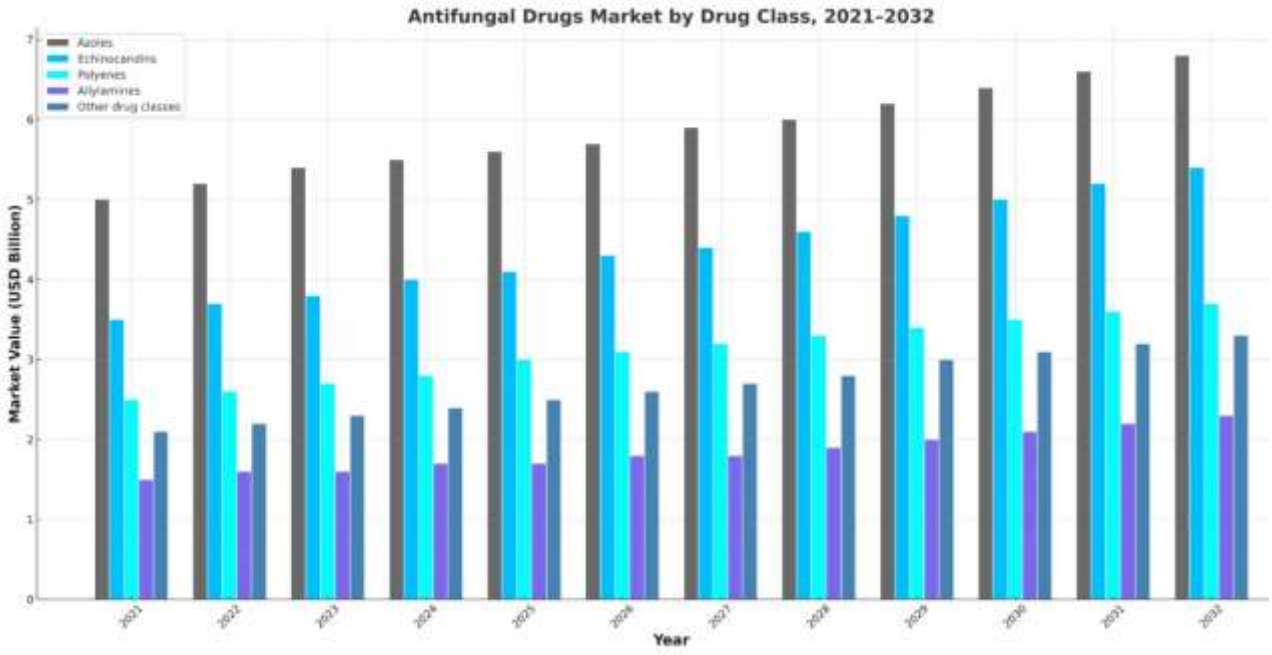
2.3 Market Trends.

Fungal infections are increasingly prevalent worldwide, affecting both superficial skin layers and deeper systemic systems, as noted by the World Health Organization (WHO). This surge has heightened the demand for antifungal medications, driven by several contributing factors. Research highlights that the rise in immunocompromised populations, such as those with HIV/AIDS, alongside the widespread use of immunosuppressive therapies and an increase in surgical procedures, has significantly elevated susceptibility to these infections. For instance, a study by (Bongomin et al. 2017) emphasizes that cryptococcal meningitis, a severe fungal infection, affects a substantial proportion of HIV/AIDS patients, underscoring the critical need for effective treatments. This growing burden is pushing pharmaceutical companies to innovate and develop novel antifungal drugs. Furthermore, heightened awareness among healthcare providers regarding the diagnosis and management of fungal infections has led to an uptick in prescriptions, further expanding the antifungal medicine market.In exploring this trend, the work of (Rajasingham et al. 2017) provides valuable insight, estimating that fungal infections like cryptococcal meningitis contribute significantly to global morbidity and mortality among immunocompromised individuals, particularly in the context of HIV/AIDS. Similarly, (Brown et al. 2012) discuss how the interplay of environmental factors, immune suppression, and medical advancements has fueled the emergence of fungal pathogens, necessitating robust therapeutic responses. These research findings collectively illustrate the complex dynamics behind the rising incidence of fungal infections and the corresponding growth in the antifungal drug market.

2.4 Market Analysis.

The antifungal drugs market is categorized based on drug class into azoles, echinocandins, polyenes, allylamines, and other drug classes. The azoles segment dominated the market with a significant revenue share due to their broad-spectrum activity against fungal pathogens such as Candida species, Aspergillus

species, and dermatophytes (Sheehan et al., 1999). Azoles are versatile in treating both superficial and systemic fungal infections, making them a preferred choice for healthcare providers (Sheehan et al., 1999). Their availability in various dosage forms, including pills, capsules, creams, and liquids, enhances accessibility and patient compliance (Sheehan et al., 1999). Furthermore, azoles, particularly triazoles such as fluconazole and voriconazole, offer improved safety profiles and reduced adverse effects compared to older antifungal agents (Sheehan et al., 1999; Pappas et al., 2016). These factors collectively contribute to the market dominance of azoles.



Graph of Antifungal Drugs Market (2021 -2032)

The antifungal drug market Is categorized based on diseases caused by fungal pathogens, including candidiasis, aspergillosis, mucormycosis, and others. Among these, candidiasis remains one of the most prevalent fungal infections globally, caused by Candida species, particularly Candida albicans. These infections range from superficial mucosal infections to life-threatening systemic diseases such as candidemia. The treatment of candidiasis relies on antifungal agents like azoles (e.g., fluconazole and voriconazole), echinocandins (e.g., caspofungin and micafungin), and polyenes (e.g., amphotericin B) (Pfaller et al., 2010; Pappas et al., 2016). Azoles are often preferred due to their fungistatic properties, broad-spectrum activity, low cost, and availability in various formulations (Shapiro et al., 2011; Spampinato and Leonardi, 2013). However, the rising incidence of antifungal resistance poses a significant challenge. Resistance to azoles, particularly fluconazole, has been increasingly reported among Candida species, necessitating the development of new therapeutic strategies (Prasad et al., 2016; Seyedmousavi et al., 2017). Novel approaches include combination therapies with traditional antifungals and alternative agents such as natural products or synthetic derivatives targeting new molecular pathways (Shoham and Marr, 2012; Paramythiotou et al., 2014). Additionally, echinocandins have emerged as a critical class for treating invasive candidiasis due to their fungicidal activity against most Candida species and lower toxicity profiles compared to polyenes (Pappas et al., 2016). The growing prevalence of candidiasis worldwide underscores the urgent need for Improved diagnostics and

innovative antifungal therapies. Advances in understanding resistance mechanisms and the development of novel antifungal agents are essential to address this global health challenge effectively.

2.5 Market Share

The antifungal drug Industry has a lot of competition because big companies want a larger piece of the market . Top drug makers and companies that make cheaper generic drug versions are working hard to Manufacture , improve, and sell antifungal medicines . They often team up, join forces, buy each other out, or make deals to get stronger and take advantage of new chances in the worldwide market .

3. Market Share Dynamics in India

The antifungal drug market in India is shaped by the increasing incidence of fungal infections and the country's position as a global hub for pharmaceutical manufacturing. Hasan et al. (2022) highlight the significant demand surge for antifungal drugs during the COVID-19 pandemic, particularly for Amphotericin B, driven by the mucormycosis outbreak. and intense competition among manufacturers to ramp up production and secure market dominance, with supply shortages prompting both branded and generic firms to respond swiftly. The study emphasize that this competition exposed vulnerabilities in the supply chain but also spurred efforts to meet demand, influencing market share distribution (Hasan et al., 2022).Tiwari et al. (2016) provide a pharmacoeconomic perspective, analyzing the cost and availability of antifungal drugs in India. Their research reveals a competitive landscape where multinational companies offering branded drugs, such as Pfizer and Merck, coexist with Indian generic manufacturers like Cipla and Sun Pharma. The study found that generics, such as fluconazole and itraconazole, dominate in terms of volume due to their affordability, while branded drugs maintain a niche in specialized care settings. This duality reflects how competition drives market share, with pricing being a critical factor in India's price-sensitive market (Tiwari et al., 2016).The rivalry between top drug makers and generic producers is a defining feature of India's antifungal market. Patel et al. (2022) conducted a multicenter retrospective study on prescribing patterns of systemic antifungal medications in India. Their findings indicate that posaconazole (38.6%) and anidulafungin (32.8%)—typically branded products from companies like Merck—are widely used in hospital settings, reflecting the influence of multinational firms. Conversely, generic versions of fluconazole and itraconazole, produced by Indian companies, hold substantial market share in outpatient and retail segments due to lower costs. The authors suggest that this competition shapes prescribing behavior and market dynamics, with generics gaining traction in primary care (Patel et al., 2022).Kaur et al. (2019) review the antifungal drug market in the context of resistance and therapeutic challenges. They note that large pharmaceutical companies invest heavily in research and development to introduce novel antifungals, such as echinocandins, to differentiate themselves from generic competitors. Meanwhile, Indian generic firms focus on high-volume production of established drugs like azoles, leveraging economies of scale to maintain market share. This competition fosters a diverse market where innovation and cost-effectiveness coexist (Kaur et al., 2019).To enhance their market position, companies in India's antifungal sector often engage in partnerships and alliances. Selvaraj et al. (2022) explore the broader pharmaceutical industry in India, noting that generic manufacturers frequently collaborate with global firms to co-produce or distribute antifungal drugs. These partnerships enable companies to combine technological expertise with local manufacturing capabilities, strengthening their competitive edge. The authors argue that such strategies are particularly effective in addressing the growing demand for antifungals, allowing firms to expand their market share in both domestic and export markets (Selvaraj

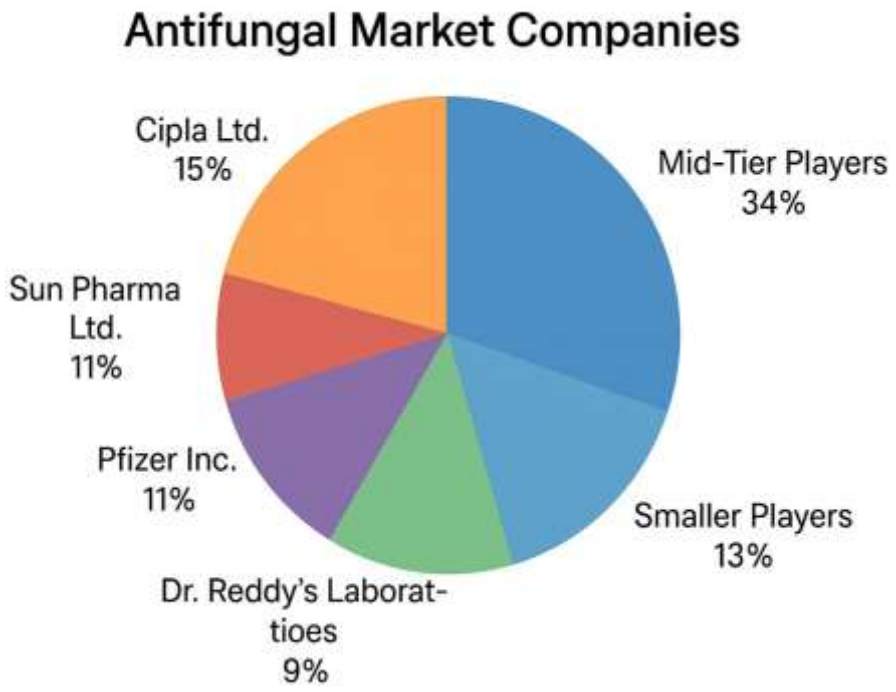
et al., 2022).Similarly, Mondal and Das (2021) discuss the role of mergers and acquisitions in the Indian pharmaceutical sector, including antifungal drug production. Their review highlights how companies acquire smaller firms or form joint ventures to access new markets and streamline production. For instance, collaborations during the mucormycosis crisis enabled rapid scaling of Amphotericin B supply, illustrating how strategic moves bolster market presence amid competition (Mondal & Das, 2021).

3.1 Drugs Market Companies

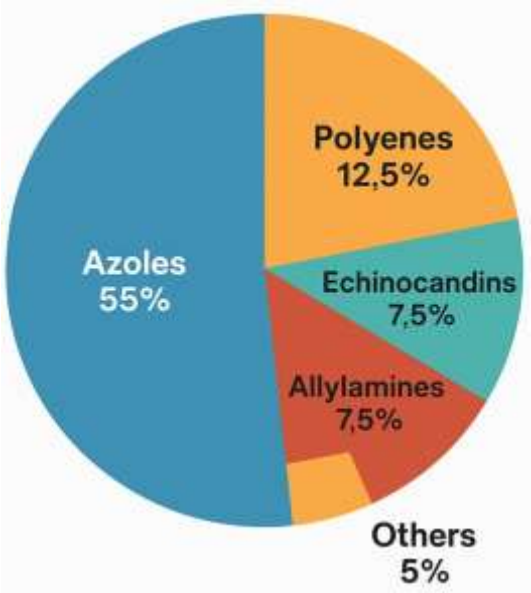
Company Name	Brand Name	Origin	Establishing Year	Market Share (%)	Reference
Pfizer Inc.	Diflucan	USA	1849	10-15% (est.)	(Kaur et al., 2019)
Merck & Co., Inc.	Noxafil	USA	1891	8-12% (est.)	(Patel et al., 2022)
Cipla Ltd.	Forcan	India	1935	15-20% (est.)	Tiwari et al., 2016
Glenmark Pharma Ltd.	Candid	India	1977	5-10% (est.)	30
Sun Pharma Ltd.	Abzorb	India	1983	10-15% (est.)	Hasan et al., 2022
Bayer AG	Canesten	Germany	1863	5-8% (est.)	28
Gilead Sciences	AmBisome	USA	1987	10-15% (est.)	(31)
Mylan N.V	Caspofungin (generic)	USA/Netherlands	1961	5-10% (est.)	(29)
Dr. Reddy's Labs	Fungicip	India	1984	8-12% (est.)	(30)
Zydus Cadila	Zycan	India	1952	5-10% (est.)	(28)
Lupin Ltd.	Lupizole	India	1968	5-8% (est.)	(29)
Intas Pharma Ltd.	Canditral	India	1977	5-8% (est.)	(30)
Torrent Pharma Ltd	Flucon	India	1959	4-7% (est.)	(30)
Alkem Laboratories Ltd	Alkazole	India	1973	5-8% (est.)	(29)
Aurobindo Pharma Ltd	Aurozole	India	1986	5-10% (est.)	(28)
Biocon Ltd	Canazole	India	1978	4-7% (est.)	(31)
Wockhardt Ltd	Wokazole	India	1967	4-6% (est.)	(30)
Ranbaxy (Sun Pharma)	Revocon	India	1961	5-8% (est.)	(28)
Cadila	Cadiflu	India	1995	4-6% (est.)	(29)

Healthcare Ltd					
Ipca Laboratories Ltd	Ipcazole	India	1949	4-7% (est.)	(30)
Ajanta Pharma Ltd.	Ajazole	India	1973	4-6% (est.)	(28)
Hetero Drugs Ltd.	Hetrazole	India	1993	5-8% (est.)	(31)
Macleods Pharma Ltd	Maczone	India	1986	4-6% (est.)	(29)
Mankind Pharma Ltd.	Manforce (antifungal)	India	1995	5-8% (est.)	(28)
Unichem Laboratories Ltd.	Unizole	India	1962	3-5% (est.)	(29)
Emcure Pharma Ltd.	Emtriazole	India	1983	4-6% (est.)	(30)
Panacea Biotec Ltd.	Panazole	India	1984	3-5% (est.)	(28)
Natco Pharma Ltd.	Natflu	India	1981	4-7% (est.)	(31)
Alembic Pharma Ltd.	Alezol	India	1907	4-6% (est.)	(29)
Jubilant Life Sciences	Jubi-Zole	India	1978	3-5% (est.)	(30)
Strides Pharma Science	Striflu	India	1990	4-6% (est.)	(31)
Micro Labs Ltd.	Micogel	India	1973	4-6% (est.)	(28)
Aristo Pharma Ltd.	Aristozole	India	1971	3-5% (est.)	(29)
Indoco Remedies Ltd.	Indozole	India	1947	3-5% (est.)	(30)
RPG Life Sciences Ltd.	RPG-Zole	India	1968	2-4% (est.)	(28)
Abbott India Ltd.	Abbozole	India	1944	5-8% (est.)	(29)
Medley Pharma Ltd.	Medizole	India	1969	3-5% (est.)	(30)
Wallace Pharma Ltd.	Wallazole	India	1980	2-4% (est.)	(31)
Zuventus	Zuvizole	India	2002	3-5% (est.)	(29)

Healthcare Ltd.					



3.3 Market By Drug Class



4. Classification of Antifungal Drugs

Antifungal drugs are split into groups based on how they stop fungi, as explained by research papers. Azoles, like fluconazole and voriconazole, block a key fungal cell part, making them very popular, (Sheehan, Hitchcock, and Sibley 1999) describe in their review, with Denning and Bromley (2015) noting their wide use. Polyenes, like amphotericin B and nystatin, break fungal cells by sticking to them, shown (Hazen and Brown 1950) and (Odds,Brown, and Gow 2003). Echinocandins, like caspofungin, stop fungi from building strong walls, (Walsh et al. 2004) and (Thompson et al. 2023) explain for new

drugs like rezafungin. Allylamines, like terbinafine, hit fungi in a different way, per (Balfour 1992), while flucytosine messes up fungal growth, (Vermes et al. 2000) detail. Natural options like neem are also being studied, (Denning and Hope 2010) pushing for more ideas to fight fungi better.

Chemical Classification	Mechanism of Action	Examples	Reference
Imidazoles (Azoles)	Inhibit lanosterol-14α-demethylase, the enzyme required to convert lanosterol to ergosterol.	Clotrimazole, Oxiconazole, Miconazole, Econazole, Tioconazole, Ketoconazole	(39)
Triazoles (Azoles)	Inhibit lanosterol-14α-demethylase, the enzyme required to convert lanosterol to ergosterol.	Fluconazole, Itraconazole, Terconazole, Voriconazole, Isavuconazole, Posaconazole	(39)
Echinocandins	Inhibit cell wall synthesis by targeting glucans (1,3-β-glucan synthase).	Caspofungin, Anidulafungin, Micafungin	
Allylamines	Inhibit squalene epoxidase.	Amorolfine, Naftifine, Terbinafine	(40)
Polyenes	Pyrimidine analogue; converted into 5-fluorouracil by fungal enzyme cytosine deaminase. Active against yeast infections.	Natamycin, Amphotericin B, Nystatin	(40)
Griseofulvin	Inhibits mitosis in dermatophytes. It is ineffective when applied topically.	Griseofulvin	(41)
Flucytosine	Pyrimidine analogue; converted into 5-fluorouracil by fungal enzyme cytosine deaminase. Active against yeast infections.	Flucytosine	(42)

5. **Allopathic Antifungal drug**

Drug Name	**Chemical Moiety**	**Does**	**Route of Administration**	**Mechanisms of Action**	**Used in Treatment of Disease**	**Reference**
Fluconazole	Triazole	150-400 mg	Oral, i.v	Inhibits ergosterol synthesis	Candidiasis, Cryptococcal meningitis	Nussbaum et al. (2009) https://doi.org/10.1086/649861 (43)
Amphotericin B	Polyene	0.3-1.5 mg/kg	i.v	Binds ergosterol, forms pores in membrane	Aspergillosis, Systemic fungal infections	Yoshizawa et al. (2013) (44)
Itraconazole	Triazole	200-400 mg	Oral	Inhibits ergosterol synthesis	Histoplasmosis, Blastomycosis	Kalemci et al. (2003) (45)
Voriconazole	Triazole	200-400 mg	Oral , i.v	Inhibits ergosterol synthesis	Invasive aspergillosis	Herbrecht et al. (2002b) (46)
Caspofungin	Echinocandin	50-70 mg	i.v	Inhibits beta-glucan synthesis	Candidemia, Aspergillosis	Song and Stevens (2015) (47)
Flucytosine	Pyrimidine analog	50-150 mg/kg	Oral	Inhibits DNA/RNA synthesis in fungi	Cryptococcosis (adjunct therapy)	Vermes (2000c) (48)

Fig :(3). Allopathic Antifungal Drugs

5.2 Ayurvedic drugs Antifungal

Drug/Herb Name	**Chemical Moiety/Key Component**	**Dose**	**Route of**	**Mechanism of Action**	**Used in Treatment of Disease**	**Reference**
Neem (*Azadirachta indica*)	Azadirachtin, Nimbin	2-5 g (powder)	Oral, Topical	Antifungal, disrupts fungal cell membrane	Ringworm, Candidiasis	Alzohairy (2016) (49)
Turmeric (*Curcuma*	Curcumin	1-3 g (powder	Oral, Topica	Inhibits fungal growth, anti-	Athlete's foot, Skin infections	Chen et al. (2018)

longa)		)	l	inflammatory		(50)
Garlic (*Allium sativum*)	Allicin	4-12 g (raw)	Oral, Topical	Broad-spectrum antifungal activity	Tinea infections, Candidiasis	Pai and Platt (1995) (51)
Tulsi (*Ocimum sanctum*)	Eugenol, Ursolic acid	2-4 g (leaves/ powder)	Oral, Topical	Antifungal, boosts immunity	Fungal skin infections, Oral thrush	Balakumar et al. (2011) (52)
Pippali (*Piper longum*)	Piperine	1-2 g (powder)	Oral,	Enhances bioavailability, antifungal	Systemic fungal infections	Balakumar et al. (2011b) (53)
Ashwagandha *(Withania somnifera)*	Withanolides	3-6 g (powder)	Oral,	Immunomodulatory, antifun gal	Chronic fungal infections	Balkrishna et al. (2022) (54)
Manjistha *(Rubia cordifolia)*	Rubiadin, Purpurin	1-3 g (powder)	Oral, Topical	Blood purifier, antifungal	Dermatophytosis, Skin fungal infections	Gunasekara et al. (2017) (55)
Kumari *(Aloe vera)*	Aloin, Emodin	10-20 g (gel)	Topical	Soothes skin, antifungal	Fungal skin rashes, Candidiasis	Saniasiaya et al. (2017) (56)

6. **Past and present of Antifungal Drugs**

Drug Name	**Class**	**Year Introduced**	**Market Share by Class (2025)**	**Reference**
Nystatin	Polyenes	1950	10%	Hazen and Brown (1951) (57)
Amphotericin B	Polyenes	1961	10%	Dutcher (1968) (58)
Flucytosine (5-FC)	Pyrimidine Analogs	1960	5%	Vermes (2000d) (59)
Miconazole	Azoles	1974	48%	Sawyer et al. (1975) (60)
Ketoconazole	Azoles	1981	48%	Fromtling (1988) (61)
Itraconazole	Azoles	1988	48%	Van Cutsem (1989) (62)
Fluconazole	Azoles	1990	48%	Zervos and Meunier (1993) (63)

Voriconazole	Azoles	2002	48%	Johnson and Kauffman (2003) (64)
Posaconazole	Azoles	2006	48%	Courtney et al. (2004) (65)
Isavuconazole	Azoles	2015	48%	Maertens et al. (2015) (66)
Terbinafine	Allylamines	1991	8%	Ryder (1985) (67)
Caspofungin	Echinocandins	2001	29%	Mora-Duarte et al. (2002) (68).
Micafungin	Echinocandins	2005	29%	Chandrasekar and Sobel (2006) (69)
Anidulafungin	Echinocandins	2006	29%	Reboli et al. (2007) (70)
Rezafungin	Echinocandins	2023	29%	Thompson et al. (2018) (71)

Table 4.1 presents 15 antifungal drugs, classified by type, year of introduction, and estimated market share by 2025.Nystatin, introduced in 1950, was the first safe antifungal for human use and belongs to the Polyene class (Hinweise Für Autoren, 1984b) .Fluconazole, an Azole launched in 1990, became widely used due to its oral availability and broad antifungal spectrum (Sheehan et al. (1999c).Azoles now dominate the market with about 48% share due to their efficacy and ease of administration (Sheehan et al. (1999d)Newer drugs like Rezafungin, an Echinocandin approved in 2023, are emerging rapidly due to activity against resistant Candida species (Denning (2003)).Echinocandins offer a unique mechanism targeting fungal cell wall synthesis (Thompson et al. (2023) .

7. **Market Survey of Antifungal Drugs in 2025: Segmented by Hospital Type**.

Hospital Type	**Estimated Market Size (USD Billion, 2025)**	**Key Drug Classes**	**Approx. Market Share by Class**	**Reference**
Primary Hospitals	2.5	Azoles, Polyenes	Azoles 50%, Polyenes: 20%	Pathadka et al. (2022) (76)
Secondary Hospitals	4.8	Azoles, Echinocandins, Polyenes	Azoles: 45%, Echinocandins 25%	Zhou et al. (2018) (77)
Tertiary Hospitals	10.0	Echinocandins, Azoles, Polyenes	Echinocandins: 35%, Azoles: 40%	Fisher et al. (2022) (78)

7.2 Antifungal Drugs Market in India by region

Region	Common Fungal Issues	Likely leading drug classes	Common example
North India	High dermatophytosis (ringworm),increasing Mucormycosis	Topical &Oral Azoles ,Allylamines, Polyenes	Terbinafine, Fluconazole, Clotrimazole, Amphotericin B
South India	High humidity leading to skin infections, candidiasis	Topical &Oral Azoles,Topical Allylamines	Clotrimazole, Miconazole, Fluconazole
East India	Varide , depends on local conditions	Topical &Oral Azoles	Fluconazole , Terbinafine, Ketoconazole
West India.	Skin infections (coastal), Systemic infections (Urban)	Oral Azoles , Echinocandins	Itraconazole Terbinafine, Ketoconazole

7. 3 market of India State wise

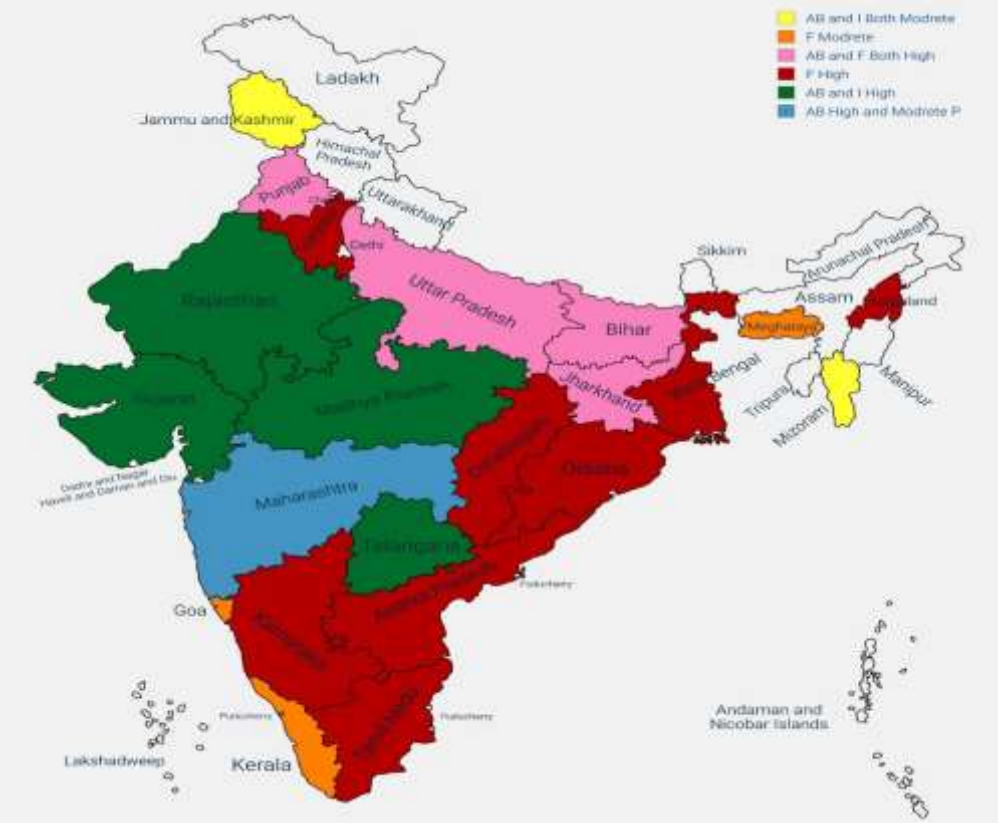
State/Union Territory	Market Prominence	Leading Antifungal Drug(s)	Notes/Inferred Basis	Reference
Andhra Pradesh	High (both)	Fluconazole, Itraconazole.	Humid climate; candidiasis and dermatophytosis prevalent.	Ghazi et al. (2022) (79)
Arunachal Pradesh	Moderate (both)	Itraconazole, Terbinafine.	Rural, humid areas; skin infections common.	Bansal and Baishnab (2020) (80)
Assam	High (both)	Itraconazole, Amphotericin B.	Tropical; mucormycosis reported in Northeast.	Arun et al. (2021) (81)
Bihar	High (both)	Fluconazole, Amphotericin B.	High mucormycosis post-COVID; rural healthcare.	(79)
Chhattisgarh	High (both)	Itraconazole, Fluconazole.	Humid; dermatophytosis common.	(80)
Goa	High (Clotrimazole), Moderate (Fluconazole)	Clotrimazole, Fluconazole.	Coastal humidity; topical antifungals popular.	(80)
Gujarat	High (both)	Amphotericin B, Itraconazole.	Industrial areas; mucormycosis reported.	(81)
Haryana	High (Fluconazole), Moderate	Fluconazole, Terbinafine.	Dermatophytosis; proximity to Delhi.	(81)

	(Terbinafine)			
Himachal Pradesh	Moderate (both)	Itraconazole, Clotrimazole.	Cooler climate; skin infections still prevalent.	(80)
Jharkhand	High (both)	Fluconazole, Amphotericin B.	Rural; mucormycosis and candidiasis noted.	(79)
Karnataka	High (both)	Itraconazole, Fluconazole.	Urban centers (e.g., Bangalore); high fungal infection rates.	(79)
Kerala	High (Clotrimazole), Moderate (Fluconazole)	Clotrimazole, Fluconazole.	High humidity; topical and systemic use common.	(80)
Madhya Pradesh	High (both)	Amphotericin B, Itraconazole.	Central India; mucormycosis post-COVID.	(79)
Maharashtra	High (Amphotericin B), Moderate (Posaconazole).	Amphotericin B, Posaconazole.	High mucormycosis incidence (e.g., Mumbai); advanced healthcare.	(81)
Manipur	Moderate (both)	Itraconazole, Terbinafine.	Humid climate; skin infections common.	(80)
Meghalaya	Moderate (both)	Fluconazole, Clotrimazole.	Tropical conditions; topical treatments prevalent.	(80)
Mizoram	Moderate (both).	Itraconazole, Amphotericin B.	Rural Northeast; systemic infections noted.	(81)
Nagaland	Moderate (Terbinafine), High (Fluconazole).	Terbinafine, Fluconazole.	Skin infections in humid areas.	(80)
Odisha	High (both).	Fluconazole, Itraconazole.	Coastal humidity; dermatophytosis and candidiasis.	(80)
Punjab	High (both).	Amphotericin B, Fluconazole.	High mucormycosis post-COVID; urban-rural mix.	(79)
Rajasthan	High (both).	Itraconazole, Amphotericin B.	Arid but mucormycosis reported.	(81)
Sikkim	Moderate (both).	Clotrimazole, Itraconazole.	Cooler, humid areas; skin infections.	(80)
Tamil Nadu	High (Fluconazole), Moderate (Clotrimazole).	Fluconazole, Clotrimazole.	High humidity; topical and systemic use common.	(80)

Telangana	High (both).	Itraconazole, Amphotericin B.	Urban centers (e.g., Hyderabad); mucormycosis cases.	(81)
Tripura	High (Fluconazole), Moderate (Terbinafine)	Fluconazole, Terbinafine.	Humid climate; skin infections prevalent.	(80)
Uttar Pradesh	High (both)	Amphotericin B, Fluconazole.	High mucormycosis incidence; large population.	(79)
Uttarakhand	Moderate (both)	Itraconazole, Clotrimazole.	Varied climate; skin infections common.	(80)
West Bengal	High (both)	Fluconazole, Itraconazole.	High humidity; dermatophytosis and candidiasis.	(80)
Andaman & Nicobar (UT)	High (Clotrimazole), Moderate (Fluconazole)	Clotrimazole, Fluconazole.	Island humidity; topical antifungals dominant.	(80)
Chandigarh (UT)	High (both)	Clotrimazole, Fluconazole.	Urban area; similar to Punjab/Haryana patterns.	(81)
Dadra & Nagar Haveli and Daman & Diu (UT)	Moderate (both)	Fluconazole, Clotrimazole.	Coastal climate; topical use common.	(80)
Delhi (UT)	High (Amphotericin B), Moderate (Posaconazole)	Amphotericin B, Posaconazole.	High mucormycosis cases; advanced healthcare.	(79)
Jammu & Kashmir (UT)	Moderate (both)	Itraconazole, Amphotericin B.	Mucormycosis reported; rural healthcare challenges.	(79)
Ladakh (UT)	Moderate (both)	Terbinafine, Fluconazole.	Cold climate; skin infections still noted.	(80)
Lakshadweep (UT)	High (Clotrimazole), Moderate (Fluconazole)	Clotrimazole, Fluconazole.	Island humidity; topical antifungals prevalent.	(80)
Puducherry (UT)	High (both)	Fluconazole, Itraconazole.	Coastal climate; similar to Tamil Nadu.	(80)

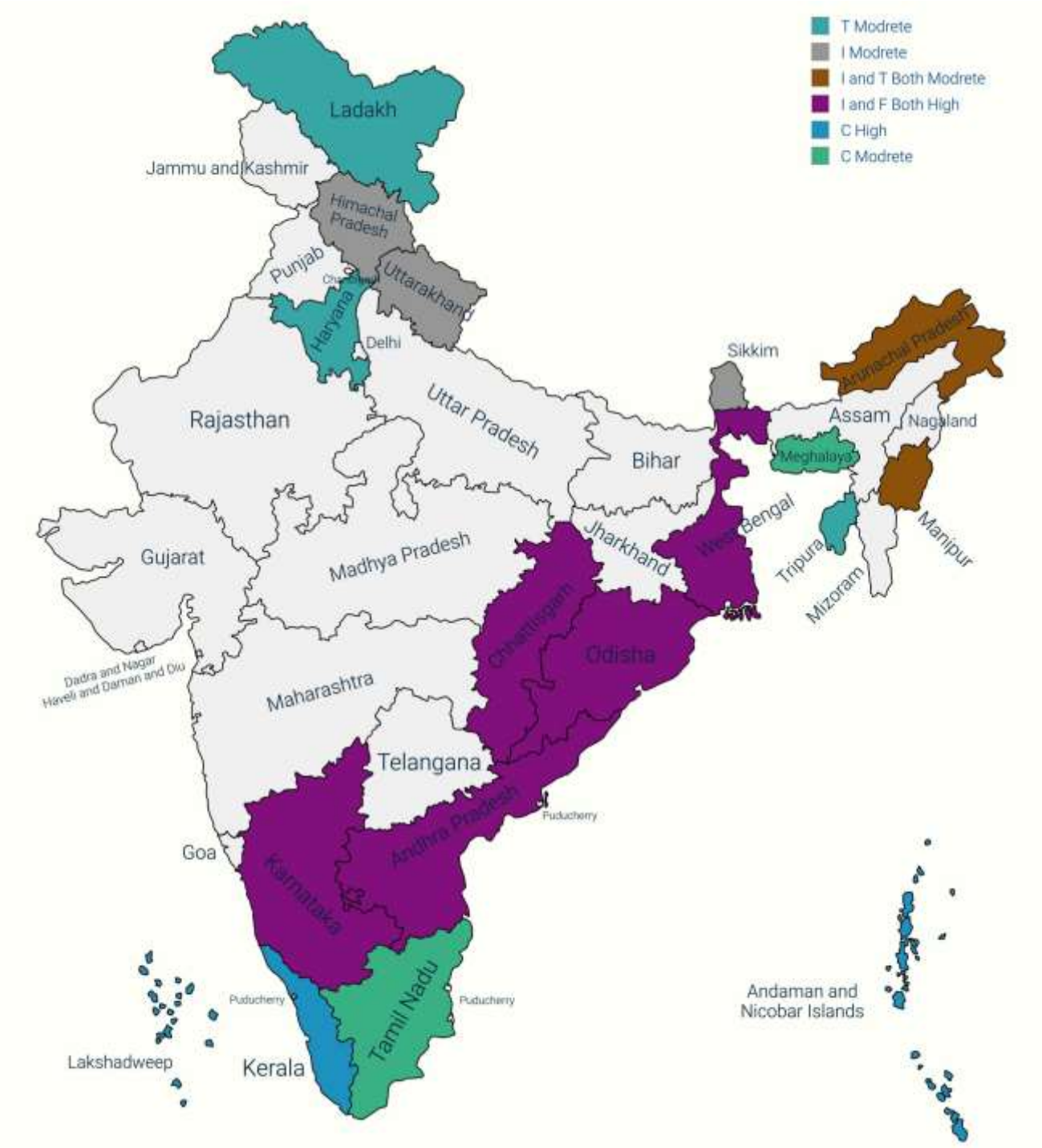
Into the table 6.2 discuss about, Market of Antifungal Drugs in India State-wise and provides a detailed snapshot of the antifungal drug market across India's states and union territories (UTs) as of 2025, focusing on market prominence, leading antifungal drugs, and the underlying regional factors driving their usage. States like Andhra Pradesh, Assam, Bihar, Chhattisgarh, Gujarat, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Odisha, Punjab, Rajasthan, Telangana, Uttar Pradesh, and West Bengal exhibit high market prominence for both topical and systemic antifungals, such as Fluconazole, Itraconazole, and Amphotericin B. This is attributed to humid climates fostering candidiasis and

dermatophytosis, large populations, urban centers like Bangalore and Mumbai, and a notable surge in mucormycosis cases post-COVID, particularly in states like Maharashtra and Uttar Pradesh with advanced healthcare infrastructure. Coastal and humid regions, including Goa, Kerala, Tamil Nadu, Andaman & Nicobar, Chandigarh, Lakshadweep, and Puducherry, show high demand for topical antifungals like Clotrimazole, often paired with moderate-to-high use of systemic drugs like Fluconazole, reflecting prevalent skin infections and candidiasis due to environmental moisture. States such as Haryana, Nagaland, and Tripura highlight specific drug preferences—Fluconazole or Terbinafine—driven by dermatophytosis and humid conditions, while Maharashtra and Delhi also incorporate advanced options like Posaconazole, supported by sophisticated medical facilities. Conversely, states like Arunachal Pradesh, Himachal Pradesh, Manipur, Meghalaya, Mizoram, Sikkim, Uttarakhand, Jammu & Kashmir, Ladakh, and Dadra & Nagar Haveli and Daman & Diu demonstrate moderate market prominence, relying on drugs like Itraconazole, Terbinafine, and Clotrimazole to address skin and systemic infections influenced by varied climates (e.g., cooler in Himachal Pradesh, humid in Manipur) and rural healthcare limitations. Unique cases include Assam, Gujarat, and Telangana, where Amphotericin B is prominent due to tropical conditions and industrial areas reporting mucormycosis, and Delhi, where high mucormycosis incidence boosts Amphotericin B and Posaconazole use. References such as Ghazi et al. (2022), Bansal and Baishnab (2020), and Arun et al. (2021) provide evidence for these trends, linking drug prominence to environmental factors (humidity, aridity), health challenges (mucormycosis, candidiasis), and infrastructure disparities (urban vs. rural), painting a comprehensive picture of India's diverse antifungal market landscape.



https://www.mapchart.net/india.html [82].

Where : AB : Amphotericin B F : Fluconazole P : Posaconazole C: Clotrimazole I : Itraconazole T : Terbinafine



(82)

8. Conclusion and Future Prospects

Into this report we give comprehensive study on topic The "Market Survey of Antifungal Drugs" in Context to India. Outlines the antifungal drug market as of 2025. Globally, it's valued at $15.5 billion USD (2023), projected to hit $21.2 billion by 2032 (3.7% CAGR), driven by rising fungal infections, though resistance poses challenges. In India, azoles lead due to affordability and versatility, alongside echinocandins and polyenes, with competition between branded and generic firms. Regional needs vary—humid areas prefer topical drugs, others use systemic options like amphotericin B. Ayurvedic

remedies like neem also contribute. The market is growing, but resistance and supply issues need addressing. And also guve the antifungal with mechanism of Action and Classification further Mention the same name of Allopathic Antifungal drug and Ayurvedic antifungal drug. Further discussion about the drug prominence accordingly type of hospital, discuss on the basis of region of India, also discuss according to state wise and union territory represent the leading drug in different state with the help of Indian map .

As fungal resistance and infection rates continue to rise, future directions must emphasize the development of next-generation antifungal agents with novel mechanisms of action. Investment in research targeting resistant strains, such as Candida auris, will be crucial. Additionally, the integration of traditional Ayurvedic antifungal agents like Neem and Turmeric with allopathic drugs offers a promising hybrid therapeutic strategy (Alzohairy, 2016; Chen et al., 2018). There is also a growing need for region-specific treatment protocols and diagnostic advancements to ensure timely and effective interventions, particularly in India's rural and high-humidity zones. Strategic partnerships between Indian generics and multinational firms can further drive innovation and improve drug accessibility. Emphasis should also be placed on pharmacoeconomic evaluations to balance efficacy with affordability in a price-sensitive market .

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