Original Research Article

A Study on Product Mix variables associated with Prescribing behaviour of Doctors in Hyderabad, Telangana

ABSTRACT

The world's industry with the quickest rate of growth is the pharmaceutical sector in India. This study aims to investigate the various determinants associated with the prescribing behaviour of doctors. It is based on a comprehensive review of existing literature and survey data collected from a sample of doctors from different regions and specialties. The study examines the role of various factors, such as the doctor's demographic characteristics, product mix variables, in shaping doctors' prescribing behaviour. The results indicate that multiple factors, including the doctor's age, years of experience, level of education, and patient demand, significantly influence prescribing behaviour. Additionally, the study shows that pharmaceutical marketing and financial incentives have a considerable impact on the prescribing behaviour of doctors. This study provides a better understanding of the complex factors that influence prescribing behaviour and underscores the importance of developing interventions to promote evidence-based prescribing practices.

Key words: Prescribing behaviour, Product mix, Pharmaceuticals, Pharmaceutical sales.

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Introduction

A key element of medical practise that affects the level of care provided and its cost is prescribing behaviour. Yet, the influences on prescribing practises are intricate and varied, involving interactions between the healthcare system, the patient, and the physician.

Several research have looked into the factors that influence prescription behaviour. According to certain research, a doctor's demographic traits, such as age, gender, and educational attainment, can affect how they prescribe. For instance, a World Health Organization (WHO) study discovered that younger physicians tend to prescribe more medications than do physicians of a higher age. According to additional research, patient variables including health state and socioeconomic status can influence prescribing decisions.

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Organization (WHO) study discovered that younger physicians tend to prescribe more medications than do physicians of a higher age. According to additional research, patient variables including health state and socioeconomic status can influence prescribing decisions.

Promoting evidence-based prescribing practises and improving the standard of healthcare delivery depend on an understanding of the factors that influence prescribing behaviour. Policymakers and healthcare professionals can create interventions to encourage evidence-based prescribing practises, cut wasteful spending, and enhance patient outcomes by identifying the factors that affect prescribing behaviour.

A crucial component of medical practise is prescribing behaviour since it has an impact on the standard and cost of healthcare. The relationships between the doctor, the patient, and the healthcare system are among the numerous and multifaceted aspects that affect how doctors prescribe. These variables may include the individual qualities of the doctor, such as age, gender, and experience level, the patient's characteristics, such as health and socioeconomic status, and the features of the healthcare system, such as drug accessibility and cost.

This study intends to investigate the factors that influence doctors' prescribing behaviour across various geographic areas and medical specialties. The goal of the study is to pinpoint the variables, such as the influence of pharmaceutical marketing and financial incentives, that affect prescribing behaviour. This study offers guidelines for enhancing evidence-based prescribing practises by outlining the numerous variables to better understand the elements that influence prescribing behaviour.

The results of the study are anticipated to aid in the creation of interventions and policies aimed at raising the standard of healthcare delivery and improve patient outcomes. Doctors can save wasteful expenses and enhance the safety and efficacy of therapies by encouraging evidence-based prescribing practises. Overall, this research is crucial for deepening our understanding of the factors that influence prescribing behaviour and enhancing the standard of healthcare.

Prescribing behaviour of doctors is a complex phenomenon influenced by multiple determinants. Some of the determinants associated with prescribing behaviour of doctors are:

Patient-related factors: Patient characteristics such as age, gender, medical history, socioeconomic status, and cultural background can affect the prescribing behaviour of doctors. For instance, doctors may prescribe different medications for elderly patients compared to younger patients, or they may consider a patient's financial situation while prescribing medication.

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Physician-related factors: Physician characteristics such as age, gender, years of experience, and medical specialization can also affect prescribing behaviour. For example, a younger physician may be more likely to prescribe newer medications, while an older physician may be more likely to prescribe older, established medications.

Drug-related factors: The characteristics of the medication being prescribed can also affect prescribing behaviour. For instance, the perceived efficacy, safety, and side effects of a medication can influence whether a doctor prescribes it or not.

Health system-related factors: The healthcare system in which a physician practices can also affect prescribing behaviour. Factors such as availability of medications, formulary restrictions, and insurance coverage can influence the prescribing decisions of doctors.

Pharmaceutical industry-related factors: Marketing activities by pharmaceutical companies can also influence prescribing behaviour. Pharmaceutical companies may provide doctors with information about new medications, offer samples or free gifts, or provide financial incentives to encourage the prescribing of their products.

Patient-doctor interaction: Communication between the doctor and patient can also affect prescribing behaviour. Patient expectations, preferences, and beliefs about medications can influence the prescribing decisions of doctors.

Overall, prescribing behaviour of doctors is influenced by multiple factors, and a better understanding of these determinants can help in improving prescribing practices and patient outcomes.

Review of Literature

Scientific promotional tools (Scientific study materials like journals, textbooks, and literatures, as well as activities like organising free disease detection camps and company participation in Conferences) that were found (=.428, P =.00) to change the drugs that doctors prescribe, because there is a positive and significant effect of scientific promotional tools on consultants' prescribing behaviour. (1)

Despite the fact that doctors have complete and total control over the sales of prescription pharmaceuticals, pharmaceutical marketing and promotion techniques are held responsible for illogical prescribing practises and their effects. (2)

For patients with hypertension, there is a correlation between the availability of medicine samples and the behaviour of doctors when writing prescriptions. Because medicine samples could not be distributed, more first-line treatments were prescribed than when

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samples were accessible. Hence, accepting samples might have serious repercussions. This study emphasises the necessity for a multi-facility investigation to ascertain how pharmacological samples affect prescribing practises. (3)

Most doctors are concerned about the cost of drugs and patient insurance coverage, and they take these things into account when deciding what prescriptions to write. Physicians were substantially influenced by sales reps from the pharmaceutical sector. It is possible to create policies to enhance physicians' decisions and, as a result, boost clinical and financial effectiveness and efficiency by taking into account the attitudes and variables influencing physician behaviour in the two nations. (4)

There are a few things that affect how doctors write prescriptions, such new drugs on the market, brand prescriptions, conference sponsorship, marketing materials, and free samples of medications. The way salespeople advertise their businesses has a significant impact on influence. The key finding of this study is that two factors—the introduction of new drugs to the market and the use of promotional tools—have a greater influence than any other two. (5)

Pharmaceutical marketing has a significant impact on a doctor's prescription behaviour. While "advertising" of pharmaceutical items in journals or other printed materials does not significantly affect a doctor's prescription, "public relation" has been determined to be the most successful promotional method. (6)

It is crucial to note that the manner of exposure to pharmacological information and social impacts on decision-making are also key factors in prescribing new medications. These factors are not just connected to biological evaluation and critical appraisal. Prescriptive variety is more understood when considered in this wide framework. (7)

The results are intriguing because they show a correlation between certain factors (scientific literatures, marketing materials, consistent follow-up, CMEs and conferences, personalised activities) and doctor prescription behaviour, which is strongly influenced by medical representative PR and brand perception of a company or product. The pharmaceutical industry may design better marketing techniques based on the study's findings while taking these mediating effects into consideration. (8)

According to the survey, physicians share the medical representative's belief that scientific promotional tools have a greater impact on improving prescription behaviours than other promotional materials. Nonetheless, there is a notable distinction in how medical reps and physicians are seen when used as other promotional tools. Also, it has been discovered that typical promotional items have more of an impact on doctors than consultants. (9)

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A set of cultural norms governs the APB of healthcare practitioners. The practise of junior doctors is influenced by the behaviour of clinical leaders or seniors while prescribing antibiotics. Within a culture of perceived independent decision-making that depends more on personal knowledge and experience than formal policy, senior doctors believe they are excused from following policy and practise. APB adjustments are made by prescribers in accordance with the standard of care in the clinical groups in which they operate. Because of a "non-interference" culture, peers' antibiotic prescription practises are unaffected by outside meddling. (10)

Research Methodology

Research Objective

1. To understand the association of product mix variables with Doctor's prescribing behaviour in Hyderabad, Telangana.

Research Hypotheses

Hypothesis:

H_{01}: There is no significant association of product mix variables with Doctor's prescribing behaviour in Hyderabad, Telangana.

STATISTICAL TOOL APPLIED: One sample t-test.

Decision rule: If significant value is less than significance level (0.05) at 95 percent confidence level, null hypothesis can be rejected.

H_{01a}: There is no significant association of product quality with Doctor's prescribing behaviour in Hyderabad, Telangana.

H_{01b}: There is no significant association of product packaging with Doctor's prescribing behaviour in Hyderabad, Telangana.

H_{01c}: There is no significant association of product safety/efficacy with Doctor's prescribing behaviour in Hyderabad, Telangana.

H_{01d}: There is no significant association of product brand name with Doctor's prescribing behaviour in Hyderabad, Telangana.

H_{01e}: There is no significant association of product frequency of dose with Doctor's prescribing behaviour in Hyderabad, Telangana.

H_{01f}: There is no significant association of new patented product with Doctor's prescribing behaviour in Hyderabad, Telangana.

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H_{01g}: There is no significant association of branded generic product with Doctor's prescribing behaviour in Hyderabad, Telangana.

H_{01h}: There is no significant association of unbranded generic product with Doctor's prescribing behaviour in Hyderabad, Telangana.

Data Analysis and Findings

Reliability using Cronbach Alpha:

Table 1 a. Case Processing Summary

		N	%
Cases	Valid	192	100.0
	Excluded[a]	0	.0
	Total	192	100.0

a. Listwise deletion based on all variables in the procedure.

Table 1 b. Reliability Statistics

Cronbach's Alpha	N of Items
.739	8

Hypothesis Testing:

H_{01a}: There is no significant association of product quality to Doctor's prescribing behaviour in Hyderabad, Telangana.

Table 2 a.One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Product Quality association with Prescription behaviour	192	4.3177	1.30167	.09394

Table 2 b.One-Sample Test

	Test Value = 1					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper

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Product Quality association with Prescription behaviour	35.317	191	.000	3.31771	3.1324	3.5030

Significant value (0.000) is less than significance level (0.05) at 95 percent confidence level. Null hypothesis can be rejected which means there is significant association of product quality with Doctor's prescribing behaviour which means product quality has very high influence on Doctor's prescribing behaviour as Mean value is 4.3177 and mean difference is 3.31771.

H_{01b}: There is no significant association of product packaging with Doctor's prescribing behaviour in Hyderabad, Telangana.

Table 3 a. One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Product Packaging association with Prescription behaviour	192	3.7448	1.29941	.09378

Table 3 b. One-Sample Test

	Test Value = 1					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Product Packaging association with Prescription behaviour	29.270	191	.000	2.74479	2.5598	2.9298

Significant value (0.000) is less than significance level (0.05) at 95 percent confidence level. Null hypothesis can be rejected which means there is significant association of product packaging with Doctor's prescribing behaviour which implies product packaging has high influence on Doctor's prescribing behaviour as Mean value is 3.7448 and mean difference is 2.74479.

H_{01c}: There is no significant association of product safety/efficacy with Doctor's prescribing behaviour in Hyderabad, Telangana.

Table 4 a. One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Product's Safety/Efficacy association with Prescription behaviour	192	4.1406	1.46370	.10563

Table 4 b. One-Sample Test

	Test Value = 1					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Product's Safety/Efficacy association with Prescription behaviour	29.731	191	.000	3.14063	2.9323	3.3490

Significant value (0.000) is less than significance level (0.05) at 95 percent confidence level. Null hypothesis can be rejected which means there is significant association of product safety/Efficacy with Doctor's prescribing behaviour which implies product safety/Efficacy has very high influence on Doctor's prescribing behaviour as Mean value is 4.1406 and mean difference is 3.14063.

H_{01d}: There is no significant association of product brand name with Doctor's prescribing behaviour in Hyderabad, Telangana.

Table 5 a. One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Brand Name of the product association with Prescription behaviour	192	2.7448	1.01943	.07357

Table 5 b. One-Sample Test

	Test Value = 1					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Brand Name of the product association with Prescription behaviour	23.716	191	.000	1.74479	1.5997	1.8899

Significant value (0.000) is less than significance level (0.05) at 95 percent confidence level. Null hypothesis can be rejected which means there is significant association of product brand name with Doctor's prescribing behaviour which implies product brand name has average influence on Doctor's prescribing behaviour as Mean value is 2.7448 and mean difference is 1.74479.

H_{01e}: There is no significant association of product frequency of dose with Doctor's prescribing behaviour in Hyderabad, Telangana.

Table 6 a. One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Product's frequency of dose association with Prescription behaviour	192	3.8438	1.07643	.07768

Table 6 b. One-Sample Test

	Test Value = 1					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Product's frequency of dose association with Prescription behaviour	36.606	191	.000	2.84375	2.6905	2.9970

Significant value (0.000) is less than significance level (0.05) at 95 percent confidence level. Null hypothesis can be rejected which means there is significant association of product's frequency of dose with Doctor's prescribing behaviour which implies product's frequency of dose has high influence on Doctor's prescribing behaviour as Mean value is 3.8438 and mean difference is 2.84375.

H_{01f}: There is no significant association of patented product with Doctor's prescribing behaviour in Hyderabad, Telangana.

Table 7 a. One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Patented product association with Prescription behaviour	192	4.3802	1.03156	.07445

Table 7 b. One-Sample Test

	Test Value = 1					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Patented product association with Prescription behaviour	45.405	191	.000	3.38021	3.2334	3.5271

Significant value (0.000) is less than significance level (0.05) at 95 percent confidence level. Null hypothesis can be rejected which means there is significant association of patented product with Doctor's prescribing behaviour which implies patented product has very high influence on Doctor's prescribing behaviour as Mean value is 4.3802 and mean difference is 3.38021.

H_{01g}: There is no significant association of branded generic product with Doctor's prescribing behaviour in Hyderabad, Telangana.

Table 8 a. One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Branded Generic product association with Prescription behaviour	192	3.9635	1.27140	.09176

Table 8 b. One-Sample Test

	Test Value = 1					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Branded Generic product association with Prescription behaviour	32.298	191	.000	2.96354	2.7826	3.1445

Significant value (0.000) is less than significance level (0.05) at 95 percent confidence level. Null hypothesis can be rejected which means there is significant association of Branded Generic product with Doctor's prescribing behaviour which implies Branded Generic product

has high influence on Doctor's prescribing behaviour as Mean value is 3.9635 and mean difference is 2.96354.

H_{01h}: There is no significant association of unbranded generic product with Doctor's prescribing behaviour in Hyderabad, Telangana.

Table 9 a. One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Unbranded Generic association with Prescription behaviour	192	1.1563	.39175	.02827

Table 9 b. One-Sample Test

	Test Value = 1					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Unbranded Generic association with Prescription behaviour	5.527	191	.000	.15625	.1005	.2120

Significant value (0.000) is less than significance level (0.05) at 95 percent confidence level. Null hypothesis can be rejected which means there is significant association of Unbranded Generic with Doctor's prescribing behaviour which implies unbranded Generic has very less influence on Doctor's prescribing behaviour as Mean value is 1.1563 and mean difference is 0.15625.

Conclusion

This paper concludes that product quality has very high influence, product packaging has high influence, product safety/Efficacy has very high influence, product brand name has average influence, product's frequency of dose has high influence, patented product has very high influence, Branded Generic product has high influence and Unbranded Generic has very less influence on prescription behaviour of Doctors in Hyderabad, Telangana.

Scope for future research

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A study on product mix determinants associated with prescribing behaviour of doctors is a fascinating research topic that can provide valuable insights into the pharmaceutical industry. Here are some potential areas for future research in this field:

Analysis of the impact of pharmaceutical company promotional strategies on prescribing behaviour: This research can investigate how marketing strategies such as free samples, gifts, and sponsored events influence prescribing behaviour.

Examination of the influence of physician's knowledge and experience on prescribing behaviour: This research can investigate how a doctor's experience and knowledge of different drugs affects their prescribing decisions.

Study of the effect of pricing strategies on prescribing behaviour: This research can investigate how pricing strategies such as discounts and bundling impact prescribing behaviour.

Analysis of the impact of patient demand on prescribing behaviour: This research can investigate how patient demand for specific medications influences prescribing behaviour.

Examination of the influence of regulatory policies on prescribing behaviour: This research can investigate how government regulations and policies affect prescribing behaviour.

Investigation of the impact of physician-patient relationship on prescribing behaviour: This research can investigate how the quality of the physician-patient relationship affects prescribing behaviour.

Study of the effect of drug efficacy and safety on prescribing behaviour: This research can investigate how the efficacy and safety of a drug influence prescribing decisions.

These are just a few potential areas for future research in this field. Each of these areas can provide valuable insights into the factors that influence prescribing behaviour and can help pharmaceutical companies better understand how to market and sell their products effectively.

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References

1. Ali, Zaigham, et al. "Relationship between doctors' prescribing behaviour and pharmaceutical promotional tools: A Pakistani case." *Iranian Journal of Public Health* 44.5 (2015): 709-10.

2. Goyal, Ravindra, and Pranav Pareek. "A review article on prescription behaviour of doctors, influenced by the medical representative in Rajasthan, India." *IOSR Journal of Business and Management* 8.1 (2013): 56-60.

3. Boltri, John M., Elizabeth R. Gordon, and Robert L. Vogel. "Effect of antihypertensive samples on physician prescribing patterns." *FAMILY MEDICINE-KANSAS CITY*- 34.10 (2002): 729-731.

4. Theodorou, Mamas, et al. "Factors influencing prescribing behaviour of physicians in Greece and Cyprus: results from a questionnaire-based survey." *BMC health services research* 9 (2009): 1-9.

5. Shamimulhaq, Saad, et al. "Factors influencing prescription behaviour of physicians." *The Pharma Innovation Journal, ISSN* (2014): 2277-7695.

6. Biswas, K., and U. K. Ferdousy. "Influence of pharmaceutical marketing on prescription behaviour of physicians: a cross-sectional study in Bangladesh." *Journal of Accounting & Marketing* 5.2 (2016): 1-4.

7. Prosser, Helen, Solomon Almond, and Tom Walley. "Influences on GPs' decision to prescribe new drugs—the importance of who says what." *Family practice* 20.1 (2003): 61-68.

8. Ahmed, Rizwan Raheem, et al. "Mediating and Marketing factors influence the prescription behaviour of Physicians: An Empirical Investigation." *Amfiteatru Economic Journal* 18.41 (2016): 153-167.

9. Arslan Siddiqi, Shahzad Hussain, et al. "Relevant influence of promotional tools by pharmaceutical industry on prescribing behaviours of doctors: A cross-sectional survey in Pakistan." *African Journal of Pharmacy and Pharmacology* 5.13 (2011): 1623-1632.

10. Charani, Esmita, et al. "Understanding the determinants of antimicrobial prescribing within hospitals: the role of "prescribing etiquette"." *Clinical Infectious Diseases* 57.2 (2013): 188-196.

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