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PHYSICIAN SUBCONSCIOUS (PERSONAL/PSYCHOLOGICAL) FACTORS AND THEIR ROLE IN INFLUENCING PRESCRIPTION PATTERN IN DELHI NCR HEALTHCARE SETUPS: A RETROSPECTIVE CROSS-SECTIONAL STUDY

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ABSTRACT

Objective To analyze the effect of subconscious factors (due to age, gender, number of academic degrees, foreign exposure and practice area) on price of drugs prescribed and whether they influence brand choice between Indian and non-Indian pharmaceutical companies. **Materials and Methods** Prescription-based, retrospective, cross-sectional study where 247 prescriptions from 164 doctors were studied and analyzed extensively. **Results** Composite variables known as Mean Price Deviation and % OP were defined as surrogate markers for price-point estimate of the prescription and inclination towards non-Indian companies in prescription, respectively. Foreign exposure (0.156 vs 0.257 mean price deviation for no foreign exposure and exposed respectively), private practice (-0.045 v 0.212: government versus private practice), more number of degrees (0.058 v 0.134 v 0.252: one, two and three or more degrees respectively) and male gender (0.111 v 0.193: female and male respectively) were influencing doctors to write more pricey brands. Foreign exposure (0.210 vs 0.235% OP for no foreign exposure and exposed respectively), private practice (0.113 v 0.233: government versus private practice), more number of degrees (0.113 v 0.212 v 0.252: for one, two and three or more degrees respectively) and male gender (0.237 v 0.204: female and male respectively) were influencing doctors to write more non-Indian company brands in their prescriptions. Age had insignificant effect on any of the variables. **Conclusion** This study showed that subconscious factors arising from personal and psychological background of the doctor resulted in differing

brand choices among doctors, which can be used by pharmaceutical companies to better target them.

KEYWORDS: Prescription Pattern, Welch's T-Test, Prescription Behavior, Subconscious Decision.

INTRODUCTION

With an average population of 46.07 million (2011), Delhi NCR is one of the biggest metropolises of India. It has a well-developed healthcare machinery, focused around government hospitals, corporate hospitals and private clinics. When it comes to healthcare settings, it is not only essential that doctors have proper knowledge about every medicine but also that every medicine has multiple reasons for being purchased which is different from other available medicines. And it becomes more challenging in the industry wherein the customer who takes decision is not the ultimate consumer. As in case of prescriptions in India where the ultimate consumers (patients) have little say and are dependent upon the intermediate customers (doctors).

It is common sense that doctors with prescription eligibility should be responsible for rational drug use. An inappropriate prescribing pattern by doctors often encourages inappropriate self-medication by patients because of the asymmetry of medical information.[1] Doctors' prescription patterns are not static or standardized but dynamic and individual.[2] Thus, studies on medicines are complicated social themes rather than medical themes.[3]

To increase prescription quality and improve the rationality of drug use, we need to investigate the subconscious (Personal/Psychological) factors that affect doctors' prescription patterns. Earlier studies have exposed that factors such as gender, age, educational qualification, specialty, work experience, and economic stimulation influenced their prescribing pattern. However, there were limitations in existing studies: all of the existing studies were single factor analyses, which may have ignored the confounding effects by subconscious factors on doctors' prescription patterns. Moreover, there were no studies concerning the equivalent relationship between a doctor's situation and their prescription records. In the present study, we investigated prescription records of doctors to reveal subconscious (Personal/Psychological) factors that influence doctors' prescription quality in Delhi NCR, India.

METHODS

Study Design

A retrospective cross-sectional study of Physicians Prescription Behavior in Delhi NCR Hospitals was performed as part of this research. We selected some of the prescription records in the present year for the physicians and filled out the Prescription Data Statistical Table (PDST), which was designed to summarize the prescription indicators for our analysis. The PDST elaborately defines doctor personal information (education, foreign exposure, age, gender and practice area) as well as prescription data for the same doctors. Each prescription has been thoroughly analyzed drug by drug – price, price of alternatives (cheapest and most expensive), origin country of the company (Indian or non-Indian). All this data has been used to arrive at: 1. How does the average price of the doctor's prescription compare to the average price of the drugs in the prescription, averaged out across brands? And 2. What is the doctor's proclivity to prescribe non-Indian company brands? Both the questions are evaluated against the doctor profile, which provides us a sneak peek into his/her subconscious decision making.

Study Indicators

The following factors were considered as the background personal factors that might influence prescription behavior:

1. Education - Number of degrees (1, 2, 3 or more)
2. Foreign Exposure - During study or work
3. Gender
4. Practice Area - Private or Government

Prescriptions were evaluated basis two variables, namely

1. Mean Price Deviation - Defined as the deviation of price of the prescribed drug over the mean price of all alternatives of the drug, averaged out over all prescriptions available for the doctor.

2. % Outside Product (OP) - Defined as the percentage of prescribed drugs that belong to companies of non-Indian origin.

Study Site: Delhi NCR: Delhi, NOIDA, Faridabad, Ghaziabad, Gurugram.

Study Population: Prescriptions were collected in the form of pictures from the various hospitals & clinics in Delhi NCR with prior permission of the authorities.

Study Duration: Prescriptions were observed during the study period commencing from August 2016 to April 2017.

Sample Size

• Number of Physicians = 164.

• Number of Prescriptions = 247.

Analysis Method: All collected data were entered in Excel (Microsoft Office Excel 2016 – Windows 10 version) twice to ensure accuracy. Statistical analysis was conducted using MS-Excel & SPSS (version 20.0).

T-Test (Two tails) was used for mean comparison.

RESULTS AND DISCUSSIONS

Data collection for this project was started in August 2016 and continued till April 2017. Total of 164 doctors were eligible for this study. A total of 400 prescription records were selected and recorded in the Prescription Data Statistical Table, of which 153 records were rejected due to incomplete information. Finally, 247 (61.7%) valid prescriptions were included in the analysis.

Population Analysis: Age, gender, number of academic degrees, work experience, practice area and foreign exposure status are shown in Table 1. As for the quality indicators of the 247 prescriptions, the minimum number of drugs per prescription was 1 and the maximum was 8, with an average of 4.1457.

Table. 1: Population Analysis of 164 doctors.

Variable	Group	Number	Percentage (%)
Age	≤35 years old	12	7.3
	36–50 years old	62	37.8
	≥51 years old	90	54.8
Gender	Male	118	71.9
	Female	46	28
No. of academic degrees	One degree	24	14.6
	Two degrees	75	45.7
	Three Degrees and above	65	39.6
Practice Area	Government	27	16.4
	Private	137	83.5
Foreign Exposure	Yes	23	14
	No	141	85.9

Analysis of the Elements that Affected Prescription Quality

The five categorical variables (age, gender, number of academic degrees, practice area and Foreign exposure) were regarded as independent variables. Meanwhile, the two indicators of prescription quality were regarded as dependent variables. Welch's T-Test was used because the five indicators were in non-normal distribution. The differences in gender, number of academic degree and specialty led to the distinctions of price deviation per prescription. The differences in age, final academic degree and specialty led to the diversity of the percentage of company factor (OP).

After performing Welch's t-test on the Price Deviation data, the following results were observed.

Table. 2: T-test results for Mean Price Deviation w.r.t.

A. Status of Foreign Exposure

B. Gender

C. Practice Area

D. Number of degree

A.

	No Foreign Exposure	*Foreign Exposure*
Mean	0.156093579	0.257750135
Variance	0.086328482	0.052467748
Observations	141	23
Hypothesized Mean Difference	0	
Df	35	
t Stat	-1.889845324	
P(T<=t) one-tail	0.033541897	
t Critical one-tail	1.689572458	
P(T<=t) two-tail	0.067083795	
t Critical two-tail	2.030107928	

B.

	Female	**Male**
Mean	0.1114893	0.193296101
Variance	0.087669462	0.079299156
Observations	46	118
Hypothesized Mean Difference	0	
Df	79	
t Stat	-1.611230493	
P(T<=t) one-tail	0.055558982	
t Critical one-tail	1.664371409	
P(T<=t) two-tail	0.111117964	
t Critical two-tail	1.99045021	

C.

	Government Practice	***Private Practice***
Mean	-0.045553979	0.212900768
Variance	0.111421925	0.06647807
Observations	27	137
Hypothesized Mean Difference	0	
Df	32	
t Stat	-3.80575509	
P(T<=t) one-tail	0.000301232	
t Critical one-tail	1.693888748	
P(T<=t) two-tail	0.000602464	
t Critical two-tail	2.036933343	

D.

	1	**2**	**1**	**3+**	**2**	**3+**
Mean	0.058064	0.134765	0.058064	0.25287	0.134765	0.25287
Variance	0.104764	0.086412	0.104764	0.059381	0.086412	0.059381
Observations	24	75	24	65	75	65
Hypothesized Mean Difference	0		0		0	
Df	36		33		138	
t Stat	-1.03261		-2.68125		-2.59858	
P(T<=t) one-tail	0.154338		0.005681		0.005189	
t Critical one-tail	1.688298		1.69236		1.65597	
P(T<=t) two-tail	0.308676		0.011362		0.010378	
t Critical two-tail	2.028094		2.034515		1.977304	

As is evident from the t-test results (comparison of t-stat and t Critical two-tail), t-stat is lesser than t-critical two-tail in all the scenarios, which means the null hypotheses in all the cases are rejected. In other words,

A. Doctors having Foreign Exposure have significantly higher Mean Price Deviation parameter as compared to those who do not

B. Male doctors have significantly higher MPD as compared to females

C. Doctors in private practice have significantly higher MPD as compared to those in government practice.

D. Doctors having more degrees have significantly higher MPDs as compared to those having less Also, correlation between age and MPD is insignificant (coefficient = 0.054).

Similarly, after performing Welch's t-test on the Company factor data, the following results were observed.

Table 3. T-test results for % OP (Company Factor) w.r.t.

A. Status of Foreign Exposure

B. Gender

C. Practice Area

D. Number of degrees.

A.

	No Foreign Exposure	**Foreign Exposure**
Mean	0.210239462	0.235662526
Variance	0.04654841	0.036973881
Observations	141	23
Hypothesized Mean Difference	0	
Df	32	
t Stat	-0.577544797	
P(T<=t) one-tail	0.283806662	
t Critical one-tail	1.693888748	
P(T<=t) two-tail	0.567613325	
t Critical two-tail	2.036933343	

B.

	Female	***Male***
Mean	0.237138576	0.204708709
Variance	0.052464894	0.042284229
Observations	46	118
Hypothesized Mean Difference	0	
Df	75	
t Stat	0.83764774	
P(T<=t) one-tail	0.202445008	
t Critical one-tail	1.665425373	
P(T<=t) two-tail	0.404890016	
t Critical two-tail	1.992102154	

C.

	Government Practice	***Private Practice***
Mean	0.11356841	0.233559526
Variance	0.025911626	0.046651023
Observations	27	137
Hypothesized Mean Difference	0	
Df	47	
t Stat	-3.327688273	
P(T<=t) one-tail	0.000853757	
t Critical one-tail	1.677926722	
P(T<=t) two-tail	0.001707514	
t Critical two-tail	2.011740514	

D.

	1	*2*	*1*	*3+*	*2*	*3+*
Mean	0.11304	0.212418	0.11304	0.25261	0.212418	0.25261
Variance	0.021787	0.042229	0.021787	0.052738	0.042229	0.052738
Observations	24	75	24	65	75	65
Hypothesized Mean Difference	0		0		0	
Df	54		64		130	
t Stat	-2.59125		-3.36619		-1.08414	
P(T<=t) one-tail	0.006136		0.000646		0.140155	
t Critical one-tail	1.673565		1.669013		1.656659	
P(T<=t) two-tail	0.012273		0.001293		0.28031	
t Critical two-tail	2.004879		1.99773		1.97838	

As is evident from the t-test results (comparison of t-stat and t Critical two-tail), t-stat is lesser than t-critical two-tail in all the scenarios, which means the null hypotheses in all the cases are rejected. In other words,

A. Doctors having Foreign Exposure have significantly higher % OP parameter as compared to those who do not

B. Female doctors have significantly higher % OP as compared to males

C. Doctors in private practice have significantly higher % OP as compared to those in government practice

D. Doctors having more degrees have significantly higher % OP as compared to those having less Also, correlation between age and %OP is insignificant (coefficient = -0.09).

DISCUSSION

A prescription study is one of the most effective methods to evaluate the prescribing behavior of physicians. A prescription by a physician denotes his/her attitude towards the disease and medication.[4] The prescription pattern of a physician is dependent upon a multitude of factors, some conscious, others subconscious. While conscious factors like efficacy, effectiveness, price, availability etcetera have been widely studied, we aimed at studying the effect of subconscious factors like age, gender, foreign exposure, practice area and number of degrees on key prescription features like price and share given to foreign companies. The drug utilization study is being conducted widely and it is being carried out in different health care setups. Such studies are helpful to determine the behavior of the use of medicines in a society.[5-10]

In this study, we used data collected from 247 prescriptions from 164 doctors. The results after statistical analysis indicate that all the factors except age (namely gender, foreign

exposure, practice area and number of degrees) have statistically significant impact on MPD factor (an indicator of how pricey the prescriptions of the doctor under study are) as well as % OP (an indicator of how foreign company oriented the doctor under study is).

In this study, the gender variable, which was connected to the average number of drugs prescribed, generic names, price deviation and outside product percentage (OP%) prescribed in single factor analysis, showed significant differences. In other words, male doctors write more pricey prescriptions than female doctors, as do doctors with foreign exposure.

Doctors having more degrees are shown to write more pricey prescriptions. Doctors practicing in government setups write prescriptions that are easy on the wallet as compared to those in private practice.

Also, male doctors write more Indian company products in their prescriptions than female doctors, as do doctors with no foreign exposure. Doctors having more degrees write more of foreign company brands. Doctors practicing in government setups prescribe Indian brands in more numbers than those having private practice.

A major deviation observed in the study was the average number of drugs prescribed per prescription. In the present data, the number was 4.14 in all 247 prescriptions with a maximum of 8. Compared to other countries, the average number of prescription drugs in this study was markedly higher than the WHO's recommended value of 1.3 to 2.0. The number of prescription drugs in this study is even higher than those of developing countries like Zimbabwe (1.3), Sudan (1.4) and Palestine (1.3).[12,13] This may be due to indefinite diagnoses and unreasonable demands by patients. The stimulation of personal economic interests from rebates of pharmaceutical companies to doctors may also account for this phenomenon. The risk of adverse interactions between drugs is raised by unreasonable combined medication, which thereby increases patients' health risks.

We also observed that the number of generic drugs prescribed was very low with respect to the total drugs evaluated. This may be due to the fact that pharmaceutical companies are doing a great job promoting brands, rather than molecules. At the same time, this may be due to lesser faith of the HCP in unbranded products or simply a demand from the patient for branded products.

CONCLUSION

Subconscious factors, guided by personal and psychological factors, are playing a major role in deciding prescription outcomes. Differences in doctors' academic degrees, foreign exposure and acquisition of medical knowledge lead to different prescribing patterns. Pharmaceutical companies can use this analysis to identify potential doctors in a better way.

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