
The role of Pharmaceutical Marketing in Prescribing Decisions in a Developing Country: a Comprehensive Study Exploiting Theory of Planned Behaviour

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ARTICLE INFO	ABSTRACT
<p>Manuscript Received: 31 July, 2024 Revised: 26 Oct, 2024 Accepted: 29 Oct, 2024 Date of Publication: 05 Nov, 2024 Volume: 4 Issue: 3 DOI: 10.56338/jphp.v4i3.5860</p>	<p>Background: Prescription medicines have become a major component of health systems in both developed and developing countries contributing to, may be, more than half of the total health care expenditure in the developing countries. Although literature directly attributing rise in medicines expenditure to prescribers' decision, but still only a few researches had employed studies with sound theoretical foundations to comprehensively examine prescribing decision behaviours. Our objective was to investigate potentially modifiable factors, which may influence prescribing decisions of physicians employing theory of planned behaviour.</p> <p>Method: A quantitative survey approach was used to investigate the proposed hypotheses. Population was physicians in outpatient clinics in both private and governmental hospitals in Sana'a, capital city of Yemen. A structured questionnaire was designed to measure the influence of drug-promoting marketing techniques on physicians' prescribing decisions. Data was collected through an anonymous survey questionnaire. The hypotheses were tested by multiple regressions analysis. Ethical approval was obtained from the Ethical Committee of the Ministry of Public Health and Population (MoPHP), and participants provided written consent before enrolling in the study.</p> <p>Result: Physicians admitted the presence of promotional influence on their prescribing decision. The study revealed that receiving low-value promotional items, belief of physicians that it is appropriate to accept both low- and high-value promotional items, physicians' exposure to company-direct sources of information, and drug promotion-related factor all are positively and significantly related to physicians' prescribing decisions ($\beta = 0.438, p < 0.001$; $\beta = 0.089, p = 0.027$; $\beta = 0.157, p < 0.001$; $\beta = 0.093, p = 0.032$; and $\beta = 0.118, p = 0.007$ respectively).</p> <p>Conclusion: This research clarified the role played by pharmaceutical companies to influence prescribing decisions of physicians. Therefore, could provide theoretical framework for policymakers in Yemen, and other countries with similar conditions, to develop a suitable policy and strategy in terms of drug promotion.</p>
<p>KEYWORDS</p> <p>Drugs; Medical Representatives; Physicians; Prescribing Decision; Promotion; Yemen</p>	

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INTRODUCTION

Prescription medicines have become a major component of health systems in both developed and developing countries. While expenditure on medicines ranges between 7% and 30% of total health care expenditure in high and middle-income countries, in the developing world this range lie between 25% and 65% (1). According to Organization for Economic Co-operation and Development (OECD), pharmaceuticals represent the third largest expenditure item of health care spending after inpatient and outpatient care (2). In addition to being high, this expenditure on medicines continues to rise. OECD estimates the increase in average per capita expenditures on pharmaceuticals

among several member countries in the past 20 years to be more than doubled (3). Several researchers have attributed this rise in medicines expenditure to prescribers’ decision, among some other factors (4). In line with that, in 2018, decisions of the prescribing physicians in the United States were found to govern a national expenditure of about \$476.2 billion, with an increase of 5.5% from 2017 expenditure (5).

Therefore, to acknowledge the need for wise spending on medicine expenditure, policy makers need to ensure that physicians’ prescribing decisions are made through an unbiased assessment of drug safety, efficacy and cost. Such decision, however, depend on particular knowledge, beliefs, and attitudes possessed by individual physicians (6, 7). This had led to an ever-growing interest in studying these factors with several research conducted in the Middle East region (8, 9). But, unfortunately, most of the researches, till now, take the exploratory approach with no sound theoretical foundations (10). Only a few researches had employed theoretical models like Theory of Reasoned Action (TRA) and Theory of Planned Behavior (TPB) in the prescribing decision research (11). Thus, this research aimed to fill this gap by conducting inclusive research based on a sound theoretical basis, employing TPB, to investigate potentially modifiable factors, which may influence prescribing decisions of physicians.

According to TPB, individuals are rational in decision-making; hence cognitive approach can be utilized to explain behaviour (12). As prescribing decision is a multi-factorial complex process (10), this theory was exploited to propose a model comprehensively include potentially modifiable factors which influence physicians’ prescribing decisions. A list of potentially modifiable factors believed to influence prescribing decisions of physicians was generated. TPB appears to capture these factors. However, the model proposed in this study attempt to prompt further consideration of a comprehensive view of factors and their significance upon physician prescribing. Consequently, a model that includes the work-related variables, physicians' characteristics and practice factors, interactions with medical representatives, attitudes toward interactions with medical representatives, belief of physicians that it is appropriate to accept promotional techniques of pharmaceutical companies, sources of information, perceived behavioural control and prescribing decision behaviours was proposed as seen below:

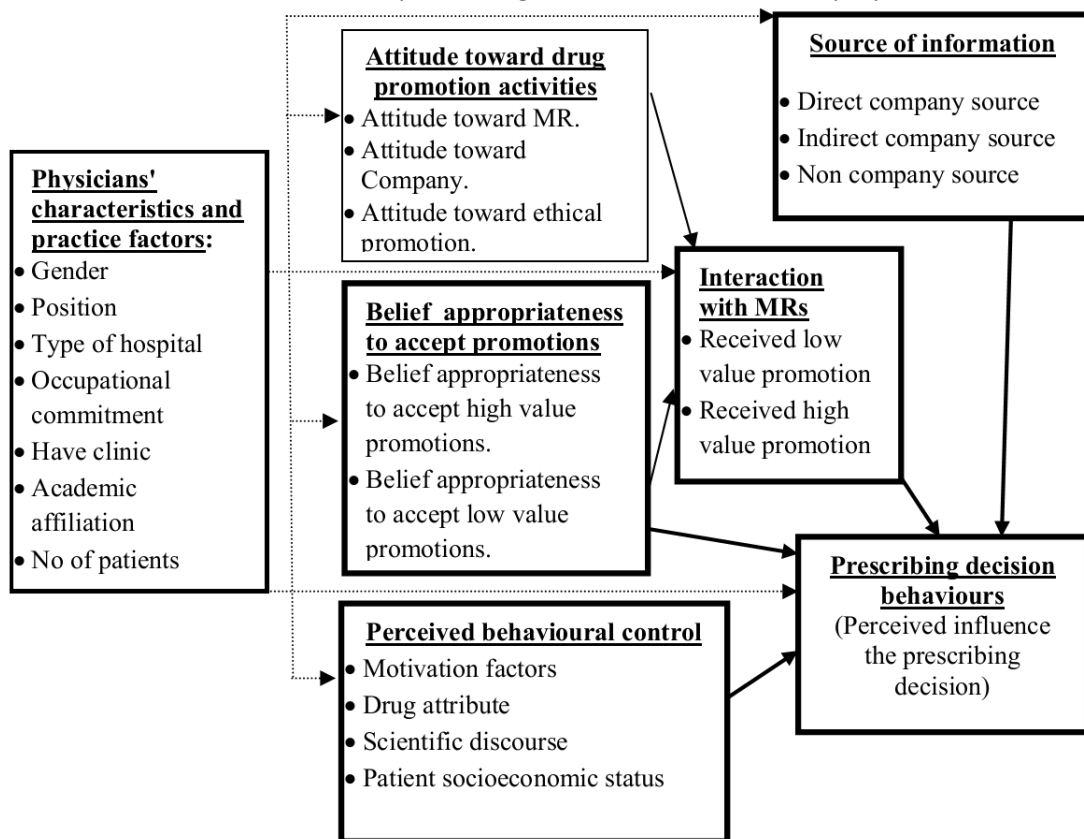


Figure 1. Conceptual framework of factors which influence physicians’ prescribing decisions

Based on this conceptual model, the following hypotheses were proposed:

Hypothesis (H1): There is a significant positive relationship between physicians' interactions with MRs and physicians' prescribing decisions.

Corollary Hypotheses:

H1.1: There is a significant positive relationship between physicians having received low-value promotional items and their prescribing decisions.

H1.2: There is a significant positive relationship between physicians having received high-value promotional items and their prescribing decisions.

Hypothesis (H2): There is a significant positive relationship between belief of physicians that it is appropriate to accept promotional items from pharmaceutical companies and their prescribing decisions.

Corollary Hypotheses:

H2.1: There is a significant positive relationship between physicians' belief in the appropriateness of accepting low-value promotional items and their prescribing decisions.

H2.2: There is a significant positive relationship between physicians' belief in the appropriateness of accepting high-value promotional items and their prescribing decisions.

Hypothesis (H3): There is a significant positive relationship between physicians' sources of information about new drugs and their prescribing decisions.

Corollary Hypotheses:

H3.1: There is a significant positive relationship between company-direct information sources and physicians' prescribing decisions.

H3.2: There is a significant positive relationship between company-indirect information sources and physicians' prescribing decisions.

H3.3: There is a significant positive relationship between non-company information sources and physicians' prescribing decisions.

Hypothesis 4 (H4): There is a significant positive relationship between physicians' perceptions of behavioural control and their prescribing decisions

Corollary Hypotheses:

H4.1: There is a significant positive relationship between drug attribute and physicians' prescribing decisions.

H4.2: There is a significant positive relationship between the drug promotions-related factor and physicians' prescribing decisions.

H4.3: There is a significant positive relationship between company scientific discourse and physicians' prescribing decisions.

H4.4: There is a significant positive relationship between patients' socioeconomic status and physicians' prescribing decisions.

Thus, this study is hoped to identify the major factors that influence physicians' behaviour in prescribing medicine, and hence to provide policy makers in Yemen, and developing countries with similar context in general, with the necessary information to better tackle this issue.

METHOD

The proposed hypotheses were examined using a quantitative approach with a survey method. A structured questionnaire was designed to measure the influence of drug-promoting marketing techniques on physicians' prescribing decisions. The questionnaire was constructed on 86 questions in which 11 questions about physicians' characteristics and practice-setting factors were nominal or ordinal scale and the other 75 questions were formulated in Likert scale. Questions were further modified during the qualitative phase of this study (13-15). Prior to the distribution of the survey, the questionnaire items were reviewed via expert consultation of three individuals in related academic fields and in the field of pharmaceutical promotion to assure its content validity. Then a pre-test of the instrument was conducted among 10 physicians in the target population. Thereafter, a pilot study was conducted with 52 physicians possessing similar population characteristics to test the feasibility, reliability and

validity of the proposed study design. Based on this, certain items were rephrased and the sequence of questions was reordered. The scale was considered to have acceptable reliability with a Cronbach's alpha (α) coefficients ranging between 0.638 and 0.840 among the main questionnaire constructs.

Data collection was carried out during June 23 to August 25, 2010 by the first author and data collection assistants who had been trained to ensure quality throughout the data collection process. All physicians (1,390) in Sana'a, capital city of Yemen, in outpatient clinics in both governmental (1159 physicians) and private (231 physicians) hospitals were targeted. Based on Cochran (1963) equation a sample size of 385 was targeted (16). To allow for incomplete or unusable responses, 602 questionnaires were distributed.

Descriptive statistical analyses from the collected data were firstly performed. Then inferential analysis including multiple regressions analysis to test study hypotheses were carried out using Statistical Package for Social Sciences (SPSS) version 16 (SPSS Inc. Released 2007. SPSS for Windows, Version 15.0. Chicago, SPSS Inc.). Mean scores and standard deviations were used to describe the study variables and bivariate correlation with a two-tailed test of significance ($p < 0.01$ and $p < 0.05$) for all variables involved in the study. In addition, factor analysis, with principal component analysis, was utilized to assess the psychometric properties of the variables included in the study and extract factors.

Ethical considerations

Ethical clearance for this study was obtained from the Ethical Committee of the MoPHP. All human participants granted written consent before enrolling in the study.

RESULTS

Demographic characteristics of the participants

Of the 602 physicians in the survey, 76.5% ($n = 461$) returned their questionnaire anonymously. 74.4% ($n = 334$) of the respondents were male. 5.6% ($n = 25$) of those surveyed were intern, 25.6% ($n = 115$) GPs/ medical officer, 28.5% ($n = 128$) board (residents), and 40.3% ($n = 181$) specialists. Of the total respondents 30.1% ($n = 135$) have private clinic versus 69.9% ($n = 314$) have not, 69.7% ($n = 313$) work in public hospitals versus 30.3% ($n = 136$) work in private hospitals, and 24.3% (109) work overtime versus 75.7% ($n = 340$) work normal day. The mean age of the respondents was 36.55 years, the mean years of experience was 9.55, the mean number of patients per day 16.8, and the mean number of MRs seeing per week was 7.06.

Physicians' perceptions about the factors which influence their prescribing decisions

The subscale describing perceptions of physicians about the factors influencing their prescribing decisions had per item means > 2 (with a possible range of 0–6). Factors influence prescribing decision were rated as follow: 4.1 to 6.0 highly influential, 2.1 to 4.0 moderate, 0.1–2.0 low influence, and factors with 0.0 mean were considered not to have influence on prescribing decisions.

Accordingly, out of 14 factors, only six could be considered as highly influential with more than 4.1 score. The factor 'the alternative drug is more effective than the current drug' was found to be perceived as the most influential on physicians prescribing decision with a score of about 4.5, while the factor 'the incentives offered with the alternative drug are better than those offered with the former drug' is perceived least with about 2.1 score. Details of the results were presented in Figure 2 below.

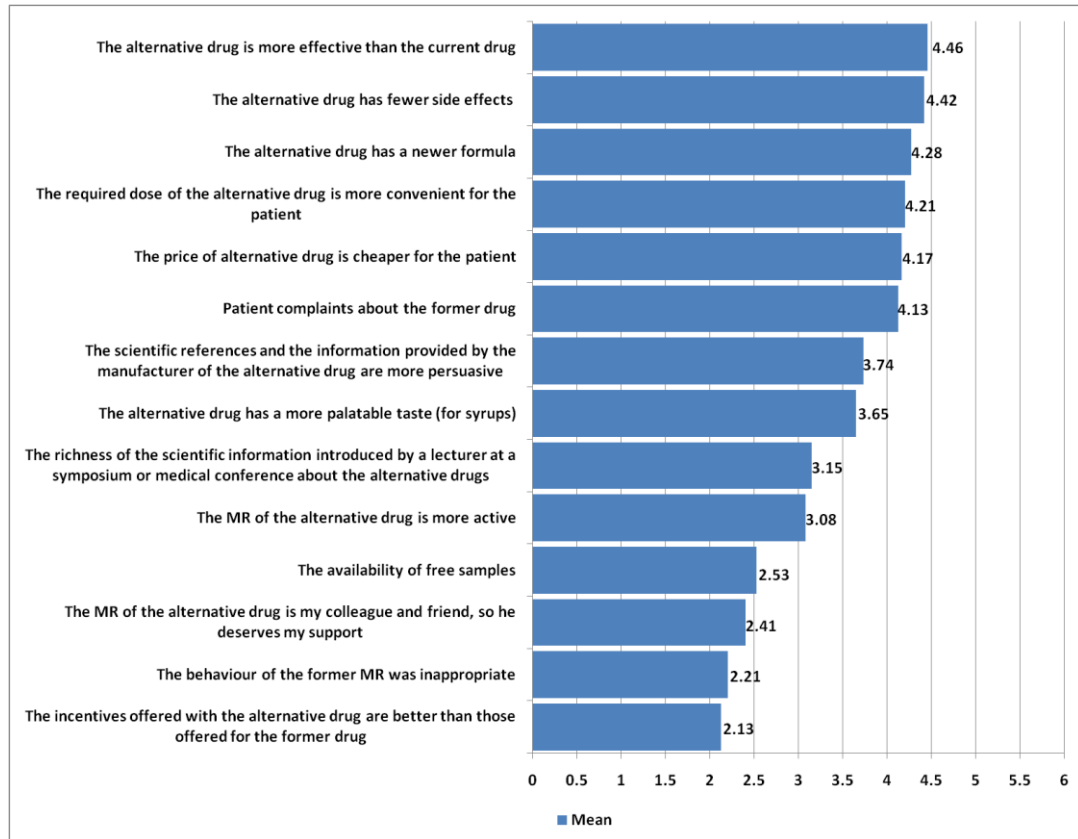


Figure 2. Physicians’ perceptions about the factors which influence their prescribing decisions

Physicians prescribing behaviour

Approximately 69% of the respondents believe that their prescribing decisions were affected by promotional activities, but they rated extent of this influence differently as presented in Figure 3 below.

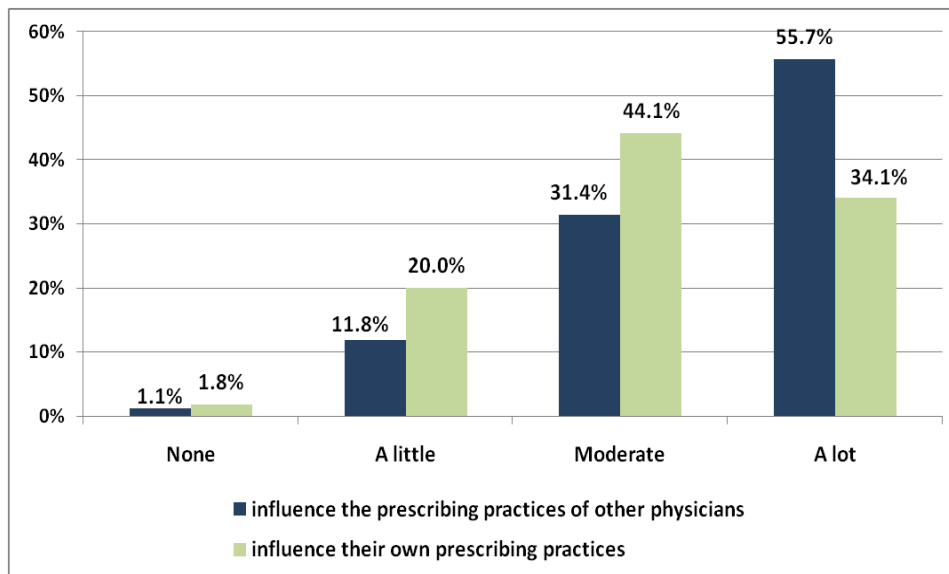


Figure 3. Perceived influences of MRs on prescribing decisions

Inferential analysis

Factor analysis: Principal component analysis was used to extract factors. Measures of the sample’s adequacy such as Bartlett’s test of sphericity (significance <0.001) and KMO value (0.851) revealed the fitness of the data for factor analysis. All items included in the extracted factors were derived from the same theorized dimensions; all the factors have been given appropriate names according to the variables that have been loaded onto each: drug attributes, drug promotion and scientific discourse. The three factors were depicted in Table 1 below.

Table 1. Factor analysis physicians’ perceptions about which factors influence their prescribing decisions

Rotated Component Matrix ^a		Component		
		1	2	3
Drug attributes	The alternative drug has fewer side effects	.766		
	The alternative drug is more effective than the current drug	.745		
	The required dose of the alternative drug is more convenient for the patient	.738		
	The alternative drug has a newer formula	.673		
	Patient complaints about the former drug	.664		
	The alternative drug has a more palatable taste (for syrups)	.484		.412
Motivation Factors	The MR of the alternative drug is my colleague and friend, so he deserves my support		.783	
	The incentives offered with the alternative drug are better than those offered for the former drug		.779	
	The MR of the alternative drug is more active		.672	
	The behaviour of the former MR was inappropriate		.669	
	The availability of free samples		.656	
Company scientific discourse	The scientific references and the information provided by the manufacturer of the alternative drug are more persuasive			.804
	The richness of the scientific information introduced by a lecturer at a symposium or medical conference about the alternative drugs			.737
	The price of alternative drug is cheaper for the patient			.546

Extraction Method: Principal Component Analysis.
 Rotation Method: Varimax with Kaiser Normalization.

In the course of assessing the goodness of fit of the measures, the internal consistency of all constructs was assessed. Most variables in the study model reflect a Cronbach’s alpha above the threshold of 0.60 which Nunnally and colleagues (1967) had deemed desirable (17). Also, assumptions pertaining to: multicollinearity, linearity, outliers, homoscedasticity, normality, and the independence of the residual regression model applied in this study were checked and results showed no violation.

Testing hypothesis

This study presented a comprehensive model of the factors that influence physicians’ prescribing decisions. Those factors were hypothesized in the prediction of physicians’ prescribing decisions, and the proposed model was proved able to explain a significant amount of variance (R² =0.45, p <0.001).

Hypothesis 1 (H1) stated that physicians’ interactions with MRs is both positively and significantly related to their prescribing decisions. After conduction of multiple regressions analysis, only receiving low-value promotional

items was found to be positively and significantly related to physicians' prescribing decisions ($\beta = 0.438$, $p < 0.001$). Therefore, only H1.1 was accepted while H1.2 was rejected.

The study also showed that belief of physicians that it is appropriate to accept both low- and high-value promotional items are positively and significantly related to their prescribing decisions. Hence, both H2.1 and H2.2 were accepted at $\beta = 0.089$, $p = 0.027$ and $\beta = 0.157$, $p < 0.001$ respectively.

It was also found that physicians' exposure to company-direct sources of information is positively and significantly related to their prescribing decisions. Therefore, H3.1 was accepted at $\beta = 0.093$, $p = 0.032$. Conversely, company-indirect and non-company sources of information were found to be negatively but not significantly predictive of physicians' prescribing decisions. Hence, hypotheses H3.2 and H3.3 were rejected.

Hypothesis 4 (H4) stated that there exists a significant and positive relationship between physicians perceived behavioural control and their prescribing decisions. However, the study revealed that only drug promotion-related factor is positively and significantly related to physicians' prescribing decisions. Therefore, H4.2 was accepted at $\beta = 0.118$, $p = 0.007$, while other hypotheses (H4.1, H4.3 and H4.4) were rejected. Details of hypotheses testing were presented in Table 2 below.

Table 2. Multiple regressions analysis the relationship between independent variables and physicians' prescribing decisions

Model	R	R ²	Adj. R ²	R ² Change	Sig. F Change	Standardized Coefficients Beta	P Value
22	.670 ^b	.449	.422	.407	.000		
(Constant)							.813
Gender (Male)						-.109	.006
Intern						-.017	.708
GPs						.073	.153
Board (Residents)						-.015	.765
Experience years						-.034	.497
Type of hospital (Public)						-.041	.331
Occupational commitment (Normal day)						-.001	.973
Have clinic						.008	.859
Academic affiliation						.055	.187
No. of patients per day						-.032	.406
Patient socioeconomic status						.027	.539
Company-direct source						.093	.032
Company -indirect source						-.039	.359
Non-company Source						-.019	.638
Drug attribute						-.013	.754
Motivation factors (drug promotion-related factors)						.118	.007
Scientific discourse						.080	.070
Belief in the appropriateness of accepting high-value promotions						.157	.000
Belief in the appropriateness of accepting low-value promotions						.089	.027
Received high-value promotion						.063	.186
Received low-value promotion						.438	.000

b. Predictors: (Constant), No. of patients per day, type of hospital, GP, intern, gender, academic affiliation, occupational commitment, have clinic, board(residents), years of experience, motivation factors, belief in the appropriateness of accepting low-value promotions, non-company information sources, drug attributes, company-direct information sources, received high-value promotions, belief in the appropriateness of accepting high-value promotions, company -indirect information sources, patients' socioeconomic status, scientific discourse, received low-value promotions.

c. Dependent Variable; Prescribing decision

DISCUSSION

This study investigated potentially modifiable factors, which may influence prescribing decisions of physicians. In this study, physicians rated the drug-related factors or drug attributes, physicians' interactions with MRs in instances in which the physician received low-value promotional items, and company-direct information sources as highly influential in terms of their decision to change from prescribing one drug to prescribing an alternative. In addition, motivation factors were found to have the strongest predictive power of physicians' prescribing decisions.

The extant literature has suggested that physicians' prescribing decisions are complex phenomena which are influenced by several factors. In this study, physicians rated the drug-related factors or drug attributes such as efficacy and safety as highly influential in terms of their decision to change from prescribing one drug to prescribing an alternative. This finding is consistent with several studies reported in the literature (18). Also, in this study the majority of physicians agreed that patients' socioeconomic status and social security must be considered in drug selection. In addition, they rated the cost of drugs as a highly influential factor in the prescribing decision. This result supported those reported in several other studies (18-20).

This study found that physicians do not deny the presence of promotional influence on their prescribing decision, perhaps due to physicians' perceptions that interactions with MRs constitute a social norm (14). However, most physicians in previous studies believed themselves to be free from any influence while simultaneously believing their peers to be more susceptible to the influence of pharmaceutical companies' promotional activities (21). A study conducted in Pakistan recorded that, promotional activities, specifically physicians' interactions with MRs, affect the prescription behaviour of physicians (22).

In the present model, the authors attempted to assess the relative importance of pharmacological and non-pharmacological factors in shaping the prescribing decision of physicians, with the goal of better understanding the impact of pharmaceutical companies' promotional activities on physicians' prescribing decisions.

Physicians' interactions with MRs in instances in which the physician received low-value promotional items proved to be an important construct when predicting physicians' prescribing decisions, while instances in which physicians received high-value promotional items were not found to be significantly related to their prescribing decisions. Although a contrast finding was reported where high-value promotional items, such as laptops, mobiles and LCDs were accepted (23,24), but several other researches supported the finding of this study (18, 20). Also, the study finding that physicians' general belief that it is appropriate to accept promotional items, whether low- or high-value, from pharmaceutical companies had significantly impacted their prescribing decision was supported by Waheed et al., (2011) who found that tangible rewards to physicians by the pharmaceutical companies lead to prescription loyalty (25).

The hypothesized relationship between physicians' perceptions of behavioural control and their prescribing decisions was not confirmed with exception of relationship between the drug promotions-related factor and physicians' prescribing decisions. Confirmation of the relationship between the drug promotions-related factor, namely; incentives, the physician's relationship with the MR, the physicians' perceptions of the MR's activity, any past experiences the physician might have had with the MR, and whether the MR makes drug samples available to the physician, and physicians' prescribing decisions comes in line with the findings generated from the qualitative part of this research where physicians mentioned frequent visits by MRs, relationship with MRs, and marketing activity as reasons for prescribing certain drugs (15). However, several contrasting findings were reported where drug characteristics' related factors, patients' socioeconomic status and scientific discourse altered physicians' prescribing decision (15, 23, 26). Also, the relationship with MRs and pharmaceutical companies' promotional efforts has been confirmed to be a predictor for changing prescribing behaviour. Several studies conducted in both Western and Eastern communities supported this finding (22, 27-30).

The results of this study suggested that company-direct information sources were a major influence on physicians' prescribing decisions. Interestingly, indirect sources and non-company sources were found to be negatively and not significantly related to physicians' prescribing decisions. This contradicts the findings reported by Faisal et al, (2020) which presented the physicians' belief that commercial sources of information had little, while scientific had a major impact on their prescription behaviours (22).

However, several previous studies supported this current finding and reported higher physicians' reliance on information from commercial sources than their reliance on information from non-commercial sources (31).

As previous literature described company-direct information sources to be the most effective as sales rather than informational materials (32, 33), this should trigger public health policy makers to enhance the role which the MoPHP and universities should be playing in the dissemination of scientific information about new drugs.

A major finding revealed by the inferential analysis was that motivation factors have the strongest predictive power of physicians' prescribing decisions among all other factors, while drug attributes factor was not significantly predictive of physicians' prescribing decisions. This finding contradicts results generated by the descriptive analysis in which the motivation factors scored the least, while factors related to drug attribute were shown to be highly influential. This discrepancy in findings shown between descriptive and inferential analysis could result from genuine belief of the physicians that promotional techniques are not ethical, and that is why these factors scored least in the direct questions, but this is unlikely. The more likely explanation, however, is that questions related to promotional techniques imply some social stigma and that is why not answered candidly in questions analysed descriptively.

Implications for Public Health

This study provides insights into the factors that influence physicians' prescribing behavior, especially in prescribing newly marketed drugs, which is important for understanding the role of pharmaceutical companies in affecting prescribing decisions. Therefore, it could be of high value in designing and evaluating interventions aimed at changing physicians' prescribing behavior. Such findings could provide the basis for public health policymakers, especially in developing countries, to develop a suitable policy and strategy in terms of drug promotion.

The information generated from this study provides strong evident for policy makers in health sectors to consider new strategies to regulate and direct the interaction between physicians and MRs in order to minimize the drawbacks of that interaction and the physicians' reliance on commercial source of information about drugs. The researchers recommend that there is a need to formulate a comprehensive strategy or regulatory framework with all stakeholders participating in its development.

Limitations and Cautions

Despite the strengths of this study that relationships of several factors influencing physicians' prescribing behaviour were studied comprehensively within single theoretical framework, but still some limitations should be acknowledged. The first limitation of this study is that it was conducted only in Sana'a, the capital city of Yemen. However, the researcher assumed a reasonable representativeness of the sample because about quarter of physicians participated in the study were Board (Residents) whose elected from different governorates in Yemen. Another limitation which should be considered is that, as in case of all self-reported surveys, it includes the risk of recall bias and social desirability bias.

Recommendations for Future Research

The researchers recommend future research investigate formulation of a comprehensive strategy with all stakeholders participating in its development. In addition, for better generalizability, studies conducted in countries other than Yemen is needed.

CONCLUSION

This research clarified the role played by pharmaceutical companies to influence prescribing decisions of physicians, and explored a range of various related-factors that affects decision-making process of physicians. It confirmed the big role of drug promotions-related factor on physicians' prescribing decision. Therefore, it could be of high value in designing and evaluating interventions aimed at changing physicians' prescribing behaviour. Such findings could provide theoretical framework for policymakers in the public and private health sector in Yemen, and

other countries with similar conditions, to develop a suitable policy and strategy or regulatory framework in terms of drug promotion.

AUTHOR'S CONTRIBUTION STATEMENT

M.A.A. designed the study, implemented the research and analyzed the results. M.M.I. designed the study and supervised the interpretation of the results. A.A.A., wrote the manuscript. All authors discussed the results and contributed to the review of the final manuscript.

CONFLICTS OF INTEREST

The authors declare that they have conflict of interest related to this publication.

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