Influence of Pharmaceutical Promotional Mix Instruments upon Healthcare Consultants Prescription Decision Making

Syed Asim Shah[*], Noman Khan[†], Muhammad Ayub[‡] and Asim Anwar[§]

Abstract

The major purpose of this research paper is to evaluate the influence of pharmaceutical companies promotional mix strategy upon healthcare consultants' drugs prescription decision making behavior to patients. It provides in-depth information related to the pharmaceutical promotional mix strategy through extensive review of the literature, and highlights the most influential promotional mix instrument, the least promotional mix instrument and the negative effect of promotional mix instrument upon the healthcare consultants' prescription decision making. The results of this study indicate that there is highly significant positive relationship found among promotional expenditures & prescription sale and prescribing decision making. Furthermore, gift reminder has negative and significant relationship with prescribing decision making. Whereas, relationship among drug sample & continuous medical educational program with prescribing decision making was found negative and insignificant. Additionally, academic detailing has also insignificant but positive relationship with prescribing decision making.

Keywords: Pharmaceutical promotional mix strategy, healthcare consultants' prescription, pharmaceutical drug.

Introduction

Pharmaceutical marketing is entirely different from the conventional marketing approaches because of its specialized nature (Kim & King, 2009). The main focus of the pharmaceutical marketing strategies is to have a bearing upon healthcare consultant, who is the ultimate decision

---

[*] Syed Asim Shah, PhD Scholar, Department of Business, Administration, IQRA National University, Peshawar, Pakistan.

[†] Dr. Noman Khan, Assistant Professor, Department of Management Sciences, COMSATS Institute of Information Technology, Attock Campus, Pakistan. Email: nomankhan1010@hotmail.com

[‡] Dr. Muhammad Ayub, Assistant Professor, Department of Management Sciences, COMSATS Institute of Information Technology, Attock Campus, Pakistan.

[§] Dr. Asim Anwar, Assistant Professor, Department of Management Sciences, COMSATS Institute of Information Technology, Attock Campus, Pakistan.

maker about any pharmaceutical drug to be purchased by the patient. The pharmaceutical industry major revenue comes from the prescription markets (Ladeira et al., 2011). Therefore the pharmaceutical industry is paying a lot of attention to the marketing strategies related to prescription generations (Kim & King, 2009). According to Gagnon and Lexchin, (2013) the pharmaceutical industry is directing 20 to 40% of their budget to the promotional expenditures. The central target of such expenditure is the healthcare consultant, through drug sampling, continuous medical education programs, drug gift reminders through their sales and marketing representatives urged by (Joyce et al., 2013). According to Gonul et al. (2001) the available literature support that pharmaceutical sales and marketing representatives visits comprise the largest percentage of such heavy pharmaceutical promotional expenditures. Narayanan, Desiraju, and Chintagunta (2005) explained that the pharmaceutical companies' promotional strategies maximize healthcare care consultants' prescriptions and hence result in more sales volume stated by (Al-Areefi, Hassali, & Ibrahim, 2013). Therefore the pharmaceutical companies usually spend more in terms of promotion expenses and incorporate different marketing mix instruments to increase their sales. Pharmaceutical companies justify their promotional expenditures as a mean of scientific and educational information to healthcare consultants (Spurling et el., 2010). This notion is further supported by literature that majority of the healthcare consultants perceive the drug promotion activities as important and convenient way of information (Al-Areefi, Hassali, & Ibrahim, 2013; Kerak, Louhoudi, & Ouardouz, 2014).

Various studies argue the positive influence of the pharmaceutical promotional activities upon healthcare consultant prescription decision making behavior (Ladeira et al., 2011; Kremer et al., 2008). Venkataraman and Stremersch, (2007) conducted a research in which he stated, though there exist an ample amount of literature regarding the influence of pharmaceutical marketing strategies upon healthcare consultant prescription decision making attitude. Various healthcare consultants disagree that their prescription attitude is under the influence of pharmaceutical marketing strategies (Saito, Mukohara, & Bito, 2010; Morgan et al., 2006). Nevertheless majority of such healthcare consultants are agree to spare most of their time to pharmaceutical promotional activities urged by (Vancelik et al., 2007). Zahrani (2014) described the possibilities that pharmaceutical companies may have an undue influence upon healthcare consultants' prescription practices are under great criticisms. There has been serious concerns regarding the fact that sufficient number of healthcare consultants might be recommending a narrow range of aggressively promoted drugs which

comes under the category of unnecessary and expensive medicines prescribing attitude to the patient who is the ultimate sufferer (Joyce, Carrera, Goldman, &Sood, 2013). Besides, the concern related to the increasing pharmaceutical promotional expenditures, there also exist a concern about illogical and even harmful drugs prescriptions (Theodorou et al., 2009) sometimes in developing countries particularly (Kayi, Atinga, & Ansa, 2015). Factors having a bearing upon healthcare consultants' prescription decision making are important to be studied (Lucas et al., 2015). In this perspective the pharmaceutical companies marketing factors are of prime importance (Al-Shami, Izham & Abdo-Rabbo, 2011). The result of the above mentioned issues can lead to loss the quality of patient life and further health of the society. The adverse influence of the pharmaceutical promotional activities upon healthcare consultants' prescription is obvious. Therefore, attention paying has been started on behalf of the government, pharmaceutical companies and managers towards such factors that may have an influence upon healthcare consultants prescription decision making (Venkataraman &Stremersch, 2007). According to the review by Salmi et al. 2015 concluded that pharmaceutical companies' promotional efforts have a significant influence upon healthcare consultants prescription decision making behavior. Spurling et al. 2010 studied that there is no evidence of the net increase in drugs prescriptions as a function of pharmaceutical promotional mix instruments in terms of information in a review of 2010. Though, the above mentioned reviews took into account narrowly the association between pharmaceutical promotional efforts and healthcare consultant's prescription decision making behavior in general.

The objective of this research paper is to examine the relationship between pharmaceutical companies promotional efforts such as prescription sales, continuous medical education program, gift reminders, drugs sample, academic detailing, & promotional expenditure and the healthcare consultants prescription decision making behavior.

Data and Methodology
The population of this study was drawn from Pakistan Medical & Dental Council i.e. (PMDC) 2016 list. According to the PMDC 2016 data, there are 19213 healthcare consultants are serving in different public and private sector hospitals and clinics in north region of Pakistan. Out of which 12697 are qualified MBBS male healthcare consultants while the remaining 6516 are female healthcare consultants. The inclusion criteria of drawing a healthcare consultants sample was only M.B.B.S qualified healthcare consultants serving in the region. While the B.D.S (Bachelors of Dental surgery) qualified healthcare consultants were excluded from

the population. The population of the study accomplished were all healthcare consultants who are practicing as senior consultants, medical officers', trainee medical officers (TMO`S) serving in different, public and private sector hospitals in the north region of Pakistan. The healthcare consultants serving in major teaching public and private sector hospitals were selected in major cities. These major public sector hospitals of the region are Lady Reading hospital, Khyber Teaching Hospital, Hayatabad Medical Complex. Whereas, Rehman Medical Institute (RMI), North West General Hospital, Peshawar Institute of Medical Sciences as private sector institutes in Peshawar city. Besides, all major Cities district headquarter level hospitals healthcare consultants are containing the population of the study.

Sample of the Study
The major focus of this study was upon specific pharmaceutical promotion mix instruments   influence; therefore probability sampling technique of multi stage stratified sample methodology was followed. Healthcare consultants' strata's was divided into specialty wise. These specialties were of cardiology, orthopedics, Gynecology, medical and general surgery; further sample events were selected randomly. Thus, a sample size including 600 healthcare consultants from different specialties serving in public and private sectors hospitals, were focused for data collection. The sample size was constituted of 600 healthcare consultants. Therefore the sample size was selected using proportional allocation method. The sample size n=600 was selected following (Krejice& Morgan, 1970) table.

Table 1 sample size

S. No.	Hospitals	Sample size
1.	Lady Reading Hospital	55
2.	Khyber Teaching Hospital	50
3.	Hayatabad Medical Complex	50
4.	Rehman Medical Institute	50
5.	North West General Hospital	50
6.	Peshawar Institute of Medical Sciences	50
7.	Al Kuwait Hospital Peshawar	30
8.	Mercy Hospital Peshawar	30
9.	Moulvi Gee Hospital Peshawar	30
10.	Bacha Khan Medical Complex	25
11.	Swat Medical Comlpex	25
12.	Nowshera Medical Complex	20
13.	DHQ Charsadda	25

14.	Khalifa Gul Nawaz Complex Bannu	20
15.	KDA Kohat	20
16.	DHQ Attack	50
17.	DHQ D.I. Khan	20
	Total	600

Data Collection Method and Tools

The current study used primary data to test the research hypotheses. The required data was gathered through self-administered questionnaire. The questionnaire was consisting of five point likert scales ranging as ,(1) Not at all important (2) Not very important (3) Neutral (4) Important (5) Highly Important. The influence of pharmaceutical promotional mix strategy was measured by 10 items. These were the independent variables of the study. The questionnaire was developed following (Bradley, 2001; Yoo et al., 2000; Cenguz et al., 2007; Kalaskar et al., 2012; Sayandhan, Kodithuwakku, &Gunaratne, 2008). The respondents were asked to rank each sub element as their level of consideration in terms of importance under promotional mixes while making prescriptions decisions based on likert scale ranging from (1) as not important at all, (2) Not very important (3) Neutral (4) Important and as (5) Highly Important. The dependent variable of the study was the prescribing behavior of the healthcare consultant which was measured with total of 5 items under the healthcare consultant selecting criteria for a drug to be prescribed 5 items on justifying healthcare consultant drug prescription, 4 items on information search for drug of choice prescription, 1 question upon the importance of drug cost in their prescriptions, 1 question on the existence of entitled patients as a compensatory measure 5 items were constructed on the safety of pharmaceutical drug to be prescribed and 1 item was asked upon adverse drug reaction importance for healthcare consultant in his prescription behavior. Thus a total of 22 items under 7 questions were constructed on dependent variable of the study. The dependent variables questionnaire was adopted from (Theodorou et al., 2009). The responding healthcare consultants were then asked to rank their level of considerations in terms prescribing behavior and attitude. Further, the reliability and mean of marketing mix instrument, and healthcare consultant decision making was measured.

The questionnaire methodology was used to obtain knowledge about the influence of pharmaceutical promotional mix upon healthcare consultants' prescription behavior in the healthcare network. Specifically efforts were made to know the influence of pharmaceutical promotional mix strategy upon the healthcare consultant prescription decisions. The

study conducted was survey design which allows the questionnaire usage for data collection as a major research tool. The questionnaire used for data collection included closed ended questions to measure items used in the research. The demographic characteristics of the respondents were measured via specific questions. These specific questions were Name, specialty, experience, gender and designation.

Dependent Variable:
Physicians' Prescribing Behavior
Physicians' prescribing behavior in terms of" prescriptions" was studied as the dependent variable of the study. According to Aert (2005) prescription behavior mean information about new products, gathering product information making a positive attitude toward a product, experiencing it directly or indirectly and adopting a product for prescription usage to the patients.

Independent Variables
Pharmaceutical Promotional mix instruments:
Promotional strategy used by the pharmaceutical companies' means messages to be communicated, materials to be used, sampling to be done, other activities like samples promotion, detailing, continuous medical education programs, gifts, sponsorships, clinical trials Filmore (David, 2004).

A self-administered questionnaire method to 70 healthcare consultants was distributed which fulfills the criteria of 10% of the sample understudy following (Churchill et al., 1995). The internal consistency reliability and validity of the instruments were evaluated through calculating the Cronbach alpha Coefficient and through descriptive statistical analysis such as mean and standards deviation. The Cronbach alpha reading shows that majority of the questionnaire items used to calculate the constructs having a value of more than 0.7 (Nunnally, 1987). The individual alpha scores of independent variables was 0.736. On the other hand the dependent variable such as healthcare consultant prescriptions decision making behavior score was 0.805. The alpha sore allowed for further data collection from the respondents of the study.

Table 2 Questionnaire Source and Reliability Test

Variable	No. of Items	Source	Cronbach's Alpha
Promotion	10	Sayandhan, Kodithuwakku, and Gunaratne (2008)	0.736
Prescribing Behavior	22	Theodorou et al. (2009)	0.805

Data Analysis Techniques
The study employed simple & multiple regression model and correlation analysis. The study used multiple regression tool due to the reason that there is more than one explanatory variables and one dependent variable. Thus, in the current study case of multiple regression model X represents independent variables (Pharmaceutical promotional mix instruments) and Y represents dependent variables i.e. Healthcare consultant prescription decision behavior. The general format of the model is as follows:

$$PrescribingBehavior = \alpha_0 + \beta_1 drugSamples + \beta_2 Gift\ reminders + \beta_3 CME`S + \beta_4 prescriptionsales + \beta_5 Academic\ Detailing + \beta_6 Promotional\ Expenditure + \varepsilon$$

Simple Regression Model
Simple regression model is also employed in the study to analyze Pharmaceutical promotional mix instrument with healthcare consultant prescription decision behavior. Therefore, in the case of current study simple regression model X indicates independent variable i.e. Pharmaceutical promotional mix instrument and Y indicates dependent variables i.e. Healthcare consultant prescription decision behavior. The general format of the model is as follow:

$$PrescribingBehavior = \alpha_0 + \beta_1 Promotion + \varepsilon \qquad (1)$$

Findings
Correlation Analysis
The Pearson correlation is used for determining the degree of correlation between drugs sample, promotional expenditure, gift reminder, academic detailing, continuous medical education program, prescription sale and prescribing decision making. According to Gall, Gall, & Borg (2007) if the variables are continuous variables in the study then Pearson Correlation is more better to use.

In the below correlation table 3 the dependent variable is prescribing decision making and the independent variables are promotional expenditure, drug sample, gift reminder, academic detailing, continuous medical education program and prescription sale. The correlation table shows the relationship between the dependent and independent variables. The number of respondents of the study in below table is 577. According to the below table the Pearson Correlation test has been conducted and there is positive highly significant relationship found between promotional expenditure and prescribing decision making where the value of Pearson correlation for promotional expenditure is

0.645. In the below mentioned table, drug sample is another independent variable and it Pearson correlation value is 0.427 that shows low relationship with prescribing decision making while it is highly significant at 0.01 level. Pearson Correlation value for gift reminder is 0.367 which is highly significant as well at 0.01 level and it shows low relationship with the independent variable. Academic detailing is another predictor, according to the table its Pearson correlation value is 0.516 which shows positive moderate relationship with prescribing decision making of consultant in pharmaceutical industry. The second last independent variable of the study is continuous medical education program. Its correlational value in the table is 0.401 which describes that low relationship exists with prescribing decision making and is also highly significant at level of 0.01. The last independent variable of the study is prescription sales, its value is 0.492 which shows low relationship with prescribing decision making and is highly significant at level of 0.01 level.

PBD=   Prescribing Behavior Decision
PE =   Promotional Expenditure
DS=   Drugs Sample
GR=   Gift Reminders
AD=   Academic Detailing
CMEP=   Continuous Medical Education Program
PS=   Prescription Sales

Table 3 Correlations

		PBD	PE	DS	GR	AD	CMEP	PS
PBD	Pearson r	1						
	Sig. (2-tailed)							
	N	577						
PE	Pearson r	.645**	1					
	Sig. (2-tailed)	.000						
	N	577	577					
DS	Pearson r	.427**	.645**	1				
	Sig. (2-tailed)	.000	.000					
	N	577	577	577				
GR	Pearson r	.367**	.687**	.412**	1			
	Sig. (2-tailed)	.000	.000	.000				
	N	577	577	577	577			
AD	Pearson r	.516**	.751**	.432**	.403**	1		
	Sig. (2-tailed)	.000	.000	.000	.000			
	N	577	577	577	577	577		
CMEP	Pearson r	.401**	.643**	.380**	.266**	.399**	1	
	Sig. (2-tailed)	.000	.000	.000	.000	.000		
	N	577	577	577	577	577	577	
PS	Pearson r	.492**	.507**	.366**	.342**	.375**	.281**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	
	N	577	577	577	577	577	577	577

**. Correlation is significant at the 0.01 level (2-tailed).

Regression Analysis

The influence of pharmaceutical promotional mix on healthcare consultants' prescription behavior is shown in table 4. The model summary is regarding regression that expresses the dependence of pharmaceutical promotion mix on prescribing decision making. In the given regression model R-square refers to co-efficient of determination and is utilized as interpretation in the analysis. The R-square value which is .380 suggests that 38% prescribing decision making is attributed to the pharmaceutical promotion mix. The F-value in the below ANOVA model is 352.096 which represents the fitness of regression. The F-value is also highly significant at level of 1% which shows that the model is good fitted because p-value is smaller than 0.01. The below coefficient model is also one of the part of regression model. It gives summary of regression coefficients. The regression coefficient value which is also called as Beta value for independent variable is 0.463. The value 0.463 shows that 1 unit change in predictor variable i.e. pharmaceutical promotion mix brings 0.463 times change in explained variable i.e. prescribing behavior decision and is highly significant as the t-value is greater than 1.96 i.e. 18.764 and p-value is less than 0.05 i.e. 0.000. It means that promotional promotion affect the behavior of consultant's decision making.

Table 4: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.616[a]	.380	.379	.36270

a. Predictors: (Constant), Promotion

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	46.318	1	46.318	352.096	.000[b]
	Residual	75.641	575	.132		
	Total	121.958	576			

a. Dependent Variable: Prescribing Behavior Decision
b. Predictors: (Constant), Promotion

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.141	.091		23.482	.000
	Promotion	.463	.025	.616	18.764	.000

a. Dependent Variable: Prescribing Behavior Decision

Relationship between Drugs Sample, Promotional Expenditures, Gift Reminder, Academic Detailing, Continuous Medical Education Program, Prescription Sale and Prescribing Behavior Decision

In table 3 model summary, the dependent variable is prescribing decision making of the consultant in pharmaceutical industry and drug sample, promotional expenditure, gift reminder, academic detailing, continuous medical education program and prescription sale are the independent variables. The R-square value which is 0.465 suggests that 46.5% prescribing decision making can be attributed to drug sample, promotional expenditure, gift reminder, academic detailing, continuous medical education program, and prescription sale. The ANOVA table also represents regression analysis. The F-value is 82.666 in the given table that explains the model fitness. It is also highly significant at level of 0.01 which is good and acceptable. The below table presents the individual analysis of independent variables of drug sample, promotional expenditure, gift reminder, academic detailing, continuous medical education program, and prescription sale with the dependent variable prescribing decision making behavior. The coefficient value of 0.524, -0.054, and 0.147 shows that 1 unit change in predictor variable i.e. promotional expenditure, gift reminders, and prescription sale respectively will bring 0.524, -0.054, and 0.147 times change in explained variable i.e. prescribing behavior decision. The table further reveals that there is a statistically significant relationship between variables as evident from t and p values, the t-values is greater than 1.96 and p-value is less than 0.05 at 5% level of significance. The promotional expenditure and prescription sales has positive whereas gifts reminder has negative relationship with prescribing decision making. Moreover, pharmaceutical promotion mix instruments i.e. drugs sample, academic detailing and continuous medical education program are insignificant as the t and p values are less than 1.96 and greater than 0.05 respectively.

Table 3: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.682[a]	.465	.460	.33824

a. Predictors: (Constant), Prescription Sales, Continuous Medical Education Program, Gift Reminders, Drugs Sample, Academic Detailing, Promotional Expenditure

ANOVA[a]					
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	56.746	6	9.458	82.666	.000[b]
	Residual	65.213	570	.114		
	Total	121.958	576			

a. Dependent Variable: Prescribing Behavior Decision
b. Predictors: (Constant), Prescription Sales, Continuous Medical Education Program, Gift Reminders, Drugs Sample, Academic Detailing, Promotional Expenditure

Coefficients[a]					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	1.604	.107		14.954	.000
Drugs Sample	-.002	.018	-.005	-.127	.899
Promotional Expenditure	.524	.072	.655	7.298	.000
Gift Reminders	-.054	.017	-.153	-3.257	.001
Academic Detailing	.017	.033	.026	.519	.604
Continuous Medical Education Program	-.033	.030	-.049	-1.110	.267
Prescription Sales	.147	.024	.219	6.124	.000
a. Dependent Variable: Prescribing Behavior Decision					

Conclusion

The study presents several theoretical insights. First, although pharmaceutical promotional mix instruments influencing healthcare consultant prescribing decision behavior have been widely investigated and there exist an ample amount of discussion regarding pharmaceutical promotional mix influence upon healthcare consultants prescription decision behavior. This study argues that influence of pharmaceutical promotional mix strategy positively and significantly influence healthcare consultants prescribing behavior. The study results reveal that promotional expenditure, gifts reminder and prescription sales are significant, in contrast, drug samples, academic detailing and continuous medical educational program are insignificant. The reason for it may be this as pharmaceutical industry is investing heavily (20 to 40%) of their revenue in their promotional expenditures and most of these expenditures are directed towards healthcare consultants who acts as the decision makers on behalf of their patients (Gagnon &Lexchin, 2008) and (Vogel et al., 2003).

Suggestions for Future Researchers
1. From the results, it can be concluded that although pharmaceutical marketing mix strategy is an important tool for influencing healthcare consultants' prescription decisions. Future research should try to include more factors than marketing strategies such as product quality, placing and other promotion strategies.
2. The current research is limited to measuring the pharmaceutical marketing mix strategy influence upon the healthcare consultants' prescription decision in the North region of Pakistan. Future studies should focus on measuring and comparing the pharmaceutical marketing mix strategy influence upon healthcare consultants serving in other regions of Pakistan as well, such as south region and central region.

References

AfiKayi, E., Atinga, R. a., & Ansa, G. a. "Informational sources on pharmaceutical medicines and factors affecting medication prescriptions: Perspectives from Ghanaian physicians". *Journal of Medical Marketing: Device, Diagnostic and Pharmaceutical Marketing* 2015; 0(0): 1–6.

Al-Areefi, M. A., Hassali, M. A., & Mohamed Ibrahim, M. I. B. "The role of pharmaceutical marketing and other factors in prescribing decisions: the Yemeni experience". *Research in Social & Administrative Pharmacy* 2013;9(6): 981–8.

Al-Shami, A. M., Mohamed Izham, M. I., & Abdo-Rabbo, A. "Evaluation of the quality of prescriptions with antibiotics in the government hospitals of Yemen". *Journal of Clinical and Diagnostic Research* 2011; 5(4): 808–812.

Bradley, F. (2001). Country–company interaction effects and supplier preferences among industrial buyers. *Industrial Marketing Management*, *30*(6), 511-524

Cengiz, E., &Yayla, H. E. (2007). The effect of marketing mix on positive word of mouth communication: Evidence from accounting offices in Turkey. *Innovative Marketing*, *3*(4), 73-86.

Churchill, G.A. and Peter, J.P. (1995). Marketing: Creating Value for Customers, Irwin, Inc. Burr Ridge

Gagnon, M. A., &Lexchin, J. (2008). The cost of pushing pills: a new estimate of pharmaceutical promotion expenditures in the United States. *PLoS medicine*, *5*(1), 29-33.

Gonul, F. F., Carter, F., Petrova, E., & Srinivasan, K. "Promotion of Prescription Drugs and Its Impact on Physicians' Choice". *Journal of Marketing* 2001 July; 65: 79–90.

Joyce, G. F., Carrera, M. P., Goldman, D. P., &Sood, N. "Physician prescribing behavior and its impact on patient- level outcomes". *The American Journal of Managed Care* 2013; 17(12): e462–71.

Kalaskar, P. B., & Sagar, P. N. (2012). Effective Marketing Strategies Makes All the Difference: A Study With Reference To Mankind Pharma. International Journal of Business and Management Tomorrow; 2(4): 1– 7.

Kerak, E., Louhoudi, H., &Ouardouz, M. "Assessment of the quality of the services provided by pharmaceutical representatives : Case of Moroccan delegates from the region of Salé". *International Journal of Innovation and Applied Studies* 2014; 8(2): 451–467.

Kim, W. J., & King, K. W. "Product Category Effects on External Search for Prescription and Nonprescription Drugs". *Journal of Advertising* 2009; 5–20.

Kremer, S. T. M., Bijmolt, T. H. a, Leeflang, P. S. H., &Wieringa, J. E. "Generalizations on the effectiveness of pharmaceutical promotional expenditures". *International Journal of Research in Marketing* 2008; 25: 234–246.

Ladeira W., Dalmoro, M., Eduardo Maehler, A., &Falcão Araujo, C. "Drug prescription practices in Brazil: a structural equation model*". International Journal of Pharmaceutical and Healthcare Marketing* 2011; 5(4): 262–278.

Lucas, P. J., Cabral, C., Hay, A. D., & Horwood, J. "A systematic review of parent and clinician views and perceptions that influence prescribing decisions in relation to acute childhood infections in primary care". *Scandinavian Journal of Primary Health Care* 2015; 33(1): 11–20.

Morgan M A, J Dana, G Loewenstein, S Zinberg, J. S. "Interactions of doctors with the pharmaceutical industry". *J Med Ethics* 2006; 32: 559–563.

Narayanan, S., Desiraju, R., &Chintagunta, P. K. "Return on Investment Implications for Pharmaceutical Promotional Expenditures : The Role of Marketing-Mix Interactions". *Journal of Marketing* 2005 October; 68:90–105.

Nunnally, J.C. (1978) Psychometric Theory, 2nd ed., New York.

Saito, S., Mukohara, K., &Bito, S. "Japanese practicing physicians' relationships with pharmaceutical representatives: A national survey". *PLoS ONE* 2010; 5(8): 1–7.

Salmi, R., Hassali, M., Saleem, F., Alrasheedy, A., Aryani, F., & Godman, B. "Physicians' knowledge, perceptions and behaviour towards antibiotic prescribing : a systematic review of the literature*". Expert Rev. Anti Infect. Ther* 2015; 13(5): 665–680.

Sayandhan, T., Kodithuwakku, S. S., &Gunaratne, L. H. P. (2008). Influence of marketing mix in prescribing pharmaceutical products by ophthalmologists in Sri Lanka.

Spurling, G. K., Mansfield, P. R., Montgomery, B. D., Lexchin, J., Doust, J., Othman, N., & Vitry, A. I. "Information from pharmaceutical companies and the quality, quantity, and cost of physicians' prescribing: A systematic review". *PLoS Medicine* 2010; 7(10).

Theodoron, D. J., Theodoron, S. J., Sartoris, D. J. (2008). An imaging overview of primary tumors of Spine: Part . Benign tumors. Clin Imaging. 32: 196-203

Theodorou, M., Tsiantou, V., Pavlakis, A., Maniadakis, N., Fragoulakis, V., Pavi, E., &Kyriopoulos, J. "Factors influencing prescribing

behaviour of physicians in Greece and Cyprus: results from a questionnaire based survey". *BMC Health Services Research* 2009; 9: 150.

Vancelik, S., Beyhun, N. E., Acemoglu, H., &Calikoglu, O. "Impact of pharmaceutical promotion on prescribing decisions of general practitioners in Eastern Turkey". *BMC Public Health* 2007; 7: 122.

Venkataraman, S., &Stremersch, S. "The Debate on Influencing Doctors' Decisions : Are Drug Characteristics the Missing Link ? Sriram Venkataraman and Stefan Stremersch REPORT SERIES". *Management Science* 2007; 35(11):1688 – 1701

Yoo, B., Donthu, N., & Lee, S. (2000). An examination of selected marketing mix elements and brand equity. *Journal of the academy of marketing science, 28*(2), 195-211.

Zahrani, H. "The impact of pharmaceutical promotions on primary health care physician\s prescribing behaviour in KAMC in central region". *International Journal of Medical Science and Public Health* 2014; 3(3): 355.