Perceptions of Saudi population towards generic drugs use in Saudi Arabia

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Abstract

Purpose: This is a descriptive, cross-sectional study design that aims to test the hypothesis on whether Saudi consumers prefer taking brand over generic drugs and to assess the difficulties that prevent Saudi consumers from shifting to generic drugs. Generic drugs are defined as a substitute to brand drugs to treat illnesses.

Methods: The targeted population was Saudi individuals 18 years and above, and 919 participants were recruited into the study. The study employed a structured questionnaire on paper as well as electronic-based questionnaire forms.

Results: In terms of relative overall effectiveness of generic versus brand drugs, the results showed equal numbers of respondents who prefer brand and who prefer generic. The binomial test was carried out to evaluate the statistical significance of the results. Also, quite high percentages indicated that Saudis could not switch to generic drugs because of two main reasons—namely, Saudis directly asked their doctors for generic drugs, and they felt that doctors did not discuss generic drugs as much as they should with their patients.

Conclusions: Healthcare providers and institutions should take the responsibility in providing more information about generic and brand drugs. Also, there is a need to more effectively communicate with patients in order to increase their level of awareness and clarify the differences between the given drugs.

Keywords: Perceptions, Saudi Population, Saudis, Generic Drugs, Brand Drugs, Saudi Consumers, Saudi Patient, Saudi Arabia

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Introduction

Generic drugs are substitutes for brand drugs to treat illnesses. The use of generic drugs contributes to reducing patient costs and health care budgets. When generic drug products become available, they lower prices of both the brand and other generic drugs [1]. Several definitions have been assigned by different health organizations regarding the term 'generic drug' or 'generic medication'. The World Health Organization (WHO) defines a generic medication as "a pharmaceutical product that is usually intended to be interchangeable with an innovator product and is manufactured without a license from the innovator company and marketed after the expiration date of the patent or other exclusive rights" [2]. The Saudi Food and Drug Administration (SFDA) and the U.S. Food and Drug Administration (FDA) define generic drugs in a similar way. The FDA defines it as "identical -- or bioequivalent -- to a brand name medication in dosage form, safety, strength, route of administration, quality, performance characteristics and intended use" [3]. The SFDA defines a generic medication as "a pharmaceutical product that is interchangeable with an innovator branded product, and is manufactured and marketed without a license from the innovator company after expiration of the medication's patent and other exclusivity rights" [4].

Physicians and pharmacists do not prefer generic drugs. Some patients refuse to accept generic drugs and directly ask for brand drugs. This could be related to studies that have shown improvements in depression and decreases in seizure frequency after utilizing brand drugs compared with generic drugs [5].

The aim of this study is to test the hypothesis that Saudi consumers prefer using brand drugs compared to generic drugs and to assess difficulties preventing them from shifting to generic drugs. The results can be used in the future to optimize health care budgets and distribute more public educational materials regarding generic drug uses.

1   BACKGROUND

A meta-analysis published in 2015 included several studies around the world (U.S., Greece, Spain, New Zealand, Malaysia, Brazil, UK, Ireland, and Turkey) and looked at patients', physicians', and pharmacists' perceptions toward generic drugs. This meta-analysis included 52 cross-sectional, mixed method, or prospective studies. Twenty-nine were classified as high quality, and 23 were classified as acceptable. The sample sizes for the studies ranged from 200 to 5000. The total numbers for lay people, physicians, and pharmacists were 11386, 1414, and 1622, respectively. The result of this meta-analysis showed that almost 35.5% of the general population have negative perceptions toward the effectiveness of generic drugs compared to 28.68% of physicians and 23.6% of pharmacists. On the other hand, 33.39% of pharmacists believe that the quality of generic drugs is

lower than that of brand drugs, which is significantly greater than physicians or the general population (28% and 25%, respectively). Moreover, safety and side effects of generic drugs were a concern for physicians and pharmacists compared to the general population (28.5%, 25.44%, and 17.9%, respectively). The authors concluded that many physicians, pharmacists, and laypeople have concerns regarding efficacy, safety, and quality of generic drugs. Based on the results, acceptance of generic drugs by laypeople is a responsibility of physicians and pharmacists as they are likely to be barriers for acceptance. This meta-analysis may have increased publication bias by including studies that were published and made available through four databases (i.e., MEDLINE, EMBASE, PsycINFO, and Scopus). In addition, they only reviewed studies that were published in English [1].

In Saudi Arabia, there are three available studies regarding perceptions of generic drugs. The first study was published in 2009 and was conducted in central Saudi Arabia in three different sectors (i.e., primary health care centers, governmental hospitals, and private sectors). A total population of 900 physicians were requested to complete the survey, and the total number of completed questionnaires collected was 772 (giving a response rate of 85.8%). The results from the study showed that according to physician knowledge about the price difference between generic and brand drugs, 47% of primary care physicians stated they would probably switch to generic prescriptions compared to 31% hospital physicians and 22% private physicians. The author concluded that there are two factors affecting the decision of physicians to prescribe generic drugs: the influence of the brand name drug companies and the use of drugs with a narrow therapeutic index. However, there are positive attitudes towards generic drugs [7]. The second study was published in 2015 and was conducted in two hospitals in Riyadh—one government hospital and one private hospital (National Guard Health Affairs Hospital (NGHA) and SGH or Saudi German Hospital (SGH) respectively). A total of 231 from 505 physicians were requested to complete the survey, and the total number of filled questionnaires collected was 178 (giving a response rate of 77%). The results showed that 75% of the physicians agreed that they were familiar with the terms "generic medication" and "brand medication," and 43.8% were able to explain therapeutic bioequivalence to patients. 45.5% of physicians stated that medical representatives were their main source of knowledge about local generics. Only 38% of physicians agreed to prescribe local generic drugs compared to 22% of physicians who disagreed. The authors concluded that the main influence toward prescribing local generic medication by physicians was the low level of knowledge about them [8]. These findings were consistent with the meta-analysis regarding physicians' negative perceptions toward the efficacy and safety of generic drugs.

Another study was conducted in Taif city, Saudi Arabia, in 2013 and was published by Taif University Journal, regarding consumers' perception on generic medication. A total of 450 adult participants were interviewed face-to-face in

markets, malls, and hospitals. The questionnaire contained of 2 parts—the first one provided demographic data including gender, age, level of education, income, and occupation, and the second part provided information of consumers' knowledge and beliefs regarding generic drugs. 80% was the response rate, and males aged less than 40 years were dominant. Most respondents held a bachelor degree, and 17% worked in a medical field. 62.7% preferred using brand medicines over generics, and only 34% of respondents accepted generic substitutions done by pharmacists. On the other hand, almost 50% accepted the generic substitution done by pharmacists after receiving doctor confirmation. The authors concluded that although most of respondents held bachelor degrees or higher education, it did not affect their knowledge and beliefs. Some limitations of the study are that it is not generalizable for the Saudi population as it was conducted in one city only [10].

2 RESEARCH DESIGN, QUESTIONS, AND OBJECTIVES OF THE STUDY

This is a descriptive, cross-sectional study design that aims to test the hypothesis that Saudi consumers prefer using brand over generic drugs and to assess difficulties preventing them from shifting to generic drugs. The needed sample size from the population was 400 according to Cohen's sample size estimation. However, the enrolled participants was 919. For data collection, the study employed a self-administered paper-based questionnaire and an online-based questionnaire.

2.1 OBJECTIVES
1.   To test the hypothesis that Saudi consumers prefer using brand drugs compared to generics.
2.   To assess difficulties preventing Saudi consumers from shifting to generic drugs.

3 METHODS

3.1 SAMPLE DESCRIPTION
The study sample included 919 participants who were asked to complete a self-administered questionnaire. Two hundred of them filled out the paper questionnaire, while the rest took it online.

This is a descriptive, cross-sectional study using both self-administered paper- and web-based questionnaires. It was conducted between May and September 2016. The consumers were recruited through direct contacts in public places for the paper-based version and through social media (twitter) announcements via a URL link from Google forms. Ethical approval was obtained from the King Saud University Medical City (KSUMC) prior to the actual study. A pilot test of the

questionnaire was conducted in April concentrating on relevance and comprehensibility.

Adult consumers (aged > 18 years) were invited to participate in the study. Each respondent had the right to refuse participation before or during the conversation and was able to refuse to answer any particular question. The first page of the questionnaire was added to provide general information about generic and brand drugs.

3.2 DATA COLLECTION TOOLS
The questionnaire was adopted from the Shrank et al. study [10] and edited to fit the Saudi community. An expert of the Arabic language and an expert in the medical field audited the questionnaire. The final version of the questionnaire is included as supplemental material.

The questionnaire consists of structured and open questions. It assesses consumers' perceptions toward generic drugs and their general preferences for using generics. Identical questions are repeated to determine perceptions about generics when used to treat long-term management (hypercholesterolemia) or short-term management (acute back pain). The other questions evaluate perceptions of prescription drug costs and the role of government and private insurers in promoting generic drug use. Questions also evaluate consumers' communication with their physicians or pharmacists about generics and their comfort with generic substitution. For demographic information, predictors are assembled to assess factors associated with consumers' perceptions about generic drugs, including sociodemographic characteristics like age, gender, ethnicity, level of income per month, health insurance, level of education, and self-reported health status.

3.3 DATA ANALYSIS
The chi-squared test was used to assess associations between the Saudi demographic data and variables related to their perceptions toward generic drugs. All statistical tests were conducted at significance levels of $p < 0.05$ using two-sided tests by SAS/JMP version 13.0.

For sample size calculation, Cohen's sample size estimation was used with a population effect size (ES) at medium power .80 for an alpha level of .05 with the chi-square (χ^2) test, giving a sample size of 200. Assuming a response rate of 60%, an approximately necessary sample size was 400 [11].

3.4 STATISTICAL ANALYSES ASSUMPTIONS
Relatively few statistical analyses assumptions needed to be made in the analyses of the data. For the most part, the analyses were frequencies and cross-tabulations, and therefore, they were nonparametric in nature and did not require distributional assumptions like normality. The evaluation of the frequency distributions and the cross-classifications was carried out through the typical chi-square methods and

where a Spearman's correlation methodology was used in the case where the chi-square statistic was not meaningful (e.g., with small cell sizes). Also, the binomial test (a nonparametric test) was used where appropriate [12].

4   RESULTS

4.1   UNIVARIATE RESULTS

4.1.1   Background and socio-demographics

Table 1: Paticepents demographic characterstics		
	Frequency	**Percentage %**
Health status		
Excellent	523	57.3
Very good	264	28.9
Good	100	11.0
Fair and poor	26	2.8
Level of education		
Higher education	163	17.8
College graduate	620	67.7
High school or less	130	14.2
Uneducated	3	.3
Age		
< 20 y	36	3.9
20 - 29 y	270	29.4
30 - 39 y	257	28.0
40 - 49 y	227	24.8
50 y +	127	13.8
Gender		
Male	209	22.8
Female	709	77.2
Work Type		
Government employee	437	47.7
Private employee	114	12.4
Do not work	365	39.8
Salary		
5000 SAR or less	252	28.8
6000 - 9000 SAR	123	14.0
10000 - 14000 SAR	233	26.6
15000 - 19000 SAR	139	15.9
20000 SAR or more	129	14.7
Private insurance		
Yes	336	36.7
No	580	63.3
City		
Urban	841	91.8

Rural	75	0.8%
Health care professional		
Yes, I'm a health care professional	152	16.6
No	764	83.4
Questionnaire type		
Paper	218	23.7
Electronic	701	76.3

4.1.2   Summary of preference questions

Table 2: Summary of preference questions with respect to whether there was a clear (and statistically significant) preference between brand and generic

Question	Number towards Brand	Number towards Generic	p-value
Overall favor	118	362	<.0001
Overall effectiveness	276	346	0.0050
Overall safety	87	641	<.0001
Overall less side effects	109	636	<.0001
Overall less costly	82	682	<.0001
Overall value	501	133	<.0001
Saudis should use	316	209	<.0001
Government system	217	347	<.0001
Insurance company role	500	199	<.0001
Government role	519	188	<.0001
Long-term favor	509	169	<.0001
Long-term effectiveness	283	291	0.7384
Long-term less side effects	211	326	<.0001
Long-term less costly	73	656	<.0001
Long-term value	417	145	<.0001
Short-term favor	532	154	<.0001
Short-term effectiveness	273	318	0.0640
Short-term less side effects	198	313	<.0001
Short-term less costly	94	603	<.0001
Short-term value	398	145	<.0001
Ask doctor about generic substitution	522	218	<.0001
Ask pharmacist about generic substitution	482	252	<.0001
Doctor tells about generic substitution	521	173	<.0001

Pharmacist tells generic substitution	347	353	0.8206
Pharmacist change generic substitution	385	310	0.0044

4.1.3   General preference questions

The majority of respondents have an overall preference for generic drugs (more than 50%, 20% neutral). In terms of relative overall effectiveness of generic versus brand drugs, there appears to be equal numbers of respondents who prefer brand and who prefer generic. Also, there is a large number (296 or 32%) who are neutral on this question. Around half of the respondents (419 or 46%) preferred generic over brand in terms of overall safety. For the overall side effects perception, it appears that the majority of respondents believed that brand drugs have more side effects. Almost three-quarters of the participants (74%) have an overall estimation that generic drugs cost less than brand drugs. In terms of the overall value responses to the given question, most of the participants were indifferent, where some tended to favor brand drugs with a total of 282 (30%), 232 (25%), and 269 (29%), respectively.

4.1.4   Saudi population questions on medication use

According to the overall perceptions of Saudis regarding medication use, there tended to be the belief that Saudis spend too much money on prescribed drugs (71%). The majority of the respondents were indifferent when asked if Saudis should use more generic drugs. Most of the participants' responses were indifferent in relation to the government in increasing generic usage among its sectors. The question asked if insurance companies should force their patients to use generic drugs as a first option and only allow the use of brand drugs if the generic medication is not effective. Almost one-third of the participants agreed on prescribing brand instead of generic. Less than one-third of the total respondents agreed with the statement that the government should force patients to use generic as a first option and only allow the use of brand drugs if the generic alternatives are not effective. The majority of respondents (73%) believed that prescribed medication costs are overpriced.

4.1.5   Scenario One - Cholesterol

The majority of respondents (55%) tended to favor brand drugs when given the scenario of having a long-term disease, i.e., high cholesterol. Respondents were indifferent in relation to the effectiveness of brand vs. generic drugs on treating long-term diseases. One-third of respondents were neutral in whether brand or generic drugs have fewer side effects during long-term usage. Approximately two-thirds of respondents (70%) have the belief that generic drugs are less costly in the long term. Respondents tended to be neutral regarding the medication value for treating a long-term disease with generic instead of brand drugs.

4.1.6   Scenario Two – Back pain

About half of the respondents (58%) favored brand drugs over generics for short-term medication use. Respondents were indifferent in relation to effectiveness for treating short-term diseases. More than one-third of respondents (44%) were neutral regarding whether brand or generic drugs have fewer side effects for short-term medication use. Approximately two-thirds of respondents have the belief that generic drugs are less costly in the short term. Respondents tended to be neutral regarding the medication value for a short-term disease with respect to brand or generic drugs.

4.1.7   Compliance given cost

Around 667 (72%) of respondents believed that the cost was not the main cause for noncompliance with drug refills.

4.2   BIVARIATE RESULTS

In the following seven subsections, we examined the bivariate relationships among pairs of variables. Specifically, how the responses to the questions related to evaluating brand vs generic drugs may relate to the responder's self-reported health status and socio-demographic background.

4.2.1   General Perceptions on Overall Quality, Cost, Cost/Quality as well as Demographics and Self-reported health

Table 3: How a responder's overall view on generic versus brand drugs relate to their self-reported health status and socio-demographic status

	Health Status	Education	Age	Gender	Occupation	Income	Private Hospital	Regions	Rural & Urban	Health Practitioner
Overall Favor	NA	NA	0.0044	NS	NS	NS	NS	NA	NS	0.0013
Overall Effectiveness	NA	NA	<0.0001	NS	NS	NS	NS	NS	NS	0.0455
Overall Safety	NA	NA	0.0006	NS	NS	NS	NS	NS	NS	0.0200
Overall Less Side Effects	NA	NA	0.0130	NS	NS	0.0186	NS	NS	NS	0.0031
Overall Less Costly	NA	NA	NS	NS	NS	NS	0.0016	NS	NS	NS
Overall Value	NA	NA	0.0250	NS	NS	NS	NS	NS	NS	NS

If the p-value was greater than 0.05, then the value of "NS" was used. Also, a value of "NA" indicates that the p-value could not be calculated by the number of cells with expected values less than 5 (i.e., indicating that the assumptions of the statistical test could not be met).

From among the bivariate relationships analyzed above, eleven were statistically significant.

1- Age was significantly related to five of the generic/brand questions.
Participants between the ages 20-29 years were more indifferent (and tended to prefer generic) than the other ages. They also disagreed with the statement that generic drugs are less effective than brand drugs. 4 out of the expected 11 participants in the age category 20-29 years responded that they strongly agreed that brand drugs have less side effects than generic drugs.
Those in the age group of 40-49 years agreed with the statement that generic drugs are less effective.
From the 40-49-year age category, 35 participants agreed that generic drugs are safer than brand drugs, i.e., the age group tended to regard brand drugs as safer.

2- Income was significantly related to one of the generic/brand questions.
With a p-value of 0.0186, participants who earned between 10000-14000 SAR per month tended to be more indifferent with respect to the relative side effects of brand versus generic drugs.

3- Private hospitals were significantly related to one of the generic/brand questions.
With a p-value of 0.0016, people who used private hospitals or had health insurance agreed with the statement that generic drugs are less costly than brand drugs. Based on the report, 7 of them strongly preferred brand drugs, while 145 of respondents strongly preferred generic drugs.

4- Health practitioner was related to four of the generic/brand questions.
With a p-value of 0.0013, people who were healthcare practitioners strongly agreed that taking generic drugs is better than taking brand drugs. There tended to be the belief that generic drugs do not have less side effects compared to brand drugs.
Conversely, respondents who were not healthcare practitioners tended to believe that generic drugs are less effective compared to brand drugs.
Respondents who were healthcare practitioners tended to agree with the statement that generic drugs are safer than brand drugs, while non-healthcare-practitioner respondents tended to believe that brand drugs are safer.

Associated with the bivariate tests for which no significance level could be calculated, we proceeded to conduct a nonparametric equivalent, namely, Spearman's rho. None of the above correlations were statistically significant.

4.2.2 Saudi population questions on medication use as well as demographics and self-reported health (table 3)

Table 3: Perceptions of the Saudi population on medication use and how they relate to their self-reported health status and socio-demographic status.

	Health Status	Education	Age	Gender	Occupation	Income	Private Hospital	Regions	Rural & Urban	Health Practitioner
Saudis spend	NA	NA	0.0076	NS	NS	NS	NS	NS	NS	0.0080
Saudis should use	NA	NA	0.0001	0.0296	0.0078	NS	NS	NS	NS	NS
Govt system	NA	NA	0.0003	0.0071	NS	NS	NS	NS	NS	NS
Insurance should	NA	NA	0.0109	NS	NS	NS	NS	NS	NS	NS
Govt should	NA	NA	NS	NS	NS	NS	NS	NS	NS	NS
Med costs	NA	NA	<0.0001	NS	0.0047	NA	NS	NS	NS	NS

1- Age was significantly related to five of the generic/brand questions.
Overall, respondents from a variety of age groups tended to believe that Saudis spend too much money on prescribed drugs. This was the case especially for respondents who were between the ages of 40-49 years.
Overall, the majority of respondents tended to agree that Saudis should use more brand drugs than generics. The exception to this was for the 40-49 age category, where these individuals equally preferred brand or generic drugs.
With a p-value of 0.0003, respondents who were aged 20-29 years tended to be indifferent, and the majority of them disagreed that the government should create polices to increase generic usage in health sectors. Converesely, respondents who were from the age group 40-49 years strongly agreed with the statement that the government should increase the generic usage among health sectors. Overall, the rest of the age groups disagreed with the statement that the government should create policies to increase the generic usage.
Overall, the majority of respondents tended to disagree with the statement that insurance companies should increase generic usage. Most of them were toward brands. That was especially the case for respondents who were aged 50 years and above. However, the age group from 40-49 years did not prefer either brand or generic drugs.

According to prescribed drugs cost it was statistically significant at $p <$ 0.0001, as respondents grew older, they were more likely to believe that prescribed drug costs are too high.

2- Gender was significantly related to two of the generic/brand questions.

With a p-value of 0.0296, the male respondents agreed that Saudis should use more generics, whereas females tended to be indifferent.

With a p-value of 0.0071, the male respondents agreed that the government should increase the use of generic drugs among health sectors, where females tended to be indifferent.

3- Occupation was significantly related to two of the generic/brand questions.

Respondents who worked in a governmental sector strongly agreed that Saudis should use more generic drugs. Conversely, unemployed respondents were indifferent with respect to brand, while those who worked in a private sector preferred brand drugs.

The majority of respondents who were from the governmental sector agreed that the cost of prescribed drugs is too high. The unemployed respondents believed that the cost was too low.

4- Health practitioners were significantly related to one of the generic/brand questions.

Healthcare practitioners were neutral on whether Saudis spend too much on prescribed drugs. Conversely, non-healthcare practitioners believed that Saudis spend too much on prescribed drugs.

Associated with the bivariate tests for which no significance level could be calculated, we proceeded to conduct a nonparametric equivalent, namely, the Spearman's rho (table 4).

Table 4: A Spearman's rank-order correlation was used to determine the relationship between health status and medication costs

	Health Status	Education	Income
Saudis spend	NS	NS	-
Saudis should use	NS	0.0204[-]	-
Govt system	NS	NS	-
Insurance should	NS	NS	-
Govt should	NS	NS	-
Med costs	0.0061[+]	NS	0.0065[+]

There was a very weak positive correlation between health status and medication costs, which was statistically significant (p= 0.0061). That is, as the subject's health status score increased (i.e., a poorer health status), the medication costs tended to increase.

A Spearman's rank-order correlation was used to determine the relationship between education and the belief for whether Saudis should use more generic drugs. There was a very weak negative correlation between education and Saudis recommended usage of more generic drugs, which was statistically significant at 0.0204. That is, as the subject's level of education score increased (i.e., less educated), the more likely the belief that Saudis should use generic drugs.

A Spearman's rank-order correlation was used to determine the relationship between income and medication costs. There was a very weak positive correlation between income and medication costs, which was statistically significant (p= 0.0065).

4.2.3 Scenario 1 (Cholesterol), demographics, and self-reported health (table 5)

Table 5: Relationship of hypothetically hypercholesterolemia (long-term medication use) and their preference of medication for long-term use and how that relates to their self-reported health status and socio-demographic status.

	Health Status	Education	Age	Gender	Occupation	Income	Private Hospital	Regions	Rural & Urban	Health Practitioner
LT favor	NA	NA	0.0003	NS	NS	NS	NS	NS	NS	NS
LT effectiveness	NA	NA	0.0055	NS	NS	NS	NS	NS	NS	NS
LT less side effects	NA	NA	<.0001	0.0391	NS	0.0483	NS	NS	NS	0.0118
LT less costly	NA	NA	0.0023	NS	NS	NS	NS	NS	NS	NS
LT value	NA	NA	0.0012	0.0108	NS	NS	NS	NS	NS	0.0413

Among the bivariate relationships analyzed above, ten were statistically significant.

1- Age was significantly related to five of the generic/brand questions.
Overall, with a p-value of 0.0003, the majority of the respondents tended to favor brand drugs over generic drugs.
Most of the respondents from different age groups agreed that generic drugs are less effective compared to brand drugs for long-term usage. This

was especially true for respondents who were aged 19 years and below and 40 years and above.

The majority of the respondents disagreed with the statement that generic drugs have more side effects compared to brand drugs, but that was not the case for respondents who were aged 20-29 years and 50 years and above. Instead, they agreed with the statement with higher percentages compared to the rest of the groups at a p-value <.0001.

Overall, the majority of the respondents agreed that generic drugs are less expensive than brand drugs, except for some of the respondents aged 40 years and above who tended to agree that brand drugs are less expensive.

2- Gender was significantly related to two of the generic/brand questions.

With a p-value of 0.0391, male respondents tended to believe that generic drugs have less side effects compared to brand drugs for long-term usage. Conversely, female respondents tended to believe that brand drugs have less side effects.

Overall, the majority of respondents tended to be indifferent in whether generic drugs have better value than brand drugs for treating long-term illnesses.

3- Income was significantly related to one of the generic/brand questions.

Overall, the majority of the respondents tended to believe that generic drugs have more side effects than brand drugs, especially for participants who earned 20000 SAR or more.

4- Health practitioners were significantly related to two of the generic/brand questions.

With a p-value of 0.0118, both non-healthcare practitioners and healthcare practitioners tended to strongly agree that generic drugs have more side effects than brand drugs for treating long-term diseases.

Since no significance could be calculated with the bivariate tests we proceeded to conduct a nonparametric equivalent, namely, the Spearman's rho. None of the correlations were statistically significant.

4.2.4 Scenario 2 (Back pain), demographics and self-reported health (table 6)

Table 6: Relationship of hypothetical scenario of back pain (short-term medication use) and respondents' preference of medication for short-term use and how it relates to their self-reported health status and socio-demographic status.

	Health Status	Education	Age	Gender	Occupation	Income	Private Hospital	Regions	Rural & Urban	Health Practitioner
ST favor	NA	NA	0.0021	0.0039	NS	NS	NS	NS	NS	0.0018
ST effectiveness	NA	NA	NS	0.0384	0.0298	NS	NS	NS	NS	0.0007

ST less side effects	NA	NA	0.0135	NS	NS	NS	NS	NS	NS	<0.0001
ST less costly	NA	NA	0.0472	NS	0.0329	NS	NS	NS	NS	NS
ST value	NA	NA	<0.0001	0.0003	0.0017	NS	NS	NS	NS	NS

Among the bivariate relationships analyzed above, thirteen were statistically significant.

1- Age was significantly related to four of the generic/brand questions.
   The majority of the respondents tended to agree that they used brand over generic drugs, and this was especially true for respondents who were aged 40-49 years.
   Overall, most of the age groups tended to believe that brand drugs have more side effects than generic drugs, especially for respondents who were aged 50 and above.
   With a p-value of 0.0472, the majority of the respondents tended to agree with the statement that generic drugs are less costly than brand drugs, except for those who were aged 50 and above.
   With a p-value of <.0001, most of the age groups tended to believe that brand drugs have a better value compared to generic alternatives, except for respondents who were 19 years or younger, who strongly agreed with the statement that generic drugs are a better value.

2- Gender was significantly related to three of the generic/brand questions.
   With a p-value of 0.0039, male respondents tended to prefer taking brand drugs over generic alternatives, whereas females were indifferent.
   Both male and female respondents tended to agree that generic drugs are less effective than their brand counterparts. This was especially the case for males.
   The majority of male respondents agreed that brand drugs are a better value than generic alternatives, while female respondents were indifferent.

3- Occupation was significantly related to three of the generic/brand questions.
   Respondents who were working in a governmental sector tended to believe that generic drugs are less effective compared to their brand counterparts. Those who worked in a private sector were indifferent, and unemployed respondents were mostly indifferent.
   Respondents who were working in a governmental sector tended to believe that brand drugs are less expensive compared to generics. For those who worked in a private sector, they were indifferent, while unemployed respondents were mostly indifferent.
   Respondents who were working in a governmental sector tended to be indifferent regarding whether generic drugs have better value than brand alternatives. For those who worked in a private sector, they tended to

believe that brand drugs are a better value. Conversely, unemployed respondents believed that generic drugs were a better value compared to brand alternatives.

4- Health practitioners were significantly related to three of the generic/brand questions.

Respondents who were healthcare practitioners tended to be indifferent with respect to whether they favored generic drugs, while non-healthcare practitioners tended to prefer brand drugs over generic alternatives.

Respondents who were healthcare practitioners strongly agreed that brand drugs are less effective than generics based on short-term medication usage. Non-healthcare practitioners believed that generics were less effective compared to brand drugs.

Respondents who were healthcare practitioners strongly agreed that generic drugs have more side effects for short-term medication usage compared to brand. However, non-healthcare practitioners believed that brand drugs have more side effects compared to generics.

A Spearman's rank-order correlation was used to determine the relationship between the health status and the value of generic drugs in the short term. There was a very weak negative correlation between health status and the value of generic drugs in the short term, which was statistically significant at 0.0463. That is, as the subject's health status score increased (i.e., poorer health status), the value of generic drugs in the short term tended to decrease.

4.2.5 Confronting provider on choices, demographics and self-reported health (table 7)

Table 7: How respondents confront providers on medication availability choices and how that relates to their self-reported health status and socio-demographic status.

	Health Status	Education	Age	Gender	Occupation	Income	Private Hospital	Regions	Rural & Urban	Health Practitioner
Ask doctor	NA	NA	NS	0.0002	NS	NS	NS	NA	NS	NS
Ask pharm	NA	NA	NS	0.0014	NS	NS	0.0323	NA	0.0228	NS
Doctor tells	NA	NA	NS	0.0068	NS	NS	NS	NA	NS	NS
Pharm tells	NA	NA	0.0332	0.065	NS	NS	NS	NS	NS	NS
Community and I agree	NA	NA	0.0328	NS	NS	NS	NS	NS	0.0104	NS

From among the bivariate relationships analyzed above, nine were statistically significant.

1- Age was significantly related to two of the generic/brand questions.
   Most participants aged 50 years and above agreed more with their healthcare, while the rest of the age groups tended to confront their providers regarding the choice of brand or generic drugs.
   The 50-years-old and above category strongly agreed with the societal prospective about using generic drugs, while younger age groups were more likely to disagree.
2- Gender was significantly related to four of the generic/brand questions.
   According to the question that asked whether respondents asked their doctor about the availability of generic drugs, male respondents agreed on brand drugs, while females were more likely to be indifferent.
   Male respondents agreed on brand drugs, while female strongly agreed with generic.
3- Private insurance was significantly related to one of the generic/brand questions.
   With a p-value of 0.0323, respondents who had private health insurance tended to ask their pharmacists about the availability of brand drugs more than those who did not have private health insurance.
4- Rural and urban residences were significantly related to two of the generic/brand questions.
   Participants who were living in urban areas tended to ask their pharmacists about brand drug availability. Those who were living in rural areas were more likely to ask their pharmacists about generic drugs.
   Participants who lived in urban areas were indifferent regarding agreeing on generic drugs with their society. However, the opinion of participants from rural areas strongly agreed with the society on the use of generic drugs.

4.2.6 Acceptance of provider choices, demographics and self-reported health (table 8)

Table 8: How respondents are willing to accept provider choices of brand or generic drugs and how that relates to their self-reported health status and socio-demographic status.

	Health Status	Education	Age	Gender	Occupation	Income	Private Hospital	Regions	Rural & Urban	Health Practitioner
Doctor comfort	NA	NA	NS	NS	NS	NS	NS	NA	NS	0.0011
pharm comfo	NA	NA	0.0454	NS	NS	NS	NS	NS	NS	0.0167

rt									
Pharm chang e	NA	NA	0.0010	NS	NS	NS	NS	NS	NS	0.0002

1- Age was significantly related to two of the generic/brand questions.

As participants' age increased, they were more likely to trust their pharmacist, except for those aged 50 years and above.
Overall, the majority of the respondents from different age groups tended to disagree with the pharmacist if they were to switch their medication from generic to brand.

2- Health practitioners were significantly related to three of the generic/brand questions.

Healthcare practitioner respondents were not comfortable asking their doctor to substitute generic drugs for brand alternatives and vice versa.
Non-healthcare practitioner respondents were not comfortable asking their pharmacist to substitute generic over brand drugs and vice versa.
Healthcare practitioner respondents tended to disagree with the pharmacist switching their medication from generic to brand, while non-healthcare practitioners agreed.

A Spearman's rank-order correlation was used to determine the relationship between education and the acceptance of the doctor for substituting generic for brand drugs. There was a very weak positive correlation that was statistically significant at 0.0324. That is, as the subject's level of education score increased (i.e., less educated), the acceptance of the doctor for substituting generic for brand tended to increase.
There was a very weak positive correlation between education and the acceptance of the pharmacist for substituting generic for brand, which was statistically significant at 0.0226. That is, as the subject's level of education score increased (i.e., less educated), the acceptance of the pharmacist substituting generic for brand tended to increase.

4.2.7 Compliance given cost, demographics and self-reported health (table 9)

Table 9: Compliance of respondents to a given cost of prescription and how that relates to their self-reported health status and socio-demographic status

Health Status	Education	Age	Gender	Occupation	Income	Private Hospital	Regions	Rural & Urban	Health Practitioner

Noncomplia nce reason	0.00 18	NA	0.01 44	NS	NS	0.002 9	NS	NS	NS	NS

1- Health status was significantly related to one of the generic/brand questions.

Respondents who had a good health status did not refill their drugs because it was too costly. However, respondents who had an excellent health status believed that the cost was not the main reason for discontinuing their drugs.
2- Age was significantly related to one of the generic/brand questions.
The majority of the respondents answered that they did not refill their drugs because of the cost; most of them actually believed that the drugs were not overpriced but had different reasons for their discontinuation. Except for respondents who were under the age of 40-49 years, it appears that they did not refill their drugs because the costs were too high.
3- Private insurance was significantly related to one of the generic/brand questions.
Respondents who had a lower income did not have their medication refilled because it was too costly for them.

5   DISCUSSION

This national study revealed that, overall, more Saudis favor generic drugs. However, from the other 24 items, of which 21 are significant, most of the significant items (specifically twelve items) were such that Saudi preferred brand over generic drugs (e.g., overall value, Saudis should use brand, insurance should cover). This conclusion supports the first objective of the study, namely, to understand whether Saudis prefer brand over generic drugs. This result is consistent with the study result of *Albarraq* [10]. The main challenging obstacles against shifting to generic drugs was that nearly 40% of the respondents were not able to confront their doctors regarding prescribed medication and ask for generic alternatives. In addition, approximately 35% of respondents felt that doctors should talk more about generic drugs. Overall, healthcare providers and institutions should have the responsibility to provide more information about generic and brand alternatives. Also, there is a need to communicate more with the patients to increase their levels of awareness and to clarify the difference between them.
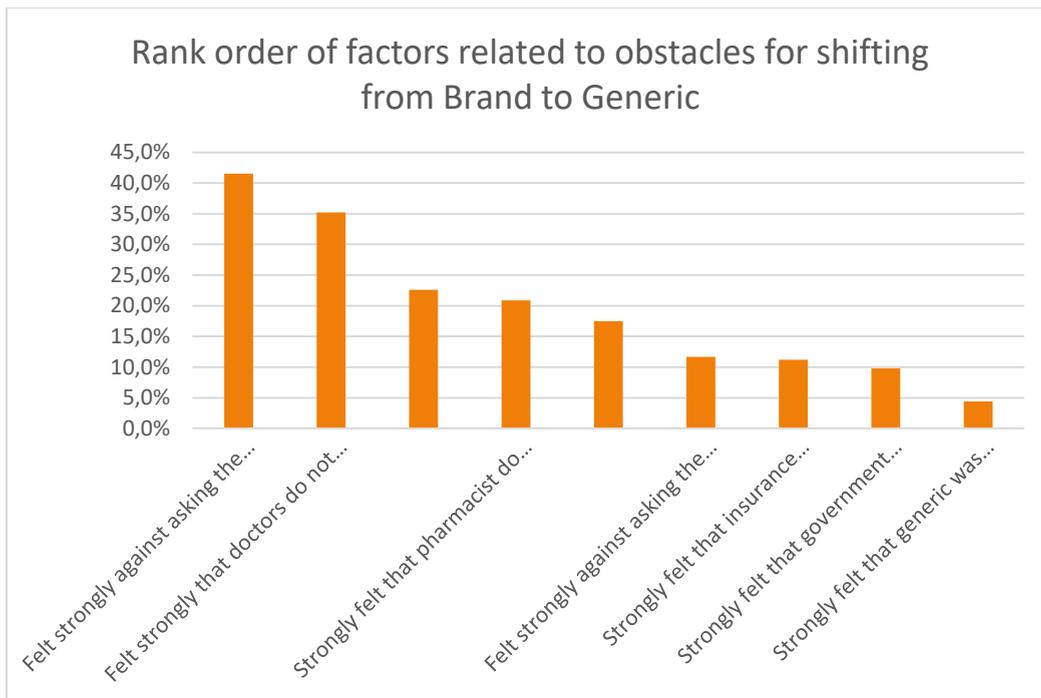
Figure 1: The following figure illustrates the difficulties faced by participants in shifting to generic with the ranking from the most observable issues to the least along with the respective percentages

Regarding the age and preferences, increased age was correlated with preferences for brand drugs, as the older participants (mainly, the age group of 40-49 years) agreed with the statement that generic drugs are less effective. This result is also consistent with the results of *Albarraq* and *Heikkilä R et al.* [10}{13]. Moreover, according to the overall perceptions of Saudis' patterns of medication use, there tended to be the belief that Saudis spend too much on prescribed drugs, although the majority of the respondents were indifferent when asked if Saudis should use more generic drugs. However, less than one-third of the total respondents agreed with the statement that the "government should force the patients on using generic as a first option and only use brand if the generic is not effective." Also, more than one-third of the participants agreed on prescribing brand drugs instead of generics. The same result was found with the statement "insurance companies should force its patients on using generic as a first option and only use brand if the generic is not effective". These two results should alert insurance companies and policymakers to increase education and rebranding of generic drugs to gain more acceptance.

5.1   STUDY STRENGTHS AND LIMITATIONS
This study has several limitations related to survey studies. First, data were collected using paper and electronic forms. Therefore, it is difficult to determine whether participants fully understand terminology and scenarios. Second, social

desirability response bias cannot be eliminated. Some of the major strengths of the study include its relatively large sample size and the variety of geographic locations represented around Saudi Arabia. In addition, the preliminary findings of this study provide prompts for future research.

6   CONCLUSION

To conclude, Saudi consumers preferred taking brand over generic drugs. Quite high percentages indicated that Saudis could not switch to generic drugs due to two main reasons, namely, Saudis were confronting their doctors and asking for generic drugs, and Saudis felt that doctors did not usually talk about generic drugs as much as they should. Hence, healthcare providers and institutions should take the responsibility to provide more information about generic and brand alternatives. Also, there is a need to communicate more with patients in order to increase their levels of awareness and clarify the differences between the given drugs.

7   ACKNOWLEDGEMENT

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