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RESEARCH ARTICLE

Final year pharmacy students' knowledge and perceptions towards generic medicines: A survey-based pilot study from Eastern province, Saudi Arabia

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Abstract

Objective: A prospective cross-sectional survey-based pilot study was conducted amongst final year pharmacy students at a private pharmacy college in Eastern Province, Saudi Arabia, to evaluate the knowledge and perception toward generic medicines. **Methods:** This online survey-based study was carried out amongst all final year students enrolled in the pharmacy programme between 1 February and 30 April 2020. **Results:** The response rate was 95.56%. Most participants (66.27%) agreed that generic products are therapeutically equivalent to the innovator brand product, and 75.57% reported the need for more information on how bioequivalence tests are conducted for generic medicines. Furthermore, 34.88% agreed that generic medicines are of inferior quality to brand drugs and 73.24% reported the need for more information on the issues pertaining to the safety and efficacy of generic medicines. **Conclusion:** This study showed that fifth-year pharmacy students had a basic knowledge of generic medicines, with an ambivalent perception of generics' quality and safety standards. A number of collaborative initiatives should be planned and executed to equip future pharmacists with broad knowledge concerning generic medications.

Introduction

Increasing healthcare costs are a universal concern, with pharmaceutical expenditures representing a notable figure (Ahmed Awaisu *et al.,* 2014). Global spending on pharmaceuticals reached a staggering amount of USD 1.2 trillion in 2018 and is expected to exceed USD 1.5 trillion by 2023 (IQVIA, 2019).

Several countries have embraced cost-control approaches to decrease pharmaceutical expenses (Alghasham, 2009). Promoting and expanding the use of generic drugs is one of the considered saving strategies without compromising the envisioned healthcare quality (Alghasham, 2009). The successful implementation of such approaches would result in more competitive drug prices in the market and, eventually, cost-effective healthcare would be accessible for more patients. Due to generic utilisation, the United States healthcare system could spare nearly USD 2 trillion from 2009 to 2019, with improved savings per annum. According to World Health Organization (WHO), generic medicines are generally planned to be interchangeable with an innovator product (IQVIA, 2019). Moreover, for the generic medicine to be approved by the Food and Drug Administration (FDA), it must be "bioequivalent" to its brand-name counterpart (FDA, 2019).

Saudi Arabia is the largest spender on healthcare across the Middle East, with over USD 37 billion in 2018, where pharmaceutical expenditure reached USD 8.2 billion (around 22%) of healthcare costs (Alrasheedy *et al.,* 2014; AlKhamees *et al.,* 2018). Implementing a generic medicine framework supporting generic medicines dispensing could generate savings of over USD 2.67 billion in Saudi Arabia (Alrasheedy *et al.,* 2014). Although

a generic medicine substitution policy has been applied in Saudi Arabia since 2005, generic dispensing has accounted for 11.5% of all drug spending (Alrasheedy *et al.,* 2014; AlKhamees *et al.,* 2018).

Despite price differences, many studies have reported doubtful perceptions and misapprehension by patients and healthcare practitioners toward generics related to quality, safety, and efficacy (Hassali *et al.,* 2014; Colgan *et al.,* 2015). However, an increasing number of studies have found that the proper provision of awareness rising for patients and the healthcare provider may help increase confidence and adherence in generic use (Desai *et al.,* 2019). Pharmacists are in a prime position to lead and promote generic substitutions once equipped with appropriate education (Chong *et al.,* 2011; Alrasheedy *et al.,* 2014). Correspondingly, pharmacy students' knowledge and perception toward generic will shape and gauge their future practice in this regard (Alrasheedy *et al.,* 2014). Several studies carried out on future healthcare practitioners, including pharmacy students, have revealed gaps in understanding the concepts of bioequivalence, in addition to mistrust about generic medicines in terms of the quality, safety, and regulatory procedure governing approval of generics in the market (Hassali *et al.,* 2007; James *et al.,* 2014; Jamshed *et al.,* 2015; Othman *et al.,* 2015; Bangalee *et al.,* 2016).

Studies have reported that community pharmacists in Saudi Arabia have expressed doubts and misconceptions about generics and are biased by the physicians' recommendations (Albadr & Khan, 2015; Wajid *et al.,* 2015). Accordingly, the successful implementation of a generic medicines framework will require collaborative initiatives from healthcare and educational systems.

By studying final-year pharmacy students' perspectives, academics and researchers can formulate more efficient interventions to fill in the knowledge gap about generic medicines and encourage future pharmacists to contribute efficiently to generic medicine use. In this regard, this study was carried out as a pilot study to evaluate the knowledge, attitudes, and perceptions of final-year pharmacy students about generic medicines at Mohammed Al-Mana College for Medical Sciences (MACHS).

Methods

Design

A prospective cross-sectional survey-based pilot study was conducted among final-year pharmacy students at Mohammed Al-Mana College for Medical Sciences (MACHS), a private pharmacy college in Eastern province, Saudi Arabia, between 1 February and 30 April 2020.

Study sample

An online survey-based study was conducted at the MACHS among all final-year pharmacy students. MACHS is the leading private healthcare college located in Eastern Province, Saudi Arabia. It is affiliated with the Saudi Arabia Ministry of Education. The estimated enrolment in all courses in 2020 was about 1500 students, out of which nearly 600 students were enrolled in pharmacy at different levels, with about 90 final-year students.

Study tool and validation of the study tool

An 18-item questionnaire was used to attain the objectives of the study. It was divided into four sections distributed as follows: demography (two items, gender and study year), knowledge of equivalent generic medicines (four items), quality, safety, and efficacy of generic medicines versus brands (eight items), and perceptions of generic medicines in the current education system (four items). Except for demography, all the questions were rated on a 5-point Likert scale. Two internal experts (the first author and the corresponding author) from MACHS reviewed the instrument before it was submitted for ethical approval to the Ethics Committee and used for the survey. After approval, the questionnaire was created on Google forms with the help of co-researchers. It was piloted on the authors, and the final checking of responses was done by the first author. After response checking and validation of the questionnaire, the survey link was disseminated to students through official emails. Reminders were sent before closing the survey. Responses received after the survey closure were not included in the study.

Ethical considerations

The study was approved by the Scientific Research Unit (SRU) of MACHS (approval number: SR/RP/26). Furthermore, any information disclosing respondent identity was excluded from the tool. Prior to participation, online consent was also obtained from the respondents who took part in the study.

Statistical analysis

All survey responses were archived and analysed in terms of percentage and frequency using Microsoft Excel 2019. Significance level was also derived by using the Chi-square test. All the values less than 0.05 were considered statistically significant.

Results

Out of the 90 final-year students, 86 participated in the survey, with a response rate of 95.56%. All participants were female (100%). Table I shows knowledge-related statements of equivalent generic medicines. Almost two-thirds of the respondents (66.27%) agreed that all generic products of a particular medicine rated as "generic equivalents" are therapeutically equivalent to the innovator brand product (p<0.05). Similarly, 63.94% of the participants were aware that generic products of a particular medicine rated as "generic equivalents" are therapeutically equivalent to each other (p<0.05). Less than half (47.67 %) of the participants indicated that they were not introduced to bioequivalence issues of generic drugs during their pharmacy education. A high proportion of participants (75.57%) reported the need for more information on how bioequivalence tests are conducted for generic medicines (p<0.05).

Table I: Knowledge of generic equivalent medicine

Statement	SD (n, %)	D (n, %)	N (n, %)	A (n, %)	SA (n, %)	*p*-value
All generic products of a particular medicine that are rated as "generic equivalents" are therapeutically equivalent to the innovator brand product.	3 (3.48)	5(5.81)	21(24.41)	40(46.51)	17(19.76)	<0.05
All generic products of a particular medicine that are rated as "generic equivalents" are therapeutically equivalent to each other.	2(2.32)	8(9.30)	21(24.41)	41(47.67)	14(16.27)	<0.05
I have not been introduced to the issues of bioequivalence for generic drugs during my pharmacy education.	3(3.48)	20(23.25)	22(25.58)	30(34.88)	11(12.79)	<0.05
I need more information on how bioequivalence tests are conducted for generic medicines.	2(2.32)	5(5.81)	14(16.27)	39(45.34)	26(30.23)	<0.05

Note: Total number of pharmacy students (n) =86
SD=strongly disagree, D=disagree, N=neutral, A=agree, and SA=strongly agree

Table II displays the knowledge of participants about the quality, safety, and efficacy of generic medicines versus brand medicines. More than half of the respondents (58.13%) agreed that generic medicine is bioequivalent to a brand medicine. Almost two-thirds (66.27%) of the participant believed that generic medicines must have the same dose as the brand medicine. In response to the quality of generic medicines, 34.88% of the surveyed students assumed that generic medicines are of inferior quality to brand drugs, whereas 26.74% opposed this opinion (p<0.05). When asked about the safety standards, 37.2% of the participants believed that brand medicines are required to meet higher safety standards than generic, while 33.71% disagreed (p<0.05).

More than half (55.81%) of the students did not fall within the opinion that generic medicines are less effective than the originators (p<0.05). When asked if generic medicines produce more side effects than brands, 51.15% did not agree with this statement (p=0.016). Also, 58.13% of the respondents reported that generic medicines are less expensive than brands.

Table II: Quality, safety, and efficacy of generic medicines versus brand name medicines

Statement	SD (n, %)	D (n, %)	N (n, %)	A (n, %)	SA (n, %)	*p*-value
A generic medicine is bioequivalent to a brand name medicine.	4(4.65)	10(11.62)	23(26.74)	34(40.69)	15(17.44)	<0.05
Generic medicine must be in the same dosage form as the brand name medicine. (e.g. tablet, capsule).	9(10.46)	18(20.93)	16(18.60)	29(33.72)	14(16.27)	0.012
Generic medicine must be the same dose as the brand name medicine.	3(3.48)	14(16.27)	12(13.95)	39(45.34)	18(20.93)	0.004
Generic medicines are of inferior quality to branded drugs.	1(1.16)	22(25.58)	33(38.37)	22(25.58)	8(9.30)	<0.05
Generic medicines are less effective than brand name medicines.	12(13.95)	36(41.86)	20(23.25)	10(11.62)	8(9.30)	<0.05
Generic medicines produce more side-effects than brand name medicine.	14(16.27)	30(34.88)	23(26.74)	15(17.44)	4(4.65)	0.016
Generic medicines are less expensive than brand name medicines.	3(3.48)	13(15.11)	20(23.25)	26(30.23)	24(27.90)	0.041
Brand name medicines are required to meet higher safety standards than generic brand.	4(4.65)	25(29.06)	25(29.06)	26(30.23)	6(6.97)	<0.05

Note: Total number of pharmacy students (n) =86
SD=strongly disagree, D=disagree, N=neutral, A=agree, and SA=strongly agree

Table III outlines the perception of students about generic medicines in the current educational system. Most participants (73.24%) reported the need for more information on the issues pertaining to the safety and efficacy of generic medicines (p<0.05). Additionally, 66.27% found it easier to recall therapeutic class using generic names rather than brand names (p<0.05). Around half of the respondents (49.99%) were confident in substituting an innovator brand with a brand generic (p<0.05). Another 63.94% of the surveyed students believed that pharmacy school education covers the topic of cost-effective use of medicines well.

Table III: Perceptions of students about generic medicines in the current educational system

Statement	SD (n, %)	D (n, %)	N (n, %)	A (n, %)	SA (n, %)	*p*-value
I need more information on the issues pertaining to the safety and efficacy of generic medicines.	1(1.16)	4(4.65)	18(20.93)	42(48.83)	21(24.41)	<0.05
From the knowledge I have, I'm confident in substituting an innovator brand with a generic brand.	1(1.16)	13(15.11)	29(33.72)	31(36.04)	12(13.95)	<0.05
I find it easier to recall a medicine's therapeutic class using generic names rather than brand names.	3(3.48)	7(8.13)	19(22.09)	29(33.72)	28(32.55)	<0.05
My pharmacy school education covers the topic of cost-effective use of medicines well.	2(2.32)	9(10.46)	20(23.25)	34(39.53)	21(24.41)	<0.05

Discussion

Pharmacists are the most accessible healthcare practitioners to the community (Ahmed Awaisu *et al.,* 2014). They can play a vital role in reducing healthcare costs, especially medicines, by providing generic substitution (IQVIA, 2019). This study targeted final-year pharmacy students to explore their knowledge and perception toward generics, which could impact their future practice.

Data analysis revealed that more than half of respondents were aware that generic products are therapeutically equivalent and bioequivalent to the innovator brand product. Similar findings have also been reported by undergraduate pharmacy students in Vietnam and Yemen (Alghasham, 2009; FDA, 2019). In contrast, the results of a study conducted in Iraq found that only 33% of participants agreed that generics are bioequivalent to brand medicine (AlKhamees *et al.,* 2014). However, most participants in the present study and similar studies have indicated the necessity to probe bioequivalence tests (AlKhamees *et al.,* 2014; Alrasheedy *et al.,* 2014; FDA, 2019). Probable reasons could be that either the topic is modestly covered during their pharmacy education or the notion of bioavailability and bioequivalence are inadequately understood by the students throughout the course.

Although earlier studies reported negative views toward safety and efficacy of generics, the results of this study do not support this observation as most respondents disagreed that generic products are less effective or cause more side effects than the brand (Alghasham, 2009; AlKhamees *et al.,* 2014; Alrasheedy *et al.,* 2014; FDA, 2019). However, this study substantiates previous findings in the literature, where the majority of respondents reported the need for more information relevant to generics safety and efficacy (Hassali *et al.,* 2014; Colgan *et al.,* 2015).

This study showed a slight discrepancy between the responses of participants regarding the quality and safety standards to be met by generic drugs. This observation reflects gaps in the understanding of the standards and requirements of the pharmaceutical industry, marketing regulations, and drug approval.

Consistent with the results of other studies conducted in Afghanistan (71.4%), Bangladesh (75.7%), Vietnam (77.4%), and Pakistan (79.7%) among students in the medical field, the majority of the surveyed pharmacy students were aware of the fact that generics are available at a lower cost than brand name medicines (Alghasham, 2009). These results correlate favourably with the response of the majority of the participants when asked whether the pharmacy school education covers the topic of cost-effective use of medicine. Consequently, these observations highlighted the impact of pharmacoeconomic undergraduate courses to promote the use of generics, thus reducing health expenditures (Desai *et al.,* 2019).

Limitations

This study has been conducted on a small sample, where the data were only collected from one university and one region of Saudi Arabia using a limited set of questions. Thus, the findings might not be representative of the whole student population. Further research should be carried out to investigate and identify the causes behind students' knowledge and perception. Moreover, implementing a comprehensive collaboration between ministries of education and health is warranted to

initiate a broad scope programme to address and dispel misconceptions related to the safety, efficacy, and quality of generics among future healthcare practitioners. This step mandates the compulsion to review the offered pharmacy curriculum to expand knowledge, regulations, and standards linked to generic drug products.

Conclusion

This study revealed a basic knowledge of generic medicines among fifth-year pharmacy students with an ambivalent perception of generics' quality and safety standards. Several collaborative initiatives should be implemented to equip future pharmacists with broad knowledge concerning generic medications, thus increasing confidence in generic use, overcoming mixed perceptions toward dispensing generics and supporting affordable healthcare.

Conflict of interest

The authors declare no conflict of interest.

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