Original Research

A qualitative assessment of the pediatric content in pharmacy curricula adopted by pharmacy schools in Jordan

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Abstract

Objective: The present study aimed to explore faculty (i.e., professors of various ranks) opinions and views regarding the pediatric content in courses taught to pharmacy students in Jordan.

Methods: Purposeful sampling was used to identify faculty from ten pharmacy schools. Participants were identified through their institutions' websites. After obtaining required approvals, twelve in-depth interviews were conducted, recorded, transcribed and analyzed using NVivo 11 Software. Interviews followed a previously prepared and validated interview guide. The interview guide covered various aspects of pediatric undergraduate education and training.

Results: Twelve professors (eight assistants and four associate professors) agreed to take part in the study. Qualitative analysis revealed four themes each with regard to respondents' knowledge of the pediatric content and their students' competency in dealing with pediatric patients. The emerging themes were: the lack of pediatric content in their current curriculum, the need for exposing students to more courses teaching pediatrics, and future aspirations to deal with this, and implications on practice.

Conclusions: This study highlights the deficiency of pediatric courses in pharmacy curriculum in Jordan. Respondent believed that this will have negative implications on pediatric pharmaceutical care and treatment efficacy and safety. It was thought that adding more pediatrics topics to undergraduate curricula, offering pediatric specialized postgraduate education, and implementing pre-registration training could alleviate the current situation.

Keywords

Child; Education, Pharmacy; Students, Pharmacy; Schools, Pharmacy; Faculty; Curriculum; Pharmaceutical Services; Qualitative Research; Jordan

INTRODUCTION

Pharmacists are trained to provide patient care to all age groups. Pediatric patients (i.e., up to the age of 18 years) can make up to 25% of the patients served by pharmacists.[1,2] This ratio is even higher in developing and low socioeconomic status countries.[3] Pharmacists who work in hospital and community settings have an integral role in pediatric care.[4,5] In these practice settings, pharmacists are required to have sufficient knowledge and training to provide patient care to pediatric patients and ensure medication appropriateness to this age group (e.g., dosage and administration).

Unlike adult patients, pediatrics do not commonly suffer from complicated and chronic diseases. Therefore, children usually require less medicines when compared to adults, leading to a relatively small pediatric market share.[6] Moreover, a few medications have been approved to be used in the pediatric patients due to several ethical issues and parental barriers regarding pediatric clinical trials.[7] This is known as the as unlicensed and 'off-label' medicine use in children.[8,9] Consequently, pharmacists and other healthcare providers usually face difficulties in selecting the appropriate medication, dosage, and route of administration for pediatric patients.[10] Therefore, it is essential to incorporate sufficient pediatric care training and education within the pharmacy curriculum in order to graduate more competent pharmacists to provide care for this age group. Ultimately, this will result in less medication errors and drug related problems for pediatric patients. Evidence from the literature showed that pharmacists had a significant improvement in both confidence and competence in pediatric pharmacotherapy following a pediatric pharmacy education program.[11]

In Jordan, there are 18 pharmacy schools (5 public and 13 private). All pharmacy schools in Jordan offer a bachelor of pharmacy program, while two public schools offer a PharmD program (Table 1).[12] The majority of students in these schools (77.6%) are enrolled in the bachelor of pharmacy program, and the remaining 22.4% are PharmD students.[12] The PharmD program in Jordan has additional therapeutic modules and hospital-based clinical rotations. The curriculums of these programs are routinely reviewed by the Higher Education Accreditation Commission (HEAC). However, the HEAC is not a pharmacy specific accreditation body; it is responsible for reviewing all programs offered by all higher education institutions in Jordan. The HEAC mandates all pharmacy curriculums to have at least 8 credit hours of pharmacotherapy courses with no recommendations to the specific contents for these courses. A previous study conducted in Jordan highlighted

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Table 1. This study interview guide

Number	Discussion Points
1	How many therapeutic courses does your pharmacy curriculum have and how many credit hours does those courses constitute of?
2	Do you teach any specialized therapeutic topics? Do those courses have any content that concentrates on pediatrics?
3	Do you have any elective pediatric courses in your curriculum?
4	Do you offer any pediatric oriented community or clinical training?
5	Do you think that courses supplied in your curriculum lack basic pediatric knowledge?
6	Would this effect the ability of your graduates to deal with pediatric patients?
7	How we overcome this problem (lack of pediatric courses)?

that current pharmacy graduates in Jordan lack basic competencies in pediatric pharmaceutical care.[13]

Thus, the present study aims to explore faculty (i.e., professors of various ranks) opinions and views regarding the pediatric content courses taught to pharmacy students in Jordan, and about ways to increase pharmacy students' experiences and knowledge regarding pharmaceutical care in pediatric patients.

METHODS

Qualitative one-on-one interview sessions were conducted. Purposive sampling was employed whereby websites of all pharmacy schools was searched for faculty involved in teaching patient-care related modules. In this study, we only included ten out of 18 pharmacy schools as the remaining eight schools started accepting students since 2013; therefore, they were excluded from the study as students in those schools were still in the first three years of their pharmacy programs and did not complete therapeutics or patient care courses. Identified faculty were contacted by phone or email and asked to take part in the study. Interviewees were informed that their responses would be anonymized and audio-recorded. To achieve maximum comfort, respondents were offered to do the interview in a place of their choice. Respondents were interviewed either in their work place, a public place of their choice, or over the phone. Written consent to record the interview was obtained and respondents were allowed to see the interview guide before the study begun.

The interview guide was developed based on the study objectives, as well as a review of the literature. Face and content validation were done by experts in qualitative research, and academics involved in undergraduate pharmacy teaching and training, who were not involved in the study. The interview guide covered various aspects of pediatric undergraduate education, including the number of hours dedicated to pediatric content, the number of students involved, the topics addressed, the methods of instruction, and the assignments involved. The guide also covered future plans and programs that could be implemented to increase the pediatric content in undergraduate programs and pediatric experiential education for both PharmD and BSc students. A detailed interview guide is displayed in Table 1.

Interviews took place between November 2016 and May 2017 and were conducted by two authors at a time convenient to the study participants, and were conducted in private to ensure confidentiality. Each session lasted between 30 minutes to one hour, and during the interview, field notes were also taken to capture key points. Participants were also requested to provide some demographic details via email or fill a form designed for this purpose.

Recorded interviews were transcribed verbatim, and de-identified prior to analysis. Results were then imported into QSR International's NVivo 11 Software. All audio recordings and interviewer field notes were also imported into NVivo for comparison and analysis. Thematic analysis was performed on the transcripts by two authors. Discrepancies were resolved by consensus. Quotations by respondents were edited on a limited basis to remove content that did not convey meaning (repeated words, stutters, etc), and to correct for grammar. An ellipsis mark was used to note removal of such extraneous content. Square brackets are used in quotations to supply words omitted by the speaker or to replace sensitive information where names were mentioned. The research protocol was reviewed and approved by the Institutional Review Board at the King Abdulla University Hospital and the Deanship of Research at the Jordan University of Science and Technology (119-2016/ 20160191).

RESULTS

The characteristics of pharmacy schools that took part in the study are shown in Table 2. All ten schools offered Pharmacy BSc programs; two of them offer PharmD programs. A total of twelve professors (eight assistant and four associate professors) took part in the study. One faculty refused to take part in the study and was replaced by another from the same university after consulting with the dean of the school. Of the respondents seven were male and five were between 35 and 40 years of age. Ten respondents taught therapeutics courses, while two taught clinical pharmacokinetics. Of the respondents 3 were responsible for the clinical training of PharmD students to deliver clinical pharmacy service in the hospital. Those were only working at the Jordan University of Science and Technology (n=2) and the University of Jordan (n=1). Other demographic characteristics of respondents are presented in Table 3. Qualitative analysis revealed four themes each with regard to respondents' knowledge of the pediatric content and their students' competency in dealing with pediatric patients. The emerging themes are: the lack of pediatric content in their current curriculum, the need for exposing students to more courses teaching pediatrics, and future aspirations to deal with this, and implications on practice. Emerging themes are summarized and in Table 4.

The first theme was the lack of pediatric content in the undergraduate pharmacy and PharmD curricula. Respondents reported not including any content related to pediatrics in the undergraduate curricula taught to Pharmacy BSc students. Regarding PharmD students, they

Table 2. Information regarding pharmacy schools in Jordan

University Name	Year of Establishment	Program(s) Offered	Governorate	University Type
Jordan University of Science and Technology	1979	PharmD and BSc	Irbid	Public
University of Jordan	1980	PharmD and BSc	Amman	Public
Al-Ahliyya Amman University	1990	BSc	Amman	Private
Applied Science Private University	1991	BSc	Amman	Private
Isra University	1991	BSc	Amman	Private
Philadelphia University	1991	BSc	Balqa	Private
Petra University	1991	BSc	Amman	Private
Al-Zaytoonah University of Jordan	1993	BSc	Amman	Private
American University of Madaba	2011	BSc	Madaba	Private
Zarqa University	2011	BSc	Zarqa	Private
Yarmouk University*	2013	BSc	Irbid	Public
The Hashemite University*	2013	BSc	Zarqa	Public
Mutah University*	2013	BSc	Karak	Public
Middle East University*	2013		Amman	Private
Jadara University*	2015		Irbid	Private
Jerash University*	2015	BSc	Jerash	Private
Aqaba University of Technology*	2015	BSc	Aqaba	Private
Amman Arab University*	2016	BSc	Amman	Private

* Pharmacy schools from these universities were not eligible to take part in this study.

were only given a two credit hour pediatric therapeutics course at the Jordan University of Science and Technology as the undergraduate curriculum for PharmD students included specialized therapeutics courses, however the undergraduate curricula for PharmD students at the University of Jordan did include any concentration on pediatric related topics as the PharmD curricula consisted of four general therapeutics courses only. Respondent went on to indicate that the curricula at all universities do not even offer a pediatric elective course for both Pharmacy and PharmD students. Furthermore, respondents reported that this situation is common in other courses taught at their schools and that all the courses do not cover pediatric related topics.

A sub-theme was the reasons for not covering pediatric related topics. Respondent thought that number of credit hours in both Pharmacy BSc and PharmD curricula adopted by their universities was overwhelming for students and it seemed impossible to add any further hours or courses to the program. Another reason reported by respondents was that the Pharmacy BSc and PharmD programs were general programs and if students were interested in any sub specialty this could be done on a postgraduate education or training basis. Some respondents thought that there were many subspecialties of pharmacy, not only pediatrics, and it is impossible to cover all those specialties in the undergraduate curricula while other respondents thought that pharmacy students should be taught and trained to deal with pediatrics, as more than one third of the population in Jordan are younger than 18 years of age. Those respondents said that medicine students get different training for the major specialties before graduation and the situation should be similar for pharmacy students.

Another sub-theme was concerns regarding the lack of pediatric knowledge. Respondents raised serious concerns and doubted the ability of pharmacy graduates to deal with pediatric patients. Except for PharmD students who get pediatric training during their hospital training, other BSc students could graduate and start working without being exposed to the minimum requirement to deal with pediatric patients. Respondents' concerns were supported by the fact that the community pharmacy training for BSc students does not cover pediatrics specifically, and is considered general community pharmacy training. It was made clear by respondents that fresh graduate do not have enough competencies and are not equipped with the required knowledge nor skill to deal with pediatric patients. Respondents indicated that treating pediatric patients needs extra care, especially that dosing is based on body weight and some formulations are not suitable for this age group as well.

The second theme was the need for exposing students to more pediatrics training and courses. Sub-themes were didactic education and experiential education. Respondents agreed that the study plans adopted at their universities to obtain a pharmacy or PharmD degree did

Table 3. Demographic Characteristics of Respondents (n=12)

Participant ID	Age	Gender	Specialty	Taught Modules	Rank
FS 1	34	Male	Clinical Pharmacy	Pharmacotherapy	Associate Professor
FS 2	34	Female	Clinical Pharmacy	Pharmacotherapy	Associate Professor
FS 3	37	Female	Clinical Pharmacy	Pharmacotherapy	Assistant Professor
FS 4	36	Male	Pharmacology	Pharmacology	Associate Professor
FS 5	41	Male	Clinical Pharmacy	Pharmacotherapy	Assistant Professor
FS 6	35	Female	Pharmacology	Pharmacotherapy	Assistant Professor
FS 7	30	Female	Pharmacology	Pharmacotherapy	Assistant Professor
FS 8	35	Male	Pharmacology	Pharmacotherapy	Assistant Professor
FS 9	42	Female	Clinical Pharmacy	Pharmacotherapy	Assistant Professor
FS 10	40	Male	Pharmacology	Pharmacotherapy	Associate Professor
FS 11	33	Male	Pharmacology	Pharmacology	Assistant Professor
FS 12	33	Male	Clinical Pharmacy	Pharmacotherapy	Assistant Professor

Table 4. Emerging themes and selected quotes

Main themes	Sub-themes	Selected quotes
Lack of pediatric content	Reasons for not covering pediatric related topics	• "The current curriculum is full of basic pharmaceutical sciences. There is no space for specialized material" FS 2 • "We are governed by the local accreditation regulations; this gives us little flexibility to add modules to the curriculum" FS 12 • "Even in therapeutic courses we don't have pediatric coverage, there is no enough time to cover specialized material" FS 9
	Concerns regarding the lack of pediatric knowledge	• "It seems dangerous to let pharmacists practice while they did not come across any pediatric related material, would you allow them to treat your child?" FS 3
The need for exposing students to more pediatrics training and courses	Didactic education	• "The curriculum outcomes should serve the patient population in Jordan. Almost one-third of the country are children" FS 8 • "More pediatric topics should be covered in therapeutic and pharmacokinetic courses. This topic should be included in all relevant material" FS 5
	Experiential education	• "Students should be exposed to more specialized pediatric training during their community pharmacy and hospital training" FS 1 • "I would suggest adding more specialized training hours to the curriculum" FS 4
Future aspirations to deal with this	Amending current curricula to cover more pediatric content	• "The current curricula need review, you can remove a lot of topics and add more pediatric related topics" FS 3 • "We could benefit of having a pediatric elective course, I'm sure many students will be happy with that" FS 5
	Requiring specialized postgraduate education in pediatrics	• "Students interested in pediatrics can pursue a postgraduate degree in that topic" FS 7 • "I would encourage establishing postgraduate degrees in Pediatrics, this should be focused and condensed and allow pharmacist to deliver better pediatric care" FS 1
	Adding a pre-registration period	• "One good solution would be adding a pre-registration year before allowing pharmacists to practice, this will allow them to practice under the supervision of senior colleague and deal with all types of patients" FS 9
The implication of lack of pharmacy pediatric education of practice	Effect on patient safety	• "This will have a negative influence on the rate of drug related problem in the pediatric population" FS 2
	Effect on treatment efficacy	• "…Don't tell me that pharmacists who just graduated are able to calculate effective doses, this is why we end up with instructions like: 5mls twice daily with no regard to patient weight..." FS
	Loss of patient trust in pharmacists	• "How would parents trust pharmacists if they knew this information?" FS 10 • "Will parents allow us to treat their children if they knew this?" FS 12

not have any focus on pediatrics or pediatric related topics. Respondents indicated that plans should be put to develop current teaching plans to include more focus on pediatric related topics. Respondents thought that didactic education is not enough to obtain skills in pediatric pharmacy and care, both community and hospital pharmacy training should have some focus on pediatric related topics. Respondents also thought that adding pediatrics topics should be in a variety of courses per curriculum; for instance, therapeutics, kinetics, and pharmaceutics.

Respondents indicated that a pediatric pharmacy elective course should be offered to students who develop special interest in this specialty. They thought that such students should be given further opportunity to develop their skills and knowledge regarding pediatrics. Furthermore, respondents indicated that current training programs adopted for BSc students have no pediatric or other specialized concentration which leads students to lack pediatric specialized experience. Respondents highlighted the importance of adding pediatric training to pharmacy students training program.

The third theme was future aspirations to deal with this. This theme had three sub-themes: amending current curricula to cover more pediatric content, requiring specialized postgraduate education in pediatrics, and adding a pre-registration period that has specialized training before pharmacists were able to practice.

In their suggestions to amend current curricula to cover more pediatric content, respondents highlighted the importance of finding prompt solutions to address the lack of pediatric content in pharmacy curricula. Suggestions covered adding pediatrics elective courses, covering pediatric dosing and recommendations in pharmacology and therapeutic courses, specialized intra curricular pediatric training, specialized pediatric pharmacokinetics courses, and covering more pediatrics topics in pharmaceutical care and pharmacy practice courses.

Respondents highlighted the importance of offering postgraduate pharmacy education that specialize in pediatrics. For instance, one respondent mentioned that the MSc in Clinical Pharmacy offered a pediatric rotation where students are exposed to many pediatric cases in the hospital. This would influence the students practice regarding pediatrics positively. Other respondents suggested offering short postgraduate courses and certificates specialized in pediatrics. The idea behind offering short courses was that it is overwhelming like obtaining a new degree. Respondents indicated that such courses could be offered during work as part of continuous professional development for pharmacists. Respondent suggested that such courses could be supported by employers.

Respondent highlighted that not having a pre-registration period in Jordan has its negative effects on early practice. This practice deficiency would be mostly noticed on topics not covered during pharmacy undergraduate education.

According to respondents, the implementation of a pre-registration period would expose pharmacy recent graduate to topics that were not covered during their education. Respondents indicated that adopting a supervised practice model would help pharmacists gain experience in pediatrics and other topics where they lack knowledge and experience.

The fourth and final theme was the implication of lack of pharmacy pediatric education of practice. Sub-themes were effect on patient safety, effect on treatment efficacy, loss of patient trust in pharmacists. Respondent thought that if pharmacists were allowed to deal with pediatric patients without having a robust base of knowledge covering this topic, this could jeopardize patient safety and put pediatric patients at risk. Respondents reported that pharmacists should give evidence based recommendations to parents when dealing with their children's illness and that this problem could be more serious among pediatrics as pediatric doses are not standardized like doses for adults. Similar thoughts were brought up regarding jeopardizing treatment efficacy in pediatrics. Respondents' thought that if the pharmacist was not able to give correct recommendations, this could not only affect the safety but the efficacy of the treatment. Respondent went further to the fact that if recommended treatments and administration recommendations were not effective and has negative effects this will have negative effects on parental views on the competency of pharmacists treating their children.

DISCUSSION

This study sheds the light on a serious problem that affects pharmacy practice in Jordan. Respondents admitted that except for one PharmD program in Jordan, other PharmD and BSc in pharmacy programs do not cover any topic related to pediatrics. With the lack of pre-registration training programs and continuous professional education programs in Jordan, a pharmacist could start his/her profession having no idea about pediatric treatment options, dosing, and counselling: a situation that needs direct and prompt attention.

This problem is even more serious as 38.6% of the population in Jordan are of pediatrics age.[14] Many Jordanians seek pharmacists as a first port of call for medical and healthcare advice and many pharmacists in Jordan dispense non-prescribed medications directly to patients based on the pharmacist's recommendation or the patients' request.[15] Allowing pharmacists with no or minimal knowledge of pediatrics to work directly after graduation and deal with parents and pediatric patients could put them at risk.

Pharmacists are expected to have at least base-line knowledge in pediatrics. More efforts should be employed to guarantee that pediatrics are prescribed safe and effective medications. This is crucial, specifically when dealing with pediatric medicines that are prescribed in an unlicensed and off-label manner, as it has been reported that such medicines pose three times the risk of harming children compared to labeled medicines used in adults.[8] Studies assessing the role of clinical pharmacists in neonatal intensive care units and pediatric wards showed a significant decrease in drug related problems and prescription errors.[16] It has been further reported that compared to other healthcare team members, pharmacists can deal with pediatric dosing and administration effectively.[17,18] This highlights the need to develop the current adopted curricula to cover more pediatric topics. In the pharmacy curriculum covers a wide range of pediatric related topics and students are trained well regarding this age group before they are allowed to practice.[19] The Accreditation Council for Pharmacy Education state that pharmacy programs should provide a curriculum appropriate to produce general practitioners of pharmacy.[20] To fulfill this, professional pharmacy curricula must include adequate content dedicated to pharmaceutical care of the pediatric patient.

Respondents highlighted the importance of adding pediatric related topics to the current curricula as a first step towards having pharmacists with good pediatric knowledge. This is important, however didactic education regarding pediatric treatments and dosing is not enough. This should be combined with a blend of experiential education programs including simulation pharmacy, community pharmacy training, and hospital pharmacy training. Members of the American College of Clinical Pharmacy Pediatrics Practice and Research Network and the Pediatric Pharmacy Advocacy Group recommendation for faculty who teach pediatric pharmacy to adopt a didactic and experiential teaching.[21] Further liaison between all pharmacy schools in Jordan and the Jordan Pharmacists Association is needed to develop extra-curricular specialized training programs.

Other recommendations included adopting a pre-registration training program where pharmacists are able to train in a work environment before they are fully registered and allowed to deal with patients solely. It is well documented in the literature that adopting pre-registration training programs significantly affects the practice of healthcare professionals positively which enhances patient safety and treatment efficacy.[22] Though respondents highlighted the importance of offering postgraduate pediatric programs, it is still unknown how programs with an academic nature could influence pediatric pharmaceutical care. Respondents also highlighted the importance of adopting continuous professional education programs in Jordan would have positive effects on pharmaceutical care, not only in pediatrics but in all other specialties. Reports indicate that pharmacists attending CPD programs are up to date and have more specialized and cumulative knowledge and experience.[23]

Respondents had true concerns regarding the ability of their graduates to deal with pediatric treatments. Pediatric education should not only be taught as a separate or elective course; it is important to cover pediatric topics in many courses taught to pharmacy students. Pharmacy students should be trained to deal with pediatrics and their parents in pharmacy practice and patient communication courses. Previous studies indicate that health care professionals, in general, fail to communicate with pediatric patients and fail to convey treatment information to their parents.[24-26] Furthermore, dose calculations and

adjustment should be highlighted and covered extensively in pharmacokinetics' courses to make sure that the pharmacists of the future are able to dispense medicines in accurate doses and to minimize dosing errors in children. Pharmacy students should be able to monitor side effects in pediatrics. Previous studies indicate that pharmacists often fail to spot and report adverse drug reactions.[27,28] Further education regarding monitoring side effects and pharmacovigilance in pediatric patients specifically is needed nowadays to optimize the role of future pharmacists regarding pediatric pharmaceutical care.

CONCLUSIONS

This study highlights the deficiency of pediatric specialized courses in pharmacy curriculum adopted by faculty of pharmacy in Jordanian Universities. Respondent thought that this deficiency would have negative implications on pediatric pharmaceutical care and would jeopardize treatment efficacy and safety. It was thought that adding more pediatrics topics to undergraduate curricula, offering pediatric specialized postgraduate education, and implementing pre-registration training could alleviate the current situation. Further research, both qualitative and quantitative should address this issue in the future, which may lead to evidence based solutions for this problem.

CONFLICT OF INTEREST

None to declare.

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