Original article

Evaluating preceptorship during advanced pharmacy practice experiences in Saudi Arabia: A Cross-Sectional Study

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ABSTRACT

Introduction: Doctor of Pharmacy (PharmD) programs offer students' academic coursework and Advanced Pharmacy Practice Experiences (APPEs). APPEs are crucial for students, providing hands-on training in practice settings and enhancing clinical skills and decision-making abilities. Nevertheless, successful APPEs relies mainly on preceptorship. Hence, this study aims to evaluate preceptorship during APPEs in one of the non-major cities in Saudi Arabia.

Method: A Cross-Sectional survey study was conducted among 40 PharmD students at Taibah University's College of Pharmacy which involved two telephone interviews conducted seven months apart. The survey instrument consisted of 46 questions divided into eight sections which covered various aspects such as demographics, clarity of rotation objectives, clinical and communication skills, assessment of the training and learning opportunities, preceptors' feedback and evaluation, interaction with patients, healthcare providers, and preceptors. Descriptive statistics and Cronbach's alpha coefficient were utilized to analyze the collected data and to assess the internal consistency of the multi-item Likert questions.

Results: Preceptors were predominantly male, aged 26–35, with extensive experience in pharmacy practice and mentorship, yet they lacked specialized post-graduate training or education certification. Almost 50% of the preceptors exhibited competence in pharmacotherapy-related science, demonstrated a willingness to teach students and acknowledged the students' knowledge and skills. Furthermore, most of the students reported understanding of the APPEs objectives as the internship progressed. However, only 15% of late rotation participants strongly agreed on the safety of the learning environment, adequate time and regular contact with their preceptors. Starkly, only 3.0% of early rotation students and 6.1% of late rotation students strongly agreed with the improvement of their written and verbal communications.

Conclusion: This study reported a noted decline in perceived learning support and environment safety as the APPEs' year progressed. Feedback and communication skills development were areas of concern, with limited satisfaction reported. The study highlights regional disparities in training quality, emphasizing the need for structured learning experiences and re-evaluation of preceptorship. Future research should aim to better understand the challenges associated with APPEs in non-major cities and rural areas, thereby making significant contributions to the enhancement of the pharmacy profession.

1. Introduction

The discipline of pharmacy has seen substantial transformations in recent decades, mirroring rapid progressions in healthcare and medicine on a global scale. Historically, pharmacists primarily engaged in the act of dispensing and distributing drugs. The job of pharmacists has experienced significant expansion, encompassing direct patient care, health promotion, illness prevention, and medical consultation (Hepler & Strand, 1990). The aforementioned transition calls for a reformation in the field of pharmacy education in order to effectively equip pharmacists with the necessary skills and knowledge to fulfill their evolving roles and responsibilities (Mohiuddin, 2020).

Given the evolving needs and requirements, there has been an international increase in Doctor of Pharmacy (PharmD) programs. These

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programs aim to equip students with the necessary skills and knowledge for a career in pharmacy practice. Typically lasting six years, PharmD programs integrate academic coursework with practical learning experiences (ACPE, 2016). The academic aspect of these programs encompasses a wide range of subjects, including pharmaceutical sciences, pharmacotherapy, pharmacology, and pharmacy practice. Through these programs, students gain expertise in various areas such as drug delivery systems, pharmacokinetics, patient counseling, and medication management (ACPE, 2016; Education, 2022).

A notable aspect of PharmD programs is the inclusion of Advanced Pharmacy Practice Experiences (APPEs). APPEs offer students practical, experiential training in different practice environments such as hospitals, community pharmacies, pharmaceutical marketing experience and ambulatory care clinics (Almarzoky Abuhussain et al., 2021). These opportunities enable students to put their classroom knowledge into practice by engaging in real-life patient care situations. By participating in APPEs, students refine their clinical skills, enhance their professional judgment, and gain valuable hands-on experiences (Tenerelli et al., 2023). APPEs are commonly scheduled in the last year of the PharmD program, offering students the chance to collaborate closely with experienced preceptors and healthcare teams (ACPE, 2016). APPEs play a crucial role in enhancing the clinical competencies and work-readiness of pharmacy graduates (Almarzoky Abuhussain et al., 2021; Hunziker, Fan, Ronald, Deshpande, & Frueh, 2021).

Over the past few decades, pharmacy education in Saudi Arabia has evolved significantly to satisfy the country's ever-changing healthcare service requirements. Early pharmacy programs are a theoretically-based curriculum predominantly aimed to graduate pharmacists skilled in stocking, dispensing, and distributing pharmaceuticals (Alhamoudi & Alnattah, 2018; Aljadhey, Asiri, Albogami, Spratto, & Alshehri, 2017). As the healthcare services became more sophisticated, the need for more clinically oriented pharmacists increased, resulting in significant changes to pharmacy education which has led all pharmacy colleges in Saudi Arabia to shift their 5-years programs to the PharmD six-year programs which intends to graduate pharmacists who are clinically competent and can actively participate in patient care (Alhamoudi & Alnattah, 2018; Alhifany et al., 2020). Nevertheless, the rapid transformation and introduction of the APPEs throughout all of the pharmacy colleges in Saudi Arabia has resulted in the high demand and shortage of qualified, specialized, and competent preceptors (Aljadhey, 2013).

A couple of studies which were conducted solely in Riyadh, reported a positive satisfaction among pharmacy students regarding their APPEs (Al-Arifi, 2018; Almetwazi et al., 2020). While the aforementioned studies provided valuable insights, it is crucial to consider the context in which they were conducted. Both studies were carried out in the capital of Saudi Arabia, which possesses the nation's premier healthcare facilities and practitioners. As such, the findings may not be entirely representative of the experiences and perspectives of pharmacy students in other parts of the country, particularly those in regions with less advanced healthcare infrastructure. Moreover, the previous two studies were carried out using single-time self-administered questionnaires, which further limit the external validity of their results.

Hence, our primary objective of this study is to evaluate students' perception and satisfaction of preceptorship during their APPEs via telephone interviews in a non-major city in Saudi Arabia.

2. Methods and materials

2.1. Study design and population

A Cross-Sectional survey study was conducted among 40 PharmD students at Taibah University's College of Pharmacy to assess their satisfaction with preceptorship during APPEs. The survey was not based on any formal sampling method, but all students were invited to participate in two telephone interviews conducted seven months apart (Time$_1$: Prior to the APPEs) and (Time$_2$: Post APPEs). Prior to the first

interviews, students were informed about the study's purpose and gave their consent. Responses were kept anonymous, and confidentiality was strictly maintained.

All PharmD students at Taibah University's College of Pharmacy were required to participate in clinical rotations for ten months at local hospitals. They could select their preferred site from nine hospitals in Madinah, with six students assigned to hospitals outside the region. Before starting, students attended an orientation lecture to prepare them for the internship program's objectives and goals. For four weeks, each student had to spend eight hours daily at their assigned site.

2.2. Survey instrument and distribution

To create the survey questionnaire, we combined relevant questions from published studies with questions of interest from our research team (Al-Arifi, 2018; Almetwazi et al., 2020; Hyrkäs & Shoemaker, 2007). The surveys were conducted through telephone interviews by our research team, who used a standardized script to ask the survey questions. The collected data were entered into a Microsoft Excel database using a standard collection form. The survey calls for Time$_1$ and Time$_2$ were completed over a four-week period from February to March 2022 for Time$_1$ and from September to October 2022 for Time$_2$.

The survey contained 46 questions divided into eight sections. The sections covered various aspects such as students' demographics (eleven questions), clarity of rotation objectives (two questions), clinical and communication skills (five questions), practice and teaching experiences (five questions), assessment of preceptors' feedback and evaluation (three questions), interaction with patients (two questions), environment (6 questions), students' skills (five questions), and preceptors (seven questions). A six-option scale was provided to respond to each question, including strongly disagree, disagree, neutral, agree, strongly agree, and not applicable. Additionally, the students were asked to share their comments on the overall experience and rate it as excellent, good, fair, or poor.

2.3. Statistical analysis

Prior to the analysis, we made sure that the gathered data was carefully reviewed to ensure its completeness and accuracy. We utilized Statistical Package for the Social Sciences (SPSS) version 27 for data analysis. Descriptive statistics were used to analyze the data, with mean and standard deviations being displayed for continuous variables, while categorical variables were presented in frequencies and percentages. To measure the internal consistency of multi-item Likert questions, we used Cronbach's alpha coefficient. An excellent value is ≥ 0.09, while a value between 0.9 and 0.8 is considered good (Tavakol & Dennick, 2011).

2.4. Ethical approval and consent to participate

All students involved in this study participated voluntarily and were not offered any incentives. Ethical clearance was granted by the research committee at the College of Pharmacy, Taibah University, with the identification number (COPTU-REC-39-20220918), and the study was conducted in accordance with the declaration of Helsinki. Prior to enrollment, participants were given a briefing on the purpose of the study and were required to provide written informed consent. Only those who consented were included in the study.

3. Results

In the present study, Tables 1 and 2 show the participated students demographic attributes and characteristics and their description of their preceptors. Of the 33 student responses, females composed the majority (84.4 %), and greater than half (63.6 %) had interned at over six sites. The preceptors were predominantly males between ages 26 and 35, with many having substantial experience in pharmacy practice and

Table 1
Students demographics.

Questions	N (%)
Gender	
Male	5 (15.2)
Female	28 (84.8)
Number of internship sites	
One site	1 (3.0)
2–4 sites	2 (6.1)
5–6 sites	9 (27.3)
More than 6 sites	21 (63.6)
Degree	
PharmD	33 (100.0)

Table 2
Preceptors' characteristics.

Questions	Early N (%)	Late N (%)
Gender		
Male	27 (81.8)	19 (57.6)
Female	6 (18.2)	14 (42.4)
Age		
20–25		
26–30	2 (18.2)	1 (3.0)
31–35	14 (42.4)	17 (51.52)
36–40	10 (30.3)	10 (30.3)
Older than 40	3 (9.1)	4 (12.1)
Experience as a pharmacist		
Less than 1 year	–	–
1–5 years	4 (12.1)	3 (9.1)
6–10 years	17 (51.5)	13 (39.4)
11 or more years	12 (36.4)	17 (51.5)
Experience as preceptor		
Less than 1 year	1 (3.0)	1 (3.0)
1–5 years	9 (27.3)	9 (27.3)
6–10 years	15 (45.5)	13 (39.4)
11 or more years	8 (24.2)	10 (30.3)
Where did your preceptor obtain his/her degree		
Local university	30 (90.9)	25 (75.8)
Oversea university	3 (9.1)	6 (18.18)
Not sure/Missing		1 (3.0)
Preceptor's education level		
Bpharm	18 (54.5)	10 (30.3)
PharmD	11 (33.3)	18 (54.5)
MSc	4 (12.1)	3 (9.1)
PhD	–	–
Other	–	3 (6.1)
Does your preceptor have advanced/ professional certificate in pharmacy?		
Yes	14 (42.4)	22 (66.7)
No	19 (57.6)	11 (33.3)
Does your preceptor have certificate in teaching and precepting?		
Yes	8 (24.2)	17 (51.5)
No	25 (75.8)	16 (48.5)

mentorship. Notably, these preceptors primarily earned their degrees from national pharmacy colleges, lacking specialized post-graduate training or education certification.

Table 3 shows students' perceptions regarding the clarity and organization of rotation goals. A notable increase was observed in the proportion of students who strongly agreed that goals were explicitly stated,

Table 3
Assessment of clarity of the rotation objectives and goals.

Questions	Early N (%)	Late N (%)	P-value*
The goals, expectations and objectives of the rotation were outlined and/or explained at the beginning of the rotation			
Strongly agree	11 (33.3)	21 (63.6)	0.169
Agree	15 (45.5)	5 (15.2)	
Neutral	0 (0.0)	2 (6.1)	
Disagree	6 (18.2)	4 (12.1)	
Strongly disagree	1 (3.0)	1 (3.0)	
Rotation activities were clear, well organized and structured			
Strongly agree	12 (36.4)	13 (39.4)	0.618
Agree	11 (33.3)	13 (39.4)	
Neutral	7 (21.2)	3 (9.1)	
Disagree	3 (9.1)	3 (9.1)	
Strongly disagree	0 (0.0)	1 (3.0)	

* Wilcoxon signed ranks test.

from 33.3 % in the first rotation to 63.6 % in the latter. The rotation activities were deemed well-structured and organized by 36.4 % and 39.4 % of respondents in the early and late stages of the internship year.

Table 4 shows the evolution of clinical and communication skills among students. The phrase 'Made me feel welcome' strongly resonated with 54.5 % of students at both rotation stages. The study also revealed noteworthy findings about the perception of pharmacy students regarding their internships. Specifically, 36.4 % of students in the early stages of their internships strongly agreed that their preceptors acknowledged their existing knowledge and skills, setting objectives for their future development. This percentage rose to 45.5 % for students in the later stages of their internships. Interestingly, the study also found a

Table 4
Assessment of clinical and communication skills development.

Questions	Early N (%)	Late N (%)	P-value *
Made me feel welcome			
Strongly agree	18 (54.5)	18 (54.5)	0.277
Agree	12 (36.4)	7 (21.2)	
Neutral	1 (3.0)	4 (12.1)	
Disagree	2 (6.1)	3 (9.1)	
Strongly disagree	0 (0.0)	1 (3.0)	
Identified my previous knowledge and skills, and set goals with me for further development			
Strongly agree	12 (36.4)	15 (45.5)	0.541
Agree	11 (33.3)	9 (27.3)	
Neutral	6 (18.2)	7 (21.2)	
Disagree	4 (12.1)	0 (0.0)	
Strongly disagree	0 (0.0)	2 (6.1)	
Had a good knowledge of the clinical, environmental, and patient/client needs			
Strongly agree	22 (66.7)	18 (54.5)	0.379
Agree	8 (24.2)	11 (33.3)	
Neutral	2 (6.1)	3 (9.1)	
Disagree	1 (3.0)	0 (0.0)	
Strongly disagree	0 (0.0)	1 (3.0)	
Was approachable and communicated clearly			
Strongly agree	16 (48.5)	19 (57.6)	0.946
Agree	12 (36.4)	7 (21.2)	
Neutral	3 (9.1)	4 (12.1)	
Disagree	2 (6.1)	2 (6.1)	
Strongly disagree	0 (0.0)	1 (3.0)	
Assisted me in identifying others that could support my learning			
Strongly agree	12 (36.4)	14 (42.4)	0.791
Agree	11 (33.3)	8 (24.2)	
Neutral	8 (24.2)	7 (21.2)	
Disagree	2 (6.1)	2 (6.1)	
Strongly disagree	0 (0.0)	2 (6.1)	

* Wilcoxon signed ranks test.

shift in perception regarding students' understanding of the clinical environment and patient needs as the internship progressed. A notable 66.7 % of early rotation participants strongly agreed that they had a clear comprehension of these aspects. However, this figure decreased to 54.5 % for those in the late rotation stage of the internship year.

Table 5 shows students' experiences during the early and late phases of the internship year, focusing on preceptors' willingness train and teach. Most participants from both phases strongly agreed on several key areas. Specifically, 60.6 % (early) and 51.5 % (late) participants strongly agreed that preceptors exhibited competence in pharmacotherapy-related science. Additionally, 51.5 % (early) and 45.5 % (late) participants agreed that preceptors demonstrated a willingness to teach students. Furthermore, 54.5 % (early) and 48.5 % (late) participants strongly agreed that preceptors professionally demonstrated practice and patient care. However, only 15.2 % of late rotation participants strongly agreed on the safety of the learning environment, in contrast to 48.5 % of early rotation in the internship year.

Table 6a and 6b show students' perspectives of preceptors regarding time spent, contact maintained, and evaluation methods. While 30.3 % of early rotation participants strongly agreed that adequate time and regular contact were ensured, only 15.2 % of late rotation participants reported this sentiment. On the other hand, feedback and evaluation methods were viewed similarly by both early and late rotation participants, with 24.2 % of early rotation and 27.3 % of late rotation participants strongly agreeing that these methods were effective. Table 7 shows the progression of students' skills during their internship. Regarding verbal communication, both early and late rotation students displayed 36.4 % strong agreement on improving their skills. Clinical skills enhancement among students in late rotation saw a leap to 36.4 %

Table 5
Students' training and learning experiences.

Questions	Early N (%)	Late N (%)	P-value*
Demonstrated competence in pharmacotherapy-related science			
Strongly agree	20 (60.6)	17(51.5)	0.524
Agree	8 (24.2)	8(24.2)	
Neutral	2 (6.1)	7(21.2)	
Disagree	3 (9.1)	1(3.0)	
Strongly disagree	–	–	
Had willingness to precept and teach students			
Strongly agree	17 (51.5)	15(45.5)	0.429
Agree	13(39.4)	12(36.4)	
Neutral	1 (3.0)	4 (12.1)	
Disagree	2 (6.1)	2(6.1)	
Strongly disagree			
Used effective clinical teaching skills (for example, brought my attention to interesting patient cases)			
Strongly agree	13(39.4)	16(48.5)	0.581
Agree	11 (33.3)	11(33.3)	
Neutral	7 (21.2)	1(3.0)	
Disagree	2(6.1)	1 (3.0)	
Strongly disagree	0(0.0)	2(6.1)	
Role-modelled professional practice and patient			
Strongly agree	18(54.5)	16(48.5)	0.490
Agree	8(24.2)	8(24.2)	
Neutral	5(15.2)	7(21.2)	
Disagree	2(6.1)	1(3.0)	
Strongly disagree	0 (0.0)	1(3.0)	
Provided a safe learning environment/ relationship			
Strongly agree	16(48.5)	5(15.2)	0.372
Agree	12(36.4)	17(51.5)	
Neutral	1(3.0)	8(24.2)	
Disagree	4(12.1)	1 (3.0)	
Strongly disagree	0(0.0)	2(6.1)	

* Wilcoxon signed ranks test.

Table 6a
Assessment of preceptors' knowledge, feedback and evaluation.

Questions	Early N (%)	Late N (%)	P-value*
Spending sufficient time with students and regularly maintain contact with them			
Strongly agree	10(30.3)	5(15.2)	0.591
Agree	14(42.4)	17(51.5)	
Neutral	4(12.1)	8(24.2)	
Disagree	5 (15.2)	1(3.0)	
Strongly disagree	0(0.0)	2(6.1)	
Evaluated my knowledge, skills, and understanding by seeking feedback and participation			
Strongly agree	8(24.2)	9(27.3)	0.879
Agree	13(39.4)	14(42.4)	
Neutral	5(15.2)	6 (18.2)	
Disagree	7(21.2)	6(18.2)	
Strongly disagree	0 (0.0)	2(6.1)	
Offered regular, specific, and constructive feedback (mid-point and final evaluation)			
Strongly agree	7(21.2)	9(27.3)	0.381
Agree	7(21.2)	10(30.3)	
Neutral	10(30.3)	5(15.2)	
Disagree	8(24.2)	7(21.2)	
Strongly disagree	1(3.0)	2 (6.1)	

* Wilcoxon Signed Ranks Test.

strongly agreeing, starkly more than 12.1 % in early rotations. Written communication improvement showed the least consensus, with only 3.0 % of early rotation students and 6.1 % of late rotation students strongly agreeing. However, most from both internship phases agreed (54.5 % early phase, 57.6 % late phase) on applying previously learned material and believed the experience would make them better pharmacists.

Table 8 shows students' perceptions of their preceptors in both early and late rotations of the internship year. Approximately 72.7 % and 69.7 % of early and late rotation students agreed that their preceptor showed interest in teaching despite challenges like a heavy workload. The study found that 57.6 % of early rotation students strongly felt their preceptor related to them as individuals or colleagues, significantly more than the 33.3 % in the late rotation. The preceptors' adaptability to a diverse student population had a significant difference in perception between early and late rotations. Lastly, only 27.3 % of early rotation and 39.4 % of late rotation students agreed that they were encouraged to engage in hospital-related projects.

4. Discussion

To the best of our knowledge, this study is the first study to evaluate the perception of pharmacy students regarding preceptorship during APPEs in the Madinah region, a non-major city of Saudi Arabia. The evaluation is crucial for enhancing the efficacy of the training program, which in turn has the potential to enhance the quality of the healthcare system and services in the region. The present study employed a cross-sectional survey study to investigate the perspectives and experiences of 33 PharmD students enrolled at Taibah University's College of Pharmacy during APPEs. Specifically, the study focused on the process of preceptorship during APPEs throughout the internship year.

The results of the study reveal a relatively small percentage of students (about 40 %) who expressed high agreement on the explicit explanation of rotation goals and the organization of the rotation which is comparable to the results reported by Almetwazi et al, specifically in relation to preceptors working in a community pharmacy environment (Almetwazi et al., 2020). Additionally, a notable consistency was observed between our results and the findings of Al-Arifi's study in relation to students who reported feeling welcome in their rotation sites, students' perspectives on preceptors' assessment of their existing knowledge and skills, as well as the establishment of goals for their future development (Al-Arifi, 2018).

A greater percentage (55 %) of our students expressed significant

Table 6b
Assessment of students' interaction with site environment.

Questions	Early N (%)	Late N (%)	P-value*
I had adequate contact with some patients or their family (providing real patient care) on this rotation to meet the learning objectives			
Strongly agree	5(15.2)	5(15.2)	0.703
Agree	6(18.2)	6(18.2)	
Neutral	8(24.2)	7(21.2)	
Disagree	13(39.4)	12(36.4)	
Strongly disagree	1(3.0)	3(9.1)	
I had access to necessary patient information			
Strongly agree	11(33.3)	15(45.5)	0.761
Agree	13(39.4)	10(30.3)	
Neutral	7(21.2)	3(9.1)	
Disagree	1(3.0)	4(12.1)	
Strongly disagree	1(3.0)	1(3.0)	
I had access to all necessary reference materials, either hard copy or via electronic means			
Strongly agree	9(27.3)	10(30.3)	0.473
Agree	13(39.4)	14(42.4)	
Neutral	7(21.2)	7(21.2)	
Disagree	4(12.1)	2(6.1)	
Strongly disagree	0(0.0)	0(0.0)	
Students were encouraged to use resource materials (Micromedex, UpToDate,.etc.)			
Strongly agree	14(42.4)	12(36.4)	
Agree	17(51.5)	11(33.3)	0.073
Neutral	0(0.0)	6(18.2)	
Disagree	2(6.1)	3 (9.1)	
Strongly disagree	0(0.0)	1(3.0)	
This rotation provided opportunities to interact with other health care professionals			
Strongly agree	7(21.2)	12(36.4)	0.425
Agree	11(33.3)	7(21.2)	
Neutral	5(15.2)	5(15.2)	
Disagree	9(27.3)	8(24.2)	
Strongly disagree	1(3.0)	1(3.0)	
This rotation provided an environment (physical and philosophical) that facilitated my learning			
Strongly agree	8(24.2)	7(21.2)	0.186
Agree	21(63.6)	17(51.5)	
Neutral	3(9.1)	6(18.2)	
Disagree	1 (3.0)	1 (3.0)	
Strongly disagree	0(0.0)	2 (6.1)	
Others at the rotation site were receptive and willing to interact with me			
Strongly agree	15 (45.5)	11(33.3)	0.626
Agree	12(36.4)	15(45.5)	
Neutral	4 (12.1)	7(21.2)	
Disagree	2(6.1)	0 (0.0)	
Strongly disagree	0 (0.0)	0 (0.0)	
This rotation provided opportunities to document activities in the medical record			
Strongly agree	6(18.2)	1 (3.0)	0.192
Agree	6(18.2)	4(12.1)	
Neutral	3(9.1)	8(24.2)	
Disagree	12(36.4)	17(51.5)	
Strongly disagree	6(18.2)	3(9.1)	

* Wilcoxon signed ranks test.

Table 7
Assessment of students' skills Development.

Questions	Early N (%)	Late N (%)	P-value*
My verbal communication skills were enhanced on this rotation on this rotation			
Strongly agree	12(36.4)	12(36.4)	0.109
Agree	16(48.5)	8(24.2)	
Neutral	4(12.1)	8(24.2)	
Disagree	1(3.0)	4(12.1)	
Strongly disagree	0(0.0)	1(3.0)	
My clinical skills were enhanced on this rotation			
Strongly agree	4(12.1)	12(36.4)	0.267
Agree	18(54.5)	11(33.3)	
Neutral	10(30.3)	8(24.2)	
Disagree	1 (3.0)	1(3.0)	
Strongly disagree	0(0.0)	1(3.0)	
My written communication skills or documentation skills were enhanced on this rotation			
Strongly agree	1(3.0)	2(6.1)	0.078
Agree	5(15.2)	11(33.3)	
Neutral	9 (27.3)	7(21.2)	
Disagree	15(45.5)	12 (36.4)	
Strongly disagree	3(9.1)	1(3.0)	
I was able to apply previously learned materials on this rotation			
Strongly agree	8(24.2)	8(24.2)	0.406
Agree	18(54.5)	19(57.6)	
Neutral	3(9.1)	6(18.2)	
Disagree	4(12.1)	0(0.0)	
Strongly disagree	0(0.0)	0(0.0)	
I believe this experience will help me be a better pharmacist			
Strongly agree	8(24.2)	7(21.2)	0.176
Agree	22(66.7)	19(57.6)	
Neutral	3(9.1)	6 (18.2)	
Disagree	0(0.0)	0(0.0)	
Strongly disagree	0(0.0)	1(3.0)	

* Wilcoxon signed ranks test.

that preceptors had willingness to precept students. In contrast, Almetwazi et al. reported a higher agreement rate of approximately 70 % among their own participants regarding this aspect (Almetwazi et al., 2020). However, this slight variation suggests that there is a need to re-evaluate precepting from the preceptors' perspective which would help us gain a better understanding of the challenges that they may encounter.

Constructive feedback plays a crucial role in the learning process as it aids students in recognizing their strengths and areas that require further improvement (Hall et al., 2019; Medina et al., 2013; Sonthisombat, 2008). Our study illuminates a critical aspect of the preceptor's responsibility, namely the provision of sufficient feedback. Unfortunately, an only 25 % of the participants expressed agreement regarding the sufficiency of evaluation and feedback offered by their preceptors to facilitate their professional development. In contrast to our results, Almetwazi's study revealed that around 90 % of students who received training in community pharmacies in Riyadh, Saudi Arabia reported receiving satisfactory appraisal from their preceptors (Almetwazi et al., 2020).

The students identified limited progress in verbal and written communication skills which was attributed to the restrictions imposed by hospital policies and preceptors to interact with other healthcare providers or to practice drafting their interventions in patient profiles. This underscores the need for more structured learning experiences that would allow students to improve their verbal and writing skills in a relevant, practical context. Regrettably, our study revealed that participants' satisfaction regarding their skills development during the rotations was approximately 50 % lower compared to the satisfaction reported in Almetwazi study (Almetwazi et al., 2020). This significant discrepancy highlights potential areas for improvement in our training

agreement regarding the competence displayed by preceptors in pharmacotherapy-related science, as opposed to the findings reported by Al-Arifi (40 %) (Al-Arifi, 2018). However, our study revealed that participants perceived the training environment to be less supportive to learning as the internship year progressed, with a notable decrease in perceived safety (15.2 % vs 48.5 %, respectively). This phenomenon can be attributed to the fatigue experienced by students towards the conclusion of the academic year.

Almost 50 % of the participants in our study expressed the perception

Table 8
Assessment of students-preceptors relationship.

Questions	Early N (%)	Late N (%)	P-value*
This preceptor is interested in teaching this rotation but had some barriers (busy workflow, ……..etc.)			
Strongly agree	13(39.4)	9(27.3)	0.608
Agree	11(33.3)	14 (42.4)	
Neutral	4(12.1)	5(15.2)	
Disagree	4(12.1)	5 (15.2)	
Strongly disagree	1(3.0)	0(0.0)	
This preceptor related to me as an individual or colleague			
Strongly agree	19(57.6)	11(33.3)	0.037
Agree	8(24.2)	10(30.3)	
Neutral	3(9.1)	8(24.2)	
Disagree	2(6.1)	3(9.1)	
Strongly disagree	1(3.0)	1(3.0)	
This preceptor encouraged students to actively participate in discussions and problem-solving exercises			
Strongly agree	11(33.3)	12(36.4)	0.527
Agree	12 (36.4)	14(42.4)	
Neutral	4(12.1)	3(9.1)	
Disagree	6(18.2)	3(9.1)	
Strongly disagree	0(0.0)	1(3.0)	
This preceptor described their approach to thinking about therapeutic problems			
Strongly agree	7(21.2)	15(45.5)	0.120
Agree	14(42.4)	7(21.2)	
Neutral	7(21.2)	9 (27.3)	
Disagree	5(15.2)	1(3.0)	
Strongly disagree	0(0.0)	1(3.0)	
This preceptor was organized and has good time management			
Strongly agree	12(36.4)	13(39.4)	0.721
Agree	6 (18.2)	7(21.2)	
Neutral	10(30.3)	7(21.2)	
Disagree	4(12.1)	5(15.2)	
Strongly disagree	1(3.0)	1(3.0)	
This preceptor was able to work with a diverse student population			
Strongly agree	19(57.6)	11(33.3)	0.034
Agree	10(30.3)	12(36.4)	
Neutral	3(9.1)	8(24.2)	
Disagree	1 (3.0)	1(3.0)	
Strongly disagree	0(0.0)	1(3.0)	
This preceptor encouraged me to participate in hospital related project (making draft of specific policy…etc.)			
Strongly agree	3(9.1)	7(21.2)	0.278
Agree	6(18.2)	6(18.2)	
Neutral	6(18.2)	5(15.2)	
Disagree	16(48.5)	14(42.4)	
Strongly disagree	2(6.1)	1(3.0)	

* Wilcoxon Signed Ranks Test.

program and the downside of expanding APPEs outside major cities such as Riyadh without ensuring the availability of proper preceptorship.

One of the main strengths of this study is valuable insights it provides into the efficacy of the PharmD APPEs in Madinah, Saudi Arabia, which may manifest regional disparities. Furthermore, the utilization of telephone and/or face-to-face survey interviews twice as the internship year progressed facilitated the acquisition of more comprehensive and elaborate responses from the participants. Nevertheless, the research also possesses limitations such as the limited sample size and exclusively focused on students from a single university, thereby constraining the generalizability of the results. Moreover, the utilization of a cross-sectional design in this study imposes restrictions on its capacity to capture temporal variations. Subsequent investigations that duly acknowledge these aforementioned limitations will contribute to a more thorough understanding of the challenges associated with advanced

pharmacy training, hence potentially facilitating advancements in the pharmacy profession.

5. Conclusion

This study offers a comprehensive evaluation of the PharmD APPEs in Madinah region of Saudi Arabia, unearthing students' perception on clinical rotations, preceptor involvement, and the overall learning experience. A significant portion of students reported a noted decline in perceived learning support and environment safety as the year progressed. Feedback and communication skill development were areas of concern, with limited satisfaction reported. The study highlights regional disparities in training quality, emphasizing the need for structured learning experiences and re-evaluation of preceptorship. Future research should aim to better understand the challenges associated with advanced pharmacy training, thereby making significant contributions to the enhancement of the pharmacy profession.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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