

Medical Students' Attitude towards Physician-Pharmacist Collaboration in Dongola, Northern State, Sudan

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Abstract

Background: Assessing the attitude of collaborative relationship between physicians and pharmacists at the undergraduate level is an important aspect in determining their future collaborative outcome. **Objective:** To assess the attitudes of medical students at University of Dongola towards physician-pharmacist collaboration. **Method:** A cross-sectional descriptive study was conducted in the Faculty of Medicine, University of Dongola. Data was collected via online Google form questionnaire from medical students in their first and last two years. Descriptive and comparative analyses were performed using SPSS, version 26. Mann-Whitney Rank Sum Test was used to analyze the statistical significance at $p < 0.05$. **Results:** Two hundreds and thirty-three students completed the questionnaire with a response rate of 100%. Students expressed relatively positive attitude towards physician-pharmacist collaboration with a total mean score of (mean = 50.2; SD = 4.8). Female students revealed more collaborative attitude (mean = 51.4; SD = 4.4) than their male counterparts (mean = 47.5; SD = 5.2; $p = 0.041$). There was a significant correlation between age and score ($p \leq 0.001$) and those who were ≥ 21 years old revealed more collaborative attitude. There was no significant score difference between students in the first two years and those in the last two years ($p = 0.985$). **Conclusion:** Students expressed relatively positive attitude towards physician-pharmacist collaboration. Besides, female students demonstrated more collaborative attitudes than their male counterparts. The study also revealed the significance of improving this collaborative relationship between physicians and pharmacists.

Keywords

Inter-Professional Collaboration, Attitude of Medical Students, Physicians,

1. Introduction

Interprofessional collaboration is defined by World Health Organization (WHO, 2010) as multiple health workers from different professional backgrounds working together with patients, families, carers (caregivers), and communities to deliver the highest quality of care. Physician and pharmacist collaboration being part of Interprofessional collaboration started long ago and is currently under development. It has gained attraction in primary care as a tool to implement team-based-care models over the past ten years. This resulted in when roles and responsibilities of the pharmacist have changed substantially in recent decades, transitioning from traditional medication to participation in the patient management in today's modern clinical practice.

Several studies have encouraged the need for collaborative practice among different professionals, including between physicians and pharmacists in the healthcare setting (van Winkle et al., 2011). Other studies have shown the significant impact that physician-pharmacist collaborative management can have on patient care like blood pressure control among patients with hypertension (Hwang et al., 2017). It enhances efficiency and effectiveness of service delivery and has been reported that it improves healthcare professional satisfaction and saves money for the health system (Dey et al., 2011). It has also been demonstrated that doctor-pharmacist collaboration improves prescription quality through increased efficiency and safety. Many healthcare authorities are now working on the improving the collaborative relationship between doctors and physicians to improve their healthcare delivery system.

It is important for medical students to have strong attitude towards physician-pharmacist collaboration, since they are the future doctors. It will increase the interprofessional collaborative relationship with their corresponding pharmacists and as a result, the future healthcare outcome will be improved. In fact, one study conducted in Croatia (Seselja-Perisin et al., 2015) suggested medical students as being the primary target group for improving the future collaborative work between physicians and pharmacists.

Several other studies in countries like Kuwait (Katoue et al., 2017), Brazil (Prado et al., 2018), and Indonesia (Setiadi et al., 2017) have evaluated the attitudes of their medical students towards physician pharmacists' collaboration.

The lack of the collaboration between health workers team is also based on the interprofessional educational process. The unprofessional model of health education seems to be the main cause of it.

To our best of knowledge, there is no study conducted in Sudan that assessed this. Generally, medical students of University of Dongola study pharmacology in two successive semesters. They seem to have strong attitude towards physician-pharmacist collaboration. And because of this, the study is designed to as-

sess the attitude of these students towards physician-pharmacist collaboration.

2. Methods

2.1. Study Area

Sudan is located in northeast of Africa, and it has an area of 728,215 mi² (Sudan, 2022). Northern state is one of the largest states in Sudan. University of Dongola is one of the largest public universities in Sudan. The college of medicine at University of Dongola is located in Dongola, Northern state and was established in 1997.

2.2. Study Design

This was cross-sectional descriptive study which was conducted in University of Dongola, faculty of Medicine and Health Science, Dongola, Northern State, Sudan.

2.3. Study Participants

The study population was the medical students at university of Dongola and consisted of two study groups; first and second year students; fifth and sixth year students. Inclusion criteria for the study was any first, second, fifth and sixth year medical student of university of Dongola in the academic year 2022 who agreed to participate in the study. The total number of the study population was provided by the admission office of the college and was 585 students. The calculated sample size from the total population using confidence level of 95%; margin error of $\pm 5\%$; and a proportion of 0.5 was 233 students.

2.4. Data Collection

Data collection was done using a 4-likert scale questionnaire developed from a validated survey instrument designed and used in the United States (van Winkle et al., 2011); (Hojat et al., 2012). The questionnaire was pretested for validity and comprehension before distribution. Several necessary modifications were made to match the research objectives and the final version composed of three sections; demographic, batch group and 16 statements for assessment of students' attitude towards physician-pharmacist collaboration. It was translated into Arabic to make easy for participants to understand and facilitate effective participation. Online Google form was used as a form of distribution.

2.5. Data Analysis

The data was entered into Statistical Package for Social Science (SPSS, version 26), and descriptive and comparative analysis were conducted. Mann-Whitney Rank Sum Test was used to analyze the difference between study groups with significance level of <0.05 . The total study population was 233; 174 female; 59 male; 89 from first two years; 144 from last two years (Table 1) and the response rate was 100%. The descriptive analysis of study population is demonstrated in

Table 2. The mean age of the participants was 22 ± 2.6 years.

2.6. Ethical Approval

The current study received verbal and written approval from the administration of the college and prior to distribution; written consent was taken from all participants.

3. Results

The study sample composed of 233 students with a 100% effective response rate. The mean (SD) and medium (IQR) age of the participants were 22.2 (2.6) and 23 respectively. Three-quarter (75%) of the participants were females. In addition, only a 40% of the study participants were the students of the first two years, whereas the rest (60%) were the last two years students. Other related demographic description is shown in **Table 1**.

Table 1. Demographic characteristics of study participants (n = 233).

Variable	Frequency	Percent % ¹
Sex:		
Female	174	75
Male	58	38
Academic Level:		
First 2 years	89	38
Last 2 years	144	62
Age-group:		
<21 years	83	36
≥21 years	150	64

¹Percentages are rounded to the nearest whole number.

Table 2. Comparative mean score differences between groups (n = 233).

Variable	N	Minimum	Maximum	Mean (SD)	p-value ¹
Sex:					
Female	174	45	64	51.4 (4.4)	0.041
Male	58	38	64	47.5 (5.2)	
Academic Level:					
First 2 years	89	45	64	50.2 (5.1)	0.985
Last 2 years	144	38	64	50.2 (4.3)	
Age-group:					
<21 years	83	40	64	50.2 (5.1)	<0.001
≥21 years	150	42	64	56.4 (4.3)	

¹Mann-Whitney Rank Sum Test is used with significance level of <0.05.

In general, the students expressed strong attitude towards physician-pharmacist collaboration, with a mean score of (mean = 50.2; SD = 4.8). As shown in **Table 3** and **Table 4**, the overall mean scores for each item on the scale ranged from a low of 2.0 (for the reverse-score item of “the primary function of the pharmacist is to fill the physician’s prescription without question”) to a high of 3.6 (for the item “a physician should be viewed as a collaborator and colleague with a pharmacist rather than his or her superior”).

Students of the first two years presented a total mean score of (mean = 50.2; SD = 4.4) which showed no significant difference from that of the last two year students with a score of (mean = 50.2; SD = 5.1; $p = 0.985$). These comparative results are shown in **Table 3**.

Table 3. Mean scores for each item on the scale based on sex differences (n = 233).

Statement	Female Mean (SD)	Male Mean (SD)	Overall Score Mean (SD)
1) A physician should be viewed as a collaborator and colleague with a pharmacist rather than his or her superior	3.7 (0.5)	3.4 (0.5)	3.6 (0.5)
2) Pharmacists are qualified to assess and response to patient’s drug treatment needs	2.9 (0.6)	2.6 (0.8)	2.8 (0.7)
3) During their education, pharmacy and medical students should be involved in teamwork in order to understand their respective roles	3.4 (0.5)	3.3 (0.5)	3.4 (0.5)
4) Pharmacists should be accountable (responsible) to patients for the drug therapy they provide	3.3 (0.6)	3.2 (0.6)	3.3 (0.6)
5) Pharmacists can contribute to decisions regarding drug interactions that can affect the patients	3.3 (0.5)	3.2 (0.5)	3.3 (0.5)
6) There are many overlapping areas of responsibility between pharmacists and physicians in drug treatment of the patients	3.3 (0.5)	3.0 (0.4)	3.3 (0.5)
7) Pharmacists have special expertise in counseling patients on drug treatment	2.9 (0.6)	2.6 (0.8)	2.8 (0.7)
8) Both pharmacists and physicians should contribute to decisions regarding the type and dosage of medicine given to the patients	3.2 (0.6)	2.9 (0.6)	3.1 (0.6)
9) The primary function of the pharmacist is to fill the physician’s prescription without question	1.9 (0.6)	2.1 (0.8)	2.0 (0.7)
10) Pharmacists should be involved in making drug policy decisions concerning the hospital/pharmacy services upon which their work depends	3.1 (0.5)	2.8 (0.6)	3.0 (0.6)
11) Pharmacists as well as physicians should have responsibility for monitoring the effects of drugs on the patients	3.2 (0.6)	3.0 (0.6)	3.2 (0.6)
12) Pharmacists should clarify a physician’s order when they feel that it might have detrimental (harmful) effects on the patient	3.4 (0.5)	3.2 (0.5)	3.3 (0.5)
13) Physicians and pharmacists should be educated to establish collaborative relationships	3.6 (0.5)	3.4 (0.5)	3.5 (0.5)
14) Physicians should consult pharmacists for help with patients having an adverse reaction or refractory (not responsive) to drug therapy	3.2 (0.5)	3.0 (0.6)	3.2 (0.6)
15) Physicians should be made aware that pharmacists can help in providing the right drug treatment	3.3 (0.5)	3.1 (0.5)	3.2 (0.5)
16) Interprofessional relationships between physicians and pharmacists should be included in their professional education programs	3.3 (0.5)	3.0 (0.5)	3.3 (0.5)

Table 4. Mean scores for each item on the scale based on academic-level differences (n = 233).

Statement	First 2 years	Last 2 years	Overall
	Mean (SD)	Mean (SD)	Score Mean (SD)
1) A physician should be viewed as a collaborator and colleague with a pharmacist rather than his or her superior	3.6 (0.5)	3.6 (0.5)	3.6 (0.5)
2) Pharmacists are qualified to assess and response to patient's drug treatment needs	2.8 (0.7)	2.8 (0.7)	2.8 (0.7)
3) During their education, pharmacy and medical students should be involved in teamwork in order to understand their respective roles	3.4 (0.5)	3.4 (0.5)	3.4 (0.5)
4) Pharmacists should be accountable (responsible) to patients for the drug therapy they provide	3.3 (0.6)	3.3 (0.6)	3.3 (0.6)
5) Pharmacists can contribute to decisions regarding drug interactions that can affect the patients	3.2 (0.5)	3.3 (0.5)	3.3 (0.5)
6) There are many overlapping areas of responsibility between pharmacists and physicians in drug treatment of the patients	3.2 (0.4)	3.3 (0.5)	3.3 (0.5)
7) Pharmacists have special expertise in counseling patients on drug treatment	2.8 (0.6)	2.8 (0.7)	2.8 (0.7)
8) Both pharmacists and physicians should contribute to decisions regarding the type and dosage of medicine given to the patients	3.1 (0.6)	3.1 (0.6)	3.1 (0.6)
9) The primary function of the pharmacist is to fill the physician's prescription without question	2.1 (0.7)	1.9 (0.6)	2.0 (0.7)
10) Pharmacists should be involved in making drug policy decisions concerning the hospital/pharmacy services upon which their work depends	3.0 (0.6)	3.0 (0.6)	3.0 (0.6)
11) Pharmacists as well as physicians should have responsibility for monitoring the effects of drugs on the patients	3.2 (0.6)	3.2 (0.6)	3.2 (0.6)
12) Pharmacists should clarify a physician's order when they feel that it might have detrimental (harmful) effects on the patient	3.3 (0.6)	3.1 (0.6)	3.2 (0.6)
13) Physicians and pharmacists should be educated to establish collaborative relationships	3.5 (0.5)	3.4 (0.5)	3.5 (0.5)
14) Physicians should consult pharmacists for help with patients having an adverse reaction or refractory (not responsive) to drug therapy	3.2 (0.5)	3.2 (0.6)	3.2 (0.6)
15) Physicians should be made aware that pharmacists can help in providing the right drug treatment	3.2 (0.5)	3.2 (0)	3.2 (0.5)
16) Interprofessional relationships between physicians and pharmacists should be included in their professional education programs	3.3 (0.5)	3.3 (0.5)	3.3 (0.5)

On the other hand, female participants revealed more positivity in the collaborative attitude with a score of (mean = 51.4; SD = 4.4) than their male correspondents (mean = 47.5; SD = 5.2; $p = 0.041$). These comparative results are shown in **Table 4**.

Finally, participants who were 21 years old or older showed higher attitude score (mean = 56.4; SD = 4.3) than those who were <21 years old (mean = 50.2; SD = 5.1; $p \leq 0.001$).

4. Discussion

Interprofessional collaboration in healthcare setting is fundamental to achieve positive outcome. A strong collaborative practice between the physicians and pharmacists is an essential part of proper healthcare delivery. Its importance is not only confined to improving the effectiveness and safety of treatment, but also management of chronic diseases. This study assessed the attitude of the medical students in the University of Dongola, Sudan, towards physician-pharmacist collaboration.

The present study revealed that medical students at the University of Dongola expressed relatively positive attitude towards physician-pharmacist collaboration with a total mean score of (mean = 50.2; SD = 4.8). Similar findings were noted in previous study conducted in Kuwait (Katoue et al., 2017) and in Indonesia (Febrinasari et al., 2021). This could be interpreted that near future doctors will be expected to have fair collaborative relationship with the pharmacists.

In this study, students who are in the first two years reported almost same mean score (mean = 50.2; SD = 4.4) as the students in the last two years (mean = 50.2; SD = 5.1). Therefore, it could be interpreted that the curriculum had no apparent role in stimulating positive attitude among the students. This finding was consistent with the result of a previous study that used the same instrument and conducted in Brazil (Prado et al., 2018).

Our study also revealed a significant means score difference between sexes. Female students expressed 4% more positive collaborative attitude (mean = 51.4; SD = 4.4) than their counterpart male students (mean = 47.5; SD = 5.2; $p = 0.041$). Similar conclusive result was reported in research conducted in Brazil (Prado et al. 2018), and the result was associated with the fact that females are better in social interaction and communication skills than males.

In our study, we also found that there was significant statistical relationship between age and mean score ($p \leq 0.001$). Our results have shown the ≥ 21 years old age-group expressed more positive attitude of collaborative relationship (mean = 56.4; SD = 4.3). On the contrary, a study conducted in Croatia (Seselja-Perisin et al., 2015) found no significant relationship between age and score.

In today's world, the health data is increasing and getting complicated. More data is exchanged daily in the healthcare settings. Therefore, handling this data and managing it requires effective communication and interprofessional collaboration between physicians and pharmacists. Most of medical errors are due to poor communication among health professionals (Dingley et al., 2008), and it can be avoided by improving the collaborative relationship among them. According to experts from World Health Organization (WHO, 2010), interprofessional collaboration should be a standard practice in patient care as a critical element in ensuring the high quality of health services. This means that there is a need for health policy-makers to introduce a legal standard practice that enhances collaborative relationship between physicians and pharmacists. Intro-

ducing and implementing such practice will ensure increase patient safety, reduce medical errors and improve healthcare outcomes.

According to a previous study (Gallagher & Gallagher, 2010); efforts to improve interprofessional collaboration between physicians and pharmacists should focus on strategic introduction of agreed changes in working practices between the two professionals and training students for this. As stated in a previous study (Nagge et al., 2017), a single Healthcare Interprofessional Education Day (HIPED) event showed significant improvement. Based on this fact, we can say interprofessional education is one of the most effective and long-term solutions for improving the interprofessional collaborative attitudes among the students. In fact, providing interprofessional education courses and practice is inevitable to improve the students' attitude towards collaborative relationships. This can be partly accomplished by providing students who finish their pharmacology courses with educational tour to pharmacies and help them explore how pharmacists work. In fact, as stated in a previous study (Zillich et al., 2004); the most influential driver of the collaborative relationship between physicians and pharmacists is exchange characteristics which can be achieved by introducing interprofessional learning courses. This will help make students more prepared for future collaborative work. One study conducted in Croatia (Seselja-Perisin et al., 2015), suggested that medical students to be the primary target for improving the interprofessional collaboration between physicians and pharmacists.

Limitations

This study had several limitations. One, based on the fact that Sudan is a large country with hundreds of medical schools with different curricular systems, the smaller targeted population and sample size did not favor larger generalization. Another possible limitation is that student's self-reporting process which could be bias as students could have provided socially desirable responses. Finally, there is period limitation. This is a cross-sectional study of assessment of collaborative attitudes in medical students at one specific point of time. Its restriction to a specific point of time may not allow continuous generalization over time.

5. Conclusion

This study assessed the attitude of medical students at University of Dongola towards physician-pharmacist collaboration. It was intended to analyze the strength of these students in their future collaboration with pharmacists. It specifically focused on students who are in their first and last two years of education. After analysis and interpretation of the data collected, the researchers conclude that medical students at the University of Dongola possess relatively positive attitude towards physician-pharmacist collaboration. It was also found out that female students demonstrated more collaborative attitudes than their male counterparts. Similarly, ≥ 21 years' old students showed higher collaborative attitude than the < 21 years old ones.

In addition, this study explored the significance of improving these collaborative attitudes at the undergraduate level. This will build a strong basis in improving future collaboration between different collaborations in the healthcare setting.

6. Recommendations

To improve the attitudes of the medical students at the University of Dongola, the researchers recommend providing interprofessional trainings and workshops for the students along with the curriculum. The authors also suggest educating the medical students during their pharmacology courses about the roles of pharmacists in the healthcare delivery.

For future researches, the authors recommend expanding the targeted research population and include pharmacy students, physicians and pharmacists; investigating the attitude of collaborative relationship among healthcare students in the whole country; and investigating about the common barriers of the physician-pharmacist collaboration and how to overcome them.

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Authors' Contribution

Zainab and Mohamed contributed equally in all the research work. Kamal was the supervisor and the senior author of the research project.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

- "Sudan" (2022, August 28). Wikipedia. <https://en.m.wikipedia.org/wiki/Sudan>
- Dey, R. M., de Vries, M. J., & Bosnic-Anticevich, S. (2011). Collaboration in Chronic Care: Unpacking the Relationship of Pharmacists and Generalmedical Practitioners in Primary Care. *International Journal of Pharmacy Practice*, 19, 21-29. <https://doi.org/10.1111/j.2042-7174.2010.00070.x>
- Dingley, C., Daugherty, K., Derieg, M. K., & Persing, R. (2008). Improving Patient Safety through Provider Communication Strategy Enhancements. In K. Henriksen et al. (Eds.), *Advances in Patient Safety: New Directions and Alternative Approaches, Vol. 3, Performance and Tools*. Agency for Healthcare Research and Quality (US).
- Febrinasari, N., Taufiq, H., & Hudaningrum, F. (2021). Medical and Pharmacy Students' Attitudes towards Physician-Pharmacist Collaboration in Indonesia: A Case Study Approach. *Borneo Journal of Pharmacy*, 4, 231-237. <https://doi.org/10.33084/bjop.v4i3.1985>

- Gallagher, R. M., & Gallagher, H. C. (2010). Improving the Working Relationship between Doctors and Pharmacists: Is Inter-Professional Education the Answer. *Advances in Health Sciences Education, 17*, 247-257. <https://doi.org/10.1007/s10459-010-9260-5>
- Hojat, M., Spandorfer, J., Isenberg, G. A., Vergare, M. J., Fassihi, R., & Gonnella, J. S. (2012). Psychometrics of the Scale of Attitudes toward Physician-Pharmacist Collaboration: A Study with Medical Students. *Medical Teacher, 34*, e833-e837. <https://doi.org/10.3109/0142159X.2012.714877>
- Hwang, A., Gums, T., & Gums, J. (2017). The Benefits of Physician-Pharmacist Collaboration. *The Journal of Family Practice, 66*, E1-E8.
- Katoue, M. G., Awad, A. I., Al-Jarallah, A., Al-Ozairi, E., & Schwinghammer, T. L. (2017). Medical and Pharmacy Students' Attitudes towards Physician-Pharmacist Collaboration in Kuwait. *Pharmacy Practice, 15*, Article 1029. <https://doi.org/10.18549/PharmPract.2017.03.1029>
- Nagge, J. J., Lee-Poy, M. F., & Richard, C. L. (2017). Evaluation of a Unique Interprofessional Education Program Involving Medical and Pharmacy Students. *American Journal of Pharmaceutical Education, 81*, Article 6140. <https://doi.org/10.5688/ajpe6140>
- Prado, F. O., Rocha, K. S., Araújo, D. C., Cunha, L. C., Marques, T. C., & Lyra Jr., D. P. (2018). Evaluation of Students' Attitudes towards Pharmacist-Physician Collaboration in Brazil. *Pharmacy Practice, 16*, Article 1277. <https://doi.org/10.18549/PharmPract.2018.04.1277>
- Seselja-Perisin, A., Mestrovic, A., Klinar, I., & Modun, D. (2015). Health Care Professionals' and Students' Attitude toward Collaboration between Pharmacists and Physicians in Croatia. *International Journal of Clinical Pharmacy, 38*, 10-11. <https://doi.org/10.1007/s11096-015-0215-z>
- Setiadi, A. P., Wibowo, Y., Irawati, S., Setiawan, E., Presley, B., Gudka, S., & Wardhani, A. S. (2017). Indonesian Pharmacists' and Pharmacy Students' Attitudes towards Collaboration with Physicians. *Pharmacy Practice, 15*, Article 1052. <https://doi.org/10.18549/PharmPract.2017.04.1052>
- Van Winkle, L. J., Fjortoft, N., & Hojat, M. (2011). Validation of an Instrument to Measure Pharmacy and Medical Students' Attitudes toward Physician-Pharmacist Collaboration. *American Journal of Pharmaceutical Education, 75*, Article 178. <https://doi.org/10.5688/ajpe759178>
- WHO (2010). *Framework for Action on Interprofessional Education & Collaborative Practice*. WHO Report. <https://www.who.int/publications-detail-redirect/framework-for-action-on-interprofessional-education-collaborative-practice>
- Zillich, A. J., McDonough, R. P., Carter, B. L., & Doucette, W. R. (2004). Influential Characteristics of Physician/Pharmacist Collaborative Relationships. *The Annals of Pharmacotherapy, 38*, 764-770. <https://doi.org/10.1345/aph.1D419>