

Original Article

KNOWLEDGE, ATTITUDES AND PERCEIVED PRACTICE TOWARDS ASTHMA AMONG PHARMACY STUDENTS IN SOUTHERN NIGERIA

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ABSTRACT

Objective: To assess the knowledge, attitudes and perceived practice of asthma among final year pharmacy students in Southern Nigeria.

Methods: This was a cross sectional study conducted in six pharmacy schools in Southern Nigeria. A 49-item structured, self-administered questionnaire was used to collect data from the final year pharmacy students. Data were analyzed using the IBM Statistical Product for Services Solution (SPSS) for Windows, Version 21.0. Both descriptive and inferential statistics were utilized. Statistical significance was set at $P < 0.05$.

Results: Overall, less than half of the students had good knowledge of asthma (47.7%); good attitudes towards asthma (49.5%); and good perception of the roles of pharmacists in counselling asthma patients (48.1%). SIWES/IT (Students' Industrial Work Experience Scheme/Industrial Training) improved students' asthma knowledge ($t = 3.119$; $df = 453$; $P = 0.002$). The University of Lagos (UNILAG) pharmacy students had significantly better asthma knowledge than their University of Uyo (UNIUYO), University of Nigeria Nsukka (UNN), Obafemi Awolowo University (OAU) and University of Port Harcourt (UNIPORT) counterparts ($P < 0.05$).

Conclusion: Less than half of the pharmacy students had good knowledge of asthma; good attitudes towards asthma and good perception of the roles of pharmacists in counselling asthma patients. UNILAG pharmacy students had significantly better asthma knowledge than most of the other schools. Students who had SIWES/IT experience (Students' Industrial Working Experience Scheme/Industrial Training) had better asthma knowledge. The SIWES/IT programme should continue.

Keywords: Attitudes, Asthma, Knowledge, Pharmacy Students, Practice

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INTRODUCTION

The World Health Organization (WHO) recognizes asthma as a major health problem [1]. It is one of the common chronic diseases among children and is characterized by recurrent attacks of wheezing, breathlessness, cough, bronchial hyper-responsiveness and/or chest tightness, which vary in severity and frequency from person to person [2]. It can occur at any age but children and young adults are the commonly affected age groups. Environmental factors appear to be strongly associated with asthma in school children in a developing nation [3]. Both sexes are affected almost equally though slight differences in prevalence between males and females have been reported [4]. Although asthma cannot be "cured," clinical episodes can largely be prevented and controlled by proper management. Asthma is the leading cause of ambulatory visits and hospitalizations among children [4]. Asthma knowledge, health service quality, medical staff's attitude and skills, as well as patients' attitude and lifestyle determine the level of asthma control [5].

In Nigeria, the prevalence of asthma ranges from 10.7% (children), 14.2% (adolescents), and 5.1 to 7.5% (adults) in the general population [6, 7]. Previous studies have shown that insufficient knowledge of asthma has been associated with inadequate disease management and increased morbidity [6]. Pharmacy students may have apathy towards practice in asthma settings if they do not have sufficient knowledge of asthma. Pharmacists have demonstrated poor knowledge of inhaler techniques and have not taken active roles in promoting self-management among asthma patients [5]. However, there is paucity of data on the knowledge, attitudes and perceived practice of pharmacy students towards asthma worldwide, Nigeria inclusive. The general objective of this study was to assess the knowledge, attitudes and perceived practice towards asthma among pharmacy students in Southern Nigeria.

MATERIALS AND METHODS

Study design and study site

This study was a descriptive, cross-sectional survey conducted in six pharmacy schools in Southern Nigeria to assess pharmacy students' knowledge, attitudes and perceived practice towards asthma. Southern Nigeria comprises three zones: South-west, South-south and South-east. Two schools were selected from each zone. The University of Nigeria, Nsukka, Enugu State (UNN) and Nnamdi Azikiwe University, Awka, Anambra State (NAU) from the South-east; University of Port Harcourt (UNIPORT) and University of Uyo, Akwa Ibom State (UNIUYO); University of Lagos, Lagos State (UNILAG) and Obafemi Awolowo University, Ile-Ife, Osun State (OAU) from the South-west.

The aforementioned schools are all Federal Government institutions, accredited by the Nigerian Universities Commission (NUC) and the Pharmacists' Council of Nigeria (PCN).

Ethical committee approval

Ethical approval was obtained from the Health Research and Ethics Committee of the University of Nigeria Teaching Hospital (UNTH), Ituku-Ozalla, Enugu State (NHREC/05/01/2008B-FWA00002458-1RB00002323). The Consent of the Deans of the different Schools of Pharmacy was obtained before the study commenced.

Eligibility criteria

All final year pharmacy students in the six aforementioned pharmacy schools (UNN, NAU, UNIPORT, UNIUYO, UNILAG, OAU) who were willing to participate in the study were included.

Data collection

A pilot study was conducted with ten final year students of UNN and they were not included in the main study. Their responses were used

to modify the questionnaire, ensuring there were no ambiguities in the statements/questions. All irrelevances were excluded. The final study instrument was a 49-item structured self-administered questionnaire divided into four sections: demographic information; knowledge on asthma; attitudes towards asthma; and perceived practice regarding asthma. Willingness to participate was taken as consent. The respondents were expected to fill the questionnaire within 15 min, without the consultation of any reference material.

Data analysis

Data were analysed using the IBM Statistical Products and Service Solutions (SPSS) for Windows, Version 21.0 (IBM Corp, Version 21.0, Armonk, NY, USA). Descriptive statistics, such as mean±standard deviation, were used to summarize data. Inferential statistics utilized the independent t-test, ANOVA and Pearson Chi-Square test, with statistical significance set at $P \leq 0.05$.

RESULTS

A total of 455 questionnaires administered were completed and returned from the six universities utilized for the study, representing an overall participation rate of 60.6% (455/751). For the individual universities, the participation rate was 94.8% (55/58) for the University of Uyo (UNIUYO); 70% (63/90) for Nnamdi Azikiwe University (NAU); 47.9% (103/215) for University of Nigeria Nsukka (UNN); 56.5% (96/170) for the University of Lagos (UNILAG); 51.8% (71/137) for Obafemi Awolowo University (OAU); 82.7% (67/81) for the University of Port Harcourt (UNIPORT). The results are presented in the tables below.

Most of the respondents (74.7%) were between 21 to 25y, had previous IT experience (77.8%) in hospital/community pharmacy settings (72.7%). See table 1 for more details.

Only 23.5% of the students got the question on short-acting β_2 -agonists. Majority of them (86.4%) knew that epinephrine has nothing to do with inflammatory reaction, table 2. Overall, less than half (47.7%) of the students had good knowledge of asthma.

Less than half of the students (48.3%) disagreed that asthmatic patients may not benefit from disease monitoring with peak flow

meter. Most of the students (93.7%) agreed that pharmacist play an important role in the asthma care team, table 3. Overall, less than half (49.5%) of the students had good attitudes towards asthma.

More than half of the students (86.8%) agreed that the role of pharmacists include counselling patients about inhaler techniques on a regular basis. Also, most of the students (87.2%) agreed that the role of pharmacist include counselling patients about asthma self-management, table 4. Overall, less than half of the students (48.1%) had good perception of the roles of pharmacists in counselling asthma patients.

More than half of the students considered that lack of time by pharmacists (84.8%), patients' perception that they are already well cared for by the doctor (81.5%), and lack of confidence or skill in asthma medication counselling (83.1%) have considerable to high impact as barriers to providing specific asthma counselling or service. See table 5. Overall, more than half of the students (53.4%) demonstrated that the items had low impact on pharmacists' ability to provide specific asthma counselling or service.

Almost all the students (93.8%) agreed that they would have good professional contact with other healthcare professionals with regards to caring for patients with asthma, table 6. Overall, 59.6% of the students believed they would have good inter-professional contact with regards to caring for patients with asthma.

In table 7, more female pharmacy students had better perceived practice regarding the role of pharmacists in counselling asthma patients ($t = 3.199$; $df = 453$; $p = 0.001$) and were more predisposed to having inter-professional contact with other health care professionals in caring for asthma patients ($t = -2.031$; $df = 453$; $P = 0.043$), than males.

Also, more female pharmacy students had a higher perception of the barriers to pharmacists' abilities to provide specific asthma counselling or service ($t = -2.921$; $df = 453$; $P < 0.004$).

Students who resided in hostels had better asthma knowledge than those who stayed off-campus ($t = 3.771$; $df = 453$; $P < 0.001$). Those who were not asthmatic had better attitudes towards asthma than those who had been diagnosed of asthma ($t = -4.176$; $F = 453$; $P < 0.001$).

Table 1: Socio-demographic information

Variables	n (%)
University	
UNIUYO	55 (12.1)
NAU	63 (13.8)
UNN	103 (22.6)
UNILAG	96 (21.1)
OAU	71 (15.6)
UNIPORT	67 (14.7)
Age (in years)	
16-20	23 (5.1)
21-25	340 (74.7)
26-30	70 (15.4)
>30	22 (4.8)
Gender	
Male	256 (56.3)
Female	199 (43.7)
Religion	
Christianity	398 (87.5)
Islam	49 (10.8)
Others	8 (1.8)
Residency	
Hostel	185 (40.7)
Off campus	270 (59.3)
Diagnosed of asthma	42 (9.2)
Family history of asthma	102 (22.4)
Previous SIWES/IT experience	354 (77.8)
Hospital/Community pharmacy IT	331 (72.7)

SIWES = Students' Industrial Working Experience Scheme; IT = Industrial Training

Those who had undergone SIWES/IT (Students Industrial Work Experience Scheme) ($t = 3.119$; $df = 453$; $P = 0.002$), especially in hospital/community pharmacy settings ($t = 4.109$; $df = 453$; $P < 0.001$), had better knowledge of asthma than those who had not. There was statistically significant difference ($F = 3.570$) between the mean attitude scores for the age groups. The Post-Hoc multiple comparisons with Scheffe between the mean attitude scores showed a difference between students aged 16–20 y and those between 21–25 years ($P = 0.046$) and 26–30 years ($P = 0.029$). Since higher scores on attitudes indicate more positive attitudes towards asthma, students between 21–25 y and 26–30 y had significantly better attitudes than those between 16–20 y. Additionally, there was a statistically significant difference ($F = 13.191$) between the mean knowledge scores for university.

The Post-Hoc multiple comparisons with Scheffe showed differences between:

NAU and UNIUYO ($P = 0.020$)

UNILAG and UNIUYO ($P < 0.001$)

UNILAG and UNN ($P = 0.018$)

UNILAG and OAU ($P < 0.001$)

UNILAG and UNIPORT ($p < 0.001$)

Since higher scores on knowledge indicate better knowledge about asthma, NAU pharmacy students had significant better asthma knowledge than their UNIUYO counterparts. UNILAG pharmacy students had significant better asthma knowledge than UNIUYO, UNN, OAU and UNIPORT pharmacy students.

There was a statistically significant difference ($F = 10.821$) between the mean attitude scores for university. The post-Hoc multiple comparisons with Scheffe showed differences between:

UYO and UNILAG ($P = 0.023$)

NAU and UNILAG ($P = 0.002$)

UNN and UNILAG ($P < 0.001$)

OAU and UNILAG ($P < 0.001$)

UNIPORT and UNILAG ($P = 0.001$)

Since higher scores on attitudes indicates attitudes towards asthma: UNIUYO, NAU, UNN, OAU and UNIPORT students had statistically significant better attitudes than UNILAG students.

Table 2: Knowledge of asthma

Questions (Correct answer)	n(%)
1. Among the following physiological factors, which could affect theophylline blood concentration the most? (All of the above)	262 (57.6)
2. Which of the following could be a side effect of inhaled steroids? (All of the above)	190 (41.8)
3. Which of the following ranges characterizes the 'yellow zone' for peak flow meter measurements? (60–80%)	229 (50.3)
4. Poor asthma control may be related to: (All of the above)	388 (85.3)
5. Which of the following is considered the cell that triggers an allergic reaction after exposure to the allergens? (Mast cell)	342 (75.2)
6. What is the best time to use a peak flow meter, if the patient can use it only once daily? (After waking up, before going out in the morning)	213 (46.8)
7. Which of the following has nothing to do with an inflammation reaction? (Epinephrine)	393 (86.4)
8. Which one of the following is not a sympathomimetic drug, administered as aerosol, and could dilate the bronchioles with fewer systemic side effects? (Ipratropium bromide).	133 (29.2)
9. Long-term asthma control for children with moderate continuous asthma should include which of the following drugs? (Beclomethasone, salmeterol and albuterol)	174 (38.2)
10. Which statement is true about short-acting β_2 -agonists? (All of the above)	107 (23.5)

Table 3: Attitudes towards asthma

Statements	SD	D	N	A	SA	Mean (SDv)
1. Healthcare providers should understand the influence of asthma care activities on patients' daily lives	0 (0.0)	0 (0.0)	9 (2.0)	96 (21.1)	350 (76.9)	4.75 (0.48)
2. Pharmacists should be certified to provide primary asthma care	1 (0.2)	8 (1.8)	25 (5.5)	133 (29.2)	288 (63.3)	4.54 (0.70)
3. The impact of asthma on patients' emotions is minor	94 (20.7)	137 (30.1)	87 (19.1)	81 (17.8)	56 (12.3)	3.29 (1.31)
4. To become a competent asthma educator, it is necessary to learn education skills	3 (0.7)	17 (3.7)	46 (10.1)	174 (38.2)	215 (47.3)	4.28 (0.84)
5. The outcome of asthma treatment depends more on a patient's behaviour than efforts of healthcare providers	10 (2.2)	41 (9.0)	87 (19.1)	182 (40.0)	135 (29.7)	2.14 (1.01)
6. Asthmatic patients may not benefit from disease monitoring with peak flow meter	88 (19.3)	132 (29.0)	103 (22.6)	83 (18.2)	49 (10.8)	3.28 (1.27)
7. Control of respiration function is too complicated in asthma care	29 (6.4)	100 (22.0)	125 (27.5)	136 (29.9)	65 (14.3)	2.76 (1.14)
8. People with asthma have the right to decide not to take care of their disease	74 (16.3)	89 (19.6)	97 (21.3)	116 (25.5)	79 (17.4)	2.92 (1.34)
9. The asthmatic patient is the most important member in the asthma care team	6 (1.3)	20 (4.4)	45 (9.9)	146 (32.1)	238 (52.3)	4.30 (0.91)
10. The pharmacist could play an important role in the asthma care team	5 (1.1)	2 (0.4)	22 (4.8)	110 (24.2)	316 (69.5)	4.68 (0.93)

SD–Strongly Disagree; D–Disagree; N–Neutral; A–agree; SA–Strongly Agree; SDv–Standard Deviation

Table 4: Perceived roles of pharmacists in counselling asthma patients

Statements	SD	D	N	A	SA	Mean (SDv)
1. Frequency of reliever (blue) inhaler use.	0 (0.0)	2 (0.4)	29 (6.4)	136 (29.9)	288 (63.3)	4.56 (0.63)
2. Overuse of reliever (blue) medication	5 (1.1)	18 (4.0)	35 (7.7)	153 (33.6)	244 (53.6)	4.35 (0.87)
3. Poor adherence with preventer medication	8 (1.8)	11 (2.4)	36 (7.9)	140 (30.8)	260 (57.1)	4.39 (0.87)
4. Inhaler technique when first prescribed the inhaler	0 (0.0)	5 (1.1)	43 (9.5)	114 (25.1)	293 (64.4)	4.53 (0.71)
5. Inhaler technique on a regular basis.	1 (0.2)	12 (2.6)	47 (10.3)	167 (36.7)	228 (50.1)	4.34 (0.79)
6. Trigger factors and avoidance strategies	2(0.4)	4 (0.9)	41 (9.0)	125 (27.5)	283 (62.2)	4.50 (0.73)
7. Patient's current level of asthma control	0 (0.0)	0 (0.0)	54 (11.9)	170 (37.4)	231 (50.8)	4.39 (0.69)
8. Action plan ownership	1 (0.2)	9 (2.0)	73 (16.0)	166 (36.5)	206 (45.3)	4.25 (0.81)
9. Patient self-monitoring of asthma control (by symptoms or peak flow measurements)	4 (0.9)	12 (2.6)	42 (9.2)	159 (34.9)	238 (52.3)	4.35 (0.82)
10. Asthma self-management by the patient (i.e. recognizing when and knowing how to take action when asthma gets worse)	3 (0.7)	9 (2.0)	44 (9.7)	143 (31.4)	256 (56.3)	4.41 (0.8)

SD-Strongly Disagree; D-Disagree; N-Neutral; A-agree; SA-Strongly Agree; SDv-Standard Deviation

Table 5: Perceived practice barriers to pharmacist's ability to provide specific asthma counselling or service

Statements	No impact	Slight impact	Moderate impact	Considerable impact	High impact	Mean(SDv)
11. Lack of time by the pharmacist	5 (11)	10 (2.2)	54 (11.9)	149 (32.7)	237 (52.1)	4.33 (0.85)
12. Lack of time by the patient	6 (1.3)	22 (4.8)	57 (12.5)	141 (31.0)	229 (50.3)	4.24 (0.94)
13. Pharmacists' perception that it is not their role	10 (2.2)	21 (4.6)	64 (14.1)	162 (35.6)	198 (43.5)	4.14 (0.97)
14. Patient's perception that it is not the pharmacist's role	9 (2.0)	23 (5.1)	72 (15.8)	154 (33.8)	197 (43.3)	4.11 (0.9)
15. Language barriers	4 (0.9)	22 (4.8)	48 (10.5)	152 (33.4)	229 (50.3)	4.27 (0.90)
16. Patient's health beliefs	0 (0.0)	16 (3.5)	61 (13.4)	153 (33.6)	225 (49.5)	4.29 (0.83)
17. Patient's lack of asthma knowledge	5 (1.1)	20 (4.4)	62 (13.6)	137 (30.1)	231 (50.8)	4.25 (0.93)
18. Patient perception that they are already well cared for by the doctor	3 (0.7)	19 (4.2)	62 (13.6)	167 (36.7)	204 (44.8)	4.21 (0.88)
19. Conflict between professional and commercial interests	3 (0.7)	17 (3.7)	64 (14.1)	167 (36.7)	204 (44.8)	4.21 (0.87)
20. Trying not to 'overstep' the role of the doctor	7 (1.5)	20 (4.4)	77 (16.9)	177 (38.9)	174 (38.2)	4.08 (0.93)
21. No financial incentive.	13 (2.9)	34 (7.5)	78 (17.1)	142 (31.2)	188 (41.3)	4.01 (1.07)
Lack of confidence or skills in:						
22. asthma medication counseling	6 (1.3)	16 (3.5)	55 (12.1)	130 (28.6)	248 (54.5)	4.31 (0.91)
23. asthma adherence counseling	8 (1.8)	16 (3.5)	50 (11.0)	133 (29.2)	248 (54.5)	4.31 (0.93)
24. asthma self-management counseling	5 (1.1)	22 (4.8)	52 (11.4)	135 (29.7)	241 (53.0)	4.29 (0.93)
25. asthma trigger factor counseling	5 (1.1)	18 (4.0)	51 (11.2)	136 (29.9)	245 (53.8)	4.31 (0.90)
26. reviewing and counselling about asthma control	2 (0.4)	19 (4.2)	52 (11.4)	150 (33.0)	232 (51.0)	4.30 (0.86)
27. asthma monitoring	4 (0.9)	16 (3.5)	54 (11.9)	129 (28.4)	252 (55.4)	4.34 (0.88)

SDv-Standard Deviation

Table 6: Inter-professional contact

Statements	SD	D	N	A	SA	Mean(SDv)
28. I would have good inter-professional contact with other healthcare professionals with regards to care of my patients with asthma	0 (0.0)	7 (1.5)	21 (4.6)	101 (22.2)	326 (71.6)	4.64 (0.65)
29. I would like to "go the extra mile" with other healthcare professionals with regards to the care of my patients with asthma	3 (0.7)	8 (1.8)	39 (8.6)	115 (25.3)	290 (63.7)	4.50 (0.78)

SD-Strongly Disagree; D-Disagree; N-Neutral; A-agree; SA-Strongly Agree; SDv-Standard Deviation

Table 7a: Mean difference analysis (I)

Variab les	N (total =45)	Mean knowl edge score (SDv)	95% confid ence interv al	p- valu e	Mean Attitu de score (SDv)	95% confid ence interv al	P- valu e	Mean Roles scores(SDv)	95% confid ence interv al	P- val ue	Mean barrier score(SDv)	95% confid ence interv al	P- val ue	Mean contac t score(SDv)	95% confid ence interv al	P- val ue
Age(in years) ^a																
16-20	23	5.70 (2.44)	4.64-6.75	0.775	34.09 (4.64)	32.08-36.09	*0.014	42.57 (6.11)	39.92-45.21	0.496	70.52 (8.56)	66.82-74.23	0.397	8.83 (1.23)	8.29-9.36	0.144
21-25	340	5.31 (1.80)	5.11-5.50		36.98 (4.63)	36.49-37.47		44.16 (5.45)	43.58-44.74		72.26 (10.27)	71.16-73.35		9.09 (1.35)	8.95-9.23	
26-30	70	5.37 (1.64)	4.98-5.76		37.51 (5.02)	36.32-38.71		43.80 (6.06)	42.36-45.24		70.60 (10.92)	68.00-73.20		9.33 (1.19)	9.05-9.61	
>30	22	5.45 (1.70)	4.66-6.25		35.73 (5.43)	33.32-38.13		44.86 (4.99)	42.65-47.08		74.09 (6.54)	71.9-76.99		9.55 (0.86)	9.17-9.93	

Gender ^b																
Male	256	5.26 (1.77)	-0.52- 0.15	0.27 9	36.51(4.81)	-1.68- 0.09	0.07 8	43.33 (5.69)	-	*0.0 01	70.79 (10.12)	-	*0.0 04	9.03 (1.37)	-	*0.0 43
Female	199	5.45 (1.86)			37.30 (4.70)			45.00 (5.25)			73.57 (10.00)			9.28 (1.20)		
Religio n ^a																
Christi anity	398	5.32 (1.76)	5.15- 5.50	0.37 0	37.10 (4.74)	36.63- 37.57	0.01 4	44.16 (5.54)	43.61- 44.70	0.5 83	71.88(1 0.28)	70.87- 72.89	0.5 59	9.15 (1.30)	9.02- 9.28	0.1 89
Islam	49	5.61 (2.19)	4.98- 6.24		35.04 (4.56)	33.73- 36.35		43.45 (5.91)	41.75- 45.14		73.33 (9.16)	70.70- 75.96		9.04 (1.40)	8.64- 9.44	
Others	8	4.75 (1.67)	3.35- 6.15		35.75 (5.52)	31.13- 40.37		42.88 (4.32)	39.26- 46.49		70.13 (9.52)	62.16- 78.09		9.14 (1.30)	9.02- 9.26	
Reside ncy ^b																
Hostel	185	5.72 (1.83)	0.31- 0.98	*<0. 001	36.45 (5.12)	-1.58- 0.21	0.13 3	44.28 (5.57)	-0.67- 1.42	0.4 82	72.66 (9.65)	-0.79- 3.02	0.2 51	9.21 (1.19)	-0.13- 0.36	0.3 49
Off- campu s	270	5.08 (1.75)			37.13 (4.51)			43.91 (5.55)			71.55 (10.47)			9.09 (1.37)		
Diagno sed of asthma ^b																
Yes	42	5.48(2. 43)	-0.43- 0.73	0.61 7	33.98 (5.16)	-4.66- 1.68	*<0. 001	44.71 (4.48)	-1.05- 2.49	0.4 23	73.69 (8.09)	-1.37- 5.09	0.2 59	9.14 (1.20)	-0.41- 0.42	0.9 73
No	413	5.33(1. 74)			37.15(4.64)			44.00 (5.65)			71.83 (10.33)			9.14 (1.31)		

Table 7b: Mean difference analysis (II)

Variables	N (to total =4 55)	Mean knowl edge score (SDv)	95% confid ence interv al	p- valu e	Mean Attitu de score(SDv)	95% confid ence interv al	P- valu e	Mean Roles scores (SDv)	95% confid ence interv al	P- val ue	Mean barrie r score(SDv)	95%conf idence interval	P- val ue	Mean contac t score(SDv)	95% confid ence interv al	P- val ue
Family history of asthma ^b																
Yes	10	5.29 (2.02)	-0.46- 0.34	0.75 8	36.28 (4.76)	-1.79- 0.32	0.17 1	44.29 (5.47)	-0.93- 1.53	0.6 29	72.47 (9.06)	-1.64- 2.84	0.5 99	9.12 (1.24)	-0.31- 0.26	0.8 70
No	35	5.36 (1.75)			37.02 (4.77)			43.99 (5.58)	-0.92- 1.52		71.87 (10.45)	-1.48- 2.68		9.14 (1.32)	-0.30- 0.25	
Previous IT experience ^b																
Yes	35	5.48 (1.80)	0.23- 1.03	*0.0 02	36.79 (4.83)	-1.37- 0.75	0.56 1	44.23 (5.55)	-0.48- 1.98	0.2 31	71.99 (10.13)	-2.30- 2.21	0.9 69	9.14 (1.36)	-0.29- 0.29	0.9 84
No	10	4.85 (1.78)			37.10 (4.58)			43.48 (5.56)			72.04 (10.26)			9.14 (1.10)		
IT in hospital/Co mmunity pharmacy ^b																
Yes	33	5.55 (1.71)	0.40- 1.14	<0.0 01	36.84(4.84)	-1.06- 0.92	0.89 5	44.34(5.59)	-0.13- 2.16	0.0 83	72.24(10.16)	-1.23- 2.97	0.4 16	9.19(1. 31)	-0.08- 0.46	0.1 72
No	12	4.78(1. 95)			36.90(4.60)			43.32(5.43)			71.37(10.13)			9.00(1. 28)		
University ^a																
UYO	55	4.51 (1.67)	4.06- 4.96	*<0. 001	36.80 (4.18)	35.67- 37.93	*<0. 001	43.71 (6.04)	42.08- 45.34	0.1 33	69.22 (12.25)	65.91- 72.53	0.2 75	9.22 (1.33)	8.86- 9.58	0.8 81
NAU	63	5.67 (1.44)	5.30- 6.03	*<0. 001	37.29 (4.15)	36.24- 38.33		45.67 (3.99)	44.66- 46.67		73.23 (10.37)	70.50- 75.98		9.22 (1.33)	8.86- 9.58	
UNN	10	5.45 (1.64)	5.13- 5.77		38.50 (5.04)	37.51- 39.48		44.28 (6.40)	43.03- 45.53		71.54 (10.14)	69.51- 73.58		9.00(1. 46)	8.71- 9.29	
UNILAG	96	6.34 (2.06)	5.93- 6.76		34.01 (7.48)	33.10- 34.91		43.13 (5.64)	41.98- 44.27		72.85(8.90)	71.05- 74.66		9.17(1. 28)	8.91- 9.43	
OAU	71	4.83(1. 53)	4.47- 5.19		37.46(4.78)	36.33- 38.60		43.99 (5.29)	42.73- 45.24		72.73 (10.15)	70.33- 75.14		9.11(1. 23)	8.82- 9.40	
UNIPORT	67	4.67 (1.66)	4.27- 5.08		37.40 (4.13)	36.40- 38.41		43.91 (4.99)	42.69- 45.13		71.85(8.59)	69.76- 73.95		9.18(1. 24)	8.88- 9.48	

Tests: a = Anova; b= Independent t-test; *P < 0.05= is statistically significant; SDv= standard deviation

DISCUSSION

In this study, less than half of the students had good knowledge of asthma; good attitudes towards asthma; and good perception of the roles of pharmacists in counselling asthma patients. SIWES/IT (Students' Industrial Work Experience Scheme/Industrial Training)

improved students' asthma knowledge. UNILAG pharmacy students had significantly better asthma knowledge than their UNIUYO, UNN, OAU and UNIPORT counterparts. Close to a quarter of the participants had family history of asthma. This depicts the prevalence of asthma in Nigeria which affects about 15 million people in the country [7]. Overall, less than half of the students had

good knowledge of asthma. Most of the knowledge-based assessments were basics of asthma treatment, and clearly indicate the need for more comprehensive training of pharmacy students. This is particularly important, now that pharmacy practice is playing an increasingly greater role in healthcare, especially through the introduction of specialized ward pharmacy services in hospitals [8]. The remarkable gap in pharmacy knowledge suggests that students might require more exposure than provided by their undergraduate pharmacotherapy lecture on asthma. Thus, asthma education should be started early and taught with proper teaching aids and techniques, including dummy devices.

The Students' Industrial Work Experience Scheme (SIWES) experience improved students' knowledge of asthma, emphasising the importance of exposing students to practice. A study conducted in Taiwan buttressed the importance of continuing education among pharmacists, with the conclusion that continuing education improves knowledge of pharmacists and would lead to more effective patient education, improved patient knowledge, and encourage proper inhaler techniques [12]. Also, only about half of the students were able to identify the yellow zone for peak flow meter measurements. This could be dependent on the extent to which teaching aids and instruments are employed while teaching asthma in pharmacy schools. Students are more likely to be exposed to these in practice settings. Peak flow meter and spirometers are important for measuring lung function as they help to monitor the progression of the disease and patients' response to therapy. It is documented that the knowledge and practice of spirometry is poor among hospital-based Nigerian health care professionals [14].

In this study, less than half of the students showed good attitudes towards asthma. If pharmacists have good attitudes towards a disease state, it could influence their level of involvement with rendering patient-centred services, considering that in Nigeria, many pharmaceutical care services are not paid for [9, 10]. The quality of pharmaceutical care rendered in asthma will depend on the combination of the right attitudes and knowledge base of the pathophysiology and pharmacotherapy of the disease [17]. As pharmaceutical care is patient-centred, pharmacists can encourage patients to be involved with self-management, consequently improving their adherence to long-term medication therapies [17]. In a study conducted at the University of Wyoming School of Pharmacy to show pharmacy students' application of their knowledge from the classroom to introductory pharmacy practice experiences, it was concluded that challenging students to think about and provide specific examples of knowledge application made the connections more explicit and also allowed students to see the relevance of the classroom portion of their education and reinforced how foundational course concepts are directly applicable to pharmacy practice [8].

Few published studies have explored pharmacists' perceived roles in asthma management and counselling. Research in this area has primarily focused on structured community pharmacy based asthma programmes [15, 16]. Overall, less than half of the students had good perception of the roles of pharmacists in counselling asthma patients. These may stem from inadequate exposure to pharmacy practice as students, and could affect their counselling skills/competence when they eventually become pharmacists. This was clearly justified by the attitudes of pharmacy students who participated in the SIWES scheme. They scored better in their perceived roles as pharmacists involved with counselling asthma patients. The SIWES scheme is a skill development programme established by Industrial Training Fund (ITF) in 1973 with the headquarters in Jos, Nigeria. It is meant to enable students in tertiary institutions in Nigeria acquire technical skills and experience for professional development in their course of study as it bridges the gap between theory and practice [11]. It enables students practice what they learnt in classroom. In some pharmacy schools in Nigeria, it is not mandatory for pharmacy students to be involved with SIWES. Regularly counselling patients on inhaler techniques and self-management will help improve adherence to medications with the achievement of the desired therapeutic outcomes [13]. Pharmacy students can inculcate this practice by learning from their senior colleagues during the SIWES.

Most of the students believed that lack of time by both patients and pharmacists and confidence/skill in asthma medication counselling are the greatest impediments to achieving the desired therapeutic outcome. Patient counselling requires the pharmacist to allot sufficient time, accordingly. Factors such as large numbers of patients per pharmacist or the patient's eagerness for fast discharge constitute the major challenges that pharmacists face [15].

Furthermore, more than half of the students considered language barrier to have a high impact on pharmacist ability to deliver pharmaceutical service since Nigeria is a multi-ethnic group. A pharmacist who cannot speak the patient's language cannot efficiently communicate, and a mediator between the pharmacist and the patient may be necessary. Also, pharmacists should avoid the use of medical jargons but as much as possible strive to be understood by the patient [17]. Most of the students agreed that financial incentives have a low impact on the ability of pharmacist to provide specific asthma counselling or services since pharmacist's consultation fee is not common in this part of the world [15]. The respondents believed that patients' perception that they are already well taken care of by the doctor has a considerable to high impact on the ability of pharmacists to provide specific asthma counselling. Doctors may believe that it is the responsibility of pharmacists to counsel asthma patients on their medications, especially at the point-of-purchase [14, 16]. The confusion on whose role it is to counsel may lead to the asthma patients not being counselled. Pharmacists should never dispense medications, including inhalers, without adequate counselling [16].

Our study had some limitations. The study was carried out when some pharmacy schools were having their final professional examinations which could have reduced their participation rate. Assessments were only made using self-reported data. Also, the study was conducted in Southern Nigeria and the results might not be generalized to other study settings.

We recommend that the Pharmacists' Council of Nigeria which is responsible for regulating education and training of pharmacy students should provide an education standard that provides connections between classroom coursework and practice. The SIWES programme should continue and be enshrined in the pharmacy school curriculum. Asthma lectures should be taught with teaching aids such as power-point presentations, videos, dummy inhalers and spacer devices, peak flow meters, which will improve understanding of the disease state and its management.

CONCLUSION

Less than half of the students had good knowledge of asthma; good attitudes towards asthma and good perception of the roles of pharmacists in counselling asthma patients. UNILAG pharmacy students had significantly better asthma knowledge than most of the other schools. Students who had SIWES/IT experience (Students' Industrial Working Experience Scheme/Industrial Training) had better asthma knowledge. The SIWES/IT programme should continue.

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AUTHOR'S CONTRIBUTIONS

KCA conceived and designed the study and participated in the data analysis; CLO was involved with the data acquisition; OFD drafted the manuscript. All authors read the final version of the manuscript.

CONFLICTS OF INTERESTS

All authors have no conflicts of interest to declare

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