

DOI: <https://dx.doi.org/10.18203/2319-2003.ijbcp20231117>

Original Research Article

Knowledge, attitudes, and practices regarding drug allergy among healthcare providers in Eastern India

Deependra Kumar Rai¹, Pramod Kumar Manjhi^{2*}, Rathis Nair³

¹Department of Pulmonary Medicine, ²Department of Pharmacology, ³College of Nursing, All India Institute of Medical Sciences (AIIMS), Patna, Bihar, India

Received: 09 February 2023

Revised: 05 March 2023

Accepted: 07 March 2023

***Correspondence:**

Dr. Pramod Kumar Manjhi,

Email: drpramodkumar@aiimspatna.org

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Drug allergy (DA) or hypersensitivity is an immunologically mediated reaction producing stereotype symptoms which is challenging for health care providers (HCP). Objective of current study was to assess the knowledge, attitudes and practices of drug allergy among healthcare providers in eastern India.

Methods: A 25-item self-administered DA questionnaire was developed and applied in our study. The questionnaire covered 3 domains: knowledge, attitudes, and practice patterns. From July 2020 to September 2020, HCPs participated in the cross-sectional study.

Results: A total of 237 HCPs participated in the study, and all questionnaires were analysed.

Among the respondents, 226 (95.4%) were nurses, 9 (3.8%) were doctors and 2 (0.8%) were pharmacists. The majority of HCPs agreed that drug-induced immediate allergic reactions were IgE mediated 225 (94.9%), occur within 6 hours of drug administration (89.9%), and epinephrine was the first choice for drug-induced anaphylaxis (76.8%). 97.9% HCPs agreed that penicillin skin test was valuable to predict the allergic reaction. More than 80% of the respondents would take patients' allergic history before drug administration, while 75.5% agreed that they recognize and manage drug allergy timely when it occurs.

Conclusions: Drug allergy was often diagnosed and managed inadequately, regardless of practice location, employment status and speciality in eastern India. The HCPs demonstrated a low level of knowledge regarding DA. Advanced education is urgently needed for better understanding and filling the gaps that exist in the knowledge and clinical practice of DA.

Keywords: Knowledge, Attitudes and practice, Drug allergy, Healthcare provider

INTRODUCTION

The WHO defines Adverse Drug Reactions (ADRs) as 'any response to a drug which is noxious, unintended and which occurs at doses normally used in humans for prophylaxis, diagnosis, or therapy of diseases, or for the modification of physiological function'.¹ None of the drugs is free from adverse effects. Drugs are an integral part of the healthcare system. Patient safety is the most

important concern for healthcare professionals while prescribing a drug. It is therefore important for prescribers to be aware of the adverse effects of drugs before the prescription. Clinically important ADRs are diverse but cutaneous drug reactions are most common among the various adverse reactions and attributed to the drugs.² Cutaneous drug reactions are defined as any undesirable change in the structure or function of skin, its appendages or mucous membranes, encompassing all adverse events related to drug eruption regardless of etiology.³ Of the

various adverse reactions to drugs, cutaneous drug reactions are the most frequent, with an incidence of 10-30% of all the reported ADRs.^{4,5} Cutaneous drug reactions are also responsible for approximately 3% of all disabling injuries during hospitalisation.⁶ Adverse drug reactions are frequent problems. They occur in 10% to 20% of hospitalized patients and in about 7% of the general population.⁷ Patients who experience ADRs often refer to them as drug allergies. However, true allergic reactions represent approximately only 10% of all ADRs. ADRs can be classified into 2 types: Type A reactions are common (approximately 80%) and may occur in any individual. These reactions are due to the pharmacologic or toxic property of the causative drug and thus technically predictable. Sometimes they are hard to recognize, for example, if there are complex drug interactions. Type B reactions are uncommon (about 10%–15%), are not predictable, and occur in susceptible individuals only. Recent evidence indicates that a large proportion of type B reactions is mediated by the specific immune system.

The term “drug allergy” is synonymous with type B or hypersensitivity reactions mediated by the specific immune system (about 10% of all ADRs). A drug allergy may be classified into the traditional Gell and Coombs scheme (IgE or T-cell mediated, or, rarely, IgG antibody or immune complex-mediated reactions). The remaining subset of type B reactions does not involve the specific immune system and is classified as nonimmune mediated (or nonallergic) hypersensitivity reactions.^{8,9} Most commonly, these latter reactions are caused by a congenital or acquired enzyme variant, so the triggering substance cannot be processed properly in the organism and causes symptoms by accumulating or blocking other substances to be processed. Such an idiosyncrasy-mimicking symptom of an allergy is also called pseudoallergy. This study will help in assessing knowledge, attitudes and practices regarding drug allergy among healthcare providers and will help in the safe and rationale use of medicines.

METHODS

A cross-sectional, questionnaire web-based survey was conducted from September 2020 to October 2020 in Patna (Bihar), India. The study population included a total of 300 healthcare providers such as physicians, pharmacists, and nurses.

Study tool

The questionnaires were adapted from questionnaires used in previous studies assessing the knowledge, attitudes and practice of HCPs regarding drug allergy.¹⁰

Data collection

Data was collected through Google forms which were sent to healthcare providers through emails or WhatsApp.

Consent of the healthcare provider was taken at the beginning of the questionnaire before attempting the questions. Baseline data like the demography of participants were asked through google forms containing questionnaires. The questionnaire was divided into three sections to assess the knowledge, attitude and practice regarding drug allergy. Section one contains 14 questions (A1-14) to assess knowledge followed by sections two and three which included 5 questions regarding attitude (B1-B5) and practice (C1-C6) towards drug allergy respectively. Questions consisted of a few multiple-type questions and a few based on a 5-point Likert scale, in which a score of 1 to 5 will range from strongly disagree to strongly agree.

Statistical analysis

Data were entered into Microsoft excel 2013, cleaned to detect any missing or invalid variable and then imported to SPSS ver. 20.0 for analysis. Descriptive parameters, such as means and standard deviations for normally distributed continuous data, frequencies and percentages for categorical data, were calculated.

RESULTS

Three hundred healthcare providers were approached for the study of which 237 agreed to participate in the study. Study population consisted of 226 nurses, 9 doctors, and 2 pharmacists. Demographic characteristics are shown in (Table 1).

Table 1: Demographic characteristics of the study participants (n=237).

Characteristic	N	%
Age (years)		
20-40	231	97.4
41-65	6	2.6
Gender		
Male	148	62.4
Female	89	37.6
Health care provider		
Doctor	9	3.8
Nurses	226	95.4
Pharmacist	2	0.8

Total 14 questions (A1-14) to assess the knowledge of study participants about drug allergy are mentioned in (Table 2). The response rate of the study participants regarding knowledge about drug allergy shows that significant number of participants have low level of knowledge about factors related to drug allergy, most common clinical manifestation, the gold standard to diagnose drug allergy, indication of a drug provocation test, first screening step, appropriate time to perform a skin test (Table 3).

Table 2: Knowledge questionnaire.

Item	Choice A	Choice B	Choice C	Choice D
A1. Drug-induced anaphylaxis belongs to:				
Type I hypersensitivity	Type II hypersensitivity	Type III hypersensitivity	Type IV hypersensitivity	
A2. All of the following factors are related to drug allergy, EXCEPT:				
Drug dosage	Drug exposure	Administration route	Heredity	
A3. Which is the effector cell in drug-induced anaphylaxis?				
Mast cells	Lymphocyte	Eosinophils	Monocytes	
A4. When will immediate drug hypersensitivity reactions occur after drug administration?				
<6 hr	6–8 hr	8–12 hr	12–24 hr	
A5. Which antibody mediates immediate drug hypersensitivity reactions?				
IgE	IgG	IgM	IgA	
A6. What is the most common clinical manifestation of a drug allergy?				
Anaphylaxis	Cutaneous symptoms	Serum sickness	Hepatic and renal injury	
A7. What is regarded as the gold standard to diagnose drug allergy?				
Clinical history	Skin tests	Drug-specific IgE	Provocation tests	
A8. What is the indication of a drug provocation test?				
Suspected drug allergy	Suspected drug allergy associated with systemic disease	The suspected drug is imperative or cannot be replaced for the concurrent	Suspected drug allergy with serious cutaneous symptoms	
A9. Which test is recommended as the first screening step when immediate drug hypersensitivity reactions were suspected?				
Skin prick test	Intradermal test	Skin patch test	Provocation test	
A10. Which is the appropriate time to perform a skin test when a drug allergy is suspected?				
Anytime	Right after the symptom disappeared	At least one month after the symptom disappeared	Never	
A11. A 24-year-old male had a cough and purulent mucus for 3 days, and he had an asthma history. His doctor decided to use penicillin to control the airway infection. In which situation bellowing is not appropriate for the penicillin skin test ?				
He has been treated with Tylenol (cold medication, including chlorpheniramine, pseudoephedrine, acetaminophen and dextromethorphan) in recent 3 days.	He has been treated with dexamethasone 5 mg by intravenous yesterday	He has had leukotriene modifier 10 mg/day by PO in recent 3 days	He has been treated with aminophylline in recent 3 days	
A12. Which of the following drug is recommended to perform an intradermal test before administration?				
Penicillin	Aztreonam	Ofloxacin	Azithromycin	
A13. What is the pivotal management for drug allergy?				
Drug therapy	Specific immunotherapy	Symptomatic therapy	Avoiding sensitization drugs	
A14. Which medication is the first choice when an anaphylactic shock occurred?				
Dopamine	Antihistamine	Glucocorticoid	Epinephrine	

Table 3: Responses about knowledge on drug allergy.

Item	Correct answer	Choice A N (%)	Choice B N (%)	Choice C N (%)	Choice D N (%)
A1	Choice A	165 (69.6)	35 (14.8)	14 (5.9)	23 (9.7)
A2	Choice A	38 (16)	17 (7.2)	26 (11)	156 (65.8)
A3	Choice A	131 (55.3)	25 (10.5)	76 (32.1)	5 (2.1)
A4	Choice A	213 (89.9)	14 (5.9)	2 (0.8)	8 (3.4)
A5	Choice A	225 (94.9)	1 (0.4)	9 (3.8)	2 (0.8)
A6	Choice B	168 (70.9)	68 (28.6)	1 (0.4)	0 (0)
A7	Choice D	7 (3)	115 (48.5)	83 (35)	32 (13.5)
A8	Choice C	109 (46)	46 (19.4)	33 (13.9)	49 (20.7)

Continued.

Item	Correct answer	Choice A N (%)	Choice B N (%)	Choice C N (%)	Choice D N (%)
A9	Choice A	35 (14.8)	149 (62.9)	25 (10.5)	28 (11.8)
A10	Choice C	104 (43.9)	81 (32.2)	36 (15.2)	16 (6.8)
A11	Choice A	75 (31.6)	86 (36.3)	33 (13.9)	43 (18.1)
A12	Choice A	232 (97.9)	2 (0.8)	0 (0)	3 (1.3)
A13	Choice D	41 (17.3)	52 (21.9)	66 (27.8)	78 (32.9)
A14	Choice D	1 (0.4)	43 (18.1)	11 (4.6)	182 (76.8)

Table 4: Attitudes of respondents regarding drug allergy.

Item	Strongly disagree N (%)	Disagree N (%)	Uncertain N (%)	Agree N (%)	Strongly agree N (%)
B1. Do you think HCPs should receive advanced knowledge and training of drug allergy?					
5 (2.1)	0 (0)	5 (2.1)	115 (48.5)	112 (47.3)	
B2. Do you think in vivo or in vitro test of drug is very important before drug administration?					
7 (3)	5 (2.1)	25 (10.5)	143 (60.3)	57 (24.1)	
B3. Do you satisfied with your knowledge of drug allergy?					
2 (0.8)	24 (10.1)	51 (21.5)	142 (59.9)	18 (7.6)	
B4. Do you think drug allergy has an adverse impact on patient's quality of life?					
3 (1.3)	8 (3.4)	14 (5.9)	134 (56.5)	78 (32.9)	
B5. Do you think drug allergy always occurred in your daily practice?					
16 (6.8)	74 (31.2)	56 (23.6)	79 (33.3)	12 (5.1)	

Table 5: Practice of respondents regarding drug allergy.

Item	Never N (%)	Occasionally N (%)	Sometimes N (%)	Often N (%)	Always N (%)
C1. Do you take the patient's history of drug allergy before the drug administration?					
2 (0.8)	4 (1.7)	11 (4.6)	24 (10)	196 (82.7)	
C2. Do you take the patient's allergy history before drug administration?					
1 (0.4)	5 (2.1)	11 (4.6)	21 (8.9)	199 (84)	
C3. Do you evaluate the drug skin test result timely and accurately?					
5 (2.1)	4 (1.7)	15 (6.3)	17 (7.2)	196 (82.7)	
C4. Do you perform positive control and negative control during drug skin test?					
13 (5.5)	8 (3.4)	41 (17.3)	51 (21.5)	124 (52.3)	
C5. Do you recognize and manage drug allergy timely when it occurs?					
2 (0.8)	5 (2.1)	22 (9.3)	29 (12.2)	179 (75.5)	
C6. Do you participate continuous medical education regarding drug allergy?					
15 (6.3)	17 (7.2)	42 (17.7)	31 (13.1)	132 (55.7)	

The response rate of study participants regarding attitude towards drug allergy shows that less than half thought that they should receive advance knowledge and training of drug allergy. 60% though that in vivo or in vitro test of drug is very important before drug administration, only 59.9% satisfied with knowledge of drug allergy.

Majority of participants thought that drug allergy has adverse impact on patient quality of life and it occur in their daily practice (Table 4). The response rate of practices of drug allergy showed that 82.7% took the patients history of drug allergy before the drug administration, evaluate drug skin test result timely and accurately (Table 5).

DISCUSSION

Drug allergies comprise about 15% of all drug adverse reactions and are of significant concern for clinicians and patients.¹² A retrospective study found that the drug was

the major cause of anaphylaxis in hospitalized patients in China.¹³ Generally multi organs or systems are involved when drug allergies occur and the clinical manifestations vary from mild to severe, sometimes can be life-threatening.¹⁴ However, the diagnosis of drug allergy is difficult due to the lack of reliable in vivo or in vitro drug-specific tests, which also had an adverse impact on subsequent drug allergy management. Despite evidence-based recommendations about drug allergy from professional organizations, adherence to these recommendations is unknown. We conduct a cross-sectional study to assess the KAP regarding drug allergy in Eastern India. Our study showed a low level of knowledge and a nonstandard practice profile, however, a strong positive attitude towards drug allergy training among HCPs. The knowledge domain in our study covered the mechanism, clinical manifestation, diagnosis and management of drug allergy. Only half of them knew the mediating molecules and cells involved in drug-induced anaphylaxis. Less than 50% regarded skin tests as the gold

standard for the diagnosis of drug allergy, the possible explanation is that skin tests might be dangerous and rarely carried out in India. The skin test has been recommended in daily practice as a simple and easily implemented approach to predict drug allergy.^{15,16} Fortunately about 80% would take epinephrine as the first choice for drug-induced anaphylaxis, which was a very important step emphasized in several guidelines.^{17,18} The results in the attitude domain also showed the majority were not satisfied with their knowledge and almost all the respondents agreed to receive advanced training of drug allergy. However, gaps existed between the knowledge and daily practice, HCPs realized skin test was important to predict or diagnose drug allergy, but they couldn't perform skin tests correctly according to the guidelines.^{16,19} More than half of them never or occasionally received medical education regarding drug allergies.

Our study showed HCPs in Eastern India had very poor adherence to the guidelines. Firstly, when drug allergies were suspected, a careful evaluation of clinical history was mandatory, 82.7% of our respondents would take the allergy history before drug administration and 52.3% perform positive control and negative control during drug skin tests, which implied they were very vigilant of drug allergy and they performed well in clinical history taken. Only 5.1% admitted drug allergies were common in their daily practice. However, only a few drug skin tests such as penicillin were validated, and the standardized procedures of them had been well stated in several guidelines.²⁰ While in India, intradermal skin tests had been applied widely regardless of whether the drug skin test had been validated or not, only 14.8% of our respondents knew to take a skin prick test for initial screening.^{20,21} Moreover, the majority had a low level of knowledge and a nonstandard practice on skin tests, which would lead to unreliable results. Finally, when drug-induced anaphylaxis occurred, only 76.8% of our respondents took epinephrine as their first choice, which was lower than the HCPs in the United States (94%).²² Thus, skin test procedures and drug allergy management training should be the priority in further education courses on drug allergy.

Limitations

The limitation of this study was the low response rates. However, this does not invalidate the study since the overall number of study participants is powerful enough to make a conclusion.

CONCLUSION

In conclusion, we first assessed the knowledge, attitudes and practices regarding drug allergy among HCPs in Eastern India and found a low level of knowledge and a poor practice profile adhering to the guidelines. Advanced education became imperative to eliminate the gaps in knowledge and practices. Future studies involving a larger

sample size may lead to information sharing and collaborative care of drug allergies among HCPs in India.

ACKNOWLEDGEMENTS

Authors are thankful to healthcare providers for participating and sparing valuable time to fill out the google form in the study.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Srinivasan R, Ramya G. Adverse drug reaction-Causality assessment. IJRPC. 2011;1:606-12.
2. Ghosh S, Leelavathi DA, Rao PM. Study and evaluation of various cutaneous adverse drug reactions in Kasturba Hospital, Manipal. Indian J Pharma Sci. 2006;68:212-5.
3. Nayak S, Acharjya B. Adverse cutaneous drug reaction. Indian J Dermatol. 2008;53:2-8.
4. Shinkai K, Stern RS, Wintroub BU. Cutaneous drug reactions. In: Longo DL, Fauci AS, Kasper DL, eds. Harrison's principles of internal medicine. 18th ed. New York: McGraw-Hill Companies; 2012:432-40.
5. Sharma VK, Sethuraman G, Kumar B. Cutaneous adverse drug reactions: Clinical pattern and causative agents-A six-year series from Chandigarh, India. J Postgrad Med. 2001;47:95-9.
6. Naldi L, Conforti A, Venegoni M. Cutaneous reactions to drug: an analysis of spontaneous reports in four Italian regions. Br J Clin Pharmacol. 1999;48:839-46.
7. Gomes ER, Demoly P. Epidemiology of hypersensitivity drug reactions. Curr Opin Allergy Clin Immunol. 2005;5:309-16.
8. Greenberger PA. Drug allergy. J Allergy Clin Immunol. 2006;117(2):464-70.
9. Johansson SG, Bieber T, Dahl R. Revised nomenclature for allergy for global use. Report of the nomenclature review committee of the world allergy organization. J Allergy Clin Immunol. 2004;113:832-6.
10. Wang Y. Knowledge, attitudes, and practices survey of drug allergy among healthcare practitioners in central China: a multicenter study. Asia Pac Allergy. 2016; 6:105-11.
11. Manjhi PK, Mohan L, Dikshit H, Mishra H, Kumar M, Dokania S. Cutaneous drug reactions notified by ADR monitoring centre in a tertiary care hospital of Bihar. Int J Basic Clin Pharmacol. 2017;6:80-4.
12. Gomes ER, Demoly P. Epidemiology of hypersensitivity drug reactions. Curr Opin Allergy Clin Immunol. 2005;5:309-16.
13. Tang R, Xu HY, Cao J, Chen S, Sun JL, Hu H, et al. Clinical characteristics of inpatients with anaphylaxis in China. Biomed Res Int. 2015;2015:429534.

14. Limsuwan T, Demoly P. Acute symptoms of drug hypersensitivity. *Med Clin North Am.* 2010;94:691-710.
15. Aberer W, Bircher A, Romano A, Blanca M, Campi P, Fernandez J, et al. European Network for Drug Allergy (ENDA). EAACI interest group on drug hypersensitivity. Drug provocation testing in the diagnosis of drug hypersensitivity reactions: general considerations. *Allergy.* 2003;58:854-63.
16. Brockow K, Garvey LH, Aberer W, Atanaskovic-Markovic M, Barbaud A, Bilo MB, et al. ENDA/EAACI Drug Allergy Interest Group. Skin test concentrations for systemically administered drugs: an ENDA/EAACI Drug Allergy Interest Group position paper. *Allergy.* 2013;68:702-12.
17. Simons FE, Arduzzo LR, Bilò MB, Dimov V, Ebisawa M, El-Gamal YM, et al. World Allergy Organization. 2012 Update: World Allergy Organization Guidelines for the assessment and management of anaphylaxis. *Curr Opin Allergy Clin Immunol.* 2012; 12:389-99.
18. Simons FE, Arduzzo LR, Bilo MB, El-Gamal YM, Ledford DK, Ring J, et al. World Allergy Organization anaphylaxis guidelines: summary. *J Allergy Clin Immunol.* 2011;127:587-93.
19. Brockow K, Romano A, Blanca M, Ring J, Pichler W, Demoly P. General considerations for skin test procedures in the diagnosis of drug hypersensitivity. *Allergy.* 2002;57:45-51.
20. Bousquet PJ, Gaeta F, Bousquet-Rouanet L, Lefrant JY, Demoly P, Romano A. Provocation tests in diagnosing drug hypersensitivity. *Curr Pharm Des.* 2008;14:2792-802.
21. Wei X, Xie Y, Wang Y. Skin test: guide of post-marketed re-evaluation of clinical safety in traditional Chinese medicine injection. *Zhongguo Zhong Yao Za Zhi.* 2011;36:2877-9.
22. Grossman SL, Baumann BM, Garcia Peña BM, Linares MY, Greenberg B, Hernandez-Trujillo VP. Anaphylaxis knowledge and practice preferences of pediatric emergency medicine physicians: a national survey. *J Pediatr.* 2013;163:841-6.

Cite this article as: Rai DK, Manjhi PK, Nair R. Knowledge, attitudes, and practices regarding drug allergy among healthcare providers in Eastern India. *Int J Basic Clin Pharmacol* 2023;12:396-401.