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Original Investigation

A Survey on General Pharmacology and Adverse Drug Effects among Undergraduate Medical Students: A Descriptive Study

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ABSTRACT

INTRODUCTION: Pharmacology is one of the cornerstones of the drug discovery process. It has been defined as "an experimental science which has for its purpose, the study of changes brought about in living organisms by chemically acting substances (with the exception of foods), whether used for therapeutic purposes or not." The purpose of this study was to assess the knowledge on general pharmacology and adverse drug effects. **MATERIALS AND METHODS:** This cross-sectional study was conducted at Janaki Medical College from January 2021 to February 2021 among MBBS First and second year undergraduate students. A structured quantitative survey, was used as an instrument for data collection. A total of 120 participants completed the questionnaire. Data analysis was carried out using SPSS version 21.0 software. **RESULTS:** In the current study, out of 120 undergraduate MBBS students, 67.5% were males and 32.5% were females. The main purpose of using drug was for treatment as reported by 33.3% of the respondents, major source of drug was plants (69.2%), while generic name was the most commonly remembered drug nomenclature. Oral route was the most common route (100%) as well as the most preferred (89.2%) route of drug administration. The first line of treatment for any illness was home remedies (54.2%) while 69.2% of the respondents reported to consume drugs for any illness after prescription by a registered medical practitioner. Similarly, 80.8% of the respondents took drugs in adequate dose while 83.3% reported to take drugs for adequate period of time for any illness. Type A was the most commonly (79.2%) reported adverse effects. **CONCLUSIONS:** The study findings demonstrated the need to reinforce information on general pharmacology and adverse effects related to different dosage forms of medications to the future practitioners.

Keywords: Adverse drug effects, general pharmacology, survey, undergraduate.

INTRODUCTION

Pharmacology is the science of drugs [1]. The birth date of pharmacology is not as clear-cut. It deals with the biochemical and physiologic aspects of drug effects, including absorption, distribution, metabolism, elimination, toxicity doses and specific mechanisms of drug action. Drug, also called as medicine, is used to treat, cure, prevent or diagnose a disease or to promote well being [2]. Drug nomenclature is the systemic naming of drug and is of 3 types: Chemical name, generic or non-proprietary name and brand name [3]. Drugs are obtained from various sources like plant, animal, mineral, microbiological, semisynthetic, synthetic and recombinant DNA technology [4]. Dosage forms are pharmaceutical drug products in the form in which they are marketed for use, with a specific mixture of active ingredients and inactive components [5]. Depending on the route of administration, dosage forms come in several types. These include many kinds of liquid, solid and semisolid dosage forms [6]. Dose is a measured quantity of a medicine, nutrient, or pathogen which is delivered as a unit. A medication administration

route is often classified by the location at which the drug is administered. Therefore it is crucial to understand the characteristics of the various routes and techniques associated with them [7]. An adverse drug reaction is "an appreciably harmful or unpleasant reaction, resulting from an intervention related to the use of a medicinal product, which predicts hazard from future administration and warrants prevention or specific treatment, or alteration of the dosage regimen, or withdrawal of the product" [8].

Pharmacology is both a basic and an applied science. It forms the backbone of rational therapeutics, thus correct and skillful application of drugs is impossible without a proper understanding of the basic pharmacology. General pharmacology has been an under-researched area, thus this study aims to observe the knowledge of general pharmacology including drug nomenclature, drug dose and dosage forms , routes of drug administration and adverse effects of drugs in undergraduate medical students.

MATERIALS AND METHODS

Study design and setting

This cross sectional study was conducted at Janaki Medical College from January 2021 to February 2021, among undergraduate students of MBBS first and second year.

Participants and study procedures

A structured questionnaire comprising of socio-demographic details, information on general pharmacology and adverse effects of drugs, was used as an instrument for data collection. Written consent was obtained from the participants (n=120) before the interview. The questionnaire for data collection was distributed to students in classrooms in the first period and was collected after the last period on the same day.

Statistical analysis and data management

The data was entered into MS excel and transferred to SPSS version 21.0 for analysis. Descriptive statistics were employed to summarize the data. The results were interpreted in terms of frequency and percentage.

Ethical considerations

Ethical approval for this study was obtained from the Institutional Review Committee (IRC) of Janaki Medical College, Tribhuvan University, Janakpur, Nepal.

RESULTS

Sociodemographic characteristics

In the current study, out of 120 undergraduate MBBS students, 67.5% were males and 32.5% were females (Table 1).

Table1| Sociodemographic characteristics of respondents (n=120)

Gender	**Frequency**	**Percent**
Female	39	32.5
Male	81	67.5
Academic year	Frequency	Percent
First	70	58.3
Second	50	41.7
Place of Residence	Frequency	Percent
Bagmati province	19	15.8
Gandaki province	14	11.7
India	1	0.8
Karnali province	2	1.7
Lumbini province	17	14.2
Madhesh province	52	43.3
Province 1	13	10.8
Sudurpashchim province	2	1.7
Total	120	100.0

80.8% of the respondents reported that they took drugs in adequate dose for any illness while 83.3% reported to take drugs for adequate period of time for any illness.

Type A (Augmented pharmacological effects) were the most commonly (79.2%) reported adverse effects. Other information from respondents on general pharmacology and adverse effects have been depicted in Table 2 and Table 3.

Table 2| Knowledge about general pharmacology of drugs

Information	Parameters	Frequency	Percent
Purpose of drug administration	Treatment	40	33.3
	Prevention	18	15
	Control	26	21.7
	Diagnosis	9	7.5
	All of the above	80	66.7
Sources of drugs	Biotechnology	3	2.5
	Microbes	14	11.7
	Plants	83	69.2
	Synthetic chemistry	20	16.7
Nomenclature of drugs	Chemical	7	5.8
	Generic	67	55.8
	Proprietary	46	38.3
Most common dosage form of drug used for any illness	Liquid	60	50
	Solid	119	99.2
	Semi-solid	9	7.5
	Vapour	4	3.3
Preferred dosage form of drug for any illness	Liquid	10	8.3
	Solid	107	89.2
	Semi-solid	2	1.7
	Vapour	1	0.8
Preferred solid dosage form of drug for any illness	Capsules	19	15.8
	Powders	2	1.7
	Tablets	86	71.7

Table 3| Information on route of drug administration treatment strategies, drug dosing and adverse effects

Information	Parameters	Frequency	Percent
What are the most "COMMON" routes of drug administration that you have used to take drugs for any illness in your lifetime?	Topical	47	39.2
	Deeper tissues	1	0.8
	Oral	120	100
	Rectal	1	0.8
	Sublingual	7	5.8
	Inhalation	12	10
	Nasal	21	17.5
	Intravenous	40	33.3
	Intramuscular	34	28.3
	Intradermal	4	3.3
	Subcutaneous	7	5.8
Which route of drug administration do you "PREFER" for taking drug for any illness?	Inhalation	1	0.8
	Intravenous	8	6.7
	Oral	107	89.2
	Topical	4	3.3
First line of treatment for any illness?	Home remedies	65	54.2
	Visit the nearest health care centre	46	38.3
	Wait and watch for symptoms to subside	9	7.5
How do you begin taking drugs for any illness?	After prescription by a registered medical	83	69.2
	Self-medication with OTC drugs	33	27.5
	Take left over medicine available at home	4	3.3
Do you take drugs in adequate dose for any illness?	Yes	97	80.8
	No	17	14.2
	Don't know	6	5
Do you take drugs for adequate period of time for any illness?	Yes	100	83.3
	No	14	11.7
	Don't know	6	5
Most common adverse effects that you suffer from while taking drugs for any illness?	Type A(Augmented pharmacological	95	79.2
	Type B (Bizarre effect / idiosyncratic	8	6.7
	Type D (Delayed effect)	9	7.5
	Type E (End of treatment effect)	7	5.8
	Type F (Failure of therapy)	1	0.8

DISCUSSION

In this study, majority of the respondents were males. The main purpose of drug was for treatment as reported by 33.3% of the respondents, followed by control of disease (21.7%), prevention of disease (15%) and diagnosis (7.5%), which is in accordance to the US Federal Food, Drug and Cosmetic Act. Sec. 210(g)(1)(B), 2018, [9] and Directive of the European parliament [10].

In this study, the major source of drug was plants (69.2%), followed by synthetic chemistry (16.7%), microbes (11.7%) and biotechnology (2.5%), similar sources of drugs were also revealed by study conducted by Newman et al. [11]. Generic name name was the most commonly remembered drug nomenclature by the respondents, which is also the name recommended by World Health Organization [12,13].

Solid dosage form was the most commonly used dosage form (99.2%) as well as the most preferred dosage form (89.2%) which was consistent with the findings of Burnside BA. [14] and Hailat et al. in Saudi Arabia [15]. Out of those respondents, who preferred solid dosage form, tablets were the most preferred ones (71.7%) which is consistent with the findings of study done by Burnside BA [14]. The possible reason for preferring solid dosage forms (tablets, capsules) is probably due to young age of the respondents. However, studies conducted in geriatric and paediatric population have shown to prefer liquid dosage form due to difficulty in swallowing solid dosage forms of drugs [14, 16].

Out of the total respondents, the most common route used for drug administration was oral (100%), which was also the most preferred (89.2%) route of drug administration. The possible reasons for preferring oral route of drug administration could be due to possibility of self-administration, economic and convenience compared to other routes of drug administration. Regarding the treatment strategies, followed by the respondent for any illness, the first line of treatment was home remedies (54.2%). Similarly, 69.2% of the respondents reported to consume drugs for any illness after prescription by a registered medical practitioner, however 27.5% reported of self-medication with over the counter drug which is similar to the findings of Chaurasia et al. [17] but the finding are contrary to the findings of Bekele KM et al. where 79.7% of the respondents had a self-medication practice [18]. 3.3% respondents reported to use the left over medicines available at home, which was also reported by Bekele KM et al. [18]. The reasons for using the drugs could be time saving, economic, convenience and easy availability of information on internet. In this study, 80.8% of the respondents reported that they took drugs in adequate dose for any illness, while 83.3% reported to take drugs for adequate period of time for any illness which is consistent with the findings of Sontakke SD et al. in Nagpur, India [19]. Though majority of respondents, were aware about the rational use of medicine, the response reported in this study emphasizes to reinforce the rational use of medicines to empower the future doctors to prescribe and practice rationally.

Responses related to adverse effects encountered following consumption of drugs for any illness revealed that Type A adverse effects were most common. Despite of these important finding in undergraduate medical students, the results cannot be generalized as only first and second year students were enrolled.

CONCLUSIONS

The present study demonstrates that, majority of the respondents preferred solid dosage form of drugs and oral route for drug administration. Also most of the respondents followed the guidelines of rational use of medicines while most of them suffered from Type A adverse effects on consumption of drugs for any illness. Based on the questionnaire, majority respondents reported using drugs rationally but, whether they actually are

practicing rational use of drugs or not, still remains a question. Since the respondents will be future practitioners and prescribers, they should be well acquainted with the knowledge on general pharmacology for providing effective health care to the patients in future.

ADDITIONAL INFORMATION AND DECLARATIONS

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Data Availability: Data will be available upon request to corresponding authors after valid reason.

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