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PREVALENCE AND NATURE OF HANDWRITTEN OUTPATIENTS PRESCRIPTION ERRORS IN YEMEN

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ABSTRACT
Objective: Prescription is an instruction written by a medical practitioner to pharmacist, which contains drug name, dose, frequency, directions for compounding, advices for drug consumption etc. The frequency of drug prescription errors is high in many countries of the world. The present study was performed to assess the current prescription writing trend for identifying frequent errors and proposing the ways by which these can be overcome. Unfortunately in Yemen although number of prescription errors is too high but there is not any study have been performed. Therefore, the aim of the present study was to indicate the prevalence and nature of handwritten outpatient prescriptions errors collected from the biggest educating hospital in Sana`a - Yemen. **Methods:** The prescribing errors were identified based on WHO guidelines for prescription writing and current guidance published in British National Formulary. The analysis of prescriptions was done manually with the help of Microsoft office Excel-2007. A total of 900 prescriptions were collected from August to January 2019. The type of error of omissions considered in this analysis includes all three important parts of prescriptions, that is superscription(Patient's information), inscription (Drug`s information), and subscription (Prescriber's information). The analyzed data were then subjected to simple descriptive analysis including frequency distribution, mean and finally expressed in percentage. **Results:** Most of the prescriptions evaluated did not follow the proper guidelines. Patient's gender, directions for patients, dosage form and duration of therapy and drug generic name were missed in more than 75% of prescriptions. Patient`s age, and illegal handwritten were missed in more than 70% of prescriptions. Medicine strength, prescribed date, prescribe signature and prescribed name were missed in more than 60% of prescriptions. The most common type of superscription error of omissions was found to be gender (**86.56%**), age (**72.11%**) and name of the patient (**7.11%**). The highest inscription error of omissions was incomplete on direction for use in **81%** of total prescription following **80%** of prescriptions omitted the dosage forms of prescribed drugs, **(78%)** of prescriptions were not having the information on dose and duration of therapy, missing the strength of medicine in (**62%**) of total prescription and (**31%**) incomplete information on drug frequency. It was also found that more than **70%** of prescriptions had illegible handwriting, **(69%)** of prescriptions omitted the prescriber's signature, **60%** of prescriptions omitted the date of prescription and (**43%**) of prescriptions omitted the prescriber`s name of total prescriptions. Most drugs in the prescription were written by trade name (52%) which equal (69%) from the total of prescription errors where (27%) of the medicines were written by generic name. **Conclusion:** We conclude from this study that the handwritten prescriptions for outpatients were associated with significant frequency of minor and major prescription error of omissions. These serious prescription errors are the major cause of patient incompliance, cost of therapy, drug adverse reactions and ultimately the patient morbidity and mortality. Therefore, the study suggests the prescriber has to be more professional, cared, focused and concentrated during writing prescription for the outpatients. Implementation of computerized order entry system and participation of pharmacists at all points of medication process may also substantially improve prescription-writing trend.

KEYWORDS: Outpatient Prescription; Prescription error, Handwritten error, WHO Standards; BNF, Yemen.

INTRODUCTION

A prescription drug order's is lawful written instruction from licensed physician or other medical practitioner to a licensed pharmacist regarding the compounding or dispensing and administration of drug/s or other medical services to the patient.[1] Although every country may have different regulations of prescription writing but most of them including Yemen adopted the guidelines defined by World Health Organization (De Vries TP et al., 1995) and British National Formulary (BNF, 2010). These guidelines suggest that prescriptions should contain complete prescriber's, patient's and drug's information also including directions for using the drugs. Prescriptions comprise of four parts. The first one is the symbol for recipe that is found in the superscription and then in the inscription specifies the ingredients and their quantities, the dosage form, dosage strength, and route of administration. The third part is named subscription in which is written the directions for compounding and in the part which is usually preceded by sign are written the direction to be given and written on the dispensed medicine including how to take and how many and how long is the therapy.[2] Furthermore, a prescription drug order shall contain the full name and address, gender and age of the patient and also contain the name of and address with telephone number of the prescriber. Other specifications include the refills authorization, prescriber's signature, registration number for controlled drug, precaution or referral advice records to be kept. Correct prescription writing has potentially significant influence on the fate of medicine therapy and health patient. Errors in prescribing may classified into three main types: Errors of superscription, inscription and subscription. Prescribing errors may be have various detrimental consequences.[3] Hence, the components of a prescription should be clearly written, free of drug-related omission (incomplete prescription), omission(incorrect information), and integration errors, without nonofficial abbreviations and fulfill the legal requirements of a prescription.[4,5] The errors of prescribing are the commonest form of avoidable medication errors and are considered the most important target for improvement.[6] The process of prescription generation and dispensing is governed by regulatory systems, the purpose of which is to maximize the safety and efficacy of the product supplied. Community pharmacist have an important role in checking prescriptions to ensure that they are appropriate to dispense.[7] Many studies had identified and documented problems associated with prescribing errors. The extent of such errors varied with 2.6% to 15.4%. Studies have shown that 15% to 21% of prescriptions contain at least one prescribing error.[3] Approximately 7.1% prescribing errors were detected during the study period of 1580 medication errors at teaching hospital in India has reported that 5% of prescriptions were incomplete.[9] In Bahrain Alkhaja et al. explored prescription errors and found 7.7%, prescriptions dispensed were found to contain errors. However, 18.7% prescription errors were found a study conducted at primary health care center in Riyadh city.[10] A study conducted in Indonesia by PerWitasari et al. recorded a wide variation in error of omission from 0.44 to 98.69%.[11]

Other studies show that pharmacists need to clarify prescriptions in 1% to 5% of prescriptions.[5] A survey conducted in prescription errors occurring in general practice concluded that the high rate of errors was mostly as a result of handwriting prescriptions.[5] As given evidence in a review of literature concludes that patient's outcomes can be improved due to the intervention of pharmacists.[12] Another study states that not only the pharmacist's role in dispensing process is vital, policies and procedures should exist to prevent errors.[13] Moreover, implementation pharmacist intervention in the care of patient taking multiple medications considerably reduce the cost, reduce adverse reactions and improve quality of life of the patient.

The study was designed to assess rates and types of handwritten outpatient prescribing errors when information is omitted. The present retrospective and observational study is the first in its kind, its outcome may assist the health professional to know the frequencies and type of prescription errors of omission occurring and to think on the steps to be taken to avoid these errors in better care and safety of patients. Moreover, outcome of the study reinforces the important of prescription screening and interventions by pharmacists in minimizing preventable adverse events attributed to medication errors.[14] It also emphasizes the necessity of interdisciplinary communication and cooperation in identifying and resolving optimal therapeutic outcomes for the patient.[15,16] The literature review has shown no study being conducted to know about the epidemiology of prescription errors of omission in outpatients being discharged from the hospitals in Yemen.

MATERIALS AND METHODS

Collection of Prescriptions

Total 900 handwritten outpatient prescriptions from the largest educating hospital in Sana`a, Yemen were collected by pharmacists who working in the outpatient pharmacy from August 2018 to January 2019.

All prescriptions were included without exclusion criteria, being these prescriptions obtained from outpatient.[17] A verbal consent was taken from all the patients during the survey. The survey was carried out with the close supervision of pharmacists and chief investigator Dr. Khaled Alazazi. This survey based research is also supported by the Department of Pharmacy, Daralsalam International University for science and technology, Sana`a, Yemen. The collected prescriptions were analyzed by experienced hospital pharmacists for the presence of prescription errors depending on prescribing parameters defined by World Health Organization (De Vries TP et al., 1995) and current guidance published in British National Formulary

(BNF, 2010). Data was evaluated using an analysis sheet that includes all essential parameters defined by the WHO and BNF for prescription writing. These parameters include prescriber's information (Name, date on prescription, legible handwriting and signature), patient's information (name, age, and gender), drug's information (drug brand/generic/mixed name, strength, dose, frequency, route of administration and duration and directions for patients).

The survey was carried out inside the outpatient pharmacy and all the prescription were collected from the patient and recorded in the registration book of the pharmacy. The collected questionnaires were then analyzed manually with the help of Microsoft office Excel-2007 and standard treatment guidelines. The data were then subjected to simple descriptive analyses including frequency distribution, mean and finally expressed in percentage. In order to replicate normal bias working conditions as much as possible, prescribing doctors were not informed about the study.

Classification of prescribed drugs
The prescribed drugs were checked manually with the help of text book such as the British National Formulary.

The frequencies of different class of drugs analyzed in the prescription includes antibiotics, non-steroidal anti-inflammatory drugs(NSAIDs), anti-diabetics, antipyretics, cardiovascular system (CVS) drugs, antacids, antiamaombiasis, bronchodilators, anti-cough, anti-anthelmintic, lipid regulations, multi-vitamins, antihistamines, antispasmodics, anti-depression etc.[18]

Types of prescription errors
Hand written outpatient prescription errors were identified by following the survey conducted in Oman.[19]

Superscription errors
The superscription errors of omissions are classified based on the information omitted on patient age, name and gender.

Inscription errors
The inscription errors considered in this survey includes an incomplete information on dosage form, strength of medicine, omitted on direction for drug use, illegible handwriting, dose and duration of therapy. In addition to the previous the drug names were concerned, trade name, generic name and mixed name.

Subscription errors
The subscription errors considered in this survey includes information omitted on name of prescriber, prescriber's signature, and date of prescription.

RESULTS
Classification of prescribed drugs
A variety of drugs was prescribed; however, only the drugs with frequencies higher than 1% of total prescribed

drugs were depicted in Figure 1. The drug with highest frequency of occurrence was antibiotics (47%), the second highest category of drugs was NSAID (34%) and the third highest drug prescribed was antidiabetics (33%) of total prescription. Antipyretics, CVS drugs, antacids, antiamebiasis, bronchodilators and anti-chough were also found to be most commonly prescribed, 20%, 20%, 13%, 13% and 7% respectively. Furthermore, anti-anthelmintic, lipid regulation, vitamins and anti-histamines, antispasmodics and antidepressants were drugs with the lowest frequency, 4%, 3%, 2%, 2%, 2%, 2% and 2% respectively shown in Figure 1.

DISCUSSION
A total of 900 prescriptions were collected from the major educating hospital in Yemen, in which a total of 1859 drugs were prescribed. The average drug per prescription was 2.1, the range was 0.5 for the maximum drugs prescribed per prescription, and the minimum drug prescribed was 0.01. The literature suggests that frequency of error increases with an increasing number of drugs.[18] One of the reasons for this diversity may be due to the number of doctors that prescribed the drugs. The highest frequencies of prescriptions were found for antibiotics (46.56%) which are low to the very recently published study.[20]

Regarding analysis of patient's information (Superscription. Table 02) we found that only few prescriptions had been identified as being lacking the name (**7.11%**). On the other hand, a large proportion of prescriptions did not possess the gender (**86.56%**) which has a great impact on the medication. For example, some medications react more fast or better with female than male. Therefore, gender play role in prescribing medication. These results are in line with the study carried out in Nepal.[14] The second highest superscription error of omission was patient age (**72.11%**) which is very important in terms of dose and dosage form and much higher than the 52.4% of Indonesian study.[11] Pertaining to drug's information on prescription (Inscription. Fig. 03), we observed that (75%), (18%) and (7%) prescriptions contained brand, generic and mixed names respectively. The highest number of omissions in inscriptions observed was incomplete directions for drug used for patient (81%), incomplete information on dosage form (80%), incomplete dose and duration therapy (79%), missing the strength of the medicine dosage form (62%), and incomplete information on dose frequency(31%) not clearly written or omission of that may lead to dispensing errors[21] which could also lead to misunderstandings. For instance, some drugs are to be taken in only at night and some combination cannot be taken altogether due to some harmful interactions. Directions should be clear, complete, and should provide careful instructions to the pharmacist for the patient. The results are found to be higher than 26.43% of recently reported study[11], 25% reported by Nadeem, et al.[7] and 25.53% of study done in teaching hospital in India.[5] Based on a survey

conducted in a general practice in US, the highest frequency of errors was due to incomplete direction or not mentioned at all, followed by the strength of drug omitted and prescribed quantity omitted.[21] As shown in figure (04), (70%) prescriptions names of drugs were not readable due to illegible handwriting. It creates definitely serious problems to the retail pharmacist who sometimes misinterpreted or even dispenses wrong medicine to the patient. The prescriber's signature is imperative, without it, the drug cannot be dispensed to the patient. The rate of occurrence of this error was 69%, which is higher to 5% and 5.1% of occurrence as reported in the studies.[5,7] However, another type of error occurring considerably high is the date of prescription (60.44%). The date of prescription is essential part of record. In case a patient suffers from an adverse reaction or the therapy is not being effective, the date could indicate when the patient started the therapy. The amount of this error in the present study was higher than the 1.02% of study carried out in India and 7.42% of study in Indonesia.[7,11] The implications of our findings are significant. First, it is clear that handwritten outpatient prescription errors of omission are abundant in Yemen as found in different countries of the world.[5,7,11,14] Second, clinical pharmacist has a significant role to play in avoiding significant prescription errors and improve the mechanism of patient care by working together with all health professionals.[8] Overall in our study, a total

number of (7587) prescription errors were found (Fig. 02). Approximately half 4252 (48.0%) of the total errors were related to missed drug information. On the other hand missed patient's information were in 1474 (39%) and 5414 (39.0%) prescriptions respectively. Finally, approximately one-tenth 984 (13.0%) of missed prescriber`s information (illegible information, physician name, signature & date prescribed) type errors were found.

To study the general classifications of errors it was clear from the Figure (Fig. 5), the inscription error was (45%), while the subscription (33%) and the superscription was (22%), which revealed that the most errors related to the drug information which reflex a serious omission.

The Figure (6) revealed that the percent of analysis of all prescreption parametres where, it was clear that the gender of the patient is the highest parameter with (87%) while the mixed of drug name is the slowest parameter with (7%).

The Figure (7) illustrated the classifications of drugs according to the name where it was clear that the percent of writing of the drug with the trade name were with highest percent (52%), this revealed the strong effect of companies in the process of changing the way of the physician prescribing.
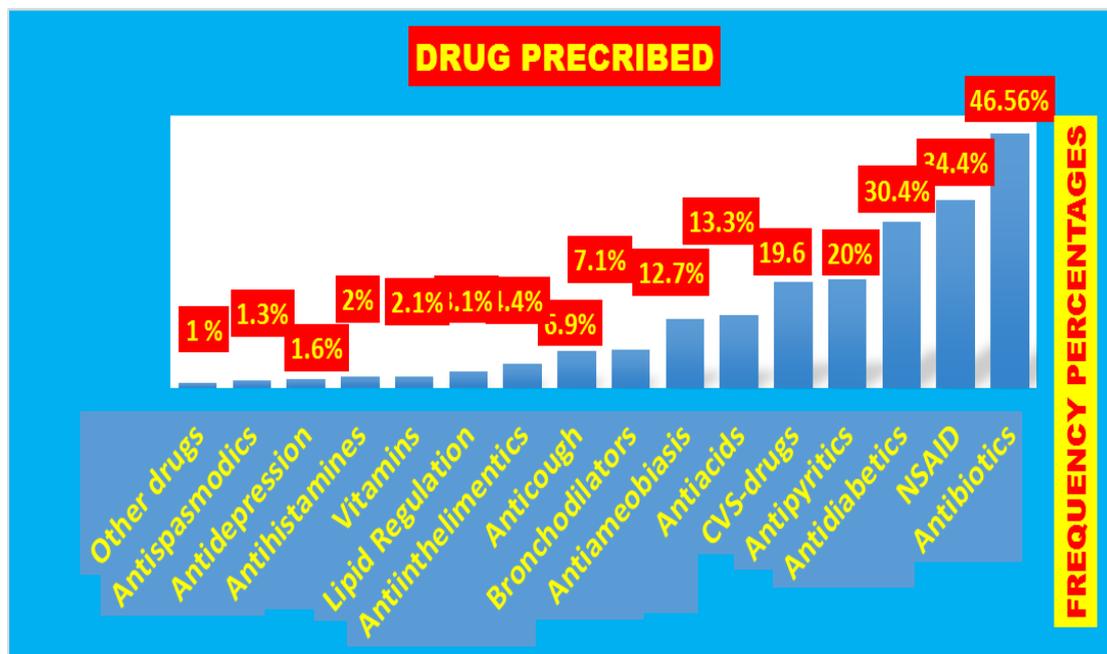

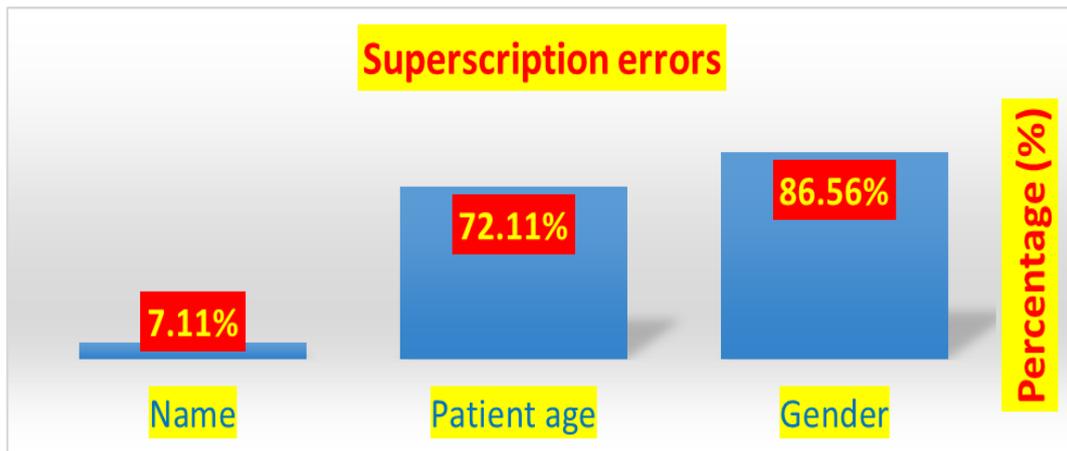**Figure 1: Classifications of Prescribed drugs and their percent of occurrence.**
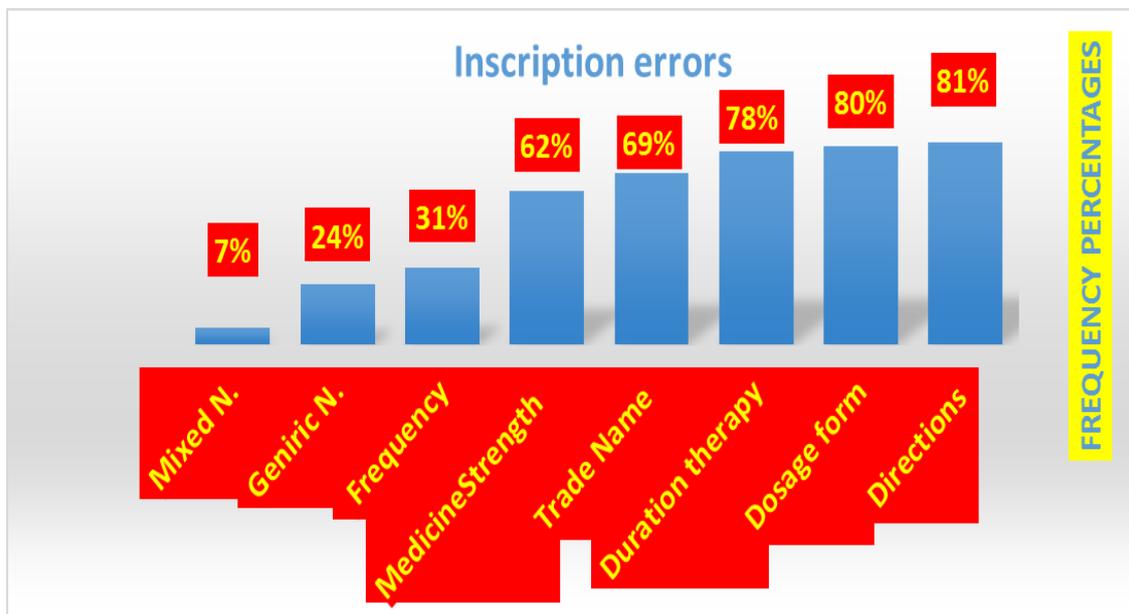
Fig. 2: Superscription error of omissions.
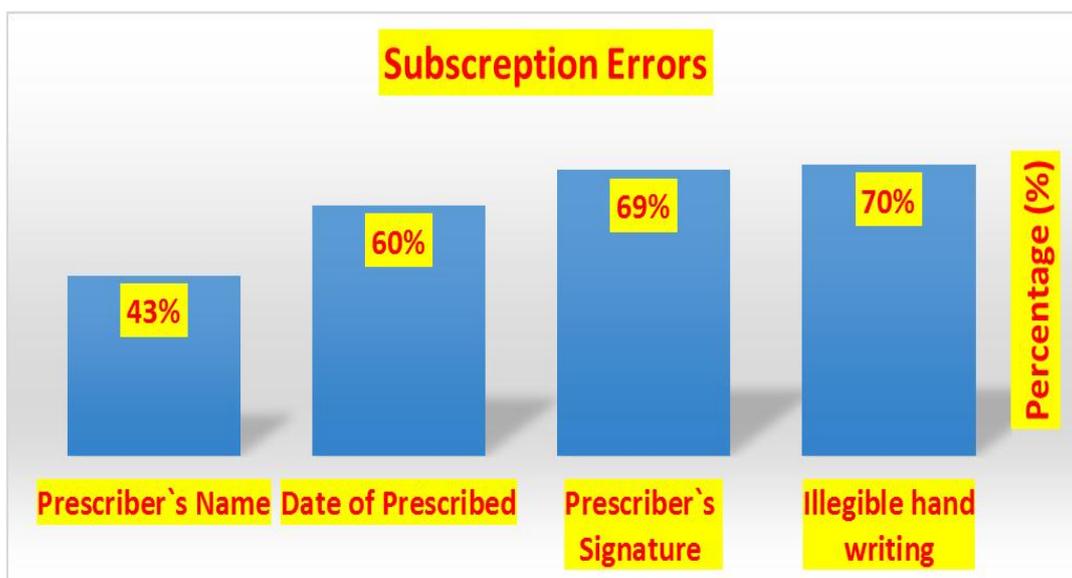
Fig. 3: Inscription error of omissions.

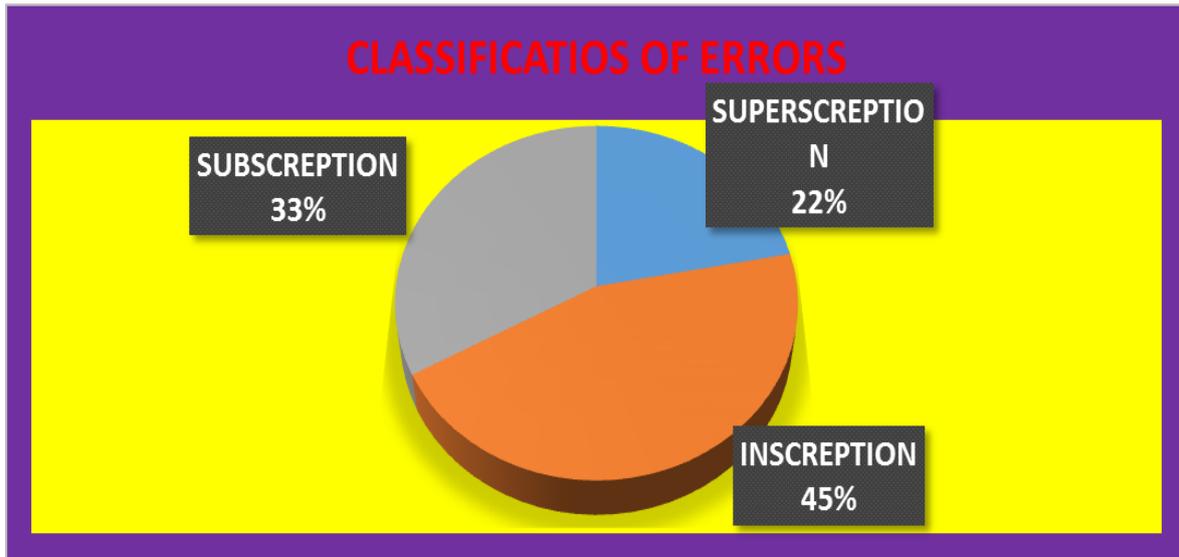**Fig. 4: Subscription error of omissions.**

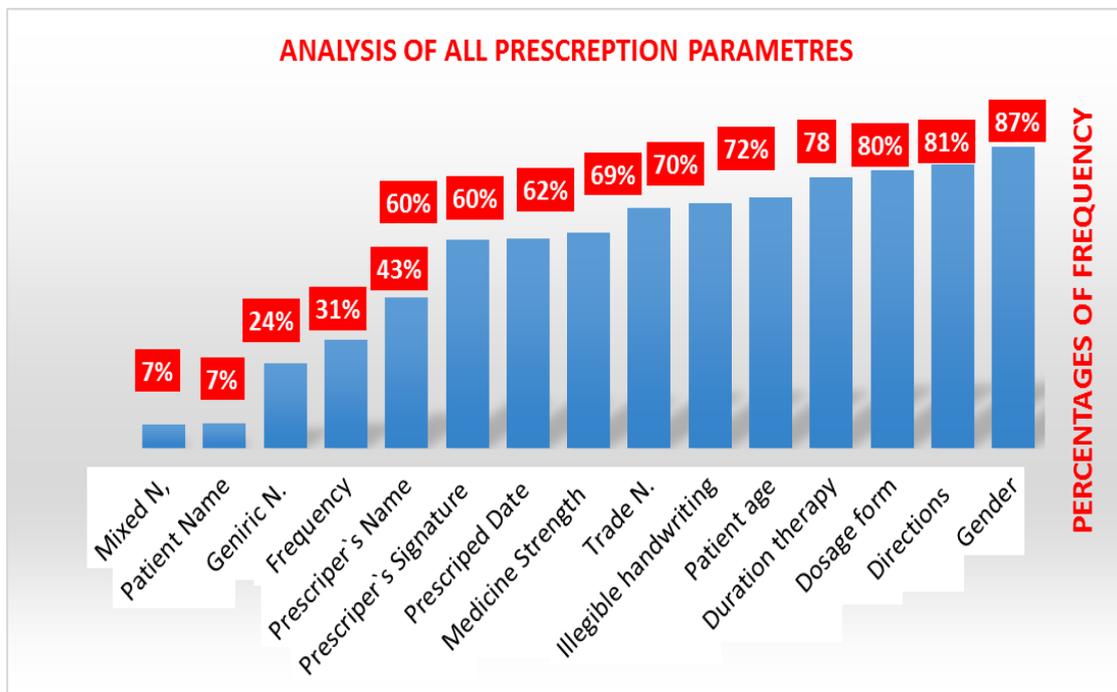**Fig. 5: General Classifications of Errors.**

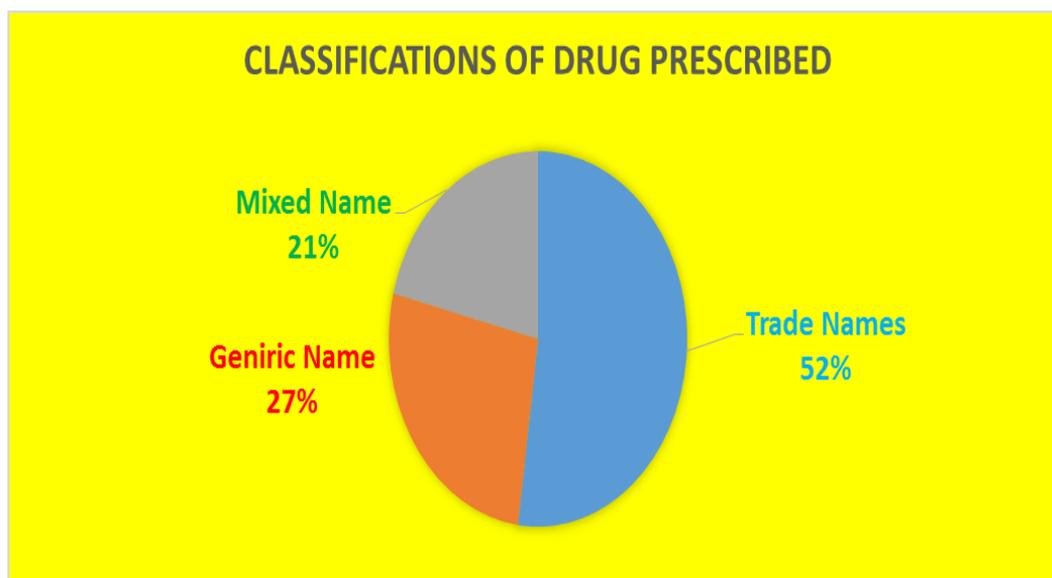**Fig. 6: Analysis of all prescription parameters.**

Fig.7: Classifications of drugs according to the name.

CONCLUSION
Our study revealed serious problems in prescription writing trend as most of the prescriptions did not follow the proper guidelines. Lack of patient`s gender, directions about drug used, duration of therapy and drug generic name were the most frequent errors. Moreover, a significant number of prescriptions were also written illegibly. This study is a small attempt to represent prescription errors at hospitals in Yemen. From our study, it is clear that prescription errors are highly prevalent for outpatients. Therefore, the study necessities the large scale research on prescribing errors in different cities, specialties and hospitals in order to get the actual scenario of Yemen. Besides, the study suggests the prescriber's to be more professional, cared, focused and concentrated during prescription for the outpatients. Furthermore, the study urges the inclusion of clinical and retail pharmacist to reduce the prescription error of omissions. Implementation of proper error reduction strategies such as; error reporting, use of computerized prescription order entry system and software programs which shows caution in case of errors and by appreciating the role of pharmacists at all points of medication process may greatly improve prescription writing trend, enhance the physician attention and reduce the errors.

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