International Journal of Pharmacy and Biological Sciences- ISSN: 2321-3272 (Print)
IJPBS | Volume 5 | Issue 4 | OCT-DEC | 2015 | 40-48
Research Article – Pharmaceutical Sciences

ASSESSMENT OF PATTERNS OF DRUG UTILIZATION EVALUATION BY WHO PRESCRIBING INDICATORS AMONG SPECIAL POPULATION IN A TERTIARY CARE TEACHING HOSPITAL IN TAMILNADU

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ABSTRACT

The objective of the study was to assess the patterns of drug utilization evaluation by WHO prescribing indicators among special population in a government tertiary care teaching hospital. Data were collected retrospectively and prospectively by scrutinizing 1139 prescriptions among special population for a period of six months.The average number of drugs per encounter was 6.69 and 41.74 drugs were prescribed by generic name. Use of antibiotics (56.1% of encounters) was frequent, but injection use (66.07% of encounters) was very high. A low number of drugs prescribed (60.5%) conformed to a National essential drugs list. Interventions to rectify over prescription to be written in generic name, to reduce the use of antibiotics after susceptibility testing , to minimize the use of injections and to confine to the National essential drug list are necessary to further improve rational use of drugs in our facility.

KEY WORDS

WHO prescribing indicators, Essential drug list, Generic name.

INTRODUCTION

The World Health Organization (WHO) suggests a set of drug use indicators that has proven useful in the investigation of drug prescribing patterns in health care facilities (WHO, 1993). Prescribing indicators have been used in several studies, showing problems in the pattern of drug prescribing in different regions of the world. These studies provide data to be used in future strategies aiming to promote rational drug use.

Several studies have assessed patterns of drug use practices in the primary health care setting using WHO prescribing indicators (Bhavesh KL et al 2012 [1] Angamo TM[2] et al 2013,T.H. Fereja[3] et al 2013). However, it is also important to assess the drug use situation in health facilities that provide more complex health services. Although specific indicators have not been described for these services, WHO prescribing indicators for primary care may be a helpful tool for such work in secondary and tertiary care settings.

This inappropriate use has serious health and economic consequences for the success of national health care system. The irrational use of drugs becomes the world wide problem than the absence of drugs information.

Generally, irrational drug use are numerous and complex involving the health system, prescriber, dispenser, patient and the community. Due to such worsened condition, it is now felt that the overall drug use situation needs to be assessed, problems identified and remedial intervention strategies to be implemented so as to check dangerous trends in drug utilization in India.

The central government has amended rules in Indian medical council regulations2002, directing to prescribe drugs with generic names in legible and capital letters. Fear of misinterpretation due to

doctor's illegible hand writing may soon be a thing of past as government is set to make it a norm for the physician to prescribe the drugs generic and capital letters. The union health ministry came out with gazette notification under MCI regulation which mandate doctors to prescribe the generic drugs in capital letter. Under this, the prescription should be legible and preferably written in capital letters along with the name of the generic drug prescribed. This will decrease prescription errors and patient able to know whether the drug is generic or not. It is considered as cheaper alternative to electronic records. On the month of June, rule has been come out without disturbing the system of practice. So we planned to assess retrospectively and prospectively the practice of the use of generic name and other WHO prescribing parameters and also tried to find out reasons regarding the irrational trends drug utilization evaluation[4].

Therefore, the objective of this study is to assess the patterns of drug utilization evaluation by WHO prescribing indicators among special population in a tertiary care government teaching hospital in Tamilnadu retrospectively and prospectively.

AIM

The aim of this study was to assess the patterns of drug utilization evaluation by WHO prescribing indicators among special population in a government tertiary care teaching hospital.

METHODS AND MATERIALS

A prospective observational study was carried out among special population in a tertiary care teaching hospital in Tamilnadu for 6 months period from March 20 to August 20, 2015. Four well-trained pharmacy personnel was collected data on prescribing indicators prospectively by using case sheets of in-patients in 3 special wards of pediatrics, geriatrics, pregnant and lactating patients and retrospectively by checking accounts. The specific types of data necessary to measure the prescribing indicators would be recorded for each patient encounter and entered directly into an ordinary prescribing indicator form. All the pediatrics, geriatrics, pregnant and lactating patients are included in this study.

According to WHO drug use evaluation guideline, prescribing indicators used includes average number of drugs per encounter, percentage of drugs prescribed in generics, percentage of prescriptions with antibiotics, percentage of prescriptions with injections and percentage of prescribed drugs from Essential Drug List (EDL).

- The average number of drugs prescribed per encounter was calculated to measure the degree of polypharmacy. It was calculated by dividing the total number of different drug products prescribed by the number of encounters surveyed. Combinations of drugs prescribed for one health problem were counted as one.
- Percentage of drugs prescribed in generics is calculated by dividing the number of drugs prescribed by generic name by the total number of drugs prescribed, multiplied by 100 which are calculated to measure the tendency of prescribing by generic name.
- Percentage of prescriptions with antibiotics was calculated by dividing number of patient encounters with an antibiotic prescribed by the total number of encounters surveyed, multiplied by 100. It is calculated to measure the overall use of commonly overused and costly forms of drug therapy.
- Percentage of prescriptions with injections was calculated by dividing the number of patient encounters with an injection by the total number of encounters surveyed, multiplied by 100. It is to measure the degree to which practices conform to a national drug policy as indicated by prescribing from the national essential drug list.

The independent variables of this study were; age, sex, education status and diagnosis of the patients. All data was first analyzed manually and then using Microsoft Excel 2007.Data was expressed as absolute frequency and percentage, mean and standard deviation (SD).

RESULTS

The WHO prescribing indicators of drug use, namely the average number of drugs per prescription, percentage generic prescribing, percentage prescribing based on EDL, and percentage

prescriptions with documented diagnosis, in a hospital in Tamilnadu.

A sample Of 586 patient encounters was assessed retrospectively for 3months from to march 2015 to may 2015 and 553 patients was assessed prospectively from June 2015 to august 2015 for 3 months in the special populations in a tertiary care hospital in Tamilnadu. Data analysis was carried out using computer software called Statistical Package for Social Sciences (SPSS) version 20.0.prescribers, pharmacists and other healthcare professionals were interviewed about the cause of the irrationality in prescription which revealed during this study.

In paediatric population total number of drugs in retrospective and prospective study was found to be 1221and 2144 respectively. The average number of drugs per prescription or mean was 6.1 in retrospective and in prospective it was found to be7.28 with a range between and Total no of the drugs are more in geriatrics population compared other special population which was found to be 34.46% in retrospective and 22.96% in prospective. The mean no of drugs were more in the geriatrics population (7.63) followed by paediatric (6.69) and pregnant (3.7) population.. On average, each prescription carries 6.96 drugs when looked at the population in the study.

The WHO recommends that the average number of drugs per prescription should be less than 2[5]. Higher values imply overprescribing[5]. Poly pharmacy is one of the essential indicators of potential drug-drug interactions with high risk of fatality combined or synergistic effects, higher incidence of adverse drug reactions, medication non-adherence and hence poor treatment outcomes that even can lead to death. It is also shown in another similar study such as Karande S[6] et al and Vallano[7] et al. In general, such findings call for urgent and well organized interventions by pharmaceutical policy makers to tackle this bothersome problem of polypharmacy.

Parameters	Paediatrics				Geriatrics				Pregnant & lactating			
	Retrospective		Prospective		Retrospective		Prospective		Retrospective		Prospective	
	Freq. (Ave. / %)	SD	Freq. (Ave. / %)	SD	Freq. (Ave. / %)	SD	Freq. (Ave. / %)	SD	Freq. (Ave. / %)	SD	Freq. (Ave. / %)	SD
Average number of drugs per encounter	1221 (6.1)	2.26	1787 (7.28)	2.68	2144 (7.14)	2.39	2430 (8.12)	2.51	182 (4.33)	1.60	173 (3.2)	0.98
Percentage of drugs by generic name	668 (37.3)	2.43	496 (40.62)	1.10	498 (23.22)	1.31	1083 (44.56)	1.67	79 (43.40)	1.27	106 (61.27)	0.70
Percentage of encounters with antibiotics	175 (71.42)	1.18	144 (72)	1.20	206 (68.66)	1.33	209 (69.89)	1.12	20 (42.85)	4.40	14 (26.41)	0.66
Percentage of encounters with injections	185 (75.51)	0.73	155 (77.5)	0.96	250 (83.33)	0.63	220 (73.57)	0.88	43 (23.62)	1.33	25 (47.16)	2.20
Total EDL drugs/ Encounters	625 (51.18)	2.88	1219 (68.21)	1.68	1120 (52.23)	1.46	1402 (57.6)	2.72	135 (74.17)		126 (72.83)	0.96

Figure 1: Evaluation of the WHO prescribing indicators in special population

50 healthcare professionals including physicians, pharmacist and nurses were interviewed regarding their opinion on the reason behind polypharmacy. According to the healthcare professionals the polypharmacy exist in the health system for many reasons. In our study we found that 48% of the healthcare professionals reported concomitant illness as the main reason behind the polypharmacy. The attempt to facilitate sudden improvement in the patient's morbidity (24%) is considered as the second reason behind polypharmacy. 20% of them responded that inadequate knowledge about appropriate indication is another significant cause for polypharmacy. 19% of the healthcare professionals agreed to the fact that multiple physicians treating a same patient might result in polypharmacy. Unclear diagnosis and attempt to prevent side effect was accounted by 8% of the healthcare professionals. An unclear diagnosis leads the physician to prescribe multiple drugs as they are treating the patient symptomatically till the significant diagnosis is discovered. And also, the patient is prone to experience side effect due to the any drug interaction and it is necessary for the patient to take additional drugs to prevent them which leads to polypharmacy(Fig:1).

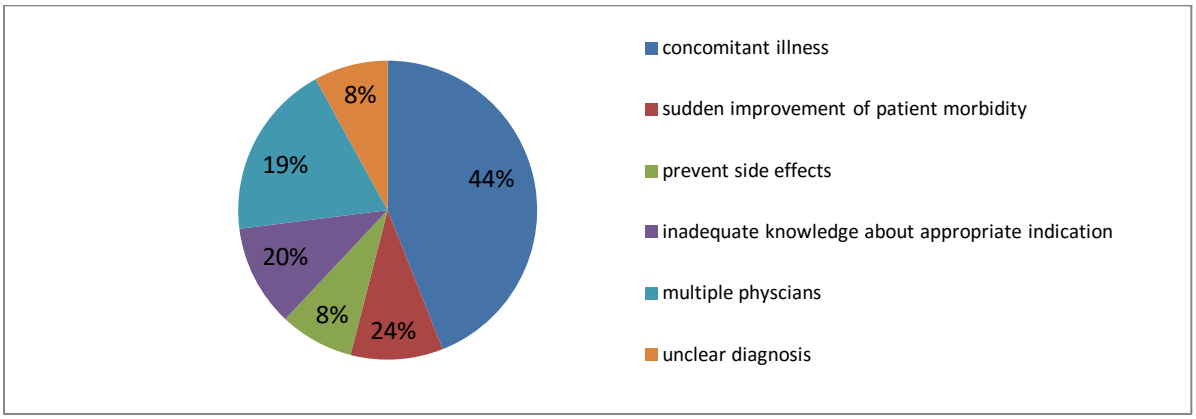

Figure 1: Reasons for polypharmacy

In retrospective study, percentage of generic names used in paediatrics, geriatrics and pregnant population was found to be 37.38%, 23.22% and 43.40% respectively where as in prospective study the percentage of generic names used in paediatrics, geriatrics and pregnant population was found to be 40.62 %, 44.56 and 61.27% respectively. The total number of drugs prescribed by generic name was 41.74% .The percentage of drugs prescribed by generic name was improved after amendment, but it was small in percentage and very low compared to the standard by the WHO. Study showed that change in practice was more in gynaecology than other wards according to the amendment.

Lack of knowledge about its relevance (16%), lack of practice (34%), influence pharmaceutical companies (30%) and lack of time (20%) were found to be reasons of less use of generic name by an interview among health professionals(Fig: 2).

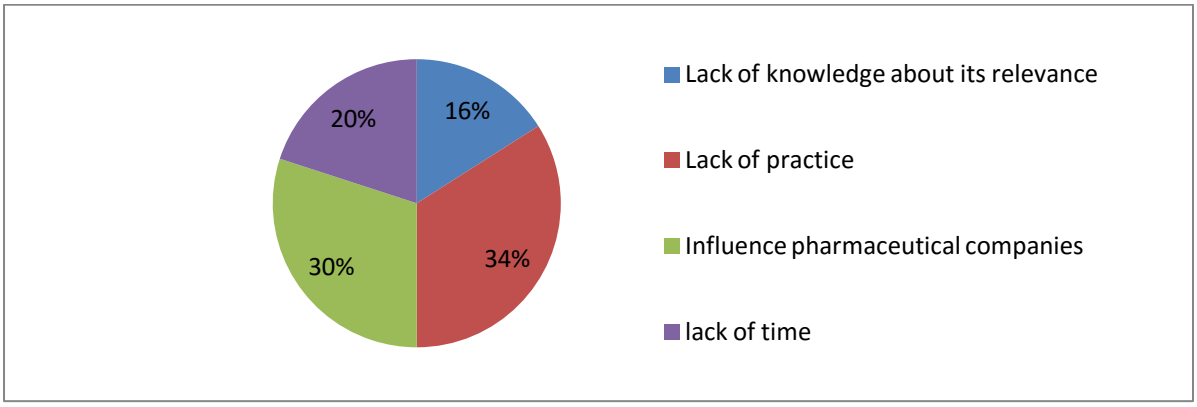

Figure2: Reasons for lesser use of generic name

Likewise, looking at the antibiotics prescribing tendency of this hospital, it was discovered that antibiotics prescribing is as high as 72% in paediatrics with highest frequency followed by geriatrics with 69.89% and as less as 26.41% in pregnant and lactating women As much as possible antibiotic prescribing in health facilities should be low and if possible based on susceptibility test results against the responsible microorganisms. This is mainly to combat the emergence of multidrug resistant organisms which are more difficult to treat. It is for such reason that WHO recommends antibiotic prescribing should be as low as less than 30%[5].

According to this standard reference the finding of the present study showed that there is overprescribing of antibiotics (56.1%) in common at

the hospital. The use of antibiotic was shown in the paediatric population and in the geriatric population. Antibiotic use is too less in the pregnant and lactating mothers because, most of the antibiotics are teratogenic and excreted through the breast milk so it should be used cautiously. The percentage of drugs encountered with antibiotics were 175 (72%), 206 (69.89%), 20 (26.41%) in paediatric, geriatrics and pregnant respectively.

The most commonly prescribed antibiotics were amoxicillin (24.8%), ciprofloxacin (15.1%) metronidazole (13.7%), sulfamethoxazole and trimethoprim (8.91%) and cephalexin(6.08%) in paediatric population. Elderly patients were prescribed 15 antimicrobial agents. The most common ones were ciprofloxacin (28.5%) amoxicillin (28%), ceftriaxone/cefotaxim (15.3%), and metronidazole (16.3%) gentamycin (6%) accounting for 94% of all antibiotic prescriptions among the elderly. In pregnant women antibiotic should be used with caution, the most commonly prescribed antibiotic was amoxicillin-clavulanic acid (46.5%), cephalosporin (20.2%), cloxcillin(8.1%), pipercillin(6.8%), and erythromycin(2.7%) (Table: 2).

Name of drugs	Freq.(percentage)
Paediatrics	
Amoxicillin	176(24.8%)
ciprofloxacin	107(15.1%)
Metronidazole	97(13.7%)
Sulfamethoxazole-trimethoprim	63(8.91%)
Cephalexin	43(6.08%)
Geriatrics	
ciprofloxacin	298(28.5%)
amoxicillin	292(28%)
metronidazole	171(16.3%)
ceftriaxone/cefotaxim	160(15.3%)
gentamycin	64(6%)
Pregnant and lactating women	
amoxicillin-clavulanic acid	34(46.5%)
cephalosporin	15(20.2%)
cloxacillin	6(8.1%)
piperacillin	5(6.8%)
erythromycin	2(2.7%)

Table 2: Antibiotics prescribed in special populations

In general, such irrational prescribing of antibiotics is very common in developing countries too that need very stringent control by drug regulatory bodies of respective country to halt the alarmingly increasing antimicrobial resistance in developing countries. Moreover, drug use evaluation researches are mandatory in this region to find out whether this vulnerable class of drugs is being prescribed rationally or not.

On interviewing 50 healthcare professionals on the reason behind antibiotic over use, the majority of them (56%) reported that it is due to emergence of antibiotic resistance. In the present scenario antibiotic resistance is one of the main problems faced in the healthcare system, due to the usage of the higher antibiotics in the initial stage, improper compliance to the antibiotic regimen and the patient's attitude to overuse antibiotics over the counter. 25% of the healthcare professionals responded as lack of sensitivity test to be the reason behind antibiotic over use. Sensitivity test is very important parameter in prescribing an antibiotic since different pathogens are sensitive to specific antibiotics and failure to prescribe the appropriate

antibiotic results in failure of the therapy as well as increase the chance of emergence of resistance. As the higher antibiotics are of high cost, it directly leads to economic burden to the patient and even if the patient needs a higher antibiotic for his medical condition, he is indirectly forced to take the lower antibiotics with low cost which ultimately leads to the therapeutic failure as well as resistance towards the lower antibiotic. This was the reason reported by 13% of the healthcare professionals. Lack of provision of sufficient antibiotic and lack of provision of newer antibiotic by government was reported as reasons by 4.5% and 2% respectively (Fig: 3).

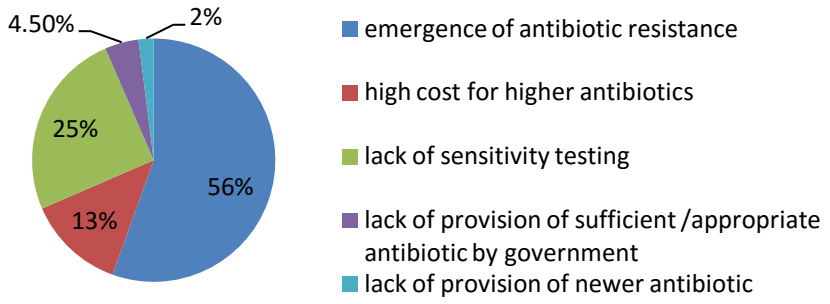

Figure 3: Reasons for antibiotic over use

Injections are very expensive compared to other dosage forms and require training for administration to avoid risk associated with it. Furthermore, the use of injections can increase the risk of transmission of serious infections like hepatitis, HIV/AIDS and many more if there is no hygienic practice. The use of injection for treatment accompanied with variety of disadvantages including sepsis at administration, the risk of tissue toxicity from local irritation, costly, difficulties in correcting the error. To reduce these physical and economic burden due to injections, WHO encourages the prescribing of injectables to be as low as less than 10%.Of all encounters with injections prescribed, as high as 155 (77.5%) encounters with injections in paediatrics was analysed followed by 220 (73.57%) in geriatrics and 25 (47.16%) in pregnant and lactating women which together accounted for 66.07% of all encounters with injections prescribed.

36% of 50 healthcare professionals interviewed agreed to the fact that the injection over use was due to the "belief of patient". As the patient demands to take injection over oral dosage forms for speedy recovery the physicians are forced to prescribe injection which ultimately leads to injection overuse. 28% of the healthcare professionals report they prescribe injections in the condition where the patient is intolerant to the oral medications such as those in coma or bed ridden. 25% of them agreed that the use of injections were to obtain a faster onset of action. 11% of the health care professionals reported that the over use of injection depends on the attitude of the physician (Fig: 4).

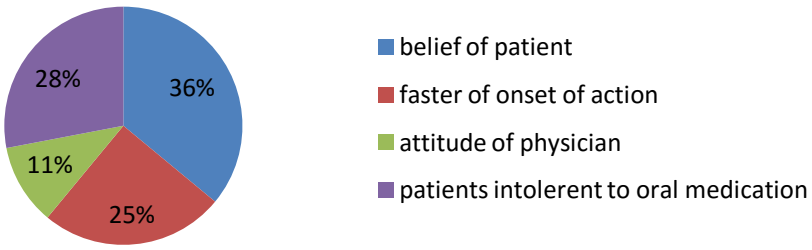

Figure 4: Reasons for injection overuse

In the present study 60.5%of the total prescriptions had one or more drugs prescribed from the National List of Essential Medicines 2011.Most of the drugs were prescribed from EDL compared with the ideal value of 100%. The percentage of drugs prescribed from Essential Drug List of India were 1219 (51.18%), 1120 (57.69%), 135 (72.83%) in Pediatrics, geriatric and pregnant population respectively. Various factors affect the prescribing of drugs from the EDL including the influence of pharma companies(46%),lack of government supply(23%),prescribers' attitude(5.4%),lack of updation of EDL(13%),lack of knowledge on the necessity to prescribe from EDL(10%),lack of practice(2.6%) (Fig: 5).

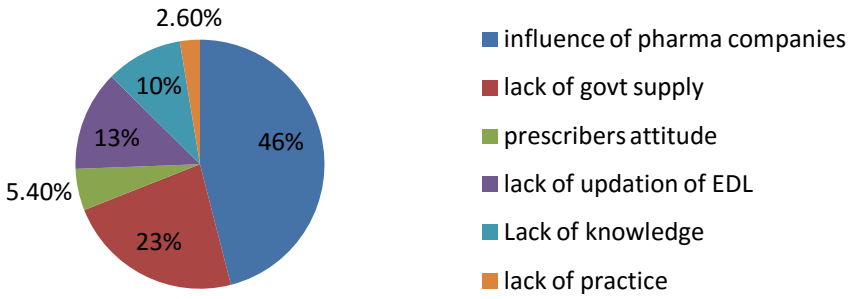

Figure 5: Factors affecting prescription of drugs from EDL

DISCUSSION

The average number of drugs per prescription or mean was 6.1 in retrospective and in prospective it was found to be7.28.The average number of drugs per prescription was found to be 6.6 which was higher when compared to other studies like those by Chandelkar UK et al[8] .His study showed that average number of drugs prescribed per encounter was 1.8 with a maximum of 6 drugs, which is within the range as compared with the standard (1.6-1.8) derived as ideal and is acceptable compared with the WHO's recommended value of 1.3-2.0[5].

But in the current study the result came in to the conclusion that polypharmacy is the prevailing indicator for this current scenario. According to the opinion of health professionals, polypharmacy is due to concomitant illness, sudden improvement of patient morbidity, preventing side effects, multiple physicians, and unclear diagnosis inadequate knowledge about appropriate indication.

The percentage of generic names used were higher in pregnant and lactating patient prescriptions indicating that the health professionals are keen on complying with the recent amendment in the law on strict rules for prescribing drugs in generic names.

Lack of knowledge about its relevance, Lack of practice, Influence pharmaceutical companies and Lack of time were found to be reasons of less use of generic name by an interview among health professionals. According to Wang et al[9], the increase in doctor's education and training experience on rational drug use, and improvement of their pharmaceutical knowledge, the proportion of drugs prescribed with generic names by doctors showed a slight decrease. Possible reason for low presentation by generic names could be due to impressive and continuous communication with the doctor by pharmaceutical companies which made the doctors more likely to use non-generic (brand) names than generic names.

In this study the antibiotic prescribing pattern was found to be higher in paediatrics (72%) with slight variation in geriatric population (69.89%) which was in concurrent with the study by Ferreria et al[10] who stated that Younger patients were more frequently prescribed antimicrobial agents than the elderly (14.9% vs. 6.7%) .In our study the total percentage of encounters with antibiotics (56.1%) do not comply with the WHO standard guidelines (<30%). This indicates the importance of antimicrobial stewardship programme by carrying out antimicrobial susceptibility testing which prevents the misuse of antibiotics.

The antibiotic over usage is due to emergence of antibiotic resistance, high cost for higher antibiotics, lack of sensitivity testing, lack of provision of sufficient /appropriate antibiotic by government and lack of provision of newer antibiotic. These reasons encourage the physicians to prescribe more antibiotics.

In the present study encounters with injections prescribed, as high as 155 (77.5%) encounters with injections in paediatrics was analysed followed by 220 (73.57%) in geriatrics and 25 (47.16%) in pregnant and lactating women which together accounted for 66.07% of all encounters with injections prescribed.

In the study conducted by Assefa Desalegn et al[11] study, the percentage of encounters in which an injection was prescribed at Hawassa University Hospital was 38.1%,which was similar to the current study .In both studies the percentage of encounters were higher than the standard. Possible reasons for the high use of injections according to our intervention could be beliefs and attitudes of patients and health professionals about the efficacy of injection versus oral medication and patient who are not tolerant to oral medications.

Essential drug list/formulary of a given country is developed to promote rational use of medicines and also help to practice the most economic prescribing in health facilities. Nevertheless, prescribing of drugs from essential drug list or formulary of India is significantly lower in our study (60.5%) compared to the one recommended by WHO (100%) which was similar to other studies conducted by Jimma Likisa Lenjisa et al[12] which recorded 83% drug prescribed from EDL. The reasons could be that the prescriber's attitude not to rely on this document must critically be addressed by the health care team or the health policy makers or stakeholders. Lack of supply of the drugs in the EDL might also force the physicians to rely on the costlier drugs supplied by the pharmaceutical companies thereby increasing economic burden to the hospital and also the patient by increasing the hospital stay cost. To address this issue the government authorities must take necessary steps to ensure proper supply of drugs necessary for the hospital.

CONCLUSION

In the current study the degree of polypharmacy in special populations were analyzed and was found to be higher in geriatrics population possibly due to concomitant illness, to acquire sudden improvement in disease conditions, to prevent side effects etc. The tendency of prescribing by generic name in a special populations was evaluated and was found to be least in geriatric population due to lack of knowledge about it relevance, lack of time, lack of practice and highly due to the influence of pharmaceutical companies . In overall the use of antibiotics and injections and the use of costly forms of drug therapy were high in special populations like paediatrics and geriatrics. The degree to which practices conform to a national drug policy as indicated by prescribing from, the national essential drug list in special populations was poor according to this study. All these factors point to the conclusion about the necessity to improve healthcare system by creating awareness about the importance to follow necessary guidelines in prescribing in generic names, use of antibiotics after antimicrobial susceptibility testing, minimizing the use of injection and costlier forms of drug therapy to whenever necessary and need to comply with the national essential drug list.

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