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A STUDY OF PRESCRIPTION PATTERN OF ANTIMICROBIAL USAGE IN EAR, NOSE AND THROAT INFECTIONS OF A RURAL TEACHING HOSPITAL

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ABSTRACT: Infections of the ear, nose and throat (E.N.T) are common clinical problems occurring in the general population. Prescription pattern study of ENT infections was conducted in ENT OPD of a rural teaching hospital with the objective of evaluating prescribing pattern of drugs and to study the rationality of the antimicrobial therapy. The study showed that in the 768 prescriptions, the AMAs (Antimicrobial agents) were indicated therapeutically in 79.68%, prophylactically in 9.16% and both in 11.16% patients. Among the infections reported the most common was Upper respiratory tract infections (URTI-38.26%) followed by Acute suppurative otitis media (ASOM -19.53%), otomycosis (11.71%), Chronic suppurative otitis media (CSOM-10.15%) and otitis externa (5.4%). Out of 768 cases, culture and sensitivity tests were performed in 138 patients and only 54 showed bacterial isolates. The notable microbes isolated were staphylococcus aureus (33.3%), pseudomonas (33.3%), beta-haemolytic streptococcus (11.11%), haemophilus influenza (11.11%) and anaerobes (11.11%). Most (53%) prescriptions contained 2 AMAs. The preferred combination was cefpodoxime plus dicloxacillin (35.15%). The generally preferred route of administration of the drugs was oral with a few exceptions where topical and parenteral routes were employed. Most of the causative microbes were sensitive to the β-lactam group of antimicrobials (53.4%), and resistant to erythromycin and doxycycline.
KEYWORDS: ENT, AMAs, Prescription pattern, Drug utilization.

INTRODUCTION: ENT infections are afflictions /clinical entities frequently seen in both children and adults and responsible for considerable morbidity, distress and rarely mortality. Respiratory tract infections are among the most important human health problems because of their high and frequent incidence. URTI constitute the majority of respiratory tract infections and the presenting manifestations are coughs or colds. Coughs and colds are also known as the common cold, coryza, acute nasopharyngitis or acute pharyngorhinitis. Drug therapy for the symptoms of upper respiratory infections is sought for the relief of discomfort and for the alleviation of the anxiety that the URTIs are potentially serious.[1-4]

Some of the other ENT infections known to occur are tonsillitis, pharyngitis sinusitis, adenoid infection, suppurative otitis media (acute and chronic), epiglottitis, laryngitis, furunculosis, labyrinthitis and infections of the ear canal such as diffuse otitis externa.

These ENT infections are generally caused by microorganisms viz bacteria, fungi and viruses and accordingly the treatment involves the use of appropriate antimicrobials[1]. The ultimate aim of the drug therapy of ENT infections is to eradicate infections and minimize the morbidity and the complications associated with them.[5]

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Moreover, the efficacy of the drug therapy in common cold and that of the supplementary measures such as steam and cold therapy in other ENT infections have been debatable and questioned by some authors[6]. Drug utilization (DU) is an essential part of pharmacoepidemiology and these two words are sometimes used interchangeably (WHO, 2003). The World Health Organization (WHO) defines drug utilization as "the marketing, distribution, prescribing, and use of drugs in society, with special emphasis on resulting medical, social and economic consequences."[1]

Research in the field of drug utilization aims to analyze the developmental trends of drug usage at various levels in the health care system. In the past few decades, marketing of new drugs, variations in the pattern of drug prescribing, concern about the delayed adverse effects of drugs, and increase in the cost of drugs have increased the importance of drug utilization studies. Drug use is a complex process. In any country, a large number of socio-cultural factors contribute to the ways drugs are used. The complexity of drug use means that optimal benefits of drug therapy in patient-care may not be achieved because of possible underuse, overuse or misuse of drugs.

Inappropriate drug use may also lead to increased cost of medical care, antimicrobial resistance, adverse effects and patient mortality. Therefore, to improve the quality and efficiency of drug therapy, it is necessary to have a thorough understanding of the existing patterns of therapy, the magnitude of the ways in which such therapy departs from optimal practice, and the factors (clinical, psychological, economic, and cultural) that underlie these patterns.[7-10]

The International Network for the Rational Use of Drugs (INRUD) was established in 1989 to promote the rational use of drugs in developing countries. Various indicators were developed by INRUD in collaboration with WHO that provided objective indices to allow for assessment of drug-use practices. Therefore, it is imperative to evaluate and monitor the drug utilization patterns from time to time, to enable suitable modifications in prescribing patterns to increase the therapeutic benefit and decrease the adverse effects to optimize the medical services for the patients.[11-15]

METHODOLOGY: A prospective, essentially observational and medical audit- study was undertaken during the period Jan-2011 to Jun-2011(6 months) in collaboration/co-ordination with the department of ENT at the KVG Medical College Hospital, Sullia, a teaching hospital. Institutional ethical committee clearance was taken for the conduct of study.

Inclusion Criteria: Patients above five years of age, of either gender, suffering from any of the common and routinely noticed ENT infections, in particular, reporting at the hospital.

Exclusion Criteria: Surgical and allergic disorders pertaining to ENT, pregnancy.

Data Collection: The relevant data was collected by the investigator in person from the medical case records pertaining to the department of ENT in the hospital.

Thus, a specially designed proforma was used for data collection, under the following headings:
1. Demographic data,
2. Disease data,
3. Data pertaining to drug therapy and
4. Data pertaining to investigations.

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Statistical Methods: Statistical evaluation in the form of measures of central tendencies, percentage & tabular forms were use. Chi-square test and determination of P value were undertaken in statistical analysis.

RESULTS: A total of 768 medical case records were collected, scrutinized and analysed for epidemiologic profile, disease incidence and drug prescription, over a period of 6 months. Table 1 reveal the incidence and prevalence of various types of ENT infections, gender wise. It also reveals the overall percentage occurrence of various types of ENT infections (males and females included) as per the medical case- records of this study.

ASOM appears to be the most prevalent infection(19.53%) followed by tonsillitis(14.06%), AOM(13.28%), otomycosis (11.71%), sinusitis (10.93%), CSOM(10.15%), pharyngitis (8.59%), otitis externa (5.46%), pharyngo-tonsilitis (2.34%), B/L AOM + pharyngitis (0.78%), laryngopharyngitis (0.78%), furunculosis (0.78%), earlobe infection(0.78%) and PTA(0.78%) in that order.

The culture and sensitivity reports have revealed the sensitivity and the resistance pattern of the isolates to the various AMAs employed for the laboratory testing listed in table 2. Among the sensitive isolates the highest sensitivity has been recorded in case of cefixime and the least sensitivity in case of doxycycline.

The resistance of the bacterial isolates has been the least to cefixime when compared with other AMAs used for performing the culture and sensitivity tests. In table 3 gender wise pattern of male and female patients for culture and sensitivity tests was almost even. Table 4 shows the diagnostic profile, 138 cases sent for culture and sensitivity tests, 54 cases showed bacterial isolates, staphylococcus (33.33%), pseudomonas (33.33%), β-haemolytic streptococcus (11.11%), haemophilus influenza(11.11%) and anaerobes (11.11%) were the common pathogens noted. Table 5 depicts the overall prescription pattern of the various AMAs individually and also the use of fixed dose combination of cefpodoxime+dicloxacillin. Collectively, however, the overall trend of the monotherapy and polytherapy prescription patterns in all the ENT infections studied herein has remained similar gender wise (Table 6).

DISEASES	MALE	%	FEMALE	%	TOTAL	%
ASOM	82	54.66	68	45.33	150	19.53
Tonsillitis	58	53.70	50	46.29	108	14.06
AOM	53	51.96	49	48.03	102	13.28
Otomycosis	46	51.11	44	48.88	90	11.71
Sinusitis	46	54.76	38	45.23	84	10.93
CSOM	40	51.28	38	48.71	78	10.15
Pharyngitis	34	51.51	32	48.48	66	8.59
Otitis externa	20	47.61	22	52.38	42	5.46
Pharyngotonsillitis	11	61.11	7	38.88	18	2.34
B/l AOM+pharyngitis	4	66.66	2	33.33	6	0.78
Laryngopharyngitis	3	50.00	3	50.00	6	0.78
furunculosis	2	33.33	4	66.66	6	0.78
Earlobe infection	3	50.00	3	50.00	6	0.78
peritonsillar abscess	4	66.66	2	33.33	6	0.78
TABLE 1: PREVALENCE OF ENT INFECTIONS IN MALES AND FEMALES						

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DRUGS	SENSITIVE		RESISTANCE	
	(n=54)	PERCENTAGE%	(n=54)	PERCENTAGE%
CEFIXIME	29	53.70	8	14.81
CEFTRIOXONE	24	44.44	-	-
CEFPODOXIME	12	22.22	24	44.44
AMOXICILLIN	16	29.62	20	37.03
AMPICILLIN	16	29.62	20	37.03
CIPROFLOXACIN	19	35.18	-	-
GENTAMYCIN	20	37.03	-	-
AMIKACIN	20	37.03	-	-
DOXYCYCLINE	12	22.22	-	-
TABLE 2: CULTURE AND SENSITIVITY PROFILE				

DISEASES	CULTURE SENT	CULTURE NOT SENT	TOTAL
MALE	70	317	387
FEMALES	68	313	381
TABLE 3: CULTURE AND SENSITIVITY TEST PROFILE IN MALES AND FEMALES			

TOTAL SAMPLES COLLECTED	NO. OF SAMPLES SENT TO LAB	SAMPLES SHOWING BACTERIAL GROWTH
n = 768	n = 138	n = 54 1. Staphylococcus-18 (33.33%) 2. Pseudomonas-18 (33.33%) 3. β-hemolytic streptococcus-6 (11.11%) 4. Hemophilus influenzae-6 (11.11%) 5. Anaerobes-6 (11.11%)
TABLE 4: DIAGNOSTIC PROFILE		

DISEASES	CEFIX	CFT	OFLOX	NOR	AZI	LEVO	CLOX	CLOT	CEFP+DICLO (fixed dose)	CIPRO
Otitis externa	24	3	-	-	-	-	-	-	18	-
Otomycosis	18	-	-	-	-	-	-	90	65	2
ASOM	25	4	-	-	5	19	-	-	50	4
CSOM	8	30	2	-	-	-	-	-	3	6
AOM	7	7	1	-	6	17	-	-	-	2
B/L AOM+pharyngitis	6	-	-	-	-	-	1	-	-	-
Pharyngitis	4	-	-	-	-	-	10	-	-	-
Sinusitis	30	25	-	-	1	7	6	-	60	4
Tonsillitis	27	26	-	3	-	-	10	-	58	-
Pharyngotonsillitis	2	-	-	-	-	-	4	-	10	-
Laryngopharyngitis	3	-	-	-	6	5	5	-	-	-
Furunculosis	4	4	-	-	-	-	-	-	-	-
Ear lobe infection	5	-	-	2	-	-	-	-	1	4
Peritonsillar abscess	5	3	3	1	-	-	-	-	5	2
Total	168	102	6	6	18	48	36	90	270	24
TABLE 5: PRESCRIPTION PATTERNS OF AMAs IN ENT INFECTIONS										

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Total number of AMAs used =768
CEFIX=CEFIXIME;   CFT=CEFTRIAXONE;   OFLOX=OFLOXACIN;   NOR=NORFLOXACIN;
AZI=AZITHROMYCIN; LEVO=LEVOFLOXACIN; CLOX=CLOXACILLIN; CLOT=CLOTRIMAZOLE;
CEFP+DICLO=CEFPODOXIME+DICLOXACILLIN; CIPRO=CIPROFLOXACIN.

THERAPY	MALE	FEMALE	TOTAL
MONO	87	89	176
POLY	336	256	592

TABLE 6: PATTERN OF MONO AND POLY THERAPY IN MALES AND FEMALES

$X2=2.942$, df = 1, p (0.08)> 0.05 In significant.

DISCUSSION: World Health Report of 2010, the World Health Organization (WHO) estimated that respiratory infections generated 94.6 disability adjusted life years lost worldwide and were the fourth major cause of mortality, responsible for 4 million deaths or 6.9% of global number of deaths in 2010.[16] A WHO study of antimicrobial use in low-middle and high-income countries revealed that antimicrobials were wrongly prescribed for approximately 30% of cases of URTI.[10]

A large community-based survey observed a high prevalence of ENT symptoms and incidence of otitis media among residents of Scotland, often with considerable variation between age, gender, occupation and socio-economic groups.[17] In the Netherlands, it has been estimated at 12–14 per 1000 population per year, and has been shown to affect more than 1% of a sample of the population in the United Kingdom over a 12 month period.[18] Acute pharyngitis is the most common cause of a sore throat and is diagnosed in more than 1.9 million people a year in the United States.[19]

The drug prescription study conducted by ENT and pharmacology department in tertiary care hospital eastern Nepal, highlights some rational prescription patterns including less utilization of antimicrobials in ENT infections, good adherence by patients and prescriptions by brand names.[20]

Interestingly, there are several enlightening reports on certain topics such as: pattern of antibiotic drug prescription in primary care in adult acute respiratory tract infections in Sicily,[21] pattern of drug utilization in acute tonsillitis in a teaching hospital in Nepal[22] which highlighted the local prevalence of ENT infections and rational drug usage by the treating doctors.

It is noteworthy that the relative incidence of certain ENT infections such as otomycosis, CSOM, pharyngitis, otitis externa, laryngopharyngitis and earlobe infection has not varied much in males and females. However, in case of other ENT infection such as ASOM, tonsillitis, AOM, sinusitis, pharyngotonsilitis, B/L AOM+pharyngitis, furunculosis and PTA the relative incidence in males and females has varied slightly. The prescription patterns noted in this study conform mainly to the oral route of medication in general, and parenteral and topical routes of administration in selected cases.

Incidentally, both monotherapy (single AMA drug therapy) and polytherapy (combination or multiple AMA drug therapy) have been highlighted in the treatment regimens of respective ENT infections. The general trend in this study highlights similarity in males and females as far as monotherapy is concerned, while there is a modest variation in regard to polytherapy gender wise.

Notable highlighting drug utilization data for various ENT infections are as Follows.
1. Drug data in ASOM: Several AMAs have figured in the treatment regimens prescribed for ASOM, in this study. Interestingly, the AMAs chosen have been cefpodoxime+dicloxacillin (a fixed dose combination).

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2. **Drug data in Tonsillitis:** The AMAs preferred for tonsillitis in this study are cefpodoxime+dicloxacillin followed by cefixime, ceftriaxone, cloxacillin and norfloxacin in that order.
3. **Drug data in AOM:** Here, levofloxacin has been the most preferred AMA, followed by cefixime, ceftriaxone, azithromycin, ciprofloxacin and ofloxacin in that order of frequency.
4. **Drug data in Otomycosis:** In most of the cases of otomycosis, the preferred AMA has been clotrimazole topically as monotherapy.
5. **Drug data in Sinusitis:** The consensus of approach is mostly in favour of cefpodoxime+dicloxacillin.
6. **Drug data in CSOM:** The most favoured AMA in CSOM in this study is ceftriaxone while cefixime and ciprofloxacin have also been employed in a few cases followed by cefpodoxime+dicloxacillin and ofloxacin less frequently.
7. **Drug data in Pharyngitis:** Here, the choice of cloxacillin is obvious while cefixime has been the only other AMA employed.
8. **Drug data in otitis Externa:** Here, the preferential AMAs prescribed have been cefixime and cefpodoxime+dicloxacillin followed by ceftriaxone in very few cases.
9. **Drug data in Pharyngotonsillitis:** The most preferred AMA observed is the fixed dose combination viz., cefpodoxime+dicloxacillin whereas cloxacillin and cefixime figure in fewer prescriptions.
10. **Drug data in B/L AOM+pharyngitis:** Cefixime has been the AMA of absolute choice while cloxacillin is prescribed sparingly.
11. **Drug data laryngopharyngitis:** Azithromycin, levofloxacin and cloxacillin have been the most frequently prescribed AMAs, while cefixime has been an alternative AMA.
12. **Drug data in Furunculosis:** The only notable AMAs prescribed for this entity are cefixime and ceftriaxone according to the observations in this study.
13. **Drug data in earlobe Infection:** The first preferential AMA noted here has been cefixime followed by ciprofloxacin, norfloxacin and cefpodoxime+dicloxacillin in that order of frequency.
14. **Drug data in PTA:** Here, it is noteworthy that the two AMAs prescribed with equal preference are cefixime and cefpodoxime +dicloxacillin (a fixed- dose combination).

Data regarding the incidence of adverse effects due to various therapeutic regimens advised were not available because of lack of compliance of patients in revisiting the hospital for periodical follow-up.

In this context, it is also worth considering that most of the ENT infections are known to be acute and short lived in nature and onset, and as such their treatment would be required for a brief period of time with a few exceptions where chronicity is observed.

Hence, the need for a follow-up in acute cases does not ordinarily arise, as the emphasis is on curative approach with standard therapeutic regimens for a short period of time. However, in cases of chronicity, the compliance of patients in revisiting the hospital is an important factor for follow-up, which, is not always predictable.

CONCLUSION: The incidence of the various types of ENT infections was grossly similar in males and females, with very few exceptions. The commonly prescribed/preferred antimicrobials were cefpodoxime+dicloxacillin, followed by cefixime and ceftriaxone, in that decreasing order.

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Clotrimazole was notably the most important antimicrobial prescribed for uncomplicated/isolated cases of otomycosis. The less preferred antimicrobials in most of the common ENT infections considered in this study were levofloxacin, cloxacillin, ciprofloxacin, azithromycin, ofloxacin and norfloxacin. Generally, monotherapy is the prime approach although in special clinical situations; polytherapy also has been employed, implying the use of certain combinations of antimicrobials.

LIMITATIONS: The study has got few limitations. Duration of study was short (six months) hence effect of seasonal variation on incidence of ENT infections could not be determined. Further large scale research is required for detail evaluation of prescription pattern in ENT infections, especially in rural setup where data regarding its rational utilization is lacking. Continuing medical education regarding appropriate use of AMAs, knowledge of its potential adverse effects and standard prescription guidelines will play pivotal role in rational prescription of AMAs.

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Date of Submission: 30/10/2014.
Date of Peer Review: 31/10/2014.
Date of Acceptance: 07/11/2014.
Date of Publishing: 08/11/2014.