SCIENTIFIC
Research and Community

Open Access

Secular Trends of Use of Medicines with Special Reference to Antibiotics in the Southern City of India

Kiranmayee A[1], Lakshmi B.V.S.[2], Vaishnavi B[2] and Dinesh Kumar B[1]

[1]ICMR-National Institute of Nutrition, Hyderabad, India

[2]Malla Reddy College of Pharmacy, Hyderabad, India

ABSTRACT

Introduction: Monitoring the consumption profile of medicines has become one of the important tools for assessing the rationality as it depends on the various indigenous factors. ICMR-NIN monitors drug consumption at retail pharmacy outlets with an objective to document the precepts and practices exist between prescription and consumption of medicine. This facilitates to translate in developing interventions and policy strategies for promotion of rational use of drugs.

Methodology: The present paper is the compilation of scientific papers documenting consumption profile of medicines and physician practices. The precepts and practices on drug consumption pattern are generated in 1985, 1995, 2013 and 2020 in a pre-tested schedule following active sampling pattern.

Results: In last three decades, the self-medication rate in India both at rural and urban areas has reduced by two folds. Among the top three categories of drugs prescribed Anti-inflammatory, multi-mineral & multivitamin supplements, antibiotics preferences have changed. The observation on use of antacids has emerged in prescribed category of drugs. The drugs prescribed in metabolic disorders also increased by 4 % in 1985 to 12% in 2020. In antibiotic category, the preferences for broad spectrum have increased by 3-5 folds in comparison to conventional. In the Covid-19 pandemic, the use of azithromycin was high among macrolide antibiotics.

Conclusion: Monitoring the secular trends in precepts and practices on use of medicines is essential to develop he interventional strategies and facilitate policy makers accordingly.

***Corresponding author**
Kiranmayee A, ICMR-National Institute of Nutrition, Hyderabad, India. E-mail: kiranmayee.ale89@gmail.com

Introduction

In the recent past, the prescriptions and purchases of medicines are being constantly audited. The definition of WHO on drug utilization "The marketing, distribution, prescription, and use of drugs in a society, with special emphasis on the resulting medical, social and economic consequences" is applicable. The importance of health care systems is assessed in various epidemic situations, which are indigenous in nature. Similarly, the prescription and use of medicines differs from region to region and country to country [1].

The reports on varied consumption profile of medicines in the Covid-19 pandemics, is witnessed as it was dependent on therapeutic outcome. The success and failure of hydroxychloroquine demonstrate the rationality of use of such preparations [2]. In this pandemic, many preparations from antiviral- immunomodulators (drug to potentiate IFNα/β) combinations have been used, withdrawn and documented the failure of therapeutics [3].

In developing countries, the irrational use of medicines is regularly documented. Our studies (1985) have brought out several gaps

in precepts and practices existing in medicine usage profile [4]. In 1995, Dinesh et al. documented the differences in prescription and consumptions profile of drugs among rural and urban areas [5]. Patel et al. highlighted the inadequacy in prescription practices [6]. Kumari et al. has also emphasized on irrational prescribing practices [7]. Ahmedet al.survey in Bangladesh reveals that Polypharmacy, high rate of irrational antibiotic usage and unscientific prescription by doctors is a cause of concern [8]. Similar observations were seen in China [9] and Europe [10].

Irrational use of medicines has become a practice all over the globe. The role of National Rural Health Mission (NRHM Sub-Mission 2009) Several measures by government, which includes updating list of essential medicines[11] and strategies for promoting Rational Use Medicine [12].

In the current study, we have compiled the secular trends in use of medicines from 1985 to 2013. A pilot investigation was conducted in 2020 to study the impact of Covid-19 on consumption of medicines.

Methodology

This report is cumulative data of drug utilizationstudies conducted in and around Hyderabad, India between the years 1985-2020.

Survey 1985 10 % of retail pharmacy outlets in the Hyderabad city were selected. Activity sampling method was followed for consecutive 4 days in each retail outlet for monitoring the use of medicines. A total of 13588 prescriptions were collected from the selected retail outlets.

Survey 1995 20 retail pharmacy outlets in Hyderabad city and 12 retail pharmacy outlets in rural area around Hyderabad city were selected in this study. Medicine useactivity was monitored for consecutive 2 days in each retail outlet. Data of 1769 prescriptions were analysed in this study.

Survey 2013 10% of retail pharmacy outlets in the selected areas of Hyderabad city which accounts to 15 outlets were selected. The drug consumption pattern in each retail outlet was monitored for one day during their active hours. In this study a total of 707 prescriptions were monitored.

Survey 2020 This is a pilot investigation conducted during covid-19 pandemic. A total of 100 prescriptions were monitored in a retail pharmacy outlet located in Hyderabad city.

From these studies, we have extracted the information on prescription, categories of medicines, self- prescription etc., from the cumulative data. The collected data was categorized and tabulated based on the year of study (1985, 1995, 2012 and 2020). Collected data was analysed using Microsoft excel 2010 and SPSS version 16.
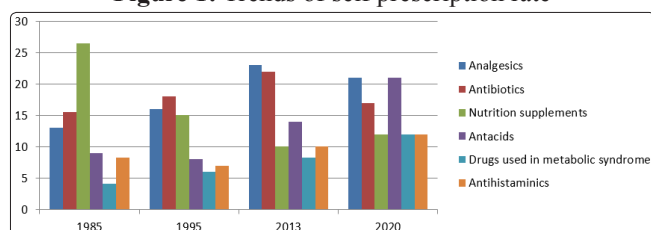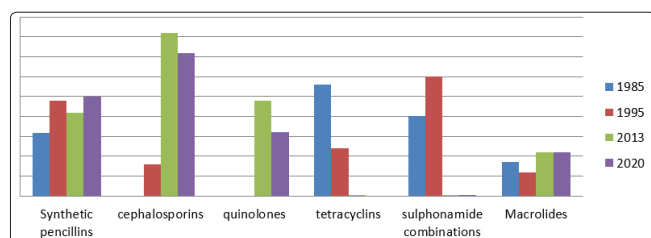
Results

Self-medication rate

The self-prescription rate has decreased constantly from 47%, 37.7%, 25% and 16% in 1985, 1995, 2013 and 2020 respectively.(Fig 1)
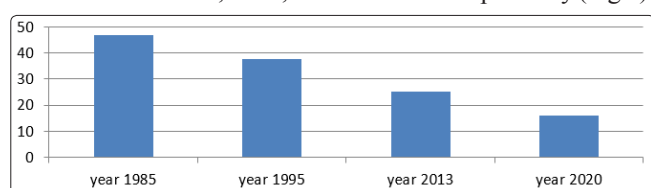
Figure 1: Trends of self prescription rate

Figure 2: Category of drugs used across various timeline

Figure 3: Category of antibiotics used across various timeline

Categories of drugs prescribed

The collected data was further analyzed for various categories of drugs prescribed by the practitioners across various timelines. We found that analgesics or anti-inflammatory drugs, antibiotics, nutrition supplements and antacids were the top medications prescribed by the physicians.

Analgesics/Anti-inflammatory medicines

Among the category of analgesics, a continuous increase in consumption was observed from the year 1985-2013. However, their use got slightly decreased in the year 2020.

Multivitamin-multimineral

The use of nutrition supplements decreased with time and it was halved in 2020 (12%) compared to 1985 (26.5%).

Antibiotics

There is a continuous increase in the use of antibiotics from the year 1985-2020 with their consumption doubled in 2020 (21%) compared to 1985 (9%).

Antacids

We observed that the use of antacids has increased steadily and almost tripled by 2020 (21%) as compared to 1985 (9%).

Medicines used in metabolic disorders

The use of drugs in metabolic syndrome which includes hypertension, diabetes mellitus and dyslipidemia has almost tripled by 2020 (12%) compared to1985 (4%).

Category of antibiotics

In this study, we have categorized the antibiotics used across the timelines. Synthetic penicillin antibiotics are one of the most used categories of antibiotics with their prescription ranging around 15% in the year 1985 and 21-25% from the year 1995-2020. The use of cephalosporin's was not documented in 1985 but their use has enormously increased since 1995 (8%) to 2020 (36%), with their highest consumption recorded in 2013 (41%). The prescription of quinolone antibiotics was not documented in the year 1985 and 1995 but they have occupied one of the prominent category of antibiotics in the years 2013 (24%) and 2020 (16%). The prescription of tetracycline and sulphonamide combination antibiotics has almost non preferred in 2020 (0%, 0.1%) as compared to 1985 (28%, 20%) respectively. The use of macrolide antibiotics remains around 6-11% from 1985-2020.

Discussion

In the last three decades, the global drug discovery has introduced many different categories of drugs with specific emphasis on targeting therapy. In spite of this cost effectiveness, their rational use is still far from satisfactory from many developed countries [9,10]. In addition self-prescription rate is one of the important indicators to determine use of drugs, as it carries the risk of undiscovered side effects, overdosing, habituation and delayed treatment or aggravation of diseases.

In the current study, it is overwhelming to note a continuous decrease in self-prescription rate from 47% in 1985 to 16% in 2020. However, the rate of self-prescription is not constant in Indian region [14]. There are conflicting reports suggesting of 92%-11%self-medication in Delhi and Puduchery [15,16]. But our observations are not accordingly. We understand improved literacy status, availability of health centers in public and private may have contributed in decreasing the self-medication rate though

we have not evaluated directly [13]. A meta-analysis confirms large variation in self-medication [14]. Developed countries like United States and Australia also recorded high variations of self-prescriptions [17, 18].

Nutritional supplements remain one of the favorite categories of medications. Their use has decreased from 26% in 1985 to 10% in 2013. The marginal increase was observed in 2020 perhapsowing to covid-19 pandemic. However, most of the nutritional supplements are multivitamin and multimineral preparations and are irrelevant to combat nutritional deficiency. A prescription survey from Goa by Patel et al. [6] reveals that 40% of prescriptions included vitamin preparations in various dosage forms. Similar observations were reported from Nepal [19]. Sufficient measures are to be taken towards rational use of nutritional supplements and curb unnecessary combinations.

In this study, we found that irrespective of timelines the major categories of drugs being prescribed includes analgesics antibiotics, nutritional supplements and antacids. The large scale consumption of anti-inflammatory/analgesics/antipyretics is a universal phenomenon. 70,000,000 prescriptions and 30 billion over-the-counter doses of NSAIDS (Non steroidalanti inflammatory drugs) are sold annually in the United States [20]. Secular trends of analgesics show that there is a continuous increase in their consumption from 13% in 1985 to 21% in 2020. The NSAIDS occupy more than 60% of the total analgesic prescriptions [21]. Even in Covid pandemic this were found highest (21%) compared to 18% in earlier studies [5, 6]. In this study we observed that the use of antacids, which were only 9% in 1985, has increased to 21% by 2020. Increase in use of analgesics has sparked the increase in the use of antacids as it became mandatory to use antacids with NSAIDS to decrease the risk of gastrointestinal (GI) and cardiovascular complications associated with use of NSAIDS [22,23].

One of the preferred and consumed categories of medicines is antimicrobials across the globe. Our reports in the last three decades suggest the use of antibiotics is in a range of 15-22% [4, 5]. However, irrational use of antibiotics remains a concern all over the world due to emergence of antibiotic resistance [25]. In developed countries like United States, one third of Americans use antibiotics inappropriately [26]. In India, the reports from central and southern regions have documented 60% of irrationality in antibiotic prescriptions [27, 28]. In our studies, around 47% prescriptions for antibiotics were irrelevant and they belong to broad spectrum group of antimicrobials [4, 5]. We also documented incomplete prescription of antibiotics with respect to dose, duration etc. Ozgenç, et al. has reported antibiotic resistance due to irrational prescription of antibiotics in Turkey [29]. This study is relevant to our observations on resistance of antibiotics to many gram negative and gram positive organisms [30].

The secular trends demonstrated that the use of conventional antibiotics (sulpha drugs and tetracyclins) preferred during 1985-1995, has reduced tremendously [4, 5]. In addition to it, this change continued. It is to be noted that emergence of multidrug resistant across the world is increased [31]. The antibiotic development has almost stand still and their rational use is to be promoted [32].

Our several studies on secular trends of medicines especially, like antibiotics, multi-vitamin multi-nutrient facilitate in development of strategies to promote rational use of medicines.

Conclusion

The secular trends of medicines use since 1985 to 2020 indicates that apart from pharmacovigilance monitoring, update on categories of drugs manufactured, prescribed, consumed, should be recorded in a structured format for universal planning in promoting rational use of drugs.

References

1. Geneva (2004) The World Medicines Situation.WHO report,: 2-3
2. Saag MS (2020) Misguided Use of Hydroxychloroquine for COVID-19: The Infusion of Politics Into Science. JAMA. 324: 2161–2162.
3. Alijotas-Reig J, Esteve-Valverde E, Belizna C, Selva-O'Callaghan A, Pardos-Gea J, et al. (2020). Immunomodulatory therapy for the management of severe COVID-19. Beyond the anti-viral therapy: A comprehensive review. Autoimmun Rev. 19: 102569.
4. K Krishnaswamy, B Dinesh Kumar, G Radhaiah (1985) A drug survey — Precepts and practices. Eur J of ClinPharmacol. 29: 363-370
5. Dinesh kumar B, Thummala C. Raghuram, Garispati Radhaiah, Kamala Krishnaswamy, et al. (1995) Profile of drug use in urban and rural India.Pharmacoeconomics. 7: 332-346.
6. Patel V, Vaidya R, Naik D, Borker P (2005) Irrational drug use in India: a prescription survey from Goa. J Postgrad Med. 51: 9-12.
7. Kumari R, Idris MZ, Bhushan V, Khanna A, Agrawal M, et al. (2008) Assessment of prescription pattern at the public health facilities of Lucknow district. Indian J Pharmacol. 40: 243-247.
8. Ahmed SM, Islam QS (2012) Availability and rational use of drugs in primary healthcare facilities following the national drug policy of 1982: is Bangladesh on right track? J Health PopulNutr. 30: 99-108.
9. Midão L, Giardini A, Menditto E, Kardas P, Costa E et al. (2018) Polypharmacy prevalence among older adults based on the survey of health, ageing and retirement in Europe. Arch GerontolGeriatr. 78: 213-220.
10. Mao W, Vu H, Xie Z, Chen W, Tang S, et al. (2015) Systematic review on irrational use of medicines in China and Vietnam. PLoS One. 10: e0117710.
11. Geneva (1977) WHO Expert Committee. The Selection of Essential Drugs. World Health Organization. Technical Report Series. 615.
12. Country office for India, World Health Organisation. (2009) Promoting Rational Drug Use under NRHM. ISBN: 978-81-908725-2-2
13. Tanushree Chandra (2019) Literacy in India: The Gender and Age Dimension. Observer Research Foundation. brief 322.
14. Rashid M, Chhabra M, Kashyap A, Undela K, Gudi SK, et al. (2020) Prevalence and Predictors of Self-Medication Practices in India: A Systematic Literature Review and Meta-Analysis. CurrClinPharmacol. 15: 90-101.
15. Kumar V, Mangal A, Yadav G, Raut D, Singh S, et al. (2015) Prevalence and pattern of self-medication practices in an urban area of Delhi, India. Med J DY Patil Univ. 8:16-20
16. Selvaraj K, Kumar S G, Ramalingam A (2014) Prevalence of self-medication practices and its associated factors in Urban Puducherry, India. Perspectives in clinical research. 5: 32–36.
17. Goh L Y, Vitry A I, Semple S J, Esterman A, Luszcz M A et al. (2009) Self-medication with over-the-counter drugs and complementary medications in South Australia's elderly population. BMC complementary and alternative medicine,

9: 42.

18. Tesfamariam S, Anand IS, Kaleab G et al. (2019) Self-medication with over the counter drugs, prevalence of risky practice and its associated factors in pharmacy outlets of Asmara, Eritrea. BMC Public Health 19: 159.

19. Poudel A, Palaian S, Shankar PR, Jayasekera J, Izham MI et al. (2008) Irrational fixed dose combinations in Nepal: need for intervention. Kathmandu Univ Med J (KUMJ). 6: 399-405.

20. Laine L (2001) Approaches to nonsteroidal anti-inflammatory drug use in the high-risk patient. Gastroenterology 120: 594-606.

21. Billa G, Gabhane M, Biswas S (2015) Practice of Pain Management by Indian Healthcare Practitioners: Results of a Paper Based Questionnaire Survey. Pain Res Treat. 2015:891092.

22. Simon LS (1996) Actions and toxicity of nonsteroidal anti-inflammatory drugs. Curr Opin Rheumatol. 8:169-175..

23. Medlock S, Eslami S, Askari M, Taherzadeh Z, Opondo D, et al. (2013) Co-prescription of gastroprotective agents and their efficacy in elderly patients taking nonsteroidal anti-inflammatory drugs: a systematic review of observational studies. Clin Gastro enterol Hepatol. 11:1259-1269.e10.

24. Prajapati DV, Bhatt DJ, Vora DB (2012) Study Of Prescribing Patterns Of Antimicrobial Agents In The Medicine Department At Tertiary Teaching Care Hospital In Gujarat: Study Of Prescribing Patterns Of Antimicrobial Agents. Natl J Integr Res Med. 3:129-136.

25. Sutherland ME (2018) Antibiotic use across the globe. Nat Hum Behav. 2: 373

26. Antibiotic resistance (2003) survey: One-third of americans use antibiotics inappropriately. Drug Week. 15.

27. Sharma M, Eriksson B, Marrone G, Dhaneria S, Lundborg CS et al. (2012) Antibiotic prescribing in two private sector hospitals; one teaching and one non-teaching: a cross-sectional study in Ujjain, India. BMC Infect Dis. 12: 155.

28. Gauri LA, Fatima Q (2013) Study of prescribing pattern of antimicrobial agents in medicine intensive care unit of teaching hospital in central India. J Assoc Physicians India. 61: 216.

29. Ozgenç O, Genç VE, Ari AA, El Sibel, Saçar S, et al. (2011) Antibiotic Resistance Study Group of Turkish Association of Clinical Microbiology and Infectious Diseases. Evaluation of the therapeutic use of antibiotics in Aegean Region hospitals of Turkey: a multicentric study. Indian J Med Microbiol. 29:124-129.

30. Bhargavi PS, Gopala Rao TV, Mukkanti K, Dinesh Kumar B, Krishna TP et al. (2010) Increasing emergence of antibacterial resistance mainly in uropathogens: southeast part of India. Intl J Microbiol Res. 2 : 1-6.

31. Ventola CL (2015) The antibiotic resistance crisis: part 1: causes and threats. P T. 40: 277-283.

32. Graham CJ (2017) The global threat of antibiotic resistance: what can be done?. Journal of Global Health Reports. 1:e2017002.