Current Clinical Pharmacology, 2020, *15*, 90-101

SYSTEMATIC REVIEW ARTICLE

Prevalence and Predictors of Self-Medication Practices in India: A Systematic Literature Review and Meta-Analysis

Muhammed Rashid[1], Manik Chhabra[2,*], Ananth Kashyap[3], Krishna Undela[4] and Sai K. Gudi[5]

[1]*Department of Pharmacy Practice, Sri Adichunchanagiri College of Pharmacy, Adichunchanagiri University, BG Nagara, Karnataka 571448, India;* [2]*Department of Pharmacy Practice, Indo-Soviet Friendship College of Pharmacy, Moga, Punjab 142001, India;* [3]*Department of Pharmacy Practice, Sarada Vilas College of Pharmacy, Mysuru, Karnataka 570004, India;* [4]*Department of Pharmacy Practice, JSS College of Pharmacy, JSS Academy of Higher Education and Research Mysuru, Karnataka 570015, India;* [5]*Department of Pharmacy, Rady Faculty of Health Sciences, University of Manitoba, Winnipeg, MB R3T 2N2, Canada*

Abstract: ***Background*:** Self-Medication (SM) is a practice of using medications to treat self-diagnosed symptoms without a legitimate prescription by a health care professional. Alongside posing a burden on a patient, SM practices are associated with certain unfavourable health conditions such as drug-resistance, adverse effects, drug-interactions, including death.

***Objective*:** To systematically review and quantify the prevalence of SM practices and its associated factors in India.

***Methods*:** A comprehensive systematic search was performed using scientific databases such as PubMed and Cochrane library for the peer-reviewed research articles that were conducted in India without any language and date restrictions. Studies which were cross-sectional by design and assessing the prevalence and predictors of SM practices in India were considered for the review, and all the relevant articles were screened for their eligibility.

***Results*:** Of 248 articles, a total of 17 articles comprising of 10,248 participants were included in the meta-analysis. Overall, the mean prevalence of SM practices in India was observed to be 53.57%. Familiarity with the medication appears to be a major reason to practice SM (PR: 30.45; 95% Confidence Interval [CI]: 17.08-43.82; 6 studies), and the practice was noticed more among individuals from a middle-lower class family with a prevalence rate of 26.31 (95%CI: 2.02-50.60; P<0.0001). Minor ailments were the primary reason for practicing SM (PR: 42.46; 95%CI: 21.87-63.06), among which headache was the most commonly reported (PR: 41.53; 95%CI: 18.05-65.02).

***Conclusion*:** Self-medication practices are quite frequent in India. While NSAIDs and anti-allergens are the most frequently utilized self-medicated drugs used for headache and cold and cough.

ARTICLE HISTORY

Received: April 25, 2019
Revised: October 15, 2019
Accepted: November 11, 2019

DOI:
10.2174/1574884714666191122103953

Keywords: Self-medication, over-the-counter medication, heterogeneity, prevalence, predictors, anti-allergens.

1. INTRODUCTION

Self-Medication (SM) is a practice of usage of medications without a legal prescription to treat the self-diagnosed symptoms or medical conditions, on the principles of self-belief of the patient [1]. For over a decade, SM is the most common practice followed throughout the world, especially in developing countries like India [2, 3]. People tend to practice SM, as it cutsdown the healthcare cost such as the consultation fees of the physician, moreover they are time-saving. Although, SM is encouraged as a first-aid in certain emergency conditions, [4] it predisposes the patient to develop various serious adverse effects and masks the symptoms of chronic diseases, leaving them undiagnosed and eventually untreated [5]. Besides, SM of antimicrobials and NSAIDs can lead to drug resistance and make individuals prone to hepatic and renal dysfunction [6]. Furthermore, SM practices result in wastage of healthcare resources, thus increasing the country's healthcare expenditure.

The prevalence of SM practice in India ranges between 8.3% to 92% [7, 8]. Particularly, in countries like India, advertisements on media and the internet are the major reasons behind increasing SM practices, which is against Drugs and Magic Remedies act 1954 [9]. Other factors such as positive attitude and confidence regarding the drug and the disease condition might be considered as the driving factors to prac-

*Address correspondence to these authors at the Department of Pharmacy Practice, Indo-Soviet Friendship College of Pharmacy, Moga, Punjab, 142001, India; Tel: +91 7696866964; E-mail: manikchhabra57@gmail.com

2212-3938/20 $65.00+.00

tice SM. Due to the fact that individuals from low-income levels could not afford medical health insurance coverage plans, SM is common among lower and middle-income families over high-income families [10].

Several studies have been conducted across India, which looked at the prevalence, types, reasons and factors affecting SM practices in India [2, 4]. However, so far, there is no systematic review and meta-analysis published on the prevalence of SM practices in India. Thus, this review aimed at assessing the overall prevalence of SM practices and its influencing factors in India.

2. MATERIALS AND METHODS

2.1. Inclusion Criteria & Study Outcomes

Two authors independently reviewed all the relevant studies, and the cross-sectional studies, which assessed the prevalence of self-medication practices among the Indian population. These studies were included in the final analysis. Studies conducted outside India, which include reviews, letters to the editors, and conference proceedings were excluded. The primary outcome of this study was the prevalence of self-medication practice in India. Secondary outcomes include the sources which provide information on SM practices, socio-economic factors, indications, type of medications used and the reasons for the SM practices.

2.2. Search Strategy, Study Selection & Data Extraction

A comprehensive search was performed using the medical subheadings, "self-medication", "OTC drugs", "medicines", "prevalence" and "India" in the PubMed/Medline and Cochrane library without any restrictions on language, date or publication format. A detailed search strategy of PubMed is provided in Appendix 1. The reference lists of all articles were screened to identify additional relevant citations. All the retrieved titles and abstracts were screened for eligibility, and eligible studies were retrieved in full text and assessed, based on the inclusion criteria outlined above by two independent reviewers (MR, MC). Disagreements between the reviewers were resolved through discussions and by consulting a third reviewer (AK). Two independent reviewers (MR, MC) extracted all the data from a standardized data extraction sheet. The name of the first author and year of publication were used to identify the study. All the data were extracted directly from the article or calculated from the available information. Any disagreements in extraction were also resolved through discussions or by consulting a third reviewer (AK).

2.3. Statistical Analyses & Publication Bias

Review Manager Software (RevMan, version 5.3 for Windows; The Cochrane Collaboration, Oxford, UK) was used to conduct the meta-analysis, and prevalence rate (PR) and 95% confidence interval (CI) values were calculated. Statistical heterogeneity of data was assessed using the I^2 statistic, and the fixed-effects model was used for studies without significant heterogeneity ($I^2 \leq 50\%$ or $P \geq 0.10$), while the random-effects model was used for studies with substantial heterogeneity. A funnel plot was used for visual inspection of publication bias and it was generated using RevMan 5.3. The prevalence rate was considered on X-axis and Standard Error (SE) of prevalence rate was considered on Y-axis; while, Begg's and Egger's tests assessed the statistical significance of publication bias.

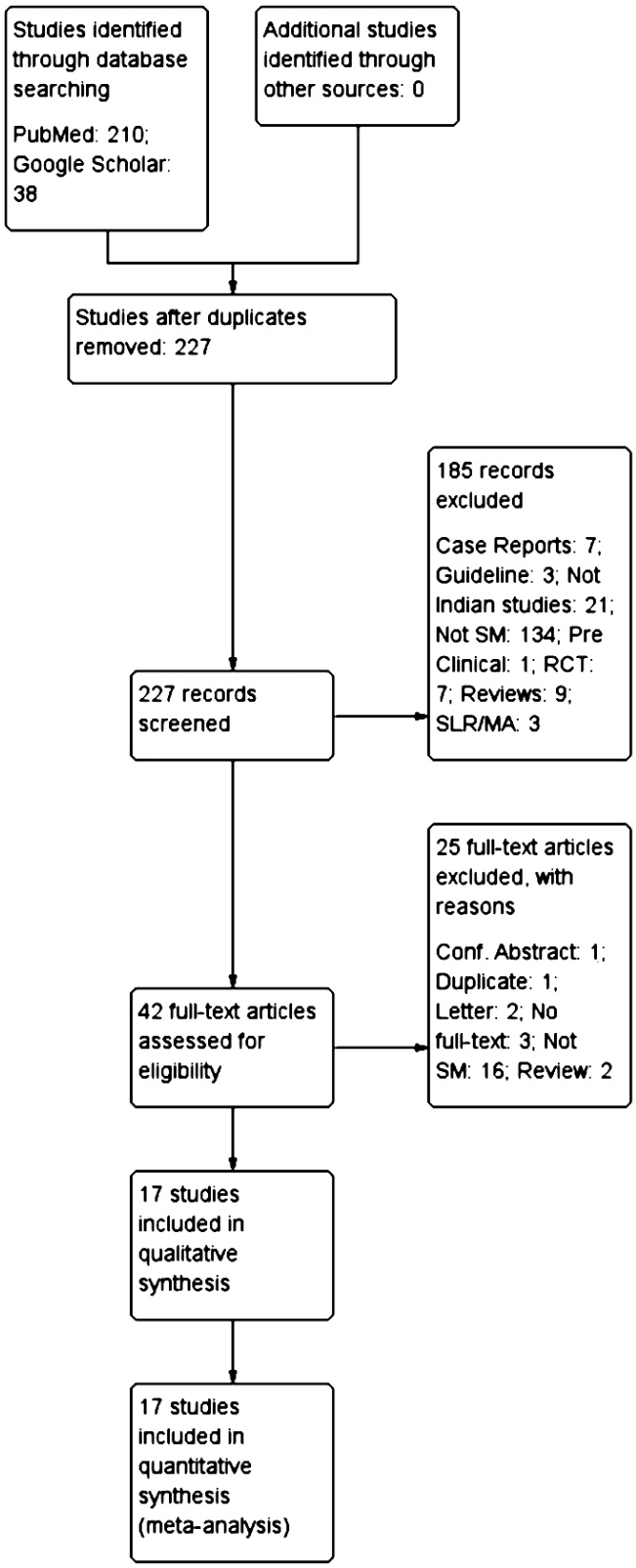

Fig. (1). Detailed study selection process (PRISMA flowchart).

Table 1. Characteristics of included studies.

Author & Year	City	State	Year of the Study Conducted	Sample Size Analysed	Refs.
Panda 2017	Berhampur	Odisha	2015	880	[2]
Amit Kumar 2016	Sasaram	Bihar	2016	320	[11]
Ritesh Kumar 2016	Bhubaneswar	Odisha	2012	337	[12]
Simon 2015	Mangalore	Karnataka	NR	400	[13]
Jain 2014	Moradabad, Meerut, Ghaziabad, and Bareilly	Uttar Pradesh	2013	352	[14]
Kasulkar 2015	Nagpur	Maharashtra	2013	488	[15]
Bhambhani 2015	Bhopal	Madhya Pradesh	2012	300	[16]
Nivedita 2015	Pudhucherry	Tamil Nadu	2014	128	[17]
Patil 2013	Gulbargha	Karnataka	2014	440	[18]
Ahmad 2014	Sahswan	Uttar Pradesh	2012	600	[4]
Selvaraj 2014	Puducherry	Tamil Nadu	2013	352	[19]
Kumar 2013	Mangalore	Karnataka	2011	440	[20]
Badiger 2012	Mangalore	Karnataka	NR	200	[7]
Banarjee 2012	Behrampore	West Bengal	2010	468	[21]
Lal 2007	Dr. Ambedkar Nagar	New Delhi	2015	1928	[8]
Tibdewal 2005	Nagpur	Maharashtra	2004	976	[22]
Saradamma 2000	Trivandrum	Kerala	2000	1639	[23]

3. RESULTS

3.1. Data Summary of Included Studies

Of 227 non-duplicate publications, only 42 studies were eligible for full-text assessment. Finally, a total of 17 studies including 10,248 participants were included in this meta-analysis. The detailed search process (PRISMA) is represented in Fig. **1**.

The characteristics of included studies are described in Table **1** [11-23]. All the included studies were cross-sectional by design and their study period varied from a single day to 6 months. The methodological characteristics of the included studies are illustrated in Table **2**.

3.2. Prevalence of Self-medication Practices

A meta-analysis of 16 studies with 9936 participants revealed that 4714 participants practiced self-medication with a prevalence rate of 53.57 (95% Confidence Interval: 36.92-70.21; Fig. **2**). However, there was high heterogeneity among the studies (I^2 = 100%; P<0.0001), therefore, caution should be taken while interpreting the result.

3.3. Sources of Information on Medication

A total of 11 studies with 3034 participants were involved in this analysis. Most of the people practiced self-medication because they were familiar with the medications (PR: 30.45; 95%CI: 17.08-43.82; 6 studies; I^2 = 98%; P<0.0001; Fig. **3**) followed by the information provided by the Pharmacist at the pharmacy (PR: 30.10; 95%CI 22.65-37.54; 11 studies; I^2 = 96%; P<0.0001; Fig. **3**). A very few individuals who were practising SM had reported that they had information from other sources (PR: 11.98; 95%CI 5.21-18.76; 6 studies; I^2 = 96%; P<0.0001; Fig. **3**).

3.4. Socio-economic Factors

A pooled analysis of 3 studies with 1227 participants revealed that self-medication practice was more common among people with middle-lower level families with a prevalence of 26.31 (95%CI: 2.02-50.60; I^2 = 99%; P<0.0001; Fig. **4**) followed by upper-lower level families (PR: 24.21; 95%CI 8.69-39.73; I^2 = 98%; P<0.0001; Fig. **4**). The least prevalence was observed among people with lower-income (PR: 6.33; 95%CI 2.64-10.02; I^2 = 87%; P=0.0005; Fig. **4**).

3.5. Indication of Self-medication Practices

A total of 13 studies with 3784 participants were included in this analysis. Among all the indications, headache was noticed as the most identifiable reason (PR: 41.53; 95%CI: 18.05-65.02; 5 studies; I^2 = 98%; P<0.0001; Fig. **5**); then cough and cold (PR: 40.45; 95%CI: 22.89-58.01; 10 studies; I^2 = 99%; P<0.0001; Fig. **5**), followed by fever (PR: 39.93; 95%CI: 20.08-59.79; 9 studies; I^2 = 99%; P<0.0001; Fig. **5**) for practicing SM.

3.6. Type of Medication

Summary from 8 studies inferred that non-steroidal anti-inflammatory drugs were the most self-practiced medications

Table 2. Methodological characters of included studies.

Author & Year	Study Design	Study Period	Type Medication	Type of Participants	Refs.
Panda 2017	Cross sectional study	6 months	OTC medication	Adults	[2]
AmitKumar 2016	Cross sectional study	3 months	Analgesic	Undergraduate	[11]
RiteshKumar 2016	Cross-sectional study	NR	Any medicine	Medical [MBBS]; dental [BDS], and para-medical students [B.Sc. Nursing, B.Sc. Optometry, and B.Sc. Medical Technology in Radiography]	[12]
Simon 2015	Cross sectional study	NR	Antimicrobials	Adult dental out patients	[13]
Jain 2014	Cross-sectional study	2 month	Drugs for oral health	Dental patients	[14]
Kasulkar 2015	Cross-sectional study	6 months	OTC medication	Medical students [All batches]	[15]
Bhambhani 2015	Cross-sectional study	1 month	OTC medication	Patients coming to a TCTH	[16]
Nivedita 2015	Cross-sectional study	2 month	Abortion Pills	Pregnant women	[17]
Patil 2013	Cross sectional study	2 months	OTC medication	Undergraduate medical students	[18]
Ahmad 2014	Cross-sectional study	2 months	OTC medication	Normal community	[4]
Selvaraj 2014	Cross-sectional study	2 months	Any medicine	Field practisers	[19]
Kumar 2013	Cross-sectional study	2 months	OTC medication	Undergraduate medical students	[20]
Badiger 2012	Cross-sectional study	NR	OTC medication	Undergraduate medical students	[7]
Banarjee 2012	Cross-sectional study	single day	OTC medication	undergraduate medical students	[21]
Lal 2007	Cross-sectional study	single day	OTC medication	Residents and family	[8]
Tibdewal 2005	Cross-sectional study	30 days	Any medicine	Mothers having at least one child < 6 years	[22]
Saradamma 2000	Cross-sectional study	14 days	Antimicrobials	Households	[23]

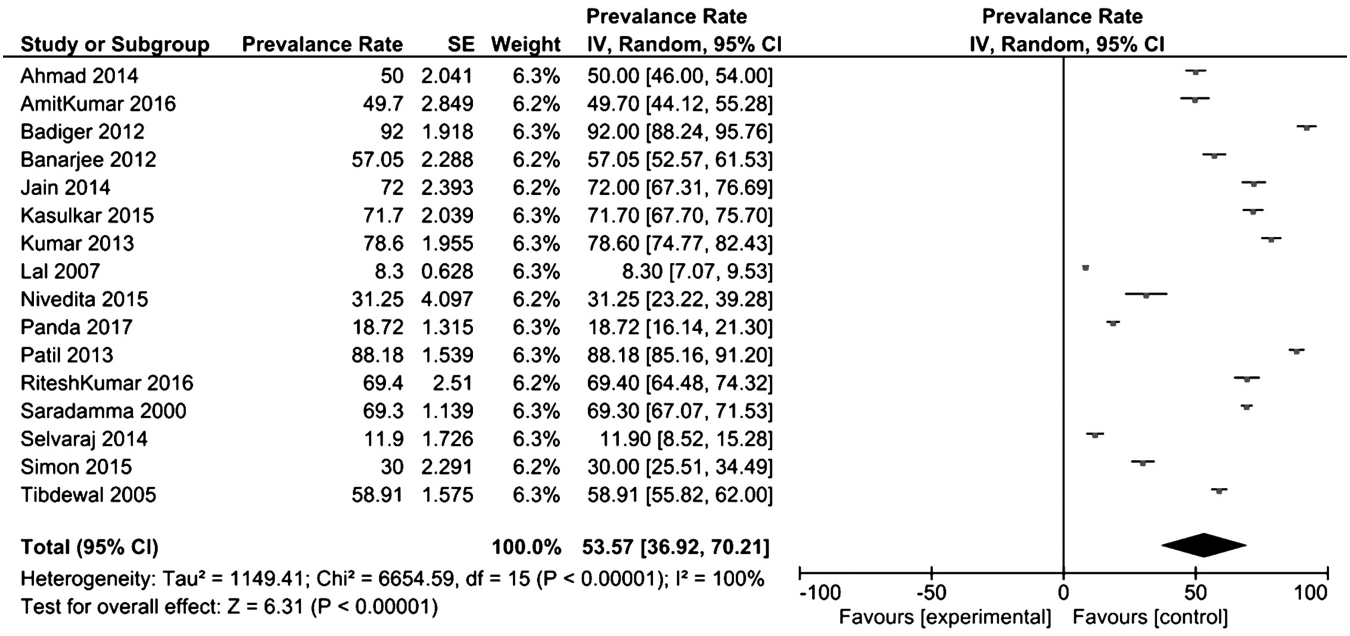

Fig. (2). Pooled prevalence of SM.

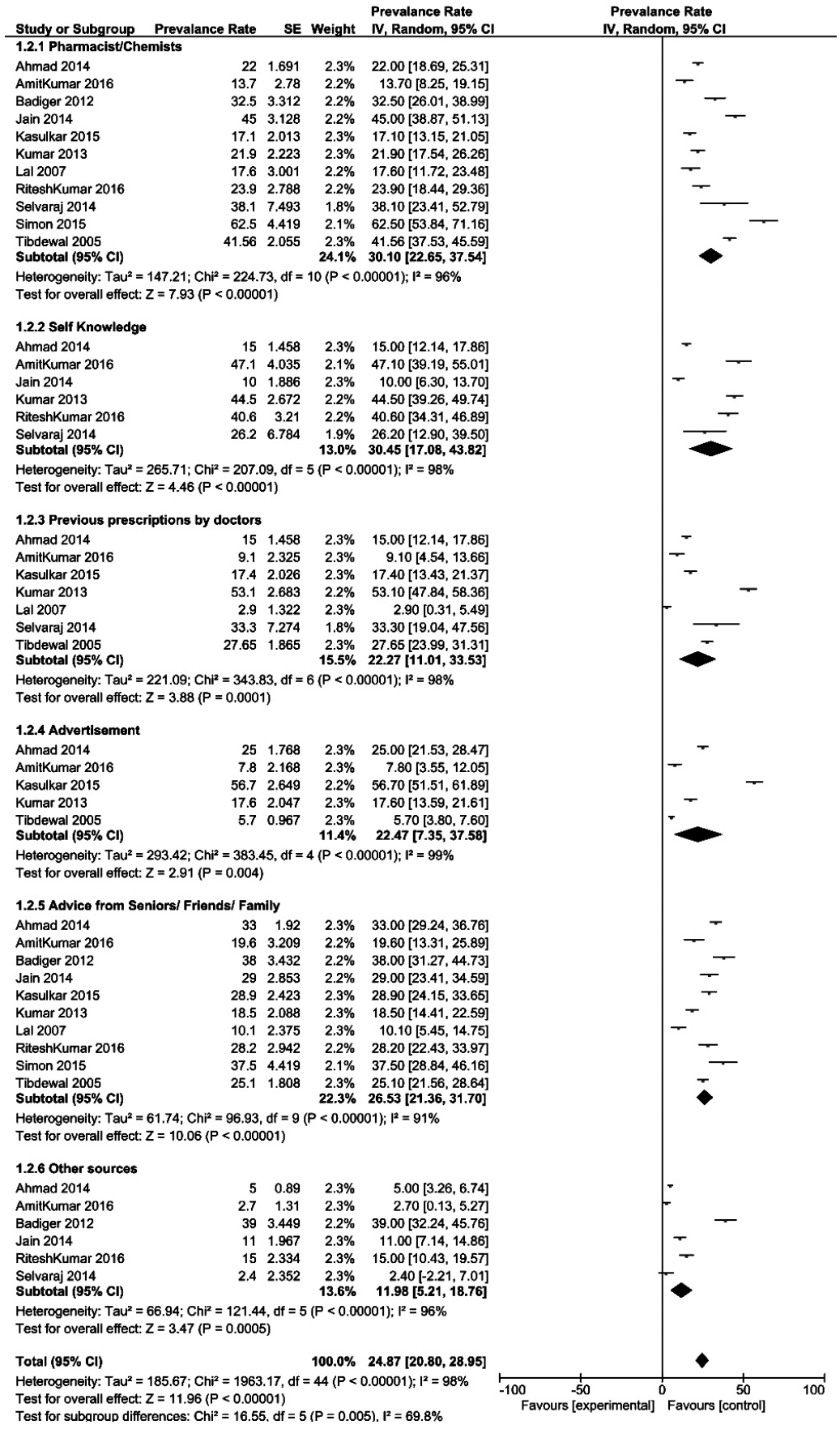

Fig. (3). Sources of information regarding SM.

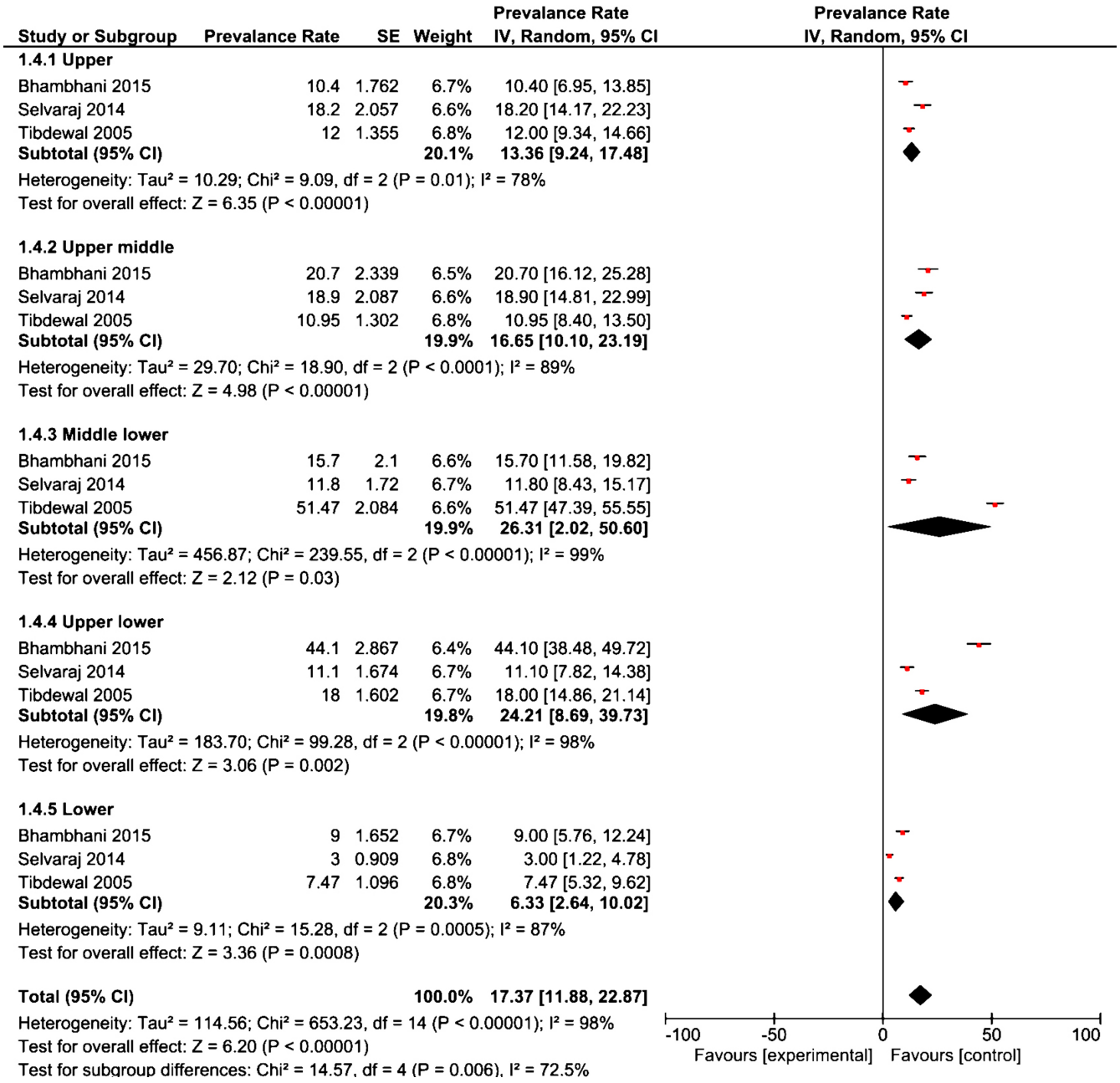

Fig. (4). Socioeconomic factors of SM.

with a prevalence of 45.90 (95%CI: 29.06-62.74; I^2 = 99%; P<0.0001; Fig. **6**); followed by anti-allergic medications (PR: 31.23; 95%CI: 5.28-57.17; 4 studies; I^2 = 99%; P<0.0001; Fig. **6**). The least self-practiced medicines were the topical preparations (PR: 9.97; 95%CI: 2.51-17.43; 4 studies; I^2 = 99%; P<0.0001; Fig. **6**).

3.7. Reasons for Self-medication Practices

Summary analysis of 9 studies revealed that minor ailments were the major reason for practicing SM (PR: 42.46; 95%CI: 21.87-63.06; I^2 = 100%; P<0.0001; Fig. **7**), followed by economical concerns (PR: 30.89; 95%CI: 9.59-52.20; 6 studies; I^2 = 100%; P<0.0001; Fig. **7**), belief in quick relief (PR: 24.90; 95% CI: 20.37-29.43; 1 studies; Fig. **7**) and previous experience (PR: 10.41; 95%CI: 7.10-13.72; 4 studies; I^2 = 62%; P=0.05; Fig. **7**) respectively.

3.8. Publication Bias

Visual inspection of the funnel plots revealed the presence of no apparent asymmetry, which indicates that there is no significant publication bias (Fig. **8**); while, Begg's test (P= 0.528) declared that there was no statistically significant publication bias. However, publication bias was found to be significant in the Egger's test (P=0.013). An extensive literature

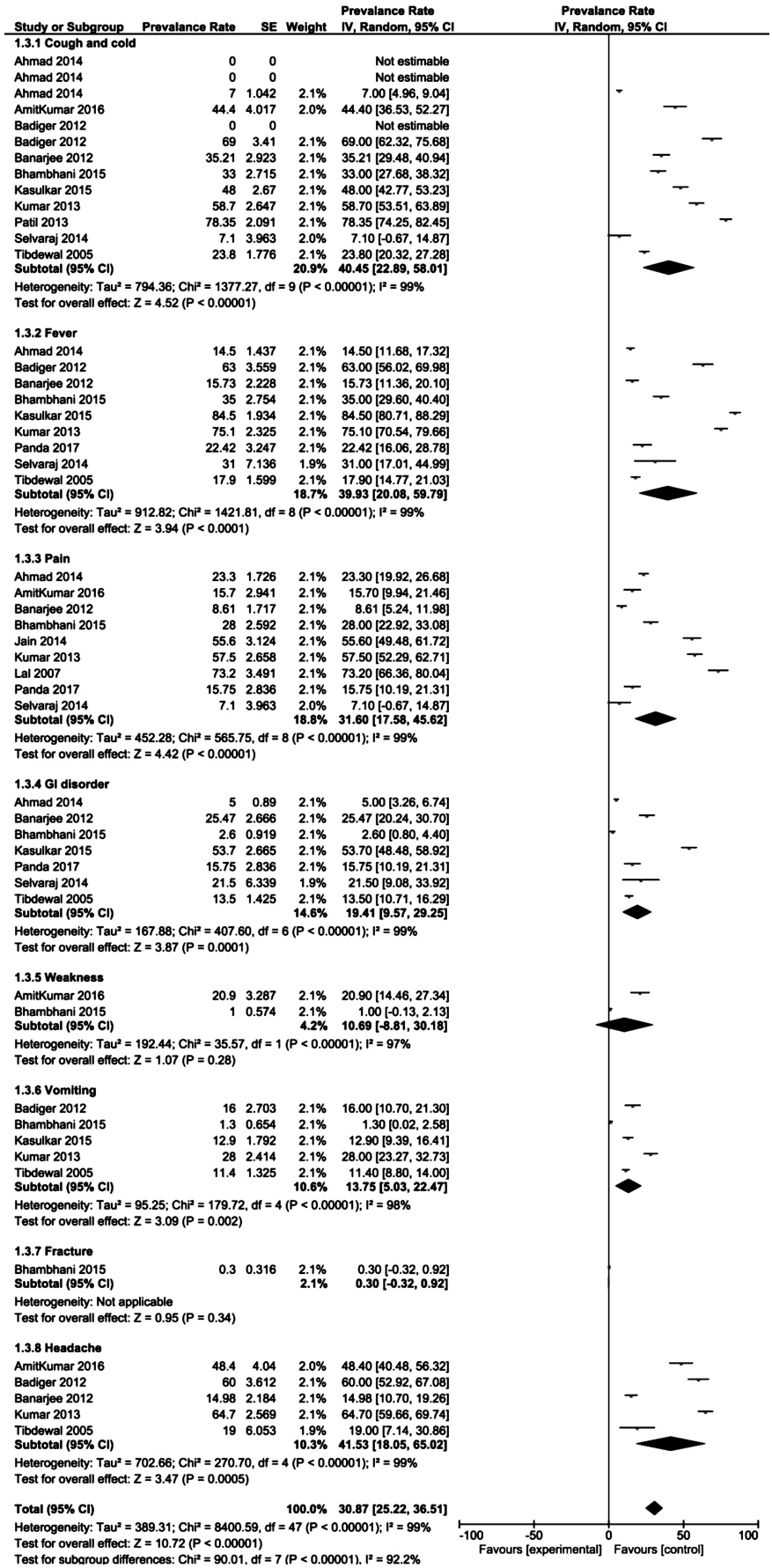

Fig. (5). Indications of SM.

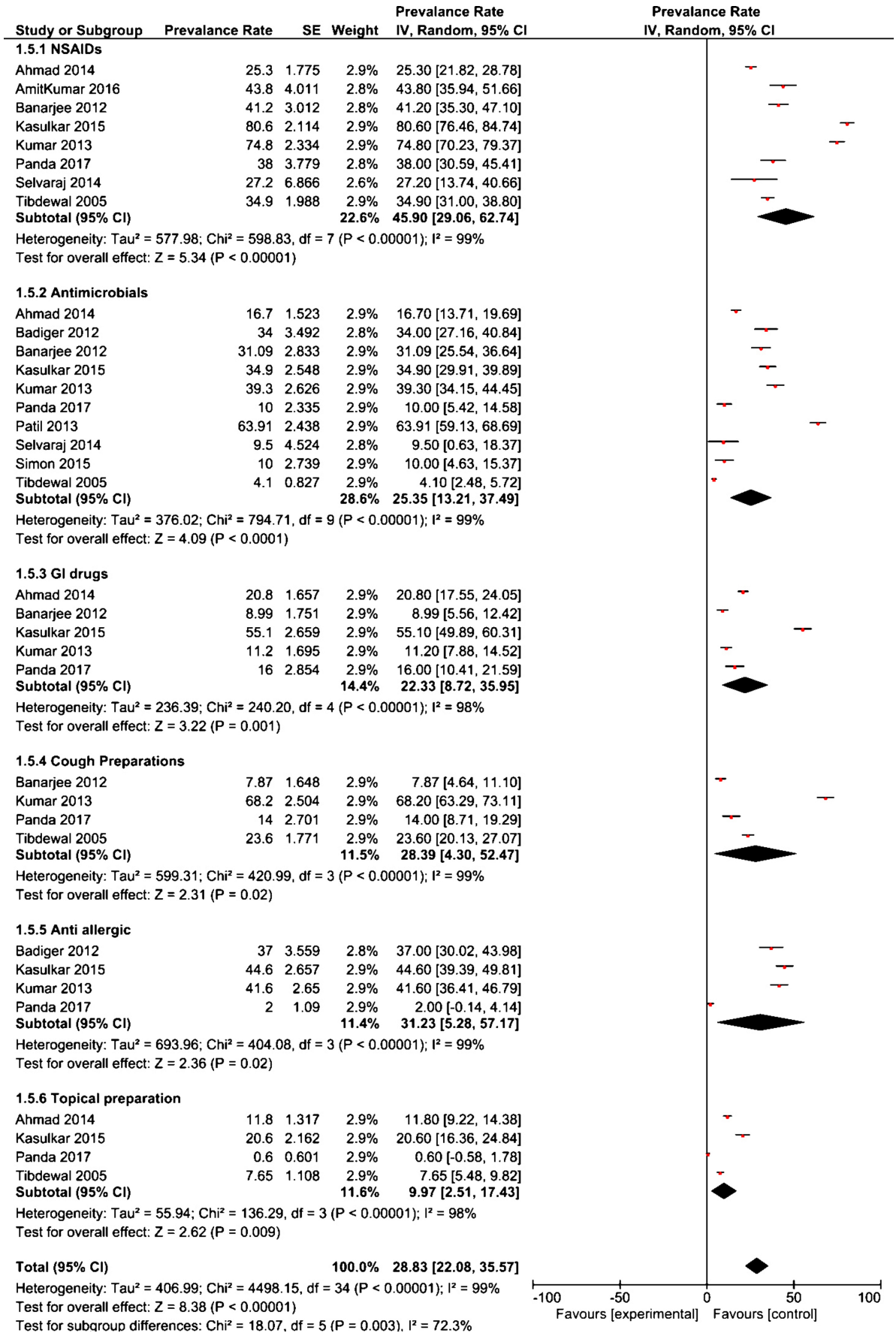

Fig. (6). Type of medication.

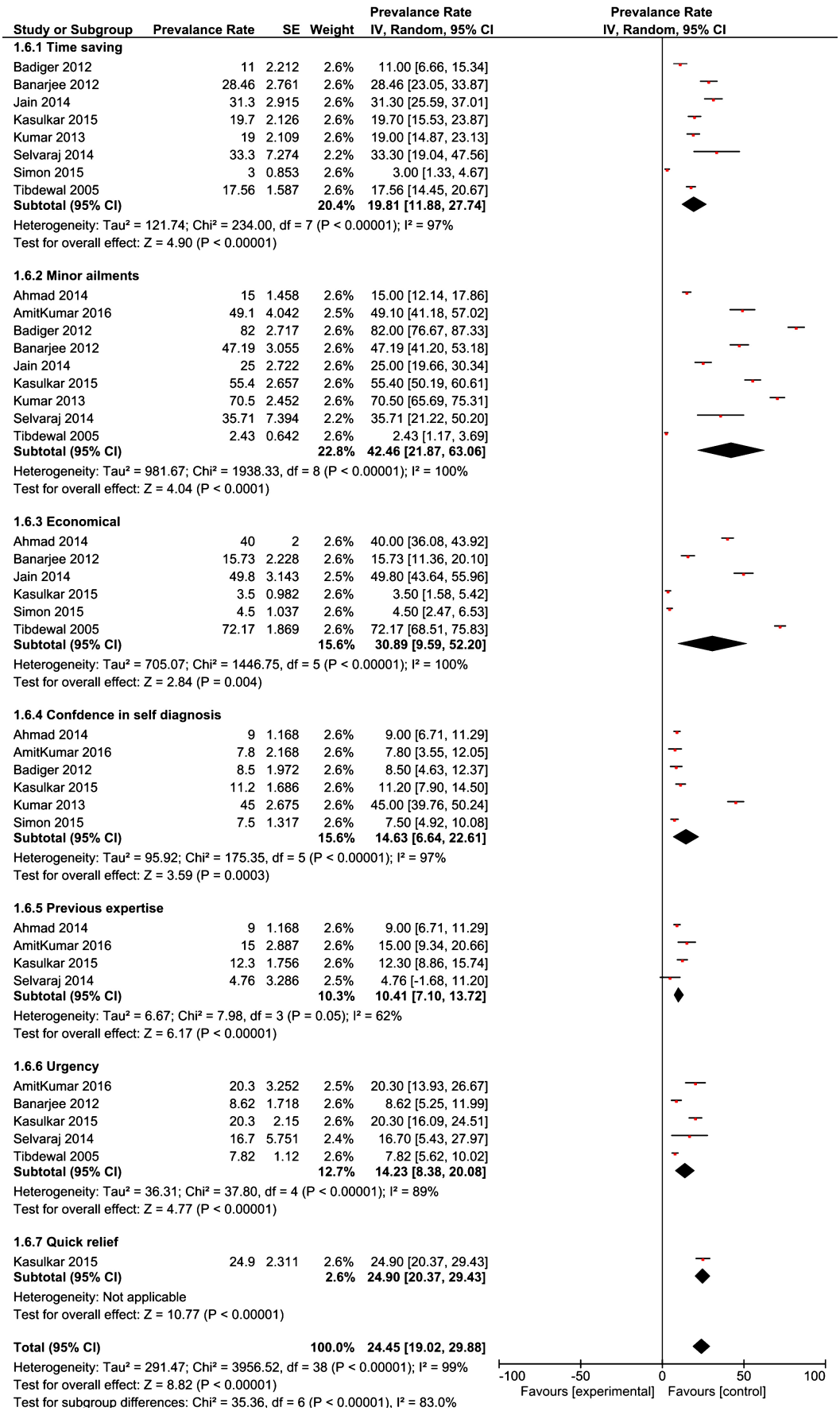

Fig. (7). Reasons for self-medication.

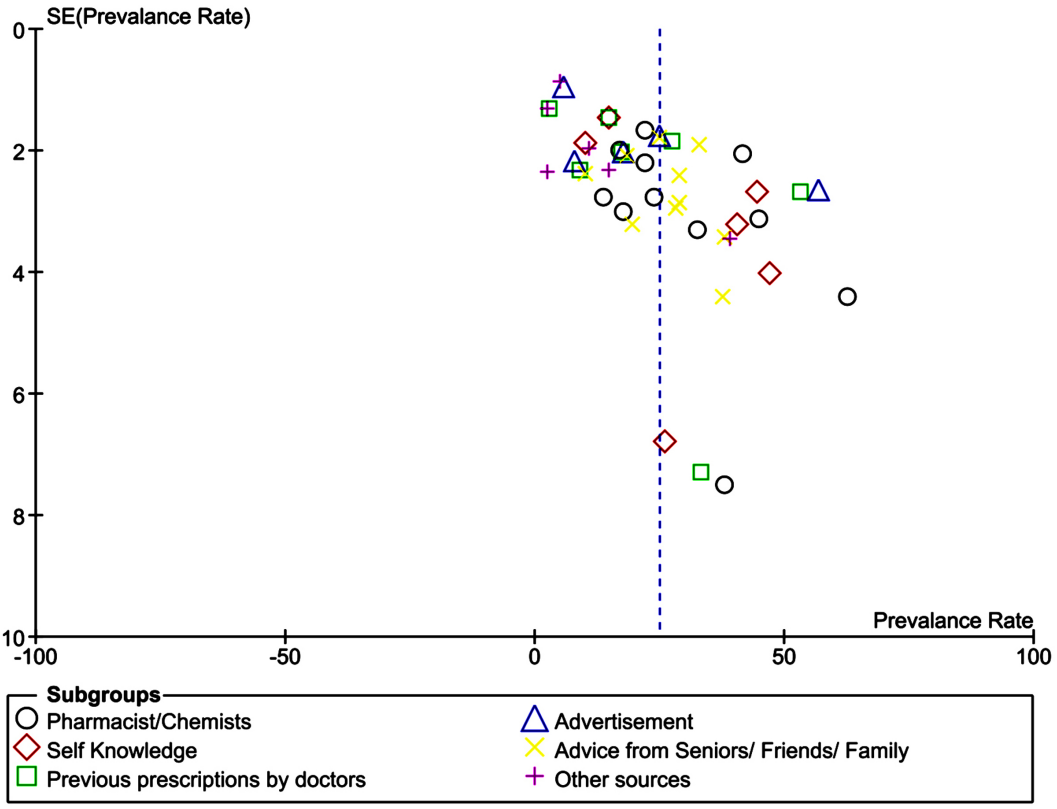

Fig. (8). Funnel plot; Prevalence rate on X-axis and SE on Y-axis. (*A higher resolution / colour version of this figure is available in the electronic copy of the article*).

search and comprehensive search strategy might be the reasons for non-significant publication bias.

4. DISCUSSION

Despite ongoing awareness and public health campaigns, SM remains a global public health concern in India. SM practices may lead to drug resistance, unwanted side-effects and may even lead to death in some cases. One of the main reasons for high SM practice in India is the lack of regulation on OTC drugs and non-adherence to the rational drug use practice and policies [1]. The current review analysed 17 studies involving 10,248 participants for pooled estimation of the prevalence of SM in India and it ranged from 8.3% to 92% with a pooled prevalence of 53.57% [4, 7, 8, 18-23]. Contributing factors for the disparities in SM practices across India might be due to variations in cultural, socio-economic, health and development status [4]. A recent systematic review conducted in Ethiopia by Sisay M *et al*., revealed pool prevalence of 44%, while the prevalence of this meta-analysis was higher when compared to their results [10]. However, these results were similar to the findings of a systematic review conducted by Alhomoud *et al*. which stated that the range of the prevalence of SM practices in the case of antibiotics varied from 19% to 82% in the Middle Eastern population [24]. The practices of SM in Lower-Middle Income countries like India are very high, and they have almost doubled since the last decade [25]. SM practices are considered almost minimal in western countries like Europe as they have strict regulations on OTC medication, which should be adopted by other countries, including India [26].

Interestingly, undergraduate medical students were more prone (92%) to practice SM as revealed in a study conducted by Badiger *et al*., in 2012 and the possible reasons for such behaviour were related to their level of knowledge, confidence in self-diagnosis, storage of leftover medication and intention to avoid the cost of physician [7]. SM practices contribute to various adverse consequences such as drug interactions, serious side-effects, drug resistance, delayed diagnosis, irrational drug use, increase in direct and indirect medical costs [27]. A study conducted in Mexico inferred that 26.7% of the adverse drug reactions reported in elderly patients were due to SM [28].

Among all the included studies, pharmacy was the primary source of information about the medications, which led individuals to practice SM [29], followed by advice from the family and friends. In addition, a systematic review conducted by Limaye D *et al*. also found that pharmacists were the primary sources of information on SM [5]. The pharmacists should be informed that at times, patients might mislead the information supplied that was provided, as a source of self-medication practices. Moreover, there should be a strict regulation of scheduled H drugs in India to prevent SM practices [30]. Surprisingly, advertisements promoting the use of medication on media contributed to the least proportion as a source of information for the practice of SM [29]. The majority of the participants practising SM in the studies were

from a lower socio-economic class followed by a higher socio-economic class, and the possible reason behind this finding might be the economical concerns for lower socio-economic class people; while, people belonging to a higher socio-economic class might have shortage of time [30]. In this regard, the pharmacist can also play an essential role in minimizing SM practices by counselling people of all socio-economic classes, especially the lower and upper classes [31]. People should be made aware regarding the adverse impacts of SM on health such as prolonged illness, under-diagnoses and increased health care expenditure, especially in a country like India where most of the health care cost is expensive [32].

Cold and cough are the prevalent conditions where most of the study participants practiced SM in the current study. Many studies have reported people using antibiotics for treating cold and cough, which are of no benefit [5, 10]. These findings for the most commonly used drugs for SM practice are different from a systematic review conducted by Sisay *et al*. where they reported that analgesics were the most frequently used drugs associated with SM practices. This study found that minor ailments were the most common reason for practising SM among the Indian population; while, Sisay *et al*., reported that the common cause of SM practices among people of Ethiopia was due to a previous experience [10]. The prevalence of SM practices in India can be reversed by enforcing the laws, forming and implementing the national plan and also providing strict directions to pharmacists to dispense drugs only upon presentation of a prescription. There are some limitations for this study such as restricting articles, which are cross-sectional in nature, limiting studies that were conducted only in India and most importantly not including other electronic scientific databases for searching the relevant articles.

CONCLUSION

The prevalence of self-medication practice appears to be high in India with more than half of the study participants practicing it. Factors such as self-knowledge, confidence in diagnosing disease and familiarity with the medication were considered as the predictors of self-medication practice in India. Further immediate actions are needed to prevent harms induced by SM practices, such as enhanced accessibility towards medical services, coverage of health insurance by the government, and lowering the medical expenses. Thus, education on the health impact of SM practices should be initiated at the community level and regulations on the medication instructions must be reinforced by the regulating authorities and governing bodies in India.

KEY MESSAGES

Regardless of the severity and types of medication, the overall prevalence of self-medication practice in India has been found to be considerably high, which suggests that healthcare authorities and governing bodies should educate the public about the adverse consequences of self-medication practices and cut down these practices.

CONSENT FOR PUBLICATION

Not applicable.

FUNDING

None.

CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

ACKNOWLEDGEMENTS

Declared none.

REFERENCES

[1] Goyal A, Gaur A, Chhabra M, Deepak K. Knowledge, attitude and practices of Over The Counter (OTC) medicines among rural population-A cross sectional study. Asian. J Pharm Pharmacol 2018; 4(2): 227-31.

[2] Panda A, Pradhan S, Mohapatro G, Kshatri JS. Predictors of over-the-counter medication: A cross-sectional Indian study. Perspect Clin Res 2017; 8(2): 79-84. http://dx.doi.org/10.4103/2229-3485.203043 PMID: 28447018

[3] Van der Geest S, Hardon A. Self-medication in developing countries. J Soc Adm Pharm 1990; 7(4): 199-204.

[4] Ahmad A, Patel I, Mohanta G, Balkrishnan R. Evaluation of self-medication practices in rural area of town sahaswan at northern India. Ann Med Health Sci Res 2014; 4(8)(Suppl. 2): S73-8. http://dx.doi.org/10.4103/2141-9248.138012 PMID: 25184092

[5] Limaye D, Limaye V, Krause G, Fortwengel G. A systematic review of the literature to assess self-medication practices. Ann Med Health Sci Res 2017.

[6] Nepal G, Bhatta S. Self-medication with antibiotics in WHO Southeast Asian Region: A systematic review. Cureus 2018; 10(4): e2428. http://dx.doi.org/10.7759/cureus.2428 PMID: 29876150

[7] Badiger S, Kundapur R, Jain A, *et al.* Self-medication patterns among medical students in South India. Australas Med J 2012; 5(4): 217-20. http://dx.doi.org/10.4066/AMJ.2012.1007 PMID: 22848313

[8] Lal V, Goswami A, Anand K. Self-medication among residents of urban resettlement colony, New Delhi. Indian J Public Health 2007; 51(4): 249-51. PMID: 18232170

[9] Law Relating to Drugs and Cosmetics: Containing Drugs Cosmetics Act, 1940, Drugs and Cosmetics Rules, 1945 Along with Drugs (Prices Control) Order, 2013, National Pharmaceuticals Pricing Policy, 2012 (NPPP-2012), Pharmacy Act, 1948, Poisons Act, 1919, Drugs and Magic Remedies (Objectionable Advertisements) Act, 1954 and Other Allied Acts, Rules Etc. with Information on Herbal Formulations, Cosmetics and Extracts, Etc: Eastern book company 2014.

[10] Sisay M, Mengistu G, Edessa D. Epidemiology of self-medication in Ethiopia: A systematic review and meta-analysis of observational studies. BMC Pharmacol Toxicol 2018; 19(1): 56. http://dx.doi.org/10.1186/s40360-018-0248-8 PMID: 30201045

[11] Kumar A, Vandana ANA, Aslami AN. Analgesics self-medication and its association with sleep quality among medical undergraduates. J Clin Diagn Res 2016; 10(12): FC07-11. PMID: 28208872

[12] Kumar R, Goyal A, Padhy BM, Gupta YK. Self-medication practice and factors influencing it among medical and paramedical students in India: A two-period comparative cross-sectional study. J Nat Sci Biol Med 2016; 7(2): 143-8. http://dx.doi.org/10.4103/0976-9668.184700 PMID: 27433064

[13] Simon AK, Rao A, Rajesh G, Shenoy R, Pai MB. Trends in self-medication for dental conditions among patients attending oral health outreach programs in coastal Karnataka, India. Indian J Pharmacol 2015; 47(5): 524-9. http://dx.doi.org/10.4103/0253-7613.165195 PMID: 26600642

[14] Jain A, Bhaskar DJ, Gupta D, Agali C, Yadav P, Khurana R. Practice of self-medication for dental problems in Uttar Pradesh, India. Oral Health Prev Dent 2016; 14(1): 5-11. PMID: 26525125

[15] Kasulkar AA, Gupta M. Self-medication practices among medical students of a private institute. Indian J Pharm Sci 2015; 77(2): 178-82.
http://dx.doi.org/10.4103/0250-474X.156569 PMID: 26009650

[16] Bhambhani G, Saxena V, Bhambal A, Saxena S, Pandya P, Kothari S. Self-medication practice amongst patients visiting a tertiary-care dental hospital in Central India. Oral Health Prev Dent 2015; 13(5): 411-6.
PMID: 25789355

[17] Nivedita K, Shanthini F. Is it safe to provide abortion pills over the counter? A study on outcome following self-medication with abortion pills. J Clin Diagn Res 2015; 9(1): QC01-4.
PMID: 25738038

[18] Patil SB. S H V, B v P, Santoshkumar J, Binjawadgi AS, Ka-naki AR. Self-medication practice and perceptions among undergraduate medical students: A cross-sectional study. J Clin Diagn Res 2014; 8(12): HC20-3.
PMID: 25653969

[19] Selvaraj K, Kumar SG, Ramalingam A. Prevalence of self-medication practices and its associated factors in Urban Puducherry, India. Perspect Clin Res 2014; 5(1): 32-6.
http://dx.doi.org/10.4103/2229-3485.124569 PMID: 24551585

[20] Kumar N, Kanchan T, Unnikrishnan B, *et al.* Perceptions and practices of self-medication among medical students in coastal South India. PLoS One 2013; 8(8): e72247.
http://dx.doi.org/10.1371/journal.pone.0072247 PMID: 24015223

[21] Banerjee I, Bhadury T. Self-medication practice among undergraduate medical students in a tertiary care medical college, West Bengal. J Postgrad Med 2012; 58(2): 127-31.
http://dx.doi.org/10.4103/0022-3859.97175 PMID: 22718057

[22] Tibdewal S, Gupta M. Mother's use of medication in their children of preschool age. Indian J Public Health 2005; 49(1): 27-9.
PMID: 15989158

[23] Saradamma RD, Higginbotham N, Nichter M. Social factors influencing the acquisition of antibiotics without prescription in Kerala State, south India. Soc Sci Med 2000; 50(6): 891-903.
http://dx.doi.org/10.1016/S0277-9536(99)00380-9 PMID: 10695985

[24] Alhomoud F, Aljamea Z, Almahasnah R, Alkhalifah K, Basalelah L, Alhomoud FK. Self-medication and self-prescription with antibiotics in the Middle East-do they really happen? A systematic review of the prevalence, possible reasons, and outcomes. Int J Infect Dis 2017; 57: 3-12.
http://dx.doi.org/10.1016/j.ijid.2017.01.014 PMID: 28111172

[25] Smith F. The quality of private pharmacy services in low and middle-income countries: A systematic review. Pharm World Sci 2009; 31(3): 351-61.
http://dx.doi.org/10.1007/s11096-009-9294-z PMID: 19343530

[26] Grigoryan L, Haaijer-Ruskamp FM, Burgerhof JG, *et al.* Self-medication with antimicrobial drugs in Europe. Emerg Infect Dis 2006; 12(3): 452-9.
http://dx.doi.org/10.3201/eid1203.050992 PMID: 16704784

[27] Ruiz ME. Risks of self-medication practices. Curr Drug Saf 2010; 5(4): 315-23.
http://dx.doi.org/10.2174/157488610792245966 PMID: 20615179

[28] Balbuena FR, Aranda AB, Figueras A. Self-medication in older urban mexicans: An observational, descriptive, cross-sectional study. Drugs Aging 2009; 26(1): 51-60.
http://dx.doi.org/10.2165/0002512-200926010-00004 PMID: 19102514

[29] Jain S. Concept of self-medication: A review. Int J Pharm Biol Arch 2011; 2(3): 831-836.

[30] Mudur G. Abuse of OTC drugs rising in South Asia. BMJ 1999; 318(7183): 556.
http://dx.doi.org/10.1136/bmj.318.7183.556b PMID: 10037623

[31] Knapp DA, Knapp DE, Engel JF. The public, the pharmacist and self-medication. J Am Pharm Assoc 1966; 6(9): 460-2.
http://dx.doi.org/10.1016/S0003-0465(15)31641-4 PMID: 5943501

[32] Sengupta A, Nundy S. The private health sector in India. Br Med J 2005; 331: 1157.
http://dx.doi.org/10.1136/bmj.331.7526.1157

[33] Organization WH. Antimicrobial resistance: Global report on surveillance. World Health Organization 2014.