

# A survey on self medication in adolescents and adults in Iran and the world

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## ABSTRACT

The term self-medication refers to the use of non-prescriptive medicines, and usually over the counter drugs (OTCs) for the treatment of certain diseases, without consulting an expert and medical supervision. Self-medication is one of the most common risky behaviors that adolescents are exposed to. In addition, the habits of this period, probably, will continue to adulthood. According to the above, this study was conducted with the aim of reviewing the self-medication in Iran and the world. In this paper, an overview was conducted in terms of self-medication by medicines and the determinants, the treatment of symptoms of diseases with self-medication, the importance of self-medication, self-medication problems, the role of local pharmacies and pharmacists, and the role of medication consumers in Self-medication. In addition, legal controls, the prevalence of self-medication in Iran, and self-medication in adolescents were investigated in this study. The results indicated that self-medication was prevalent among adults and adolescents in developed and developing countries. Self-medication is more prevalent among girls and women and as they grow it become more and more. Mothers' education, parenting factors, family training, and socioeconomic status are some of important factors affecting self-medication. Pharmacists, parents, coworkers, and friends are the main sources for gathering information on medicine to cope with headaches, colds and menstrual problems. In addition, the media encourages adolescents and adults to take medication freely. Monitoring the current process of self-medication can help to have control over-consumption and drug abuse among adolescents and adults. Reviewing research not only provides insight into generalized therapies and self-medication, but also it explains factors such as easy access, and the lack of attention to prescriptions.

**Keywords:** self medication, OTCs, adolescents, adults.

## Introduction

The term self-medication refers to the patients who use non-prescription medicine, usually over-the-counter drugs (OTCs), for the treatment of certain diseases without consulting an expert and medical supervision. Children often have access to medicines used by their parents and use them for self-

medication. While adults may treat themselves as a kind of self-medication. OTC medicines for children contain various medications such as cough and cold medicines (CCM), pain killers (such as paracetamol and ibuprofen), vitamin supplements and skin products, and others.<sup>[1-3]</sup>

Anyone in his lifetime, may experience the lack of complete health conditions either as a major illness requiring immediate medical attention, or as a simple illness. Self-medication can be defined as the use of medication to treat disorders and symptoms that the person detects. Consumers often use self-medication when they think there is not enough justification for consulting a doctor, while they are aware that some symptoms require medical therapy.<sup>[4]</sup> Self-medication is defined by the World Health Organization (WHO) as the selection and use of medications by individuals to treat symptoms and illnesses that they detect.<sup>[5]</sup> Self-medication is a part of self-care.<sup>[6]</sup> Self-

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medication can be defined as a request and use of medication without the assistance of a physician in the diagnosis, administration, monitoring, and care.<sup>[7]</sup> As Caulin et al. have stated medications should have definite quality, efficiency, and safety before being available to people in the market for the purpose of treatment of illnesses.<sup>[8]</sup> The National Medicine Policy Committee of the WHO has stated in 1995 that self-medication is used in developed and underdeveloped countries. Medicines that have been approved for self-medication by the National Medicines Regulatory Authority are normally used to treat or prevent symptoms or mild illnesses. In some chronic and recurrent diseases, self-medication is possible with the doctor's role and guidance after the initial diagnosis and prescribing.<sup>[9]</sup> Self-medication is as old as human life; however, its scope and nature depends on social and educational factors, as well as the cultural environment. It seems that, extensive access to doctors and their greater availability reduce self-medication but this hypothesis has been rejected by an international study. In fact, in developing countries such as Iraq, self-medication constitutes 50 to 90 percent of treatment interventions for most diseases.<sup>[10]</sup> In Iran, as another developing country, a significant proportion of non-prescribed medicines are generally purchased from local pharmacies without consulting doctors. The risk is that if the medications are not used properly, serious health problems may occur. However, there is little available information about self-medication in Iran. Each Iranian consumes 683 tablets each year, exceeding the global standard. It is estimated that 83.3% of Iranian people use self-medication.<sup>[11]</sup> The prevalence of self-medication varies from 12% to 90% in Iran.<sup>[12-16]</sup> Painkillers, eye drops, and antibiotics have the highest share in self-medication.<sup>[14, 17]</sup> According to a report by the Center for Health and Medical Education (ADR), 10,000 adverse drug reactions have been documented in the past ten years, with 30% of them relating to the injecting medicines. Factors affecting the incidence of self-medication include doctors' high fees, transportation issues, insurance problems, easy access to medications, sense of well-being, negligence in illness, previous prescribing of medicines, ignorance, cultural and socio-economic issues, and others.<sup>[18-21]</sup> In another report, the overall prevalence of self-medication in Iran was 53%. The most important determinants of self-medication include mild symptoms, auto-diagnostic symptoms of disease, previous use of medication, and ease of access to non-prescriptive drugs. The most important groups of illnesses exposed to self-medication are respiratory illnesses, common colds, and headaches. The most important medications used in self-medication are analgesics, antibiotics, and cold medicines.<sup>[21]</sup>

Self-medication is one of the common behaviors associated with high-risk health issues that adolescents are exposed to.<sup>[22]</sup> In addition, the habits that exist during this period continue to adulthood.<sup>[23]</sup> This issue has often raised serious concerns in medical unions and associations. Several factors affect the behavior of self-medication in adolescents.<sup>[24, 25]</sup> So that a positive attitude toward self-medication and over-assurance in terms of knowledge on medicines often acts as a driving force

for self-medication<sup>[26]</sup> as well as improper use of medications.<sup>[27]</sup> Adolescents take medications without prescribing, use old prescriptions, share medications with friends and relatives, and use the remaining medications from previous prescriptions and medicines accumulated at home.<sup>[28, 29]</sup> Over-the-counter (OTC) and prescription only medicines (POMs) are available without the need for essential information on symptoms, contraindications, and risky conditions.<sup>[26, 30, 31]</sup> In addition, the potential risks associated with self-medication can include the improper use, overdoses, or drug abuse.<sup>[27]</sup> Despite the risks and potential damages of self-medication, previous epidemiological studies have shown that self-medication is common in adolescents and adults. According to aforementioned statements, this study aimed at reviewing self-medication in adolescents and adults in Iran and around the world.

## Methodology

The present study was conducted through systematic reviews. Various studies published in Elsevier, SID, Google Scholar, Proquest, Scopus, and Medline / Pubmed databases -dating from 1998 to 2018- were investigated and then were compared systematically. Regarding self-treatment, the terms "Self-medication", "Prevalence", "Medicine Utilization", "Non-prescription medicines", and "Prescriptive medicines" were used in various combinations. The criteria for the entry of studies into the research include: (1) the use of the terms specified for the title, (2) the completeness of the report, (3) the English or Persian language, and (5) the quantitative method of the research. In addition, excluding criteria included the studies that reported only the abstracts, and the text of the articles that were written in languages other than English and Persian. All research with full text have been evaluated, compared, and scored based on the scale of Jaddad and colleagues. Needless to say that the repeated studies were excluded.

## Findings

There were 893 quantitative articles found being related to the search terms. Out of which 107 articles were directly related to the subject, and 101 articles included the entire text being used for analyzing. Studies were conducted in the USA, Iran, Brazil, Turkey, Spain, Denmark, England, Finland, France, Mexico, Paraguay, 19 European countries, and Argentina. Most of the research was published between 2000 and 2012. The findings of self-medication studies in adults and adolescents are as follows:

### 1. Self-medication with over-the-counter (OTC), non-steroidal anti-inflammatory drugs, and analgesics in adults

A range of medicines is produced annually in many countries around the world, especially in Europe and the United States. Most of these medications are prescribed by doctors, while many OTC medications can be accessed from local pharmacies.

Many of the addictions and other side effects of medicines on health can be due to the belief of many consumers that the OTC medicines have fewer risks. Due to the tolerance they make, OTC drugs can lead to addiction. In addition, if a high dose of OTC medication is taken, it can create strange changes in mood, sleep, and even illusion.<sup>[32]</sup> Policies for OTC drugs around the world can vary. Since over-the-counter medicines are kept in retail stores and pharmacies with counters available to customers, in countries like the United States, these drugs are called over-the-counter or non-prescriptive. In Canada, over the counter medicines should be kept behind a counter or in a shelf that pharmacists can see. OTC drugs are available only from pharmacies in many European countries. In Australia, pharmacists should personally make recommendations for OTC medications to vendors.<sup>[33]</sup> OTC drugs in Ireland and England are divided into two categories: General Sales and pharmacy medicines; general sales (GSL) are medicines that can be purchased from the retail market, and do not require trained pharmacists; pharmacy medicines, though, (P) are not available "inside the shelves", and can be provided by registered pharmacists who can advise on the use and monitoring of patients.<sup>[32]</sup> Pharmacists should be personally involved in the marketing of medicines included in the pharmaceutical group of medicines, and stick specific protocols with regard to treatment and advice on medications.<sup>[34]</sup> Medicines' control agency is in charge of licensing medicines in the UK. In 1992, it facilitated the use of medicines through further improvements related to medicine laws. In addition, in 1992, the Medicines control agency was obliged to re-evaluate all licensed medicines every five years and provided justifications for their continued status as medicines that were limited to prescription.<sup>[35]</sup> One of the most widely used medicines in the whole world is non-steroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen, aspirin, and diclofenac. More than 8% of the adult population worldwide consume NSAIDs with prescriptions and at specific times. Differences in the NSAID gastrointestinal effects that are accurately registered can be categorized into two types: controlled factors such as type and duration of NSAID treatment, concurrent treatments, dose, and possible infection of *Helicobacter pylori*. Uncontrolled factors include gender, coexistence of two diseases, two diseases, history of digestive conditions and age.<sup>[36]</sup> By increasing self-medication, the probability of a variety of gastrointestinal complications is suggested due to the use of different doses of over-the-counter NSAIDs. Research in Sweden showed that analgesics were commonly used by people who suffered from chronic pain, and women used more analgesics than men did. Self-medication with analgesics was influenced by factors such as pain intensity, insomnia, and consultation with the physician, poor perceived health, and gender. Level of education, marital status, social and economic status were less important.<sup>[37]</sup> Analgesics and fever medications are among the many drugs used for children, although their effectiveness and the possibility of their side effects are much discussed. Research conducted in France between 1981 and 1992 showed that there was a dramatic increase in the use of analgesics / fever medication for children.

The study showed that the percentage of cases treated with aspirin was decreased <sup>[27]</sup> while treatment with NSAIDs (+179) as well as paracetamol (+19) were increased. Nasopharyngitis (cold) syndrome / semi influenza was the main reason for taking these medications. The use of analgesics / fever medications was as common as medical prescription, as self-medication and by others recommendation who were not qualified to do so.

In a relatively valid picture of self-medication, a number of adolescents were involved in the inappropriate use of over-the-counter drugs, such as multiple aspirin use. Regular use of aspirin is associated with gastrointestinal bleeding. It seems that the risk of the dose is greater than the duration of aspirin use. In order to minimize reverse effects of aspirin therapy in the short and long term, the use of the lowest effective dose should be emphasized on. This finding highlights the importance of providing relevant and valuable information on the use of these drugs to adolescents and adults.<sup>[38]</sup> Table 1 summarizes the results of self-medication studies using non-steroidal drugs, analgesics, and over-the-counter drug (OTC).

**Table 1. Summary of Self-medication Studies Using Nonsteroidal Drugs, Neutropenics, and OTC Drugs**

Author	Medications	Results
Hagler Robinson <sup>[39]</sup>	Orlistat	A case report of a 45-year-old woman of normal weight who had Orlistat abuse. This person consumed orlistat more than the authorized dose
Fernandez- Aranda et al <sup>[40]</sup>	Orlistat	A report of two women with a previous diagnosis of Bulimia nervosa that used Orlistat as the only mechanism after a period of too much eating.
Cochran and Malcolm <sup>[41]</sup>	Orlistat	A case report of Orlistat's self-medication by a person with normal weight who was afflicted with Bulimia and dependent on stimulus.
Orioles and Associates <sup>[42]</sup>	Codehenine, Dextromethorphan, Pseudophodrin, H1 receptor antagonist	A cross-sectional study was conducted in France using a questionnaire. Patients taking psychoactive medicines were included in this study. The control group used lipid lowering drugs for self-medication. There was a significant difference in the use of non-medicines from the group of codeine medicines in comparison with the lipid lowering medicines.
Barrington et al <sup>[43]</sup>	Diphenhydramine	A cross sectional study was conducted on medicines using a self-report questionnaire; 304 people participating in the study bought nytol or sleep medications. The results showed that 33.8% of participants consistently over used the product, ignoring the label (two weeks); they consumed 8.2% more than the recommended maximum dose.

Felan et al [44]	OTC medications helping to sleep	A cross-sectional study on medicines was conducted through a self-report questionnaire, which was completed by 86 people having bought OTC sleep medicines. 49% were classified as inappropriate consumers (the use of more than 30 nights, weekly use for 2 years).
Laugerlou et al [45]	OTC analgesics	A cross-sectional study was conducted with a survey of 367 adolescents aged 15 to 16 years old. 26 percent of people used OTC medications daily or weekly. Painkillers were commonly used to treat headaches and muscle aches. The pain and discomfort were created by prolonged exposure to various displays, the timing schedule, and exposure to high levels of noise in the classroom.
Monty Seleca et al [46]	Prescriptive and OTC analgesics	A cross sectional study was performed by self-report questionnaires on 358 patients with musculoskeletal pain aged 20-75 years. The general health questionnaire was used to evaluate mental disorders. Beck Depression Inventory was used to assess depression. 28% of the subjects used medicines on a daily basis and 29% of them used multiple medicines to reduce pain. The use of OTC drugs was linked with lonely life. Depression and mental anxiety were associated with everyday use.
Mayer et al [47]	Prescriptive and OTC	This study analyzed the data collected by 23 clinics for self-medication treatment in Cape Town, South Africa. A standard one-page form was completed by those who were treated. 710 forms were collected during the years 1998 to 2000, which referred to the use of prescription medicines and OTC. 33.7% of these drugs- as main medications- were used in an improper manner. 107 patients (15%) had self-medication of analgesics; 2.3% of OTC drugs used codeine.
Goniovicks et al [48]	OTC drugs replacing nicotine	Analysis of studies showed that 0.4 to 17 percent of patients used NRT drugs more than the recommended dose. The research did not reveal anything to assess the specific dependency symptoms (mental sensitivity related to dependence, incidence of withdrawal symptoms, problems with stopping drug use).
Hughes et al [49]	OTC NRT	Two cross-sectional studies were conducted based on a telephone survey of smokers that were published through newspaper advertisements. The first study (N = 266) showed that 20% of long-term users (≥90 days), attributed their use to addiction. The second study (on 100 smokers or those who had previously smoked and had nicotine gum addiction) showed that 66% had diagnostic criteria of DSM-IV and 74% ICD-10 criteria for substance abuse.

## 2. Self-medication of antibiotics

The available data in developing countries and around the world indicates that antibiotics are often consumed with inaccuracy and indifference; not being used properly. The results indicated

that, as the socioeconomic level grows, self-treatment also increases. Antibiotics that are commonly used include erythromycin, metronidazole, ampicillin / cloxacillin, cefalexin, co-trimoxazole, tetracycline, amoxicillin and *Neomycin*. The average amount of antibiotics purchased, were packs of 12 pills or tablets and the tendency to use them was three days or less.<sup>[50]</sup> One of the key reasons for not completing the remedy period with antibiotics is the low awareness of buyers about antibiotics (prior to financial constraints). Analyses have shown that the type of the previous remedy, the time length of symptoms and the patient's age are predictors of the purchase of antibiotics or other medicines. Antibiotics are often used when the disease continues for more than a week.<sup>[51]</sup> As noted in the study by Amici Kei et al., resources for obtaining antibiotics include pharmacies, OTC purchase, gifts from friends, and the remainder of the previous pills. Nowadays, there is a concern around the world about the increase in the resistance to antimicrobial drugs. The WHO and the house of Lords of England identified the causes for this issue, urgent preventive measures must be implemented to restrict the dispersal of resistant organisms, which can be done by explaining the risks of self-care, identifying bacteria that the patient's body is resistant to, helping consumers identify diseases that are prone to self-treatment or needing referrals, using the most appropriate product, advising on its proper use and monitoring the results. Understanding the causes of increasing resistance to a variety of living organisms is not difficult. Since Fleming discovered penicillin, people around the world thought that access to it was a fundamental right for everyone, which made people prescribe cheap and affordable antibiotics. Such widespread abuse of strong antimicrobials for animals and human beings can lead to the emergence of an era in which microbes predominate, the reason is that microbes also resist against strong antibiotics.<sup>[52, 53]</sup>

There is now resistance to common antibiotics such as erythromycin, chloramphenicol, co-trimoxazole and ampicillin.<sup>[53]</sup> In addition, experts have warned against the advent of the "post antibiotic" era; an era in which infectious diseases can no longer be treated, just like the era before antibiotics, i.e. before penicillin was discovered. Often, antibiotics are used to treat diseases caused by the virus.<sup>[54]</sup>

A cross-sectional study was conducted by Sarahroudi et al. regarding "self-medication of antibiotics among Southern Iranian students". The aim of this study was to assess the self-medication knowledge concerning antibiotics and related behavior among medical and non-medical university students. The sample consisted of 195 medical and non-medical students in Ahvaz who were randomly selected. To this end, a questionnaire was used to collect data. Ninety-seven of subjects (49.7%) were male and ninety-eight (50.3%) were female. There was no significant difference between male and female students in self-medication. 48% of non-medical students and 42% of medical students used antibiotics without advising or prescribing of physicians. Penicillin was ranked first by 91.9% for non-medical students and 81% for medical students. Among the types of penicillin, amoxicillin had the most frequent use

with 74.3 percent for non-medical students and 40.5 percent for medical students. Regarding the self-medication factors, the previous experience of using prescriptive medicines was 32.6% among non-medical students and the academic medical knowledge was 50% among medical students. According to the results of the study, the inappropriate consumption of antibiotics was high, so it was suggested that the use of medicines, especially antibiotics, should be taught to non-medical students, and that such training should be improved in medical schools. Physicians must know that their patients need to learn to avoid using previously prescribed antibiotics for the same future conditions, be sure to complete their treatment, and avoid using previous prescription drugs for illnesses without consulting a physician or pharmacist. Self-medication involving antibiotics may also be caused by the lack of control over pharmacies; therefore, stricter implementation of the rules is required for pharmacies.<sup>[55]</sup> Table 2 shows a summary of self-medication studies using antibiotics.

**Table 2. Summary of Self-medication Studies Using Antibiotics in Adults**

Author	The type of the study	Main findings
Dareser et al <sup>[56]</sup>	Overview	Among 70% and 80% of the recommendations of pharmaceutical staff were inappropriate in Mexico regarding the treatment of acute respiratory and gastrointestinal infections.
Basulto et al. <sup>[57]</sup>	A survey of 700 people taking antibiotics and interviewing 28 doctors from Paraguay	According to physicians, self-medication with antibiotics is a widespread treatment. The most commonly used self-medicated antibiotics were amoxicillin, tetracycline, ciprofloxacin and cephalosporin.
Gregoryan et al <sup>[58]</sup>	Cross-sectional study performed on 15548 people from 19 European countries	Throat disease, teeth and bronchitis were the most common causes for self-medication with antibiotics. Penicillin was the most used antibiotics for self-medication.
Sarahroudi et al <sup>[59]</sup>	Cross-sectional study on 160 students in Tehran based on self-report questionnaire	Respiratory diseases were the most common symptom for self-medication with antibiotics (73.3%). Amoxicillin was the most commonly used antibiotic (40%) used for self-medication.
Richman et al <sup>[60]</sup>	Prospective studies of 1363 American patients admitted to the emergency	17% of the participants used the remaining antibiotics to treat cough (11%) and sore throats (42%).
Raz et al. <sup>[61]</sup>	Cross-sectional study performed on 467 subjects using a questionnaire	Amoxicillin was mostly used (32.7%) among the subjects. About 10% of the antibiotics were purchased without a prescription; 24.4% of the respondents kept the remaining antibiotics at home.
Papayounidou et al <sup>[62]</sup>	Cross-sectional study using questionnaire	Four out of every ten people had antibiotics at home and one out of four used the medicines without a prescription for fever (44%), influenza (32%), sore throat (19%), and cough (16%).

Nuno et al <sup>[63]</sup>	A cross-sectional study conducted using a survey of 482 people from Argentina	53% of respondents at least occasionally took antibiotics. Sore throats (48%) and fever (18%) were the main reasons for self-medication using antibiotics. Amoxicillin had the highest antibiotic use (70%).
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The results of the reviews of studies on adult are also reported in Table 3.

**Table 3. Summary of self-medication studies according to the age of the participants**

Author	Participants	Average drug intake (SD)	Most used drugs
Chagas Bortoloun et al <sup>[64]</sup>	218 female from Brazil, aged over 60	Unreported	Analgesics, Gastrointestinal medicines, food supplements, supplements, cardiovascular medicines, anti-allergens
Flores et al. <sup>[65]</sup>	215 males and females from Brazil, aged over 60	3.2 (2.5)	Analgesics, Gastrointestinal medicines, food supplements, supplements, cardiovascular medicines
Gavilan Moral et al <sup>[66]</sup>	143 males and females from Spain, aged over 65	6.8 (3.4)	Analgesics, lipid lowering medicines, antihypertensive, NSAIDs
Ion <sup>[67]</sup>	58 females from the United States, age: 65 years	8.7 (3.9)	Unreported
Barat et al <sup>[68]</sup>	492 males and females from Denmark, age: 75 years	5.4 (unreported)	Cardiovascular medicines, Central nervous system medications, Gastrointestinal medicines, Alternative medicines
Falahareti et al <sup>[69]</sup>	833 males and females from the United States, aged over 65	6.6 (3.9)	Cardiovascular medicines, analgesics, digestive medicines, dietary supplements
Chen et al <sup>[70]</sup>	12485 men and women from England and Weil, aged over 65	2.47 (2.02)	Cardiovascular medicines, Central nervous system medications, Digestive medicines, Supplements
Linjukumpo et al <sup>[71]</sup>	1197 males and females from Finland, aged over 64	3.8 (3.1)	Cardiovascular medicines, central nervous system medications

### 3. Self-medication in adolescents

A review of the literature showed that the prevalence of self-medication in many countries was higher in adolescent girls.<sup>[24, 26, 72-74]</sup> Although in Brazil <sup>[75]</sup> and Kenya <sup>[76]</sup>, self-medication was higher in male adolescent. Many studies have shown that the incidence of self-medication in both sexes was increased by age.<sup>[24, 25, 73, 74, 77, 78]</sup> International studies in 29 countries showed that the use of analgesics for headaches increased by age, but it was decreased for sleep disorders and anger.<sup>[74]</sup> Another

international study found that taking medications for sleep and anger was more consistent between countries compared to headache and stomachache.<sup>[79]</sup> An upward trend has been reported in the use of medications for headache and stomachache over the past ten years.<sup>[80]</sup> Self-medication with OTC drugs was related to social and psychosocial factors such as mother's education,<sup>[24, 25]</sup> socioeconomic status,<sup>[25, 81-83]</sup> smoking, unhealthy eating habits,<sup>[22]</sup> bullying in schools,<sup>[84]</sup> and poorly evaluated health by the person.<sup>[85]</sup>

The overall prevalence rate of self-medication was between 2% and 92%. The prevalence was high in Germany,<sup>[26]</sup> the United States,<sup>[86]</sup> India,<sup>[87]</sup> Malta,<sup>[30, 88, 89]</sup> Kuwait,<sup>[90]</sup> the Arab League,<sup>[31, 91]</sup> Sweden<sup>[92]</sup> and Spain.<sup>[93]</sup> A number of common factors were the cause of self-medication among adolescents, such as the previous experience of taking medications, a minor-chronic illness, the lack of time for having an appointment with a doctor, ease of purchase,<sup>[31]</sup> the cost of medication and the lack of access to health facilities.<sup>[94]</sup>

OTC medicines that contained analgesics, vitamins, dietary supplements, anti-allergies, cold and cough medicines were commonly used. The use of painkillers was related to females' <sup>[72, 90, 95, 96]</sup> age <sup>[74]</sup> and liberal (libertarian) attitudes.<sup>[97]</sup> Among the subgroups of POM, systemic antibiotics had the highest levels of use in India <sup>[87]</sup> and the lowest in Kenya.<sup>[76]</sup> Subsequently, opioid subgroups were used more, mostly reported in the United States <sup>[98-101]</sup> and Canada.<sup>[102]</sup> A study among US students revealed that non-medical use of POMs for opioids was higher than the rest (18%), followed by hypnotics (6%), anti-anxiety (3.5%), and stimuli (2 %).<sup>[73]</sup>

On the other hand, studies have shown a strong correlation between self-medication and health complaints among adolescents with age and sexual differences.<sup>[31, 79, 84, 85, 88]</sup> Headache was one of the common health complaints that resulted in self-medication. Other common complaints were fever, allergies, colds, cough-related symptoms, sleep disorder, skin problems, and menstrual disorders. Adolescent girls generally reported health complaints related to self-medication <sup>[31]</sup> and repeated periods of pain and depression.<sup>[96, 97]</sup> However, self-healing was most common among boys for headache, anger <sup>[79, 89]</sup> and athletic injury.<sup>[89]</sup> A study conducted in Hong Kong showed that poor perceived health, smoking, and alcohol, as a contributing factor to diseases, have increased self-medication among adolescents.<sup>[103]</sup>

Common sources for medicine recommendations included parents (especially mothers), relatives, pharmacists, and teachers. Local pharmacists often offer treatments for certain chronic diseases in adolescents.<sup>[75]</sup> Teenage athletes often consulted their coaches for nutritional supplements.<sup>[104]</sup> Nearly 34% of adolescents were influenced by television, Internet, and newspaper when selecting a medicine.<sup>[94]</sup> Interestingly, there was a positive relationship between watching TV and consuming painkillers in Belgium, especially among boys.<sup>[105]</sup> On the other hand, the most common sources for medication were local pharmacies, home medicine cabinets, parents, friends, and relatives. However, in Norway, 31% of female adolescents received painkillers from their friends. In addition,

teenagers generally referred to parents and pharmacists to search for medicine information. In addition to these resources, doctors were also consulted.<sup>[89]</sup> Females had more medication information than males.<sup>[89]</sup> Girls were more likely to receive recommendations from parents <sup>[90]</sup> and school nurses.<sup>[91]</sup> While boys consulted more with doctors.<sup>[90]</sup> Cultural differences were also found in non-Western students who were more dependent on doctors (44%) and pharmacists (20%) than western students.<sup>[97]</sup> In Saudi Arabia, teenage girls relied on television (61 %) for knowledge over medicine.<sup>[78]</sup>

Adolescents often think that they have full knowledge about the proper use of medicines; this thought contradicts with many studies. A study on the island of Malta showed that the average score of student's knowledge of medicine was  $4.3 \pm 22.9$  out of the final score of 32.<sup>[89]</sup> In Germany, students received a score of  $1.9 \pm 5.74$  out of 13, indicating poor perception of them. Contrary to lower overall scores, 55 percent of students rated their knowledge as satisfactory, and many reported that they were reading medicine information or consulted with a doctor about medicine information.<sup>[26]</sup> However, girls <sup>[26, 89]</sup> and regular medicine users <sup>[26]</sup> reported better drug knowledge. Sloand et al. <sup>[106]</sup> reported that only 15% of the students could choose correct medications for menstrual pain.

POM misuse may be due to self-medication or desire for excitement.<sup>[107, 108]</sup> POMs have been reported to be used for pain, anxiety, insomnia, obesity, and improved academic performance or increased appetite.<sup>[73, 107, 109-113]</sup> Girls reported more motivation regarding self-medication while boys were more excited. <sup>[107, 114-116]</sup> The attitude and behavior of lenient parenting, easy access, high exposure to medical treatment <sup>[107, 108, 111, 115, 117, 118]</sup> and misunderstanding of drug safety <sup>[116]</sup> were other major causes of the observed trend. The abuse of POMs was more common among adult students, <sup>[110, 119-123]</sup> white and indigenous American adolescents <sup>[115, 124, 125]</sup>, high social and economic classes, <sup>[126]</sup> athletes, <sup>[127]</sup> and victims of rape.<sup>[99]</sup> Most adolescents had uncontrolled access to prescriptive drugs,<sup>[128]</sup> and their common source was their prescriptions. <sup>[127, 129-131]</sup> Many people have had access to these medications through their friends and relatives, <sup>[29, 98, 111, 126, 129, 132]</sup> with a high probability of abuse. <sup>[127, 131]</sup> In addition, they were more involved in other high-risk behaviors such as alcoholism, illegal drug use, delinquency <sup>[102, 111, 118, 125]</sup> and night parties with psychosocial drugs. <sup>[133]</sup> Studies have shown that a stable family environment, a tight parental bond, and monitoring, have been less associated with reported abuse of POMs. <sup>[110, 122, 132, 134, 135]</sup>

## Conclusion

These studies have shown that self-medication is common among adults and adolescents, and the process is affected by several factors. Self-medication is more prevalent among girls and women being increased as they grew up. Maternal education, parenting factors, family training, and socioeconomic status are among other important factors affecting self-care. OTC drugs (analgesics, anti-allergies) and POMs (antibiotics, opioids, hypnotics) are used repeatedly for

various health complaints. Non-medical use of medicines in the United States is reported more than other countries. Pharmacists, parents, colleagues, and friends are the main sources of drug information and their preparation to deal with headaches, colds and menstrual problems. Risky self-medication, such as previous prescription drugs, has also been reported. In addition, the media encourages adolescents and adults to take medication independently. Most studies have revealed a gap between the knowledge of medicine and the satisfactory assessment of adolescents and adults of their knowledge. Viewing the current process of self-medication can help to have control over-consumption and self-medication among adolescents and adults. Reviewing research not only gives insight into overall therapies and self-medication, but also adds factors like easy access and self-medication of prescriptions. These factors seem to be closely related to voluntary self-medication, especially among girls and women. The use of OTC medications as well as other types of medications can always pose a risk to the consumer. This is especially the case when consumers do not follow the instructions on the medication. Educational interventions are aimed at informing consumers of the potential risks of OTC and other medications as well as the importance of obtaining information on the use of OTC and alternative medicines for physicians and / or pharmacists as one of the most important measures to reduce the risks of self-medication. Interventions should also inform people about the importance of the instructional tags on the dose, symptoms, duration of treatment, and the need to consult a doctor in case of persistence of symptoms.

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