

THE FREQUENCY AND EFFICIENCY OF THE APPLICATION OF ONLINE SOURCES FOR SEARCHING DRUG INFORMATION AND SELF-TREATMENT

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ABSTRACT

The problem of self-treatment of patients is relevant, both for countries with strict regulatory regulation and the release of drugs and for countries with weak control of restrictions on population access to prescription drugs. Sociological survey of the population (n = 762) using Google Forms. Statistical analysis was performed using the International Business Machines Statistical Package for the Social Sciences (IBM SPSS) Statistical 25 program, Spearman's rank correlation coefficient. A third of respondents constantly or often turn to a pharmacy worker for advice. The most common answer about the frequency of use of online resources, to search for information about drugs, was 3-4 times a month, and 1 time a month. The most popular resource is an online pharmacy apteka.ru. 65% of respondents partially understand specialized medical/pharmaceutical literature. About a third of respondents constantly or often self-prescribe drugs after reading online resources. More than half of the patients surveyed rated the effectiveness of self-medication as constant or frequent. The high frequency of pharmaceutical consultation needs proves the public's confidence in pharmacy workers. The popularization and availability of specialized information can lead to an increase in self-medication and the use of drugs, and a partial understanding of the information can lead to a decrease in compliance or errors in drug therapy.

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Introduction

Expanding the work functions of pharmaceutical workers and increasing the subjects of pharmaceutical consultation and the list of medical services are actively studied around the world [1-3]. So, in the USA, the possibility of informing the population about immunization, including tourist vaccinations, the use of drugs for the prevention or self-treatment of diseases, and pharmaceutical care [4] is discussed. The pharmaceutical specialist is a reliable and accessible source of information, which often leads to violations of the rules and procedures for the sale of drugs. The lack of proper control in the release of prescription drugs is a predictor of an increase in self-medication, a decrease in the effectiveness of therapy, low compliance, and an exacerbation of global health problems, such as an increase in antibiotic resistance, and abuse of opioid analgesics.

According to a study conducted in Tanzania (n = 718), 48% of respondents reported the purchase of prescription (antimicrobial, antihypertensive, sugar-lowering drugs) drugs without a prescription. 89% of respondents independently prescribed a drug. Factors associated with self-treatment are education, younger age, and higher socioeconomic status [5]. Data from a quasi-experimental study in Iran showed the feasibility of educational activities and courses based on medical centers to reduce the practice of self-medication among mothers [6].

The problem of self-medication is also relevant for eastern countries with widespread traditional medicine. According to the results of a sociological study in China, 35% of elderly people with diseases reported self-medication. Factors for self-medication were: mild disease course, lower alcohol consumption [7], higher level of education and lower self-reported economic status, lack of basic health insurance, and non-empty nesters [8]. Data from a study conducted in Australia demonstrated the effectiveness of self-treatment, as well as joint care for chronic wounds using bandages and antibacterial drugs [9].

The problem of self-medication by students of medical educational institutions in connection with the availability of

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professional knowledge is actively being studied. So, the results of a study in Jordan showed that self-medication was widespread and comparable between medical and non-medical students. The most common symptoms in which self-medication was used: headache, cold, and flu. Self-treatment for headache and toothache, the use of painkillers, and anti-allergic were significantly higher among medical students. Independent use of influenza and contraceptives was more common in non-medical students. The main sources of information, when self-treatment, are called friends and their own experience [10]. Data from a similar study among medical and pharmacy students in Iran ($n = 170$) demonstrated that 57% of respondents performed self-medication over the past 6 months. The frequency of self-medication is on average $4,2 \pm 2,9$ times a year. The factor of self-medication was the male gender. The cold was the most common disease in which self-medication was used (93%), and antibiotics (74%) were the most used drugs. The main sources of information were previous recipes. Pharmaceutical students had a higher level of drug information [11]. The results of a meta-analysis in Iran (89 studies, $n = 60938$ students) showed that the overall prevalence of self-medication was 70%. The prevalence factor of self-medication revealed female gender, as well as medical education (2 times higher than in non-medical students) [12].

Due to the significant spread of antibiotic resistance worldwide, many studies focus on the problem of self-medication with antibiotics (SMA). According to meta-analysis, twenty-two studies were found in Saudi Arabia. The prevalence of SMA ranged from 19% to 82%. Age, gender, level of education, and income were major determinants of SMA. Sociocultural, economic, and regulatory factors were the most studied causes of SMA. Penicillins are the most used antibiotics. The most common reason for the use of antibiotics was upper respiratory infections. Main sources of information: relatives/friends and previous successful application experience. The main errors in SMA were: incorrect indications, short and long treatment duration, antibiotic sharing, and antibiotic storage at home for further use [13]. A study conducted in Africa also analyzed SMA practices, and pharmaceutical workers recognized the sale of antibiotics without a prescription. The main ways to purchase antibiotics without a prescription were: using a common name, describing the physical appearance, using empty packaging, describing symptoms or health problems, using old prescriptions, and sharing antibiotics with family, friends, and neighbors [14]. Another common and dangerous infection on the African continent is malaria. A study conducted in Ethiopia showed that the prevalence of self-medication for malaria is 37%. The main methods of self-medication were: medicines (chloroquine and coartem - artemether/lumefantrine), herbs (garlic, ginger, and harmaguse), and non-pharmacological measures (rituals) [15].

In economically developed countries, the problem of self-medication is also considered in the aspect of prescription drug abuse (PDM). A review conducted in the United States, it was found that the prevalence rates of PDM by opioids, as well as their sources and motives, vary significantly depending on the age group or risk factors. PDM prevalence tends to decrease with aging, and with more frequent doctor visits. Often PDM occurs concurrently with other substance use and psychopathology, including suicidality, in different age groups [16]. Patients described four basic motivators for self-treating with non-prescribed buprenorphine: «perceived demands of formal treatment, the desire to utilize non-prescribed buprenorphine in combination with a geographic relocation, to self-initiate treatment, while preparing for formal services, and to bolster a sense of self-determination and agency in their recovery trajectory» [17]. Another USA study ($n = 12223$) assessed the non-medical use of prescription drugs (stimulants, central nervous system depressants, and opioids). The main motivations for use were: recreation, self-medication, experiment, boredom, and stimulation [18].

Thus, the problem of self-medication remains urgent for world health. In the context of the pandemic 2019-2021 [19], a decrease in the availability of medical care, widespread access to pharmaceutical and medical information, including online, and an increase in the self-prescribed use of medicines by the population can be predicted [20]. Therefore, the goal of the study was: to analyze the use of online sources of pharmaceutical information and the effectiveness of self-treatment of patients.

Materials and Methods

The survey of the population was carried out in the city of Khabarovsk and Khabarovsk Krai in October 2021. To minimize the risks associated with the spread of new coronavirus infection, the survey was conducted online using Google Forms (<https://docs.google.com/forms/>). The sample was 762 respondents. The sampling error with 95% confidence probability and 50% trait fraction was 3,55%. The mathematical calculation of the data was carried out using the Microsoft Excel 365 Data Analysis package. The coding of the responses received was used. Statistical analyses were performed using IBM SPSS Statistical 25. Paired correlations of respondents' responses were calculated using the Spearman rank correlation coefficient. A valid correlation was considered at two-sided significance < 0.05 . The questions asked of respondents: what is the frequency of consultation with a pharmaceutical specialist in a pharmacy, when purchasing drugs; how often do you search/read online information about drugs (not necessarily prescribed to you); what online drug information sources do you use; what is your understanding of the information in the specialized medical/pharmaceutical literature, that you use as a source; what is the frequency of self-prescribing (self-medication) for yourself after reading medical information on the Internet; what is the effect of a treatment when self-prescribing drugs (self-medication) after reading medical information on the Internet.

Results and Discussion

Characteristics of respondents surveyed: female gender (62.26%); age 18-36 years (69.3%), 26-35 years (10.5%), 36-45 years (11.2%), 46-65 years (7.8%), more 65 years (1.3%); profile of work or study– technical (24.6%), medical (16.7%),

humanitarian (14.3%), economic (9.9%), services (8.4%), trade (5.8%), Culture and art (5%), Natural Science (4.5%), Other (10.9%). The most studied age group (18-36 years) was chosen as the target group because young people, according to Mediascope, are the most active users of Internet resources and online technologies in the Russian Federation [21].

In the context of the pandemic of 2019-2021 and a decrease in the availability of medical care for the population, the pharmacy worker remains one of the most reliable and qualified sources of pharmaceutical information. The distribution of respondents' responses on pharmaceutical consultation rates is shown in **Figure 1**.

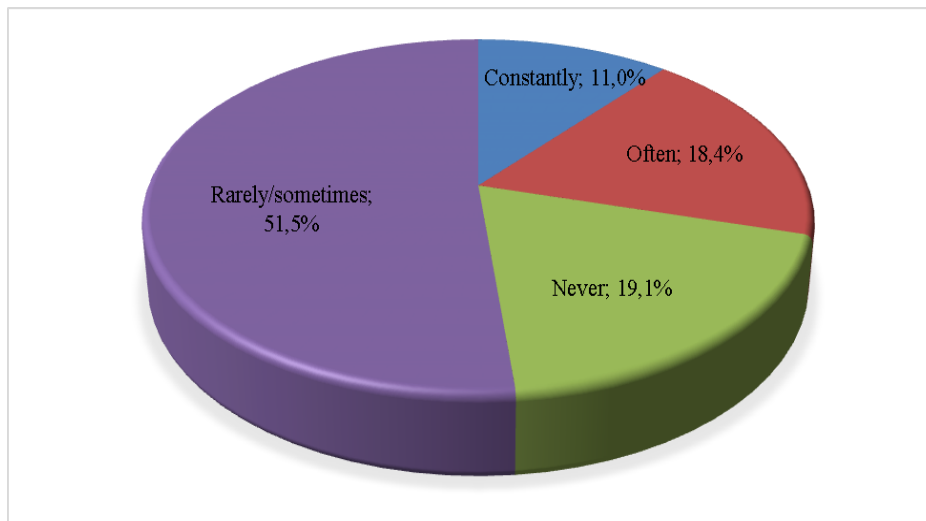


Figure 1. The frequency of consultation with a pharmaceutical specialist (pharmacy worker, who has specialized higher or secondary education) at the pharmacy when buying drugs

However, only 29% of respondents seek advice constantly or frequently. The most common answer was - rarely/sometimes, and most rare - never. There was no reliable correlation between the age ($p = 0.936$) and gender ($p=0.418$) of the respondent. Alternative sources of pharmaceutical information are online resources. In the legislation of the Russian Federation, there are almost no prohibitions and restrictions on access and posting of information about medicines on the Internet, as well as, unfortunately, no full control and responsibility for its content. Any user can find information of interest about the drug. The distribution of respondents' responses on the frequency of searching the Internet for drug information is shown in **Figure 2**.

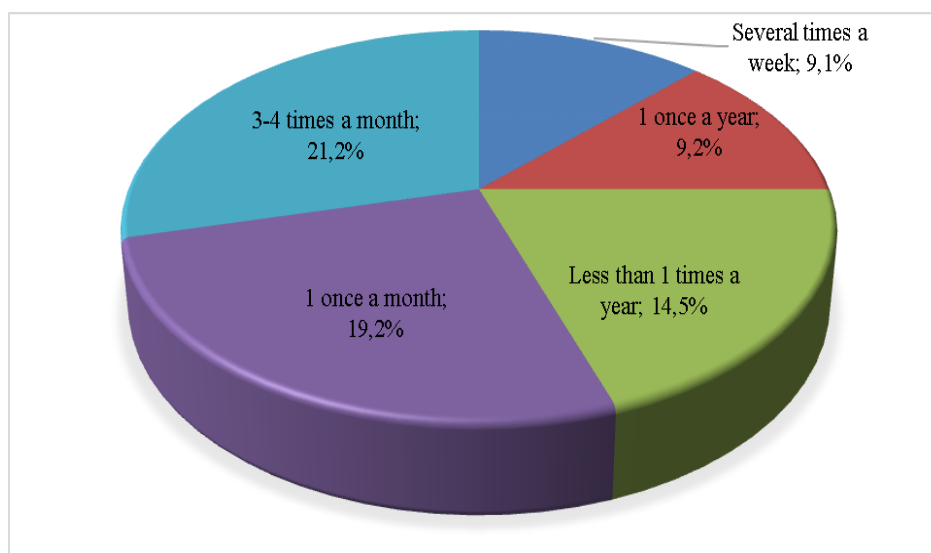


Figure 2. The frequency of internet search/reading drug information

The most common response of respondents was 3-4 times a month, and 1 time a month. More than 30% of respondents turn to online resources regularly. And a quarter - 1 time a year and less often. At the same time, a weak but reliable correlation with gender was observed - women ($p = 0.001$; correlation coefficient (r_s) = 0.149) and young ($p = 0.011$; $r_s = 0.092$) most commonly used digital resources. The most significant direct correlation of the distribution of answers to this question was with the answer about the frequency of contact with a pharmaceutical specialist ($p = 0.001$; $r_s=0.177$).

Further, respondents specified the most used sites for searching for information about drugs. The distribution of respondents' responses is shown in **Figure 3**.

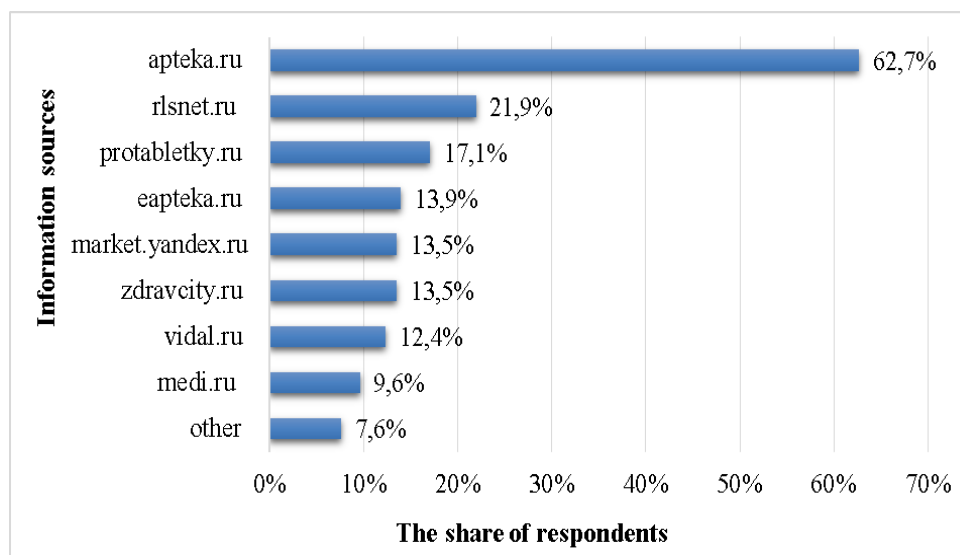


Figure 3. Online drug information sources

The most popular resource is an online pharmacy «apteka.ru». More than 60% of respondents use this resource. The most popular professional site is the «Encyclopedia of Medicines» «rlsnet.ru». The remaining respondents' answers accounted for less than 20%, but Internet pharmacy reference systems are more used. There was no reliable correlation between age and gender.

Despite the high frequency of application of popular market platforms and online pharmacies, it is difficult to assess the degree of understanding of specialized medical and pharmaceutical information in the population. The distribution of respondents' responses is shown in **Figure 4**.

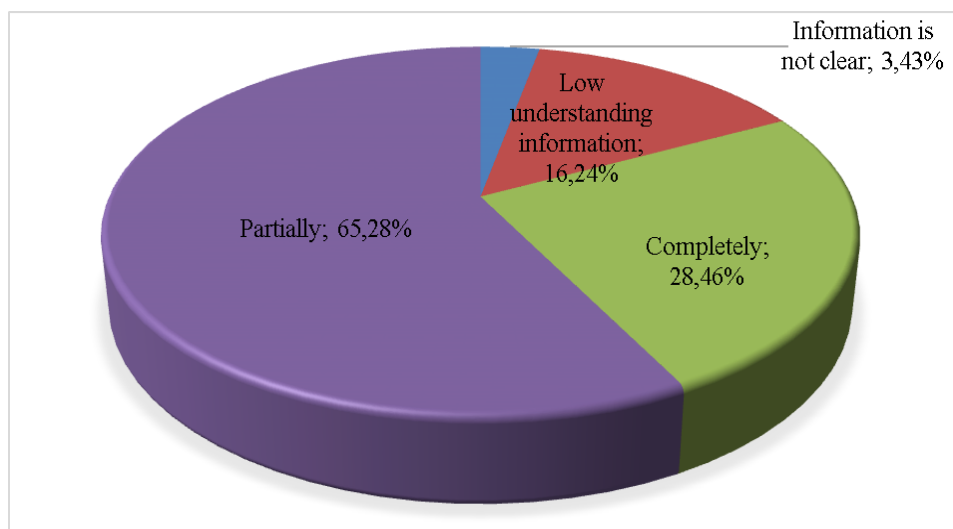


Figure 4. Degree of understanding of information in specialized medical/pharmaceutical literature about drugs

Only 28% of respondents chose the option "completely." At the same time, 65% preferred the option "partially," which can lead to incorrect judgment or errors in the evaluation of data. There was a reliable correlation between responses with the frequency of drug information retrieval. More often, it has been those who better understood it who were looking for information, which in general is quite natural ($p = 0.001$; $rs=0.242$).

The problem of self-treatment of patients remains urgent for the Russian Federation. One of the factors for its dissemination may be the availability of information, so respondents were asked to assess how often they self-prescribe medicines after searching for information on the Internet. The distribution of responses is shown in **Figure 5**.

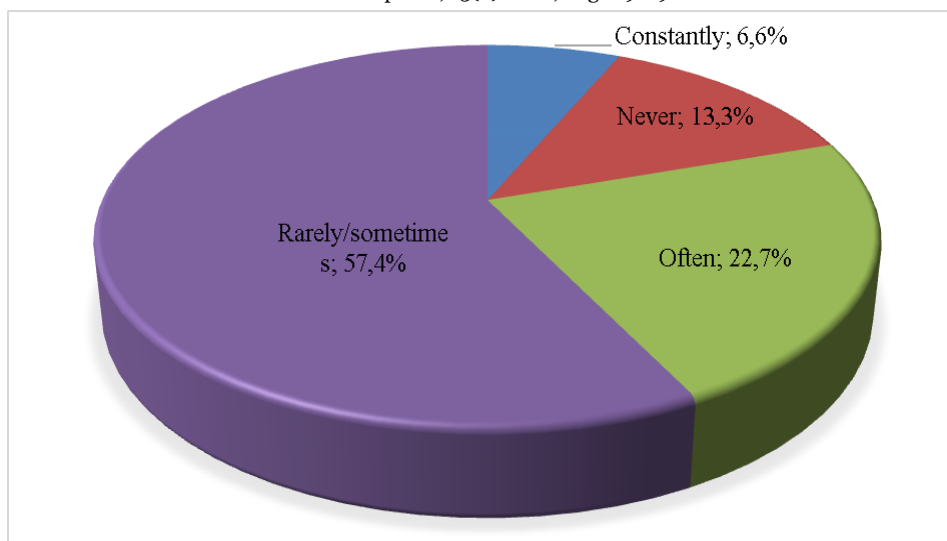


Figure 5. The frequency of self-prescribing drugs after reading medical information on the Internet

About 30% of respondents admitted that they do it constantly or often, and only 13% never. A large proportion (57%) of respondents self-prescribe drugs using online resources rarely. A reliable correlation was observed with parameters: the frequency of consultation with a pharmaceutical specialist ($p = 0.001$; $rs=0.224$); Internet search frequency ($p = 0.001$; $rs=0.191$); understanding specialized medical and pharmaceutical information ($p = 0.001$; $rs=0.156$).

Further, respondents were asked to evaluate the effectiveness of self-medication/self-prescribing drugs after searching for information on the Internet. The distribution of respondents' responses is shown in **Figure 6**.

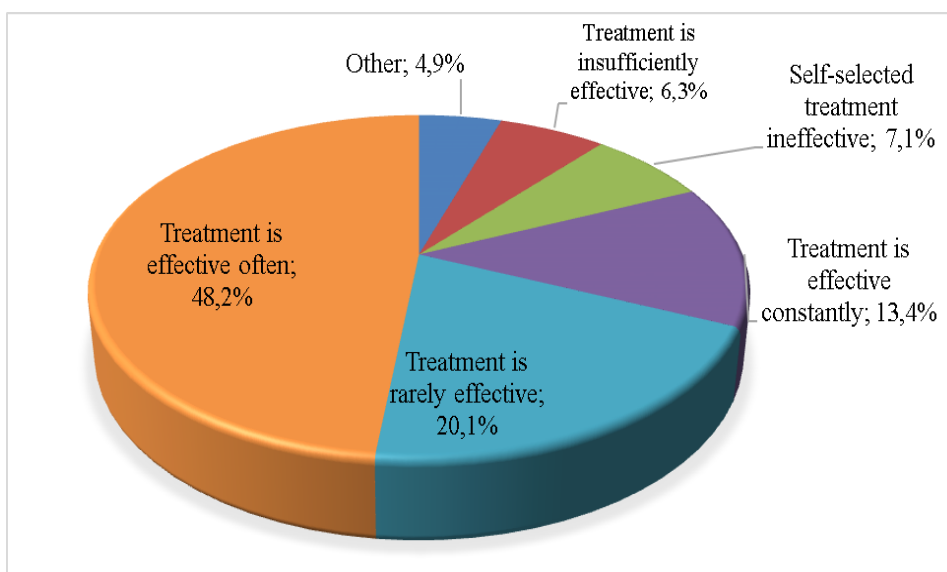


Figure 6. Treatment performance when self-prescribing drugs after reading medical information on the Internet

The option of high efficiency was constant or often chosen by 62% of respondents. The share of inefficient or rarely effective self-medication was almost twice as low - 34%. At the same time, a natural correlation of effectiveness with frequency was observed: consultations with a pharmaceutical specialist ($p = 0.020$; $rs=0.084$); searching for information on the Internet ($p = 0.001$; $rs=0.157$); understanding of specialized information ($p = 0.001$; $rs=0.257$); self-prescription/self-treatment ($p = 0.001$; $rs = 0.482$ -the maximum).

Regular consultation with a pharmaceutical specialist of almost 1/3 of the interviewed population shows a high level of confidence in the opinion of pharmacy workers. Nevertheless, more than 50% of respondents chose the "rarely" option, which may be due not only to a preference to visit a doctor, which is difficult in an epidemic but also to a high frequency of self-medication.

The active use of online resources to search for pharmaceutical information may be due to their availability on the Internet. Most resources, even professional ones, do not require registration, but are limited to the fact that "the site's materials are intended exclusively for medical and pharmaceutical workers and are of an information and reference nature." The correlation between the high frequency of drug information retrieval and the frequency of pharmaceutical consultation can be explained by the desire to receive specialized care available in pandemic conditions and confidence in the qualifications of a pharmacy

worker.

The high frequency of access to reference data of market sites for the sale of drugs is explained by their convenient and intuitive interface, the presence of tabs, and the systematization of information. An important factor is an ability to directly order and understand the price category of a drug, which increases the likelihood of impulse purchase. In addition, many sites provide recommendations for "additional" sales, which may be in demand from a population that does not have specialized knowledge. Many online pharmacies popularize and simplify pharmaceutical information while understanding information from professional sources requires appropriate training and skills. The preferences of the site apteka.ru can be particularly explained by the duration of its existence, active advertising in the media, and an extensive network of partners - pharmacy organizations that retail medicines directly to the customer.

An incomplete, partial understanding by most patients of medical and pharmaceutical information can lead to errors in self-medication, low compliance, or self-change of therapy, as well as refusing to use prescribed drugs. The results of the questionnaire prove the need to adapt drug data on sites, for the population, nevertheless, this simplification of terms and concepts should be carried out only by a specialist, to avoid distortion of meaning and content.

The high frequency of self-medication/self-prescribing after searching for information online can be explained by the availability of resources, the possibility of saving money and time for consultation with a doctor, and the decrease in the availability of specialized medical care in pandemic conditions 2019-2021. The data obtained by the study on the correlation of the frequency of self-prescribed drugs with the frequency of searching for information and its understanding demonstrate confirmation of the relationship of the investigated parameters. The maximum correlation coefficient was observed with the frequency of consultation with a pharmaceutical specialist, which on the one hand proves the existing need for specialized care and, on the other hand, confidence in the qualifications of pharmacy workers.

Most respondents estimate the high frequency of effective self-medication. The correlation of efficacy with the frequency of pharmaceutical consultation, information retrieval, and self-prescribing of drugs is also a consequence of the popularization and availability of online medical resources, and their active use, especially in epidemic settings. In addition, one of the reasons may be weak control of restrictions on access to medicines, including those realized by a doctor's prescription. At the same time, the rare effectiveness of self-medication noted by 1/3 of patients proves that it cannot and should not replace full-fledged medical care, especially highly specialized, but is nevertheless actively used by the population.

Conclusion

According to the results of the study, one of the available and reliable sources of information about drugs is the pharmaceutical specialist. The high frequency of pharmaceutical consultation needs proves the public's confidence in pharmacy workers. At the same time, most respondents search the Internet for information about drugs 1 time a month and more often, which are a consequence of the popularization and the availability of specialized information. The most popular Internet resource, according to respondents (the study was carried out in the city of Khabarovsk and Khabarovsk Krai), is an online pharmacy apteka.ru. More than half of respondents understand the information about drugs partially, which can lead to a decrease in compliance or errors in drug therapy. About 30% of respondents regularly or often self-prescribe drugs, which may be a consequence of reduced access to medical care in the epidemic of 2019-2021. At the same time, more than half of respondents noted a high frequency of self-medication efficiency, which correlates with a high frequency of consultation with a pharmaceutical worker, searching for information online, the degree of its understanding, and the frequency of self-prescribe drugs.

Research on the importance of pharmaceutical consultation and information, as well as the problem of self-treatment of patients, its causes and consequences, is in demand, relevant and significant for the field of healthcare. Further research areas may be the impact of drug promotion in the Internet on the structure of drug sales; assessment of risks, complications, and hospitalization of patients as consequences of self-medication; moderation of pharmaceutical and medical information from online sources and social networks; use of online resources in self-diagnosis and self-treatment of patients with a new coronavirus infection (COVID-19); monitoring chronic disease therapy using online technologies.

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