Research Article

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Opinions of Pharmacists in Turkey on Drug Shortages and Effects on Treatment

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ABSTRACT

Drug shortage is defined as a lack of supply of a medicinal product that affects the patient's ability to access the necessary treatment when they need it. The origins of this deficiency are complex and varied, and both supply and demand can cause the problem. This study determined the reasons for the drug shortages, their incidence, the most affected drug groups, the precautions taken, and their effects on treatment. The research is in a survey model and quantitative type. A questionnaire form prepared by the researchers was used as a data collection tool in the study. The questionnaire form was sent to community and hospital pharmacists via the Internet. Volunteers were asked to participate. 107 people, including 90 community pharmacists and 17 hospital pharmacists, participated in the research. In our study, the participants listed the essential causes of drug shortage as problems in the supply of raw materials (78.5%), production problems (53.3%), and increased demand for some drugs (29%). Early warning systems should be developed and integrated into relevant processes, ensuring a consistent supply of drugs to prevent drug shortages. Ensuring this structure requires the cooperation of all professionals, institutions, and organizations involved in the national and international health system.

Keywords: Drug shortages, Pharmacists, Community pharmacy, Hospital pharmacy

1. Introduction

Even though access to medicines is a fundamental human right, many people cannot take primary pharmacotherapy [1]. Especially in recent years, although the countries in the European Union (EU) and the Americas, as well as Turkey, are willing to bear high costs to access the drug, the lack of drugs stands out as an essential problem [2-4]. Although it can be defined in different ways, according to the World Health Organization (WHO): 'There are problems in accessing medicines and drug shortages occur due to problems with active pharmaceutical ingredients, financial constraints, problems with forecasting, difficulties with supply chain management, logistics difficulties. [5]. The European Medicines Agency defines a drug shortage as an event when "supply does not meet demand at the national level" [6].

A drug shortage can be defined as a shortage in the supply of a medicinal product that affects the patient's ability to access the necessary treatment when needed. The origins of this deficiency are complex and varied; the problem can be caused by both supply and demand [7]. Drug shortages affect every stakeholder in the healthcare system, and collaborative efforts are required to manage and reduce deficiencies [8]. Drug shortages are likely to affect workload and clinical decision-making; clinical and financial impact must be anticipated [9]. Drug shortages, which indisputably affect patients, lead to delays or noncompliance in initiating treatment [10].

Pharmaceutical distributors and community pharmacies have experienced an unprecedented frequency of drug shortages in recent years. This is a recurring problem for healthcare systems worldwide [11, 12]. Interruption/change of treatments negatively affects chronic diseases such as cancer and HIV; poses a severe public health risk by increasing relapse rates [13, 14]. All drug groups are affected by this shortage, but the shortage of antibiotics, vaccines, immunoglobins, and radiopharmaceuticals is more common [2, 15].

This study tried to determine the reasons for the drug shortages in Turkey, which increased even more with the Covid-19 pandemic, their incidence, the most affected drug groups, the precautions taken, and their effects on treatment. As far as we know, it is the first research conducted in Turkey.

2. Materials and Methods

The research is in a survey model and quantitative type. A questionnaire form prepared by the researchers was used as a data collection tool in the study. A pilot study was conducted before collecting research data. The questionnaire form was sent to community and hospital pharmacists via the internet; volunteers were asked to participate. In the questionnaire form, the opinions of the participants were taken about the frequency of drug shortages in the last year, the results observed when drug shortages occur, the measures taken to avoid drug shortages, the reasons for drug shortages, the estimated effects on the cost of treatment, the pharmacological groups/dosage forms with most drug shortages.

Before the research data were collected, Ankara University Ethics Committee was consulted. The research was found ethically appropriate with the decision numbered 18/175 at the board meeting on 21/11/2022. Research data were collected between 23/11/2022-17/01/2023. The data obtained from the research are presented descriptively in graphics.

3. Results and Discussion

107 volunteers, including 90 community pharmacists and 17 hospital pharmacists, participated in the research. The opinions of the participants are presented below.

3.1. Frequency of drug shortages that adversely affect patient treatments in the last year

Participants were asked how often they encountered drug shortages in their pharmacies in the last year, and the results are shown in Figure-1. As can be seen from Figure-1, 70% of the participants stated that they could not afford medicines for the patients who applied to their pharmacies more than 60 times. 2.8% of the participants encountered a sufficient amount of medication. On the other hand, 97.2% of them stated that they experienced drug shortages at least once.

3.2. The groups most affected by drug shortages in the last year

Anatomic Therapeutic Chemical Classification (ATC) was used to identify the groups with drug shortages. As shown in Figure-2, the participants stated that the groups that experienced the most drug

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shortage were anti-infective drugs at 82.2%, cardiovascular system drugs at 56.1%, and endocrine system drugs at 42.1%. Although it is relatively less compared to other groups, it was stated that there was a lack of drugs in parasites and pesticides at 21.5%, musculoskeletal system drugs at 24.3%, and blood and blood-forming drugs at 25.2%.

3.3. Dosage forms most affected by drug shortages in the last year

When the opinions of the participants are sought to determine the dosage forms affected by drug shortages, as can be seen from Figure-3, the most affected forms are liquid formulations (syrup, solution, etc.) with 78.5%, solid dosage forms (tablets, capsules, etc.) with 67.3%, and sterile eye/ear/nose preparations with 61.7%. Compared to other forms, rate-control drug delivery systems, rectal and vaginal preparations, and locally acting preparations such as gels and ointments were relatively less affected.

3.4. Results observed when drug shortages occurred in the past year

When the results observed by the participants in drug shortages were examined (Figure-4), accessible drugs were preferred to start the treatment. To achieve this, it was observed that a different dosage form was chosen with 54.2%, as well as prescribing another drug used in the same indication with a rate of 80.4%. One of the study's actual results is that drug renouncing affects treatment compliance in almost one out of every two patients (49.5%) and discontinuation of treatment in one of every three patients (34.6%). The significance of the issue was emphasized by stating that 28% of the participants had postponed the life-saving treatment, and 13.1% stated that the treatment was abandoned.

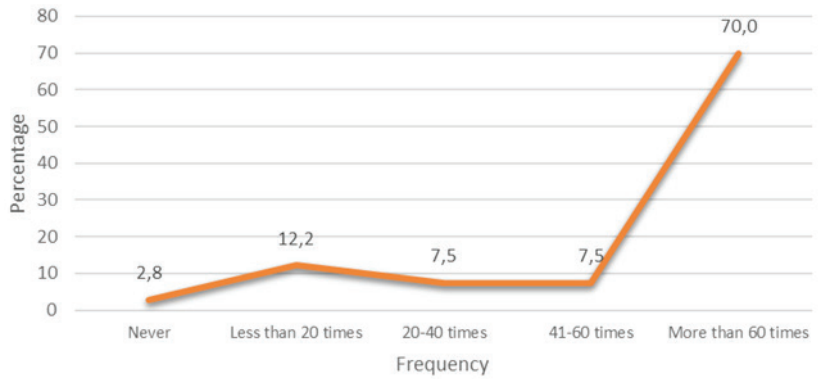

Figure-1. Frequency of pharmacists encountering drug shortages in their pharmacies in the last year

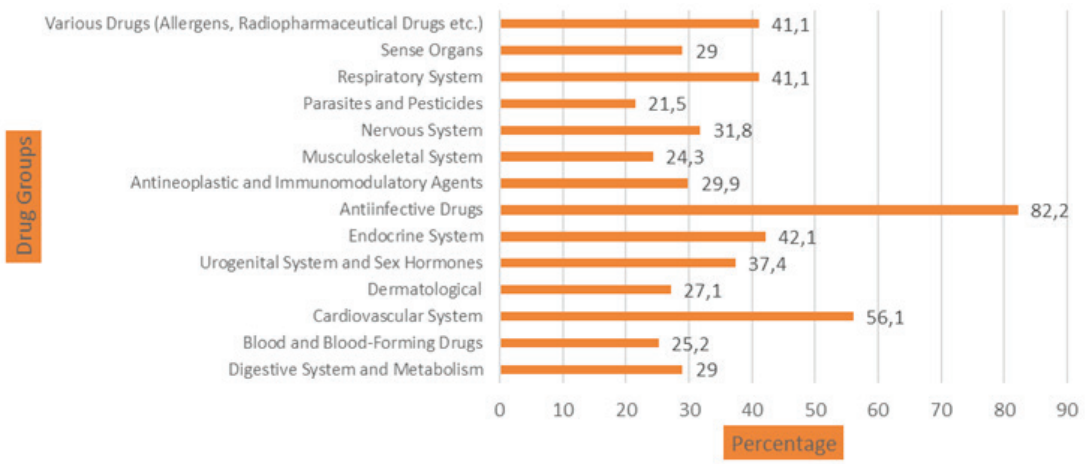

Figure-2. Groups most affected by drug shortages

3.5. Effects of drug shortages on the treatment cost of the stakeholder(s)

As it is known, drug shortages affect economic outcomes as well as clinical results. As shown in Figure-5, the participants stated that drug shortages mainly involve the cost of treatment in pharmacies (72.9%) and patients (69.2%). Reimbursement institutions (34.6%) and hospitals (28%) were less economically affected relatively.

3.6. Precautions taken in the last year to avoid drug shortages that may interfere with treatment

Pharmacists take some precautions to avoid drug shortages. As can be seen from the opinions of the pharmacists participating in our study in Figure-6, supplying an equivalent instead of the prescribed drug (77.6%), communicating with other pharmacies (74.8%), contacting the prescribing physician for an alternative prescription (72%), and measures such as increasing the stocking (68.2%) have been taken.

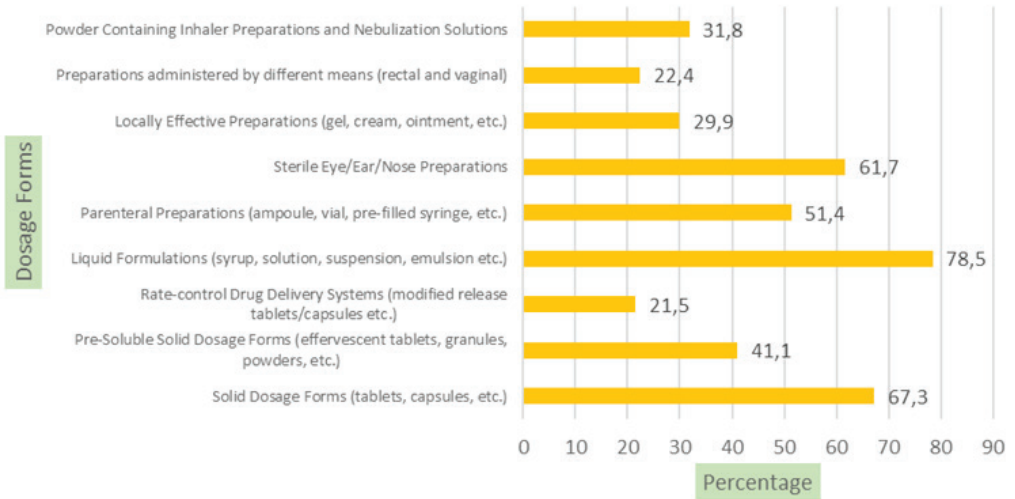

Figure-3. Dosage forms most affected by drug shortages

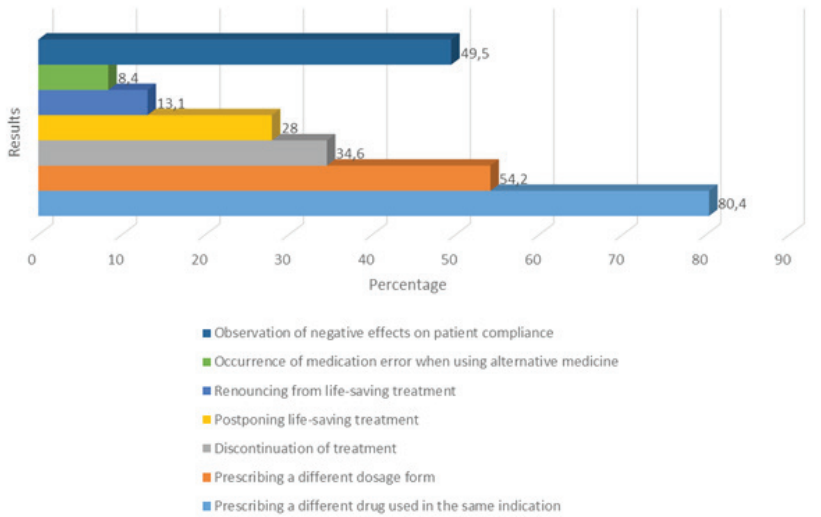

Figure-4. Results observed when drug shortages occur

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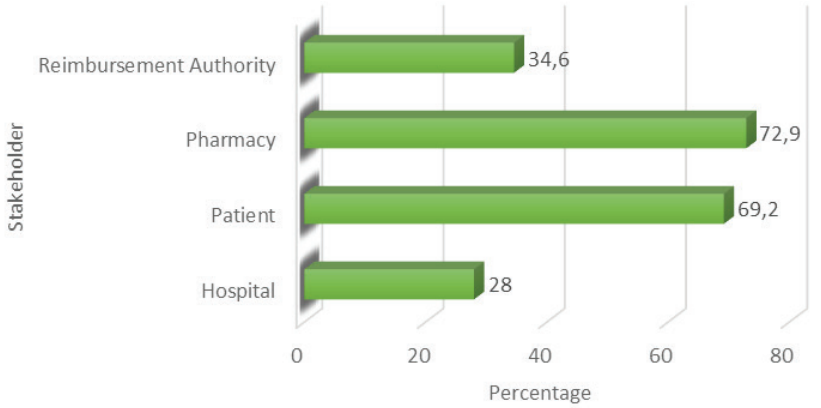

Figure-5. Effects of drug shortages on the treatment cost of the stakeholder(s)

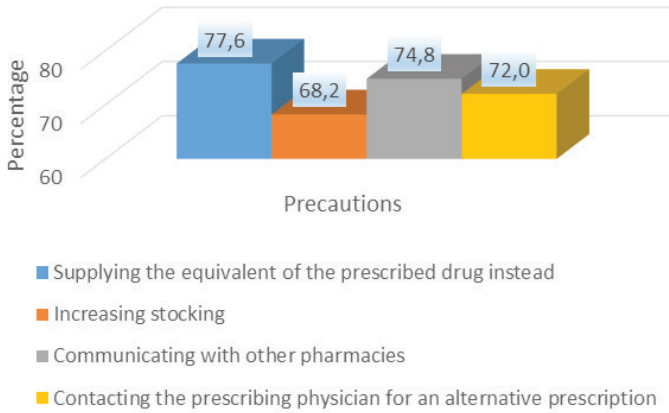

Figure-6. Precautions taken to avoid drug shortages that may interfere with treatment

3.7. Estimation of the negative effect of drug shortages on treatment

When the participants were asked to make their predictions on the adverse impact of drug shortages on treatments, 97.2% of them stated that medicines were adversely affected, in line with their views on the incidence of drug absences in Figure-1. Only 2.8% think that there was no treatment problem (Figure-7).

3.8. Sources of information about drug shortages

Pharmacists are known to require information to address drug shortages. As shown in Figure-8, pharmacists stated that they received information from different institutions/organizations. Pharmaceutical warehouses (76.6%) and pharmaceutical companies (60.8%) were the most reliable information sources. Pharmacy bulletins (34.6%) and the Turkish Pharmacists' Association (27.1%), a professional organization, are among the vital information sources preferred. Only 3.7% of the participants stated that they needed a reliable source of information.

3.9. Reasons for drug shortages in the last year

There can be global and national causes of drug shortages. As can be seen in Figure-9, the reasons for drug shortage are drug pricing policies in Turkey (94.4%), economic crisis (84.1%), reimbursement agency policies (69.2%), and meager prices of some drugs (52.3%). At the global level, problems in the supply of raw materials (78.5%), production problems (53.3%), increased demand for some drugs (29%), low need estimates of pharmaceutical companies (27.1%), and the Covid-19 pandemic (24.3%) appear to be substantial reasons.

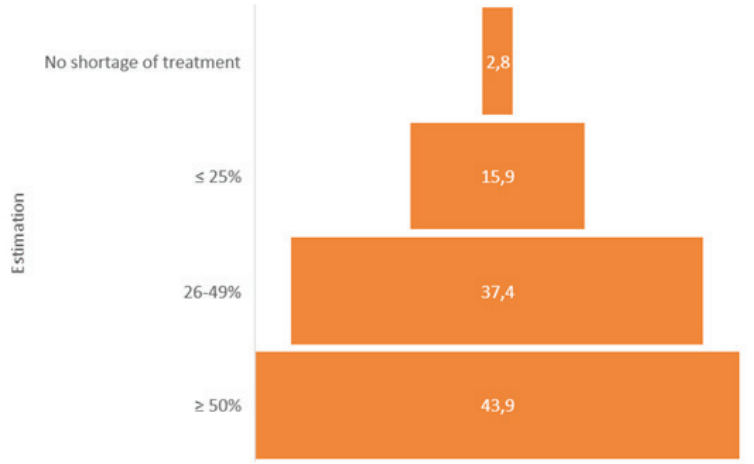

Figure-7. Estimation of the negative effect of drug shortages on treatment

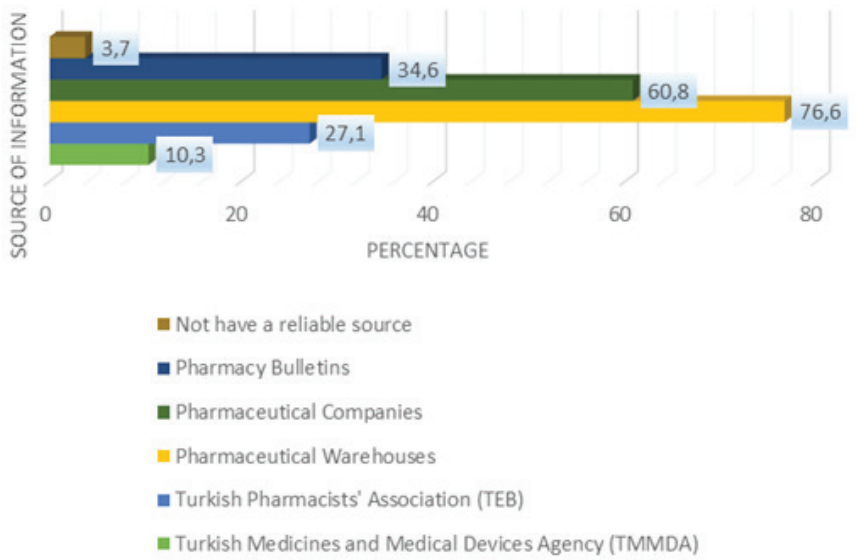

Figure-8. Sources of information about drug shortages

3.10. Stakeholders causing drug shortage

Some institutions/organizations carry out and regulate the processes related to the drug from production to the final consumer, reaching the patient. Figure-10 shows the responsibilities of stakeholders that are highly effective in these processes in drug shortages. At this point, the health authority (85.1%) was established as the most significant factor according to the participants, while pharmaceutical companies (71%) and pharmaceutical warehouses (57%) were also stated as other responsibilities.

4. Conclusion

This study is the first to provide descriptive data on drug shortages in Turkey, especially in recent years. Our research shows that pharmacists have comprehensive and valid information to take certain precautions and reveal drug shortages' characteristics, effects, causes, and management.

Though studies emphasizing the increasing problem of drug shortages and the consequent growing concern for patients' health and well-being have been encountered frequently in recent years, no solution has yet been found [4, 16-18]. Drug shortages cause

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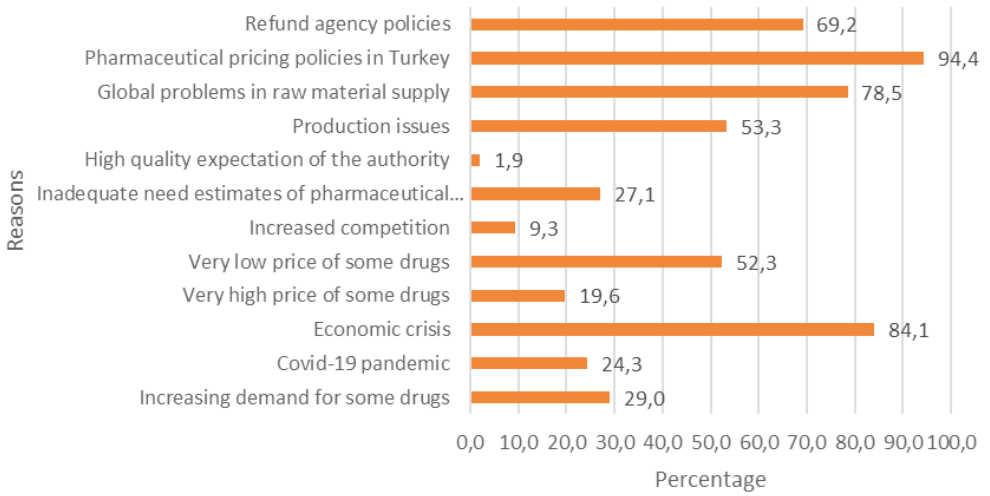

Figure-9. Reasons for drug shortages

Figure-10. Stakeholders causing drug shortage

severe problems in patient care for healthcare professionals [19, 20]. The task of pharmacists is to provide continuous and adequate treatment for patients. Looking at drug shortages from a pharmacist's perspective is critical for identifying adverse effects on patient safety [21].

In our study, 97.2% of the participants stated that they had experienced drug shortages at least once last year. The rate of pharmacists who indicated that they did not experience any problems is only 2.8%. Similarly, in a study conducted in Germany, more than 80% of hospital pharmacists and approximately 90% of community pharmacists experienced drug shortages at least once during the study period. And 3% of pharmacists stated that they did not face a lack that threatened patients' treatment [22].

Drug shortages may affect patients' treatment plans. In our study, 97.2% of the participants stated that drug shortages adversely affected the treatment of patients at different rates. This is often due to discontinuation of treatment or medication errors. In our study, prescribing another drug used in the same indication (80.4%) is found to be the most common way to continue the treatment. There are studies stating that substitution with equivalent drugs is most preferred, but in this case, medication errors are also observed [23]. Choosing a different dosage form (54.2%) for treatment has also been frequently used. However, drug shortages and preferred substitution methods also caused non-compliance (49.5%). In our study, 28% of the participants stated that life-saving treatment was postponed, and 13.1% stated

that life-saving treatment was abandoned. In a similar survey conducted in 2016, these rates were found to be 15% and 25.8% respectively [22]. In general, it is an issue that should be examined separately that these interventions for the continuation of the treatment may cause drug non-compliance as well as a loss of confidence in pharmacists.

Sourcing drugs through pharmaceutical warehouses, purchasing directly from pharmaceutical companies, making phone calls to physicians for alternative prescriptions, or maintaining more great stocks can ensure drug supply for patients. Still, it also requires significant time and effort [24, 25]. In addition to higher financial costs, substituting a different drug or dosage form for an existing drug requires a high level of expertise, collaboration between healthcare professionals, and intensive patient counseling [26, 27].

According to the participants, drug shortages increased the treatment costs of pharmacies (72.9%) and patients (69.2%). Although it is understood that reimbursement institutions (34.6%) and hospitals (28%) are affected relatively less, it is recommended to conduct detailed studies on this subject. A similar study stated that the costs of hospitals and pharmacies increased due to the use of more expensive alternatives. Still, patient costs were rarely affected by drug shortages [23].

One of the significant barriers to access to medicines is price [28]. Pharmaceutical expenditures substantially impact the health budget of developing countries, which can be 50% to 90% of the total health budget [29]. Measuring and understanding the reasons for the price of drugs is an essential step in developing drug pricing policies to ensure affordable drug pricing. Drug price regulation varies worldwide, ranging from free pricing to complete government determination of the cost [30]. Pharmaceutical pricing can be done according to free price, direct price controls, international price comparisons, profit controls, and reference pricing methods. These different approaches reflect the national policy priorities of each country [31].

Pharmaceutical prices in Turkey are determined by choosing the lowest manufacturer price as the reference price in the five European Union (EU) countries, including France, Italy, Greece, Spain, and Portugal [32]. Reference prices are also followed in Euro currency. The Price Evaluation Commission is responsible for converting the Euro to Turkish Lira(TL). The relevant commission determines the fixed exchange rate as 70% of the Euro average of the previous year and carries out the conversion [33]. As of March in Turkey, while the current euro rate is about 20 TL, the rate announced in medicine has been determined as 10.76 TL for 2023 [34]. This situation is quite challenging for drug manufacturers and suppliers. Our study determined that the biggest reason for drug shortages was the drug pricing policies (94.4%) specific to our country, as seen in Figure-9. Studies show that the reference price application in our country is positive to protect the competition in the sector and finance drug expenditures within the framework of the market structure requirements [30]. Although it is seen that it decreases generic drug prices and increases sales volume to a large extent, and even affects original drug prices, there are also studies showing that it cannot be an effective method for health expenditures in the long term [35]. Considering these opinions, revising the reference price application applied in our country is recommended, significantly to update the euro rate.

Studies point to parallel trade as one of the critical causes of drug shortages, especially in the EU region [6]. Similar trade within the EU is carried out within the framework of the traditional economic market and free movement of goods. Studies indicate that parallel trade in drugs, which is thought to affect many other interests and products positively, causes non-compliance with treatments and is shown as the primary source of drug shortages. [36-38]. It should be considered that parallel trade, defined as the purchase of drugs from low-priced countries and their sale to high-priced countries, may cause drug shortages, especially for countries such as Turkey that sell medications at low prices. More research should be conducted on this issue [16].

It is known that there has been a shortage of many drug groups in the last year. The participants stated that the groups they experienced the most drug shortage were anti-infective drugs at 82.2%, cardiovascular system drugs at 56.1%, and endocrine system drugs at 42.1%. In addition, patients had severe difficulties in accessing the respiratory system and radiopharmaceutical drugs (41.1%), urogenital system and sex hormones (37.4%), digestive system and metabolism drugs (29%). When the literature is examined, it is seen that the most affected groups worldwide are antiinfective, antidiabetic, anticoagu-

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lant, antidepressant, asthma, and oncology drugs [6, 22, 23, 39, 40].

Previous studies stated that pharmacists needed to be systematically informed about the reasons for drug shortages [41, 42]. Our research shows pharmacists frequently receive information about drug shortages from pharmaceutical warehouses (76.6%) and pharmaceutical companies (60.8%). Pharmacy bulletins (34.6%) and professional organizations (27.1%) are essential information sources. The least referenced resource was the Turkish Medicines and Medical Devices Agency (10.3%), a public authority. In a similar study, parallel to our research, the majority of pharmacists accessed information from pharmaceutical warehouses (94.0%), pharmaceutical companies (84.5%) or pharmacy bulletins (53.6%). It was stated that only 5.5% preferred the data of the health authority [22].

Drug shortages can have many causes, such as manufacturing issues, pricing, demand or recall [43]. All drug development, approval, production, and distribution processes are subject to high-quality standards. Manufacturer shortages are often due to poor facilities quality or severe industrial accidents. Rapid marketization of drugs is only desirable if alternative therapeutics are available and there is an immediate risk to patients [39]. In our study, the participants listed the crucial causes of drug shortage as problems in the supply of raw materials (78.5%), production problems (53.3%), and increased demand for some drugs (29%).

Early warning systems should be developed and integrated into relevant processes, ensuring a consistent supply of drugs to prevent drug shortages. Ensuring this structure requires the cooperation of all professionals, institutions, and organizations in the national and international health system.

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Author contributions

Concept – M.Ç., G.Ö.; Design – M.Ç., G.Ö.; Supervision – G.Ö.; Resources – M.Ç.; Materials – M.Ç., G.Ö.; Data Collection and/or Processing – M.Ç.; Analysis and/or Interpretation – M.Ç., G.Ö.; Literature Search – M.Ç., G.Ö.; Writing – M.Ç., G.Ö.; Critical Reviews – M.Ç., G.Ö.

Conflict of interest statement

The authors declared no conflict of interest.

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