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Research Article

Use of Pharmaceutical Chemistry Information in the Pharmacy

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Abstract

The purpose of this study is to determine the use of Pharmaceutical chemistry science in pharmacy education and to emphasize its importance for pharmacy. The survey method was used in the research. The audience participating in the research consists of some of the students of Erzincan Binali Yıldırım University Faculty of Pharmacy (4th and 5th grade) in Erzincan and pharmacists participating in the survey on the social platform. The questionnaire consists of questions I personally prepared and includes multiple choice answers. Requirements for those participating in the research: have taken a course in Pharmaceutical chemistry and worked or working in the pharmacy. As a result of the answers given by the pharmacists and pharmacist candidates who participated in the questionnaire, it was seen that Pharmaceutical chemistry information was used from the clarification of the structure of the drug to the design of the pharmacy and even to the policies of drug trading.

Keywords: Pharmaceutical chemistry, survey, pharmacy, pharmacy education

Eczane İşletmesinde Farmasötik Kimya Bilgilerinin Kullanımı

Bu çalışmanın amacı, eczacılık eğitimi içerisinde yer alan Farmasötik kimya biliminin eczane ortamında kullanım durumlarını tespit etmek ve eczacılık için önemine vurgu yapmaktır. Araştırmada anket yöntemi kullanılmıştır. Araştırmaya katılan kitleyi, Erzincan'da bulunan Erzincan Binali Yıldırım Üniversitesi Eczacılık Fakültesi öğrencilerinin bir kısmı (4. ve 5. sınıf) ve sosyal platformda ankete katılan eczacılar oluşturmaktadır. Anket, şahsen hazırladığım sorulardan oluşmakta ve çoktan seçmeli cevaplar içermektedir. Araştırmaya katılanlarda aranan şartlar: Farmasötik kimya dersi almış olması ve eczanede çalış(-mış)ıyor olmasıdır. Ankete katılan eczacı ve eczacı adaylarının vermiş olduğu cevaplar sonucu Farmasötik kimya bilgilerinin, ilacın yapısının aydınlatılmasından eczane dizaynına hatta ilaç alım satım politikalarına kadar kullanıldığı görülmüştür.

Anahtar Kelimeler: farmasötik kimya, anket, eczane eczacılığı, eczacılık eğitimi

1. Introduction

Humanity has been affected and reacted to the conditions it has been in since its first existence. Primitive man is ambiguous in understanding and interpreting the causes of events that occur around him, and must explore it in order to overcome it. However, before the day humanity began to plant the seeds of cumulative knowledge, the diseases that kept it busy and disturbing have a great place in their lives. As with other cases, primitive people sought causes for diseases and associated them with supernatural forces. They took advantage of plants in nature with random trials for treatment and created the beginning of mystical period by spell-magic. The most important representative of the scientific period is undoubtedly Hippocrates (460–377 BC). Hippocrates, considered the father of modern medicine, has demonstrated a scientific understanding of medicine that distinguishes medicine from philosophy and religion, which includes a mind-test against traditional religious-magic treatment methods (Tekiner, 2006).

Communication-related information transfer accelerated when humanity starts to deal with agriculture after hunting and gathering. Built-in life has accelerated the development of social life, and with the invention of the article, people began to write, symbolize what they saw as important, and made knowledge permanent. Civilizations were established, demolished, replaced by other civilizations, but the experiences and experiences of the people were folded into the next. The Renaissance movement has engulfed all of Europe in this century and, as in all areas, major changes have occurred in the fields of medicine and pharmaceuticals. During this period, pharmacy was completely separated from medicine and the methods of medicine were abandoned and studies in the field of chemistry were started. In this period, the principles that apply to the pharmacy alone can be opened to pharmacies by the pharmacist alone, the pharmacy can be performed by the pharmacist alone, the pharmacy company belongs to the pharmacist alone, and the hospitals can open pharmacies that will provide medicine to inpatient patients in the hospital, and that remain in force today (Targan, 2019).

Over the years, non-professional and professional differences of opinion have emerged as a result of the fact that most of those who have completed their pharmacy training do not have enough space in other pharmaceutical branches by opening pharmacies. One of these differences is about the relationship between pharmaceutical chemistry and pharmacies. Today, the pharmaceutical profession is generally seen as a pharmaceutical care support and the skills gained to pharmacists during the training period are ignored. In this study, it is aimed to reveal the statistical results obtained from the survey of pharmaceutical chemistry information, which is a department of pharmacy vocational sciences, in pharmacies. Pharmacy, diagnosis and treatment of diseases and preparation of different types of pharmaceutical drugs from natural and synthetic-induced pharmaceutical raw materials used to protect against diseases; analysis of the drug, supervision in terms of continuity, safety, effectiveness and cost of pharmacological effect; It is the health service that carries out activities related to ensuring standardization and quality safety related to the drug and informing patients about problems related to drug use and reporting problems (Şenol and Tunçtan, 2018).

The objectives of pharmacy undergraduate education were collected under 4 main

headings in the World Health Organization's publication "Role and Functions of Pharmacists in Europe" in order to meet the wishes of students who want to choose the pharmacy profession and to educate highly qualified pharmacists with attitudes, knowledge, skills and abilities:

1) Supply, storage and distribution of medicines.
2) Preparation of medicines, production, quality control and delivery to the patient.
3) Rational use of drugs.
4) Monitoring of drug epidemiology and unwanted effects (Kanzık et al., 1999).

Turkish National Pharmacy Training Programs Accreditation Standards and Guidelines explain in Standard 9 the main components of the pharmaceutical core training program as follows (Özçelikay and others, 2015).

The pharmacy vocational training program should be organized to train a pharmacist who has professional responsibility for society, can use the information obtained from different sciences, interpret them together, identify problems, develop analysis skills, and act in accordance with moral and ethical values. The components of the training program must be in vertical and horizontal integration.

In accordance with the mission of the Faculty of Pharmacy, the three main areas of the core education program are "Basic Pharmaceutical Sciences", "Pharmacy Professional Sciences" and "Pharmacy Technology". Pharmaceutical Management should cover areas such as Pharmaceutical/Medisinal Chemistry, Pharmacognosis, Pharmaceutical Botage, Pharmacology, Pharmacotherapy, Pharmaceutical Toxicology and Clinical Pharmacy/Pharmaceutical Care.

Internships in pharmacy training in Turkey should be in intensity, scope, structure and time to ensure predefined results related to education. In accordance with applicable pharmaceutical legislation, each student must do at least "6 months of internship" under the supervision of a pharmacist in a free pharmacy and/or hospital during five years of pharmacy training. Students of the Faculty of Pharmacy can also do internships in pharmaceutical industry, private hospitals, Social Security Institution (SGK) drug-related reimbursement institutions and organizations, and this internship is considered as an "optional internship" in addition to the 6-month internship period. Internships should continue throughout the pharmacy vocational training program and gain weight in the final year of the program.

Internships must ensure that students earn all targeted outcomes and professional qualifications in their education before the completion of the academic program.

In the last year of the pharmacy vocational training program, each student should make a graduation project under the supervision of an academic advisor in order to become competent in the field of profession and to create an knowledge on a specific subject. In addition, in the last year of the training, pharmacy, hospital and industry/research areas, which are the main application areas of pharmacy, are obliged to take the regulated direction courses. Within the scope of these courses, the preferred student should obtain more detailed information in that field.

Within the framework of European Union compliance laws, in accordance with the European Union's directive no. 2005/36/EC, "Regulation on Determining Minimum Education Conditions of Doctoring, Nursing, Midwifery, Dentistry, Veterinary, Pharmacy and Architecture Education Programs" by the Higher Education Institution (YÖK) is entitled to "Pharmacy" according to the regulation published in the Official Gazette dated 02 February 2008 and numbered

26775. article 11, it is decided that pharmacy education will consist of at least five years of education at a full day at a university.
Pharmaceutical chemistry is a science branch that is among the biological and chemical sciences. He also uses two science branches mentioned above because of the topics he deals with. Pharmaceutical chemistry with a concise description a) tries to explain the mechanisms of effect of drugs, b) examines the chemistry of the drug. In order to explain the mechanism of action of the drug, it first tries to establish a relationship between its biological effect and its chemical and physical structure, as well as its biological and chemical effectiveness. Only chemical information is insufficient for these relationships to establish. It is necessary to know the chemistry of the events of the drug in the living organism. Pharmaceutical Chemistry is a scientific branch of pharmaceutical pharmacy related to the design of active substances, organic synthesis and the development of drugs in nokts at the intersection of pharmaceuticals (Ningur, 1978).

Medisinal chemistry; synthetic organic chemistry is a major science branch that is directly related to science such as inorganic chemistry, pharmacology, toxicology, biology, biochemistry and computational chemistry. To briefly describe medisinal chemistry; The discovery, design, synthesis and structure of a drug active in biological systems is also a branch of science that examines the interaction of this drug in biological systems at the molecular level. (Güzel and Kiren, 2016).

Thanks to the discovery and structural characterization of compounds with chemical activity, researchers working in synthesis chemistry can design new drugs with improved potency and reduced side effects (Sathyaraj, 2011).

Pharmaceuticals, Pharmaceutical Chemistry and drug exploration are intertwined in nature. Pharmaceutical Chemistry allows pharmacy students to fully understand drug movementmechanisms, structure-activity relationships (SAR), acid-base and physical characteristics and absorption, distribution, metabolism, excretion and toxicity (ADME) profiles. A comprehensive understanding of the chemical basis of the drug equips pharmacy students with the ability to rationally answer "cause" and "how" questions about drug action and identifies the pharmacist as a chemical expert among health professionals. By creating a special knowledge base, pharmaceutical chemistry plays a vital role in providing pharmacy students with critical thinking and evidence-based problem solving skills and enables them to make special treatment decisions for patients (Khan, 2011).

Pharmaceutical chemistry courses are generally taught in 4 semesters (3rd and 4th grade) in the faculties of pharmacy. This 4-term process continues as both practical and theoretical courses.

Open formula of drug active substances used in treatment, naming, general physical-chemical properties, general synthesis schemes, metabolite chemistry, stability, general chemical analysis, relationships between drug active substance structure and biological effect, and brieftreatment are examined by addressing the places of use. In addition, drug design and quantitative building-impact relations based on the mechanism of action are also among the topics of this course.

The topics of the pharmachic chemistry course are composed of the following groups: general anesthetics, sedatives-hypnotics, transkilizes, neuroleptic drugs, muscle relaxants, anticonvulsants, antidepressants, localanestics, non-steroidal antiinflammatory, narcotic analinflammatorys, narcoticanic anthroptics, antineoplics, antihistamines, chemotherapy, chemotherapeutics (Beta-lactam group antibiotics, beta-lactase inhibitors, amino acid antibiotics, polypeptideantibiotics, macrolyte antibiotics, aminoglycocyte antibiotics, tetracycline, chloramphicholy, other antibiotics, sulfonamides, kinolon derivatives, antituberculosion drugs, antifungals, antiviral drugs, antifungals, antiviral drugs) blockeric drugs (parasymptomomymetic drugs, anti-colisterase drugs), parasymptomatic drugs, neuromuscular blocker drugs, ganglion blocker drugs, sypathomymetic compounds, sepatholytic compounds, sepatholytic compounds, cardio-vascular effective drugs: antianjinal compounds, antiarrhythmic compounds, antihypertensidemic compounds, anticoagulant, thrombolytic and antiplatelet drugs, effective drugs in the gastrointestinal tract, compounds used in bowel dysfunction, emetic and antiemetic compounds, radiodiagnostic drugs, effective respiratory system, drugs oral antidiabetic drugs, hyperglycemic drugs, hormones describes steroid hormones, troid hormones and troid-effective drugs.

If we outline the subjects in the practical course (laboratory): determinations and purification methods of organic compounds obtained in organic reactions by titrimetric analysis methods of drug active substances, synthesis of certain compounds, drug discovery processes and methods, modeling studies, acquisition of literature screening skills, recognition of organic substances (diagnosis) methods, as well as instrument methods that will enable information about the molecular structure of compounds are given by addressing. These include: 1-functional group analyses, instrumental methods for 2- organic compounds: a) UV, b) IR, c) NMR, d) mass spectroscopic methods, 3- elemental analysis subjects.

2. Material and Methods

The study was first carried out by examining the history of pharmacy and then examining the stages of which the drug passed in this historical process. As a result of the examinations, it was understood that the development of Pharmaceutical Chemistry, which holds an important place in these issues, parallels with the development of pharmaceuticals and pharmaceuticals. The information contained in pharmaceutical chemistry science has been analyzed and 20 multiple choice questions have been prepared in light of these analyses, which constitute the subject of the thesis, which is intended to suggest the use of pharmaceutical chemistry information in the pharmacy. Then these questions were submitted to be filled with people who worked or worked in pharmacies operating in the center of Erzincan and who had been working in the center of Erzincan, who were converted to surveys on a platform through the internet because we were in the pandemic process. After five days, data was collected from a total of 70 people surveyed.

Table 1. Question groups in the surveys and answers to these questions

Category	Number of Questions	Correct Answer (n)	Correct Response (%)	Wrong Response (n)	Wrong Response (%)	Total Response (n)
Chemical Structure	10	500	71,4	200	28,6	700

Pharmacokinetics	3	147	70	63	30	210
Dosage	2	75	53,6	65	46,4	140
Mechanism of Action	2	98	70	42	30	140
Side Effect/Toxicity	1	41	58,6	29	41,4	70
Drug-Drug Interaction	1	68	97,1	2	2,9	70
Other	2	82	58,6	58	41,4	140

Here's how to sort the features searched in

the audience:

- To have succeeded in pharmaceutical chemistry.
- To have worked in the pharmacy for a period.

Target audience of the survey:

- The ones who are the self-employed pharmacie sororors.
- Working as a second pharmacist.
- Freelance pharmacy retirees.
- Employees or pensioners in public pharmacies.
- Pharmacy faculty 4. and 5. students.
- Academicians graduated from the faculty of pharmacy.
- Employees in the pharmaceutical industry who graduated from the faculty of pharmacy.
- Employees of state institutions graduated from the faculty of pharmacy.

3. Results

In this section, the answers to the survey questions were analyzed and the statistical data were extracted. According to the survey data, the pharmacist's characteristics surveyed were interpreted.

According to the questions topics in the surveys, the correct and incorrect answers to questions in each group and percentage ratios for these answers are shown in Table 1 and the percentage ratios of the correct answers to questions are shown in Figure 1. According to this data, most of the questions in the surveys (n=20) were found to be questions about measuring the information of participants in the chemical structure of the drug. While the survey questions were categorized, it was noticed that one of the questions was a question for measuring both the participants' dose information and the mechanism of action of the drug. In addition, a question of the sinonimiation and equivalence of the drug has been evaluated under the category "Other" because it cannot be included in the question categories created. Individuals who participated in the study responded correctly to 71.4% of questions about the chemical structure of the drug in the surveys. In addition, 70% of questions about the pharmacokinetic properties of the drugs were answered correctly by the participants. According to the Ki-Square statistic, the participants' information levels were different in the subjects of the dose and mechanism of action of the drugs ($p<0,005$). In addition, it was observed that there was no statistically significant difference between the knowledge level of the participants in the questions related to the drug side effect/toxicity and drug-drug interactions, and that the information levels of the participants in the subjects mentioned were similar to each other. ($p>0,05$; 1,00).

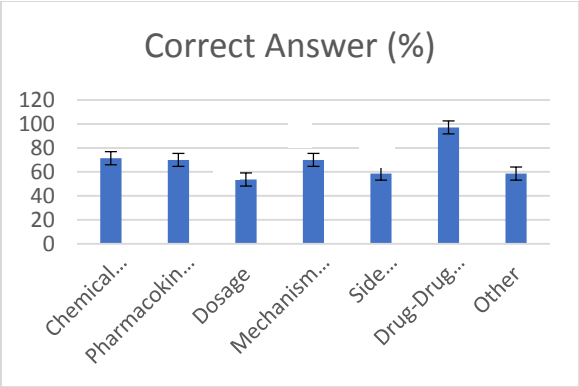

Figure 1. Percentage rates of correct answers to questions in Table 1, * p<0,005

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