



Determination of Factors Influencing Pharmacists While Recommending Immune-Enhancing Products *via* Analytic Hierarchy Process

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ABSTRACT

Objectives: Immune enhancers are attracting attention day by day. Besides, during the coronavirus disease-2019 (COVID-19) pandemic, there has been an increasing demand for immune enhancers. Pharmacists are seen as trustable providers of complementary and alternative medicines, dietary and herbal supplements, immune-enhancers, and so on. This study aims to prioritize criteria that affect community pharmacists' recommending behavior regarding immune enhancers.

Materials and Methods: This paper adopts the analytic hierarchy process (AHP) to rank different criteria substantial for affecting community pharmacists' recommending behavior regarding immune enhancers. In this direction, firstly seven criteria were identified through literature review and views of pharmacists who have community pharmacy experiences. These are; (i) ease of access, (ii) selling price, (iii) package, (iv) content (appropriateness to patient health status), (v) expectation of patient, (vi) quality, and (vii) trust in the manufacturer. Then, a questionnaire including criteria was prepared and delivered to community pharmacists. The data obtained from 93 participants were transferred to the Super Decisions software. The hierarchical structure of the AHP was established and pair-wise comparisons were made.

Results: This study showed that the most important criterion was the ease of access (28%). Secondly, pharmacists give importance to the content of the product, while advising immune-enhancers (22%). Besides, it was determined that the least important criterion was the package of the product (4%).

Conclusion: This study will contribute to the literature by facilitating the process of assessing factors that pharmacists pay attention to while recommending immune-enhancing products. Additionally, the present study results will shed light on firms producing such products, to shape their supply chain management strategies, especially for marketing and sales.

Key words: Immune-enhancers, pharmacist, analytic hierarchy process

INTRODUCTION

Immunity plays a crucial role in protecting against harmful agents, particularly pathogenic organisms like bacteria, viruses, fungi, and parasites.¹ Recently, strong immunity has been thought of as an indicator of a healthy life. This situation also increased individuals' demand for immune-enhancing products. Additionally, it is seen that healthcare professionals recommend immune enhancers for diseases for which there is no definitive treatment yet.² The coronavirus disease-2019 (COVID-19)

pandemic is one of the best examples of this situation. These products have also been commonly recommended to prevent COVID-19.³

Immune-stimulants are synthetic or biological-originated biomolecules that help regulate, suppress, and stimulate the immune system, including different product groups such as vitamins, minerals, probiotics, antioxidants, herbal, and dietary supplements (DS), and some of the complementary and alternative medicines.⁴⁻⁶ Usage of these products is gradually

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increasing.^{7,8} The safest place where these products are offered to the market is pharmacies. Besides, individuals trust pharmacists, while choosing them.⁹⁻¹¹

In the literature, studies on these products mainly focus on pharmacists' roles, knowledge, and attitude.^{12,13} Boon et al.¹⁴ summarize pharmacists' role in natural health products/DS in three main topics as demand, safety issues, and accessibility from pharmacies.

The number of studies dealing with pharmacists behavior to recommend different immune-enhancing products is quite limited. In a qualitative study conducted in Australia, Culverhouse and Wohlmuth express that providing health benefit is the primary reason for recommending complementary medicines (CM) for pharmacists and state customer demand, company profile, and cost as some other factors.¹⁰ According to Kanjanarach et al.¹⁵, Thai pharmacists' selecting criteria of DS and CM are determined as the credibility of the firm, customer income, product appearance, and firm's approach to unsold products. A study was conducted with community pharmacists ranking the factors that influence the purchasing decision of medicines, and these factors are stated as customers' satisfaction, profitability, promotion, and original-generic drug price difference, respectively.¹⁶

In this regard, this study evaluates and prioritize factors, determined considering the above mentioned studies, which affect the community pharmacists' recommending behavior related to immune-enhancers in Türkiye. To the best of the authors' knowledge, this is the first study that prioritizes the pharmacists' selection criteria of immune-enhancers *via* the Analytic Hierarchy Process (AHP) approach.

MATERIALS AND METHODS

Within the scope of this study, prioritization of the factors affecting pharmacists' choice of immune enhancers for patients will be done with the AHP method. A questionnaire form was prepared according to the AHP approach in line with this purpose.

The AHP is one of the multi-criteria decision-making techniques based on pair-wise comparisons, developed by Saaty¹⁷ in the

1970s. The AHP can be used in health management and patient-related issues.¹⁸⁻²⁰

In this study, the hierarchical structure of the AHP was established and solved *via* the Super Decisions Support software. Criteria are identified according to the literature^{10,14,15,21-26} and views of pharmacists, who have community pharmacy experiences. These are; (i) ease of access, (ii) selling price, (iii) package, (iv) content (appropriateness to patient health status), (v) expectation of patient, (vi) quality, and (vii) trust in the manufacturer (Figure 1).

The ethics committee permission was obtained from İzmir Katip Çelebi University Social Research Ethics Committee (04.09.2020-no: 2020/09-08). Online questionnaires were delivered to community pharmacists in Türkiye between September 10th, 2020 and October 19th, 2020. Participants were informed about the study and their consent was obtained.

The literature states that the sample size can be one or more, around 109 on average in AHP studies.¹⁹ One hundred two community pharmacists answered the questionnaire in this study, despite working conditions during the COVID-19 pandemic. Nine of them were not included in the analysis due to a lack of answers. Therefore, 93 participants were considered.

RESULTS

The study takes arithmetical averages of pair-wise comparison matrices created by pharmacists. Table 1 summarizes the findings obtained from the pair-wise comparison matrices for the criteria.

As given in Table 1, calculated averages are rounded to the nearest integer. The information in Table 1 can be summarized as follows: "Ease of access" is about 3.769 (almost 4) times more important than "package", "selling price" is about 4.432 (almost 4) times more important than "package", "content" is about 6.403 (almost 6) times more important than "package", and "quality" is about 4.387 (almost 4) times more important than "expectations of patient" *etc.*

After that, data are transferred to the Super Decisions software. The priority values of the criteria and the consistency rate are calculated. The inconsistency rate is calculated as 0.093, which

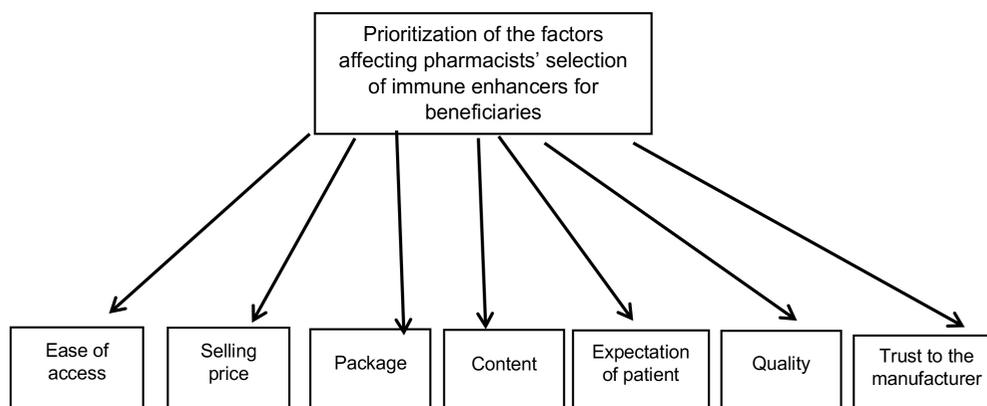


Figure 1. Hierarchical representation of the proposed issue

should be less than 0.1.¹⁷ In this regard, this value is under an acceptable level of inconsistency. The priority values of the criteria are given in Table 2.

In Table 2, the “ease of access” is found as the most important criterion (28%). Three other criteria follow it: “content” (22%), “selling price” (19%), and “quality” (14%).

Table 1. Pair-wise comparisons of criteria

Criteria	Averages	Criteria
Ease of access	2.694	Selling price
Ease of access	2.276	Content
Ease of access	3.769	Package
Ease of access	2.209	Quality
Ease of access	2.109	Expectations of patient
Ease of access	2.450	Trust to the manufacturer
Selling price	2.121	Content
Selling price	4.432	Package
Selling price	2.099	Quality
Selling price	2.430	Expectations of patient
Selling price	2.369	Trust to the manufacturer
Content	6.403	Package
Content	2.731	Quality
Content	4.173	Expectations of patient
Content	3.785	Trust to the manufacturer
Quality	2.159	Package
Expectations of patient	2.222	Package
Trust to the manufacturer	2.230	Package
Quality	4.387	Expectations of patient
Quality	3.572	Trust to the manufacturer
Expectations of patient	2.900	Trust to the manufacturer

Table 2. Priorities of criteria

Criteria	Priorities
Ease of access	0.2752
Content	0.2167
Selling price	0.1859
Quality	0.1418
Expectation of patient	0.0785
Trust to the manufacturer	0.0589
Package	0.0431

DISCUSSION

The immune-enhancing products are generally included in over-the-counter (OTC) drugs. Pharmacist opinion highly influences customers' decisions, while selecting these products.²¹ Moreover, Chan and Tran mentioned that individuals had viewed community pharmacies as preferable places for OTC products due to having the opportunity to access trustable information and safe products.²⁷ Therefore, it can be considered that pharmacists' influence in selling these products is essential. To the best of the authors' knowledge, this is the first study assessing community pharmacists' recommending behavior for immune-enhancers and revealing the order of importance of the criteria *via* the AHP. According to the study results, the most and least important criteria were the ease of access and the package.

Procurement of health products is a pharmacists' main functions according to Good Pharmacy Practice (GPP) Guidelines.²⁸ Additionally, today pharmacy practices change from product-oriented to patient-oriented. However, as stated by Moltó-Puigmartí et al.²², it should be noted that patient-oriented service delivery's complete success depends on patients' access to the relevant product. In other words, pharmaceutical care services offered in pharmacies should be both product- and patient-oriented. In this context, accessibility to a product is of paramount importance. Especially, accessing OTCs such as immune-enhancers became more crucial during the COVID-19 pandemic. Indeed, considering the questionnaire applied in the current study during the COVID-19 pandemic, it should not be surprising that the first criterion becomes ease of access from the viewpoint of pharmacists.

Community pharmacists are closely concerned with their patients' health status *via* pharmaceutical care services. These services also balance selling a product and meeting patient healthcare needs. According to the clinical decision-making process, “identifying alternatives” and “choosing among alternatives” are included as main steps for pharmacists.²⁹ These steps affect pharmacists' recommending behavior of a product. Taking the medication history of a patient is a necessary process. An inaccurate or incomplete medication history can lead to negative consequences.³⁰ It is known that concomitant usage of drugs or herbal supplements with other medications can cause unwanted drug interactions.³¹ This situation is vital, primarily when the pharmacist evaluates the drugs or non-pharmaceutical products used by the patients and offers the patient suggestions about these products. This is why immune enhancers content becomes an important factor after accessing these products. Pharmacists attach importance to selecting the most appropriate product for consumers/patients. Similarly, De Tran et al.²³ stated that, while recommending an OTC product, Vietnamese community pharmacists are most significantly influenced by the combination of active ingredients, range of dosage forms, and quick onset of action, related to the product. When selecting dietary/nutritional supplements, Nickerson-Troy et al.²⁴ expressed that pharmacists should pay attention to patient characteristics such as disease state and concomitant usage with medicines/supplements. Depending

on the most commonly cited bioethics principles, pharmacists should first consider the patient's benefit (beneficence) and prevent patients from being harmed (non-maleficence).^{32,33} As Hanna and Hughes's²⁵ study emphasized, pharmacists should provide patient safety while offering an OTC to a patient. This is another indicator that evaluating product content regarding patient health status is critical, while pharmacists recommend immune-enhancers.

New resources are required for pharmacies' financial survival due to the regulations restricting health expenditures. In the literature, supporting non-prescription sales is seen as crucial for improving pharmacy economies.^{21,34,35} The market size of natural health products/DS is increasing, and these products have good profitability for pharmacies.¹⁴ In this study, considering the effect of the product-selling price on pharmacy profitability, sale price is one of the most important factors affecting pharmacists' recommending behavior related to immune-enhancers. The Turkish Pharmacists Association published a report addressing community pharmacies' economic and financial situation in Türkiye in 2019. According to this report, there is insufficient improvement in community pharmacies' economies.³⁶ This is an expected result, when considering community pharmacies' financial situations in Türkiye. In contrast, De Tran et al.²³ revealed that Vietnamese community pharmacists are least influenced by economic factors including financial pressure of excess stock, profit from the product, and volume selling product, while suggesting an OTC.²³

According to Kanjanarach et al.¹⁵, motivation to recommend DS/CM often comes from customer demands. Welna et al.²⁶ presented that the first two factors that affect community pharmacists' decisions about stocking natural products were patients' requests and the demand of consumers/popularity, respectively. Contrarily, in this study, patient expectation was not one of the primary factors for pharmacists.

Kanjanarach et al.¹⁵ stated that Australian and Thai pharmacists consider firms' credibility, while selecting DS/CM. De Tran et al.²³ expressed that brand factor, including confidence in the manufacturer, was of medium importance among five factors about Vietnamese community pharmacists' OTC recommendation. Welna et al.²⁶ put forth that manufacturers' reputation and "willingness/ability to provide product quality data" were the first five of the eighteen criteria affecting pharmacies' natural product stocks. However, in this study, quality and trust in the manufacturer did not occur in the upper ranks. Considering the immune-enhancers sold in community pharmacies are strictly controlled and licensed, pharmacists' priorities may be affected by this. The package was the least important factor affecting pharmacists' behavior, while recommending immune-enhancers. It can be said that pharmacists do not pay much attention to the packages of immune-enhancer products. Similarly, in the study of Kevrekidis et al.²¹, packaging was the least affecting factor for customers while selecting OTCs.

CONCLUSION

Product selection and recommending decisions of pharmacists can directly affect the health outcomes of patients. In this regard, using scientific methods to evaluate the decision process is vital. As it is known, pharmacists should be good decision-makers. In this study, one of the most widely used multi-criteria decision analysis techniques, AHP, was applied to investigate pharmacists' recommending behavior related to immune-enhancers. Examining the importance order of the criteria that affect pharmacists' recommending behavior related to immune-enhancers will fill the gap in the literature and contribute to the continuation of the services offered in the pharmacy without interruption.

The results obtained from this study raise several important issues that could spark further research, especially on pharmaceutical production, marketing, logistics, and public relations. A similar study design can be adapted for companies with no immune-enhancing products but other natural health products/supplements.

The study results may shed light on pharmaceutical educators developing curricula differently. The increased demand for supplements and OTCs, especially with COVID-19 pandemic, has revealed that pharmacists should know OTC and prescription drugs and manage these products correctly. For this reason, it is necessary to include these products in pharmacy faculty curricula. It is thought that the results of the study will be instructive about the points to be considered in presenting these products to patients.

Ethics

Ethics Committee Approval: The ethics committee permission was obtained from İzmir Katip Çelebi University Social Research Ethics Committee (04.09.2020-no: 2020/09-08).

Informed Consent: Participants were informed about the study, and their consent was obtained.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Concept: N.T., Design: N.T., M.A., Data Collection or Processing: N.T., M.A., Analysis or Interpretation: M.A., Literature Search: N.T., M.A., Writing: N.T., M.A.

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REFERENCES

1. Calder PC. Nutrition, immunity and COVID-19. *BMJ Nutr Prev Health*. 2020;3:74-92.
2. Petrunov B, Nenkov P, Shekerdjiisky R. The role of immunostimulants in immunotherapy and immunoprophylaxis. *Biotechnol Biotechnol Equip*. 2007;21:454-462.
3. Soni VK, Mehta A, Shukla D, Kumar S, Vishvakarma NK. Fight COVID-19 depression with immunity booster: curcumin for psycho neuroimmunomodulation. *Asian J Psychiatr*. 2020;53:102378.

4. Cassa Macedo A, Oliveira Vilela de Faria A, Ghezzi P. Boosting the immune system, from science to myth: analysis the infosphere with Google. *Front Med (Lausanne)*. 2019;6:165.
5. Vaishnavi A, Roy A, Anjali AK. Immune boosting drugs—a myth or reality—a review. *Indian J Forensic Med Toxicol*. 2020;14:5204-5211.
6. Anywar G, Kakudidi E, Byamukama R, Mukonzo J, Schubert A, Oryem-Origa H. Medicinal plants used by traditional medicine practitioners to boost the immune system in people living with HIV/AIDS in Uganda. *Eur J Integr Med*. 2020;35:101011.
7. Mehralian G, Yousefi N, Hashemian F, Maleksabet H. Knowledge, attitude and practice of pharmacists regarding dietary supplements: a community pharmacy-based survey in Tehran. *Iran J Pharm Res*. 2014;13:1457-1465.
8. Ung COL, Harnett JE, Hu H, Desselle SP. Barriers to pharmacists adopting professional responsibilities that support the appropriate and safe use of dietary supplements in the United States: perspectives of key stakeholders. *Am J Health Syst Pharm*. 2019;76:980-990.
9. Koleva N, Argilashki D. Pharmaceutical Care in the prevention of childhood immunity—the experience of the pharmacist in Bulgaria. 8th Mediterranean Interdisciplinary Forum on Social Sciences and Humanities, MIFS 2020, 28-29 May Online Conference, pp.84-97. (2020). *Eur Sci J*. Retrieved from. Available from: <https://eujournal.org/index.php/esj/article/view/13363>
10. Culverhouse SE, Wohlmuth H. Factors affecting pharmacists' recommendation of complementary medicines—a qualitative pilot study of Australian pharmacists. *BMC Complement Altern Med*. 2012;12:183.
11. Clayton K, Luxford Y, Stupans I. Decision-making factors of pharmacy customers purchasing over-the-counter complementary and alternative medicine for stress. *Adv Integr Med*. 2017;4:103-108.
12. Kheir N, Gad HY, Abu-Yousef SE. Pharmacists' knowledge and attitudes about natural health products: a mixed-methods study. *Drug Healthc Patient Saf*. 2014;6:7-14.
13. Harnett JE, Ung COL, Hu H, Sultani M, Desselle SP. Advancing the pharmacist's role in promoting the appropriate and safe use of dietary supplements. *Complement Ther Med*. 2019;44:174-181.
14. Boon H, Hirschhorn K, Griener G, Cali M. The ethics of dietary supplements and natural health products in pharmacy practice: a systematic documentary analysis. *Int J Pharm Pract*. 2009;17:31-38.
15. Kanjanarach T, Krass I, Cumming RG. Exploratory study of factors influencing practice of pharmacists in Australia and Thailand with respect to dietary supplements and complementary medicines. *Int J Pharm Pract*. 2006;14:123-128.
16. Ülger Y, Tosunoğlu N. Ranking of Factors effecting the purchasing decision of pharmacists by AHP: a research in Ankara province. *Journal of Business Research-Türk*. 2020;12:2702-2720.
17. Saaty RW. The analytic hierarchy process—what it is and how it is used. *Mathematical Modelling*. 1987;9:161-176.
18. Liberatore MJ, Nydick RL. The analytic hierarchy process in medical and health care decision making: a literature review. *Eur J Oper Res*. 2008;189:194-207.
19. Schmidt K, Aumann I, Hollander I, Damm K, von der Schulenburg JMG. Applying the analytic hierarchy process in healthcare research: a systematic literature review and evaluation of reporting. *BMC Med Inform Decis Mak*. 2015;15:112.
20. Arslan M. Application of AHP method for the selection of pharmaceutical warehouse location. *J Fac Pharm Ankara*. 2020;44:253-264.
21. Kevrekidis DP, Minarikova D, Markos A, Malovecka I, Minarik P. Community pharmacy customer segmentation based on factors influencing their selection of pharmacy and over-the-counter medicines. *Saudi Pharm J*. 2018;26:33-43.
22. Moltó-Puigmartí C, Vonk R, van Ommeren G, Hegger I. A logic model for pharmaceutical care. *J Health Serv Res Policy*. 2018;23:148-157.
23. De Tran V, Dorofeeva VV, Loskutova EE, Lagutkina TP, Kosova IV. Factors influencing community pharmacists' recommendation of over-the-counter medications in four Vietnam cities. *Trop J Pharm Res*. 2019;18:421-427.
24. Nickerson-Troy J, Morse K, White R, Beals A, Hudson M, Kuczmarski K. State of the art review: pharmacists' approach to selecting dietary/nutritional supplements for patients. *Am J Lifestyle Med*. 2007;1:490-498.
25. Hanna LA, Hughes CM. 'First, do no harm': factors that influence pharmacists making decisions about over-the-counter medication: a qualitative study in Northern Ireland. *Drug Saf*. 2010;33:245-255.
26. Welna EM, Hadsall RS, Schommer JC. Pharmacists' personal use, professional practice behaviors, and perceptions regarding herbal and other natural products. *J Am Pharm Assoc (2003)*. 2003;43:602-611.
27. Chan V, Tran H. Purchasing over-the-counter medicines from Australian pharmacy: what do the pharmacy customers value and expect? *Pharm Pract (Granada)*. 2016;14:782.
28. World Health Organization. WHO Technical Report Series, No. 961, 2011. Joint FIP/WHO guidelines on good pharmacy practice: standards for quality of pharmacy services. Available from: <https://www.who.int/docs/default-source/medicines/norms-and-standards/guidelines/distribution/trs961-annex8-fipwhoguidelinesgoodpharmacypractice.pdf>
29. Duffull SB, Wright DFB, Marra CA, Anakin MG. A philosophical framework for pharmacy in the 21st century guided by ethical principles. *Res Social Adm Pharm*. 2018;14:309-316.
30. Carter MK, Allin DM, Scott LA, Grauer D. Pharmacist-acquired medication histories in a university hospital emergency department. *Am J Health Syst Pharm*. 2006;63:2500-2503.
31. Ramos-Esquivel A, Viquez-Jaikel Á, Fernández C. Potential drug-drug and herb-drug interactions in patients with cancer: a prospective study of medication surveillance. *J Oncol Pract*. 2017;13:e613-e622.
32. Beauchamp TL, Childress JF. *Principles of Biomedical Ethics* (6th ed). Oxford: Oxford University Press; 2009.
33. Özcömert GH, Özçelikay G, Şar S, Asil E. The assessment of beneficence and non-maleficence principles from the perspective of pharmaceutical ethics. *T Klin Med Ethics*. 2000;8:101-104.
34. Gyaneshwari K. A study on consumer behavior towards OTC products. *Int J Manag Soc Sci Res Rev*. 2015;1:134-137.
35. Lessenger JE, Feinberg SD. Abuse of prescription and over-the-counter medications. *J Am Board Fam Med*. 2008;21:45-54. Erratum in: *J Am Board Fam Med*. 2008;21:175.
36. Fidan Ü, Türker M, Albayrak ÖD. Eczanelerde ekonomik ve finansal durum araştırması, TEB Yayınları, 2019. Available from: https://www.teb.org.tr/versions_latest/1147/eczanelerdearastirma2019