



A CROSS-SECTIONAL STUDY: PERCEPTION AND CONSUMPTION BEHAVIOR ABOUT IMMUNITY BOOSTER SAMBUCUS SP. PRODUCTS (AZERBAIJAN, GEORGIA, UZBEKISTAN)

IMMUN GÜÇLENDİRİCİ SAMCUBUS TÜRLERİ İÇEREN ÜRÜNLERİN ALGISI VE TÜKETİMİ
HAKKINDA KESİTSEL BİR ÇALIŞMA (AZERBAIJAN, GÜRCİSTAN, ÖZBEKİSTAN)

Melek ULUSOYLU-DUMLU^{1*}

¹Asfarma International Pharma Marketing, Istanbul, Turkey

ABSTRACT

Objective: The aim of this cross-sectional study was to measure and determine the difference between perception and consumption changes of elderberry products in Azerbaijan (AZ), Georgia (GEO) and Uzbekistan (UZB) countries.

Material and Method: A questionnaire based, cross-sectional, multi country study was conducted by using an online based with consumers of pharmacies, drug stores and shops where had food supplement category between April and August 2021.

Result and Discussion: The majority of responders belong to 31-50 age group, and higher gender profile was on female part, 85%. The results showed that end users of consumed products were children (51%) and older family members (39%) in the average data of 3 countries. Elderberry products were classified as expensive products but were consumed high amount during the pandemic. During the pandemic, immune boosting had been in prior place of individual healthcare, and prophylactic approach had become more important than earlier. This is the first study in Azerbaijan, Georgia and Uzbekistan as a digital survey based, cross-sectional study.

Keywords: Behaviour, coronavirus, immune booster, Sambucus sp., social media

ÖZ

Amaç: Bu kesitsel çalışmanın amacı Mürver içerikli ürünlerin Azerbaycan (AZ), Gürcistan (GEO), Özbekistan (UZB) ülkelerindeki algısı ve tüketimindeki değişimi belirlemek ve ölçmektir.

Gereç ve Yöntem: Anket temelli, kesitsel, çoklu ülkede, dijital ortamda; eczane ve gıda takviyesi ürünleri kategorisi bulunan eczanelerin, sağlık ürünleri mağazalarının tüketicileri ile, 2021 yılının Nisan ve Ağustos ayları arasında gerçekleştirilmiştir.

Sonuç ve Tartışma: Ankete katılanların büyük kısmı 31-50 yaş aralığında olup ve %85'lik kısmını kadınlar oluşturmaktaydı. 3 ülkenin ortalama verilerine göre ürünlerin nihai kullanıcıları çocuklar (%51) ve yaşlı aile üyeleridir (%39). Mürver içeren ürünler pandemi süresinde yüksek miktarda tüketilmelerine rağmen, pahalı

* **Corresponding Author / Sorumlu Yazar:** Melek Ulusoylu-Dumlu
e-mail / e-posta: ulusoylumelek@hotmail.com, **Phone / Tel.:** +90 5335024789

ürünler olarak sınıflandırılmıştır. Pandemi döneminde, immun sistemi güçlendirmek bireysel sağlıkta önceliklenmiş ve daha önceki dönemlere göre önleyici yaklaşımlar daha önemli hale gelmiştir. Bu çalışma Azerbaycan, Gürcistan ve Özbekistan'da gerçekleştirilmiş, dijital anket temelli, kesitsel ilk çalışmadır.

Anahtar Kelimeler: Davranış, immun güçlendirici, koronavirus, Sambucus sp, sosyal medya

INTRODUCTION

The *Sambucus* genus consists of 5 to 30 species, mostly in the Northern hemisphere, including study countries, although they have become naturalized throughout much of the temperate and subtropical regions. Because its fruits are highly desirable for birds, elderberry rapidly colonizes moist and sunny areas along railways, roadways, forest edges, and fence lines [1]. Various parts of the elderberry have been used in traditional medicine as a diaphoretic, diuretic, astringent, laxative, and emetic. The berries were traditionally used in nutrition, such as elderberry wine and pies, and as a flavoring or dye. Currently, extracts of the berries are used primarily as antiviral agents for colds, influenza and *Herpes* virus infection. Also, several clinical trials have shown that symptoms of influenza like sneezing and fever were quickly treated with elderberry including products which are both commercially produced or home recipes [2-5]. The effects of the plant and/or parts of plants come from its main natural components, which are flavonoids, catechins and proanthocyanidins. Generally, these compound classes are accepted as natural immunostimulators. Scientific literature also emphasizes that the potent antioxidant activity of the plant is related to these phenolic compounds [6-8].

Currently, elderberry is not only on scientific researchs' target, but also has gained therapeutic popularity in the commercial market over herbal supplements. The commercial products of the plant are in the top recommendations in pharmacy practices, and digital platforms, daily life person to person in consumer practices. Elderberry is a well-known medicinal plant. Elderberry use is rising in immune boosting due to the products registered as food supplements in different pharmaceutical forms and combinations. In many countries, elderberry extracts are combined with *Pelargonium* extracts, *Echinacea* extracts, Vitamin C, Zinc and Vitamin D.

The awareness of elderberry, mostly flowers of the plant, is very high in those countries. Elderberry has already been placed in their traditional medicine and daily life. Elderberry included products are available in herbal market of countries. The product portfolio range is highly extended from medicinal tea to honey. In the pandemic, some medicinal plants have been re-launched to markets for their medicinal properties with novel marketing tactics [9-10].

The study aimed the determine consumption and perception profile of those 3 countries of medical plants and their products from a known elderberry point of view.

MATERIAL AND METHOD

This is a questionnaire based, cross-sectional, multi country study. The study was conducted by using an online based with consumers of pharmacies, drug stores and shops where had food supplement category between April and August 2021 in Azerbaijan, Georgia and Uzbekistan. The period of study was identified just after the winter in period of the pandemic for to gather total perception and consumption information, after all passed diseases and their treatments in that time.

The questionnaire contained 19 questions regarding the socio-demographic profile of medicinal plant consumption, knowledge of elderberry, choice of immunity booster if there has any, source of information and/or recommendation regarding the immunity support of the participant etc. The form consisted of yes or no answers and multiple-choice questions.

The inclusion criteria were to be a customer (a random consumer - in food supplement category was established pharmacies, drug stores and shops) in targeted locations and the ability to understand and answer online Google form questionnaires. Personal information was not requested for participation. Only google sign-in was kept compulsory to ensure that respondents would fill out the form only one time and confidentiality of the data was assured. The language of the questionnaire was simple and written in Russian. The response related to statistics gathered from the system and analyzed with the use of Excel software. The data was exported to SPSS (Version 17). Descriptive statistics such as Chi-square, t-test, Pearson and Exact test were used for analysis. p values < 0.05 were considered as statistically significant in all conducted analysis [11-13].

RESULT AND DISCUSSION

Questionnaires were distributed over digital platforms in each country, out of which 771 (296, 121, 354 Azerbaijan, Georgia, Uzbekistan respectively) responses were obtained and included to the study. The responses were shown in below Tables.

Demographic profile of population

The majority of total responders, 85% were female and 15% were males. 83% were university degree and postgraduates. The maximum number of responders was in 31-50 age group (Table 1). The mean age of responders was 40.76 (SD \pm 7.44).

Immunity booster consumption profile before and during the pandemic

The main part of responders, 90%, were no COVID-19 infected during the period of the pandemic outbreak. The percentage was calculated from personal statements, not cross-checked with public

personal healthcare results. There was no correlation between herbal product consumption and COVID-19 infection. The detailed consumption profile is shown below.

“During illness” period consumptions were not changed before or in the pandemic in total data. The drastic change was on “Never” responder side. Before the pandemic 49% of responders were in “never” consumer but, during the pandemic the number decreased to 3.11%, ($p<0.05$). Besides, “everyday” and “twice a day” consumer percentages were increased. Everyday rate was increased from 0.5% to 13.62%. The rate of “twice a week” was increased from 0.9% to 34.5%, ($p<0.05$). This outcome showed that herbal product consumption was raised in the pandemic for immunity boosting and prophylaxis (Table 2). In the pandemic “everyday” and “twice a week” consumption rates were drastically increased in Azerbaijan; because of this, “During illness” consumption rates were significantly decreased (Table 2). Triggering of consumption was not related to COVID-19 infection because there is no correlation between COVID-19 infected responders’ rate and increased consumption.

Table 1. Socio-demographic profile of population

Variables	AZE (n)	GEO (n)	UZB (n)	Total (n)	Percentages (%)
Age					
18-20	3	2	2	7	0.85%
21-30	50	24	43	117	15.18%
31-50	148	68	269	485	62.95%
51-60	86	23	36	145	18.81%
>60	9	4	4	17	2.20%
Gender					
Female	255	90	315	660	85.60%
Male	41	31	39	111	14.40%
Education					
Till high school	20	10	86	116	15.05%
High school	90	31	95	216	28.01%
University	160	74	150	384	49.80%
Master or PhD	26	6	23	55	7.14%

Differentiation on awareness of herbal product consumption

This study showed that the outbreak of COVID-19 pandemic increased the awareness of herbal product consumption. The results indicated that recommendations were taken from multiple sources. The main advisors were healthcare professionals (HCPs) (Doctor and Pharmacist). 84.57% of responders were taken advice from HCPs ($p<0.05$) (Table 3).

Table 2. The consumption changing profile of herbal products outbreak of the pandemic

Variables	AZE(n)	GEO(n)	UZB(n)	Total (n)	Percentages (%)	
herbal product consumption before the pandemic	Everyday	2(1.54) [0.14]	1(0.63) [0.22]	1(1.84) [0.38]	4	0.51%
	Twice a week	5(2.69) [1.99]	1(1.10) [0.01]	1(3.21) [1.53]	7	0.90%
	During illness	148(146.66) [0.01]	78(59.95) [5.43]	156(175.39) [2.14]	382	49.54%
	Never	141(145.12) [0.12]	41(59.32) [5.66]	196(173.56) [2.90]	378	49.02%
herbal product consumption during the pandemic, if any	Everyday	57(40.31) [6.91]	13(16.48) [0.73]	35(48.21) [3.62]	105	13.62%
	Twice a week	147(102.12) [19.72]	27(41.75) [5.21]	92(122.13) [7.43]	266	34.50%
	During illness	87(144.35) [22.79]	78(59.01) [6.11]	211(172.64) [8.52]	376	48.77%
	Never	5(9.21) [1.93]	3(3.77) [0.16]	16(11.02) [2.25]	24	3.11%

Table 3. Consume advisor profile

Variables	AZE (n)	GEO (n)	UZB (n)	Total (n)	Percentages (%)
Doctor	95(116.33) [3.91]	48(47.55) [0.00]	160(139.12) [3.13]	303	39.30%
Pharmacist	146(133.99) [1.08]	60(54.77) [0.50]	143(160.24) [1.86]	349	45.27%
Family Member	37(26.11) [4.55]	6(10.67) [2.05]	25(31.22) [1.24]	68	8.81%
Friend	18(19.58) [0.13]	7(8.00) [0.13]	26(23.42) [0.29]	51	6.62%

The primary end users were children (50.97%). Old family members were on the second line as 39.43%, $p < 0.05$, Table 4.

Table 4. “Become consumer” end user profile in family members

Variables	AZE (n)	GEO (n)	UZB (n)	Total (n)	Percentages (%)
Children	170(150.88) [2.42]	69(61.68) [0.87]	154(180.44) [3.88]	393	50.97%
Wife/Husband	21(24.57) [0.52]	11(10.04) [0.09]	32(29.39) [0.23]	64	45.27%
Old Family Members	102(116.71) [1.85]	39(47.71) [1.59]	163(139.58) [3.93]	304	8.81%
Others	3(3.84) [0.18]	2(1.57) [0.12]	5(4.59) [0.04]	10	6.62%

Elderberry perception

Elderberry - Black Elderberry - Бузина чёрная (belongs to *Sambucus* sp.) is a well-known plant. Meanwhile, during the pandemic, people became more fragile to increasing immune system with “novel” recommendations. Specifically, elderberry related perception was questioned in survey. Responders received information, recommendations and advice from social media about the registered (as food supplement), marketed, and “immune booster” products containing elderberry. The primary information sources were social media 40.96% and HCPs 38.26%, $p < 0.05$.

During this period, the frequency of digital advertising dramatically increased. The results indicated that social media advice, advertisements, informative blogs, etc. positively influenced perception development. Consumers followed social media advice much more than traditional advice, as seen in Table 5.

Table 5. Source of information for perception development

Variables	AZE (n)	GEO (n)	UZB (n)	Total (n)	Percentages (%)
Family	36(43.77) [1.38]	22(17.89) [0.94]	56(52.34) [0.26]	114	14.78%
HCPs	99(113.26) [1.79]	46(46.30) [0.00]	150(135.45) [1.56]	295	38.26%
Social Media	155(121.32) [9.35]	47(49.59) [0.14]	114(145.09) [6.66]	316	40.96%
Do not know	6(17.66) [7.70]	6(7.22) [0.21]	34(21.12) [7.85]	46	6.00%

Preferred consumption of elderberry

Consumption preference of natural immunity booster agents/supplements/medicinal plants are still in developing from the ancient time to date. The most familiar way that to be a follower of the family heritage. The dilemma of today is traditional remedies/recipes and modern supplements. Table 6 indicates that the majority of the population (66%) preferred to use “elderberry” as a food/herbal supplement. 16% of the population has been using the plant as food. The main gathered information from this is that even being a well-known medicinal plant, preference for consumption has been derived from the pharmaceutical form of supplements.

Table 6. Preferred consumption type of elderberry

Variables, as	AZE(n)	GEO(n)	UZB(n)	Total(n)	Percentages (%)
dried food	6	4	4	14	1.82%
food	65	37	18	120	15.56%
home remedy	56	18	57	131	17%
pharmaceutical food supplement	169	62	275	506	65.63%

The ratios between willingness to use after the pandemic and affordability perception

Most of the responders were not dedicated chronic-long term users of elderberry products. Also, the responders almost agreed on high priced profile of the products. There was no significant association between education and age for willingness and affordability. Another main outcome was that willingness responders were 100% female.

The use of food/herbal/dietary supplements has increased significantly in the last decade. Both in developed and developing countries, healthcare providers have suffered from raised pharmaceutical expenditures. A governmental reimbursement system is not common in many parts of the world, even if there is no coverage for food supplements, known as supportive care agents or called “anonymous” therapeutics in some countries. In all parts of the world, societies deeply understood that prophylactic

approaches are very important to be on the safe-side for wellbeing [14]. Phytopharmaceuticals, food supplements, vitamin-mineral combinations have potential from this point of view.

This multi country based, cross-sectional study, investigated pandemic related immune booster use and re-profiled elderberry perception and consumption.

The study demonstrated that the majority of responders belong to 31-50 age group in all 3 countries (63%). And, gender profile also had higher ratio on female part (average 86%, 74%, 89% Azerbaijan, Georgia and Uzbekistan respectively). The results have shown that the pandemic enormously increased consumption of herbal products. Habitual consumption was on during the illness (cold, flu, etc.) period before the pandemic (50%, 64%, 44% Azerbaijan, Georgia and Uzbekistan respectively). Still, during the pandemic the average ratios were changed such as every day 13%, twice a week 34.50% and illness period 48.77%. The main outcomes of this result; immune boosting had been in prior place of individual healthcare and prophylactic approach had become more important than earlier. The mentioned above ratio was almost in same pattern in each country ($p < 0,05$).

The results also indicated that buyer or payer of the products was not always “consumer”. The median age is 40.76, who have more responsibility for children and aged family members. The results showed that the consumer of products was 51% for children 39% for older family members in the average of 3 countries’ data ($p < 0,05$). However, elderberry products were classified as high priced but consumed in high volume during the pandemic.

A variety of supplements are utilized during the pandemic, use of any nutritional-food-dietary supplements remains the traditional experience of medicinal herbs. Future investigation should be into the effects of food supplements on supportive care and whether optimal supplementation strategies for immune boosting are required.

In COVID-19 pandemic, science literature and key opinion leaders underline the importance of having a strong immune system. This well known, heritage information proved its again and again in the pandemic waves in many parts of the world. This study is the first investigation in those countries where still follow habitual recipes in their daily life to be healthy. The mentioned cultures ensured the engagement of family-based attitudes to protection of diseases. Today, countries realize that the protective advantages of traditional folk medicine, and the novel forms-dosages of food supplements with their known ingredients are being involved in daily life. They are asked to engage in preventive practices to protect against possible diseases; exploring their perceptions is important to orient them towards this change from traditional to current perspective.

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AUTHOR CONTRIBUTIONS

Concept: *M.U.D*; Design: *M.U.D*; Control: *M.U.D*; Sources: *M.U.D*; Materials: *M.U.D*.; Data Collection and/or processing: *M.U.D*.; Analysis and/or interpretation: *M.U.D*.; Literature review: *M.U.D*.; Manuscript writing: *M.U.D*.; Critical review: *M.U.D*.; Other:-

CONFLICT OF INTEREST

The authors declare that there is no real, potential, or perceived conflict of interest for this article.

ETHICS COMMITTEE APPROVAL

The study was approved by the Farmatsevtika Tarmog'ini Rivojlantirish Agentligi ethical committee (No: 00/88-344, Date: 10.03.2021).

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