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Consumption of Apitherapy Products by Late Adolescents Before and During the COVID-19 Pandemic: A Cross-Sectional and Comparative Descriptive Study

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Abstract

Background: Apitherapy has emerged as both a conventional and alternative treatment effective against COVID-19-related symptoms.
Objectives: This study aimed to determine the types, frequency, and amount of apitherapy products that late adolescents use before and during the pandemic.
Methods: The study employed a cross-sectional, descriptive, and comparative design. Using stratified random sampling, 3307 late adolescents aged 17 - 21 were included. Data were collected through a questionnaire on demographic characteristics and apitherapy products. Descriptive statistics and paired sample t-tests were used for data analysis, with effect size calculated using Cohen's d method.
Results: Half of the participants (n = 1595, 48.2%) had never heard of "apitherapy" before, while those who had heard mentioned honey (35.6%), pollen (25.5%), propolis (14.9%), royal jelly (11.3%), bee venom (8.4%), and bee bread (4.3%). They reported using these products to "boost their immune systems", "prevent respiratory infections/reduce cough", and "reduce nausea and vomiting". Late adolescents consumed significantly more honey ($t = -15.683$, $P < 0.001$, effect size = 0.35), pollen ($t = -11.111$, $P < 0.001$; effect size = 0.44), and propolis ($t = -15.302$, $P < 0.001$, effect size = 0.45) during the pandemic than before. They primarily examined labels before purchasing (36.4%) and believed that products approved by the Ministry of Agriculture and Forestry should be purchased (63.3%).
Conclusions: This study underscores the popularity of apitherapy among late adolescents. Further surveys are recommended to better understand young people's apitherapy habits and provide valuable data for healthcare practitioners combating the pandemic.

Keywords: Apitherapy, Complementary Therapies, COVID-19, SARS-CoV-2

1. Background

The World Health Organization (WHO) declared COVID-19 a pandemic on 11 March 2020. Since the outbreak of COVID-19, infections from the virus have caused more than 6 million deaths globally, and daily life has been disrupted by curfews and social distancing measures imposed by governments across the world (1). This unprecedented circumstance has had a serious impact on both the physical and mental health of late adolescents (2).

COVID-19 symptoms include fever, diarrhea, cough, fatigue, weakness, shortness of breath, chills, sore throat, nasal congestion, headache, nausea, vomiting, muscle pain, and loss of taste and smell (2, 3). The most characteristic symptoms of COVID-19 are loss of taste and smell, followed by diarrhea and stomach pain (2-4). COVID-19 may also cause severe psychological problems, such as anxiety, fear, and panic (2). Apitherapy, a treatment method that involves the use of bee products for health and healing, protects people against COVID-19 pandemic-related physical and psychological symptoms and improves their health (5-8).

Apitherapy products (honey, pollen, propolis, royal jelly, bee bread, bee venom, etc.) have both nutritional and medicinal values, including anti-inflammatory, antiviral, anti-arthritis, anti-fungal, anti-nociceptive, neuroprotective, anti-tumoral, antimicrobial, antioxidant, anti-diabetic, and anti-rheumatic properties (6, 9). They have the ability to enhance the cardiovascular, pulmonary, gastrointestinal, and nervous systems and are used to treat illnesses and their associated symptoms (6). Apitherapy products boost the immune system and stimulate antibody production; therefore, they are sources of promising therapeutic and chemoprophylaxis agents against COVID-19 symptoms (7, 8, 10, 11). Studies in the literature have determined that apitherapy products are effective against severe acute respiratory syndrome coronavirus-2 (SARS-CoV2) (11) and COVID-19-related hyperinflammation (12). They have also been found to be effective in reducing COVID-19 symptom severity, the number of deaths, and the duration of hospitalization (13-17). According to Berretta et al., propolis is a safe and promising treatment option to reduce the risk and severity of COVID-19 (10). These reports indicate that apitherapy is the most effective conventional and alternative treatment for COVID-19 (8, 10, 17).

2. Objectives

This study aimed to determine the types, frequency, and amount of apitherapy products that late adolescents use before and during the pandemic.

3. Methods

3.1. Study Design

The study adopted a cross-sectional, descriptive, and comparative design. Descriptive research collects data to describe or define a phenomenon. Before performing a large-scale study, researchers use descriptive research as a starting point to gather data on a topic and categorize its qualities (18). This study adhered to the guidelines for strengthening the reporting of observational studies in epidemiology (STROBE).

3.2. Setting and Participants

The research was conducted between 15 January and April 2021 at a university in the Eastern Black Sea region of Turkey. The university has seven faculties and one vocational school. The population consisted of all undergraduate students at the university (n = 10,249). The inclusion criteria were (1) being between the ages of 17 and 21, (2) being literate in Turkish, (3) testing negative for COVID-19, and (4) agreeing to participate in the study. The exclusion criteria were (1) testing positive for COVID-19 and (2) refusing to participate in the study. All undergraduate students were stratified using stratified random sampling (19), and the sample size was 3307 (Appendix in the Supplementary File).

3.3. Scales

The questionnaire was based on a literature review conducted by the researchers (6-9). It consists of three parts. The first part includes items on descriptive characteristics (such as age, gender, region of residence, parental education level, chronic illness status, etc.), knowledge levels, and sources of information on apitherapy. The second part asks whether participants consumed apitherapy products (such as honey, pollen, propolis, etc.) and why and how frequently they consumed them before and during the pandemic. The frequency of consumption of apitherapy products by participants before and during the pandemic is scored as follows: "never (1), rarely (2), once a month (3), once every 15 days (4), once a week (5), 3 - 4 times a week (6), and every day (7)". Based on COVID-19 symptoms documented in the literature, the rationale for using honey, pollen, and propolis was determined.

The third part includes ten items on participants' attitudes toward apitherapy products. For each item, participants were asked to respond as "Agree", "Undecided", or "Disagree". The Content Validity Index (CVI) of the section on attitudes towards apitherapy products was evaluated by 5 experts in the field of apitherapy in terms of "content, scope, relevance, clarity, and question structure". As a result of experts' evaluations, the Item-Based Content Validity Index (I-CVI) was found to be between 0.80 - 1.00 and the Scale-Based Content Validity Index (S-CVI) was 0.98. Internal consistency scores between 0.00 - 0.40 are considered unreliable; 0.40 - 0.60 low reliable; 0.60 - 0.80 quite reliable; 0.80 - 1.00 is considered highly reliable (19). The internal consistency of the items in the third section was 0.768, indicating quite reliable. To check the questionnaire's clarity and applicability, a pilot study (n = 20) was carried out. Participants in the pilot study were excluded from the main study.

3.4. Data Collection

Due to the pandemic, all universities in Turkey switched to distance education, so the data were collected using Google Forms in four steps. First, the researchers and the IT staff of the relevant university

identified late adolescents who met the inclusion criteria. Second, the researchers shared a link to the online questionnaire with each late adolescent and asked them to read and approve Google's privacy policy (2021) (20). Third, each late adolescent was assigned an ID at the beginning of the questionnaire (ID = 10-digit school number. Example: 0123456789), ensuring that each participant filled out the questionnaire only once. Participants were instructed to complete the questionnaire independently, and researchers reassured them that their refusal to participate would not affect their grades. It took between 25 and 30 minutes to complete the questionnaire. Fourth, the IT staff checked all IDs and removed duplicates and incomplete responses (n = 146).

3.5. Data Analysis

The data were analyzed using the Statistical Package for Social Sciences (SPSS, v. 23). Numbers, frequencies, percentages, mean, and standard deviation were used for descriptive statistics. A mathematical equation was used to determine the percentage change in consumption of apitherapy products. The difference between pre and during the COVID-19 pandemic consumption rates of honey/pollen/propolis was calculated and divided by the original number. To calculate the percentage decrease or increase in the use of apitherapy products, the result was multiplied by 100. This calculation was repeated to determine the frequency and percentage change in consumption of apitherapy products (21).

To ascertain differences between the two groups, an independent samples t-test is utilized (22). However, these tests do not demonstrate the size of the difference. Therefore, in this study, Cohen's d effect size was employed to determine the magnitude of the difference between the use of apitherapy products pre and during the COVID-19 pandemic. Cohen's d effect size provides the ratio of the difference between the means of the groups to the standard deviations of the groups, assuming the variances of the two groups are homogeneous (23). Effect size quantitatively reflects the size of the effect of an intervention, treatment, or phenomenon (24). Cohen suggested that an effect size of $\leq$ 0.20, 0.21 - 0.80, and $>$ 0.81 indicates small, moderate, and large effects, respectively (23). The results are evaluated at a confidence interval of 95% and a significance level of $P < 0.05$.

3.6. Ethical Considerations

The study was approved by the Ethical Committee of the university, and official permission was obtained from the faculties (dated 06/01/2021 and numbered 2020/12) and by the General Directorate of Health Services. Before data collection, all participants were informed of the research purpose and procedure, and their informed consent was obtained. The Declaration of Helsinki's ethical guidelines were followed during every stage of the research project.

4. Results

The population of the study was 10,249 undergraduate students. The sample included 3,307 late adolescents using stratified random sampling. More than half of the participants (61.7%) were women. A quarter of the participants (27.9%) lived in the Black Sea region. The maternal education level of most participants (85.6%) was a secondary school or lower degree. The paternal education level of more than half of the participants (67.4%) was a secondary school or lower degree (Table 1). Ten percent of the participants had chronic diseases.

Table 1. Sociodemographic Characteristics (n = 3307)

Sociodemographic Characteristics	Values [a]
Gender	
Female	2039 (61.7)
Male	1268 (38.3)
Region of residence	
Black Sea	923 (27.9)
Aegean	479 (14.5)
Eastern Anatolia	474 (14.3)
Southeast Anatolia	470 (14.2)
Central Anatolia	463 (14.0)
Marmara	303 (9.2)
Mediterranean	195 (5.9)
Maternal education level	
Secondary school or lower	2832 (85.6)
High school	362 (10.9)
Bachelor's or higher	113 (3.5)
Paternal education level	
Secondary school or lower	2229 (67.4)
High school	778 (23.5)
Bachelor's or higher	300 (9.1)
Total	3307 (100)

[a] Values are expressed as No. (%).

Nearly half of the participants (48.2%) had never heard of apitherapy before. Participants had heard of honey (35.6%), pollen (25.5%), propolis (14.9%), royal jelly

(11.3%), bee venom (8.4%), and bee bread (4.3%) as apitherapy products. They learned about apitherapy methods from the Internet (48.3%), family members (21%), TV (20.3%), doctors (5.9%), nurses (2.7%), or radio (1.3%).

During the pandemic, the number of those consuming honey, pollen, and propolis to strengthen their immune system increased. Likewise, to prevent respiratory tract infections and reduce cough, the number of participants consuming honey, pollen, and propolis increased during the pandemic (Table 2). In comparison with the pre-pandemic period, a significant rise was observed in the number of individuals who consumed honey, pollen, or propolis for any reason like enhancing immunity, preventing respiratory tract infections/reducing cough, or alleviating muscular or joint pain (Table 2).

The frequency of pre and during the COVID-19 pandemic apitherapy consumption is presented in Table 3. The number of participants who consumed honey, pollen, and propolis 3 - 4 times a week increased during the pandemic compared to pre-pandemic by 35%, 51%, and 95%, respectively. The number of participants who consumed honey, pollen, and propolis every day increased during the pandemic compared to pre-pandemic by 56%, 55%, and 105%, respectively.

According to the results, late adolescents consumed significantly more honey ($t = -15.683$, $P < 0.001$, effect size = 0.35), pollen ($t = -11.111$, $P < 0.001$, effect size = 0.44), and propolis ($t = -15.302$, $P < 0.001$, effect size = 0.45) during the pandemic than before (Table 4).

Less than half of the participants disagreed with the statements "I have been consuming apitherapy products since the outbreak of COVID-19 because they are excellent sources of energy (31.8%)," "I have been consuming apitherapy products since the outbreak of COVID-19 because they are rich in vitamins and minerals (30.2%)," "I have been consuming apitherapy products since the outbreak of COVID-19 because they have medicinal properties (27.7%)," or "I carefully examined the labels before purchasing honey, pollen, and propolis during the COVID-19 pandemic (26.2%)" (Table 5).

5. Discussion

This study aimed to examine why and how frequently late adolescents consume apitherapy products during the pandemic. It was determined that late adolescents' consumption of honey, pollen, and propolis increased during the pandemic. Duarte Silveira, et al. reported in a randomized controlled trial that propolis reduced the number of days of oxygen therapy and hospitalization of COVID-19 patients (14). In a case study by Fiorini et al., propolis was reported to significantly improve the overall clinical condition of an uncomplicated COVID-19 patient (7). Lima et al. suggested that high amounts of quercetin and kaempferol in bee pollen might prevent COVID-related cytokine storm and ARDS complications (8). In this study, the number of participants consuming honey, pollen, and propolis "to boost their immune systems," "to prevent respiratory infections/reduce a cough," and "to reduce nausea and vomiting" has significantly increased since the beginning of the pandemic. A qualitative study is recommended to determine whether this increase in students' use of honey/pollen/propolis during the COVID-19 pandemic is to gain more control over their health and lives.

Adolescents go through quick social, psychological, and physical changes that lead to the adoption of health-harming habits (25, 26). Adolescence is important because it is the last step before adulthood and university students correspond to late adolescence. Another critical issue is figuring out whether the rise in apitherapy use among university students during the COVID-19 pandemic was motivated by a desire to keep them healthy. There were ongoing COVID-19 restrictions in Turkey at the time of this study, so a follow-up study is recommended to determine whether these restrictions influenced late adolescents' use of apitherapy products.

Various studies show that women consume apitherapy products more than men (27). There could be two reasons for this as follows: First, women have more positive attitudes toward organic products than men (28). Second, they do more grocery shopping than men do (29). There is limited research on the side effects of apitherapy products in COVID-19 patients (30). These researchers recommend removing allergens from apitherapy products. Therefore, despite the positive health outcomes of apitherapy products, possible side effects require further research.

Another remarkable finding of our study is that more than half of the participants in this study believed that purchasing products approved by the Ministry of Agriculture and Forestry should be a priority. Less than half of the participants reported examining the effects of apitherapy products before buying them. Apitherapy products have side effects such as grayanotoxin intoxication (mad honey), allergic reactions, dizziness, vomiting, nausea, itching, neurotoxicity, contact dermatitis, rhinitis, conjunctivitis, respiratory distress, infant botulism, urticaria, bronchospasm, severe abdominal pain, anaphylaxis, hypereosinophilic sensitivity, and eosinophilia (9, 31). Mad honey is produced by bees feeding on the nectar of the

Table 2. Reasons for Consumption of Apitherapy Products Before and During the COVID-19 Pandemic [a]

Variables	Before the COVID-19 Pandemic [b]	During the COVID-19 Pandemic [b]	Before the COVID-19 Pandemic	During the COVID-19 Pandemic	*t*-Test	P-Value
Honey						
Boosting the immune system	540 (16.3)	1061 (32.1)	0.163 ± 0.36	0.320 ± 0.46	-18.665	< 0.001
Preventing respiratory tract infections/reducing cough	569 (17.2)	1164 (35.2)	0.172 ± 0.37	0.352 ± 0.47	-25.555	< 0.001
Reducing muscle or joint pain	213 (6.4)	335 (10.1)	0.064 ± 0.24	0.101 ± 0.30	-5.242	< 0.001
Reducing nausea and vomiting	398 (12.0)	760 (23.0)	0.120 ± 0.32	0.229 ± 0.42	-12.668	< 0.001
Preventing diarrhea	372 (11.2)	733 (22.2)	0.112 ± 0.31	0.221 ± 0.41	-12.577	< 0.001
Restoring appetite	348 (10.5)	608 (18.4)	0.105 ± 0.30	0.183 ± 0.38	-9.773	< 0.001
Healing mouth sores	390 (11.8)	665 (20.1)	0.117 ± 0.32	0.201 ± 0.40	-11.006	< 0.001
Natural sweetener	329 (9.9)	632 (19.1)	0.099 ± 0.29	0.191 ± 0.39	-12.020	< 0.001
Reducing stress	303 (9.2)	542 (16.4)	0.091 ± 0.28	0.163 ± 0.37	-13.323	< 0.001
Relieving mental and physical fatigue	323 (9.8)	510 (15.4)	0.097 ± 0.29	0.154 ± 0.36	-7.189	< 0.001
Energy source	307 (9.3)	537 (16.2)	0.092 ± 0.29	0.162 ± 0.36	-9.700	< 0.001
Reducing hair loss	114 (3.4)	192 (5.8)	0.034 ± 0.18	0.058 ± 0.23	-4.472	< 0.001
Pollen						
Boosting the immune system	694 (21.0)	806 (24.4)	0.209 ± 0.40	0.243 ± 0.42	-3.219	< 0.01
Preventing respiratory tract infections/reducing cough	366 (11.1)	440 (13.3)	0.110 ± 0.31	0.133 ± 0.33	-2.824	< 0.01
Reducing muscle or joint pain	213 (6.4)	391 (11.8)	0.064 ± 0.24	0.118 ± 0.32	-8.070	< 0.001
Reducing nausea and vomiting	290 (8.8)	413 (12.5)	0.087 ± 0.28	0.124 ± 0.33	-5.232	< 0.001
Restoring appetite	153 (4.6)	292 (8.8)	0.046 ± 0.21	0.088 ± 0.28	-7.829	< 0.001
Relieving mental and physical fatigue	143 (4.3)	297 (9.0)	0.043 ± 0.20	0.089 ± 0.28	-8.174	< 0.001
Energy source	263 (8.0)	377 (11.4)	0.079 ± 0.27	0.114 ± 0.31	-5.326	< 0.001
Reducing hair loss	175 (5.3)	224 (6.8)	0.052 ± 0.22	0.067 ± 0.25	-2.856	< 0.01
Propolis						
Boosting the immune system	309 (9.3)	615 (18.6)	0.093± 0.29	0.186 ± 0.38	-11.071	< 0.001
Preventing respiratory tract infections/reducing cough	261 (7.9)	565 (17.1)	0.078 ± 0.26	0.170± 0.37	-13.873	< 0.001
Reducing nausea and vomiting	209 (6.3)	394 (11.9)	0.063 ± 0.24	0.119 ± 0.32	-8.169	< 0.001
Healing mouth sores	182 (5.5)	320 (9.7)	0.055 ± 0.22	0.096 ± 0.29	-6.532	< 0.001

[a] Values are expressed as mean ± SD or No. (%).

[b] More than one answer.

rhododendron ponticum plant. Daily consumption of 5 - 30 g of grayanotoxin in mad honey causes poisoning and, in advanced cases, death (32). Bee pollen, with increased pesticide levels (imidacloprid) and allergenic compounds (anemophilous plant pollen includes allergens that could induce severe allergy symptoms in people, a condition known as pollinosis), can have life-threatening side effects. Therefore, allergy-prone and atopic individuals should not consume it (33). The safe daily dose of propolis is 24 - 72 mg/kg, and consuming

Table 3. Frequency of the Consumption of Apitherapy Products Before and During the COVID-19 Pandemic (n = 3307) [a]

Variables	Never	Rarely	Once a Month	Once Every 15 Days	Once a Week	3 - 4 Times a Week	Every Day
Honey							
Before the COVID-19 pandemic	944 (28.5)	465 (14.1)	236 (7.1)	208 (6.3)	300 (9.1)	461 (13.9)	693 (21.0)
During the COVID-19 pandemic	688 (20.8)	398 (12.0)	199 (6.0)	147 (4.4)	171 (5.2)	621 (18.8)	1083 (32.7)
Total	1632 (49.3)	863 (26.0)	435 (13.1)	355 (10.7)	471 (14.2)	1082 (32.7)	1776 (53.7)
Pollen							
Before the COVID-19 pandemic	1010 (30.5)	954 (28.8)	473 (14.3)	177 (5.4)	168 (5.1)	327 (9.9)	198 (6.0)
During the COVID-19 pandemic	653 (19.7)	1147 (34.7)	226 (6.8)	239 (7.2)	241 (7.3)	494 (14.9)	307 (9.3)
Total	1663 (50.2)	2101 (63.5)	699 (21.1)	416 (12.5)	409 (12.3)	821 (24.8)	505 (15.2)
Propolis							
Before the COVID-19 pandemic	1096 (33.1)	1105 (33.4)	460 (13.9)	205 (6.2)	129 (3.9)	134 (4.1)	178 (5.4)
During the COVID-19 pandemic	876 (26.5)	644 (19.5)	517 (15.6)	396 (12.0)	247 (7.5)	262 (7.9)	365 (11.0)
Total	1972 (59.6)	1749 (52.8)	977 (29.5)	601 (18.1)	376 (11.3)	396 (11.9)	543 (16.4)

[a] Values are expressed as No. (%).

Table 4. Comparison of Participants' Average Consumption of Apitherapy Products Before and During the COVID-19 Epidemic (n = 3307)

Variables	Mean ± SD	*t*-Test	P-Value	Cohen's d Effect Size
Honey		-15.683	< 0.001	0.35
Before the COVID-19 pandemic	3.78 ± 2.38			
During the COVID-19 pandemic	4.48 ± 2.43			
Pollen		-11.111	< 0.001	0.44
Before the COVID-19 pandemic	2.79 ± 1.89			
During the COVID-19 pandemic	3.29 ± 2.06			
Propolis		-15.302	< 0.001	0.45
Before the COVID-19 pandemic	2.47 ± 1.68			
During the COVID-19 pandemic	3.22 ± 2.02			

more than 15 g may cause side effects, possibly due to the isoprenyl caffeate it contains. The most common side effects of propolis are allergic reactions (34). Other apitherapy products (royal jelly and bee venom) have also been reported to have more side effects (35, 36). Due to the allergens MRPJ 1 and MRPJ 2 in their contents, royal jelly and bee venom can be life-threatening. Also, bee venom can cause allergic reactions after a sting, as bee venom contains 12 main allergens (35, 36). Therefore, late adolescents should consult experts and undergo allergy tests before using apitherapy products. Further research is advised to determine the effects, safe dose range, and use of other apitherapy products by late adolescents.

5.1. Limitations

The main identified strength of the study is that it presents information on the underlying reasons and frequency of apitherapy product use by late adolescents before and during the pandemic. However, the study has five limitations. First, we did not assess parental influences (parental role modeling, food exposure, force-feeding, and restriction on food access) on their children's food preferences (37). Second, we did not consider the fact that different religions and cultures consume different amounts of honey. Third, the results cannot be generalized to other populations because the consumption of apitherapy products may have been affected by cultural differences. Fourth, the data were collected online. Fifth, the use of other apitherapy products (royal jelly, bee venom, or bee bread) was not evaluated.

5.2. Conclusions

This study highlights the popularity of apitherapy among late adolescents. Our study provided information on why and how frequently late adolescents consumed apitherapy products pre and

Table 5. Participants' Views of Apitherapy Products (n = 3307) [a]

Variables	Agree	Undecided	Disagree
Since the COVID-19 pandemic began, I have been buying apitherapy products approved by the Ministry of Agriculture and Forestry.	2094 (63.3)	675 (20.4)	538 (16.3)
The quality of apitherapy products is more important than their price.	1751 (52.9)	914 (27.6)	642 (19.4)
I carefully examine the labels before purchasing honey, pollen, and propolis during the COVID-19 pandemic.	1205 (36.4)	1236 (37.4)	866 (26.2)
I have been consuming apitherapy products since the outbreak of COVID-19 because they have medicinal properties.	1336 (40.4)	1056 (31.9)	915 (27.7)
I do not believe that the apitherapy products on the market are of good quality.	1369 (41.4)	1141 (34.5)	797 (24.1)
I have been consuming apitherapy products as food supplements since the outbreak of COVID-19.	1770 (53.5)	684 (20.7)	853 (25.8)
Apitherapy products have been important for healthy eating since the outbreak of COVID-19.	2133 (64.5)	704 (21.3)	470 (14.2)
I have been consuming apitherapy products since the outbreak of COVID-19 because they are excellent sources of energy.	1191 (36.0)	1065 (32.2)	1051 (31.8)
I have been consuming apitherapy products since the outbreak of COVID-19 because they are rich in vitamins and minerals.	1528 (46.2)	780 (23.6)	999 (30.2)
Apitherapy products must be of high quality and approved by authorities.	2613 (79.0)	381 (11.5)	313 (9.5)

[a] Values are expressed as No. (%).

during the pandemic and their views on these products. Almost half of the participants (48.2%) had never heard of apitherapy before. Honey was the most widely known apitherapy product. Late adolescents have been consuming more honey, pollen, and propolis since the outbreak of COVID-19. Around one-third of the participants said they examined the labels before purchasing honey, pollen, and propolis during the COVID-19 pandemic. More than half of them bought apitherapy products that were approved by the Ministry of Agriculture and Forestry during the COVID-19 pandemic (63.3%). Given these results, it is advised that late adolescents consult with a healthcare provider before utilizing apitherapy products to reduce the risk of adverse effects (such as allergic reactions, anaphylaxis, respiratory distress, etc.) that could arise if they become infected with COVID-19. Further surveys are recommended to better understand the apitherapy habits of young people and provide valuable data to healthcare practitioners against the pandemic. A greater understanding of the benefits and drawbacks of these treatments on the symptoms, course, and consequences of COVID-19, as well as the usage of apitherapy by late adolescents, requires further evidence-based research. Few late adolescents reported receiving information about apitherapy from doctors and nurses. Therefore, late adolescents might benefit from doctors and nurses educating them about apitherapy products.

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Supplementary Material

Supplementary material(s) is available here [To read supplementary materials, please refer to the journal website and open PDF/HTML].

Footnotes

Authors' Contribution: BA, definition, conceptualization, methodology, formal analysis, visualization, writing of the original draft, review, and editing; VAC, definition, conceptualization, formal analysis, methodology, supervision, visualization, writing of the original draft, review, and editing.

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Data Availability: The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

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Informed Consent: Participants who agreed to participate in the study were informed about the study through Google Forms before data collection, and their written informed consent was obtained.

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