

CONSUMER PREFERENCES FOR BEE PRODUCTS: EVIDENCE FROM SLOVAKIA

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Abstract:

The main objective of this paper is mapping the situation with consumption of bee products and consumer preferences. Paper is based on primary data obtained from conducting an online questionnaire survey in 2021. In total, 526 respondents filled in the questionnaire. The results showed that the most consumers in Slovakia consume mainly honey. The other bee products such as propolis, royal jelly, bee pollen, bee bread or apilarnil is consumed only occasionally or not at all. Honey is consumed on regular basis and mostly as sweetener in beverages or directly from the jar. Honey is consumed more frequently by consumers who are older than 50 years. In addition, other bee products would be preferred as an addition in natural honey together with ginger, strawberry, or raspberry. The least attractive addition was indicated honey with poppy or turmeric.

Key words:

Consumer Behaviour, Bee Products Market, Slovak Market

JEL: M31, M21, Q13

1 Introduction: Heading for the introductory chapter

Bee products, honey, in particular, have been used for their nutritional value and a wide range of therapeutic purposes since ancient times (Münstedt & Bogdanov, 2009; Alvarez-Suarez, 2017). According to Nainu et al. (2021), traditional medicine use bee products for the treatment of a large number of diseases, including cancer and diseases associated with microorganisms. In fact, it has been shown that many chemical substances in bee products have anticancer, antibacterial, antiviral, and antiparasitic effects. Moreover, Denisow & Denisow-Pietrzyk (2016) claim that natural products like bee products can be used as an alternative drug for therapeutic reasons. In the context of the above, recent research done by Lima, Britu & Cruz Nizer (2020) discovered that bee products represent a possible source of pharmaceutical and nutraceutical substances for treating COVID-19. A number of honeybee products such as propolis, royal jelly, honey, pollen, bee venom or beeswax indicated impressive antiviral activity against pathogens causing serious respiratory syndromes. Many of them contribute to the formation of antibodies, the maturation of immune cells, and the stimulation of both innate and adaptive immunological responses. In other words, apitherapy may provide promise for reducing risks related to COVID-19 in the future.

Recently, due to an increasing concern for customers' physical and emotional wellbeing, functional food products have gained a lot of interest (Kolyali & Keskin 2020). The term „functional food“ can be used to describe food that delivers physiological advantages by improving human health and/or reducing the risk of chronic diseases above nutritional functions (Martirosyan & Singh, 2015). Bobis et

al. (2010) state that food producers are getting more interested in products of apiculture, namely, honey, royal jelly, propolis, pollen and bee bread. These bee products can be viewed as a functional food that improves nutritional value and has numerous effects on psychological and physiological health. Similarly, studies done by Viuda-Martos et al. (2008); Socha et al. (2015); Salimi et al. (2013) also agree with the opinion that bee products can be an important component of functional food. According to Yucel, Topal & Kosoglu (2017), new studies that examine the effects of bee products on general health are conducted every year, and the significance of these studies is constantly growing. Moreover, several studies have been dealing with the perception of bee products as functional food, specifically royal jelly (Collazo et al. 2021), honey (Berenbaum & Calla, 2021; Bugarova et al., 2021; Luchese, Prudêncio & Guerra, 2017, Bogdanov, 2012), bee pollen (Khalifa et al., 2021).

There are numerous types of bee products such as propolis, royal jelly, beeswax, honey, bee bread and bee venom (Habryka, Kruczek & Drygaś, 2016). Moreover, bee products are an important source of essential amino acids, monounsaturated fatty acids, proteins and simple sugars. These characteristics boost the immune system, fight against bacteria and protects human health (Yucel, Topal & Kosoglu, 2017). Nevertheless, the structure of bee products and their biological active properties are affected by various environmental aspects such as plant species, location and climate (Castaldo & Capasso, 2002; Sabatini et al. 2009).

It could be mentioned that Kafantaris, Amoutzias & Mossialos, (2021) consider honey as the most known bee product, however, bee pollen and bee bread are becoming more popular functional foods due to their high concentrations of bioactive compounds. In regard to Bogdanov et al. (2008) and Ahmed & Othman (2013), honey is made from nectar and dews of different plants. Honey contains 95% of sugars and the other 5% includes numerous proteins, enzymes, polyphenols, vitamins, minerals, peptides, organic acids and proteins. Studies done by Osato et al. (2001) Al-Habsi & Niranjana (2012), Halstead et al. (2016) explored that honey has valuable and efficient antimicrobial activity. According to Abeshu & Geleta (2016) honey is mostly known as a natural sweetener. According to Christy & Anna (2011), honey is usually consumed as an energy food due to absorbed sugars. Furthermore, consumers are showing a rising demand for flavored honey which is made by adding ingredients such as propolis, spices, dried fruits or herbs (Šedík, Pocol & Ivanišová, 2020).

According to Yeung & Argüelles (2019) royal jelly and propolis are considered to be the most relevant bee products. Royal jelly provides a broad spectrum of health-promoting and pharmacological effects. Also, royal jelly has antioxidant, neurotrophic, and hypotensive, anti-inflammatory, antibiotic and immunomodulatory properties. Moreover, it is mostly used in the cosmetics industry for its alleged tonic and bio-stimulating effects (Pavel et al., 2011). Feás et al. (2012); Paulino et al., (2015); Kaplan et al. (2016) highlighted some important benefits of following bee products affecting human health:

- Bee bread – contains polyunsaturated fatty acids. It is mostly used for improving the nervous and immune system and has a positive impact on blood circulation.
- Bee pollen – contains B vitamins, unsaturated fatty acids and minerals. Moreover, bee pollen fights off harmful bacteria. In addition to Denisov & Denisov-Pietrzyk (2016), bee pollen has higher antimutagenic activities against certain cancer cells.
- Propolis – is efficient against bacteria, and has an antibacterial effect. It is recommended for treating wounds, ulcers and colds, for diseases influencing the joints. Furthermore, a study by Castaldo & Capasso (2002) demonstrated that propolis decreased the level of cholesterol and also blood pressure.

To sum up, conclusions of a study done by Camacho-Bernal et al. (2021) discovered that bee products can be added to various food such as dairy, meat products, alcoholic and non-alcoholic drinks, and coating fruits. Overall added bee products can enhance the quality of the food beneficial for the consumer. For instance, adding honey to dairy products increased sensory characteristics like texture and taste and also increased antioxidant activities. Regarding royal jelly, its use in dairy products

enhanced the physical and chemical properties while being stored. Pollen added in cookies caused the significant rise of several micronutrients, also, fiber, protein, phenolic compounds, and antioxidant activity.

2 Material and Methods:

The main aim of this paper is to map the consumption patterns of bee products among Slovak consumers and their preferences. The paper is based on primary data obtained by conducting an online questionnaire survey using snowball method. The survey was executed in 2021. The consumption of bee products was an inclusive criterion for filling the questionnaire. Research sample comprised 526 respondents. Socio-demographic profile is presented in Table 1.

Table 1: Socio-demographic profile

Gender	
male	36.7%
female	63.3%
Age	
18 - 24 years	47.7%
25 - 50 years	38.8%
51 - 85 years	13.5%
Economic activity	
pensioner	5.9%
student	43.7%
employed	46.6%
other	3.8%
Monthly income in netto	
more than 1000 €	18.1%
801 - 1000 €	16.3%
601 - 800 €	14.3%
401 - 600 €	9.7%
up to 400 €	41.6%
Place of residence	
urban	42.8%
rural	57.2%

Source: own processing, 2022

Data were analysed using Xlstat software. and non-parametric statistics were applied (Friedman test, Chi-square test of independence and Nemenyi's procedure). Friedman test is commonly applied as an alternative to one-way ANOVA with repeated measures represented by ordinal scales (Norušis, 2004). The similar approach was used for studying difference in the preferences by Kusá at al. (2021). A multiple pairwise comparisons were applied by using Nemenyi test in order to study significance levels among respondent's preference evaluation of selected types of honey with additions. Furthermore, several research questions were formulated:

RQ1: There exists dependency between the type of bee product and the consumption frequency.

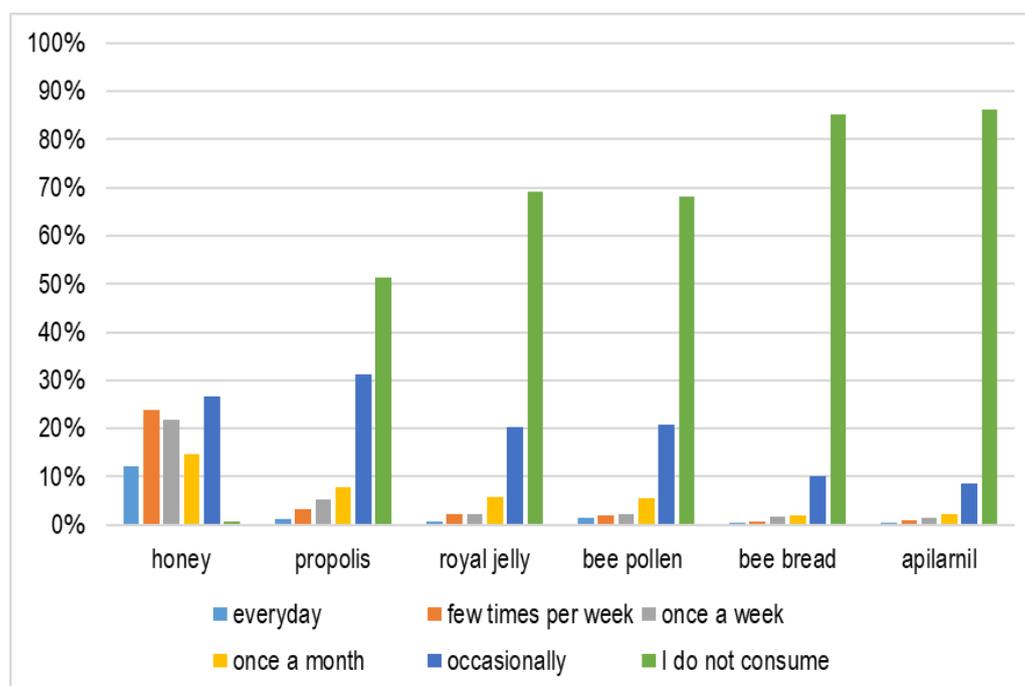
RQ2: There exists dependency between honey consumption and respondent's age.

RQ3: There exists statistically significant differences in consumer preferences for honeys with additions.

3 Paper results

The research shown that bee products are consumed by Slovak consumers in low frequency (occasionally- 36.8%, once per month- 14.8% or once per week-18.2%). Honey was indicated as the most frequently consumed bee product by respondents followed by propolis, bee pollen and royal jelly. Moreover, Friedman test confirmed statistically significant differences in consumption frequency among selected bee products (p -value=0.001). It can be stated that majority of respondents consume honey and do not consume other bee products (Figure 1). More than 80% of Slovak consumers indicated that they do not consume apilarnil and bee bread. Approximately 30% stated occasional consumption in case of propolis. In case of honey, it can be stated that the majority of respondents consumed on regular bases (few times per week- 24% or once a week-21.7%). In addition, honey consumption among various age segments differs, which was confirmed statistically by applying Chi-square test of independence (p -value=0.017). The oldest segment (51-85 years) has the highest daily frequency of consumption and the lowest percentage rate in terms of occasional consumption. The main reasons of honey consumption were healing properties and nutritional composition. Consumers from Slovakia most often consume honey directly from the jar or as a sweetener in tea, coffee, or other beverages.

Figure 1: Consumption frequency of bee products in Slovakia



Source: own processing, 2022

Furthermore, research was aimed at consumer preferences for another bee product represented by the category called flavoured honeys or in other words honey with additions. Respondents indicated their preference for 13 flavours. Friedman test confirmed statistically significant differences among them (p -value=0.001). Nemenyi's procedure showed (Table 2) that the most attractive ones were honey with ginger and honey with strawberry followed by honey with raspberry and cinnamon. The least attractive were honey with poppy and turmeric. Very interesting is the fact that although the respondents indicated the low frequency of consumption for propolis, royal jelly and bee pollen, these products as additions to honey was evaluated positively.

Table 2: Multiple pairwise comparisons using Nemenyi's procedure

Sample	Mean of ranks	Groups						
Poppy	4.907	A						
Turmeric	4.924	A						
Coconut	5.954		B					
Cocoa	6.089		B					
Passion fruit	6.692		B	C				
Royal jelly	6.929			C	D			
Bee pollen	7.466			C	D	E		
Propolis	7.494			C	D	E	F	
Sea buckthorn	7.592				D	E	F	G
Cinnamon	8.036					E	F	G
Raspberry	8.260					E	F	G
Strawberry	8.278						F	G
Ginger	8.379							G

4 Discussion

The results of our consumer study showed that honey is the most consumed of the bee products that are included in the group of functional products. According to Statistical Office of the Slovak Republic (2022) the average inhabitant in Slovakia consumed in 2020 approximately 1.2 kg of honey. Other bee products, such as pollen, propolis, royal jelly, bee bread, apilarnil and other bee products are not so attractive for consumption to Slovak consumers. Flavoured bee honey, which is enriched with other health-promoting substances, may be the most promising of all functional bee products. Slovak consumers would mainly consume ginger honey, strawberry honey, raspberry honey, and cinnamon honey as a new innovative functional bee product.

Previous studies about honey and other functional bee products have been also carried out. It is therefore possible to compare the results of our study with the results of previous consumer studies focused on the consumption of bee products. Kopala et al. (2019) points to the fact that approximately 0.8% of consumers are allergic to bee products. Several studies confirm that honey is the most preferred and consumed bee product (Niyaz & Demirbaş, 2017; Oliveira Neto et al., 2020; Aytöp et al., 2019). Moreover, Oliveira Neto et al. (2020) found that 88% of respondents consume only honey, among various bee products. Aytöp et al. (2019) emphasized that 84.4% of the consumers consume honey. In addition to honey, bees also produce several products, including bee pollen, propolis, bee bread, royal jelly, and beeswax which are excellent sources of bioactive compounds, macronutrients and micronutrients and have antimicrobial, antioxidant, and anti-inflammatory properties. For these reasons, it is possible to classify bee products as functional food products (Giampieri, 2022). A survey carried out by Khaoula et al (2019) in Morocco showed that the most well-known product was royal jelly and, on the contrary, propolis remains unknown to most consumers. The consumption of bee products, such as pollen, royal jelly or propolis, is relatively low. The average annual consumption of pollen is 34.74 grams, royal jelly is 12.37 grams and propolis is 12.96 grams (Aytöp et al., 2019). In another study Niyaz and Demirbaş (2017) found that the respondents consume 14.87 grams of pollen, 3.52 grams of propolis, 0.98 grams of royal jelly per month. Oliveira Neto (2020) pointed out that after honey, propolis and royal jelly are the most consumed.

Even though honey is the most consumed bee product, its annual consumption is still very low. Arowosoge (2018) stated that more than 50% of consumers consumed honey occasionally. This is followed by 36.0% of respondents who consume honey daily, 6.1% of respondents who consume honey

weekly and 4.4% of consumers who consume honey monthly. Khaoula et al. (2019) found that most Moroccan consumers consume honey irregularly and only occasionally. Pocol (2011) confirms the relatively low consumption of honey also among consumers in Romania. 11% of Romanian consumers do not consume honey at all, 35% of consumers consume honey at the level of up to 750 grams per year, 27% of consumers at the level of 750 grams to 2000 g and only 20% of consumers consume more than 2 kg of honey per year. On the other hand, Klickovic et al. (2019) state that honey consumption is very common in Croatia. Almost 50% of Croatian consumers consume honey several times a week and 16% of consumers declare daily consumption of honey, which can be attributed to consumer habit. 25% of Croatian consumers consume honey several times a month, and approximately 12% of consumers stated that they eat honey very rarely, only a few times a year. In this context, Pires et al. (2017) found that a higher frequency of honey consumption was recorded in cold dry weather during the rainy season. Oravec & Kovacz (2019) emphasize that a certain segment of honey consumers consumes honey only seasonally or during illness. Furthermore, consumer studies confirm that the quantity and frequency of honey use increases with age (Kopala et al., 2019). The annual consumption of young generation is lower in comparison to older generations (Guizy et al., 2017; Khaoula, 2019; Kopala, 2019). Šedík et al. (2021) found that the highest consumption of honey is among consumers older than 50 years. Kowalczyk et al. (2017) states that honey consumption is more significant for consumers from older age groups, namely aged 45–59 years, aged 60–74 years, aged 75 years and older. Pocol & Moldovan-Teslios (2012) confirm that the young generation of consumers under 30 years of age prefers less consumption of honey and consumption of honey in smaller quantities.

The key and decisive reason for consuming honey as a functional food is its nutritional value and positive health effects, which has been confirmed by several consumer studies conducted in different countries (Kowalczyk, 2017; Khaoula, 2019; Bardy, 2008; Przybyłowski et al., 2011; Wilczyńska, 2011; Pocol & Bolboacă, 2013). Purnomo (2021) identified the main motives for honey consumption, which are consumption of honey as medicine, motivation for lifestyle, satisfaction of nutritional needs, or motivation for consumption of honey as prevention and treatment of diseases. Žak (2017) and Selmi et al. (2020) found that consumers consume honey more for medicinal purposes and for health reasons.

According to the study of Oliveira Neto (2020) honey consumers preferred to consume it pure or used honey as a sweetener. Kowalczyk (2017) emphasized that the consumption of honey among Polish consumers is most widespread in the form of spreads and as a sweetener due to a healthier substitute for sugar. He also discovered the use of honey as an addition to cakes, desserts, cereals, or direct consumption from a spoon. In his study, he also identified the use of honey in cosmetics and medicine. Batt and Liu (2012) in study in Australia found using the honey as a sweetener for breakfast cereals and oatmeal.

Due to the growing demand and changing consumer requirements for healthy and functional foods, it is essential to promote bee products and motivate consumers to consume them. Increasing consumer awareness and the popularization of bee products can be achieved through the media, the Internet, sales in pharmacies, or doctors' advice, as was the case with the promotion of royal jelly in Morocco (Khaoula et al., 2019). For the younger age group of consumers, especially children, honey enriched with health-promoting substances can be relevant. Currently, honeys with the addition of nuts, dried fruits, various spices, such as cinnamon, ginger, chili, cocoa powder, or honeys enriched with other bee products are already available on the food market. These innovative products are characterized by higher antioxidant properties and nutritional values compared to traditional honey (Šedík et al., 2019). Flavoured honey is also a suitable choice for consumers who are looking for an easy-to-spread product with an original taste and nutritional and functional benefits (Mateescu et al., 2020).

Conclusion

The results showed that honey is the most frequently consumed bee products due to its nutritional and healing properties. Generally, it is consumed directly from the jar or in beverages as a sweetener.

The other bee products are consumed only occasionally or not at all. Above mentioned results confirmed our first research question which stated that the different bee products will have different consumption frequency among respondents. Furthermore, the highest consumption of honey was indicated only by the oldest segment (51-85 years), which conformed the second research question indicated different level of honey consumption among various age segments (p -value=0.017). Nevertheless, the other bee products are attractive for Slovak consumer as an addition in honey. The last research question assumed differences in preferences for selected types of honey with additions. Results of Friedman test supported by Nemenyi's procedure have confirmed it (p -value=0.001). The most attractive additions were ginger followed by strawberry, raspberry, cinnamon and other bee products. The least important were turmeric and poppy. The results provide interesting insight for beekeepers in terms of extending their product portfolio and increasing the sale of bee products on the Slovak market.

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