

EVALUATION OF CONSUMER AWARENESS OF HEMP AND ITS APPLICATIONS IN DIFFERENT INDUSTRIES

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Abstract: The purpose of the study was to evaluate consumer awareness of the medicinal properties of hemp and its applications in various industries. Before commencing the survey, the following research hypothesis was made: the survey respondents would lack basic knowledge about hemp. The study group of survey respondents consisted of 50 randomly selected people from the Pomeranian Voivodeship, Poland. The research tool was an original survey questionnaire containing 11 questions and a section for sociodemographic data. The survey study was conducted from October to December 2018. As a result of the study, the research hypothesis was positively verified. It was found that most members of the study group were unfamiliar with the term hemp, but still associated it positively. This was related to the erroneous attribution of its properties to *Cannabis indica*. More than half of the study group were unable to state whether the plant in question was used in medicine. The level of knowledge among the study group concerning the applications of hemp in various industries was low.

Keywords: hemp, consumer awareness, medicinal properties, application.

1. INTRODUCTION

Today, hemp is once more gaining recognition as a medicinal product, foodstuff, source of fibre for bag and sack production, as well as a raw material for other textiles. For a long time, this well-known source of cannabis was not cultivated. As a result of the global ban on cannabis use and the several decade-long prohibition of hemp cultivation, highly valuable products have been lost. Hemp seeds and oil, valuable for the human body, have been removed from the diet. Before the outbreak of World War II, hemp oil was the most common and most frequently consumed plant oil. In 1996, the European Union began to support the return of hemp to its markets [Simonsohn 2016].

Cannabis sativa are plants of the Cannabaceae family, and have a beneficial impact on the human organism. They are also referred to as hemp or industrial hemp [Korszikow 1991]. Although this plant is currently increasing in popularity, it is often confused with *Cannabis indica*, which has a psychoactive effect.

Today, hemp seeds are considered a staple food product in China. The roasted form of hemp seeds is also popular in Turkey. In Germany, "hemp soup" is gaining popularity, the Baltic States and Russia consume hemp butter, while in Iran hemp is known as the "king of seeds". Fibrous hemp has a number of advantages, applicable in numerous industries. It is used in the food, pharmaceutical, cosmetics, textile, cellulose and paper, construction material, and grain industries [Simonsohn 2016].

The seeds, whose dominant component is fat, also form a valuable part of the plants. The fat content in hemp seeds can exceed 35%. This material is also rich in protein (approx. 25%) and carbohydrates (approx. 28%) [Callaway 2004]. Hemp fat is characterised by a very beneficial composition of fatty acids. Linoleic acid is the most abundant, followed by α - and γ -linolenic acids. The n-6/n-3 acid ratio is approx. 3:1 and is beneficial from the standpoint of nutrition [Da Porto, Decorti and Tubaro 2012; Teh and Birch 2013]. Carotenoids, tocopherols, polyphenols and sterols have been found in hemp oil [Leizer et al. 2000; Aladić et al. 2015]. The high share of fat with a beneficial composition of fatty acids makes these seeds a valuable ingredient in the human diet and for animal feeds [Silversides and Lefrancois 2005]. The seeds contain valuable proteins, which exhibit an antioxidant effect due to their amino acid composition [Girgih, Udenigwe and Aluko 2013]. The protein composition of these seeds make them an excellent natural source of amino acids [Wang et al. 2008].

1.1. Application of hemp in different industries

In North America and Europe, many foodstuffs are based on cannabis seeds. These include hemp flour, whole grain bread, milk, burgers, pasta, pancakes, cookies, hummus, ice cream, paste and plant protein [Wilkerson 2009].

Products made of the seeds, stems, leaves and flours of hemp can be found in the food industry. Industrial hemp seeds are a source of readily assimilated protein, which makes them a good alternative to meat or chemically prepared protein supplements. Hemp leaves and flowers contain the valuable cannabidiol compound - CBD, which has pro-health properties [Wilkerson 2009].

Unshelled, shelled, and roasted hemp seeds are enriched in fatty acids and contain Omega-3 and 6 fats. They provide a highly nutritional food source and contain GLA (gamma-linolenic acid), formed by the breaking down of fats. Hemp seeds have a 35% protein content, including vital amino acids. The seeds are also rich in mineral components: potassium, magnesium and calcium. They can be

consumed directly, as well as cooked or fried. The product has a pleasant walnut flavour [www.dobrekonopie.pl].

Pastries may contain hemp, e.g. crunchy hemp cookies with added hemp seeds. Hemp flowers serve as a basis for hemp tea [www.konopie-zdrowie.pl] and polyfloral honey with Polish hemp flower extract [www.dobrekonopie.pl].

The balanced and high content of vital omega-3 and 6 amino acids in hemp seed oil makes it an excellent ingredient for body care products. The products available include: lip balms, moisturisers, conditioners, shaving products, massage oils, shampoos and soaps [www.cosmeticsbusiness.com].

The presence of gamma-linolenic acid in hemp seeds accelerates the product effects and improves their effectiveness. The cosmetics can be applied to very dry, atopic, psoriatic, highly sensitive, mature and acned skin [www.helfy.pl].

Hemp fibre are used to produce strong and durable products, such as ropes, sail canvas, cords, bags and tarpaulin thread [DL 2017]. The exceptional resistance of hemp fibre to the processes of decay makes it suitable for objects exposed to biological decomposition under raised humidity levels, including surgical thread, firefighting hoses, shoemaker's thread and nets [www.pilik.pl]. The modern textile industry has also produced garments that incorporate hemp fibre. Mixtures of hemp fibre with other natural fibres (wool, linen, cotton or silk) are used to manufacture underwear, jeans clothing, blouses, skirts, jackets, sweaters, and non-woven fabrics [Tyszkiewicz-Borawska 2018].

Hemp stems and flowers, as well as the hair on seeds and fruits, are used to produce agricultural, technical and household textiles. Hemp products that have a compact structure protect against UV radiation. The fibres are characterised by pro-health and anti-allergic properties, as they contain antioxidants [Kaniewski et al. 2017].

Hemp fibre is used to produce diapers. These products place no burden on the environment and absorb moisture better than cotton diapers [Simonsohn 2016].

The Institute of Natural Fibres, based in Poznań, has designed a range of cotton and hemp clothing under the name "Gangin" [www.ukcia.org]. In Hungary, hemp fibre shower curtains have been made, which unlike plastic ones do not release harmful substances at high temperatures [Simonsohn 2016].

The hemp cultivated on one hectare of land provides as much cellulose as one hectare of cut trees. Additionally, paper made of hemp is more durable than that from wood. It has been demonstrated that this hemp product was used many years ago, including for the printed Gutenberg Bible and the handwritten American Declaration of Independence, while approximately a thousand years ago paper was produced from hemp in China [Simonsohn 2016].

Hemp is a plant with pro-health properties. The positive impact on human health stems from the ability to grow the plant without the use of additional fertilisers or other systems of chemical protection against weeds. Studies demonstrate that extracts, essential oil and oil produced from hemp have numerous

medicinal properties. These include painkilling, antidepressant, anti-inflammatory, anti-seizure, calming, anti-diabetic, anti-vomiting, anti-coughing, anti-atherosclerotic, anti-neoplastic, anti-diarrhoeal, and appetite stimulating properties, as well as the prevention of cataracts. Studies conducted by Senderi et al. indicate that *Cannabis sativa L.* extracts, and particularly the cannabinol they contain, could be used to treat Alzheimer's and have an anti-oxidant effect. It has been demonstrated that essential hemp oil has more than thirty ingredients. Essential hemp oil has an anti-microbial effect. It affects a number of Gram-negative and positive aerobic, anaerobic and microaerophilic bacteria. The oil also has an anti-fungal effect, which includes mould, yeast-like and dermatophyte fungi. Compounds with antiprotozoal, antiviral, anti-insect, and antiparasitic effects are also present in *Cannabis sativa* [Senderi, Steardo and Esposito 2014]. Hemp produces a special class of compound: cannabinoids. These include cannabidiol, which has numerous applications in medicine. It is not a psychoactive a compound, unlike THC. Currently, hemp is used for such medical indications as multiple sclerosis, chronic neuropathic pain, neoplastic diseases, Tourette syndrome and nervous tic disorder [Kaniewski et al. 2017].

The Institute of Natural Fibres and Medicinal Plants in Poznań is also involved in the study of *Cannabis sativa L.* Scientific teams and people working in the Institute's laboratories have grown the "Białobrzeskie" hemp strain, well-known in many countries around the world, and most commonly cultivated in European Union countries. The plant is highly valued due to the high straw yield and low THC content. The cannabidiol and cannabidiolic acid present in Białobrzeskie hemp are the main ingredients in the first dietary supplement, Hemp Element™ CBD + CBDa 3%. The Seed Testing and Processing Department of the Institute is introducing hemp products in pharmacies, e.g. "BOFLAX" cold-pressed oil and ground linseed and "Kanabia" cream based on hemp oil [www.politykanarkotykowa.pl].

Studies indicate that in the near future, hemp may become an inexpensive source of materials for producing effective painkillers. This will be possible when the psychoactive substance is removed completely from the plant. Currently, the amount of information and knowledge available on this subject is limited. Studies are being conducted on the effective action of cannabinoids, as well as their effects when combined with other biologically-active compounds present in *Cannabis sativa L.* [Chmielewska 2018].

The purpose of the study was to evaluate consumer awareness of the medicinal properties of hemp and its applications in various industries.

The following research hypothesis was prepared for the study: the survey takers would lack basic knowledge about hemp.

2. TEST MATERIAL AND METHODOLOGY

The research tool was an original survey questionnaire containing 11 questions. The survey had 8 closed questions, 2 of which were multiple choice. The form had 3 open questions, which were related to the previous answers given by the survey takers. People whose opinions were affirmative were requested to answer the open question. A personal information section for sociodemographic data was attached to the survey. The survey study was conducted from October to December 2018. The survey was fully anonymous, and everyone participating in the survey were familiarised with the principles of completing the form.

The survey take group consisted of 50 randomly selected people from the Pomorskie Voivodeship. A total of 31 women (62%) and 19 men (38%) participated in the study. The majority of the survey group were people living in cities (68%), while those living in rural areas formed 32%. The age distribution revealed that the majority (48%) were aged up to 26, while those aged 26 to 40 constituted 22% of the group, and those above the age of 40 constituted 30%. In terms of education, those with middle education formed the largest part of the study group, constituting 58% of all survey takers, while those with higher education accounted for 20%, vocational education 14%, and basic education 8%.

3. STUDY RESULTS AND DISCUSSION

The first question in the survey tested the understanding of the term 'hemp'.

To the question of what associations the study group had with the term 'hemp', 86% (52% women, 34% men) replied that they had positive associations. Only 7 people gave a negative answer, with the majority being women aged up to 26 and between 26 and 40. The study revealed that the respondent's breakdown by education had an impact on their answers, albeit a minor one. 100% of people with higher and vocational education responded positively to the question.

42% of the study group aged up to 26 had positive associations with hemp. The same answer was given by 16% of the group aged 26 to 40. For those aged above 40, 14 out of the 15 respondents, which constituted 28% of the study group, had positive associations with hemp.

It was found that most people participating in the study had positive associations with hemp. As a result of the study, it was found that the sex, education and age of the study group members were not of great importance, as more than 85% of the respondents replied positively to the question.

The second question was intended to verify the knowledge of the positive effects of hemp on the human body. To examine the study group reliability, a question similar to question 5 was asked, concerning the fat contained in hemp and its health properties.

For question 2, of the 62% of the study group who were women, 38% responded 'yes', while for question 5, 42% also responded 'yes'. A similar result was observed for the men. For question 2, of the 38% of the study group who were men, 26% responded 'yes', while for question 5, a similar result of 28% was observed. The entire study group reliably completed the survey questionnaire.

According to the results of a survey conducted through a website, very few Poles know that this plant is an excellent addition to the daily diet. Only 9% of the respondents associated *Cannabis sativa* with cuisine and diet [www.dobrekonopie.pl].

The next question was intended to verify how many people confused hemp with marijuana. Question 3 (Do you identify hemp with marijuana?) had three possible answers: 'yes', 'no' and 'don't know'.

Only 40% of the study group gave the correct answer. As many as 28% of the women in the study group chose the answer 'don't know', while among the men, only 10% chose this answer. This result may indicate an insufficient knowledge about this plant.

Breaking down the study group by education, major discrepancies in the answers given were noted. The greatest differences were observed in people with middle education. 16% of the respondents chose 'yes' as the answer, 22% chose 'no', and 20% chose 'don't know'. This result indicates that the group constituting a majority of the study group, i.e. 58%, with middle education, lacked basic knowledge concerning hemp.

It can be concluded that age had little effect on the answers given. The members of the study group above the age of 40 mostly chose an incorrect answer. Only one person belonging to this group did not associate hemp with marijuana. The members of the study group aged 26 to 40 answered the question correctly in only 6% of cases. The best result was achieved by those aged up to 26, forming 48% of the study group, with 26% answering correctly.

To summarise, the study group members lacked essential knowledge about hemp. The high indecision observed in the group may stem from insufficient knowledge and limited flow of information about the plant. As many as 20% of the group identified the plant with the drug marijuana. It is recommendable that information on hemp and its positive impact on the human body are disseminated in the media and health clinics.

A different result was obtained in the study conducted by the dobrekonopie.pl website, which indicated that the awareness of hemp (*Cannabis sativa L.*) among Poles is growing. Only 13% of the 300 respondents associated it with intoxicating effects. This indicates that increasing numbers of Poles recognise the difference between the industrial strain of cannabis and marijuana [dobrekonopie.pl].

In question 4, the study group selected products that can be made of hemp. They were allowed to select more than one product.

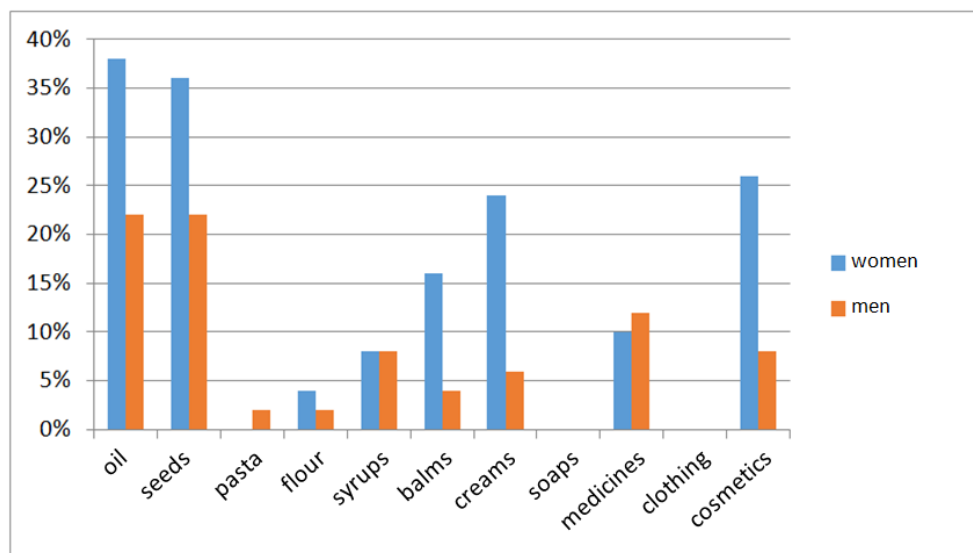


Fig. 1. Products made of hemp, by sex of respondent

Source: original study.

The most common products selected by the study group, ranked 1 and 2, were oil and seeds (Fig. 1). The distribution by sex was as follows: among women, 35% selected oil, while 36% selected seeds. Among men, both products were selected by 22%. Ranks 3 and 4 show some differences between the members of the study group. 26% of women picked cosmetic products, while 24% selected creams. Men ranked medicines in third place, while cosmetics and syrups were ranked fourth ex aequo, with a result of 8%. Products such as soaps and clothing were not selected by the respondents.

Age affected the replies. Seeds were selected mostly by people aged up to 26 (32%) and 26 to 40 (16%). Those aged above 40 mostly picked oil (20%). Flour was selected the same number of times in all age groups.

The only group to select such products as soap and pasta were those with basic education. Furthermore, people with basic and vocational education also selected medicines the most frequently. Flour also stood out, as it was only selected by those with vocational and middle education.

No one selected all the examples provided in the questionnaire. This result may reflect the low availability and limited selection of hemp in retail stores in Poland, as well as a lack of knowledge about the varied hemp applications in different industries. Consumers wishing to purchase most of the products listed have to order them online.

For the survey question: "Do you know in which countries hemp is grown?", only 7 respondents gave the affirmative answer.

Out of the 62% of the study group who were women, only 6% indicated they knew in which countries hemp is grown. Out of the 38% of the study group who were men, only 8% indicated they knew. It can be concluded that one in five men believed they knew in what countries hemp is grown. Furthermore, it was noted that 1 in 10 women knew where the plant is cultivated.

Survey points seven and eight examined the latter subject in more detail. Those that chose 'yes' as the answer were asked two more open questions. In the first, they were required to indicate a country where hemp is grown. Of the 7 respondents that responded 'yes', only 3 gave correct answers. The countries indicated included India and Poland. The next point of the questionnaire concerned hemp cultivation methods. To the question: "How is hemp cultivated?" only 1 person selected the correct answer.

Question 9 was presented in the form of a table, where the vitamins and mineral components contained in hemp were listed. The members of the study group were allowed to select more than one answer. All of the compounds listed are present in the plant, but the answers were mostly focused on the B-vitamins (B₁₂, B₆ and B₃) and the C vitamin. Mineral compounds were mostly not considered, and only iron, potassium and phosphorus were marked as singular answers. This result may indicate society's lack of knowledge or interest in such important mineral compounds, essential for the correct building and functioning of the human organism.

Question 10 required the study group to answer whether hemp is used to treat diseases. Among the answers 'yes', 'no' and 'don't know', 56% of the replies were 'don't know'. The option 'no' was not selected by any respondents.

In the case of men, the option 'don't know' was selected 20% of the time, while the option 'yes' was selected in 18% of cases. The majority of the women, 36%, stated they did not know if hemp was used to treat diseases. 26% of the women answered affirmatively that hemp is used in medicine.

In the survey conducted by the dobrekonopie.pl website, the authors observed interesting relations, visible after analysing the answers given by two age groups: 21–30 and 31–40 years. Ewa Gryt found that while the younger people rarely associated hemp with food, and more with the drug, the older group focused on diet rather than on intoxication. This age group was also characterised by the highest awareness that this plant is edible.

A significant majority, 67%, associated hemp with health and treatments [dobrekonopie.pl].

To the majority of society, the term 'hemp' is unfamiliar. More than half of the people were unable to state whether the plant in question is used in medicine. The level of knowledge among the study participants concerning the applications of hemp is low. The results of the study presented in this report reveal how scarce knowledge about this plant is among society.

The survey results published on the www.dobrekuchnie.pl website demonstrated that consumer awareness concerning hemp is rising.

4. CONCLUSIONS

1. Following the survey, the research hypothesis was verified positively. The survey demonstrated that society lacks essential knowledge about hemp.
2. Society has positive associations with hemp, although this is caused by the erroneous attribution of its properties to marijuana.

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