Pharmaceutical Care in The Prevention of Childhood Immunity – The Experience of the Pharmacist in Bulgaria

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Abstract

The immune system is a collection of many biological structures and processes in the body that protect it from disease. In newborns, infants and young children, the immune system is still immature, leading to frequent illnesses. Practice shows that very often parents seek the advice of pharmacists for prevention or in the initial stages of the disease. This in turn requires pharmaceutical care A representative, anonymous and voluntary online survey was conducted in the period April 2019 – September 2019. It included 158 people, assistant and master pharmacists. 96% of the attendees agreed that pharmaceutical care gives them professional satisfaction. When it comes to children 93% of the respondents said that pharmaceutical care is their top priority. At the same time 70% of the participants pointed out the lack of sufficient time as the main problem for giving pharmaceutical care.

The study concluded that it would be advisable to develop a model for the application of a comprehensive immunostimulatory program in pre-school and primary school children for prevention.

Keywords: Childhood immunity, Pharmaceutical Care, Bulgaria.

Introduction

The aim of the present study is to follow the opinion of pharmacists in Bulgaria on the topic of immunostimulation in the pediatric population. We also want to assess the level of awareness of pharmacists on the subject and their attitude to the provision of pharmaceutical care to strengthen children's immunity.

The immune system is a collection of many biological structures and processes in the body that protect it from disease. In order to function properly, the immune system must recognize a wide range of agents, called pathogens - from viruses to helminths, and differentiate them from the body's

own healthy tissue. (Ferenčík, et al. 2006) (Foster 1970) (Silverstein 1989) The immune system consists of a complex network of innate and adaptive components, equipped with an exceptional ability to adapt and respond to many diverse challenges. Collectively, this cellular network acts as a huge regulator of the host's homeostasis, allowing it to maintain and restore tissue function in the context of microbial and environmental encounters. (Belkaid & Hand, 2014) The immune system is an integral part of the body's basic physiological processes, such as the development, reproduction, and healing of wounds. The closed circle of interaction between the immune system and other body systems such as metabolism, the central nervous system and the cardiovascular system is also apparent. (Sattler, 2017) The immune system is divided into two types - innate and acquired. The innate immune system provides an early first line of defense against invading pathogens. Participating cells are neutrophils, monocytes, macrophages and dendritic cells that all interact with the adaptive immune system. The acquired immune system develops after a "meeting" of the organism with various pathogens. The acquired immune system recognizes specific microbial antigens through its highly mutated cell surface receptors and, depending on the type of bacteria it encounters, naive T cells can differentiate into either effector T cells to fight the bacteria, or in regulatory T (Treg) cells. Although it takes time for the acquired immune system to differentiate and proliferate to respond to microbial antigens after the first encounter, some of the cells survive long-term and provide a strong and timely response upon recurrence. (Zhao & Elson, 2018) In newborns, infants and young children, the immune system is still immature. This leads to frequent illnesses, which can be chronic, affecting the physical development and emotional state of adolescents. (Haneen, 2018) The immune system matures gradually from 1 to 7 years of age. In cases where the immune system is not functioning properly, different disease states develop. Children attending a day nursery or kindergarten get sick average 8 times in the first year, 5-6 times in the second year and 3-4 times in the third. Often diseases are chronic, affecting the physical development and emotional state of adolescents. (Ugrinova, 2016).

Creating the right hardening regime, nutrition, wakefulness and motor activity combined with regular physical prophylactic procedures are a prerequisite for the development of healthy and harmoniously developed children. (Kasnakova, Tornyova, Mihaylova, & Stankova, 2019)

Some of the most common mild illnesses observed in children include: Pain and fever, colds and coughs, diarrhea and vomiting.

The incidence of pain is common in newborns, infants and children, with approximately 33-82% of hospitalized pediatric patients experiencing moderate to severe pain, especially after surgical or other painful procedures.

(O'Donnell & Rosen, 2014) (Twycross, MacLaren Chorney, McGrath, Finley, & al, 2013)

High fever is one of the most common medical problems experienced by children and is often caused by relatively harmless, self-limiting viral diseases that parents cope with. (Impicciatore, Pandolfini, Casella, & Bonati, 1997) (Casteels-van Daele, 1991)

Chronic cough is a common childhood problem. Viral infections are the most common cause, but other less common disorders should be ruled out when the cough seems unusually severe and / or frequent. Chronic cough - defined as a daily cough for more than 3-4 weeks - is one of the most common symptoms in childhood. While most children with cough do not have a serious illness, coughing can be troublesome and difficult to treat. (Jongste, 2003) Coughing in children can be troublesome and can have a big impact on a child's sleep, school performance, and ability to play. Similarly, it may disrupt the sleep of other family members and interfere with teachers in the normal course of study. (Shields, Bush, Everard, Mckenzie, & Primhak, 2007)

Babies and children suffer from nausea and vomiting. Doctors usually encounter various difficulties in dealing with these problems because of their similarities. (Abu Naser & ELhaleem El-Najjar, 2016) Acute diarrhea accounts for 1.8 million deaths annually in children under the age of 5, or approximately 17% of all pediatric deaths worldwide. Even in developed countries like the US, diarrhea remains a major cause of childhood morbidity, leading to over 1.5 million outpatient visits, 200,000 hospital admissions and 300 deaths each year. (Levine, et al., 2010)

Main Text

Practice shows that very often parents seek the advice of pharmacists for prevention or in the initial stages of the disease. In recent years, more and more parents have been considering the use of herbal medicines for their children for health prophylaxis and for the treatment of latter illnesses. The increased use of herbal medicines and medicinal herbs corresponds to their wide availability in pharmacies, drugstores and other sources. (Petkova, Hadzhieva, & Nedialkov, 2019) This in turn requires pharmaceutical care. In the context of pharmaceutical care, patients are accepted for children in the range of newborns up to 18 years of age. Particular attention should be given to the 0-12 year group, where dosing of medicinal products is specific and often the most critical time providing pharmaceutical care. Children can be classified into the following groups: Newborns - from birth to first month; Babies - children from 1 month to 2 years old; Young children - children aged 2 to 6 years; Children - ages 6 to 12; Adolescents - over 12 years. The pediatric group we are considering is in a period of rapid development,

during which a number of physiological changes occur in the body. The intake of medicines, food supplements and other agents in newborns should be consistent with this fact, as well as the different rate of emptying of the gastrointestinal tract, the degree of drug absorption, renal and hepatic clearance. (Lu and Rosenbaum 2014) This is the cohort that should be handled with care and observation when taking medicines for prophylaxis or treatment. On the part of parents, doctor, pharmacist or other medical professionals. (Georgiev, et al. 2019) Adherence of children to a given therapy or prophylaxis depends on the dosage form, its taste, appearance, type of administration. Of great importance is the experience of parents in understanding the benefit / risk of medicinal products. (Liu, et al. 2014) In pediatrics, medicines are also often used outside the indications described in the summary of product characteristics - the so-called "Off-label" use.

The dosage forms used in pediatrics should be tailored to the needs of children in terms of age, weight, physiological condition and treatment requirements. The right dosage form is key to achieving the right dose and proper dosing, reducing the risk of medication errors, increasing adherence to therapy and leading to good therapeutic results. (Batchelor and Marriott 2013)

Features of dosing of medicinal products in children

The majority of pediatric doses are calculated on the basis of body weight by multiplying the child's weight by the recommended dose (in grams, milligrams, milliliters, etc.) of the respective medicinal product. However, in children whose weight is significantly different from normal body weight - for example, at obesity, the dose is calculated on the basis of ideal weight. Errors when dosing medicines in children are common and usually occur at the time of prescribing or at the time of administration. Due to the need to recalculate the dose, to dissolve it and to prepare the finished dosage form, a significant part of the preventable errors are those associated with ten or ten times the dose deviation. Dosing error can also occur in a home environment. (Yin, et al. 2010) Studies in the United States show that many parents make mistakes when they need to measure or calculate a dose of paracetamol for their children. (Li, Lacher and Crain 2000) Another problem is that household spoons are often used to measure the amount of medicine needed instead of the measuring spoon / cup / syringe, which results in incorrect doses.

Pharmaceutical care in some of the most common childhood disorders

The role of the pharmacist in pharmaceutical care in children with high fever or pain is related to advising parents on the choice of drug, the

correct dosage and the route of administration. Consideration should be given to the means of dispensing the medicines and to recommend the factory-fitted measuring cups, spoons and syringes, not household utensils, as this will lead to inaccuracies and potential harm to the child. (Georgiev, et al., 2019)

Matherials and methods

A representative, anonymous and voluntary online survey was conducted in the period April 2019 – September 2019. It included 158 people, assistant and master pharmacists. The online questionnaire form is made with the help of Google forms. It uses its own tools - a questionnaire consisting of four panels. The first panel consists of questions related to the demographic characteristics of the respondents - gender, age, education, place of residence, medical specialty. The second panel is related to the supply, release and use of immunostimulating products in pharmacies in Bulgaria. The third and fourth panels are from 11 questions each. These panels address attitudes and barriers to pharmaceutical care. For every question is used the 5-point Likert scale.

Statistical data processing was performed using the software product SPSS v.17.

Pharmacists of different ages (Fig. 1) with different professional experience (Fig. 2) were interviewed.

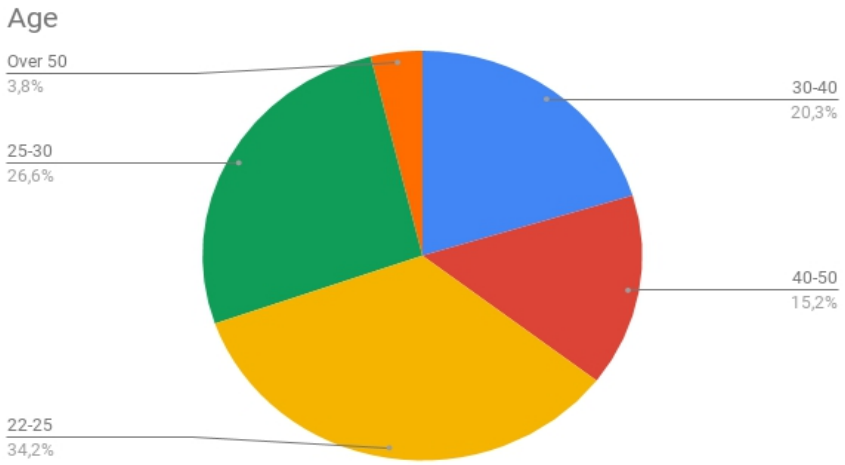

Figure 1

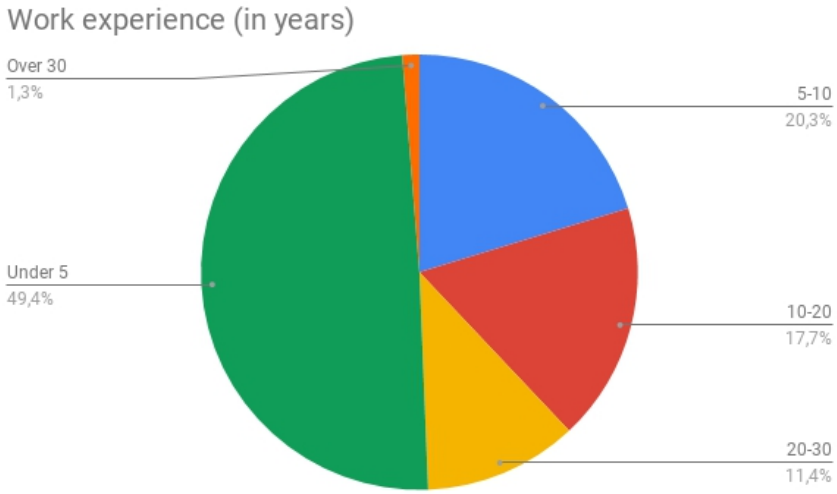

Figure 2

Pharmacists from different regions of the country were interviewed. Most of the respondents were from the city of Plovdiv (82 respondents), which is the second largest city in the country. 28 of the respondents are from the capital - Sofia.

Pharmaceutical care is important for many of the surveyed pharmacists. 88 people completely agree with the opinion that the provision of pharmaceutical care brings them professional satisfaction, and 64 agree with this statement - Fig. 3. In Fig. 4 shows that according to 148 respondents one of the pharmacists' main priorities is to provide pharmaceutical care.

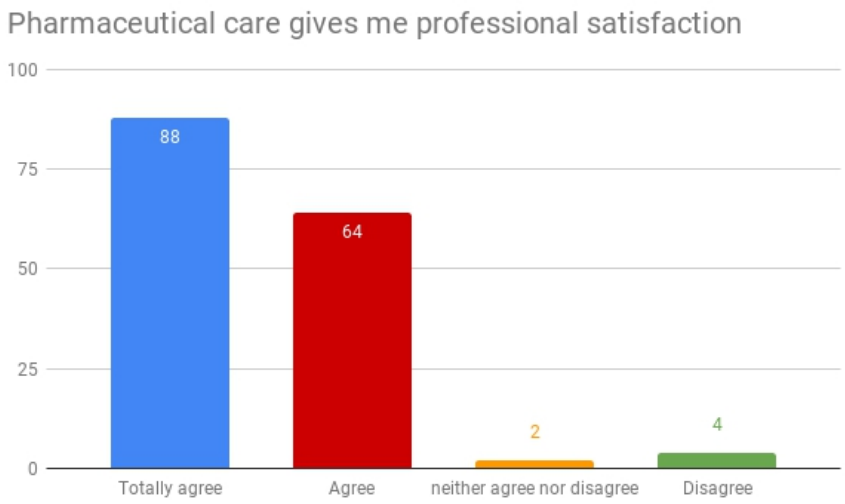

Figure 3

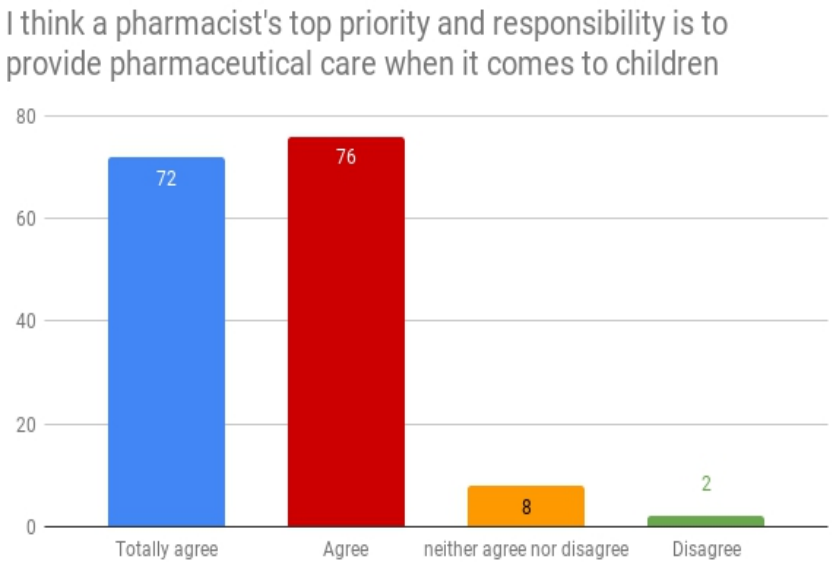

Figure 4

Figures 5 and 6 make it clear that, according to the surveyed pharmacists, the provision of pharmaceutical care will help improve the health of children and their parents' knowledge on the one hand and, on the other, increase parents' confidence in pharmacists.

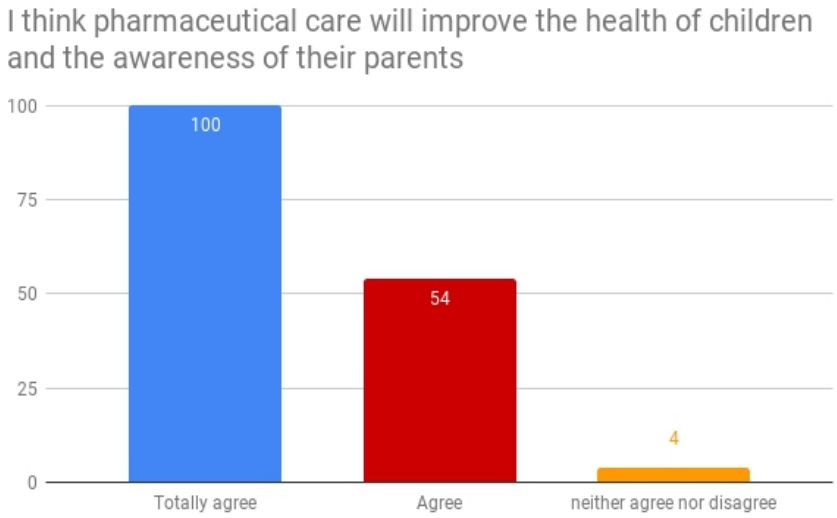

Figure 5

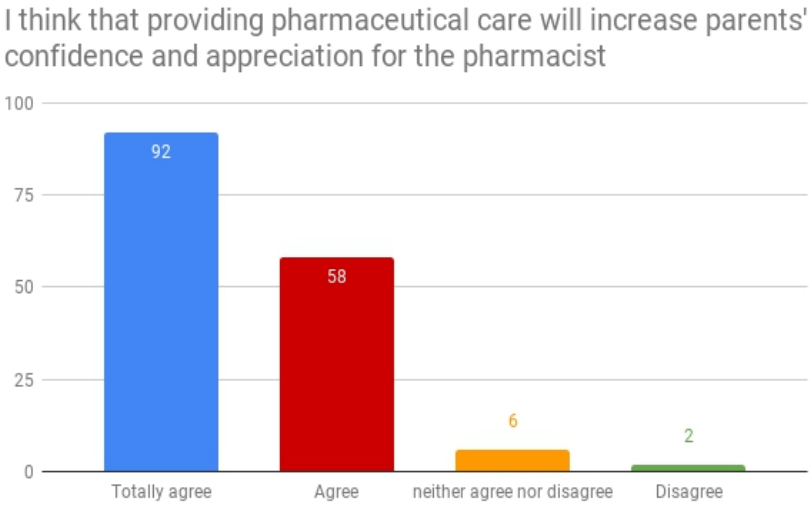

Figure 6

At the same time, pharmacists in Bulgaria are clearly aware of and outline some of the major barriers to pharmaceutical care. According to 112 of the respondents, the main problem is the lack of sufficient time. (Fig. 7), and on the other hand 98 of the respondents cited the lack of a separate place in the pharmacy for providing pharmaceutical care (Fig. 8).

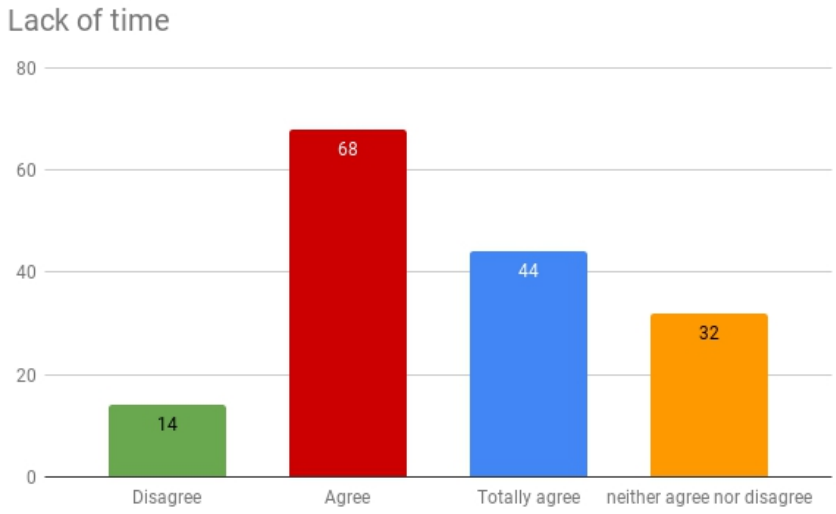

Figure 7

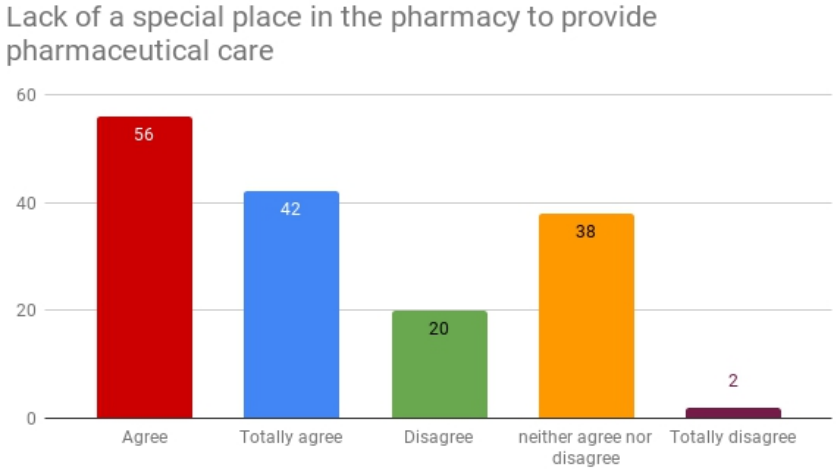

Figure 8

Big part of the pharmacists also face difficulties with the parents. Figure 9 and Figure 10 show the results that pharmacists have difficulty communicating with parents, and also a reluctance of parents to listen to the advice of professionals.

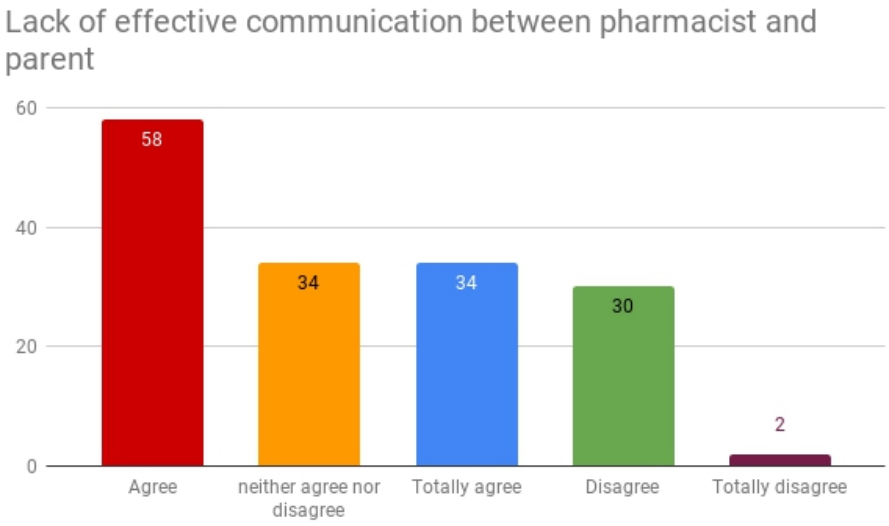

Figure 9

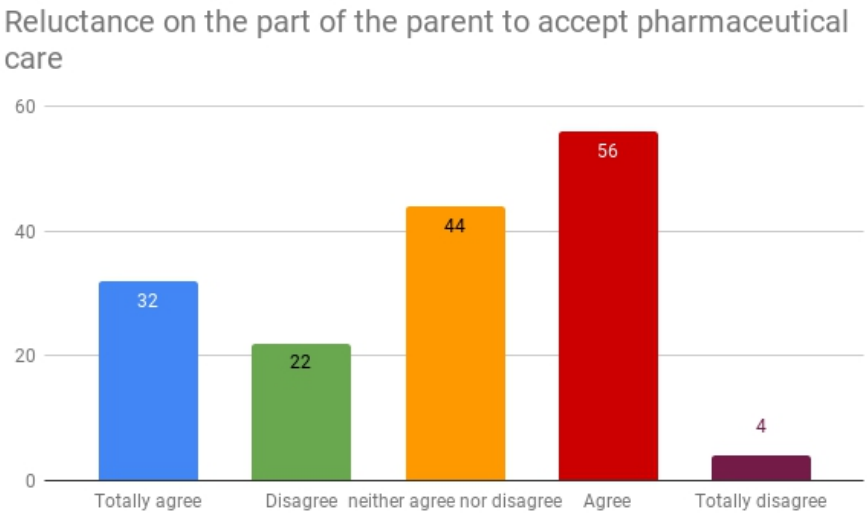

Figure 10

Significant self-criticism was noted among the respondents. More than 35% of respondents were concerned about consulting a risk group of patients, such as pediatric patients. (Fig. 11). In Figure 12 we can see that over 30% of the respondents believe that the current knowledge and skills are not enough to provide quality pharmaceutical care. This is due to the lack of additional training modules to support the professional development of pharmacists (Figure 13).

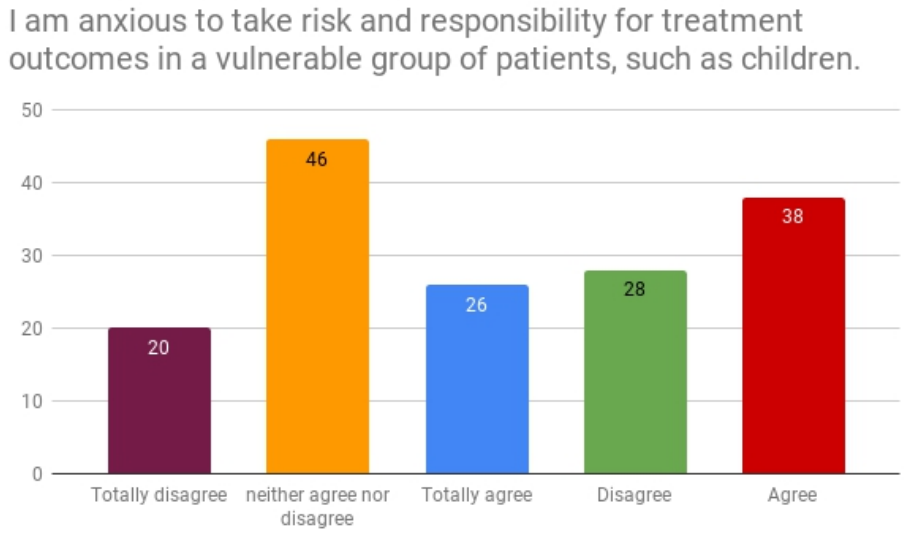

Figure 11

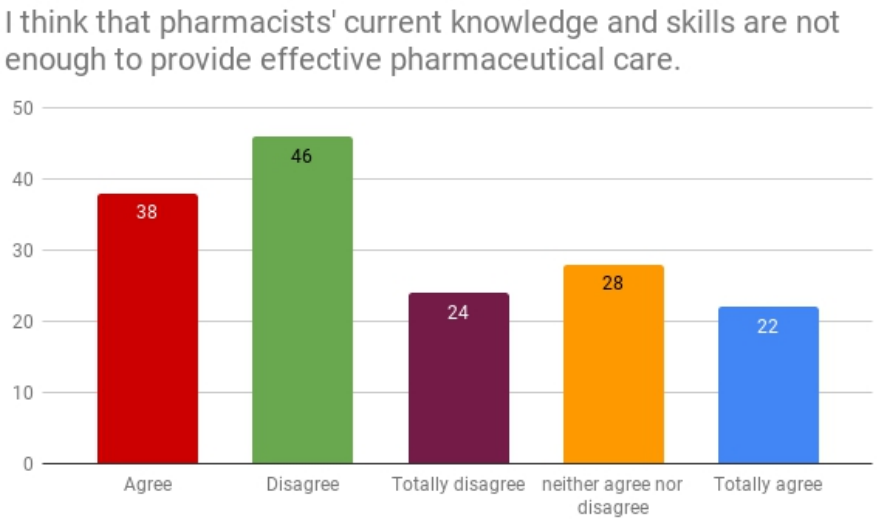

Figure 12

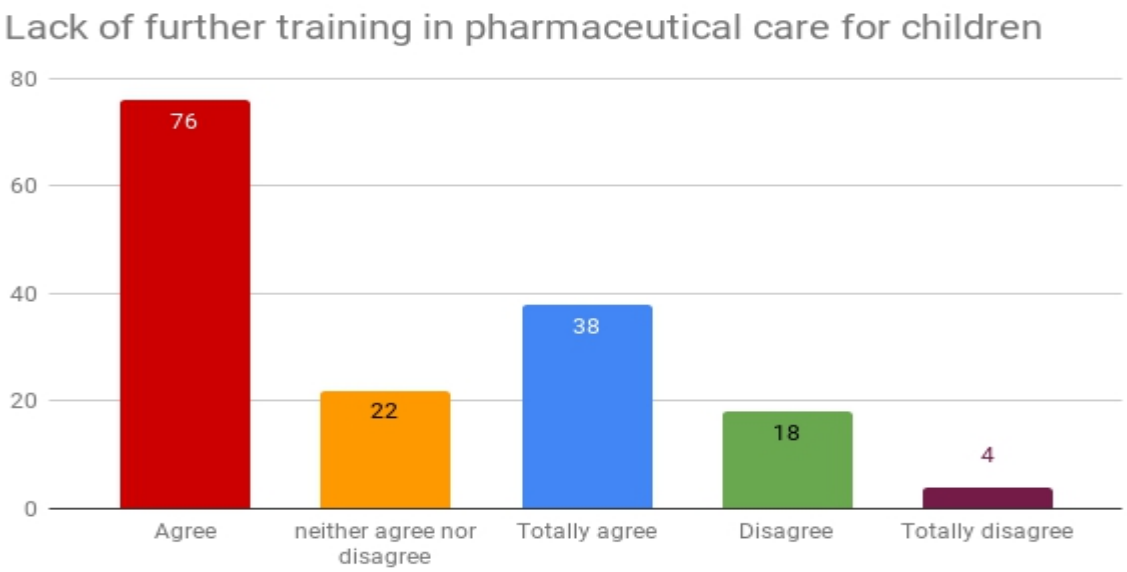

Figure 13

Discussion

The literature review on the topic shows that building children's immunity is a long process. Because the immune system is still immature in childhood, parents often resort to the use of immunostimulants. Pharmacists and the pharmaceutical care they provide play an important role in the selection of immunostimulants. Our research on research on the topic worldwide has made us realize that no such research has been done in Bulgaria. This is the main reason to embark on this project, part of which is the role of the pharmacist in protecting children's immunity. The lack of sufficient data on the topic in our country is both a problem and a challenge for our team. Our idea is to continue working in this direction, to collect new and new data so that we can develop a proposal for a national program for protection and strengthening of children's immunity in Bulgaria.

Conclusion and Policy Recommendations:

According to a study, in most pharmacies, patients have free access to OTC products and supplements. However, the results show that patients' confidence in the pharmacist is increasing. When choosing immunostimulants, parents trust the recommendation as much as the doctor and the pharmacist. This increased confidence, in turn, obligates the pharmacists to be trained in this field. That is why we recommend organizing educational modules for pharmacists to provide pharmaceutical care for the prevention of childhood immunity. We also recommend organizing seminars

for parents to raise their awareness of the benefits and methods of immunostimulation. It would be advisable to develop a model for the application of a comprehensive immunostimulatory program in pre-school and primary school children for prevention.

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