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ANALYSIS OF THE COMPOSITION OF ANTIPIRETIC SYRUPS AND VITAMIN SUPPLEMENTS FOR CHILDREN IN TERMS OF HARMFUL SUBSTANCES INCLUDED IN THEM

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Abstract: New medications and supplements in attractive forms and flavours for children, such as lollipops, jellies, sweets, lozenges, etc., appear on the pharmaceutical market all the time. The society perceives these products as completely safe and even desirable in maintaining good health. Meanwhile, due to their form, they contain a whole range of potentially harmful food additives. The aim of this study was to analyse the content of colourings, preservatives and flavour enhancers in medications and food supplements for children. The research material consisted of 80 randomly chosen antipiretic syrups and food supplements dedicated to children. After evaluating the collected data, it has been found that none of the 80 analysed pharmaceuticals were free from potentially harmful substances and most of them contained more than one additive hazardous to health.

Key words: food supplements, vitamins, food additives, colourings, preservatives, flavour enhancers

Introduction

Nowadays, the media form an integral part of people's lives that function as an important source of information, also related to health. They provide necessary medical knowledge and promote pro-health behaviours. Unfortunately, they also advertise a vast number of medicines and food supplements that are not always safe. The society eagerly chooses the "miracle drugs" and treats them as substitutes of healthy eating and hygienic way of life. Such behaviours get intensified as the pharmaceutical market offers new medicaments all the time. Only a few pay attention to the content of such products, as nobody suspects that they could contain substances harmful to health.

Regrettably, pharmacy shelves are full of more and more products for the youngest in all forms, like lollipops, jellies, sweets, lozenges, etc. It creates a serious risk of overdosing, and, in consequence, a possibility of overvitaminosis, especially that food products nowadays (juice, yoghurts, cereals, sweets, etc.) are enriched with synthetic vitamins. The biggest threat to children's health, however, are the additives in medicines and parapharmaceuticals. The same colourings, preservatives and flavour enhancers are present in processed food. Due to this fact, it becomes very easy to go over their acceptable daily intake. Unfortunately, excessive intake of chemical additives has a detrimental effect on the human body [1, 2].

Thus, it seems that the producers of dietary supplements for children concentrate only on interesting packaging and alluring flavour or aroma, whereas, the safety of the product seems to be of secondary importance. It has to be taken into account that food additives can affect the bioavailability of vitamins and medicinal components [3], thus, can interfere with how the medicine works. Medicaments' manufacturers do not declare the amount of food additives on the packaging, and, contrary to medicines, it is not controlled on a regular basis. The vast majority of additives in the food and pharmaceutical industry have been used only for a few dozen of years. For that reason, many of them have been considered as safe only temporarily. Unfortunately, their full effect will be visible by the next generations. Meanwhile, non-prescription medicines should have very little impact on the body and be basically free from any contraindications or risk [4, 5].

Objective

The aim of the study was to determine a percentage of pharmaceuticals that contain harmful substances and to establish the most common preservatives, colourings and other food additives, as well as to present their potential harm.

Material and method

The research material consisted of 80 randomly chosen antipiretic syrups and food supplements dedicated to children. The research was performed in Lomza pharmacies in the period between November 2015 and January 2016. The research involved the analysis of package leaflets in terms of the chemical content declared by the producer. The fo-

cus was placed on colourings, preservatives, antioxidants as well as flavour and aroma enhancers.

Results

The most common forms of non-prescription pediatric products are jellies, chewing gums, lozenges, effervescent tablets, capsules, sirups, liquids, lollipops and sweets. None of the studied medicines were free from potentially harmful additives and most of them contained more than one dangerous component. The most common group of additives are preservatives – their presence was established in 53 products, which represents 66% of the analysed pharmaceuticals. The second largest group of additives present in the pediatric pharmaceuticals are antioxidants – they were included in 52 tested products (64%). Flavour enhancers were present in 41 products, which represents 51% of the studied group. Colourings appeared in 21 out of 80 medicines, which constitutes only 21% of all harmful additives (Fig. 1).

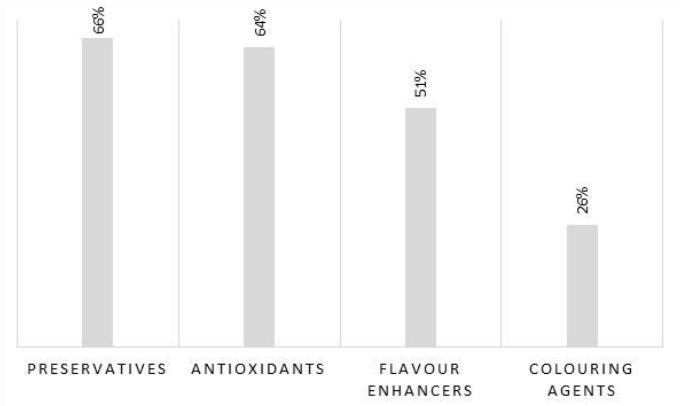

Fig. 1: Food additives in terms of their prevalence.

The most widely used preservative was sodium benzoate (40 products). The second popular was potassium sorbate (25 products). Other preservatives, like propanoic acid, sodium propionate and sodium pirosulphate, occurred singularly. 16 of the studied products contained more than one preservative.

Citric acid was an oxidant present in all 51 products; in 47 cases, it appeared on its own, and in 4 other cases, with other antioxidants – trisodium citrate and butylated hydroxytoluene (BHT).

Non-prescription sirups and vitamins are mostly sweetened with glucose-fructose sirup (14 products). The following sweeteners are: sorbitol (11 products), glucose sirup (10 products), mannitol and maltitol (5 products each), aspartame and acesulfame K (2 products each). Six pharmaceuticals contained more than one sweetener. The most common colouring was titanium dioxide (8 products). Other found colourings included: carmine (7), iron oxide (4), carmine red (3), brilliant blue FCF and caramel (2 each) as well as iron oxides and dioxides, azorubine, erythrosine and indigo carmine. Six pharmaceuticals contained more than one colouring substance.

Discussion

The available literature does not provide information on the safety of the additives used in pharmaceutical products. It is presumably due to the controversy of the subject. How can anybody suspect that medicines and dietary supplements be harmful, when, by definition, they are meant to be used for prophylactic and medicinal purposes. It has to be pointed out that registration of a dietary supplement in Poland is not as problematic and time consuming as in the case of medicines. During the registration process, it is not required to provide study results indicating the efficiency of the product or lack of side effects. The amount of vitamins and minerals in food supplements is not tested by means of analytical methods, it is merely a numerical declaration of the producer, therefore, it can be over- or underestimated [6]. Among dietary supplements there are products with declared amount of vitamin B6 at the level of 75 mg, while the European Food Safety Authority (EFSA) determined 25 mg as the maximum tolerated daily intake of this vitamin [5]. Moreover, medicine and vitamin producers do not declare the amount of all additional ingredients on the packaging. Moreover, in the case of food supplements, on the contrary to medicines, their content is not checked on a regular basis.

More and more often, the parents, without consulting the doctor, decide to give their child new medicines or start supplementation [7]. The literature data indicates that society doesn't buy medicaments conciously (after a detailed analysis of the ingredient list).The biggest motivator for purchasing medicines and supplements are the advertisements present everywhere, which encourage consumers to buy, use, or give their children more and more of the "miracle drugs" [8]. Such behaviour entails a risk of interaction between each of the medicine in use, as well as between the medicines and the ingredients of every day diet [9]. It appears, however, that the biggest threat to children's health are the additives in the medicines and parapharmaceuticals. Unfortunately, the substances used in pediatric pharmaceutical products can have negative impact on children's well being or even threaten their lives.

The least numerous group of additives in the studied pharmaceuticals were the colourings. They were present in only 21 medicines and supplements. The most common colouring was titanium dioxide (E 171). It is a white pigment from inorganic compounds group, considered to be

a safe substance. Nevertheless, according to some literature reports, it can cause irritation in contact with the skin [10], and, in its fine particle form, it passes through cellular and nuclear membranes, which creates a risk of DNA damage and carcinogenic mutations [11]. Furthermore, it has been found that this compound has neurotoxic properties [12, 13]. The next most frequently occuring colouring was carmine (7 pediatric products). Carmine (E 120) is a natural, red colouring obtained from dried, crushed Mexican insects known as cochineal. Unfortunately, carmine is very often contaminated with substances that can cause hay fever, urticaria or even anaphylactic shock [14, 15]. There were individual occurrences of such colourings as carmine red A, brilliant blue FCF, iron oxides and dioxides, azorubine, erythrosine and indigo carmine. Carmine red A (E124) can cause allergic reactions (hay fever) and hyperactivity in children [16–18]. It can have a negative effect on kidneys and liver as well as affect fertility. Moreover, it has been found that it has carcinogenic properties [19]. It is particularly unsafe for asthmatics, although there was no indication of such contraindication on the leaflets of the products with this colouring. Whereas, brilliant blue FCF (E133) – a blue green synthetic colouring, is not recommended for people with irritable bowel syndrome and other gastrointestinal diseases. It can also (like most of food additives) cause allergic reactions and is carcinogenic [20]. Another synthetic red colouring that is added sporadically to medicaments is azorubine (E122). It can increase the severity of asthma and cause hyperactivity in children [21]. Pharmaceutical products can also contain iron oxides and dioxides (E172). It is a group of natural colourings. Depending on the variation, they can be yellow, orange, red, brown or black. All iron oxides are toxic to humans, if overdosed [10]. Fortunately, it is comforting that the colouring substances that are potentially harmful to the health and life of little children, are not added to pediatric products on a regular basis. It should be kept in mind, however, that the same colourings are present in other products consumed by children on daily basis (sweets, jellies, drinks, etc.), which can result in the daily intake overdose and expose our children to chronic toxicity.

Flavour and aroma enhancers were found in almost half of the studied pediatric products (41). The most common sweetener (14 products) was glucose-fructose sirup. According to the literature, it is responsible for a range of side effects – increases the risk of obesity and can lead to diabetes [22]. Moreover, it induces cardiovascular diseases by increasing blood pressure and the level of LDL-cholesterol [23]. It also increases the risk of getting cancer [24]. It should be stressed that the global toxicity of glucose-fructose sirup is very real, as it is very difficult to find a product on the food market without this substance. The most controversial sweetener added to pediatric products, however, is aspartame, which is suspected to induce epilepsy seizures and damage the optic nerve [25,26]. The studies on humans and animals have shown that aspartame induces a false feeling of hunger (there is a need to eat something after maximum 1.5 hour after the ingestion of aspartame). The cause of this phenomenon is the stimulation of taste receptor cells on the tongue – the brain demands for a particular amount of energy, but then it realises that there?s no energy behind the sweetness. Therefore, it "forces" the body to ingest an additional meal. Aspartame is prohibited for children under the age of 3 and pregnant women. It is perceived as the most dangerous substance added to food. It is responsible for 75% of all adverse health side effects. Documented symptoms include, among others: headaches, epilepsy seizures, muscle contraction, nausea, weight gain, fatigue, rashes, heart palpitation, depression and breathing difficulties [27,28]. Therefore, the fact that it is present in medicinal products dedicated to children is absurd. The same number of products included acesulfame K (E950). This compound can cause headaches, respiratory system diseases, eyesight problems, hyper activity, problems with kidneys and liver. The animals which were given acesulfame developed breast, lungs, blood and other types of cancer [29, 30].

Another large group of additives present in the analysed medicines and supplements were antioxidants. They were found in 51 pharmaceuticals. The citric acid (E330) represented 93% of all antioxidants. It is a substance commonly perceived as safe (in a single product), however, it is present in a huge number of food products. Therefore, a child's mouth is in touch with a big amount of citric acid throughout the day, which can result in enamel damage and teeth weakness. In addition, citric acid facilitates the absorption of heavy metals, such as aluminum and lead, into the blood.

The largest group among the additives present in pharmaceuticals were preservatives. They were found in 53 out of 80 studied products. The most common was sodium benzoate (60% of all used preservatives). Such frequent occurrence of these substances is alarming, as sodium benzoate (E211) can cause allergic reactions, increase breathing problems in asthmatics and irritate the digestive tract (reflux-like symptoms). Moreover, it was found that sodium bonzoate and vitamin C form a toxic duet, when taken together, they then convert into carcinogenic benzene (C_6H_6) in the body [31]. Therefore, sodium benzoate in vitamin supplements should be strictly prohibited. What is more, according to Beezhold et al. [32], there is a correlation between the ingestion of E211 and ADHD symptoms in children. Another preservative used to a large extent in children's pharmaeuticals was potassium sorbate – E202 (25

products). It can cause skin irritation, it is dangerous to asthmatics and induces other allergic reactions. 8 out of 80 studied pharmaceuticals contained sodium propionate (E281), which can lead to headaches, skin and stomach mucus irritation. It can cause asthma and learning difficulties in sensitive children. Its frequent ingestion is not recommended [33].

The collected results show that many of the pediatric pharmaceutical products can have a detrimental effect on children's health as they contain a whole range of harmful preservatives, colourings and flavour enhancers. These additives very often comprise 50% of the product's composition. Therefore, keeping future generations in mind, special attention should be paid to the education of parents and children on the risks of excessive supplementation and the harmful effects of food additives in pharmaceuticals. Consumers should understand that a varied diet and exercise are the foundations of health and that dietary supplements should be used only when there are clear medical indications to do so, never long-term, or as a precaution. If the use of a pharmaceutical product is necessary, it should be preceded by careful analysis of the leaflet for undesired substances.

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