

DOI: 10.7251/QOL1901055P

UDC: 641.5+613.2-053.3/.6

Review

FOOD FLAVOUR AS INFLUENCE FACTOR FOR BALANCED DIET FOR CHILDREN

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Abstract: Aetiology of some health disorders and diseases, such as obesity, cardiovascular diseases, diabetes and malignant diseases, can be linked to unbalanced diet started from the earliest days of life. For that reasons, it is very important to adopt proper diet patterns from the earliest days of life. There are few factors influencing choice of food. Food flavour is one among them. Understanding mechanisms, which later make influence how to accept or reject some food in children, in intrauterine development phase, and after birth period, is of vital significance when we create healthy habits for children and adult diets.

Key words: Prevention, human health, children, food flavour, food choice.

INTRODUCTION

Increased food intake, considers as main cause for obesity. Excessive food intake in the early childhood, can result in obesity later in adulthood. It is confirmed that number of adipocytes in the body of adult human being, depends only on quantity of fat tissue previously deposited at the early stage of life (*Beleslin, 2008*). Anyway, in obesity children, number of adipocytes increase up to the three times comparing to the children with normal body weight, during puberty production of adipocytes additionally increases, while obesity of adults is mainly consequence of hypertrophy of already existing adipocytes.

It is possible to link cardiovascular diseases, diabetes, malignant diseases, such as colon carcinoma, breast carcinoma, kidneys and digestive tract, with unbalanced diet and obesity from the earliest life age.

For that reasons it is necessary to pay attention to diet for children and youth, and how they choose food. Aim of this paper is to analyse mechanism of developing of preferences for specific food, review consequences of choice they made, and to provide guidelines for prevention to improve public health status.

FACTORS THAT INFLUENCE CHOICE OF FOOD

Research actually shows tendency to specific type of food, more accurate flavour of food what can be congenital or acquired. It is concluded that tendency for sweet flavour, just like repulse toward bitter and sour flavour, exists from the child birth. However, particular tendencies or repulse against some type of food flavour, are consequences of experience from the earliest age in the life, and later develops additionally as consequences of different attitudes, convictions and expectations (*Павлушевић and all., 2014*). We can not make influence on acquired tendency, in a way to create healthy habits in children diet. However, acquired tendency to some food is something that parents can make influence in a way to create healthy habits in childrens, and in some point of view it is parent duty.

Key impuls for food consumption is hunger, but type of food we choose, is not defined exclusively by physiological or nutritive requirements. Some of the factors for food selection in our diet are:

- biological factors (hunger, appetite, flavour),
- economical factors (price, availability),
- physical factors (art of cooking, time for food preparation),
- social factors (culture, tradition, family, age, society),

- physiological factors (mood, stress),
- psychological influence.

Many factors influencing choice of food for consumption, shows process complexity, how to choose, and tendency to specific food (АНОН, 2005).

FOOD FLAVOUR

Food flavour, as one of the most important factors, when we talk about how to make a choice for specific food. Term food flavour, means all the senzoric stimuli as the result of food consumption, like flavour, smell, appearance and consistency of a food (Павлићевућ and all., 2014). Most prominent senzoric characteristic of the food is *flavour*. Term - english word flavour means and include tottality of food senzoric characteristics, defined from consumers as smell, flavour and texture of food. By definition, flavour is perception when it stimulates three anatomically remoted chemistry senses, gustatory sense, sense of smell and chemical-senzoric irritation and represents complex combination of olfactory, gustatory and trigeminal senses, which appears after food consumption (Beauchamp and Mennella, 2009).

Gustatory sense: gustatory sense makes taste receptors located on the tongue (upper surface of the tongue and the epiglottis). We have taste receptors on taste buds (gustatory calyculi), 10000 of them in oral cavity. gustatory calyculi is made of 50 – 100 sense cells. The sensation of taste includes five established basic tastes: sweetness, sourness, saltiness, bitterness, and umami. However, humans can distinguishe infinitely much tastes, where additionally helps olfactory sense (Guyton, 1980). de Araujo and all., 2003).

Olfactory sense: substances with smell characteristics, release molecules reacting with olfactory receptors locates in upper part of nasal cavity (Бајмућ and all., 2007). Olfactory region (olfactory mucose) makes about 5-10 millions olfactory cells (Guyton, 1980). Olfactory system is organized in such manner, that it is capable to recognize wide spectar of smells, difference among them, but still, in human beings, up to 2 third of receptors out of function, comparing to other mammals (f. ex. dogs, rodents) (Shepherd, 2007).

Chemical-senzoric irritation: Irritation that appears after chemical stimuli of receptors and free nerv endings of trigemnal nerve and nervus Vagus, in oral cavity, and nose, may lead to sense of pain, warm, coldness, refresheness, itch, pricking and tackling. By all that mean, we talk about irritate sensations, and it can be unexceptably when we talk about senzoric characteristics of the food (Mela and Mattes, 1988).

Biological factors: When it comes to biological factors, closely related to food senzoric characteristics, and make influence to specific type of taste, it is mentioned congenital mechanism how humans resolve the hunger, in a way to taste more different tastes. (Rolls, 2000). This mechanismfor meeting satiety, most probably had it own adaptive role in human evolution, ensuring that consumption of food with different taste (flavour) ensure enough quantities of essential nutritiens (Павлићевућ and all., 2014). This congenital predestination, in some way has impact to tendency for specific food especially when it comes to children, however, it is known that biggest influence for food acceptance and tendency for some food aquired/learned, as a result of experience, and in that way can be chenge (Menella and all., 2004).

Psychological influence: Diet and behaviour linked to collection, preparation and food consumption are deeply linked with psyche and individual development, also human society evolution. Reduction this relation to physical, chemical or physiological characteristics and influences would be mistake. This can be easily spotted from the nature itself of interaction of psychological and physiological apparatus while feeding. Informations from chemical senses next to the described influence na flavour sensation is linked with sexual and predator behaviour, not just with humans but other species to (Stevens, 2001), and it is more or less linked with emotions from informations gained by eye or ear (Koster, 2003). It is possible to notice evolutionary role of the senses, but also learnig mechanism, where positive and negative experience with food developes acceptably patterns in consumption.

TENDENCY AND REPULSE TO FOOD FLAVOURS

To what degree, one organism will develop tendency to some flavour, depends on congenital factors, and then to environmental factors after birth (diet, experience) (*Павлућевућа and all, 2014*).

Congenital tendency: Tendency to sweetness is congenital, but it is changing during growing up, and can be modified with experience. Following evolution of human species, humans are born with natural tendency for sweetness, and from evolutionary point of view represents advantage, considering that taste for sweetness, actually reflects food rich in sugars (high energy value), what is necessary for life functions and survival in early stage of life (*Blissett and Fogel, 2013*). Although children during early childhood express higher tendency to sweetness comparing to adults, that tendency is decreasing at puberty period, as a result of gustatory papilla decreasing on the tongue, during the time (*Blissett and Fogel, 2013*).

Mother milk itself, the best source of nutrients in first few months of the life of the child, is moderately sweet. Breastfeeding, beside numerous other biological functions develops emotional bond between mother and baby, makes decisive influence to emotional development in first ages of life. Since newborn child information about its own environment, gather in the first line through mouth, Freud (Sigmund Freud), postulates oral phase psycho-sexual development, and same opinion are numerous other psychoanalysts such as Melanie Klein and Herbert Sullivan, who are noticing influence of breastfeeding and child relation to breast for personality development as a possible root of psychopathological processes (further readings *Freud, 1991; Plon, & Rudinesko, 2002*). It is possible to notice role of taste for sweetness in combination with tactile sense as important mechanism of emotional development. Sense for sweet in this process has role to reinforcing, respectively indulging not just biological needs but emotional needs.

Because of its high calorie values not followed with appropriate nutritive value, we can consider sweet food as one of the basic cause for excessive intake of energy leading to obesity (*Stanišić, 2019*). From this reason one should take into account about control in providing children sweet food, and total percentage in total consumed food. It is recommended not to give to children food containing simple sugars. Since it is almost impossible carry into effect this recommendation in our social environment, it is important that parents control children for this food in first age of life. It can help in later stage of life regarding sweet food intake, when children start to choose some food by itself, this measure will prevent occurrence of circular caries, often happens to children consuming simple sugars. Carrying into effect these recommendations will be subject of analysis soon.

As opposed to congenital tendency to sweet, humans are born with congenital repulse to bitter taste. Reason for congenital repulse against bitter taste, is linked to human evolution. Bitter taste, most often shows on presence of ingredients possibly toxic for humans: plants developed its own system, how to protect itself, by presence of bitter materials in plant body, while herbivores developed different type of sensoric systems to avoid potential toxic effect (*Beauchamp and Mennella, 2009*).

Vegetables containing low quantities of sugars, is not attractive without sweet flavour, and taste itself does not indicate high levels of energy. Beside that, vegetable composition, bitter as it is because of alkaloids containing most offensively indicates presence of potential chemical hazards. That's why it is the fact that vegetables such as carrot, corn, bean and potato, most often well accepted and widely consumed in adults and children (*Blissett and Fogel, 2013*). Because of all mentioned, pediatricians are recommending, for children diet, first to introduce grains, then vegetables and at the end fruits, so we can avoid that child after consumption more tasteful food start to reject food less tasteful, but necessary in diet.

When it comes to taste of saltiness, it is well known that tendency to this taste, develops in the first few months of life. Infants up to 4 months of life prefer moderate concentrations of salt water, and when it comes in second year their preference to salt food is even bigger than in adults. Scientific studies in this area, tendency to saltiness, and later alterations based on new experiences, makes a lot of possibilities for

future work, also having in mind the fact, that higher salt intake in regular diet, one links to high blood pressure (*Beauchamp and Mennella, 2009*). Pediatricians do not recommend adding salt in infant formula, children as well, respectively advising to avoid salt. Even the fact that adding salt improve taste of the food, because of possible damage of kidneys and negative influence to developing organs and function.

Prenatal influences: Tendency to food flavours, that we detect with olfactory sense, in general refers to learning process and acquires very early in life, during intrauterine phase. Fetus develops inside of amniotic sack, very dynamic system. Sensoric characteristics inside of amniotic sack are changing, depending on mother diet, apropos food flavours are transmitting to amniotic fluid (*Schaal and cap., 2000*). That experience (learning) of flavours during intrauterine life, are linked to children tendency to specific flavour, what is expressing, very fast after birth and in period of stopping breastfeeding (*Menella and assoc., 2001*). However, it is paradox nowadays that almost every infant formula on the market have added glucose. This is how just for marketing and reasons for profit offers to children product with better flavour, but with all side effects previously mentioned.

Afterbirth influences: Experiences regarding new flavours, continues after birth, during breastfeeding, or feeding with adapted infant formulas. Mother milk, with ingredients representing flavours from mother diet, same as at intrauterine stage, influence accepting, tendency to specific flavours. (*Menella and all., 2001*). Coming from the fact that mother during breastfeeding, does not change significantly diet comparing period of pregnancy, it can be said that mother milk actually represents „bridge“ between food flavours experience in intrauterine stage and later from solid food (*Beauchamp and Mennella, 2009*). In connection with this, previously mentioned, breastfeeding, allows children, to have experience of many different flavours from food, and that is not the case when we feed children with uniform milk (infant) formula, uniformed in quality and flavoure (*Павлићевућ and all, 2014*). Big sensoric experience in children, who were breastfeeding, explains the fact, that those children, less finicky and much more „open“ and ready to taste the new flavours, making this as first step and condition for developing healthy habits when feeding (*Sullivan and Birch, 1994*).

Even we consider mother milk as first choice for feeding infants, in situation when mother lack of milk, we can add adapted milk (infant) formula to prevent malnutrition, apropos providing proper growing and development. It is the same situation when mother is not able for breastfeeding. However, often in this situations happens that infant reject to consume infant formula or vomit after meal. One of the most often reasons for this is that infant don't accept the flavour of that adapted infant formula. In this situation, it is recommended to use infant formula from other manufacturer, because there is difference in flavoure. Change as it is, most often increase appetite and speed up growing, and reasons for this lays in flavoure more acceptable from infant. It would be mistake to conclude that flavoure is the only factor for this, but it is important to recognize how important it is.

When introducing food without milk, in some cases children refuse to consume some food. In this situation it is wrong to insist on this food, no matter how important it is for healthy diet, but it is wise to sustaine from that food for a while. Food flavoure not accepted from child is reason for this situation. After few days, when child make new experience with some new food flavoure it is very probably that next attempt for introducing food in diet will be succesful.

Therefore, exposing children to food flavours beginning from intrauterine stage, then mother milk, and after that solid food makes influence how to form long lasting tendency to specific flavoures, and make possible for children to develop patterns for accepting new food flavoures when it comes to healthy diet.

CONSLUSION

Feeding infants and children has a significant role in overall development, both physical and personality

development. Habbits aquired in this period may have numerous consequences on health status, and later during whole life. Breastfeeding and proper introducing nonmilk food to infants represents fundament of future healthy habbits and food preference. Because of that, it is important to educate parents and support them when are trying to introduce recommendations of pediatricians, despite of often local community ignorance and social pressures.

Food tastefulness represent fundamental base for acceptancing or rejecting food and one should be aware of this when it comes to create healthy habbits for children. Using sweet flavoure, as stimulus for different behavioires correction, might be usefull as education (learning) tool, but it is wise to use it moderately or completely to avoid it, all because of possible negative consequences to health and growing up. It is the same situation, when we give candies as gift, as a way to create likes or sympathy and enforcing affective bonds with children or as tool to calm them down. It is wise, always keep it on mind long lasting consequences, not in proportion with short lasting benefitwe can gain in this particular way.

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Recived: May 24, 2019

Accepted: June 20, 2019