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**Influence of some homeopathic remedies as a factor in
the risk assessment system for the development of carious
processes**

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INTRODUCTION

Tooth decay is one of the most common chronic diseases in childhood. It is well known that the key etiological factors that contribute to the development of a carious process are the enamel as a terrain for development, the microorganisms (MO) in the oral plaque biofilm, as well as the simple carbohydrates decomposed by them. The fermentation of the latter under the action of the plaque MO leads to a decrease in pH in the dental biofilm, to domination of the demineralisation process, which triggers the carious process.

In this respect a considerable number of researches have proved the risk from the frequent use of conventional medications containing sugar, especially during childhood. The factors determining the cariogenic potential of a conventional drug, are the sucrose content and the acidity of the drug. The frequency, dosage and the application method of the medication also play a significant role. The usage of sweetened medications among children is widespread. They are often administered at a very early age, sometimes even as early as the second month after the baby is born.

Homeopathy is one of the most popular forms of complementary and alternative medicine (CAM) nowadays. Very often the patients who use homeopathy are children. A leading reason for that is the fact that homeopathic remedies do not have potential side effects, they are easily accessible (over the counter), and they are prescribed for acute and chronic conditions. Patients are satisfied and rarely experience side effects.

Homeopathic remedies, like conventional paediatric medication, contain sugars and acids. They also have specific rules for intake – multiple times during the day, between meals; they should be left for a while under the tongue and should not be taken alongside with fluoride toothpastes. It is a common practise to take one of the doses in the evening before bedtime. All these factors are prerequisites for creating conditions for an increased risk for development of a carious process with more frequent intake. Their massive and constant use, accompanied with the lack of awareness on the part of the parents of the presence of simple sugars in these homeopathic remedies and their connection with the higher risk of development of carious processes, is a potential risk for children's oral health. At the same time the role of homeopathic remedies is underestimated or there is no knowledge about the possible risks among medical specialists, regarding the health of the dental structures, especially during childhood. Medical specialists are the ones who are expected to adequately educate parents and theirs is the responsibility for providing a possibility for implementation of effective prevention and treatment towards good dental health.

In the world scientific medical literature the role of homeopathic remedies as a factor in the risk assessment system for development of a carious process remains a topic which is insufficiently discussed. There is a lack of detailed research and evidence for their effect on oral health. There is no such in Bulgarian scientific literature either. This motivates us to conduct our own scientific research and to assess the effect of this type of medications on dental structures, as well as their role as a risk factor in frequent use in childhood for the initiation and progression of carious processes. The development of specific preventive measures and the assessment of their efficiency is a mandatory element in the course of our work. The frequent use of some homeopathic remedies in childhood could be included as an important additional factor in the risk assessment system of tooth decay, contributing for the emergence and

development of carious processes. This would lead to a thorough change in the preventive thinking of parents and specialists in terms of tooth decays as a disease, as well as motivation for changing behaviour in view of achieving a better oral health.

OWN RESEARCH

I. OBJECTIVE AND TASKS

Objective: Research in the role of some homeopathic remedies as a risk factor in the risk assessment system for the development of carious processes in children.

Tasks:

The following tasks were set towards the execution of the formulated objective:

1. Research in the frequency of application of homeopathic treatment (on its own and combined) in children from the Varna province.
2. Assessment of the knowledge of homeopathic remedies among specialists and parents.
3. Assessment of the dental status and the oral hygiene in groups of children:
 - 3.1. Healthy children.
 - 3.2. Children who are often ill and are treated conventionally.
 - 3.3. Children who are often ill and are treated homeopathically.
 - 3.4. Children who are often ill on combined treatment.
4. Clinical study on the pH change of supragingival dental plaque in children volunteers after treatment with homeopathic remedies.
5. Clinical study on the pH change of the saliva in volunteers after treatment with homeopathic remedies.
6. Investigation of the cariogenic potential of some homeopathic remedies through:
 - 6.1. Assessment of endogenous pH in some of the most commonly used homeopathic remedies.
 - 6.2. Assessment of titratable acidity of the same remedies.
7. Developing a set of recommendations for oral health prophylaxis in children who are frequently treated with homeopathic remedies.

II. MATERIAL AND METHODS

1. Material for research

The object of this investigation are: **403 specialists** including **203 doctors** - paediatricians, general practitioners, homeopaths and **200 dentists**, practising on the territory of several towns in Bulgaria (Varna, Dobrich and Sofia); and **884 parents** of the children participating the study.

Object of the clinical study. In order to form the respective groups of children a total of **884 children** between 3 and 9 years of age were examined. Out of them 600 children were selected: 150 healthy and a total of 450 children who are frequently ill and are subject to different types of treatment - conventional, homeopathic and combined. The study includes **18 healthy volunteer students** between 22 and 26 years of age and **25 children volunteers** between 5 and 9 years of age (part of the examined 600 children).

Object of the experimental study. Three of the most commonly used homeopathic remedies in childhood were studied – combined homeopathic cough syrup; homeopathic remedy – granules on the basis of camomile, used also as an anti-inflammatory agent during teething; combined homeopathic remedy in the form of pilules, used in flu-like conditions.

2. Methods

Clinical study

- 2.1. **A direct study method to investigate the frequency of application of a homeopathic remedy and the knowledge of homeopathic remedies among parents.**
- 2.2. **A direct study method for assessment of the awareness with regard to the homeopathic remedies among specialists** (paediatricians, general practitioners, homeopaths and doctors of dental medicine).
- 2.3. **Clinical and statistical method for assessment of the oral status of the children** – 884 children were examined in total in order to form the respective groups of children. Out of these 600 children were selected for the clinical study. (Item 2.1). The children are between 3 and 9 years of age and are divided into four groups. A detailed oral status is recorded for all children, including indicators of general, extraoral and intraoral status. The data are recorded on a chart. It includes a short ID part, dental status, record of the quality of oral hygiene, risk assessment of caries development.
- 2.4. **Clinical method for assessment of the pH of the dental plaque and saliva**

Methodology for pH studying of the supragingival plaque

The sampling of dental plaque is done using a sterile instrument and scraping in the area of the gingival one third of the buccal surface of the molars. The quantity of the plaque is

the size of a pin (1 mg). It is then dissolved in 20 ml of distilled water, and then the pH of the solution is measured via a colorimetric method.

Methodology for assessment of the change in the pH of the saliva.

Non-stimulated saliva is used. The volunteers spit a small quantity of it in a specimen pot. An in vitro test of GC Saliva Check with test strips is used, which change their colour according to the level of pH. pH of the saliva of each of the participants is measured at the beginning and then at the 15th, 30th and 60th minute after the homeopathic remedy has been taken.

2.5. Developing a set of recommendations for oral health prophylaxis in children who frequently take homeopathic remedies.

At the beginning each child and parent received motivation and training, according to their individual needs, they were also given recommendations for appropriate oral and hygiene resources and for their application at home alongside with specific recommendations. These children had their output value of the dfs-index recorded, then followed by its values on 6th, 12th and 18th month respectively after the start of the study. The results obtained from the implementation of the previous tasks give reason for proposing a set of rules of conduct of both the dentist and the parents of the children who frequently take homeopathic remedies.

Experimental study

2.6. An experimental method for assessment of the erosive and cariogenic potential of some homeopathic remedies

The endogenous pH and titratable acidity of the given homeopathic remedies are measured in laboratory conditions, a validation process for the titratable acidity method is carried out.

2.7. Methodology of statistical analysis – descriptive analysis, diagnostic analysis, analysis of the difference in mean values

III. RESULTS AND DISCUSSION

TASK ONE

Table 1. Distribution of children according to the type of medication used for treatment.

	Type of medical treatment		
	Homeopathic	Conventional	Combined
Number of children	231 (26,1%)	304 (34,4%)	349 (39,5%)

Conclusions:

1. A high frequency of application of homeopathic remedies has been identified (on their own 26,1%) or in a combination with conventional ones (39,5%) among children from Varna province.

TASK TWO

Table 2. Results of the survey among 203 general practitioners, pediatricians and homeopaths.

QUESTION	ANSWER	N	%
1. Type specialist	general practitioners	105	51,7
	peditricians	77	37,9
	homeopaths	21	10,3
2. How many children patients do you have per month?	to 10 patients	40	19,7
	10-49 patients	37	18,2
	50-100 patients	84	41,4
	over 100 patients	42	20,7
3. Do you prescribe homeopathic medicines to children?	Yes	135	66,5
	No	68	33,5
4. To what percentage of children do you prescribe homeopathy? (out of 135 respondents)	to 10%	45	33,3
	to 10-30%	36	26,7
	to 30-50%	31	23,0
	To over 50%	23	17,0
5. Which type of homeopathy? (out of 135 respondents)	Classical	21	15,6
	Symptomatic	65	48,1

	Both types	49	36,3	
6. Factors by choosing a homeopathic remedy?	*additional table 2 A		*additional table 2 A	
7. Recommendation for OH after taking homeopathy (more than one answer possible; out of 135 respondents)	Yes	34	25,2, of which:	
	*gurgling with water	27	79,4	
	*washing teeth	13	38,2	
	No	101	74,8	
8. Knowledge of the presence of sugars in homeopathic remedies (out of all 203/out of 135, using homeopathy)	Yes	110/78	54,2/57,8	
	No	93/57	45,8/42,2	
9. Which sugars are used in homeopathy? (more than one answer possible) (out of 110 respondents)	sucrose	25	22,7	
	lactose	30	27,3	
	glucose	5	4,5	
	sugar substitutes	22	20,0	
	don't know	57	51,8	
10. Knowledge of a relationship between a frequent intake of homeopathic preparations and an increased risk of caries (out of all 203/out of 135, using homeopathy)	Yes	46/20	22,7/14,8	
	No	157/115	77,3/85,2	
11. Restriction of toothpastes with fluoride when using homeopathy (out of 135)	Yes	28	20,7	
	No	107	79,3	
12. Factors in homeopathic treatment, increasing the risk of caries (more than one answer possible)	Is not increased	157	77,3	
			От общия брой (203)	От остатъка (46)
	simple carbohydrate content	22	16,3	47,8
	lack of OH	38	18,7	82,6
	form of medication	5	2,5	10,9
	frequency of intake	19	9,4	41,3
	way of intake	8	4,0	17,4

* Table 2A. 6th question „ Factors by choosing a homeopathic remedy“:

LEVEL OF IMPORTANCE	FACTORS BY CHOOSING A HOMEOPATHIC REMEDY	N	%
1	drug specificity	19	14,1
	characteristics of the child	30	22,2
	characteristics of the disease	77	57,0
	socio-economic	0	0
	personal preferences of the physician	9	6,7
2	drug specificity	70	51,9
	characteristics of the child	28	20,7
	characteristics of the disease	20	14,8
	socio-economic	12	8,9
	personal preferences of the physician	5	3,7
3	drug specificity	42	31,1
	characteristics of the child	73	54,1
	characteristics of the disease	3	2,2
	socio-economic	16	11,9
	personal preferences of the physician	1	0,7
4	drug specificity	0	0
	characteristics of the child	4	3,0
	characteristics of the disease	10	7,4
	socio-economic	71	52,6
	personal preferences of the physician	50	37,0
5	drug specificity	4	3,0
	characteristics of the child	0	0
	characteristics of the disease	25	18,5
	socio-economic	36	26,7
	personal preferences of the physician	70	51,9

Table 3. Results of the survey among 200 dentists.

QUESTION	ANSWER	(n)	%
1. General information			
- Type of dentist	General practitioners	152	76,0
	Specialists:	48, of which:	24,0, of which:
	Oral and max. surgery	1	2,1
	Orthodontics	7	14,6
	Conservative dentistry	4	8,3
	Paediatric dentistry	10	20,8
	Periodontology	2	4,2
	Prosthetic dentistry	15	31,3

		General dentistry	9	18,8
- Gender		F	119	59,5
		M	81	40,5
- Age		24-35	122	61,0
		36-45	59	29,5
		46-55	15	7,5
		over 50	4	2,0
- Years of practice		to 5 years	111	55,5
		6-10 years	21	10,5
		over 10 years	68	34,0
2. Patients under 12 years	Yes	to 10%	79	39,5
		10-30%	53	26,5
		30-50%	42	21,0
		over 50%	14	7,0
	No	Don't work with children	12	6,0
3. Do you have a question about the use of medicines in your anamnesis? (out of 188)		yes	139	73,9
		no	19	10,1
		by anesthesia	20	10,6
		by high caries activity	10	5,3
4. Do you have a question about the use of homeopathic medicines in your anamnesis?		yes	62	33,0
		no	126	67,0
5. Knowledge about sugar content in medicines?		yes	129	68,6
		no	59	31,4
6. Knowledge about sugar content in homeopathic medicines?		yes	73	38,8
		no	115	61,2
7. Do you associate the frequent use of homeopathic remedies with increased risk of caries?		yes	75	39,9
		no	113	60,1
8. In frequent use of medicines from children do you recommend prevention? (more than one answer possible)		yes, of which:	142, of which:	75,5%, of which:
		*fluoride	70	49,3%
		*remineralisation	94	66,2%
		*sealents	4	2,8%
		*nutrition	2	1,4%
		no	46	24,5%
9. In frequent use of medicines from children do you recommend a change in type/frequency of OH? (more than one answer possible)		Yes, of which:	140, of which:	74,5%, of which:
		*additional OH means	73	52,1%
		*increased frequency of washing	50	35,7%
		*rinsing after intake	79	56,4%
		*brushing after intake	40	28,6%

	No	48	25,5%
10. In frequent use of homeopathic medicines from children do you recommend prevention? (more than one answer possible)	Yes, of which:	73, of which:	38,8%, of which:
	* fluoride	36	49,3%
	*remineralisation	70	95,9%
	No	115	61,2%
11. In frequent use of homeopathic medicines from children do you recommend a change in type/frequency of OH? (more than one answer possible)	Yes, of which:	98, of which:	52,1%, of which:
	*additional OH means	62	63,3%
	*increased frequency of washing	31	31,6%
	*rinsing after intake	40	40,8%
	*brushing after intake	24	24,5%
	No	90	47,9%

Assessment of the awareness of parents of our children patients

Assessment of the awareness of over 600 parents (of our 600 children patients, included in the respective group for the performing of task 3) according to the separate indicators, defined as risky for the development of a carious process, was done based on the responses in the questionnaire.

Conclusions:

From the questionnaire survey conducted among 203 general practitioners, paediatricians and homeopaths:

1. A great number of the general practitioners, paediatricians and homeopaths (66,5%) administer homeopathic remedies to their children patients, however, 85,2% of them were not aware of the potential risks they have in terms of initiation of a carious process in children's teeth.
2. A significant percentage of the medical professionals (45,8% of all surveyed) are unaware of the presence of sugars in this type of alternative medications and are not prepared to recommend a certain oral prophylaxis for the children who are frequently ill and use them (74,8% do not recommend such).
3. A great number of the general practitioners, paediatricians and homeopaths neglect and/or are not acquainted with the potential side effects that the frequent use of homeopathic remedies could have on the oral health of children patients. Some of them reject the idea of a harmful impact of this type of medicine.

Based on the survey questionnaire conducted among 200 dental professionals we reach the following conclusions:

4. Most of the dental professionals (67%) do not conduct a directed medical history for the frequent intake of homeopathic remedies among their children patients.
5. A great number of the dental professionals (60,1%) do not find a connection between the frequent intake of homeopathic remedies and the potential risk of tooth decay during childhood.

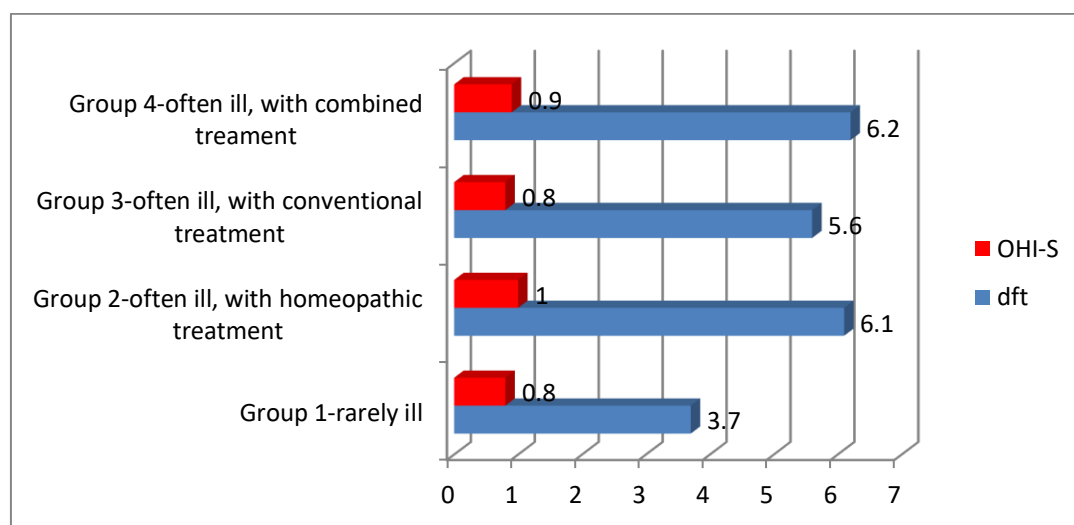
6. There are not adequate recommendations for tooth decay prevention when using homeopathy.

From the survey questionnaire conducted among 600 patients of children patients we reach the following conclusions:

7. A great number of the parents (54,54%), whose children are treated with homeopathic remedies, are not aware of the presence of sugars in the homeopathic remedies and therefore do not encourage their children to take care of their oral hygiene after taking the separate doses (47,2%).
8. Many of the children (39,6%) take the homeopathic remedies with great frequency – over 3 times daily and have started taking them at a very early age (before 1 year of age).
9. It is very often that parents give their children medications without knowing that they belong to the group of homeopathic remedies (33,5% of the 600 parents surveyed).

TASK THREE

Diagram 1. Values of dft-index and OHI-S-index for individual groups of examined children.



Conclusions:

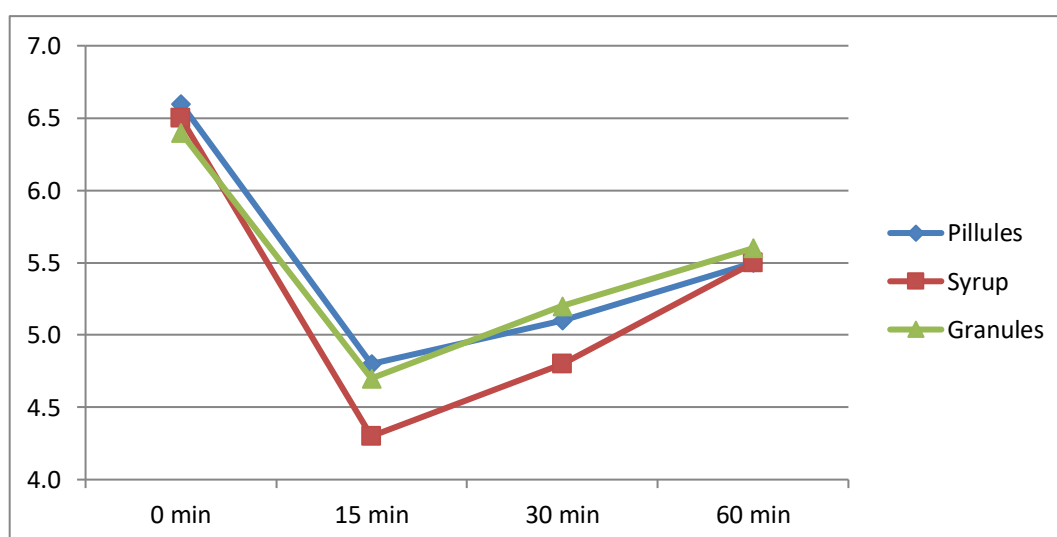
1. There are significantly higher mean values of the dft-index for children who are often ill (group 2 - 6,13; group 3 – 5,57; group 4 – 6,19), regardless of the type of treatment applied compared to the mean values of the healthy children index (dft=3,66).
2. The highest mean values of the dft-index are found with frequently ill children who use a combined type of treatment (dft=6,19).
3. The difference between the mean values of the dft-index of frequently ill children treated homeopathically (dft=6,13) and healthy children (dft=3,66) is statistically credible.
4. The mean values of the dft-index of frequently ill children treated homeopathically is found to be higher (dft=6,13), compared to that of frequently ill children treated

conventionally (dft=5,57). The difference is probably due to the specific way of taking the homeopathic remedies.

5. The mean values of OHI-S for all groups are almost the same. This confirms the acknowledged view in the specialised literature that the dental biofilm is predisposing for the development of tooth decay; it is necessary but is not a sufficient factor.
6. Children undergoing frequent medication therapy are several times more likely to develop a carious process than healthy children, with the risk being the highest in children who use a combined type of medication therapy.
7. The good personal oral hygiene and dietary habits are not always enough to serve as prevention against the development of carious processes when a person is subjected to frequent medication therapy.

TASK FOUR

Diagram 2. Curve with the mean pH-values of the dental plaque at the individual time intervals after administration of each of the three homeopathic drugs tested.



Conclusions:

1. The intake of the homeopathic remedies studied by us leads to a sudden drop in the pH of the dental plaque in all of the studied specimens (people) on 15th minute, and in a significant number of the cases this drop is under the critical values.
2. In over 90% of the cases the values of the pH of the dental plaque is not restored to the initial ones until the 60th minute after the homeopathic remedies have been taken, while some of them remain under the critical levels.
3. In one of the remedies – a liquid form of a homeopathic remedy, no case has been observed where the initial value of the pH has been restored on the 60th minute.
4. The specific intake of homeopathic remedies (at frequent intervals during the day – over 3 times, dissolving them in the mouth without the possibility of rinsing them off) and the sudden and prolonged drop in the pH of the dental plaque, caused by

their intake, creates conditions for a higher risk of development of carious processes.

TASK FIVE

Results children

Table 4. Samples with a registered drop in saliva pH by groups and time intervals of 5.5-6 and below 5.5 (by number of samples and % of samples with drop in group) in children.

Group	Drop 15 th minute				Drop 30 th minute				Drop 60 th minute			
	Below 5.5		5.5-6.0		Below 5.5		5.5-6.0		Below 5.5		5.5-6.0	
	Number of samples (n) with drop	%	Number of samples (n) with drop	%	Number of samples (n) with drop	%	Number of samples (n) with drop	%	Number of samples (n) with drop	%	Number of samples (n) with drop	%
1	n=0	0.0	n=0	0.0	n=0	0.0	n=0	0.0	n=0	0.0	n=0	0.0
2	n=5	20.0	n=12	48.0	n=1	4.0	n=11	44.0	n=0	0.0	n=6	24.0
3	n=12	48.0	n=8	32.0	n=6	24.0	n=10	40.0	n=0	0.0	n=7	28.0
4	n=3	12.0	n=19	76.0	n=1	4.0	n=10	40.0	n=0	0.0	n=4	16.0

Results adults

Table 5. Samples with a registered drop in saliva pH by groups and time intervals of 5.5-6 and below 5.5 (by number of samples and % of samples with drop in group) in adults.

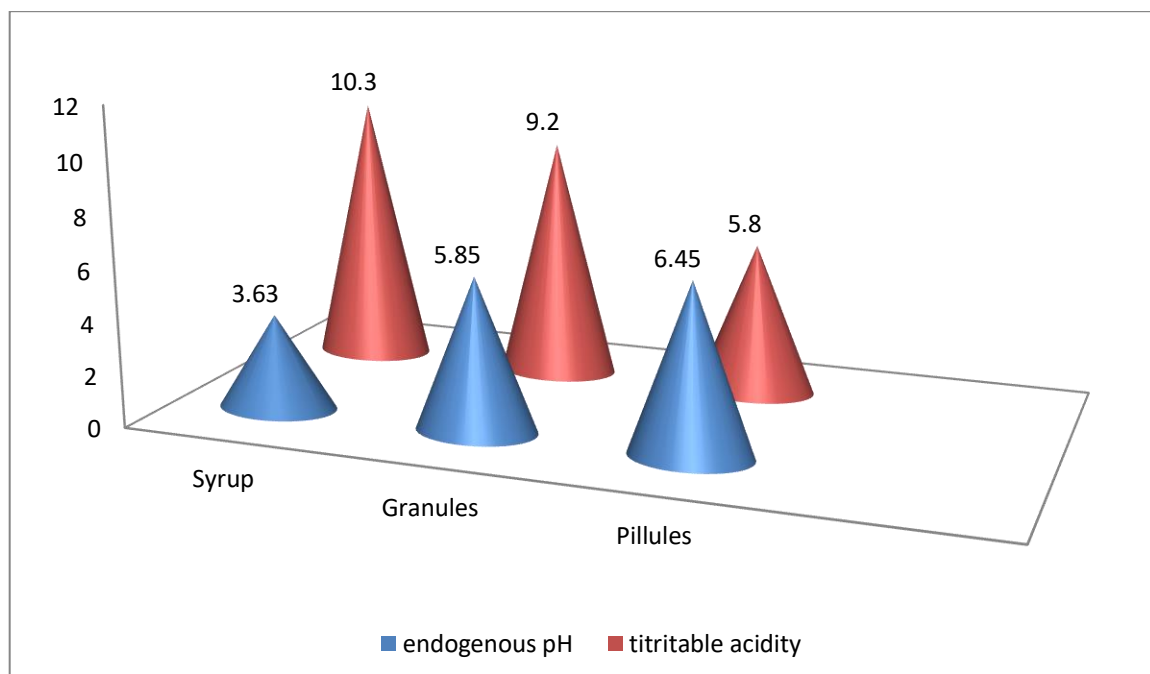
Group	Drop 15 th minute				Drop 30 th minute				Drop 60 th minute			
	Below 5,5		5,5-6,0		Below 5,5		5,5-6,0		Below 5,5		5,5-6,0	
	Number of samples (n) with drop	%	Number of samples (n) with drop	%	Number of samples (n) with drop	%	Number of samples (n) with drop	%	Number of samples (n) with drop	%	Number of samples (n) with drop	%
1	n=0	0.0	n=0	0.0	n=0	0.0	n=0	0.0	n=0	0.0	n=0	0.0
2	n=2	11.1	n=4	22.2	n=1	5.6	n=4	22.2	n=0	0.0	n=5	27.8
3	n=8	44.4	n=2	11.1	n=2	11.1	n=7	38.9	n=0	0.0	n=5	27.8
4	n=10	55.6	n=5	27.8	n=4	22.2	n=9	50.0	n=2	11.1	n=4	22.2

Conclusions:

1. The intake of homeopathic remedies causes a drop in the values of the pH of the saliva at 15th minute in 100% of the patients in both age groups.
2. Critical values of the pH=5.5 of the saliva are recorded in 40 specimens (equal number of children and adults) on the 15th minute. In 52 specimens (39 children and 13 adults) the recorded values of the pH of the saliva fall within the interval 5.5-6 again on 15th minute.
3. In 31 of the specimens (17 children and 14 adults) the drop in the pH of the saliva remains within the interval 5.5-6 on the 60th minute after the intake of the homeopathic remedy and does not reach its initial value.
4. The form of the homeopathic remedy has an impact on the time over which a drop under the critical pH of the saliva is observed, as well as on the value of this drop.
5. The age specifics may have an impact on the values of the pH of the saliva after taking a homeopathic remedy, as well as on keeping these values within these ranges for a longer period of time.
6. The characteristics of the composition of the saliva suggests a difference in the composition of the children's saliva compared to that of adults, leading to a greater drop in the pH and its slower recovery.

TASK SIX

Diagram 3. Endogenous pH and titratable acidity of the three investigated homeopathic medicines - syrup, granules and pillules.

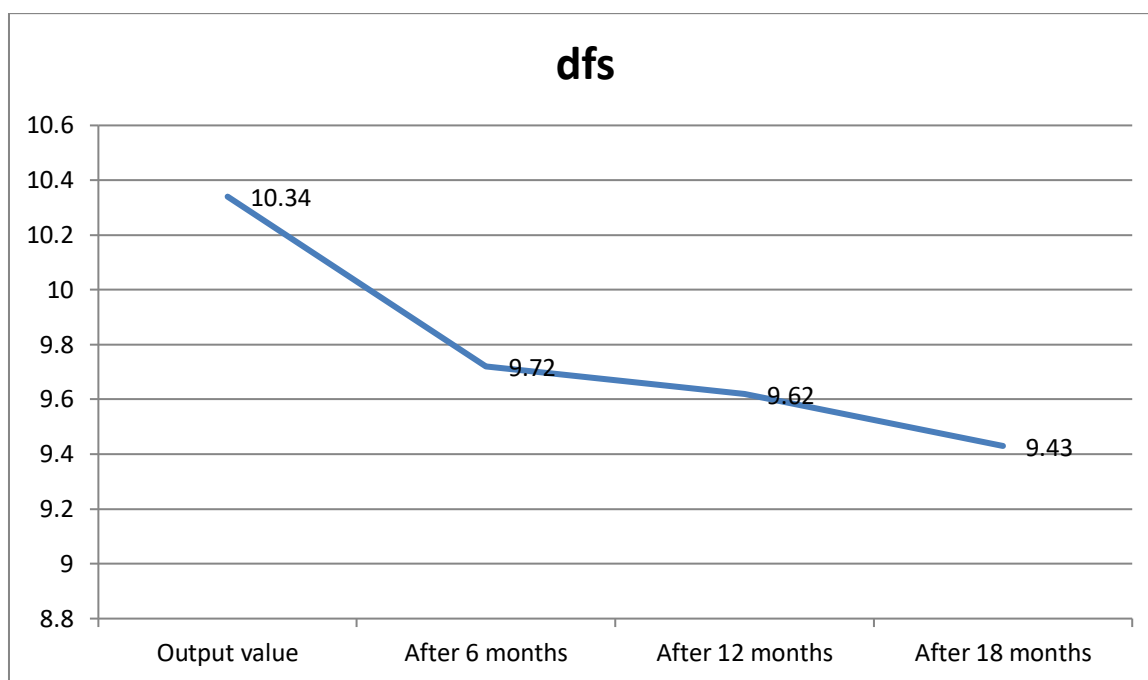


Conclusions:

1. The lowest value of endogenous pH=3,63 is recorded in the homeopathic cough syrup which has been studied.
2. The highest value of the titratable acidity (10.3) is again recorded in the cough syrup tested.
3. Our studies show that the homeopathic cough syrup has the most pronounced acidic nature.
4. The three homeopathic remedies that were studied have an acidic nature, proven by their measured endogenous pH and titratable acidity.
5. The acidic nature of the studied homeopathic remedies proven by us determines their risk potential for the onset of destructive changes on the enamel surface of the teeth in cases of frequent and prolonged intake.
6. The homeopathic syrup has the most pronounced risk potential for the onset of destructive changes on the enamel surface in the cases of frequent and prolonged intake.

TASK SEVEN

Diagram 4. Average value of the dfs-index at the specified time intervals for an 18-month period.



Conclusions:

1. The recorded values of the df(s) index confirmed the expedience of the proposed and applied personal and professional preventive measures for frequently ill children who are treated homeopathically.
2. In the case of frequently ill children treated homeopathically the application of concrete preventive measures limits the occurrence of new carious lesions and contributes to the the stopping and reversal of existing ones without the need to give up on their preferred homeopathic remedy.

CONTRIBUTIONS

Contributions of a confirmatory nature:

1. Through laboratory tests we found low endogenous pH and high titratable acidity of some of the most commonly used homeopathic remedies and proved that according to these indicators they are no different from the conventional paediatric medications.

2. Through the results from the clinical studies of the pH of saliva and dental plaque after taking homeopathic remedies, which show a drop, often below its critical value of 5.5 and is staying low for a long period of time, we confirmed and contributed to the world scientific experience in this field.

3. We compared the dental status of healthy children and that of children subject to frequent treatment with different types of medications and unambiguously proved and confirmed the high cariosity of the latter, which is especially pronounced in children treated with homeopathic therapy.

Contributions of an original nature

1. We developed and applied a set of original preventive recommendations and algorithm for prophylaxis for parents who treat their children homeopathically .

2. The efficiency of the set of preventive measures, developed and applied by us, for frequently ill children treated homeopathically as well as with a combined method of treatment is proven by monitoring the values of the dfs-index over a period of 18 months.

3. For the first time we studied the prevalence of homeopathic treatment among children from Varna province.

4. For the first time we studied the awareness of parents from Varna province, of medical professionals and doctors of dental medicine from several regions in Bulgaria regarding the composition and action of the homeopathic remedies in the oral cavity, as well as their attitude towards the need for preventive measures when they are applied.

5. The development of a validated laboratory method for assessment of the pH and free acids in some homeopathic remedies is also one of our contributions of scientifically applicable nature.