ხანმგრძლივობა,ხარისხი და სიხშირე,რაც სადღეისოდ პრაქტიკულად შეუსწავლელია. კარიესოგენული სიტუაციის კუპირებისათვის საჭიროა ინტენსიური პროფილაქტიკური ღონისძიებების რეალიზება, რაც გულისხმობს ტკბილეულის და შაქრის შემცველი სასმელების მიღების შემცირებას, ფთორშემცველი კბილის პასტებით კბილების რეგულარულ მოვლასთან და დაბალანსებულ კვებასთან ერთად.

## DENTAL FLUOROSIS PREVALENCE, SEVERITY AND ASSOCIATED RISK FACTORS IN PRE-SCHOOL AGED CHILDREN RESIDING IN FLUORIDE DEFICIENT REGIONS OF GEORGIA

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Dental Fluorosis (DF) is a disease caused by ingestion in high amounts of inorganic material Fluoride during tooth development (maturation stage), resulting in hypomineralized enamel formation [1]. Dental Fluorosis is high prevalent disease, affecting 200 million people with 25 different nations worldwide [2,3]. The most affected countries by dental fluorosis are located in Fluorosis endemic belt of the earth (India, China, Iraq, Turkey, Egypt and et ctr.) [4].

As trace amount of Fluoride is found in water, DF etiology is recognized as water related [5]. However, fluoride naturally occurs in foods and beverages like fatty fish and tea. Artificially fluoridated products like milk, salt, juices and dental materials are considered as fluoride-rich products [6], increasing fluoride daily ingestion level.

Fluoride with optimal level represents caries preventive tool by influx into enamel from saliva creating Fluorapatite, acid-resistant mineral, hence, creating less soluble enamel type from further acidic attacks [7]. According to WHO recommendations estimated daily dosage of ingested fluoride should not exceed 1 mg/kg body weight, having just beneficial effect with caries prevention and no undesirable toxic effect (WHO, 2004). DF prevalence in countries having fluoridated water above optimal concentration level (>1 ppm) varies between 15-70% [8], while DF prevalence in countries having optimally fluoridated and Fluoride deficient water is 8-10%, respectively [9]. In areas having optimal or low-fluoridated water DF occurrence is related to F ingestion by environmental factors, various Fluoride-rich products and dental materials [10]. Georgia represents the type of region, having naturally Fluoride deficient water. However, water is not the only source of Fluoride uptake on regularly bases. That serves for the main reason of DF occurrence in non-fluoridated areas.

For past couple decades there has been a great controversy between scientists regarding artificial water fluoridation [11]. As far as Fluoride (F) is the only chemical added in water for treatment/preventive purposes unlike other adjuncts that are needed for water taste or quality control. Furthermore, it is hard or even impossible to control F ingestion by different types of individuals as each person consumes different amount of water. Individuals having various diseases or athletes demand more water per day on regularly bases [12]. Beneficial role of artificial water fluoridation is controversial due to introduction of various Fluoride-rich dental materials in modern dentistry. Due to many researches F local distribution has the highest beneficial effect in caries prevention and the lowest toxicity or health issues [13]. After artificial water fluoridation there has been a decline in caries prevalence worldwide but not eradication [14], whereas DF prevalence and severity had considerably increased [15]. Furthermore, late studies prove caries occurrence together with DF and increased odds of dental caries in individuals having dental fluorosis, compared to DF free individuals [16].

**Material and methods.** A cross-sectional study was conducted to assess dental fluorosis prevalence and severity in a study group of 570 pre-school aged children (1-6 years) attending public kindergartens of Tbilisi and Akhaltsikhe, Georgia. For Dental fluorosis prevalence and severity determination, a clinical examination was conducted by a skilled dentist using TFI index. To assess dental fluorosis potential predictive risk-factors questionnaire was introduced including biological and social variables. To differentiate genuine fluorosis from fluorosis resembling defects Early Childhood Events Life-grid method was used by interviewing recruit parents/caregivers.

According to literature overview dental fluorosis prevalence in low-fluoridated areas varies from 8% to12%. Study sample size was defined considering expected average prevalence criteria. Study power was 80%, confidence interval 95%. For difference detection among two study locations study power was 80%, Confidence Interval 95%, sample size proportion by study locations was 0.4/0.6. Study sample size was defined with 570 children considering all criteria mentioned above. By two study locations population sizes proportionally, 333 children had to be examined from Tbilisi, and 237 from Akhaltsikhe. Individuals were randomly chosen using two step randomized cluster method. Public kindergartens of study regions were admitted as Natural clusters. With the first randomized generator 16 public kindergartens were chosen among Public kindergartens in study regions (Tbilisi-8, Akhaltsikhe-8). By secondary randomization, individuals within kindergartens were randomly chosen considering full study sample size, number of attendants in kindergartens, and their relative share in kindergartens. Eventually, every 8th (Tbilisi) and every 4th (Akhaltsikhe) child by the kindergarten group list was included in a study, until pre-defined number of examined study participants of each kindergarten was being achieved.

Included variables: the aim of our study was to assess DF prevalence and severity in the study groups and locations. Study purpose was also to outline DF possible predictive risk-factors in the study groups and locations. Information about DF possible associated risk-factors was collected through questionnaire including different social and biological factors as potential DF risk-factors, like: Age, Gender, Location, Coal-burning environ-

ment used in different periods of life (Including mother's pregnancy period), hereditary or acquired diseases, ingested type and amount of water per day, ingested tea in different stages of life (including mother's pregnancy period), complications during pregnancy, child's eating patterns (various types of foods, or poor nutritional status), individual oral hygiene type and frequency, types of dental materials used, dentifrice ingestion habit, aluminum used for food boiling purposes, ingestion of natural juices.

Descriptive statistics was used for included variables. For detection of connection between dichotomic variables Pearson Chi-Square test and its modification Fisher's Exact Test were used. For determination of association power between dichotomic variables Odds ratio was introduced with 95% Confidence Interval. In order to detect independent predictive risk-factors multivariate logistic regression forward selection was used. We used logistic regression analysis to assess the effect of high tea consumption on DF. Statistical analysis was performed using SPSS (Statistical Package for Social Sciences) 21st version (SPSS Inc, Chicago, Illinois).

**Results and discussion.** The overall prevalence of Dental Fluorosis in study group was 6.3%. (95% CI; (4.3 - 8.3)). By study locations DF prevalence in Akhaltsikhe was 4.2% (95% CI; (1.6-6.8)) and 7.8% in Tbilisi (95% CI; (4.9-10.7)). There was no statistically significant prevalence difference in study locations (p>0.05). DF prevalence was similar among different genders. 6% of girls were affected with DF (95% CI; (2.2 - 8.8%)), whereas 6.5% of boys had been diagnosed with DF (95% CI; (3.7- 9.3)). According to TFI index, mean number of primary teeth affected by DF was 2.5 (St. D. 1.4. Med. 2. Min. 1. Max. 6). DF severity mean value with TFI index in primary dentition was 1.36. and 1.14 in permanent teeth, respectively. Total number of permanent teeth affected by DF was 2 (Fig.).

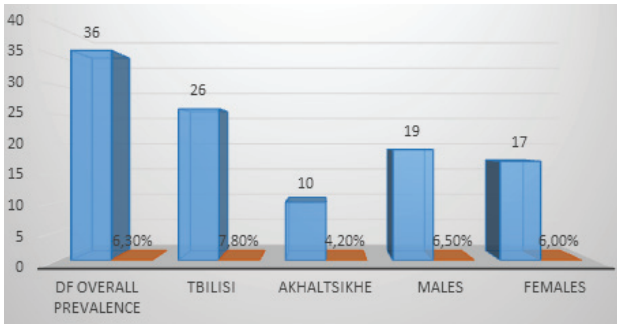


*Fig. DF Prevalence Descriptive Analysis*

DF prevalence was significantly high (22.0%) among children consuming ≥2 cups tea/day, compared with children taking 0-1 cup tea/day (1.6%) (Pearson Chi-Square 71.2; df 1; p<0.001). Children that regularly were consuming≥2 cups tea/day had high odds of DF (OR=17.3, 95% CI; (7.4-40.7)). Among 36 participants having DF, 29 (80.6%) individuals were taking ≥2 cups tea/day, while 7 (19.4%) individuals mentioned ingestion of 0-1 cup tea/day (Table 1).

Odds of having DF was 5.8 times higher in children whose mothers were exposed by indoor coal-burning during pregnancy (OR=5.8; (95% CI; (2.1- 15.9)). Therefore, indoor coal-burning during pregnancy was associated with high DF prevalence in study children (6/22; 27.3%) compared to those, whose mothers did not share the same environmental effects. (29/477; 6.1%) (Fisher's Exact Test 14.48; DF 1; p=0.003) (Table 2).

There was no statistically significant association between water type used and amount ingested affecting DF prevalence and severity (Table 3).

Overall prevalence of DF in a study group was 6.3%. (36 children) (95% CI;(4.3 - 8.3)). There was no statistically significant difference in DF prevalence between study regions (p>0.05). Indicating Socio-economic and Geographic conditions indifference in DF occurrence. Social and Biologic factors effecting Fluoride exposure increase Odds of DF in Fluoride deficient areas.

Dental fluorosis affects equally both genders. 6.5% of males and 6.0% girls had defected teeth (p<0.005). Results indicate that DF occurs equally in both gender. According to our study results the most affected dentition type by DF was primary dentition. Only three cases of DF were diagnosed in permanent dentition. But results, indicating DF high prevalence in primary dentition should not be misinterpreted, due to anatomical and physiological developmental status (1-6 years) study participants mostly had primary dentition.

*Table 1. High tea consumption, DF prevalence, and increased Odds*

| Tea consumption (Per day) | DF n (%) n=36 | No DF n (%) n=534 | p value | OR (95% CI) |
|---|---|---|---|---|
| 0-1 | 7 (19.4) | 431 (80.7) | <0.001 | 17.3 (7.4- 40.7) |
| **≥2** | 29 (80.6) | 103 (19.3) | | |

*Table 2. Indoor coal-burning effect increasing Odds of DF occurrence and prevalence*

| Indoor Coal-burning during pregnancy | DF n (%) n=35 | No DF n (%) n=464 | p value | OR (95% CI) |
|---|---|---|---|---|
| Yes | 6 (17.1) | 16 (3.4) | 0.003 | 5.8 (2.1-15.9) |
| No | 29 (82.9) | 448 (96.6) | | |

*Table 3. Ingested water amount and DF*

| Water ingested per day | DF n (%) n=36 | No DF n (%) n=534 | p value | OR (95% CI) |
|---|---|---|---|---|
| **0.5 l** | 29 (80.6) | 414 (77.5) | 0.673 | 0.8 (0.4- 1.9) |
| **>1 l** | 7 (19.4) | 120 (22.5) | | |

Diagnosed 33 DF cases in primary dentition, indicated high possibility for affected children to have DF in permanent teeth.DF occurs due to high Fluoride ingestion during tooth development (Maturation stage), and has abrupt effect on apatite normal formation. As primary teeth have thinner and less mineralized enamel than that in permanent teeth, Fluoride toxic effect is leading to less changes in tooth structure and less severe forms occur. Having DF in primary dentition serves as a "Biomarker" for high risk DF existence in permanent dentition. Doctor diagnosing DF in primary dentition should raise awareness about preventive nutritional or behavioral habits of patient.

According to multivariate logistic regression analysis the main predictor of DF in primary dentition was indoor coal-burning environment. Affecting pregnant women during their pregnancy. Indoor coal burning increasing Fluoride concentration in the air and polluting furniture or goods indoor, easily crosses placental barrier exposing embryo to F toxic effect on developing teeth. Indoor coal-burning should be minimized in pregnancy to avoid F toxicity both in pregnant mother and future oral health of a child.

Regular high tea consumption (≥2 cups tea/day) both by pregnant mothers and study children was increasing odds of DF (OR=17.3 (95% CI; 7.4-40.7)). As far as tea leaves accumulate F from surrounding environment, especially mature leaves containing 20 times more F than immature types [17], regular high tea consumption in Fluoride-deficient area increases Fluoride absorption rate putting individuals under high risk of DF occurrence. Minimizing regular high tea consumption during pregnancy and early years of life of a child will serve as preventive tool in a study community.

Dental Fluorosis prevalence is low with mild forms in study regions in fluoride deficient areas. Etiology of DF in study regions is not water related. Exposure to diverse fluoride sources like indoor coal-burning and high tea consumption in non-fluoridated areas is a risk-factor of dental fluorosis in study community. To reduce DF occurrence in study regions, awareness should be raised considering environmental and nutritional high F ingestion, being the only sources for high Fluoride exposure. Educational and informative involvement of local population will be efficient in preventing DF occurrence.

Study results indicating regular high tea consumption as the main DF risk-factor in non-fluoridated area, put certain Georgian citizens at high risk of DF, due to their cultural and ethnic characteristics (Marneuli population, having Azerbaijani ethnicity and culture, consume high amounts of tea on regularly bases). Further epidemiologic studies should be conducted to have better understanding about Marneuli population DF occurrence and severity.

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**SUMMARY**

**DENTAL FLUOROSIS PREVALENCE, SEVERITY AND ASSOCIATED RISK FACTORS IN PRE-SCHOOL AGED CHILDREN RESIDING IN FLUORIDE DEFICIENT REGIONS OF GEORGIA**

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The aim of study was to assess prevalence, severity, and associated risk-factors for Dental Fluorosis in Pre-School children (1-6 years) in Fluoride deficient regions (1) Tbilisi (F=0.08-0.22 mg/l) and (2) Akhaltsikhe, (F<0.4 mg/l) Georgia, having different geographic location and socio-economic conditions. A cross-sectional study was carried out on 570 pre-school aged children (1-6 years) attending public kindergartens of Tbilisi and Akhaltsikhe region. Descriptive analysis was performed for Dental Fluorosis prevalence and severity using Thylstrup-Fejerskov Index (TFI). Correlative analysis was done to assess information about possible acquired risk-factors through questionnaire including biological and social variables. To differentiate genuine Dental fluorosis from other non-carious resembling defects ECEL method was introduced. For Fluoride concentration determination in potable water (2) ISO 10359-1:1992 Electrochemical probe as ion-selective electrode method was used. Information about F concentration in Tbilisi tap water (1) was obtained by GWP. (Georgian Water and Power, 2019). The overall Prevalence of Dental Fluorosis in study group was 6.3% (36 Children) (95% CI;(4.3 - 8.3)). There was no statistically significant difference in the level of Dental Fluorosis prevalence between rural and urban residents (P>0.05). Dental Fluorosis prevalence was similar in both gender groups. 6.0% of girls had dental fluorosis (95% CI 2.2% - 8.8%), whereas DF prevalence in boys was 6.5% (95% CI3.7% - 9.3%), respectively. Regular brushing and dentifrices ingestion were not effecting DF prevalence and severity (p>0.05). Indoor coal-burning environment increasing airborne Fluoride absorption during pregnancy was recognized as a risk-factor for dental fluorosis occurrence in children (OR=5.8 (95% CI; 2.1-15.9)). High tea consumption (≥2 cups/day) was increasing Odds of DF occurrence (OR=17.3 (95% CI; 7.4-40.7)).

Exposure to diverse fluoride sources like indoor coal-burning and high tea consumption in non-fluoridated areas is a risk-factor of Dental Fluorosis in study community.

**Keywords:** Dental Fluorosis, Low-fluoridated area, Prevalence, Severity, Risk-factors, TFI Index.

**РЕЗЮМЕ**

**РАСПРОСТРАНЕННОСТЬ, ТЯЖЕСТЬ И АССОЦИИРОВАННЫЕ ФАКТОРЫ РИСКА ДЕНТАЛЬНОГО ФЛЮОРОЗА У ДЕТЕЙ ДОШКОЛЬНОГО ВОЗРАСТА, ПРОЖИВАЮЩИХ В РЕГИОНАХ ГРУЗИИ С ДЕФИЦИТОМ ФТОРА**

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Целью исследования явилось установление распространенности, тяжести и факторов риска дентального флюороза у детей дошкольного возраста (до 6 лет) в регионах Грузии с дефицитом фтора с различными географическими и социально-экономическими особенностями (г. Тбилиси, F=0,008-0,22 мг/л, Самцхе-Джавахети, F<0,4 мг/л).

В рамках кросс-секционных исследований изучены 570 детей - воспитанников государственных детских садов в возрасте от 1 года до 6 лет в г. Тбилиси и Самцхе-Джавахетском регионе. На основании описательных популяционных исследований изучены распространенность и тяжесть дентального флюороза посредством индекса TFI. В аналитической части исследования изучены факторы риска, вызывающие дентальный флюороз. Для интервьюирования родителей/опекунов обследованных детей использован вопросник, содержащий биологические и социальные переменные. Для дифференциальной диагностики дентального флюороза от других дефектов некариозного происхождения использован метод ECEL. Определена концентрация фтора в питьевой воде в Самцхе-Джавахети методом электрохимического анализа по стандарту ISO 10359-1: 1992, а в г. Тбилиси - данные о содержании фтора в питьевой воде - GWP 2019 года.

Дентальный флюороз наблюдался у 36 (6,3%) детей исследуемой группы (95% CI; 4.3-8.3). Показатель распространенности дентального флюороза по двум локациям исследования статистически достоверно не различался (p>0,05). Дентальный флюороз развивается одинаково как у детей женского пола - 6,0% (95% CI; 2,2–8,8), так и мужского - 6,5% (95% CI; 3,7–9,3), p<0,05. Статистически достоверной положительной корреляционной связи между регулярной чисткой зубов, использованием зубной пасты и развитием дентального флюороза не наблюдалось (p>0,05). Использование во время беременности матери открытого источника огня в бытовых целях увеличивает риск развития флюороза у детей - OR=5.8 (95% CI; 2.1-15.9). Регулярное потребление чрезмерного количества чая (≥2 стакана в день) вызывает увеличение риска развития флюороза зубов (OR =17.3, 95% CI; 7,4-40,7).

Основными факторами риска развития дентального флюороза у неэкспозируемой популяции, проживающей в регионах с дефицитом фтора, являются использование в бытовых целях открытого источника огня и регулярное потребление чрезмерного количества чая.

რეზიუმე

დენტალური ფლუოროზის გავრცელება, სიმძიმე და მასთან ასოცირებული რისკის ფაქტორები საქართველოში არსებულ ფთორ-დეფიციტურ რეგიონებში მცხოვრებ 6 წლამდე ასაკის ბავშვებში

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საქართველოს უნივერსიტეტი, ჯანმრთელობის მეცნიერებების სკოლა, თბილისი საქართველო

კვლევის მიზანს წარმოადგენდა საქართველოს განსხვავებული გეოგრაფიული და სოციო-ეკონომიკური თავისებურებების მქონე ფთორ-დეფიციტურ რეგიონებში (ქ. თბილისი, F=0.008-0.22 მგ/ლ, სამცხე-ჯავახეთი, F<0.4 mg/l) მცხოვრებ 6 წლამდე ასაკის (სკოლამდელი ასაკი) ბავშვებში დენტალური ფლუოროზის გავრცელების, სიმძიმისა და გამომწვევი რისკ-ფაქტორების შესწავლა.

ჯვარედინ-სექციური კვლევის ფარგლებში შესწავლილია ქ. თბილისისა და სამცხე-ჯავახეთის რეგიონებში არსებული საჯარო ბაღების (1-6 წლის) 570 აღსაზრდელი ბავშვი. აღწერითი პოპულაციური კვლევის საფუძველზე მოხდა დენტალური ფლუოროზის გავრცელებისა და სიმძიმის შესწავლა. აღნიშნული კვლევისათვის გამოყენებული იყო TFI ინდექსი. კვლევის ანალიტიკურ ნაწილში მოხდა დენტალური ფლუოროზის გამომწვევი რისკ-ფაქტორების შესწავლა, რისთვისაც გამოკვლეულ ბავშვთა მშობლებთა/მეურვეთა ინტერვიუირებისათვის გამოყენებული იყო ბიოლოგიური და სოციალური ცვლადების შემცველი კითხვარი. დენტალური ფლუოროზის დიფერენციული დიაგნოზისათვის სხვა, არაკარიესული წარმოშობის დეფექტებისაგან, გამოყენებული იყო ECEL მეთოდი. კვლევის რეგიონებში არსებული სასმელი წყლის ფთორის კონცენტრაცია განისაზღვრა: სამცხე ჯავახეთში ელექტროქიმიური ანალიზის ISO 10359-1:1992 სტანდარტის მიხედვით, ქ. თბილისში - GWP 2019 წლის სასმელ წყალში ფთორის შემცველობის მონაცემების მიხედვით.

საკვლევ ჯგუფში დენტალური ფლუოროზი აღენიშნა 36 ბავშვს, რაც გამოკვლეულ ბავშვთა აბსოლუტური რაოდენობის 6.3%-ს შეადგენს (95% CI; 4.3 - 8.3).კვლევის ორი ლოკაციის მიხედვით დენტალური ფლუოროზის გავრცელების მაჩვენებლები სტატისტიკურად სარწმუნოდ არ განსხვავდება ერთმანეთისაგან (p>0.05). დენტალური ფლუოროზი თანაბრად ვითარდება, როგორც მდედრობითი სქესის - 6.0% (95% CI; 2.2 - 8.8),ისე მამრობითი სქესის მქონე ინდივიდებში - 6.5% (95% CI; 3.7 - 9.3) (p<0.05). სტატისტიკურად სარწმუნო დადებითი კორელაციური კავშირი არ აღინიშნება კბილების რეგულარულ ხეხვას, კბილის პასტის გამოყენებასა და დენტალური ფლუოროზის განვითარებას შორის (p>0.05). დედის ფეხმძიმობისას ღია ცეცხლის წყაროს საყოფაცხოვრებო მიზნით გამოყენება ბავშვებში ზრდის დენტალური ფლუოროზის განვითარების რისკს (OR =5.8; 95% CI; 2.1-15.9). ჭარბი რაოდენობით ჩაის რეგულარული მიღება (2 ჭიქა/დღე), იწვევს დენტალური ფლუოროზის განვითარების რისკის მატებას (OR =17.3; 95% CI; 7.4-40.7).

ფთორ-დეფიციტურ რეგიონებში მცხოვრებ არაექსპოზირებულ პოპულაციაში დენტალური ფლუოროზის ძირითად გამომწვევ რისკ-ფაქტორებს წარმოადგენს ღია ცეცხლის წყაროს საყოფაცხოვრებო მიზნით განმოყენება და ჩაის რეგულარული ჭარბი რაოდენობით მიღება.

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## УРГЕНТНЫЕ ХИРУРГИЧЕСКИЕ ВМЕШАТЕЛЬСТВА ПРИ БОЛЕЗНИ КРОНА У ДЕТЕЙ

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Болезнь Крона (БК) – заболевание желудочно-кишечного тракта неясной этиологии, которое характеризуется трансмуральным гранулематозным воспалением кишечной стенки с прогрессирующим развитием кишечных и внекишечных осложнений [1,2,7]. Ориентировочное количество больных БК в Украине составляет 30.33 на 100000 населения, из них 48% - случаи со средней и тяжелой степенью активности воспалительного процесса, хотя точное количество пациентов неизвестно из-за отсутствия общего реестра патологии [2]. Трансмуральное воспаление охватывает все слои кишечной стенки, вследствие чего, несмотря на проводимую терапию, часто возникают хирургические осложнения заболевания – кишечные перфорации, острая кишечная непроходимость, кишечные кровотечения, внутрибрюшные инфильтраты, большинство из них требует неотложной помощи [4,6,8,11]. Количество осложненных форм БК не имеет тенденции к уменьшению. Так, на протяжении 10 лет от момента установления диагноза они возникают у значительного количества пациентов (около 90%), а хирургические вмешательства выполняются в 50% случаев [8]. В 2006 г. K.A. Diefenbach and C.K. Beuer опубликовали обзор литературы по диагностике и лечению БК у детей, в котором показали, что более половины детей с БК требуют хирургического лечения [5]. Перианальные осложнения развиваются приблизительно у 26-57% пациентов с БК, в специализированной литературе даже введено опеределение «перианальная болезнь Крона» [3,13].

Современная концепция хирургического лечения пациентов с БК базируется на выполнении экономных резекций кишки и проведении органосохраняющих операций. В последние годы появилось значительное количество работ, посвященных применению лапаросокпических вмешательств при БК у детей [9,10,12].

На сегодняшний день БК относится к тем заболеваниям, диагностика и лечение которых у практических врачей вызывает значительные трудности, а единая хирургическая тактика при осложненных формах обсуждается специалистами всего мира. Врачам педиатрического профиля все чаще приходится сталкиваться с проблемами оказания помощи детям с осложненной БК. Перед детскими хирургами стоит острая проблема необходимости проведения дальнейших исследований по своевременной диагностике и адекватному лечению осложненных форм БК. Учитывая множество послеоперационных осложнений, рецидивов хирургических осложнений БК у детей, проблема требует дальнейшего изучения и разработки единой стратегии лечения данного контингента пациентов.

Цель исследования – оценка эффективности хирургического лечения детей с осложненной болезнью Крона.

**Материал и методы.** Проанализированы результаты диагностики и лечения 23 детей с хирургическими осложнениями БК – пациентов 3 детских хирургических отделений за период с 2008 по 2020 гг. Все дети поступили в стационар