ORIGINALNI RAD

UDK BROJEVI:
616.98-053.2-036.22(497.11)"2015/2019"
DOI: https://doi.org/10.5937/zdravzast50-32454

EPIDEMIOLOŠKE KARAKTERISTIKE EPIDEMIJA BOLESTI ŠAKA, STOPALA I USTA U VRTIĆIMA U BEOGRADU ZA PERIOD 2015 – 2019. GODINE

Sonja Giljača[1], Slavica Maris[1], Nataša Rančić[2], Milutin Mrvaljević[3], Zorica Mrvaljević[3]

[1] Gradski zavod za javno zdravlje Beograd, Beograd, Republika Srbija
[2] Institut za javno zdravlje Niš, Niš, Republika Srbija
[3] Urgentni Centar - Klinički Centar Srbije, Privatna ordinacija „IVAL", Beograd, Republika Srbija

SAŽETAK

Uvod/Cilj: Bolest šaka, stopala i usta (engl. *Hand, Foot and Mouth Disease* - HFMD) prvi put je u svetu prijavljena 1957. godine u Kanadi, dok je na teritoriji Beograda prva epidemija ovog oboljena registrovana 2014. godine. Cilj ovoga rada je da se analiziraju epidemiološke karakteristike epidemija HFMD u vrtićima u Beogradu za period od 2015. do 2019. godine.
Metode: Primenjena je deskriptivna epidemiološka studija. Za analizu epidemija korišćeni su podaci iz epidemioloških upitnika i informacije Centra za kontrolu i prevenciju bolesti Gradskog zavoda za javno zdravlje Beograd, medicinska dokumentacija i rezultati virusoloških analiza obavljenih u Referentnoj laboratoriji Instituta za virusologiju, vakcine i serume „Torlak".
Rezultati: U periodu od 2015. do 2019. godine registrovano je 20 epidemija HFMD u kojima je ukupno obolelo 220 dece. Ukupan broj obolele dece u epidemijama se kretao od 9 do 102. Dečaci su neznatno češće obolevali (52%), kao i osobe uzrasta dve godine (51%). Svi oboleli imali su makulopapulozne kožne promene, a veći deo povišenu temperaturu (96%) i malaksalost (68%). Enterovirus je detektovan *Real-Time* PCR metodom kod dva obolela deteta. Bolest nije bila praćena komplikacijama.
Zaključak: Pravovremenom primenom protivepidemijskih mera i to prijavom oboljenja, izolacijom i lečenjem obolelih, poštovanjem mera opšte i lične higijene, kao i merama tekuće dezinfekcije u kolektivu, uspešno se može zaustaviti dalje širenje infekcije.

Ključne reči: bolest šaka, stopala i usta, ospa, enterovirus, epidemija, predškolski uzrast

Uvod

Bolest šaka, stopala i usta (engl. *Hand, Foot and Mouth Disease* - HFMD) je zarazna bolest koja se najčešće javlja kod dece mlađe od 10 godina, a ređe kod odraslih (1). Manifestuje se povišenom telesnom temperaturom, vezikularnim osipom na šakama, stopalima i gluteusu, kao i vezikuloznim promenama na oralnoj sluzokoži koje podsećaju na herpanginu. Kod većine dece bolest se ispoljava u blagoj formi, ali kod malog procenta može doći do ozbiljnih komplikacija, u vidu meningitisa, encefalitisa, akutne flakcidne paralize i neurorespiratornog sindroma. Period inkubacije je kratak i iznosi 3-6 dana.

Prouzrokovač bolesti je virus iz grupe enterovirusa. Koksaki A16 i enterovirus 71 predstavljaju najčešće uzročnike bolesti šaka, stopala i usta. Infekcija se prenosi direktnim kontaktom sa zaraženom osobom putem: pljuvačke, fecesa, sadržaja kožnih promena, respiratornih kapljica i indirektno preko kontaminiranih predmeta. Virus se može izolovati iz ždrela i stolice nekoliko dana pre pojave simptoma i perzistirati nedeljama nakon kliničkog ozdravljenja (do 2 nedelje u ždrelu, a u stolici i do 11 nedelja) (1-3).

Dijagnoza se najčešće postavlja na osnovu kliničke slike i detekcijom virusa *Real-Time* PCR metodom. Većina obolelih se oporavi u toku nekoliko nedelja bez rezidualnih sekvela, pri čemu akutna faza oboljenja obično traje 10 do 14 dana. Terapija je simptomatska (4,5).

Epidemije HFMD javljaju se u kolektivima (vrtićima, školama, kampovima), zdravstvenim ustanovama i u porodicama (4,6-8). Ovo oboljenje prvi put je prijavljeno 1957. godine u Kanadi i od

ORIGINAL ARTICLE

UDK NUMBERS:
616.98-053.2-036.22(497.11)"2015/2019"
DOI: https://doi.org/10.5937/zdravzast50-32454

EPIDEMIOLOGICAL CHARACTERISTICS OF OUTBREAKS OF HAND, FOOT AND MOUTH DISEASE IN KINDERGARTENS IN BELGRADE DURING THE PERIOD FROM 2015 TO 2019

Sonja Giljaca[1], Slavica Maris[1], Natasa Rancic[2], Milutin Mrvaljevic[3], Zorica Mrvaljevic[3]

[1] Institute of Public Health of Belgrade, Belgrade, Republic of Serbia
[2] Institute of Public Health of Nis, Nis, Republic of Serbia
[3] Emergency Centre -Clinical Centre of Serbia, Private ordination "IVAL"

SUMMARY

Introduction/Aim: For the first time in the world Hand, Foot and Mouth Disease was reported in 1957 in Canada, while the first outbreak of this disease was registered in Belgrade in 2014.The aim of this paper is to analyze epidemiological characteristics of outbreaks of HFMD, which occurred in kindergartens in Belgrade in the period from 2015 to 2019.
Methods: A descriptive epidemiological study was applied. Data were collected from epidemiological questionnaires, Reports of Center for Disease Control and Prevention, City Institute of Public Health Belgrade, from the case history of sick children, and using the results of the virological and serological analyses that had been done in the Reference Laboratory of the Institute of Virology, Vaccines, and Sera "Torlak".
Results: In the period from 2015 to 2019, 20 HFMD outbreaks were registered, in which a total of 220 children became ill. The total number of infected children in outbreaks ranged from 9 to 102. Boys were slightly more often ill (52%), as well as persons aged two years (51%). All patients had a maculopapular rash, and most had a fever (96%) and malaise (68%). Enterovirus was detected by Real-Time PCR in two infected children. The disease passed without any complications.
Conclusion: By timely application of anti-epidemic measures, by reporting the disease, isolation and treatment of patients, respecting the measures of general and personal hygiene, as well as measures of current disinfection in the collective, it is possible to successfully stop further spread of the infection.

Key words: hand, foot and mouth disease, maculopapular rash, enterovirus, outbreak, preschool age

Introduction

Hand, Foot and Mouth Disease (HFMD) is a contagious disease that mainly affects children younger than 10, and more rarely adults (1). The main manifestations are fever, vesicular rashes on hands, feet and buttocks, and ulcers in the oral mucosa that remind of herpangina. Manifestations are usually mild, but a small proportion of children may experience severe complications, such as meningitis, encephalitis, acute flaccid paralysis and a neurorespiratory syndrome. The incubation period is short, usually 3-6 days.

The cause of the disease is a virus from the group of enteroviruses. Coxsackie virus A16 and enterovirus 71 are the most common causes of hand, foot and mouth disease. The infection is transmitted by direct contact with an infected person: saliva, feces, fluids of skin changes, respiratory droplets, and indirectly via contaminated things. The virus can be isolated from pharynx or feces a few days before the appearance of symptoms and it can persist weeks after clinical recovery (to 2 weeks in the pharynx and 11 weeks in feces) (1-3).

The diagnosis is most frequently established on the basis of clinical picture and the virus is detected with the help of Real-Time PCR method. The majority of people with the disease recover within several weeks without residual sequelae, while the acute phase of the disease usually lasts 10 to 14 days. The therapy is symptomatic (4,5).

tada se registruje širom sveta. Na teritoriji Beograda prva epidemija bolesti šaka, stopala i usta registrovana je 2014. godine (9,10).

Cilj ovoga rada je da se analiziraju epidemiološke karakteristike epidemija HFMD koje su se javile u vrtićima u Beogradu tokom perioda od 2015. do 2019. godine.

Metode

Primenjena je deskriptivna epidemiološka studija. Za analizu epidemijskog javljanja HFMD korišćeni su podaci iz epidemioloških upitnika i informacije Centra za kontrolu i prevenciju bolesti Gradskog zavoda za javno zdravlje Beograd, medicinska dokumentacija i rezultati virusoloških analiza obavljenih u Referentnoj laboratoriji Instituta za virusologiju, vakcine i serume „Torlak". Statistička obrada podataka urađena je primenom SPSS programa (IBM SPSS Statistics 22).

Rezultati

U periodu od 2015. do 2019. godine registrovano je 20 epidemija HFMD u kojima je ukupno obolelo 220 dece iz 15 beogradskih vrtića. Najveći broj obolele dece registrovan je u opštini Novi Beograd 140 (64%), Obrenovac 39 (18%) i Voždovac 18 (8%), a najniži u opštinama Čukarica 12 (5%) i Palilula 11 (5%). U ostalim opštinama Beograda nije registrovano obolevanje.

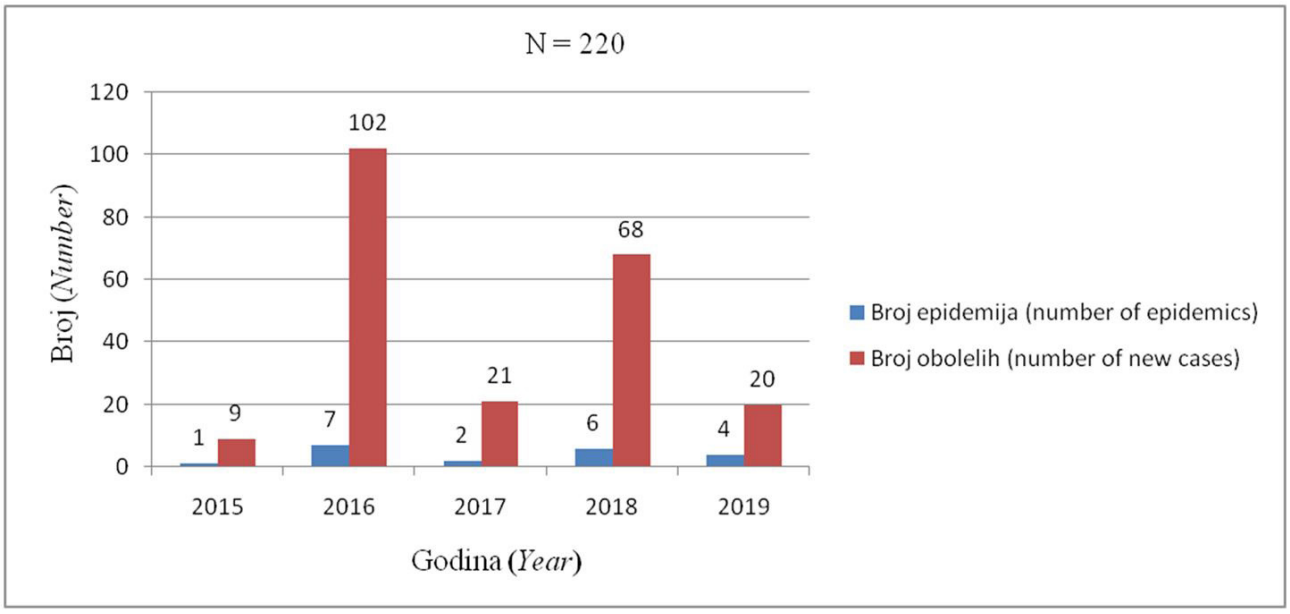
U posmatranom periodu godišnji broj epidemija se kretao od jedan do 7, a broj obolelih od 9 do 102 (Grafikon 1). Najveći broj prijavljenih epidemija, i to sedam, zabeležen je tokom 2016. godine. U istoj godini bilo je 102 obolelih, što predstavlja najveći ukupan broj obolelih u jednoj godini. Najmanji broj epidemija (i to samo jedna), kao i najmanji broj obolelih u epidemijama (samo devet obolelih), registrovani su 2015. godine. Enterovirus je detektovan *Real-Time* PCR metodom kod dva obolela deteta (2015. i 2016. godine).

Tokom posmatranog petogodišnjeg perioda, najveći broj obolelih od HFMD je bio u drugoj godini života (51%), a najmanje u šestoj (1%) (Tabela 1). Dečaci (52%) su nešto češće obolevali od HFMD nego devojčice (48%). Među obolelima ne postoji statistički značajna razlika u godinama starosti između dečaka i devojčica (χ^2=2,633, df=5, p=0,756, p > 0,05).

Najveći broj obolele dece registrovan je trećeg dana (19%), četvrtog (18%) i drugog dana (16%) od pojave prvog slučaja oboljenja u kolektivu, što odgovara inkubaciji HMFD, koja iznosi 3 – 6 dana (Tabela 2).

Kod svih obolelih klinička slika se karakterisala pojavom makulopapuloznih kožnih promena na predilekcionim mestima, a kod 96% dece došlo je do pojave povišene temperature i kod 68% malaksalosti (Grafikon 2).

Ospa je bila prisutna kod najvećeg broja dece na stopalima (29%), a zatim oko usta 26% i na šakama (26%) (Grafikon 3). Ređe se javljala na leđima, u glutealnoj i genitalnoj regiji.



Grafikon 1. Broj epidemija i novoobolelih od bolesti šaka, stopala i usta, Beograd, 2015 – 2019. godine

Outbreaks of HFMD appear in the collectives (kindergartens, schools, camps), health care institutions and families (4,6-8). This disease was reported for the first time in Canada in 1957 and since then it has been registered around the world. The first outbreak of hand, foot and mouth disease was registered in the territory of Belgrade in 2014 (9,10).

The aim of this work was to analyze the epidemiological characteristics of outbreaks of HFMD that appeared in kindergartens in Belgrade during the period 2015-2019.

Methods

A descriptive epidemiological study was applied. Data from the epidemiological questionnaires and information from the Center for Disease Control and Prevention of the City Institute of Public Health Belgrade, medical history, and the results of virological analyses that had been done in the Reference Laboratory of the Institute of Virology, Vaccines and Sera "Torlak" were used for the analysis of epidemics of HFMD. The statistical analysis of data was done with the help of SPSS package (IBM SPSS Statistics 22).

Results

During the period 2015-2019, 20 outbreaks of HFMD were registered when 220 children from kindergartens in Belgrade got the disease. The largest number of children with the disease was registered in the municipality of Novi Beograd 140 (64%), Obrenovac 39 (18%) and Vozdovac 18 (8%), while the lowest number was in the municipality of Cukarica 12 (5%) and Palilula 11 (5%). The disease was not registered in other municipalities.

During the observed period, the annual number of epidemics ranged from 1 to 7, while the number of ill people ranged from 9 to 102 (Figure 1). The largest number of epidemics that were reported was registered in 2016, that is, 7 epidemics. During the same year, there were 102 ill people, which was the largest total number of ill people during one year. The smallest number of epidemics (only one), and the lowest number of ill persons in an epidemic (only 9 ill persons) was registered in 2015. Enterovirus was detected by the Real-Time PCR method in two ill children (2015 and 2016).

During the observed five-year-period, the largest number of children with HFMD was in their second year (51%), while the smallest number was in their sixth year (1%) (Table 1). Boys (52%) were affected by HFMD more frequently than girls (48%). There was no statistically significant difference regarding age between boys and girls (χ^2=2.633, df=5, p=0.756, p<0.05).

The greatest number of ill children was registered on the third day (19%), the fourth (18%) and the second day (16%) from the appearance of

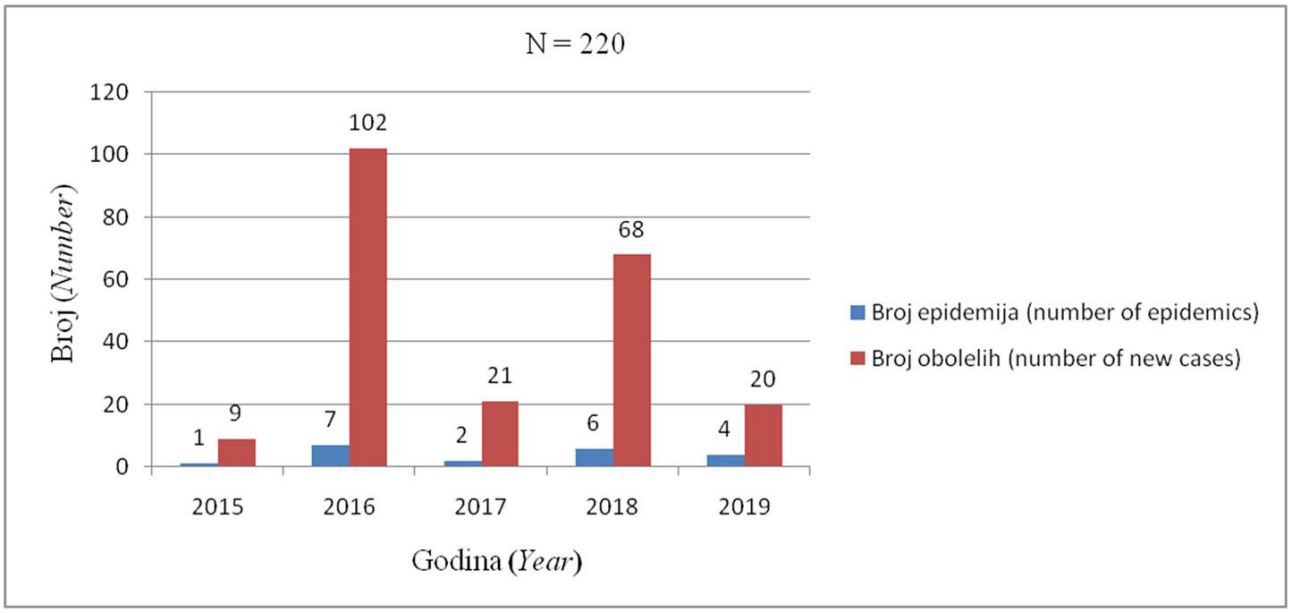


Figure 1. Number of epidemics and new cases of hand, foot and mouth disease, Belgrade, 2015 – 2019

Tabela 1. Distribucija novoobolelih od bolesti šaka, stopala i usta po polu i uzrastu, Beograd, 2015 – 2019. godine

Uzrast (godine)	Dečaci Broj (%) N=114	Devojčice Broj (%) N=106	Ukupno Broj (%) N=220
1	15 (13,2)	16 (15,1)	31 (14,8)
2	58 (50,9)	56 (52,8)	114 (51,8)
3	28 (24,6)	23 (21,7)	51 (23,2)
4	7 (6,1)	6 (5,7)	13 (5,9)
5	5 (4,4)	2 (1,9)	7 (3,2)
6	1 (0,9)	3 (2,8)	4 (1,8)

Sezonska distribucija ukazuje da je najveći broj obolelih registrovan u maju - 89 i junu– 40, a najniži u avgustu - 5 i decembru- 6, dok u januaru, februaru i aprilu mesecu nije bilo obolelih (Grafikon 4).

Diskusija

U našoj studiji, u periodu od 2015. do 2019. godine registrovano je 20 epidemija HFMD u 15 beogradskih vrtića, pri čemu je najveći broj obolele dece (102) bio u 2016. godini, a najmanji (samo devetoro dece) u 2015. godini. Najveći broj obolelih je bio u drugoj godini (51%), a najmanji u šestoj godini (1%). U epidemiji bolesti šaka, stopala i usta u 4 države Sjedinjenih Američkih Država (SAD), u periodu od 07.11.2011. do 29.02.2012. godine, obolele su 63 osobe. Epidemiološkim istraživanjem utvrđeno je da su od 63 pacijenta 40 (74%) bili mlađi od 2 godine, a 15 (24%) su bili odrasli uzrasta 18 i više godina. U predškolskim i školskim ustanovama su se zarazila 44 (70%) obolela deteta, dok se 8 (53%) od 15 odraslih inficiralo pri kontaktu sa obolelom decom (pružanje zdravstvene nege, kućni kontakt) (12). Dečaci su među obolelima bili zastupljeniji sa 52% u odnosu na devojčice. Rezultati studije sprovedene u bolnici na jugu Španije, ukazuje da su devojčice bile zastupljenije među obolelima (64%), suprotno našim rezultatima (13). U našem ranijem istraživanju sprovedenom 2016. godine, bilo je nešto više obolelih dečaka i to najviše uzrasta tri godine (14).

Tabela 2. Distribucija obolevanja po danima u odnosu na pojavu prvog slučaja oboljenja u vrtiću, Beograd, 2015 – 2019. godine

Dan od pojave prvog slučaja obolelog od bolesti šaka, stopala i ruku u kolektivu	Dečaci Broj (%) N=114	Devojčice Broj (%) N=106	Ukupno Broj (%) N=220
1	13 (11,4)	16 (15,1)	29 (13,2)
2	22 (19,3)	14 (13,2)	36 (16,4)
3	25 (21,9)	17 (16,0)	42 (19,1)
4	22 (19,3)	17 (16,0)	39 (17,7)
5	14 (12,3)	9 (8,5)	23 (10,4)
6	4 (3,5)	18 (17,0)	22 (10,0)
7	7 (6,1)	7 (6,6)	14 (6,4)
8	2 (1,8)	5 (4,7)	7 (3,2)
9	4 (3,5)	1 (0,9)	5 (2,3)
10	1 (0,9)	2 (1,9)	3 (1,4)

Table 1. Distribution of new cases of hand, foot and mouth disease by gender and age, Belgrade, 2015 –2019

Age (years)	Boys Number (%) N=114	Girls Number (%) N=106	Total Number (%) N=220
1	15 (13.2)	16 (15.1)	31 (14.8)
2	58 (50.9)	56 (52.8)	114 (51.8)
3	28 (24.6)	23 (21.7)	51 (23.2)
4	7 (6.1)	6 (5.7)	13 (5.9)
5	5 (4.4)	2 (1.9)	7 (3.2)
6	1 (0.9)	3 (2.8)	4 (1.8)

the first case in the collective, which responds to the incubation period for HFMD that amounts to 3-6 days (Table 2).

The clinical picture of all patients was characterized by the maculopapular rash on the predilection sites, while 96% of children had fever and 68% malaise (Figure 2).

The majority of children had rash on their feet (29%), then around their mouth (26%) and on hands (26%) (Figure 3). It appeared more rarely on the back, in the gluteal and genital region.

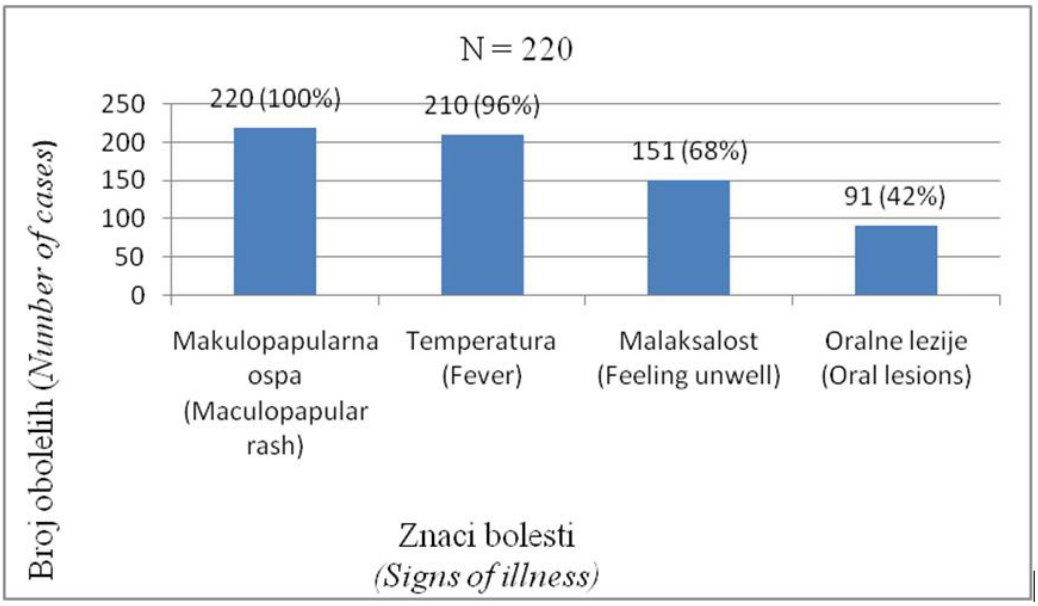
Seasonal distribution suggested that the largest number of ill children was registered in May (89) and June (40), while the lowest number was registered in August (5) and December (6) and there were no ill children in January, February and April (Figure 4).

Discussion

In our study, during the period 2015-2019, 20 epidemics of HFMD were registered in 15 Belgrade kindergartens, while the largest number of ill children was in 2016 (102), and the lowest was in 2015 (only 9 children). The majority of patients were 2 years old (51%), while only 1% of patients were six years old. In the epidemics of hand, foot and mouth disease in four states of the United Stated of America, during the period November 7th, 2011 to February 29th, 2012, there were 63 ill persons. It was established in the epidemiological investigation that of the 63 patients, 40 (74%) were younger than 2, while 15 of them (24%) were adults aged 18 and older. In the pre-school institutions and schools, there were 44 (70%) ill

Table 2. Distribution of disease by days in relation to the occurrence of the first case of the disease in kindergartens, Belgrade, 2015 –2019

The day since the appearance of the first case of the disease of hands, feet and hands in the team	Boys Number (%) N=114	Girls Number (%) N=106	Total Number (%) N=220
1	13 (11.4)	16 (15.1)	29 (13.2)
2	22 (19.3)	14 (13.2)	36 (16.4)
3	25 (21.9)	17 (16.0)	42 (19.1)
4	22 (19.3)	17 (16.0)	39 (17.7)
5	14 (12.3)	9 (8.5)	23 (10.4)
6	4 (3.5)	18 (17.0)	22 (10.0)
7	7 (6.1)	7 (6.6)	14 (6.4)
8	2 (1.8)	5 (4.7)	7 (3.2)
9	4 (3.5)	1 (0.9)	5 (2.3)
10	1 (0.9)	2 (1.9)	3 (1.4)

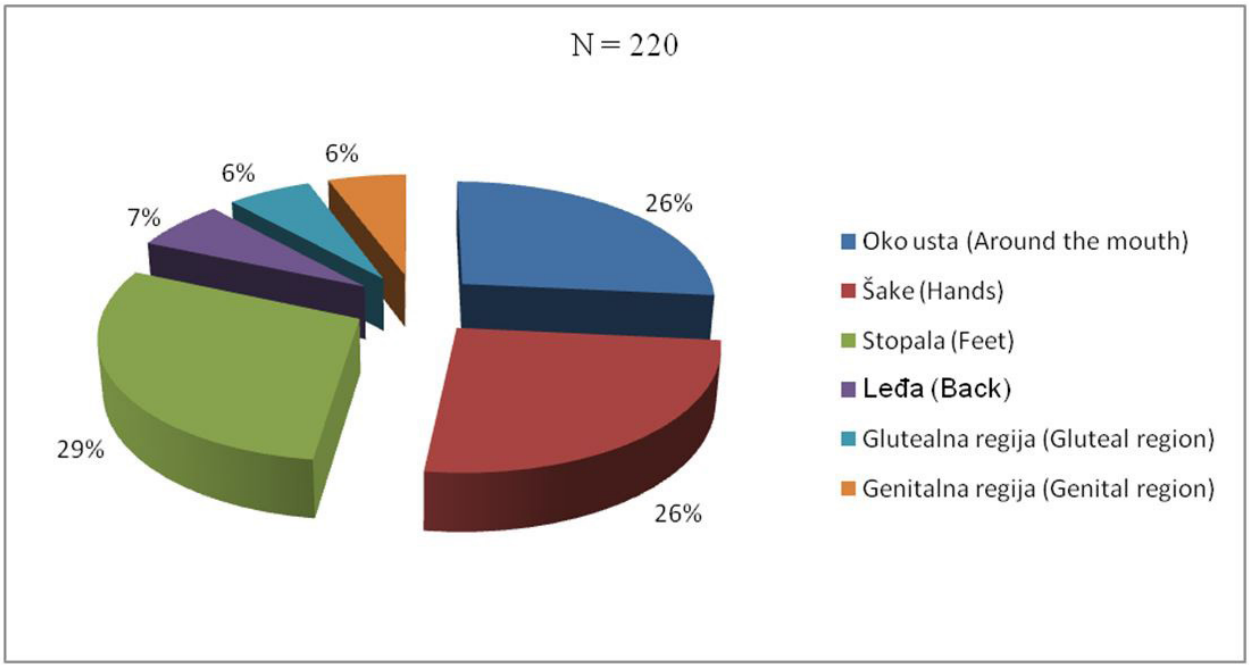


Grafikon 2. Zastupljenost simptoma i znakova bolesti šaka, stopala i usta među obolelima, Beograd, 2015 – 2019. godine

U našem istraživanju, u kliničkoj slici dominirala je pojava ospe (100%), povišena temperatura (96%) i malaksalost 68%, a ređe su bile prisutne oralne lezije (42%). Suprotno našim rezultatima, u epidemiji bolesti šaka, stopala i usta u četiri države SAD, u periodu od 07.11.2011. do 29.02.2012. godine, kliničku sliku je karakterisala povišena temperatura (76%), ospa na šakama, stopalima ili ustima (67%), na rukama ili nogama (46%), licu (41%), glutelnoj regiji (35%) i na trupu (19%) (12). Klinički uzorci su prikupljeni za 34 pacijenta. Enterovirus je detektovan *Real-Time* PCR metodom kod 25 (74%) obolelih.

U svim beogradskim vrtićima u posmatranom periodu svi oboleli od HFMD javili su se unutar 10 dana od pojave prvog slučaja bolesti, što ukazuje na uspešno sprovedene protivepidemijske mere (11). Enterovirus je detektovan *Real-Time* PCR metodom samo kod dva obolela deteta.

U poređenju sa našim epidemijama koje su protekle bez komplikacija, studija koja je pratila decu obolelu od HFMD primljenu u bolnici na jugu



Grafikon 3. Procentualna zastupljenost ospe prema lokalizaciji, Beograd, 2015– 2019. godine

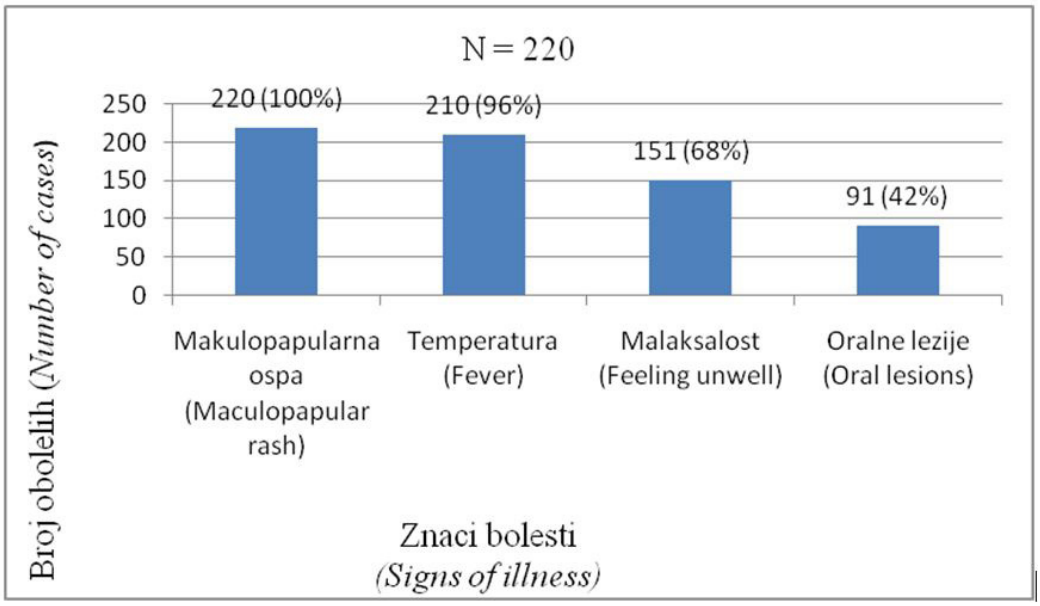


Figure 2. Signs and symptoms of hand, foot and mouth disease by percentage among the sick children, Belgrade, 2015 –2019

children, while 8 (53%) of 15 adults contracted the disease through contact with the infected children (contact with children in child care, contact at home) (12). There were slightly more boys (52%) than girls among the infected. The results of one study conducted in the hospital in the south of Spain suggested that there were more girls (64%) among patients, contrary to our results (13). In a previous research conducted in 2016, there were slightly more boys who were three years old (14).

In our study, rash (100%), fever (96%) and malaise (68%) were dominant in the clinical picture, while oral lesions (42%) were less frequent. Contrary to our results, in an outbreak of hand, foot and mouth disease in the four states of the USA, from November 7th, 2011 to February 29th, 2012, the clinical picture was characterized by fever (76%), rash on the hands, feet or in the mouth (67%), on the arms or legs (46%), face (41%), buttocks (35%), and trunk (19%) (12). Clinical specimens were collected for 34 patients. Enterovirus was detected by the Real-Time PCR method in 25 (74%) of patients.

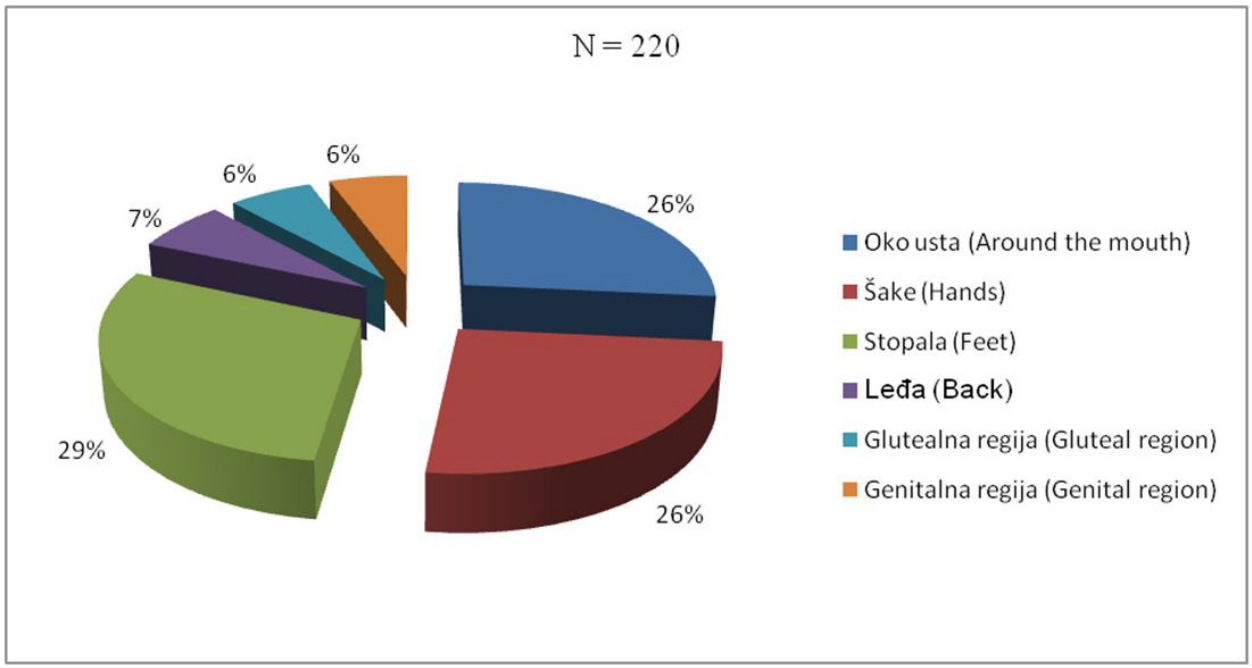
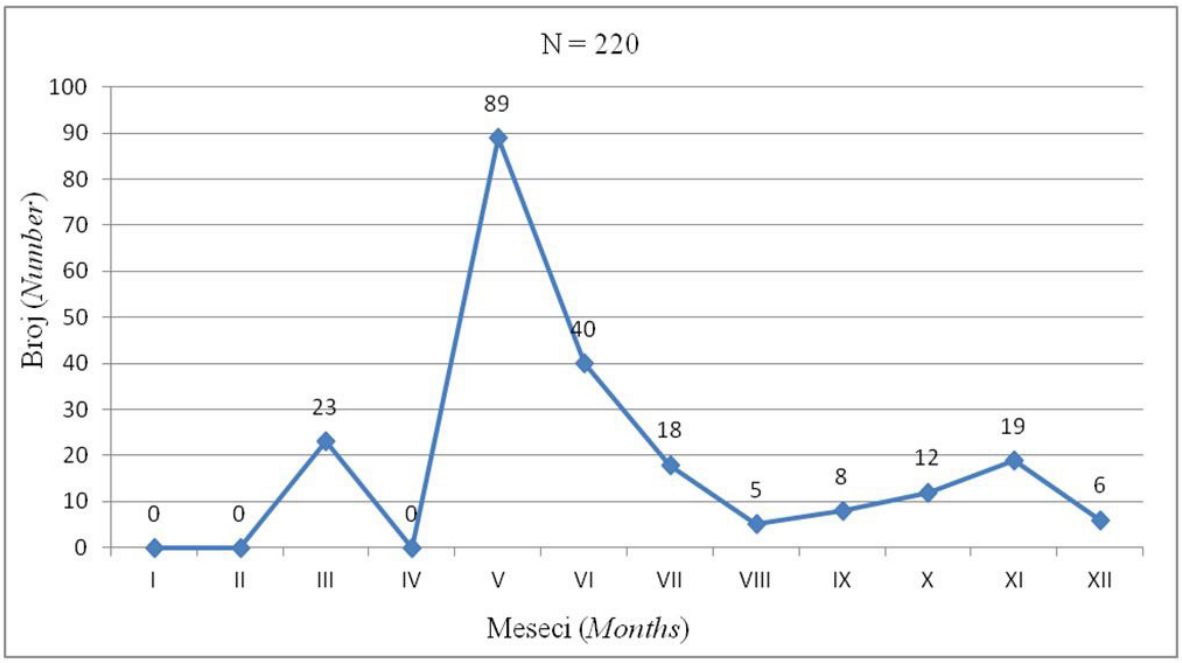


Figure 3. Skin Percentage of skin rash according to localization, Belgrade preschools, 2015 – 2019



Grafikon 4. Distribucija novoobolelih od bolesti šaka, stopala i usta po mesecima, Beograd, 2015 – 2019. godine

Kine, u periodu 2013 – 2017. godine, pokazala je da su se komplikacije javile kod 35,6% obolelih, a do smrtnog ishoda je došlo kod 56 (0,8%) pacijenata (15).

Sezonske varijacije obolelih u našoj studiji ukazuju da je najveći broj obolelih - 89 registrovan u maju mesecu (kasno proleće). Epidemiološka istraživanja HFMD epidemija sprovedena u Narodnoj Republici Kini septembra meseca 2012. godine, u naselju Shavo, istočne provincije Henan, i novembra meseca 2015. godine u vrtiću grada Pekinga, ukazuju da je najveći broj epidemija registrovan u jesenjim mesecima (16,17).

Zaključak

Od 2015. do 2019. godine u beogradskim vrtićima u epidemijama HFMD obolelo je 220 dece. Među obolelom decom bilo je najviše dece uzrasta dve godine, kao i nešto više dečaka nego devojčica. Klinička slika kod svih je bila u vidu ospe, a kod 96% dece u vidu povišene temperature i kod 68% u vidu malaksalosti. Oralne lezije zabeležene su kod 42% obolelih.

Oboljenje je uglavnom proticalo sa blagom kliničkom slikom, bez komplikacija, sa potpunim oporavkom. Pravovremenom primenom protivepidemijskih mera: prijavom oboljenja, izolacijom i lečenjem obolelih, poštovanjem mera opšte i lične higijene, kao i mera tekuće dezinfekcije u kolektivu, uspešno se zaustavlja dalje širenje infekcije.

Literatura

1. Aswathyraj S, Arunkumar G, Alidjinou EK, Hober D. Hand, foot and mouth disease (HFMD): emerging epidemiology and the need for a vaccine strategy. Med Microbiol Immunol 2016; 205(5):397-407.
2. Wei Ang L, Koh BKW, Peng Chan K, Tee Chua L, Lyn James L, Kee Tai Goh K. Epidemiology and Control of Hand, Foot and Mouth Disease in Singapore, 2001-2007. Ann Acad Med Singap 2009; 38(2):106-112.
3. How Ooi M, Solomon T, Podin Y, Mohan A, Akin W, Yusuf M, et al. Evaluation of Different Clinical Sample Types in Diagnosis of Human Enterovirus 71-associated Hand-Foot-and-Mouth Disease. J Clin Microbiol 2007; 45(6): 1858-66.
4. Guerra AM, Waseem M. Hand Foot and Mouth Disease. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2021 Jan. 2021 Feb 10. Bookshelf ID: NBK431082.
5. Esposito S, Principi N. Hand, foot and mouth disease: current knowledge on clinical manifestations, epidemiology, etiology and prevention. Eur J Clin Microbiol Infect Dis 2018; 37(3):391-398.
6. Yan-rong Wang, Lu-lu Sun, Wan-ling Xiao, Li-yun Chen, Xian-feng Wang, Dong-ming Pan. Epidemiology and clinical characteristics of hand foot and mouth disease in a Shenzhen sentinel hospital from 2009 to 2011. BMC Infections Disease 2013; 13:539.
7. Osterback R, Vuorinen T, Linna M, Susi S, Hyypia T, Waris M. Coxsackievirus A6 and Hand, Foot and Mouth Disease, Finland. Emerg Infect Dis 2009; 15(9):1485-1488.
8. Lizasoain A, Piegas S, Victoria M. Da Silva EE, Colina R. Hand-foot-and-mouth disease in Urugay: Coxsackievirus A6 indetified as a causative of an outbreak in a rural childcare center. J Med Virol 2020; 92(2):167-173.

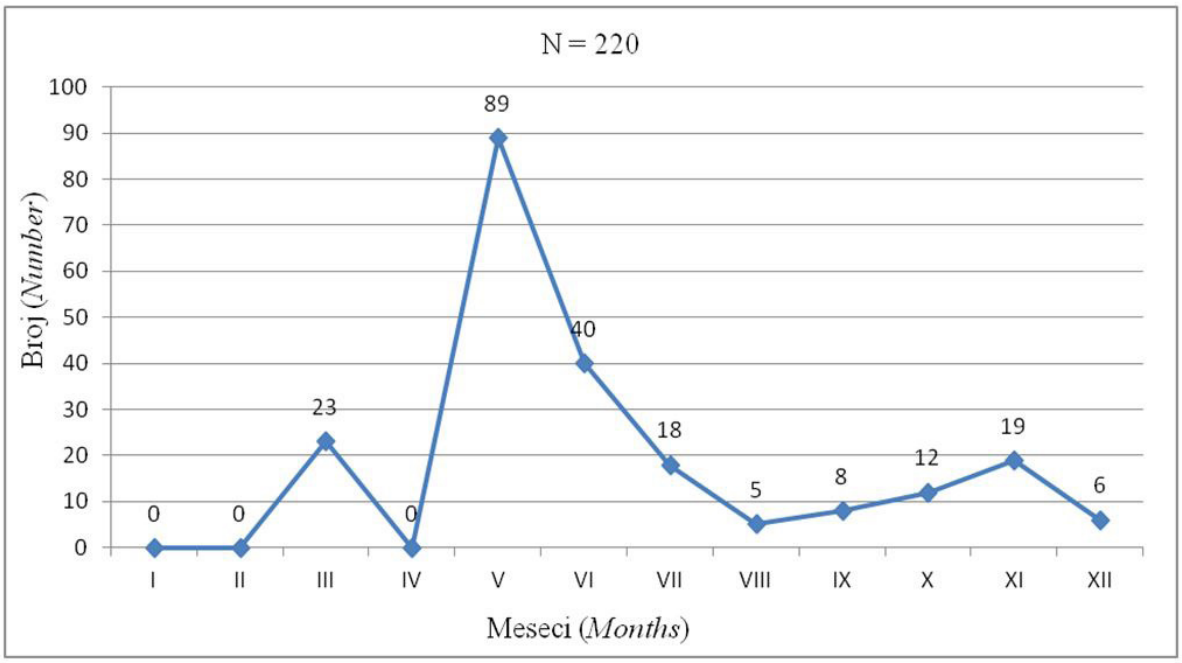


Figure 4. Distribution of new cases of hand, foot and mouth disease by months, Belgrade, 2015 – 2019

In all Belgrade kindergartens during the observed period, all patients with HFMD visited their doctors within 10 days from the appearance of the first case of disease, which pointed to the successful prevention measures (11). Enterovirus was detected by the Real-Time PCR method only in two children.

In comparison to our epidemics that passed without complications, a study that observed children with HFMD at one hospital in the south of China, during the period 2013-2017, showed that complications appeared in 35.6% of ill persons, whereas there came to the deathly outcome in 56 (0.8%) patients (15).

Seasonal variations among ill patients in our study suggested that the largest number of patients (89) was registered in May (late spring). Epidemiological investigation of HFMD epidemics conducted in the People's Republic of China in September 2012, in the town Shawo in eastern Henan province, and in November 2015, in one kindergarten in the city of Beijing, indicated that the largest number of epidemics was registered in autumn months (16,17).

Conclusion

From 2015 to 2019, there were 220 children with HFMD in Belgrade kindergartens. The majority of children were aged 2, and there were slightly more boys than girls. Rash was present in the clinical picture of all of them, while 96% had fever and 68% had malaise. Oral lesions were registered in 42% of patients.

The disease usually passed with a mild clinical picture, without complications and with the complete recovery. Further spreading of the infection may be successfully stopped by the timely application of prevention measures, that is, the notification of disease, isolation and treatment of persons with the disease, by respecting the measures of general and personal hygiene, as well as the measures of current disinfection in the collective.

Literature

1. Aswathyraj S, Arunkumar G, Alidjinou EK, Hober D. Hand, foot and mouth disease (HFMD): emerging epidemiology and the need for a vaccine strategy. Med Microbiol Immunol 2016; 205(5):397-407.
2. Wei Ang L, Koh BKW, Peng Chan K, Tee Chua L, Lyn James L, Kee Tai Goh K. Epidemiology and Control of Hand, Foot and Mouth Disease in Singapore, 2001-2007. Ann Acad Med Singap 2009; 38(2):106-112.
3. How Ooi M, Solomon T, Podin Y, Mohan A, Akin W, Yusuf M, et al. Evaluation of Different Clinical Sample Types in Diagnosis of Human Enterovirus 71-associated Hand-Foot-and-Mouth Disease. J Clin Microbiol 2007; 45(6): 1858-66.
4. Guerra AM, Waseem M. Hand Foot and Mouth Disease. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2021 Jan. 2021 Feb 10. Bookshelf ID: NBK431082.

9. Machain-Williams C, Dzul-Rosado AR, Yeh-Gorocica AB, Rodriguez-Ruz KG, Noh-Pech H, et al. Detection of hand, foot and mouth disease in the Yucatan Penisula of Mexico. Infect Dis Rep 2014; 6(4):5627.
10. Gradski zavod za javno zdravlje Beograd. Izveštaj o realizaciji Programa zdravstvene zaštite stanovništva od zaraznih bolesti od 2002. do 2010. godine na teritoriji Beograda u periodu od 01.01. do 31.12.2015. godine. Beograd: Gradski zavod za javno zdravlje Beograd, 2016.
11. Gradski zavod za javno zdravlje Beograd. Centar za kontrolu i prevenciju bolesti. Informacije o epidemiološkim istraživanjima obavljenim povodom epidemija „Hand Foot and Mouth Disease“ među decom u Beogradskim vrtićima, 2015 – 2019. Beograd: Gradski zavod za javno zdravlje Beograd; 2020.
12. Centers for Disease Control and Prevention. Notes from the Field: Severe Hand, Foot, and Mouth Disease Associated with Coxsackievirus A6 – Alabama, Conecticut, California, and Nevada, Novembar 2011 – February 2012. Weekly, March 30, 2012 / 61(12);213-214.
13. Moreno NE , Lopez AD, Jimenez JR, del Moral Campana MC, Fernandez AG, Ruiz PM, Nievas AD. Outbreak of hand, foot and mouth disease with onychomadesis caused by Coxackie virus A16 in Granada.An Pediatr (Barc) 2015; 82(4):235-41.
14. Begović Vuksanović B, Giljača S, Begović Lazarević I, Maris S, Pavlović N, Uzelac M. Epidemija bolesti ruku, stopala i usta u tri novobeogradska vrtića u maju 2016. godine. Zdravstvena zaštita 2017; 46(1):9-12
15. Qiu J, Yan H, Cheng N, Lu X, Hu H, Liang L, et al. The Clinical and Epidemiological Study of Children with Hand, Foot, and Mouth Disease in Hunan, China from 2013 to 2017. Sci Rep 2019;9(1):11662.
16. Li J, Zhu R, Huo D, Du Y, Yan Y, Liang Z, et al. An outbreak of Coxsackievirus A6-associated hand, foot, and mouth disease in a kindergarten in Beijing in 2015. BMC Pediatr 2018; 18(1):277.
17. Liu MY, Liu J, Lai W, Luo J, Liu Y, Vu GP, et al. Characterization of enterovirus 71 infection and associated outbreak of Hand, Foot, and Mouth Disease in Shawo of China in 2012. Sci Rep 2016; 6(1):38451.

Sukob interesa: Nije prijavljen.
Primljen: 28.05.2021.
Revizija: 20.06.2021.
Prihvaćen: 01.07.2021.

Autor za korespondenciju: Mr sci. med. dr Sonja Giljača, Gradski zavod za javno zdravlje Beograd, ul. Bulevar despota Stefana 54a, 11000 Beograd, Republika Srbija, e-mail: sonja.giljaca@zdravlje.org.rs

5. Esposito S, Principi N. Hand, foot and mouth disease: current knowledge on clinical manifestations, epidemiology, etiology and prevention. Eur J Clin Microbiol Infect Dis 2018; 37(3):391-398.
6. Yan-rong Wang, Lu-lu Sun, Wan-ling Xiao, Li-yun Chen, Xian-feng Wang, Dong-ming Pan. Epidemiology and clinical characteristics of hand foot and mouth disease in a Shenzhen sentinel hospital from 2009 to 2011. BMC Infections Disease 2013; 13:539.
7. Osterback R, Vuorinen T, Linna M, Susi S, Hyypia T, Waris M. Coxsackievirus A6 and Hand, Foot and Mouth Disease, Finland. Emerg Infect Dis 2009; 15(9):1485-1488.
8. Lizasoain A, Piegas S, Victoria M. Da Silva EE, Colina R. Hand-foot-and-mouth disease in Urugay: Coxsackievirus A6 indetified as a causative of an outbreak in a rural childcare center. J Med Virol 2020; 92(2):167-173.
9. Machain-Williams C, Dzul-Rosado AR, Yeh-Gorocica AB, Rodriguez-Ruz KG, Noh-Pech H, et al. Detection of hand, foot and mouth disease in the Yucatan Penisula of Mexico. Infect Dis Rep 2014; 6(4):5627.
10. City Institute for Public Health, Belgrade. Report on the implementation of the Program of health protection of the population from infectious diseases from 2002 to 2010 on the territory of Belgrade in the period from 01.01. to 31.12.2015. years. Belgrade: City Institute for Public Health Belgrade, 2016.
11. City Institute for Public Health, Belgrade. Center for Disease Control and Prevention. Information on epidemiological research conducted on the occasion of epidemics "Hand Foot and Mouth Disease" among children in Belgrade kindergartens, 2015 - 2019. Belgrade: City Institute for Public Health Belgrade; 2020
12. Centers for Disease Control and Prevention. Notes from the Field: Severe Hand, Foot, and Mouth Disease Associated with Coxsackievirus A6 – Alabama, Conecticut, California, and Nevada, Novembar 2011 – February 2012. Weekly, March 30, 2012 / 61(12);213-214.
13. Moreno NE , Lopez AD, Jimenez JR, del Moral Campana MC, Fernandez AG, Ruiz PM, Nievas AD. Outbreak of hand, foot and mouth disease with onychomadesis caused by Coxackie virus A16 in Granada.An Pediatr (Barc) 2015; 82(4):235-41.
14. Begović Vuksanović B, Giljača S, Begović Lazarević I, Maris S, Pavlović N, Uzelac M. Epidemija bolesti ruku, stopala i usta u tri novobeogradska vrtića u maju 2016. godine. Zdravstvena zaštita 2017; 46(1):9-12
15. Qiu J, Yan H, Cheng N, Lu X, Hu H, Liang L, et al. The Clinical and Epidemiological Study of Children with Hand, Foot, and Mouth Disease in Hunan, China from 2013 to 2017. Sci Rep 2019;9(1):11662.
16. Li J, Zhu R, Huo D, Du Y, Yan Y, Liang Z, et al. An outbreak of Coxsackievirus A6-associated hand, foot, and mouth disease in a kindergarten in Beijing in 2015. BMC Pediatr 2018; 18(1):277.
17. Liu MY, Liu J, Lai W, Luo J, Liu Y, Vu GP, et al. Characterization of enterovirus 71 infection and associated outbreak of Hand, Foot, and Mouth Disease in Shawo of China in 2012. Sci Rep 2016; 6(1):38451.

Conflict of interest: None declared.
Received: 05/28/2021
Revised: 06/20/2021
Accepted: 07/01/2021

Corresponding author: Mr sci. med. dr Sonja Giljaca, Institute of Public Health of Belgrade, Bulevar despota Stefana 54a, 11000 Belgrade, Republic of Serbia, e-mail: sonja.giljaca@zdravlje.org.rs