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Review

The influence of social isolation during the COVID-19 pandemic on speech and language development in preschool children

Ana Lukić[1], Bojan Joksimović[2], Jelena Vidojević[1], Kristina Drašković[2], Aleksandar Tanović[2], Veljko Marić[2], Nenad Lalović[2], Vesna Krstović Spremo[2], Siniša Ristić[2]

[1]University of Belgrade, Faculty of Special Education and Rehabilitation, Belgrade, Serbia
[2]University of East Sarajevo, Faculty of Medicine Foca, The Republic of Srpska, Bosnia and Herzegovina

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Corresponding author:
Ana Lukić, MD
Koste Vojinovića 8,
78 000 Banja Luka,
lukic0512@gmail.com

Summary

Speech is a way of communication formed by rhythmic units of syllables, words and sentences, and as such is inherent in man, the only being whose organs and psyche are trained for this process. Delayed speech is defined as a phenomenon in which a child does not start speaking on time, or there are errors in the speech pattern that are not appropriate in relation to a given age. It is known that significant risk factors for the development of delayed speech in preschool children are physical, and most often social and emotional in nature. For the normal development of speech, it is necessary that the child is in a human environment, and therefore the circle of people with whom children come into contact should always be expanded.

The aim of this study is to review the existing literature on studies examining the impact of social isolation during the COVID-19 pandemic on preschool children, as well as the speech and language development in preschool children.

The recent pandemic of corona virus infection (COVID-19) has led to a state of emergency, quarantine, closure of public institutions, and preschools, kindergartens and schools in 172 countries. These epidemiological measures have led to social isolation and the need for children to learn from home, which has manifested itself in the emergence of difficulties in the development of speech and language. Research has shown that during the pandemic, children spent significantly more time watching television and computer screens than before pandemic, and less in play and physical activity.

Keywords: speech, speech development, social isolation, COVID-19 pandemic, preschool children

Introduction

Speech can be defined as normal fluency [1]. This fluency is understood as the ability to speak with normal continuity, degree, and effort. We communicate in order to satisfy our desires, reveal our feelings, share information and achieve a set goal [2]. Speech plays an important role in people's lives and due to the complex process and early development

of speech in children, awareness of parents, guardians and the environment on how to help children and encourage their speech development, as well as overall development, is also important. By talking to the child, parents build and supplement the child's knowledge. The conversation directs him/her to independent thinking and reasoning [3]. In the preschool period, children should not only be taught how to speak, but also to communicate in a cultural way with adults and their peers, by learning to listen to the speech of the interlocutor [4]. Petz [5] states that speech includes all types of letters, all forms of mimic and gestural communication, as well as the use of various communication signals. Also, speech facilitates the psychological function of thinking, because words are symbols with a certain meaning, and in that way concrete and abstract concepts are created. Language disorders are defined [6] as all forms of disorders in speech and language functioning that, in any way, interfere with communication and have an impact on psychosocial development or are otherwise related to it. Known risk factors for the development of language disorders and speech retardation in preschool children are physical, and most often social-emotional factors [2]. Physical causes are usually disorders of the organs that enable speech (rabbit's lip, irregularly spaced teeth, cleft palate) [2]. The cause can also be a multilingual family environment, a family history of slow speech development, a low level of parental education and inadequate stimulation for speech development by parents or guardians [7]. In the literature [8], it is known that speech will not occur without the influence of the social environment. For the normal development of speech, it is necessary for the child to be in a human environment, and therefore the circle of persons with whom children come into contact should always be expanded. Such experiences encourage speech and communication skills in children. In addition to the significant influence of the child's parents on speech development at the beginning of the preschool period, peers have the most significant influence on speech development in the second half of the preschool period [9, 10]. That is why this review work is planned so that we can see whether the pandemic of coronavirus infection (COVID-19), particularly isolation during the pandemic, had an effect on slow speech development in preschool children. Given that it has been shown that the COVID-19 epidemic is not only a health crisis, but also affects social and economic trends, thus causing numerous consequences for the lives of adults and children - the starting idea of this research is to examine these consequences. This research would have a significant, both scientific and social aspect. Although it is known from the literature that the causes of slow speech development can be physical, emotional, as well as social factors such as parental educational status, time spent with the child or excessive exposure of children to filming [7], so far relatively few research examined whether the social isolation caused by the COVID-19 pandemic could have an impact on the occurrence of slow speech development.

Speech development

It is important for every parent to know the stages and norms of speech and language development in order to be able to consciously monitor the child's progress, encourage him/her to pronounce words correctly, and to be able to assess at any time whether speech develops properly and whether there are potential deviations in this area of development. The first vocalization that a child realizes is crying and this is the beginning of later speech. After that, the child gradually learns to use the speech of the people around him, ie. he/she tries to make the sound as similar as possible to the one he/she hears. In this way, the child

learns by repetition, ie to pronounce certain words after another person [11]. Speech development in children is influenced by biological (organic), psychological and social factors [2]. The influence of the environment is very important, because without it, speech could not even develop. That is why it is important to raise awareness of the environment about the importance of its impact on the psycho-physical development of the child, as well as its positive effect and encouragement of speech in everyday situations [12]. The family, as the child's most natural environment, is the most important factor in speech development, as in other areas of development [10]. Starc et al. [13] state that the critical period in which children begin to speak is the period from 18 to 24 months after birth. Also, these authors state that sensitivity to speech development is associated with the development of the central nervous system, and especially with structural changes in the brain, ie. a sudden increase in brain mass, and the number of synapses between nerve cells between certain regions of the brain. It is very important that in this period of life the child has adequate social stimulation, because that is the only way to get to the use of innate possibilities and speech development. Also, in addition to this period when speech begins to develop, the preschool period of child development is very important, ie the period from 2 to 7 years of age, which is considered the most important period for speech development, because at that age the child absorbs every year more and more content from the environment and begins to learn and adopt the grammatical rules of the language, and increasingly shapes its linguistic level of speech expression [14, 15].

Although communication encompasses more aspects than language and speech, it is very important to distinguish these concepts. The psychological dictionary defines language [5] as a system of signs by which people communicate, and this system realizes the function of communication. Language significantly helps the psychological function of thought and registers personal experiences. Language also preserves memorized information and experiences, so in that way it enables the use of other people's eyes and ears so that one can learn not only from one's own, but also from other people's experiences [16]. Language consists of five aspects of communication: voices, meanings, forms and word order, as well as the social use of language [17].

Speech consists of two key components, sending and receiving messages, therefore, the speech organs include those that create speech, as well as those that receive information and enable understanding of speech [15]. We have divided the speech organs that create speech into movable and immovable. The moving organs important for voice formation are: larynx, vocal cords, palate, tongue, lower jaw, pharyngeal walls, and lips. The immobile organs important for the formation of the voice are: the hard palate, the upper jaw and the teeth. The voice is created by the sound current passing from the lungs through the trachea, then passing through the larynx with the vocal cords - this is where we get the shape of the voice. Once the voice reaches the throat over which the pharynx is located, the voice goes through the nasal and oral cavities. These cavities have the function of resonators, ie they help to amplify or reduce the voice. In these cavities, the air flow takes on its final shape [18–25].

Speech and language disorders

Speech disorder is a disorder in which the child, at the age when certain sounds need to be pronounced, cannot speak some sounds adequately and standardly for the native language due to various reasons, mixes or omits them, and does not pronounce syllables or whole words correctly, while his/her language and vocabulary are grammatically

correct and meaningful [17]. We have divided all speech and language disorders into several categories, namely: slowed speech and language development, pronunciation disorders, dumbness and deafness, rhythm and tempo disorders, ie. speech fluencies (stuttering, bradylalia, battarismus), dyslalia, reading and writing disorders and voice disorders [12, 15, 26, 27]. Also, a special entity of speech disorders is a pronunciation disorder that can occur in three forms, such as the absence or realization of a voice that is not heard (omission): the child cannot pronounce a voice at all (eg. instead of book the pronunciation is "boo", instead of pronouncing pig pronounces "pi"), substitution of voices (substitution): the child replaces one voice or set of voices that he/she cannot pronounce with another voice (eg. instead of a rabbit, he/she pronounces "wabbit"), incorrect pronunciation of a voice or a set of voices (distortion): the child utters voices, but their sound realization deviates from the standard pronunciation ("thith" instead of this) [14]. The causes of slow speech development in children of the typical population are not fully known. However, several factors could play a significant role [28–30].

When we notice a delay in speech and language development in a child under the age of four, then we can talk about a slow development of speech and language. Slowed speech and language development can be observed in a child up to the age of four [15, 26]. However, if the difficulties continue after the fourth year of life, then we are talking about underdeveloped speech. Underdeveloped speech can be recorded if the child speaks less than his/her peers or speaks much later, uses a limited number of words, often uses a word order that is unusual, simpler and shorter sentences, or has difficulty understanding language or speech messages. A child who lags behind in speech and language development, in a large number of cases will lag behind in other segments such as motor skills, coordination of movements, graphomotor skills and insecurity in left-right relationships [26]. After the parent or the child's environment notices deviations in speech and language development, from the norms for a given calendar age, it is very important to contact on time professionals involved in the prevention, diagnosis and treatment of speech, voice, language disorders, and all other forms of communication, namely speech therapists. Speech therapists are the most competent in determining whether a child really has a problem with speech and language, and the examination of speech ability is conducted with the help of non-standardized and standardized tests. Research has shown that 5% to 10% of children have more serious speech difficulties that require professional help [17]. Therefore, it is not important to just assess what a particular child can do at a given moment, it is just as important to know what it can do in the future, how he/she will further develop his/her cognitive skills. From the perspective of socio-cultural theories as which is Vygotsky's theory in this sense, it is a significant concept of the zone of further development, that is, it is necessary to distinguish between what the child can do independently and what he/she can achieve with the help of a competent adult [30].

COVID-19 virus pandemic

In December 2019, a series of cases of viral pneumonia of unknown cause appeared in Wuhan, Hubei, China. The World Health Organization [31] was the first to report cases of pneumonia of unknown origin in the city of Wuhan, and the occurrence of the disease was associated with the use of products from the local market for the sale of animals and seafood. However, the infection soon spread and reached pandemic proportions, so that a pandemic was declared on March 11, 2020 [32].

Detailed sequential analysis from samples of the lower respiratory tract identified a new virus called SARS-CoV-2, which causes coro-

navirus infection (COVID-19). The clinical picture of COVID-19 infection ranges from asymptomatic or mild forms with respiratory symptoms: fever, cough, shortness of breath, difficulty breathing, loss of sense of taste and smell, to severe forms: :pneumonia, severe acute respiratory syndrome (Engl. Acute Respiratory Distress Syndrome -ARDS), multiorgan failure and even fatal outcome [33, 21, 34]. Risk factors for the development of severe forms of COVID-19 disease are older age, obesity, as well as previous chronic diseases and conditions [35, 34]. According to WHO data [23] until 06.03.2022. a total of 433 million people became ill, while 5.9 million people died from the effects of COVID-19 worldwide [23]. At a time when everyone is talking about the COVID-19 virus pandemic and its spread, it is expected that children partially know what is happening and that they feel scared, confused and anxious due to a sudden change in lifestyle [36]. By encouraging conversation with the child, parents get the opportunity to correct all the information that is not necessarily verified or true. A special problem in this situation is the fact that during the COVID-19 pandemic, parents must continue to go to work (health workers, workers in state institutions), so children stay with other family members who keep them at home [33, 35]. The proper treatment of children by their parents is to provide them with accurate information, but also to adapt it to the child's age, to limit children's exposure to information from the media and to try to create a fun, positive atmosphere at home. From the scientific point of view, it is interesting to show whether the literature data confirm that isolation during the COVID-19 pandemic led to slow speech development in preschool children, and from the social point of view to draw public attention to the possibility of applying certain measures if society finds itself in this situation again.

Aim and methodology

The aim of the study is to review the existing literature to present studies that examined the impact of social isolation during the COVID-19 pandemic on the development of speech and language of preschool children, with special emphasis on the nature and type of that impact.

The Google Scholar browser, SCIndex, the ProQuest browser and the service of the Consortium of the Library of Serbia for Unified Procurement (KOBSON) were used to search the existing literature. Studies in mother tongue and English were searched. The key words were speech, speech development, social isolation, the COVID-19 pandemic, and preschool children. The studies are further selected on the basis of key words in the title or abstract of the study. After reviewing the available literature, theoretical and review studies have been excluded, and studies which in their research studied the impact of the COVID-19 pandemic on preschool children and on their speech and language development have been presented.

The impact of the COVID-19 virus pandemic on preschool children

The COVID-19 pandemic has led to significant economic and social challenges in the world. National authorities around the world responded to the pandemic relatively quickly by introducing a state of emergency, quarantine, closure of public institutions, social distance, travel restrictions and increased control of work in the workplace. Preschools, kindergartens, schools and universities were closed in 172 countries, affecting 98.5% of the child population who had previously attended some of these institutions [37]. These conditions of extensive restriction in social relations in schools have led to the fact that children have spent a lot of time at home with their families. The

United Nations Educational, Scientific and Cultural Organization has stated that one of the most significant risks that school closures due to a pandemic can cause is "interrupted learning" which affects children's mental and physical health and that this disruption is one of the most harmful consequences of a pandemic [38]. The COVID-19 pandemic and the social isolation caused by the pandemic significantly affect daily activities in all aspects of a child's life, and there is a particularly negative effect on children's growth and development [20, 39]. Although preschools and schools have resumed operations after the closure period, what has remained is the concern how the COVID-19 pandemic will affect the younger population. Research done during earlier epidemics and pandemics has shown that the negative effects of a pandemic on children's development will occur immediately and later, with a particularly high risk in early childhood, when brain architecture is still developing rapidly, it is not fully formed and it is very sensitive to difficulties from the environment. Previous data show that the pandemic has significantly affected children's learning capacities, physical and mental health, adaptive behavior, and productivity [40]. In education, generations of children have realized that their education has been abruptly interrupted. It is estimated that during the pandemic, classes were interrupted for 1.59 billion pupils and students - or 91% of pupils and students worldwide [41, 42]. The effect of closing kindergartens, preschools and schools on the level of children's education remains unknown, however, the consequences for younger children, on their growth and development are already beginning to appear. Interruption of formal education can cause a negative effect on a number of children of younger calendar age in the form of learning difficulties, especially in children who are at a disadvantage and do not have equal access to information [37].

Social isolation in the form of quarantine, social distancing and increased use of masks are measures proposed by the World Health Organization [32] for children who are exposed to or infected with the corona virus in order to prevent its spread. Although these protective measures are necessary, they can have adverse effects on children's speech and language, as well as the development of communication skills during a critical period of growth and development. It was mentioned that social interaction is necessary for the development of speech and language, and epidemiological measures of distancing and prohibition of group gatherings have influenced preschool and school age children to be limited in interactions with peers [43].

In most countries, the alternative to formal education during the pandemic was to continue learning and monitoring classes with the help of electronic devices from home. However, most preschool children are not able to read independently, and reading aloud to children of this age significantly affects the formation of their speech and language [44]. In addition, the closure of educational institutions leads to social and emotional problems of children such as significantly fewer hours of sleep, poorer nutrition, more time spent on electronic devices, less physical activity, development of higher levels of stress, and all this can significantly contribute to physical and mental health of children [29]. These results are confirmed by data stating that the COVID-19 virus pandemic has put children at risk for the development of fear of illness, social isolation, prolonged confinement indoors and increased stress levels of parents or guardians of children [40]. This situation has a negative impact and can cause stress in children, which can result in poorer neurological development, negative effect on physical and mental individual and collective health, cognitive abilities, as well as work habits and abilities of future adults.

The COVID-19 pandemic is an unprecedented situation in which all systems of society are suddenly affected at the same time, and adapting to the new reality and habits is

expected to be a difficult task, especially for younger children, especially if they already have developmental disabilities. The pandemic has led to changes in society, and in every household, which are difficult for children to understand. These changes in normal daily activities can lead to frustration and anxiety in children, especially if there is some form of developmental, speech, language, or communication disorder [45].

Research overview - the impact of the COVID-19 virus pandemic on speech development in preschool children

Kyle and co-workers [46] found back in 2013 that wearing protective masks significantly reduced the intensity of the speech signal, especially for high frequencies, and the level of attenuation ranged from 3 to 4 dB when it came to surgical masks, and about 12 dB for KH95 masks. This change in the intensity of the speech signal can affect speech comprehension in children who have speech disorders or some hearing disorder when compared to peers who do not have these problems. Harding et al. [47] state that the use of masks and protective equipment by parents and health care workers can have a negative impact on the mental development of children with whom they come into contact in health care institutions. These protective measures limit contact and reduce the possibility of connecting parents and infants, and can potentially negatively affect the establishment of breastfeeding and the physiological stability of infants. Wearing masks limits mother-child contact and prevents the child from watching and cooperating with the parent, which is part of every child's early learning and research. These limitations could delay the learning necessary for the timely development of communication. These authors state that it is important to regularly apply certain strategies of interaction between parents and children in order to encourage the development of speech, language and communication. Some of the strategies proposed by Harding et al. [47] are to use voice and change in voice intonation in interaction with children, use gestures in interaction to encourage the development of gestural communication, and use masks with transparent or plastic slits so that the child can, when he/she wishes, see the expression on the parents' faces and the movements of the parents' speech organs during speech. Reading books aloud to preschool children by parents is recommended as one of the best alternatives for the period during the social isolation caused by the pandemic, given that children of younger calendar age have limited ability to read independently. In addition, the vocabulary from books, which children listen to when parents read, is composed of more complex sentences in relation to telling stories to children or in relation to everyday conversation. Also, one of the advantages of reading to children is that it can help them practice reading words with their parents and interact with the text from the book, asking parents questions about what they do not understand, which significantly contributes to better speech and language development.

A study by Darmiyanti et al. [48] conducted in Indonesia examined the impression of 400 parents and teachers on the impact of the COVID-19 pandemic on the language and speech development of children aged 4 to 6 whose formal education was interrupted for 8 months. The authors examined receptive skills (listening and reading) and productive language skills (speaking and writing), with special reference to listening and speaking. The results of the study showed that only 165 respondents (41%) could achieve the goal of curriculum in mastering language skills prescribed by the Ministry of Education and Culture, while the curriculum in mastering listening could be achieved by only 138 respondents (35%), while the goal of curriculum which was related to children's speech could reach only

166 respondents (42%). The results of this study showed that social isolation (learning from home) had a significant negative effect on learning to read and speak in children [48]. These data were confirmed by a study by Bao et al. [49] conducted on a sample of 3170 preschool children over a period of 100 days of social isolation caused by a pandemic, and the study also used the results of a longitudinal early childhood study conducted in 2010/11. These authors, comparing the two studies, found that reading and language-speaking skills during social isolation caused by the emergency situation due to the COVID-19 pandemic decreased by 67% compared to 2010/11. The study also showed that children's reading of books decreased by 10.5% during social isolation, and that one of the main causes of those changes was the inability of children to read aloud, as a result of which they could not learn speech and language properly. The authors of the study [49] found that, during the school closure period, reading books at home led to an improvement in achievement on language assessment tests by 40% compared to children who did not read books at home during this period. Children with whom parents read books regularly every day had a significantly higher percentage of improvement in reading ability, a 79% higher improvement compared to children whose parents did not read books on a daily basis. These data are in line with the results of Kuhveld et al. [50] who found that the average reading achievement of children from third to seventh grade during 2020 fell by 35%. Davies et al. [51] examined the language and cognitive abilities of 189 children aged 8 to 36 months. The study was done in the UK, and the results showed that the development of receptive vocabulary was better in younger children compared to older children. These authors also stated that more frequent visits of children to preschool were statistically significantly associated with a more pronounced receptive vocabulary, while children who went to preschool less often had a significantly less developed receptive vocabulary. The results were confirmed by a survey of teachers [52] when most teachers expressed the opinion that children spent half as much time learning when schools were closed compared to the period before schools were closed due to the COVID-19 virus pandemic. The occurrence of the COVID-19 pandemic has opened a new question when it comes to the development of speech and language of children, and that is what and how much influence people outside the family can have on the development of speech and language. Kanero and Aktan [53] in their study, in which they assessed children's achievements in vocabulary assessment tasks done in Turkey on two occasions, at the beginning of isolation due to a pandemic and three weeks later, stated that due to limited children's interaction with people outside the family, children's speech might stagnate, but on the other hand, there might not be language development disorders, because early language development depends primarily on parental contributions, so social isolation should not have a significant negative impact on language development. The authors found that mothers contributed statistically significantly to the development of children's vocabulary during social isolation caused by the COVID-19 pandemic compared to fathers, who did not significantly contribute to speech development. According to WHO recommendations [31] on physical activity and behavior of preschool children of calendar age, each child should spend at least 180 minutes a day in some physical activity, not exposed to screening more than an hour a day, and have 10 to 13 hours of quality sleep (31). However, due to the COVID-19 pandemic, it is a great challenge for parents to follow these recommendations, and the main reason is the closure of preschool and school institutions and social isolation. In the literature, so far there has been very little data on what content the children filled their free time with and how they spent the same time during social

isolation. We have not found data on whether children spend less time during the day in physical activity, whether they stay awake longer, whether they sleep shorter, whether they spend most of their time exposed to screens, but it is known that non-compliance with these recommendations in early childhood can cause cognitive impairment, psychological disorders and disorders of mental functions of thinking, attention and memory, which can negatively affect the development of speech and language in preschool children (54). Also, it has been proven that children are less physically active and sleepy, with a less consistent sleep pattern on days that are not structured or on non-school days compared to school days (55). There is very little data in the literature on whether children spend less time with peers during social isolation, more time on computers or television, or spend most of their time playing with toys. Guan et al. (21) state that they interviewed 97 parents of preschool children in South Korea during the social isolation caused by the COVID- 19 pandemic. In this study, it was found that 79 (91%) parents reported that the time spent by preschool children on television or computer screens during a pandemic increased significantly and 46 (94%) of 49 parents reported that children playing and playing sports decreased significantly.

Conclusion

The situation caused by the COVID-19 pandemic has led to numerous changes in daily activities that have affected the development of children. The closure of preschools and schools has led to social and emotional problems for children, such as significantly fewer hours of sleep, poorer nutrition, more time spent on electronic devices, less physical activity, and the development of higher levels of stress. All this can significantly contribute to the damage to the physical and mental health of children, and consequently to disorders in the development of speech and language. Wearing protective masks, social distancing, and especially social isolation, as well as learning from home via electronic platforms has a large number of gaps that negatively affect the development of speech of preschool children, so this review can serve the Ministries of Education in the surrounding countries to precisely define models of learning from home through electronic platforms in such a way that learning is aligned with the characteristics of preschool children, so that children's speech and language skills during the COVID-19 pandemic can be improved. Finally, the limitation of this study is that there has not been much research addressing this topic that we could rely on in our review study. Future research should, therefore, be based on further consideration of this topic, as well as on the extent to which the accessibility of special educators and rehabilitators and therapies during the pandemic has affected children's speech and language development, and whether there are gender differences, sociodemographic characteristics, material status of parents and others.

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Uticaj socijalne izolacije tokom pandemije COVID-19 na razvoj govora i jezika kod djece predškolskog uzrasta

Ana Lukić[1], Bojan Joksimović[2], Jelena Vidojević[1], Kristina Drašković[2], Aleksandar Tanović[2], Veljko Marić[2], Nenad Lalović[2], Vesna Krstović Spremo[2], Siniša Ristić[2]

[1]Univerzitet u Beogradu, Fakultet za specijalnu edukaciju i rehabilitaciju, Beograd, Srbija

[2]Univerzitet u Istočnom Sarajevu, Medicinski fakultet Foča, Foča, Republika Srpska, Bosna i Hercegovina

Govor je zvučni način komunikacije oblikovan ritmičkim jedinicama slogova, riječi i rečenice te je kao takav svojstven čovjeku, jedinom biću čiji su organi i psiha osposobljeni za ovaj proces. Usporenje razvoja govora se definiše kao pojava u kojoj dijete ne počinje sa govorom na vrijeme ili u obrascu govora postoje greške koje nisu primjerene u odnosu na dati kalendarski uzrast. Poznato je da su značajni faktori rizika za nastanak usporenja govora kod djece predškolskog uzrasta fizičke, a najčešće socijalno-emotivne prirode. Za normalan razvoj govora neophodno je da se dijete nalazi u ljudskom okruženju, pa zbog toga treba uvijek širiti krug osoba sa kojima djeca stupaju u kontakt.

Cilj ovog rada je da pregledom postojeće literature prikaže radove koji su ispitivali uticaj socijalne izolacije u toku pandemije COVID-19 na predškolsku djecu, te na razvoj govora i jezika kod djece predškolskog uzrasta.

Skoro nastala pandemija korona virusne infekcije (COVID-19) je dovela do toga da je većina zemalja svijeta uvela vanrednu situaciju, uvođenje karantina, zatvaranje javnih ustanova, a predškolske ustanove, vrtići i škole su zatvoreni u 172 zemlje. Ove epidemiološke mjere su dovele do socijalne izolacije i do pojave da djeca moraju da uče u kućnim uslovima, što se manifestovalo pojavom poteškoća u razvoju govora i jezika. Istraživanja su pokazala da su djeca za vrijeme pandemije u odnosu na period prije značajno više vremena provodila izložena televizijskim i kompjuterskim ekranima, a manje u igri i fizičkoj aktivnosti.

Ključne riječi: govor, razvoj govora, socijalna izolacija, pandemija COVID-19 virusa, djeca predškolskog uzrasta