Published online: 2019-05-19

Identification and Analysis of Children Developmental Dysphasia Factors in Karawang

Hadi Sudarjat[1] Mally G. Sholih[1] Ahsanal Kasasiah[1]

[1] Faculty of Health Science, Universitas Singaperbangsa Karawang, Telukjambe, Indonesia

Address for correspondence Hadi Sudarjat, S.Farm., M.Farm., Apt., Universitas Singaperbangsa Karawang, Telukjambe, Indonesia 41361 (e-mail: hadi.sudarjat@fkes.unsika.ac.id).

J Child Sci 2019;9:e24–e28.

Abstract

Some children fail to develop language skills for obvious reasons. The inability is usually seen due to difficulties in producing and understanding spoken language, lack of intelligence, or other developmental disorders. This usually causes difficulties in reading and writing; in many cases, language difficulties continue until adolescence. This research was conducted from May to June 2018 at Dewi Sri Karawang Hospital and in the Karawang community. This study aims to determine the correlation between factors such as family history, child's gender, febrile seizures, exposure to TV/gadget, and mother's occupation, with children developmental dysphasia in Karawang. This study uses an analytical survey method with a cross-sectional approach. Data retrieval was performed by interviewing parents of pediatric patients diagnosed with dysphasia as the case group and parents of children in the Karawang area as the control group. The data obtained were processed using the multivariate regression statistical method. The results showed that heat seizures, excessive multimedia exposure (more than 1 hour per day), and identified hereditary causes were significant risk factors for dysphasia in children aged 1 to 6 years in Karawang, with *p*-values less than 0.05.

Keywords

- dysphasia
- risk factor identification
- multimedia exposure

Introduction

Developmental dysphasia (developmental dysphasia) is a specific disorder in neurological development that causes children to have limited communication, either expressive (verbal communication through speaking and speaking) or receptive (comprehension of comprehensive information conveyed by others) or both.[1] In contrast to the term general dysphasia, developmental dysphasia includes neurological aspects and developments that occur at the age of the learning phase and talking to children.[2] The term dysphasia is also different from aphasia, in which sufferers of aphasia experience more severe speaking and language disorders.[1] The general characteristics of people with developmental dysphasia are better receptive speech ability than expressive speech ability; the patient's ability to carry out spontaneous monologue talks is better than the commend dialogue talks; not fluent in story-telling; and limitations in syntactic abilities in language.

Developmental dysphasia is included in language disorder. This disease will cause delay in a child's ability to learn to communicate and speak (speech delay). Language disorders can also cause a person to suffer from speech disorder in the long term.[3] There have been many studies related to cases of disruption in communication with children from other countries. In a study conducted in Australia, 13% of elementary school-aged children were diagnosed with speech disorders. In this study, it was also concluded that the prevalence of speech disorders was higher than behavioral, mental, and hearing disorders.[4] Data in the last 25 years in Amsterdam indicate that developmental dysphasia can occur in children aged 8 months to 12 years.[1]

Until now, research on the prevalence of developmental dysphasia in Indonesia has never been conducted. In theory, genetic factors and environmental factors play a role in causing developmental dysphasia. In some cases, dysphasia is caused by a mutation in the GRN gene that is derived from the dominant autosomal chromosome. This gene mutation is

received
December 7, 2018
accepted after revision
March 20, 2019

DOI https://doi.org/10.1055/s-0039-1688806.
ISSN 2474-5871.

also associated with behavior disorders.[5] In some cases, dysphasia is caused by a mutation in the GRN gene that is derived from the dominant autosomal chromosome. This gene mutation is also associated with behavior disorders.[5] Other cases of dysphasia are associated with epilepsy which starts at an early age and that involve GRIN2A gene mutations.[6] Gender also influences the prevalence of speaking and speaking disorders. The male sex has a higher risk of 2:1 in studies that use a uniform distribution of population between male and female sexes.[7] Besides genetic and sex factors, environmental factors such as exposure of children to technology (TV, gadgets) can also cause communication delays and disintegrate concentration of children that can lead to developmental dysphasia.

Cases of developmental dysphasia will have an impact on communication disorders as adults, for example, stuttering, where it is caused by trauma, stroke, or injury to the brain. Apart from being caused by those reasons, stuttering can also be caused by conditions of limited communication skills that occur during the development of children. Stuttering is included in terms of speech disorders where the ability to speak is not fluent accompanied by an excessive repetition of sounds, words, and phrases, and a break when speaking.[8] In a study conducted from 2008 to 2011, at least 3 million Americans experience stuttering, with the most frequency found in young children aged 2 to 6 years.[9]

In theory, many factors play a role in causing developmental dysphasia in children. However, until now, there have been no studies that explain the factors that influence the developmental dysphasia in children. The impact of this disease in the long term has a significant influence on the academic ability and communication in children. Therefore, identification and analysis of factors that influence this disease are very important so that in the future preventive measures could be taken.

Methods

This study used an analytical survey method with a cross-sectional approach carried out in Dewi Sri Karawang Hospital and in the Karawang community. The research subjects were parents of pediatric patients diagnosed with dysphasia and parents of nondysphasia children in the Karawang region who had met the inclusion and exclusion criteria. This study comprised two groups: control group and case group. The control group consisted of 22 children, whereas the case group consisted of 30 children.

This study used an analytical survey method with a cross-sectional approach carried out in Dewi Sri Karawang Hospital and in the Karawang community. The research subjects were parents of pediatric patients diagnosed with dysphasia and parents of nondysphasia children in the Karawang region who had met the inclusion and exclusion criteria. This study comprised two groups: control group and case group. The control group consisted of 22 children, whereas the case group consisted of 30 children.

In the case group, inclusion criterion was children aged 12 to 72 months who experienced delays in speaking according to the criteria for delayed talking by Allen and Rappin: (1) children at the age of 10 months who cannot babble, (2) children at the age of 18 months who cannot speak words other than daddy/mama and cannot point out what he/she desired, (3) children at the age of 24 months who have not been able to compose sentences consisting of two words/speech cannot be understood/the child does not understand other people, and/or children examined by the Early Language Milestone Scale Score scale (ELMS-2) experiencing slow talk, (4) children with delayed speech without functional organ disorders (including congenital abnormalities), (5) having data in the form of medical records or health cards, and (6) parents consenting that their children become research samples.

Children also underwent screening stimulation of growth in toddlers and preschoolers based on guidelines from the Ministry of Health, Directorate General of Community Health Development, Republic of Indonesia. These guidelines are intended to inform the patient about their cognitive status level, but it is not used for the diagnostic purpose. The cognitive status data are required for understanding whether there is a connection between the cognitive status and developmental dysphasia occurrence in the patient. However, the hospital did not make it an obligation for children to undergo an intelligence quotient (IQ) test. Instead, the hospital did screen each of the patients as per the guidelines from the ministry to get information about their cognitive status. The screening stimulation process involved several criteria, namely coarse motion ability, smooth motion ability, speaking and language skills, and socialization and independence capabilities. These criteria are distinguished by age: 0 to 3 months, 3 to 6months, 6 to 9 months, 9 to 12 months, 12 to 15 months, 15 to 18 months, 18 to 24 months, 24 to 36 months, 36 to 48 months, 48 to 60 months, and 60 to 72 months. The presence or absence of cognitive problems in patients is detected by determining the age-level ability of the patient; if the level of ability is in accordance with his age, then the patient has normal cognitive status.[10] In our case, all of the patients had normal cognitive status.

The exclusion criteria included children with delays in speaking and who had a neurological examination/hard sign and dysmorphology, children with delayed speaking and suffering from hearing loss. In the control group, inclusion criteria were nondevelopmental dysphasia children aged 12 to 72 months and residence of Karawang.

Data collection was conducted by questioning the parent of both groups to identify risk factors for child development dysphasia, such as family history, gender, febrile seizures, exposure to TV/gadget, and mother's employment status. The obtained data were analyzed using multivariate statistical regression: enter-method with a 95% confidence level to see the correlation between risk factors and child development dysphasia.

Result

This study involved 30 children with developmental dysphasia in Dewi Sri Hospital; negative controls accounted for 22

children. The research subjects consisted of 28 (54%) males and 24 (46%) females. The average age of the study subjects was 45.57 months ± 16.75 months (range: 1–6 years). The study was conducted by interviewing and filling out questionnaires aimed at the parents of patients to determine the condition of children with dysphasia. The results of the study show that there are several risk factors that have a significant effect on childhood developmental dysphasia, such as multimedia exposure, heat convulsions, and genetics.

- Multimedia exposure (TV, gadgets, mobile phones) is one of the environmental factors that influence children's developmental dysphasia. We ask the respondent about how long their children were exposed to the multimedia. We classified the exposure into two types: (1) children with multimedia exposure of less than 1 hour and (2) children with multimedia exposure of more than 1 hour. In this study, criteria for less than 1 hour per day were used for low exposure and for more than 1 hour per day were used for high exposure following the recommendations of the American Academy of Pediatrics (AAP), in which for children aged 2 to 5 years, the maximum limit of exposure to multimedia is 1 hour. From the results of this study, most children in the case group were exposed to more than 1-hour multimedia exposure (24 children), whereas in the control group, 11 children were exposed to less than 1 hour to multimedia. The results of multivariate analysis also showed that multimedia exposure influenced the incidence of developmental dysphasia ($p = 0.010$).
- Febrile seizures: these occurred in 50% of the case group and 13.63% in the control group and influenced the occurrence of dysphasia in children ($p = 0.042$).
- Genetic factors: these can significantly influence the incidence of child development dysphasia, with a *p*-value of 0.008.

Some risk factors that do not affect child development dysphasia are as follows:

- The employment status of mothers: in the case group, 53.3% (16 people) mothers did not work and 46.7% (14 people) mother worked. In the control group, mothers who did not work were lesser in number than those who worked (►**Table 1**). The results of multivariate analysis also showed that maternal working status did not affect the incidence of developmental dysphasia ($p = 0.549$).
- Based on gender, the case group showed that male sex suffered more from developmental dysphasia than women, but the results of multivariate analysis showed that gender variables did not have a significant effect ($p = 0.745$) on the incidence of dysphasia development in a child (►**Table 2**).

Table 1 Respondent characteristics

Demographics	Case group (30)		Control group (22)	
	N	%	*N*	%
Age (years)				
1–3	12	40.00	3	13.64
4–5	9	30.00	16	72.73
≥ 6	9	30.00	3	13.64
Gender		0.00		0.00
Men	20	66.67	14	63.64
Women	10	33.33	8	36.36
Febrile seizure		0.00		0.00
Yes	15	50.00	3	13.64
No	15	50.00	19	86.36
Multimedia exposure		0.00		0.00
High (>1 h a day)	24	80.00	7	31.82
Low (< 1 h a day)	6	20.00	11	50.00
Genetic family history		0.00		0.00
Yes	14	46.67	1	4.55
No	16	53.33	21	95.45
Mother's level of education		0.00		0.00
Elementary school	1	3.33	2	9.09
Junior high school	1	3.33	4	18.18
High school	20	66.67	9	40.91
College	8	26.67	7	31.82
Income		0.00		0.00
> 3 million IDR	23	76.67	5	22.73
< 3 million IDR	7	23.33	17	77.27
Mother's employment status		0.00		0.00
Yes	14	46.67	12	54.55
No	16	53.33	10	45.45

Discussion

Children must be exposed to language at the earliest possible age so that they can master the language. Preschool age is the recommended age.[4] Language disorders that occur in preschool children will have an impact on the ability to write and understand academic subjects.[7] Speech and language disorders that are not properly treated will have an impact on communication skills and verbal, behavioral, psychosocial,

Table 2 SPSS result

Variable	*p*-Value
Febrile seizure	0.042[a]
Multimedia	0.010[a]
Genetic family history	0.008[a]
Mother's employment status	0.549
Gender	0.745

[a]Significant ($p < 0.05$).

and academic adaptation.[11] Based on the results of this study, the risk factors that influence the occurrence of child dysphasia are multimedia exposure, febrile seizure, and genetic heredity.

Multimedia Exposure

The result shows that multimedia can affect the incidence of developmental dysphasia. This result is consistent with that in the research by Nurmalasari, in which a higher intensity of gadget exposure influences the delay in children's speech.[12] Multimedia exposure (TV, gadgets, mobile phones) is one of the environmental factors that influence children developmental dysphasia. Research conducted by Chonchaiya and Pruksananonda, Duch et al, and Lin et al showed that there is a relationship between excessive multimedia exposure (screen) in children under 6 years of age and delayed speech.[13–15] In addition, Lin et al's research shows that television exposure correlates with higher speech development delay in children aged 15 to 35 months. Duch et al showed that infants and toddlers who watch television excessively as much as 2 hours per day or more have a 5.5 times greater risk of getting a small score on communication section of the Ages and Stages Questionnaire (ASQ-3).[14] The same results are shown by research conducted by Chonchaiya and Pruksananonda who pointed out that children who watch television for more than 2 hours per day have six times greater risk of experiencing delays in speaking.[13]

Febrile Seizure

Febrile seizures occur in children who experience learning difficulties[16] but have not been studied for their effects on developmental dysphasia. This is different from the research conducted by Hidajati in which the seizure factor did not significantly influence the incidence of dysphasia in children. Based on the data collected from 30 children with developmental dysphasia, 50% experienced seizures and 50% did not experience it. While in control case only 13.6% of children experienced a febrile seizure.

Genetic Family History

Hidajati's research[17] showed that "genetic factors were a significant factor of childhood dysphasia." This research also found that genetic factors have significant influence on the incidence of child developmental dysphasia ($p = 0.008$). Research conducted by Tallal et al showed that most cases of specific language impairment have a history of language impairments (LI) in their families. The study also showed a significant correlation between family members who had LI and the family descendants who had LI. When more family members have LI, then the proportion of descendants who will have LI also increases.[18] Another study conducted by Loo and Young also shows that genetic factors influence the incidence of speech disorders.[19] The study conducted a genetic examination of 9-year-old boys who had speech disorders and learning difficulties. The results of the study were the discovery of DNA duplication on chromosome 7. The chromosome 7 region of 7q22.1 to 7q31 in various studies was associated with a delayed speech in autism as well as in various other diseases related to the speech component (language). Furthermore, research conducted by Cukier shows abnormal chromosomes that strengthen the involvement of 7q22-31 chromosome.[20] Consistent with previous studies, this study also shows an association between heredity (genetic) and the development of developmental dysphasia in children. This might be based on the presence of abnormal chromosome 7 regions 7q22-31. Further research is required to find out whether developmental dysphasia in children in Karawang is also related to chromosome 7 or not.

Mother's Employment Status

The low intensity of mother–child interaction can also affect the linguistic abilities of children[21]; therefore, it is assumed that the status of the mother's employment plays an indirect role in the development of children's speech skills. The working status of the mother is related to the amount of time parents spend talking to their children. A working mother will have less time to talk with children. The amount of time parents speak to their children is related to the development of children's vocabulary and language. Kuhl et al's research on learning perceptions of speech shows that interactions between humans greatly influence the development of a child's language. Kuhl also revealed that the best learning for babies is through direct interaction and not from television. The advantages of screen time can affect the development of children's speech because parents spend less time interacting with their children.[23] However, in this study, the result shows that the mother employment status did not become a significant factor in the occurrence of children developmental dysphasia in Karawang.

Gender

In this study, gender is not related to the incidence of children developmental dysphasia. Gender has become a unique factor to be investigated in the event of delays in speaking. Many studies show that there are more men who experience delays in speaking compared to women. But, after reviewing it, the sex differences reported in several studies are the result of a bias, which is more likely to study men in clinical research.[22]

Conclusion

Febrile seizures, excessive multimedia exposure (>1 hour per day), and identified hereditary factors are significant risk factors for children developmental dysphasia in Karawang, with an age range from 1 to 6 years ($p = 0.042$, 0.10, and 0.08). Meanwhile, gender and mother's employment status did not affect the occurrence of child dysphasia ($p = 0.549$ and 0.745).

Research Limitations

Instead of IQ test, children underwent screening stimulation of growth in toddlers and preschoolers based on

guidelines from the Ministry of Health, Directorate General of Community Health Development, Republic of Indonesia. For future research, it is recommended to perform the IQ test to eliminate the bias between cognitive status and the occurrence of the children developmental dysphasia.

This research did not differentiate multimedia exposure into passive (watching television) and active (computer games). It is recommended for future research to differentiate the multimedia exposure to see if there are any different outcomes in the occurrence of developmental dysphasia in children.

Funding
This research was carried out by a research grant from the Directorate of Higher Education Ministry of Education and Culture, Republic of Indonesia.

Conflict to Interest
None declared.

References

1 Acharya AB, Wroten M. Aphasia Broca. Treasure Island, FL: StatPearls Publishing
2 Beesems MAG. Developmental Dysphasia Theory Diagnosis and Treatment. Amsterdam: Developmental Dysphasia Foundation; 2007;1–11
3 Yeung HH, Werker JF. Learning words' sounds before learning how words sound: 9-month-olds use distinct objects as cues to categorize speech information. Cognition 2009;113(02):234–243
4 McLeod S, McKinnon DH. Prevalence of communication disorders compared with other learning needs in 14,500 primary and secondary school students. International Journal of Language and Communication Disorder 2007;42(Suppl 1):37–59
5 Hsiung GYR, Feldman HH. GRN-related frontotemporal dementia. In: Pagon RA, Adam MP, Ardinger HH, et al., eds. GeneReviews [Internet]. Seattle, WA: University of Washington, Seattle; 1993–2017
6 Lesca G, Rudolf G, Bruneau N, et al. GRIN2A mutations in acquired epileptic aphasia and related childhood focal epilepsies and encephalopathies with speech and language dysfunction. Nat Genet 2013;45(09):1061–1066
7 Sices L, Taylor HG, Freebairn L, Hansen A, Lewis B. Relationship between speech-sound disorders and early literacy skills in preschool-age children: impact of comorbid language impairment. J Dev Behav Pediatr 2007;28(06):438–447
8 Sharp HM, dan Hillenbrand K. Speech and language development and disorders in children. Pediatr Clin North Am 2008;55(05): 1159–1173
9 Boyle CA, Boulet S, Schieve LA, et al. Trends in the prevalence of developmental disabilities in US children, 1997-2008. Pediatrics 2011;127(06):1034–1042
10 Ministry of Health. Republik of Indonesia. Pedoman Pelaksanaan Stimulasi, Deteksi dan Intervensi Dini Tumbuh Kembang Anak (in Bahasa). Available at: http://e-cinta.com/simulasi/unduh_buku
11 Leung KA, dan Kao PC. Evaluation and management of the child with speech delay. Am Fam Physician 1999;59(01):32–45
12 Nurmalasari A. 2016 Hubungan Intensitas Penggunaan Gadget dengan Keterlambatan Perkembangan pada Aspek Bicara dan Bahasa Pada Balita di Kelurahan Tambakrejo Surabaya. Skripsi Thesis, Universitas Airlangga.
13 Chonchaiya W, Pruksananonda C. Television viewing associates with delayed language development. Acta Paediatr 2008;97(07): 977–982
14 Lin LY, Cherng RJ, Chen YJ, Chen YJ, Yang HM. Effects of television exposure on developmental skills among young children. Infant Behav Dev 2015;38:20–26
15 Duch H, Fisher EM, Ensari I, et al. Association of screen time use and language development in Hispanic toddlers: a cross-sectional and longitudinal study. Clin Pediatr (Phila) 2013;52(09):857–865
16 Al-Ossaimi S, dan Jaward HN. Recent advances in febrile seizures, review article. Kuwait Med J 2001;33(01):7–21
17 Hidajati Z. Faktor Resiko Disfasia Perkembangan pada Anak. Thesis Universitas Diponegoro, Semarang; 2009
18 Tallal P, Hirsch LS, Realpe-Bonilla T, et al. Familial aggregation in specific language impairment. J Speech Lang Hear Res 2001;44 (05):1172–1182
19 Loo W, Young W Identification of a Single Chromosome Region Linked to Specific Language Impairment. New England Journal of Medicine. Institute of Medical Science and Department of Molecular and Medical Genetics, University of Toronto; 2005
20 Cukier Holly N, Skaar David A, Rayner-Evans Melissa Y, Konidar Ioanna, Whitehead Patrice L, Jowarski James M, Cuccaro Michael L, A Margaret A, Pericak-Vance Gilbert John R 2009. Identification of Chromosome 7 Inversion Breakpoints in an Autistic Family Narrows Candidate Region for Autism Susceptibility. International Society for Autism Research, Wiley Periodicals, Inc. DOI: 10.1002/aur.96
21 Beatriz Servilha Brocchi, Maria Isabel da Silva Leme. Relation between mother-child interaction upon the development of oral language of the preterm newborn. Audiology - Communication Research 2013;18(04):321–333
22 Kulh PK, Conboy BT, Padden D, Nelson T, Pruitt J. Early Speech Perception and Later Language Development: Implications for the "Critical Period". Language Learning and Development 2005;1 (3&4):237–264
23 Duch H, Fisher EM, Ensari I, Fon M, Harringto A, Taromino C, Rodriguez C. Association of screen time use and language development in hispanic toddlers: A cross-sectional and longitudinal study. Clinical Pediatrics 2013;52(09):857–865