KASTAMONU MEDICAL JOURNAL

Review

DOI: 10.51271/KMJ-0136

Kastamonu Med J. 2024;4(1):24-28

Health follow-up visits of children with autism

Ayse Esra Tapcı[1], Aysu Duyan Çamurdan[2]

[1]Department of Pediatrics, Ankara Training and Research Hospital, Uviversity of Health Sciences, Ankara, Turkiye
[2]Department of Social Pediatrics, Faculty of Medicine, Gazi University, Ankara, Turkiye

Received: 20/12/2023 ◆ **Accepted**: 13/02/2024 ◆ **Published**: 01/03/2024

ABSTRACT

Child health follow-up is the most important of basic health services and should continue at regular intervals until the age of 18 years. Physicians' child health follow-up examinations present the best opportunity to deliver evidence-based preventive health services, such as monitoring the growth and development of the child, conducting age-appropriate screenings, providing vitamin/mineral support according to age and requirements, administering childhood vaccinations, informing the family about home accidents and nutrition, monitoring the child in terms of child neglect and abuse risks, and raising the awareness of the family in this regard. Child health follow-up should encompass not only children without any health problems but also those with mental, physical, visual, or hearing impairments, or special needs such as those with autism. Autism spectrum disorder is a neurodevelopmental disorder characterized by social and communication limitations and repetitive, restricted behaviors. The presence of a child with special needs such as autism can have social, psychological, and economic implications for family members. While there are many difficulties in caring for a healthy child, these difficulties increase exponentially in the care of a child with special needs. Professional assistance is necessary for families to address matters such as monitoring the child's development, providing nourishment, and administering vaccinations. Children with autism constitute a group that needs to be closely followed up for vitamin-mineral deficiencies and growth retardation due to their higher risk of malnutrition. For these reasons, regular health follow-up of children with autism is essential at regular intervals.

Keywords: Children, follow-up visit, autism

INTRODUCTION

The primary objective of health services and the principal responsibility of healthcare personnel is to promote and maintain the well-being of individuals, striving to proactively prevent the occurrence of illnesses. Child health follow-up is the most important of the basic health services and should continue at regular intervals until the age of 18 years. Physicians' child health follow-up examinations encompass evidence-based preventive health services, such as monitoring the growth and development of the child, conducting age-appropriate screenings, initiating vitamin and mineral support according to age and requirements, administering childhood vaccinations, and informing the family about home accidents and nutrition, and monitoring the child in terms of child neglect and abuse risks.[1,2]

The concept of well-child follow-up has seen a transformation in recent years, being replaced by child health follow-up, with the recognition of the utmost importance of regularly monitoring not only healthy children but also those with chronic diseases or disabilities. Child health follow-up is a service that involves the monitoring of the growth and development of all children, evaluating their health and disease status, offering preventive medicine practices such as vaccination, age-appropriate nutrition, and protection from accidents, and aims to make families competent in child care. It is every child's natural right to benefit from this service.[3] Therefore, child health follow-up should include not only completely healthy children without any health problems but also those with mental, physical, visual, hearing impairments, and autism, i.e., children with special needs.[2,4]

Autism spectrum disorder (ASD) is a heterogeneous neuropsychiatric disorder characterized by varying degrees of social impairment, problems in communication and behavior, and delayed cognitive development.[5] ASD is defined as a permanent neurodevelopmental disorder that commonly occurs in the first years of life and presents with deficits in social skills, language impairment, and limited interest and behavior. However, these problems may not be fully recognized until the child's capacity falls behind environmental demands.[6,7] The majority of children with ASD have cognitive and linguistic impairments, and this disorder has been associated with known medical, genetic, and environmental factors. There is no medical or biological marker for the diagnosis of this complex disorder, which is divided into different levels of severity.

Corresponding Author: Ayse Esra Tapcı, esratapci@gmail.com

Cite this article as: Tapcı AE, Duyan Çamurdan A. Health follow-up visits of children with autism. *Kastamonu Med J.* 2024;4(1):24-28.

Diagnosis is made clinically based on history, observation, and structured tests used in ASD screening and evaluation.[8] In the literature, the prevalence of ASD varies between 1 in 40 and 1 in 500, depending on the methodology used and the population evaluated in previous studies. In a report published in the USA in 2018, the prevalence of ASD was reported to be 1/59. This prevalence has increased across the world, especially since the late 1990s, primarily due to changes in the case definition and increased awareness.[9,10] In Turkiye, the frequency of ASD in children aged 18-30 months has been found to be 1/1,000.[11,12] ASD has been found to be four to six times more common in boys than in girls in studies conducted with clinical samples and two to three times more common in boys in population studies.[13]

Although there is no treatment method that completely normalizes development or functionality in ASD, it is known that evidence-based treatment and intervention programs enable children diagnosed with ASD to achieve developmental and behavioral gains. An individualized treatment plan is required for individuals with ASD and their families. This intervention may vary depending on the age, condition, and additional physical and mental disorders of the child and requires a multidisciplinary approach. Treatment targets specified in the National Institute for Health and Care Excellence 2013 guidelines include reducing the core symptoms of ASD, enabling individuals to reach their potential, treating simultaneous physical and mental illnesses that disrupt the harmony and functionality of the family or the patient, supporting caregivers, and applying education and certain evidence-based treatment methods to individuals with ASD.[14,15] Families play an important and effective role in this entire treatment and intervention process. However, living with a child with special needs such as autism has social, psychological, and economic implications for family members. Parents experience significant stress in adapting to this challenging condition, which hinders their ability to meet the demands of everyday life. While even caring for a healthy child has many difficulties, these difficulties increase exponentially in caring for a child with special needs. Families with children who have special needs require expert assistance in various areas, including their child's growth, dietary requirements, nutritional supplements, and protection from diseases.[16,17]

NUTRITIONAL STATUS IN AUTISM SPECTRUM DISORDER

Children with ASD exhibit distinct variations in their eating practices in comparison to their typically developing peers. Feeding problems are more common in these children than in healthy children in the first year of life, from the moment they are introduced to complementary foods. Autistic children have difficulty eating and require a significantly higher level of additional parental involvement than their healthy peers.18 Studies evaluating children with ASD highlight nutritional problems such as food rejection, food selectivity, and excessive consumption of a particular food. In addition, research shows that children with ASD are inclined toward consuming certain food groups based on their texture, color, smell, and temperature, and that they frequently exhibit a preference for particular foods while rejecting others.[19,20] Furthermore, gastrointestinal disorders are one of the most common medical conditions associated with ASD. If left untreated, these comorbidities can exacerbate the symptoms of ASD and lead to other associated clinical findings and a poorer quality of life. Therefore, it is important for clinicians to understand how these gastrointestinal problems occur and apply effective treatments.[21] It is considered that along with these complaints, food selectivity and rejection may put the individual at risk of nutritional deficiency. It has been suggested that children with ASD experience many vitamin and mineral deficiencies as a result of their poor intake of daily energy sources, carbohydrates, fats, and protein, as well as their extremely permeable intestines and highly selective diets.[22,23] Another study found that children with autism have a higher rate of food rejection compared to healthy children, resulting in nutritional inadequacies caused by their limited dietary preferences.[24] In addition, nutritional treatments applied to prevent the symptoms of autism, such as gluten-free and casein-free diets, may cause vitamin and mineral deficiencies.[25,26] Research conducted on children with autism generally indicates low whole blood, serum, and plasma levels of pantothenic acid, folate, biotin, vitamin B12, vitamin D, and vitamin E in this group.[22,25] While vitamin D insufficiency is prevalent among children with ASD, for whom regular prophylaxis is recommended, there are only limited studies on the effect of vitamin D in the treatment of ASD.[27] In a case report by Jia et al.[28] a 32-month-old infant diagnosed with ASD was administered 150,000 IU of vitamin D intramuscularly every month and 400 IU of oral vitamin D daily. The results of the study showed a significant increase in the serum 25(OH) D level and significant improvements in scale scores. Another study evaluated the relationship of vitamin D status and vitamin D deficiency with autism severity. Vitamin D deficiency was observed in 57% of the participants (n=122), and vitamin D insufficiency was detected in 30%. Approximately 81% of children who received vitamin D supplements at the treatment dose for three months exhibited improvement in ASD scales measuring behavior, eye contact, and attention span.[29]

For all the reasons discussed above, children with autism are at risk of malnutrition and constitute a group that needs to be closely followed up in terms of vitamin-mineral deficiencies and growth retardation due to malnutrition. A review of the literature shows that a multitude of treatment approaches have been attempted in relation to nutritional support. These treatment approaches generally include special diets and nutritional supplements. Special diets include the gluten- and casein-free diet, ketogenic diet, specific carbohydrate diet, Feingold diet, and candida body ecology diet. Nutrient supplements include fatty acid supplements (omega-3 fatty acids), multivitamin supplements, mineral supplements (zinc), and probiotics.[30-32] The preference of these special diets and supplements may differ among individuals with ASD, and there is ongoing debate regarding their potential benefits. Therefore, families with children who have autism require more professional support on nutrition and vitamin and mineral supplements, which are key aspects of child health follow-up.

IMMUNIZATION IN AUTISM SPECTRUM DISORDER

Vaccination is a public health service that saves the lives of millions of individuals in developed countries.[33] According to data from the World Health Organization (WHO), vaccination is a crucial preventive public health service that saves the lives of two to three million children every year, and it is projected that by enhancing global vaccination efforts, an additional 1.5 million children's deaths can be prevented.[34] The success of

vaccination strategies depends on societies' perceptions of the benefits or risks of vaccines and, thus, their trust in vaccination. In this context, one of the major sources of hesitation has been the debate about whether vaccines cause autism. Research published by Wakefield et al.[35] in the Lancet in 1998 suggested a relationship between the measles, mumps, and rubella (MMR) vaccine administered during infancy and autism, resulting in changes in parental behavior regarding MMR vaccination and a decrease in trust in healthcare providers. This publication was later retracted from the Lancet, and Andrew Wakefield, the principal researcher, was banned from practicing medicine due to the methodology problems in the study, such as the inclusion of only 12 non-randomly selected children and the involvement of some families in a lawsuit against vaccine companies, as well as his subsequent attempts to market his own mumps vaccine.[36] A 2014 meta-analysis evaluated 10 observational studies of childhood vaccines, including five cohort studies or five case-control studies. No correlation was detected between the MMR vaccine and autism in any of the two cohort studies and four case-control studies that explicitly investigated the association between the MMR vaccine and autism.[37] Across various international studies investigating the potential link between MMR vaccination and autism, no evidence was found to support a correlation between MMR vaccination and the rise in autistic cases. A nationwide cohort study was conducted in all children born between January 1, 1999, and December 31, 2010, in Denmark to evaluate whether the MMR vaccine increased the risk of autism in children during the post-vaccine period. The study initially included 663,236 children born to Danish mothers who were followed up during this period, but 5,775 children were excluded from follow-up. During follow-up, 6,517 children were diagnosed with autism (incidence: 129.7/100,000 person-years). The risk of autism did not increase in those who received or did not receive the MMR vaccine. In addition, no correlation was found between the time of vaccination and the development of autism in autistic children. Covering 6517 cases, that study is the largest single-center study to date and considerably enhances our knowledge on this subject.[38] In a similar national study conducted in 2003, 467,450 Danish children were vaccinated with the thiomersal-containing pertussis vaccine or a thiomersal-free formulation of the same pertussis vaccine and detected no association between thiomersal content and autism.[39] Thiomersal is widely recognized as the best vaccine preservative, primarily used in multi-dose non-live vaccine vials, due to its antiseptic and antifungal properties.[40] It is metabolized to the compound ethylmercury and is used in concentrations corresponding to 12.5-50 μg per vaccine dose. Concerns about mercury accumulation from childhood vaccination schedules and other sources led to the replacement of thiomersal-containing vaccines with thiomersal-free formulations in many high-income countries in the 1990s and early 2000s. All mercury compounds are neurotoxic when exposed to high doses, but most concerns about thiomersal-containing vaccines are based on experience with methylmercury, a different organic mercury compound with known neurotoxic effects. Humans are commonly exposed to methylmercury through fish consumption, and there is abundant evidence that fetal exposure, particularly through fish consumption during pregnancy, leads to adverse effects on neurodevelopment. Furthermore, ethylmercury has different pharmacokinetic properties than methylmercury. The half-life of ethylmercury (less than 1 week) is shorter than that of methylmercury (1.5 months), meaning that blood exposure to the former is relatively short-term. Ethylmercury is also rapidly excreted through the digestive system.[41,42] Thiomersal has a proven track record of effectiveness and safety. Although thiomersal has been removed from routinely used childhood vaccines in most high-income countries as a precautionary measure, it nevertheless serves a crucial function as a potent preventative agent, guaranteeing millions of individuals across the world access to vaccines that are free from contamination. It is also noteworthy that in countries where thiomersal has been excluded from childhood vaccines, the prevalence of neurodevelopmental disorders such as autism continues to rise.[43]

While concerns about thiomersal have begun to decrease due to the statements made by international authorities and the removal of thiomersal from many vaccines in use, aluminum adjuvanted vaccines have emerged as a fresh subject of debate. Aluminum is widely found in the environment and is a component of many consumer products, including antacids, skin astringents, and antiperspirants. Since the early 20th century, aluminum oxide has been used as an adjuvant to enhance immune responses to vaccines in various forms, including hydroxide and soluble salts.44 The mechanism of action of aluminum is complex and involves the direct stimulation of multiple immune receptors, thereby enhancing the body's innate immune response to the antigen. Concentrations of aluminum vary among vaccines. The diphtheria-tetanus vaccine contains 1.5 mg of aluminum phosphate per dose, although it is not present in the MMR vaccine, which is a live vaccine.[45] Many studies in the literature have shown no risky levels of aluminum compounds in the blood or hair of children who have received vaccines containing aluminum adjuvants.[46,47] The Global Advisory Committee on Vaccine Safety, a scientific advisory body of the WHO, stated in a report published in June 2012 that there is no scientific evidence supporting a relationship between thiomersal-containing and aluminum adjuvant vaccines and autism.[48]

Gaining further insight into concerns surrounding vaccines among families of individuals with autism and the underlying reasons can inform the development of optimal vaccination strategies. Both practitioners and individuals should engage in informative activities that are grounded in scientific data. It is crucial to effectively manage these processes to access accurate information. It is also necessary to base our actions on objective data rather than relying on prejudices or presuppositions.

AUTISM AND CHILD NEGLECT-ABUSE

According to the WHO, 1/4 of adults are physically abused as children, 1/5 of women and 1/13 of men are exposed to sexual abuse during childhood, and 31,000 children under the age of 15 years die due to child abuse every year across the world.[49] The Child Abuse and Domestic Violence Research in Turkiye showed that in school and family environments, 43% of children aged seven to 18 years were physically abused, 51% were emotionally abused, and 3% were sexually abused, while a total of 681,000 children were victims of some type of neglect or abuse.[50] It is very important that children with autism who cannot protect themselves and cannot clearly explain the incident to others due to their mental and motor development are protected from individuals who may exploit their vulnerability and their possible acts of abuse. The most important basis for preventing this situation and

safeguarding children against these acts is to determine their parents' awareness of abuse.[51] It is considered that determining parents' awareness of abuse will form the basis for understanding their thoughts and attitudes concerning potential abuse before it occurs, as well as their responses following the abuse. Clarifying the relationship between ASD and abuse and parents' views on this issue will form the cornerstone of abuse prevention to be provided for parents. In this regard, increasing parents' awareness of this issue is important in terms of both effectively identifying the situation and intervening at an early stage.[49]

CONCLUSION

It is important to conduct regular health follow-up visits for children with autism, particularly when there are concerns regarding vaccination, malnutrition, growth retardation, neglect, and abuse. It should not be forgotten that child health follow-up includes not only completely healthy children without any health problems but also those with mental, physical, visual, or hearing impairments and autism, i.e., children with special needs.

ETHICAL DECLARATIONS

Referee Evaluation Process

Externally peer-reviewed.

Conflict of Interest Statement

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

Financial Disclosure

The authors received no financial support for the research and/or authorship of this article.

Author Contributions

All of the authors declare that they have all participated in the design, execution and analysis of the paper and that they have approved the final version.

REFERENCES

1. Gür E, Sağlam Çocuk İzlemi. İ.Ü. Cerrahpaşa Tıp Fakültesi Sürekli Tıp Eğitimi Etkinlikleri. Sağlam Çocuk İzlemi Sempozyum Dizisi No: 35, Ekim 2003:9-16.
2. Geoffrey R Simon, Cynthia Baker, Graham A Barden, et al. 2014 recommendations for pediatric preventive health care. *Pediatrics.* 2014;133(3):568-570.
3. Ünver Korğalı E. Çocuk Sağlığı İzlemi. In: Ataseven H, ed. Güncel Pratik Tıp El Kitabı-2. Cumhuriyet Üniversitesi Yayınları: 2021:21-32.
4. Coker TR, Chung PJ, Cowgill BO, Chen L, Rodriguez MA. Low-income parents' views on the redesign of well-child care. *Pediatrics.* 2009;124(1):194-204.
5. American Psychiatric Association. Diagnostic and statistical manual of mental disorders (DSM-5®). 5th ed. American Psychiatric Publishing: 2013.
6. American Psychiatric Association. Autism spectrum disorder. In: Diagnostic and Statistical Manual of Mental Disorders. 5th ed. Text Revision, American Psychiatric Association: 2022:56.
7. Autism spectrum disorder. In ICD-11 for Mortality and Morbidity Statistics (Version 2/2022) https://icd.who.int/browse11/lm/en#/http%3a%2f%2fid.who.int%2ficd%2fentity%2f437815624 Accessed on September 20, 2023.
8. Ozonoff S, Goodlin-Jones BL, Solomon M. Evidence-based assessment of autism spectrum disorders in children and adolescents. *J Clin Child Adolesc Psychol.* 2005;34(3):523-540.
9. Schendel DE, Thorsteinsson E. Cumulative incidence of autism into adulthood for birth cohorts in Denmark, 1980-2012. *JAMA.* 2018;320(17):1811-1813.
10. Kogan MD, Vladutiu CJ, Schieve LA, et al. The prevalence of parent-reported autism spectrum disorder among US children. *Pediatrics.* 2018;142(6):e20174161.
11. Baio J, Wiggins L, Christensen DL, et al. Prevalence of autism spectrum disorder among children aged 8 years - autism and developmental disabilities monitoring network, 11 sites, United States, 2014. *MMWR Surveill Summ.* 2018;67(6):1-23.
12. Kondolot M, Özmert EN, Öztop DB, Mazıcıoğlu MM, Gümüş H, Elmalı F. The modified checklist for autism in Turkish toddlers: a different cultural adaptation sample. *Res Autism Spectr Disord.* 2016;21:121-127.
13. Fombonne E. The changing epidemiology of autism. *J Appl Res Intellect Disabil.* 2005;18(4):281-294.
14. Le Couteur A, Szatmari P. Autism spectrum disorder. In: Thapar A, Pine DS, Leckman JF, Scott S, Snowling MJ, Taylor E, eds. Rutter's Child Adolesc Psychiatry. Wiley: 2015:661-682.
15. Kadak MT. Otizm spektrum bozuklukları-güncel bilgilerimiz neler. *Osb.* 2019;12:15.
16. Eren G, Doğan U. Zihinsel engelli çocuğa sahip babaların stres düzeyleri ve stresle başa çıkma yöntemlerinin incelenmesi: karma desenli bir çalışma. *Yıldız Sos Bil Enst Derg.* 2020;4(1):1-21.
17. Akkuş PZ, Saygan BB, Bahadur Eİ, Tuna CAK, Özmert E. Otizm spektrum bozukluğu tanısı ile yaşamak: ailelerin deneyimleri. *Türkiye Çocuk Hast Derg.* 2021;15(4):272-279.
18. Brzóska A, Kazek B, Kozioł K, et al. Eating behaviors of children with autism-pilot study. *Nutrients.* 2021;13(8):2687.
19. Esteban-Figuerola P, Canals J, Fernández-Cao JC, Arija Val V. Differences in food consumption and nutritional intake between children with autism spectrum disorders and typically developing children: a meta-analysis. *Autism.* 2019;23(5):1079-1095.
20. Kars S, Abaoğlu H, Huri M. Otizm spektrum bozukluğu olan çocuklarda beslenme aktivitesinin incelenmesi. *Hacettepe Uni Fac Health Sci J.* 2019;6(3):232-242.
21. Madra M, Ringel R, Margolis KG. Gastrointestinal issues and autism spectrum disorder. *Child Adolesc Psychiatr Clin N Am.* 2020;29(3):501-513.
22. Peretti S, Mariano M, Mazzocchetti C, et al. Diet: the keystone of autism spectrum disorder? *Nutr Neurosci.* 2019;22(12):825-839.
23. Arija V, Esteban-Figuerola P, Morales-Hidalgo P, Jardí C, Canals-Sans J. Nutrient intake and adequacy in children with autism spectrum disorder: EPINED epidemiological study. *Autism.* 2023;27(2):371-388.
24. Bandini LG, Anderson SE, Curtin C, et al. Food selectivity in children with autism spectrum disorders and typically developing children. *J Pediatr.* 2010;157(2):259-264.
25. Al-Farsi YM, Waly MI, Deth RC, et al. Low folate and vitamin B12 nourishment is common in Omani children with newly diagnosed autism. *Nutrition.* 2013;29(3):537-541.
26. Graf-Myles J, Farmer C, Thurm A, et al. Dietary adequacy of children with autism compared with controls and the impact of restricted diet. *J Dev Behav Pediatr.* 2013;34(7):449-459.
27. Özlü T, Arslan E, Kenger EB, Ergün C. Otizm Spektrum Bozukluğunda D Vitamini. *Turkiye Klin J Pediatr.* 2020;29(2):107-114.
28. Jia F, Wang B, Shan L, Xu Z, Staal WG, Du L. Core symptoms of autism improved after vitamin D supplementation. *Pediatrics.* 2015;135(1):196-198.
29. Saad K, Abdel-Rahman AA, Elserogy YM, et al. Vitamin D status in autism spectrum disorders and the efficacy of vitamin D supplementation in autistic children. *Nutr Neurosci.* 2016;19(8):346-351.
30. Taha Z, Abdalhai KA. A Review of the efficacy of the dietary intervention in autism↑ spectrum disorder. *Open Access Maced J Med Sci.* 2021;9:88-94.
31. Amadi CN, Orish CN, Frazzoli C, Orisakwe OE. Dietary interventions for autism spectrum disorder: an updated systematic review of human studies. *Psychiatriki.* 2022;33(3):228-242.
32. Yu Y, Huang J, Chen X, et al. Efficacy and safety of diet therapies in children with autism spectrum disorder: a systematic literature review and meta-analysis. *Front Neurol.* 2022;13:844117.
33. Gust I. Deadly choices: how the anti-vaccine movement threatens us all. Hum Vaccin Immunother. 2012;8(2):159-160.
34. WHO. Ten threats to global health in 2019. Available from: https://www.who.int/news-room/spotlight/ten-threats-to-global-health-in-2019 Accessed September 25, 2023.
35. Wakefield A, Murch S, Anthony A, et al. RETRACTED: Ileal-lymphoid-nodular hyperplasia, nonspecific colitis, and pervasive developmental disorder in children. *Lancet.* 1998;351(9103):637-641.
36. Erdemli Köse SB, Balcı A, Yirün A, Erkekoğlu P. Tiyomersal maruziyeti ve otizm spektrum bozuklukları arasındaki olası ilişkinin değerlendirilmesi. *Literatür Eczacılık Bil Derg.* 2020;9(3):304-318.

37. Taylor LE, Swerdfeger AL, Eslick GD. Vaccines are not associated with autism: an evidence-based meta-analysis of case-control and cohort studies. *Vaccine*. 2014;32(29):3623-3629.
38. Hviid A, Hansen JV, Frisch M, Melbye M. Measles, mumps, rubella vaccination and autism: a nationwide cohort study. *Ann Intern Med*. 2019;170(8):513-520.
39. Hviid A, Stellfeld M, Wohlfahrt J, Melbye M. Association between thimerosal-containing vaccine and autism. *JAMA*. 2003;290(13):1763-1766.
40. Clarkson TW, Magos L, Myers GJ. The toxicology of mercury--current exposures and clinical manifestations. *N Engl J Med*. 2003;349(18):1731-1737.
41. Debes F, Budtz-Jørgensen E, Weihe P, White RF, Grandjean P. Impact of prenatal methylmercury exposure on neurobehavioral function at age 14 years. *Neurotoxicol Teratol*. 2006;28(5):536-547.
42. Pichichero ME, Cernichiari E, Lopreiato J, Treanor J. Mercury concentrations and metabolism in infants receiving vaccines containing thiomersal: a descriptive study. *Lancet*. 2002;360(9347):1737-1741.
43. Conklin L, Hviid A, Orenstein WA, Pollard AJ, Wharton M, Zuber P. Vaccine safety issues at the turn of the 21st century. *BMJ Glob Health*. 2021;6(Suppl 2):e004898.
44. Hogenesch H. Mechanism of immunopotentiation and safety of aluminum adjuvants. *Front Immunol*. 2013;3:406.
45. Excipients in vaccines per 0.5 mL dose. Available from: http://www.vaccinesafety.edu/components-Excipients.htm Accessed September 25, 2023.
46. Mitkus RJ, King DB, Hess MA, Forshee RA, Walderhaug MO. Updated aluminum pharmacokinetics following infant exposures through diet and vaccination. *Vaccine*. 2011;29(51):9538-9543.
47. Karwowski MP, Stamoulis C, Wenren LM, et al. Blood and hair aluminum levels, vaccine history, and early infant development: a cross-sectional study. *Acad Pediatr*. 2018;18(2):161-165.
48. World Health Organization. Global Advisory Committee on Vaccine Safety, June 2012. *Wkly Epidemiol Rec*. 2012;87(30):281-287.
49. World Health Organization (WHO). Child maltreatment. Available from: http://www.who.int/mediacentre/factsheets/fs150/en/2018 Accessed September 25, 2023.
50. Resarch study on child abuse and domestic violence in Turkiye. Available from: http://www.unicef.org.tr/files/bilgimerkezi/doc/cocuk-istismari-raporu-tr.pdf Accessed September 23, 2023.
51. Celiloğlu UB. Çocuk istismari ve ihmali farkindalik ölçeklerinin geçerlik ve güvenirlik çalişmasi. *Sos Bil Derg/J Soc Sci*. 2023;65:443-471.