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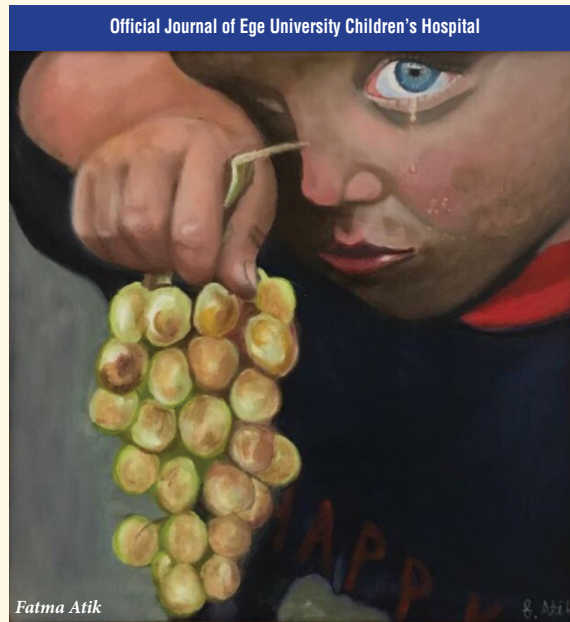
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The Journal of Pediatric Research



Original Articles

School Health in Turkey
Uğur Baysal and İnce.

Effective Speaking Skills and Affecting Factors
Küçüköğlü et al.

Assessment of Endotracheal Tube Position
Gül et al.

Risk Factors of Epilepsy in Children with Cerebral Palsy
Gürkan et al.

The Effect of Music on Children and Adolescents' Anxiety and Vital Signs
Karakul and Bolışık.

Evaluation of Contact Burn on Ex Vivo Human Skin
Arda et al.

When Pediatricians Become Mothers
Bağ and Karaaslan.

Case Reports

Progressive Pseudorheumatoid Chondrodysplasia
Esra Kılıç

Triple X Syndrome with a Rare Finding: Cleft Palate
Gürkaş et al.

Sturge-Weber Syndrome Type III
Gazeteci Tekin et al.

Attention Deficit-hyperactivity Disorder and Eating Disorders
Kalyoncu et al.

Anti GQ1b Antibody Syndrome
Ayça et al.



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Materials and Methods: The study plan should be clearly described, indicating whether the study is randomized or not, whether it is retrospective or prospective, the number of trials, the characteristics, and the statistical methods used.

Results: The results of the study should be stated, with tables/figures given in numerical order; the results should be evaluated according to the statistical analysis methods applied. See General Guidelines for details about the preparation of visual material.

Discussion: The study results should be discussed in terms of their favorable and unfavorable aspects and they should be compared with the literature. The conclusion of the study should be highlighted.

Study Limitations: Limitations of the study should be discussed. In addition, an evaluation of the implications of the obtained findings/results for future research should be outlined.

Conclusion: The conclusion of the study should be highlighted.

Acknowledgements: Any technical or financial support or editorial contributions (statistical analysis, English evaluation) towards the study should appear at the end of the article.

References: Authors are responsible for the accuracy of the references. See General Guidelines for details about the usage and formatting required.

Case Reports

Case reports should present cases which are rarely seen, feature novelty in diagnosis and treatment, and contribute to our current knowledge. The first page should include the title in English, an unstructured summary not exceeding 50 words, and key words. The main text should consist of introduction, case report, discussion and references. The entire text should not exceed 1500 words (A4, formatted as specified above). A maximum of 10 references shall be used in case reports.

Review Articles

Review articles can address any aspect of clinical or laboratory pediatry. Review articles must provide critical analyses of contemporary evidence and provide directions for future research. **The journal only accepts and publishes invited reviews.** Before sending a review, discussion with the editor is recommended.

Reviews articles analyze topics in depth, independently and objectively. The first chapter should include the title in English, an unstructured summary and key words. Source of all citations should be indicated. The entire text should not exceed 18 pages (A4, formatted as specified above)

Letters to the Editor

Letters to the Editor should be short commentaries related to current developments in pediatrics and their scientific and social aspects, or may be submitted to ask questions or offer further contributions in response to work that has been published in the Journal. Letters do not include a title or an abstract; they should not exceed 1.000 words and can have up to 5 references.

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Contents

Review

- 60 ▶ Recent Developments in School-Based Health Services in Turkey
Serpil Uğur Baysal, Tolga İnce, İzmir, Turkey

Original Articles

- 65 ▶ Determination of Effective Speech Skills of Pediatric Nurses and Affecting Factors
Sibel Küçükkoçlu, Semra Köse, Aynur AYTEKİN ÖZDEMİR, Neşe Taşkıran, Erzurum, Balıkesir, İstanbul, Turkey
- 71 ▶ Assessment of Endotracheal Tube Position After Oral Intubation in Neonates
Ali Gül, Şahin Takçı, Deniz Anuk İnce, Şeyma Ünüvar, Tokat, Ankara, Turkey
- 76 ▶ Determining Risk Factors of Epilepsy in Children with Cerebral Palsy: A Retrospective Study
Ferda Gürkan, Sarenur Gökben, Hepsen Mine Serin, Sanem Yılmaz, Gül Aktan, Hasan Tekgül, İzmir, Turkey
- 82 ▶ The Effect of Music Listened to During the Recovery Period After Day Surgery on the Anxiety State and Vital Signs of Children and Adolescents
Atiye Karakul, Zehra Bahire Bolışık, İzmir, Turkey
- 88 ▶ Comparison of Burn Depth at Different Temperatures on *Ex Vivo* Human Skin with Standardized Model and Comparison of the Results with Rat Contact Burn Model
Mehmet Surhan Arda, Nilsun Kuas, Erdem Söztutar, Atacan Emre Koçman, Hüseyin İlhan, Eskişehir, İstanbul, Turkey
- 92 ▶ The Attitude of Female Pediatricians Towards Birth, Breastfeeding and Child Care on Their Own Children in Turkey
Özlem Bağ, Utku Karaarslan, İzmir, Turkey

Case Reports

- 98 ▶ Progressive Pseudorheumatoid Chondrodysplasia, an Unusual Cause of Joint Swelling and Stiffness
Esra Kılıç, Ankara, Turkey
- 100 ▶ Triple X Syndrome with a Rare Finding: Cleft Palate
Esra Gürkaş, Hülya Maraş Genç, Esra Kılıç, Ankara, Turkey
- 103 ▶ Sturge-Weber Syndrome Type III
Hande Gazeteci Tekin, Sarenur Gökben, Sanem Yılmaz, Hasan Tekgül, Gül Serdaroğlu, İzmir, Turkey
- 106 ▶ Relationship of Attention Deficit-hyperactivity Disorder on the Spectrum of Anorexia Nervosa to Obesity: A Case Report
Tuğba Kalyoncu, Burak Baytunca, Sezen Köse, Burcu Özbaran, İzmir, Erzurum, Turkey
- 109 ▶ Acute Ophthalmoplegia; Same Disease, Different Variants: Anti GQ1b Antibody Syndrome
Senem Ayça, Anna Carina Ergani, Muzaffer Polat, Manisa, Turkey



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Editorial

Dear Readers,

We are so proud and happy to welcome you to the second issue of “The Journal of Pediatric Research” in 2018.

In this issue, we present you with 12 articles including 1 review, 5 case reports and 6 original pieces of research from different disciplines.

The review about school-based health services opens a specific scientific area for clinicians. Especially, in countries where social inequalities are prevalent, school-based health services have a particular importance. In the light of this information, you may find a new research area to understand and to improve school based health services.

In one of the studies in this issue, the authors present the risk factors for epilepsy development in children with cerebral palsy and, in addition to the literature, they found that the presence of visual deficits are a significant risk factor in the development of epilepsy in cerebral palsy cases.

This issue, with its articles published, covers several scientific areas in pediatrics such as neonatology, pediatric neurology, social pediatrics, pediatric genetics, child psychiatry and pediatric nursery care. This broad range makes our journal special. The impact factor of “The Journal of Pediatric Research” is growing and it gives us hope to enter greater scientific areas and new international indexes.

I would like to acknowledge the members of our editorial board reviewers, authors and Galenos Publishing House for preparing the second issue of 2018. We look forward to your scientific contributions in our future issues.

Best wishes

İzmir, June 2018

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Recent Developments in School-Based Health Services in Turkey

© Serpil Uğur Baysal, © Tolga İnce

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ABSTRACT

Seventeen million students aged between five and nineteen years and one million teachers and staff attending over 55.000 schools account for more than twenty percent of the Turkish population. They can present with a broad range of medical disorders. It is important that they have services designed to deal with their health problems. The aim of this article is to review the recent developments in school health services in Turkey. Recent projects aiming to improve school-based health services and health research at schools have also been reviewed. In countries where social inequalities are prevalent, school-based health services have a particular importance in reaching out to children who do not have access to appropriate health care. Nowadays, it is encouraging to observe that the topic of “school health” has gained interest among managers and health workers in Turkey.

Keywords: Health policy, school health, Turkey health project

Introduction

Turkey's population reached 78 million recently. Although the population is getting older in recent decades, the proportion of the young is still greater than those of many other countries. The child population is approximately 30%, and in this population, the percentages of 0-4, 5-9, 10-14 and 15-17 years are 27.6%, 27.7%, 27.4% and 17.3% respectively (1-3). These rates do not show any significant difference by year or sex. The highest child population (47.8%) can be found in two provinces in South-East Anatolia. The region with the lowest proportion of child population is West Marmara (21.9%). The lowest proportion of child population is in one province in East Anatolia (18.0%) and two provinces in the West Marmara Region (the most part in Europe) (1,2). The population living in poverty is 16.706.000; the ratio of children in this population is 44.3%. Children living in poverty is highest in the South-East, North-East and Central Anatolia,

whereas the lowest levels are in the West Marmara, Aegean and East Black Sea Regions (2). Seventeen million students aged between 5 and 19 years and one million teachers and staff in 55.000 schools corresponds to approximately 20% of Turkey's population and they are interfaced directly with schools (3). Students can present with a broad range of medical disorders. It is important that they have health care services designed to deal with their medical issues (4,5). In 1936, an Organization of the Ministry of Health and Civil Law described school health services as the responsibility of the government. Since 1946, UNICEF has promoted programs at schools for nutrition and prevention of infections. The ministry of education, health issues department published a health services application guide in 1992 (5). Services were limited to vaccinations and screenings at school enrollment, and priority was given to rural areas. Today, all social security plans are united in a single “general health insurance”. Family physicians and practitioners are appointed as “family

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doctors". Turkey has a relatively medium-strong structure for primary care (governance, economy and workforce). However, it has relatively low-strong primary care process dimensions (access, comprehensiveness, continuity and coordination of care). Continuity of the policies is important. Turkey is a transitional society; social, political, economic, nutritional and lifestyle changes have occurred in Turkey in recent decades. One of these changes is school health services based on the program of transformation in health (THP) (6-10). Since 2003, a comprehensive reform program in the health sector, which is called the transformation in health program, has been enacted. This program aimed at improving the efficiency and quality of the health system (7,9,10). Ten years after its adoption, maternal and child mortality indicators showed significant improvements (7,9-13). The health issues of school age children and adolescents were not among the priorities of the health service provision before the transformation of health in Turkey. The major priorities of the Mother and Child Health Department of the Turkish Ministry of Health, for a long period of time, were focused on mother and newborn health (7-9). However, it is encouraging to observe that the topic of "school health" has gained interest among managers and health workers in Turkey recently. In 2011, a Health System Performance Assessment was carried out to measure the achievements of the THP (12). The Turkish School of Public Health was in charge of coordinating national and international public health work on behalf of the ministry of health and took the technical lead. The first strategic plan for the health sector covered the period 2010-2014 (11). It was reviewed in 2012 to ensure consistency with the national development plan, policy papers, the ministry of health's strategy and health system needs. The current second Strategic Plan covers the period 2013-2017 (13). Turkey's health system has been characterized by centralization of decision-making at both regional and local levels (14).

Developments in School Health Services

A variety of special programs by the ministry of health called "Child Health Programs" are being carried out to reduce infant and children mortality rates and foster healthier babies and children. Progress has been achieved as a result of these programs (15). The Turkish Ministry of Education Department of Health was responsible for school health, in cooperation with the related institutions. Health screening has covered 1.5 million students each year in primary schools since 1982 (6). Turkey's Ministry of Health has been responsible for school health since January 2005 in collaboration with the ministry of education. Principles related to school health in Turkey were determined by circular number 2008/58 (16). Physicians working at Regional Health Centers are mainly responsible. A team approach is essential. School health services have four aspects: student's health, health of school staff, health education and the school environment. A new comprehensive online guidance on "School Health for Primary Level Health Workers" was prepared (17). The 'Turkey Health Promotion Workshop' was held in February

2010 by the ministry of health; the 'School Health Working Group Report' was written. The 'First National School Health Symposium' took place in May 2010 (18).

Projects in School Health Services

Health Promoted Schools

The European Network of Health Promoting Schools (ENHPS) is a project by the World Health Organization (WHO), European Assembly and European Committee applied in over 40 countries in Europe. The project aims to improve the psychological and social environment in school as well as the health status of the children (19,20).

The following was accomplished within the ENHPS project:

- The project was introduced in a three-day meeting to the trainers and coordinators.
- A "Project Support Centre", a technical and an advisory committee, were formed within the Ministry of Health.
- School coordinators were selected, and a health center was established in each school.
- Related published materials were prepared; workshops were organized for the teachers and trainers on several topics including psychological, physical development and demands of children.
- Summer schools were organized for students educating them on nutrition, such as; a healthy life, first-aid and public speaking.
- The project is being evaluated at six monthly intervals mainly by reports from the schools and questionnaires given to students and teachers.

This project was approved in 1995 in Turkey and initiated in collaboration with the ministry of health and ministry of education in 10 schools in seven cities encompassing 42.817 students and 1.512 teachers (5,7).

School-Based Health Service Project

Based on a strategic approach, a school-based health service project aimed to become an application model to enhance quality and to promote awareness of children's health including mental health. It was initiated in order to implement widespread practical use of this health care model in Turkey (21,22). An elementary school located in a semi-urban area of İstanbul where the students come from immigrant families with a low socioeconomical level was selected for this project. The study showed that oral and dental health problems; acute diseases including acute respiratory infections; chronic symptoms and disorders such as enuresis, chronic recurrent pain; mental health problems which were mainly learning difficulties and behavioral problems; vision disturbances and skin disorders were found to be the main health issues (5,21,22).

Mental Health Project

Approximately, 1.5 million students are screened annually for health in primary schools by Turkey's Population Health

Council. Mental health problems were reported as less than one percent in the 1990s (6). In crowded classes, underestimation or ignorance of symptoms by teachers is common. Mental health problems constituted up to 12% of all health problems; 22% of students had learning difficulties, behavioral problems or other mental health issues in a school based health services project (21). Hence, it is necessary to develop a different and comprehensive tool to detect mental health problems. Nowadays, most schools have guidance counselors. Guidance and Research Centers should be strengthened for both organization and staff. Families must learn how they can reach and use these services. For the continuity of health care services for child development, families' support is needed for the prevention and early detection of mental health issues at schools. School teachers are expected to recognize and report students with learning and behavioral problems. Counselor teachers are responsible for taking care of the child after an interview. If needed, counselor teachers send students to Guidance and Research Centers. Students also can be referred to public or university hospitals for further evaluation and therapy (6,21,22).

Oral and Dental Health Projects

The proportion of the students with caries or at high risk of caries, those who do not brush their teeth regularly or at all, is high in Turkey (23,24). Relevant topics for the success of school oral health projects are: considering special needs of the child's dentition, informing and guiding families about treatments, involving the student, teacher and families when giving oral health education. Additional means to provide sustainability to the health education, such as ensuring that all children can access a toothbrush and toothpaste, recognizing children who are at high-risk and applying extra preventive measures to them, establishing regular and supervised brushing at school as a daily habit, applying fluoride, giving knowledge of nutrition and maintaining a supportive environment should be implemented (24). A few assessment criteria can be used for screening dental health such as: the number of caries in primary and permanent teeth, the grade of the caries for both primary and permanent teeth (decay number per student); malocclusion proportion. Students should also be assessed using number of fillings and extractions and also tooth-brushing habits. For students with high risk, a 1% sodium fluoride gel should be applied on their teeth (23,24).

Safe Schools Programs

Children in penal institutions have increased (6.132 children) in Turkey. The types of crimes are robbery, vandalism and assault, in order of prevalence. The proportion of children in penal institutions by age is as follows: 18%, 12-14 years; 82%, 15-17 years. 3.8% of all convicted are between 12-17 years, and male ratio is 97% (2). The main issues regarding safety at schools are violence, bullying and traffic and other

unintentional injuries on the way to or from schools. Schools are responsible for ensuring safety and reducing risks of injury at school. 'Safe school' is a new concept in childhood safety. Safe schools programs have been developed in Turkey since 2006. The "School safety" approach is being conducted as a subprogram under the WHO Safety Population Program. Safety programs should be integrated into school health programs (25).

Nutrition Friendly Schools

The program of Nutrition Friendly Schools has been implemented since September 2013 by the WHO in 17 countries from Europe using the criteria of nutrition friendly schools initiative (26). The program covers preschools, elementary schools, middle and high schools. It is aimed at fighting against childhood obesity and at promoting sufficient and well-balanced nutrition and acquiring the habit of regular physical activity within the context of the project. Hence, the nutrition education is given to students in schools, the physical training lessons are being carried out (at least two hours per week) and a school environment supporting

Table I. Recently developed school health projects in Turkey
White flag project (schools have more than 90 scores are given WF)
Shining smiles, shining futures project -promotion oral- dental health 425.000 students in 22 provinces, January 2008
First step to first aid project, September 2007
Family social aid
Blood donorship
Nutrition education
Promotion of adolescent health
Adolescence transformation project
Education on hazards of smoking
Norovirus epidemics, June 2007
Schools buffets-hygiene, obesity, 2007
School health collaboration protocol, 2007
School health project 2001-2004
Law related to the prevention and control of hazards of smoke products, May 2008
Prevention of unhealthy habits, March 2008
Control of school canteen and conforming to hygiene rules, April 2007
Health screening
Hygiene of public areas in schools, February 2009
Diabetes education in school, April 2010
Development of awareness of puberty in female students, March 2010
Ankara elementary school grade 1 students review refractive error frequency, December 2013
Nutrition friendly school project, January 2010

WF: White flag

balanced nutrition is formed. 1423 schools had been certified with the “certificate of nutrition friendly school” through the Nutrition Friendly Schools Programme as of 2015 (27). Table I shows recently developed projects related to school health in Turkey (27,28).

Research at Schools

Overweight and Obesity

Several studies were performed between 2000 and 2010. They revealed prevalence rates of 10.3%-17.6% and 1.9%-7.8% for overweight and obesity respectively, in children aged 6-16 years. Metabolic syndrome was found in 2.3% of Turkish school children aged 10-19 years. This rate was 28.0% in obese children. Public measures have been initiated by the state to control the rising prevalence of obesity (29). Neyzi et al. (30) showed that weight-for-age values indicate an increase in obesity among Turkish children aged 6 to 18 years. Height values for both sexes in all age groups were close to the updated 2000 USA growth references and showed an increase from the data on Turkish children born 30 years earlier. Weight values were high compared to reference data on US children and the previous data on Turkish children.

Health Behaviors

A descriptive study showed that the most common risky health behaviors in adolescents include substance abuse, risky sexual behaviors, violence and accidents. The age of the participants (n=230) was 16.1±1.17 years, and gender was proportioned equally. The risky health behaviors were shown to be alcohol consumption at 10.4%, smoking at 1.7%, paint thinner inhalation at 1.3%, and drug abuse at 0.9%. However, these rates were lower when compared to the literature. Health promotion activities are needed (31). The results of another cross-sectional study on self-reported health behaviors among high school students were: 33.8% had experimented with smoking, 26.3% smoked one cigarette during the 30 days before the survey, 14.9% smoked cigarettes regularly during the 30 days before the survey, 54.1% had experimented with drinking alcohol, 38.4% drank alcohol during the 30 days before the survey, 31.6% got drunk, 10.9% were adequately physically active, 59.9% watched TV for long periods of time, 72.8% used the internet for long periods of time, 48.1% had breakfast regularly, 36.2% ate an adequate amount of fruit, 14.1% ate an adequate amount of vegetables, 31.3% ate candies and chocolate very often, 18% drank soft drinks very often, 30.3% were bullied, 29.9% bullied others and 41% were involved in a physical fight (32). Adolescent friendly health services are needed; physicians should evaluate each adolescent for health behaviors during each visit; prevention programs with a health promotion perspective are necessary.

Negative Childhood Experiences

Despite much effort and progress in studies on child abuse and neglect in Turkey recently, the number of abused children is increasing; many problems pertaining to the care and protection of these children could not be solved yet. The newly formed ministry of family and social politics, and the Centers of Child Surveillance belonging to the ministry of health are quite new institutions working in this area. Sofuoğlu et al. (33) participated in the Child Abuse and Neglect Balkan Epidemiologic Study-European Union Project aimed at determining the frequencies of negative childhood experiences in past year and negative childhood experiences throughout life in 11, 13 and 16 year-age group children. The frequencies of negative childhood experiences for the last one year and for the life-long period were determined using the International Society for the Prevention Child Abuse screening tool in Turkey for the first time in three provinces for 7.500 children. The frequency of psychological and physical negative childhood experiences and neglect throughout life was found to be 70.5%, 58.3% and 42.6% in the 11, 13 and 16-year age groups respectively; the frequencies in the last one year were found to be 62.7%, 46.0% and 37.5% respectively. The frequency of negative childhood experiences related with child abuse and neglect screened were found to be 42%-70% and it was extrapolated that we are confronted with a very significant public health problem and adult health risk in these regions of Turkey.

Conclusion

Turkey is a transitional society; social, political, economic, nutritional and lifestyle changes have occurred in Turkey in recent decades. One of these changes is school health services based on the THP. The projects and studies aiming to improve the school-based health services have been implemented. Approximately twenty percent of the Turkish population can be seen in a school setting. School health services can be used as an effective way to integrate psychosocial care, medical care and health promotion. It is important to develop strategies and standards for school-based health centers to deal with mental and physical health problems. Health screening should also include a psychosocial risk assessment. Poverty, low education levels, lack of social security of parents and immigration are the main points that influence the effectiveness of school-based health services. The collaboration with, involvement of and contribution by teachers, parents, social workers and volunteers, as well as health workers trained in school health are needed for the efficacy of these programs (20).

In countries where social inequalities are prevalent, school-based health services have a particular importance in reaching out to children who do not have access to appropriate health care. Nowadays, it is encouraging to

observe that the topic of 'school health' has gained interest among managers and health workers in Turkey.

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Ethics

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Authorship Contributions

Concept: S.U.B., T.İ., Design: S.U.B., T.İ., Literature Search: S.U.B., T.İ., Writing: S.U.B., T.İ.

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Determination of Effective Speech Skills of Pediatric Nurses and Affecting Factors

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ABSTRACT

Aim: This descriptive and cross-sectional research aims to determine effective speech skills of pediatric nurses and their affecting factors.

Materials and Methods: The study population consisted of 124 nurses working in pediatric clinics of one university hospital, two state hospitals and two private hospitals located in the Province of Erzurum, Turkey. The research data were obtained using a "Demographic Information Form" and an "Effective Speech scale (ESS)". In the analysis of the data, percentile distributions, averages, t-test, One-Way variance analysis, Kruskal-Wallis variance analysis and Cronbach's alpha coefficient were used. Ethical principles were adhered to when conducting the study.

Results: In the study, it was found that the vast majority of nurses did not receive training to improve effective speaking skills (76.6%). It was determined that the mean ESS score was 98.40 ± 11.08 , and that the average score of the nurses who received training on effective speech skills was higher ($p < 0.05$).

Conclusion: In the study, it was determined that the nurses had moderately effective speech skills, and the average ESS score of the nurses who received training on effective speech skills was found to be higher. According to the results of the study, nurses should be supported both in their formal education and working life with activities such as domestic or foreign courses, symposiums, seminars, congresses, etc. in order to improve their effective speech skills professionally.

Keywords: Child, effective speech, nurse

Introduction

Communicating with the other people is an important need for humans who are a social being. Communication, which has many definitions, may be defined as the conveyance of a message by the sender to the receiver through a specific channel (1). People may firstly enjoy their lives, solve their problems, understand their environment better, have the opportunity to make themselves and the others happy and contribute to their control and development by sharing their feelings, thoughts, knowledge and problems through communication involving all moments and fields of life (2). Also, communication is the way to maintain interpersonal

relations. A person's ability of self-expression that he/she uses in relationships can affect the person's feelings, thoughts, behavior and actions toward whomever he/she establishes a dialogue (3). The shortest and most effective way of communication is speaking (1). The speaking skill has the characteristics of both being the starting point of literacy skills and being the most effective way in our social life and communication. According to Özbay (4), speaking is a skill that affects and directs the success, education, work life and private life of a person and allows him/her to become social and not be isolated from society. Effective speech occurs with a harmony of the mental and physical aspects of speaking. Therefore, the prerequisites of effective

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speech involve components such as the coexistence of the grammar rules, the social structure of language and speech competence (5). According to Temizyürek et al. (6); the fact that the conveyance of any kind of message, coded by the speaker, is that having a maximum effect on the listener shows the effectiveness of the speech. The success of occupational groups that are based on human beings, service to the humans and help depends on their communication skills. It is required that people or occupational groups who are continuously in communication with other people know communication techniques very well and use them effectively. Therefore, communication is a tool that one should know technically and have good skills with. Nursing, like all healthcare professionals, is also a profession that serves directly to people and leads to intense communication with people (3). A nurse communicates with people of all ages, races, religions and socio-economic levels. The aim of the nurses in this communication level is to meet the basic needs of the individuals in their daily life activities and help them to cope with their health problems. Therefore, it is important for nurses to have high communication skills in order to evaluate reactions and understand feedback (7). In the communication the nurses establish with both patients and society, they have key roles in many areas ranging from reflecting properly the care he/she provides to professional conveyance of the education he/she has received and the helping principle that he/she aims to achieve. Allocating time for communicating with patients by speaking with them and listening to them enhances the quality of the care, decreases costs and leads to patients being discharged in a shorter time and returning to their work sooner if they work, by helping patients to resume their daily activities. Additionally, it allows hospitals to provide service for more patients in a shorter period (8). A study by Tutuk et al. (9) has demonstrated that effective interpersonal relations and advanced communication skills of nurses created positive effects (being more satisfied with the service, increased motivation to improve, adherence to treatment) on patients. Also, the care-focused effective communication has positive effects on patient care (10). In order to enhance the quality of patient care and patient satisfaction, firstly the communication skills between the nurse and the personnel need to be improved (11,12). When the related literature was examined, it was observed that nurses had problems both with patients and physicians from time to time due to insufficient communication (13-15). It is stated that patients and their relatives feel emotionally better with the effectively established communication; on the other hand, when insufficient communication is established, those receiving care experience uncertainty and dissatisfaction and they feel anxious (16). The pediatric nurse has roles such as prime caregiver, advocate, educator, researcher, manager, coordinator-collaborator and also consulting. With these roles, the nurse helps children and their families to cope with

the fears, discomfort and stress associated with diseases and develops his/her skills related to protecting and improving child and family health. In such situations, he/she deals with the feelings of patients closely, understands his/her emotions and thoughts, accepts the situation unconditionally, shows empathy and helps them to solve their problems by using effective communication skills (17,18). Communication is an art and if a child is in question, this art should be better learned and executed. The healthier a child is communicated with, the better his/her mental health is. In the light of this information, this study was conducted in order to determine the effective speech skills of nurses working in children's services and the effective factors.

Materials and Methods

The Population and Sample of the Study

This descriptive study was conducted in the pediatric clinics of one university hospital, two state hospitals and two private hospitals in Erzurum between August 2013 and November 2013. In the study, a sampling method was not used and the study was conducted on the whole population. The study was completed for 124 nurses who were working actively in the related clinics and agreed to participate in the study. As 19 nurses did not agree to participate in the study, they were not included in the sample and so 86.7% of the population were reached in this study. The data were obtained using the "Personal Information Form" prepared by the researchers as a result of a literature review (9,19,20) in order to determine the effective speech skills of the nurses who were working in the pediatric clinics as well as their "Effective Speech scale (ESS)".

Personal Information Form

This form consisted of a total of 10 questions investigating the socio-demographic characteristics and the work life properties of the nurses (age, educational status, marital status, whether or not they have children, the unit he/she works in, the working duration at their profession, the working duration at their clinic, the way of work, whether or not they had received training on effective speech etc.).

The Effective Speech Scale

The scale was developed by Yıldız and Yavuz (19) in 2012 to improve the effective speech characteristics of individuals. The scale consists of 5 subscales: presentation, sound, style and statement, focusing on speaking and paying attention to listeners. The "presentation" subscale consists of 7 items (items 1-7), the "style and statement" subscale consists of 5 items (items 12-16), the "sound" subscale consists of 4 items (items 8-11), the "focusing on speaking" subscale consists of 4 items (items 17-20), and the "paying attention to listeners" subscale consists of 4 items (items 21-24). The items of this

Likert Type scale are rated as “strongly agree”, “agree”, “partly agree”, “disagree”, and “strongly disagree”. Minimum 1 point to maximum 5 points can be obtained from each item of the scale. Twenty items on the scale have positive judgment and 4 items have negative judgment out of the total of 24 items. Minimum 24 points and maximum 120 points are obtained from the scale. High scores signifie high effective speech skills of individuals. Yıldız and Yavuz (19) calculated the Cronbach α value of the scale as 0.92. In this study, the Cronbach’s α value of the scale was found as 0.90.

The Data Collection

The data collection stage had two stages. In the first stage, the information form was filled out by the researchers via a face-to-face interview technique with the nurses who were working in the specified clinics, at their available times, outside of treatment and care hours in a suitable room in the clinic. It took on average 10-15 minutes to fill out this form. In the second stage of the data collection, the researchers observed the nurses between 08:00 and 12:00 in which care and treatment are performed by them most commonly. Although it is a Likert Type Self-report scale, the observation method was preferred in this study as the concept it measures is an abstract one. The nurses were not informed that they would be observed about effective speech with the intention of minimizing being affected. As a result of this observation, both researchers scored the ESS were recorded separately. Then, the concordance between the independent observers

was examined and accordingly, the concordance between the observers was determined as almost perfect.

Ethical Consideration of the Study

Before starting the study, the ethics committee decision from the Ethics Committee of the Faculty of Health Sciences of Atatürk University (approval number: 05.08.2013/01) and the official permissions from the provincial directorate of health and the specified hospitals were obtained. The participants were informed about the purpose of the study, duration of the study and processes to be performed during the study and their consent was obtained.

Statistical Analysis

In the assessment of the data; the percentage distribution and mean, independent Samples t-test, One-Way analysis of variance, Kruskal-Wallis and the Cronbach alpha coefficient calculation were applied by using the SPSS 18 software package.

Results

According to the obtained data, it was determined that 62.9% of the nurses were in the age group of 18-28 years, 50.8% were married, 64.5% had no child, 63.7% had a bachelor’s degree, 58.1% had working experience of 1-5 years and 72.6% worked in shifts (Table I). When the trainings received by the nurses to develop their effective

Descriptive characteristic	Number	%
Age (year)		
18-28	78	62.9
29-39	43	34.7
40-50	3	2.4
Marital status		
Married	63	50.8
Single	61	49.2
Child		
Yes	44	35.5
No	80	64.5
Level of education		
Health vocational high school	21	16.9
Associate degree	11	8.9
Undergraduate	79	63.7
Graduate	13	10.5
Year of working		
1-5 year	72	58.1
6-10 year	35	28.2
11 and over	17	13.7
Style of working		
Daytime	34	27.4
Shift	90	72.6

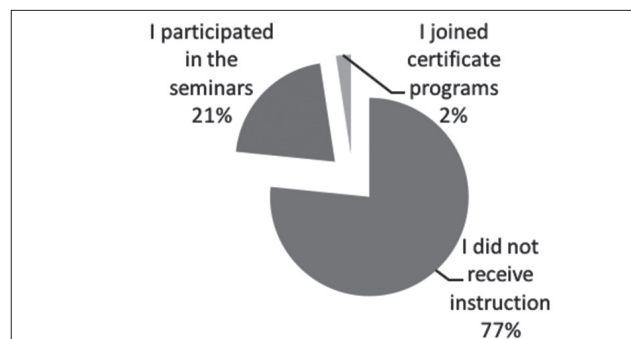


Figure 1. The state of the nurses on receiving training on effective speech skills

	ESS	Min and max values of scale	X \pm SD
	ESS Total score	73-120	98.40 \pm 11.08
Subdimension	Presentation	23-35	30.22 \pm 3.48
	Sound	11-20	16.66 \pm 2.49
	Style and statement	10-25	20.56 \pm 3.01
	Focusing on speaking	6-20	15.01 \pm 3.15
	Paying attention to listeners	10-20	15.96 \pm 2.35

SD: Standard deviation, min: Minimum, max: Maximum, X: Mean, ESS: Effective Speech scale

speech skills were examined in the study, it was determined that 76.6% of the nurses did not receive training on this subject, 21% participated in seminars on effective speech and 2.4% participated in certification programs on this subject (Figure 1). Table II shows the mean scores on the nurses for effective speech skills. When the mean scores obtained by the nurses from the subscales of the scale were examined, the presentation mean score was determined as 30.22 ± 3.48 ,

sound mean score as 16.66 ± 2.49 , style and statement mean score as 20.56 ± 3.01 , focusing on speaking mean score as 15.01 ± 3.15 , paying attention to listeners mean score as 15.96 ± 2.35 and the ESS total mean score as 98.40 ± 11.08 . When the distributions of ESS mean scores according to descriptive characteristics of the nurses were examined, it was determined that the nurses who were aged 40 years and over, married and had bachelor's degree had higher

Table III. The comparison of Effective Speech mean scores of the nurses with their descriptive characteristics

Descriptive characteristic	Presentation X ± SD	Sound X ± SD	Style and statement X ± SD	Focusing on speaking X ± SD	Paying attention to listeners X ± SD	Total X ± SD
Year						
18-29	29.81±3.74	16.44±2.60	20.50±3.12	14.73±3.34	15.91±2.35	97.38±11.34
30-39	30.79±2.96	17.02±2.35	20.67±2.87	15.51±2.86	16.04±2.45	100.09±10.84
40 and over	32.67±1.54	17.33±0.58	20.33±3.21	15.00±1.00	16.00±1.00	101.33±5.13
Test and p value	KW=3.237 p=0.198	KW=1.360 p=0.507	KW=0.077 p=0.962	KW=1.319 p=0.517	KW=0.040 p=0.980	KW=1.526 p=0.466
Marital status						
Married	30.68±2.89	16.65±2.56	20.52±2.83	15.27±2.77	15.89±2.20	99.02±10.45
Single	29.74±3.97	16.67±2.43	20.59±3.21	14.74±3.51	16.03±2.52	97.77±11.77
Test and p value	t=1.519 p=0.131	t=0.048 p=0.962	t=0.122 p=0.903	t=0.940 p=0.349	t=0.339 p=0.735	t=0.624 p=0.534
Have children						
Yes	30.73±2.82	16.89±2.44	20.39±2.83	15.36±2.71	15.91±2.27	99.27±10.22
No	29.94±3.78	16.54±2.52	20.65±3.12	14.81±3.37	15.99±2.41	97.93±11.57
Test and p value	t=1.211 p=0.228	t=0.746 p=0.457	t=0.465 p=0.643	t=0.931 p=0.353	t=0.177 p=0.860	t=0.646 p=0.519
Level of education						
Health vocational high school	29.86±3.71	17.00±2.49	20.63±2.87	14.90±3.25	16.81±2.54	99.19±11.17
Associate degree	29.55±3.27	16.18±2.64	18.91±3.48	12.91±2.63	16.09±2.02	93.64±8.54
Undergraduate	30.32±3.43	16.58±2.45	20.76±2.80	15.11±2.96	15.73±2.33	98.51±10.87
Graduate	30.77±3.90	17.00±2.80	20.62±3.93	16.31±3.90	15.85±2.38	100.54±13.99
Test and p value	KW=0.336 p=0.779	KW=0.367 p=0.777	KW=1.229 p=0.302	KW=2.489 p=0.640	KW=1.182 p=0.320	KW=0.873 p=0.457
Years of work						
1-5 years	29.72±3.65	16.56±2.42	20.46±2.97	14.43±3.27	15.75±2.38	96.92±10.67
6-10 years	30.97±3.43	16.80±2.88	20.74±30.02	16.09±3.13	16.40±2.55	101.00±12.54
11 years and over	30.76±2.54	16.66±2.48	20.59±3.32	15.24±2.02	15.94±1.75	99.35±8.96
Test and p value	KW=3.820 p=0.148	KW=0.452 p=0.798	KW=0.255 p=0.880	KW=5.938 p=0.051	KW=1.480 p=0.477	KW=3.304 p=0.192
Style of working						
Daytime shift	30.06±3.17 30.28±3.61	17.03±2.33 16.52±2.55	19.94±2.75 20.79±3.08	14.47±2.42 15.21±3.38	15.71±2.18 16.06±2.42	97.21±9.73 98.86±11.58
Test and p value	t=0.311 p=0.756	t=1.013 p=0.313	t=1.404 p=0.163	t=1.169 p=0.245	t=0.737 p=0.463	t=0.738 p=0.462
Training in effective speaking						
Yes	32.14±3.48	17.31±2.42	22.00±2.72	17.00±3.33	16.97±2.47	105.41±10.76
No	29.63±3.28	16.46±2.49	20.12±2.97	14.40±2.84	15.65±2.24	96.26±10.33
Test and p value	t=3.549 p=0.001	t=1.615 p=0.109	t=3.048 p=0.003	t=4.137 p=0.000	t=2.697 p=0.008	t=4.137 p=0.000

SD: Standard deviation, KW: Kruskal-Wallis, X: Mean

ESS mean scores but the difference between groups was statistical insignificant ($p>0.05$). In terms of the state of the nurses who had or had not received training on effective speech, it was determined that the nurses who had received training obtained higher scores from the overall scale and its subscales compared to those nurses who had not and the difference between ESS total and subscales was significant except for the subscale of sound (Table III, $p<0.05$).

Discussion

Communication contains elements like volume, tone and stress of voice, speaking speed, type of breathing, pausing, facial expression, eye movements, bearing, the distance between people, gestures, dressing style as well as the words spoken (21). In the study, it was determined that the nurses had moderate effective speech skills (Table II) and it was thought that this situation should be enhanced. In the literature, it is stated that medical errors are observed more when healthcare professionals do not establish professional, effective communication (22,23). Voice is required to be used appropriately for effective speech during communication (19). In the study by Akkaya (24), it was stated that individuals experienced problems about failing to focus on speaking during communication. The individuals also stated that they had problems in establishing communication due to voice, tone, stress along with the above-mentioned problem (24). The tone, volume, and variability of voice, hearing of voice by everyone in an environment, a clear, comprehensible speaking speed and inflection when required allow communication to be more effective (19). The education process is important in developing communication skills in nursing. Some of the goals are increasing self-confidence and respect levels of students during both formal courses and clinical/field practices within this process as well as their personal and professional development (25). It is possible to say that the results of effective speech skills of nurses with higher educational levels and experience are higher. Speech skill develops through training like all other skills. What is intended with speech training is that a person becomes able to tell about his/her feelings, thoughts and desires (26). Although speech skill is innate, correct and effective speech is a skill gained through training. The speech skill is innate but correct and appropriate speaking of a person is shaped through education received during the school life (27). An individual who speaks well can express himself/herself exactly and correctly. Especially, the quality of life of individuals is affected by the success obtained owing to speech and the impressive power of speech and the importance of training should be understood (21). When the training received by the nurses to develop their effective speech skills was examined in this study, it was determined that a great majority of them did not receive training on this subject, only 21% of

them participated in seminars on effective speech skills and 2.4% participated in certification programs on this subject (Figure 1). In the study by Kurudayıoğlu (21), activities to be performed to improve speech skill were drawn attention to and it was stated that one of the leading factors in improving the speech skill was training. Similarly, in his study in which he offered his suggestions on improving the speech skill, Doğan (28) also emphasized that receiving training for effective speech allowed speech to become more effective and planned. In this study, when the scale mean scores obtained from the nurses were examined in terms of the state of receiving training on effective speech, it was found that the nurses who had received training had higher scores on the overall scale and its subscales compared to the nurses who had not (Table III, $p<0.05$). Not receiving training on communication may cause a failure to express feelings and thoughts clearly, comprehensibly and meaningfully and to correctly understand what is intended to be expressed (19). This situation reveals itself for nurses who received training on effective communication with their high scores in the style-statement. In the study by Arifoğlu and Razi (29), the mean score of the Empathic Tendency scale of students who had received training on communication were found to be higher than ones who had not received information. In a study conducted by Thomas and Cohn (30), it was stated that the training of communication skills and the way of communicating with patients left a positive and lasting impression on the trust patients felt in health professionals. The aim of the speech lessons provided in educational institutions is to have students gain the skills to express their feelings and thoughts in a correct, appropriate and effective way according to grammatical rules (5,25). Therefore, starting from formal education courses, courses on bringing effective speech skills to nursing students should be added to the curriculum and subjects and certification programs related to effective speech should be organized within the scope of in-service training in their professional lives.

Study Limitations

It is a limitation that the research was done with nurses working in the child clinic in the hospitals where the data were collected. Therefore, the results obtained without research can be generalized to nurses in this research group.

Conclusion

In this study, it was determined that the great majority of the nurses had not received any training to improve the effective speech skills, the total mean score of the effective speech was moderate and the nurses who had received training on effective speech skills obtained higher ESS mean scores. In accordance with these results, it is recommended that institutions should give support to nurses to participate in national and international activities

like courses, symposiums, congresses etc., in order to help them improve their effective speech skills in professional standards, nurses should have a more comprehensive education on improving their effective speech skills during their undergraduate education, the education should not be limited to undergraduate education and should be continued with in-service training. Effective speech skills should be the primary responsibility of all members of the health team as they improve patient safety, quality and satisfaction. Institutions and units should determine policies in this field and aim to have their personnel improve in this subject. Studies with larger groups should be conducted with nurses working in hospitals with different structures.

Ethics

Ethics Committee Approval: The study was approved by the Atatürk University Faculty of Health Sciences Ethics Committee (approval number: 05.08.2013/01).

Informed Consent: Consent form was filled out by all participants.

Peer-review: External and internal peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: S.K., A.A.Ö., S.K., N.T., Concept: S.K., A.A.Ö., Design: S.K., A.A.Ö., Data Collection and Processing: S.K., N.T., Analysis and Interpretation: S.K., A.A.Ö., S.K., Literature Search: S.K., A.A.Ö., S.K., Writing: S.K., S.K.

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Assessment of Endotracheal Tube Position After Oral Intubation in Neonates

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ABSTRACT

Aim: Endotracheal intubation is a common procedure in the delivery room and neonatal intensive care unit. We aimed to determine the accuracy of this method of endotracheal tube (ETT) placement in our neonatal cohort.

Materials and Methods: Data on infants requiring oral intubation were reviewed retrospectively. The initial ETT depth of insertion had been calculated using the Tochen 7-8-9 rule. The initial depth was compared to the mid-tracheal region. The differences between the initial and ideal depth was calculated and divided by the mid-tracheal distance. Infants were grouped according to their weights as ≤ 1000 g, 1001 to 2000 g, 2001 to 3000 g and ≥ 3001 g.

Results: We evaluated ETT placement in 160 neonates. The mean gestational age was 32.2 ± 4.4 weeks (23 to 41 weeks) and the mean weight was 1989 ± 829 g (560 to 3800 g). The mean range of the difference between the initial depth and ideal depth divided by mid-tracheal distance was 0.39 ± 0.04 , 0.35 ± 0.04 , 0.46 ± 0.05 , and 0.23 ± 0.04 in infants weighing ≤ 1000 g, 1001 to 2000 g, 2001 to 3000 g and ≥ 3001 g respectively ($p=0.025$). The differences between the 2001-3000 g group and the 1001-2000, also the 2001-3000 g group and the ≥ 3001 g group were statistically significant ($p < 0.05$).

Conclusion: The 7-8-9 rule should be used to assess ETT length in neonates, especially in those weighing more than 3 kg. As this rule has low accuracy for extremely low birth weight neonates, its reliability may not be high for neonates weighing less than 3 kg in weight.

Keywords: Endotracheal intubation, neonates, Tochen's rule, resuscitation, position of the tube

Introduction

Respiratory problems requiring endotracheal intubation are common during the neonatal period and occur extensively in neonatal practice. Endotracheal intubation is a common procedure in the delivery room and neonatal intensive care unit (1,2). As the tube malposition is associated with hypoxemia, pneumothorax, right upper lobe collapse and death, rapid confirmation of proper tube placement is critical (3). The correct position of the endotracheal tube

(ETT) tip is the mid-tracheal area. However, the success rate of correct ETT placement for junior medical staff is less than 50%, and accidental esophageal intubation is common (4). The incidence of malposition for the placement of ETT can be as high as 50% (5). Pediatric resident trainees are currently not provided with adequate guidance to ensure the development of competency in neonatal intubation (4). Proficiency at intubation in controlled circumstances requires 40 or more procedures (6). Previously, the 7-8-9 rule was described by Tochen (7) and recommended by

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the American Academy of Pediatrics (2) to determine the depth of ETT insertion. Although this rule is frequently used in neonatal practice, studies about its accuracy are inadequate. Using gestational age can be useful especially when infants are intubated in the delivery room. Despite this, although gestation information is usually both accurate and available, the baby will not have been weighed (8). X-ray chest radiography is the gold standard procedure available to determine the tube position; however, this is often delayed until after ventilation has initiated. Therefore, a number of rapid point-of-care methods (e.g., clinical signs, exhaled carbon dioxide (CO₂) detectors, respiratory function monitors and ultrasound) to confirm the correct tube placement have been developed (3). Nasal-tragus length (NTL) to predict the optimal ETT depth with the formula, NTL plus 1 cm, has been suggested as clinically practical for newborn infants (9). In our country, NTL is currently used under the Neonatal Resuscitation Program (NRP) recommendations (10). Foot length has been suggested as a reliable and reproducible predictor of nasotracheal tube length (11). Clinical findings of accurate tube placement include an increase in heart rate, adequate chest wall movements, auscultation of breathing sounds in the axillary and an absence of sounds in the epigastric region (12). We conducted this study between 2013 and 2014, the period before the introduction of the NTL in the NRP guidelines in Turkey. We aimed to determine the accuracy of this method in the prediction of the optimal ETT depth in our neonatal cohort. Hence, we might contribute to studies on the estimation of accurate ETT depth.

Materials and Methods

The data of infants requiring oral intubation from March 2013 to December 2014 were reviewed retrospectively. The subjects' demographic and clinical data were collected retrospectively from hospital records. Infants with congenital anomalies that complicated the intubation procedure were excluded. The intubation had been performed by a supervised pediatric resident or a neonatologist in accordance with guidelines. The initial ETT depth of insertion had been calculated using actual weight with the 7-8-9 rule. After endotracheal intubation, the positioning of the tube was confirmed by observing symmetrical chest-wall motion and listening for equal breath sounds in the chest and additional corrections were performed. While a position between T1 and T2 represented an acceptable standard for the position of the ETT tip on chest radiographs (11), the mid-tracheal position was defined also as the point halfway between the inferior clavicle and carina on a chest radiograph (13). The initial depth was compared to the ideal depth (mid-tracheal region). These measurements were taken on the chest X-rays by a researcher of the present study (Ş.T.). The differences

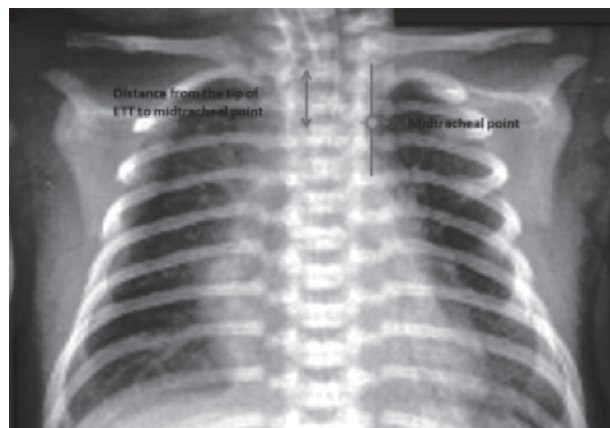


Figure 1. Assessment of the mid-tracheal point and the distance from the tip of the endotracheal tube to the mid-tracheal point
ETT: Endotracheal tube

between the initial and ideal depth were calculated and divided by the mid-tracheal distance. The assessment of the mid-tracheal point and the distance from the tip of the ETT to the mid-tracheal point is illustrated in Figure 1. The ideal proportion was zero according to this calculation. The formula is: (initial depth minus ideal depth)/mid-tracheal distance (note: ideal depth is defined as the mid-tracheal point and so equals the mid-tracheal distance). The neonate's heads were placed in a neutral position (i.e., neck neither flexed nor extended) during the chest X-ray examinations according to the protocol of the neonatal intensive care unit (NICU). Only the first accurate chest radiographs were taken into account. Infants were placed into weight groups of 1000 g or less, 1001 to 2000 g, 2001 to 3000 g, and more than 3000 g. These groups were chosen based on the weight categories used to enable the appropriate selection of ETT size. Data concerning demographic variables, intubation time and intubation place were collected. Because of the retrospective nature of this study, it is outside the scope of the ethics committee, and so we did not apply to ethics committee. In addition to that, we did not disclose any patient information in accordance with the Helsinki declaration.

Statistical Analysis

Data were obtained regarding the arithmetic mean and standard deviation. Independent Samples-t or ANOVA tests were used to compare the variables between groups. A p value <0.05 was considered significant. Analyses were performed using SPSS 19 (IBM SPSS Statistics 19, SPSS inc., an IBM Co., Somers, NY).

Results

This retrospective cohort study evaluated ETT placement in 160 neonates. The mean gestational age was 32.2±4.4 weeks (23 to 41 weeks) and the mean weight was 1989±829 g (560 to

3800 g). Seventeen (10.6%) infants weighed 1000 g or less, 70 (43.7%) weighed between 1001 and 2000 g, 50 (31.3%) infants weighed between 2001 and 3000 g and 23 infants (14.4%) weighed 3001 g or above. Table I shows the demographic and clinical data of the subjects with the distance of the ETT tip to the mid-tracheal point. The ETT tip was lower than the ideal depth in 51 (31.9%) infants and it was higher in 109 (68.1%) infants. Right bronchus intubation was detected in 23 (14.4%) infants. The mean range of the difference between the initial depth and ideal depth divided by mid-tracheal distance was 0.39 ± 0.17 , 0.35 ± 0.30 , 0.46 ± 0.38 , and 0.23 ± 0.19 in infants weighing 1000 g or less, 1001 to 2000 g, 2001 to 3000 g, and 3001 g or above respectively ($p<0.05$). The difference between the 2001-3000 g group and the over 3000 g group was statistically significant. Table II shows the values of the ratio in all study groups. The number of infants intubated above the ideal depth was more than twice of the number of infants intubated below the ideal depth (109 infants vs

51 infants). There were no statistically significant difference between birth weight groups and location of ETT in terms of being below or above the ideal depth (Table III).

Discussion

There have been various studies to evaluate both the correctness and usefulness of different techniques for ETT placement in neonates. Although one study found flexible fiberoptic bronchoscopy to correlate well with chest radiography (14), another study without chest radiography, concluded that a mathematical algorithm could be used to estimate the depth of ETT insertion and so could help a practitioner perform intubation when radiography is not available (15). All these attempts are to overcome both ETT malposition and its associated complications, while also allowing for rapidly deciding the appropriate ETT insertion length for resuscitation. Despite these techniques and methods, until recently, the Tochen rule was used in neonatal resuscitation practices for assessing depth of ETT insertion. This rule was accepted as useful, safe and effective by some authors (13). In our country, The Tochen rule has not been used since 2015. NTL is in use in accordance with current NRP

Table I. Demographic and clinical data of subjects with distance of endotracheal tube tip to mid-tracheal point

Variables		Distance of ETT tip to mid-tracheal point (cm)		p value
		n (%)	Mean \pm SEM	
Gender	Male	89 (55.6)	-2.05 \pm 0.86	-
	Female	71 (44.4)	-3.03 \pm 0.8	
Radiography time	First 30 minutes	72 (45.0)	-1.35 \pm 0.69	0.297
	30 minutes to 2 hours	52 (32.5)	-3.71 \pm 1.16	
	2 to 24 hours	34 (21.3)	-3.2 \pm 1.57	
	After first day	2 (1.3)	0.7 \pm 1.6	
Place of intubation	Delivery room	31 (19.4)	-0.91 \pm 1.01	0.265
	NICU	97 (60.6)	-2.7 \pm 0.75	
	Out of the center	32 (20.0)	-3.36 \pm 1.63	
Birth weight	1000 g or less ^{ab}	17 (10.6)	-1.31 \pm 1.35	0.002
	1001 to 2000 g ^a	70 (43.8)	-2.61 \pm 0.74	
	2001 to 3000 g ^b	50 (31.3)	-3.74 \pm 1.4	
	\geq 3001 g ^a	23 (14.4)	-0.24 \pm 1.24	
Right main bronchus intubation	No	121 (75.6)	-5.1 \pm 0.57	-
	Yes	39 (24.4)	5.63 \pm 0.76	

ETT: Endotracheal tube, SEM: Standard error of mean, ^{ab,ab:} Same uppercase letters indicate insignificant difference within the same column ($p<0.05$), NICU: Neonatal intensive care unit

Table II. The values of ratio in all study groups

Variables		(ID-MTD)/MTD* ratio		p value
		n (%)	Mean \pm SEM	
Gender	Male	89	0.38 \pm 0.03	-
	Female	71	0.36 \pm 0.04	
Place of intubation	Delivery room	31	0.35 \pm 0.04	0.281**
	NICU	97	0.35 \pm 0.03	
	Out of the center	32	0.45 \pm 0.07	
Birth weight	1000 g or less ^{ab}	17	0.39 \pm 0.04	0.025
	1001 to 2000 g ^a	70	0.35 \pm 0.04	
	2001 to 3000 g ^b	50	0.46 \pm 0.05	
	\geq 3001 g ^a	23	0.23 \pm 0.04	
Location of ETT	Below	51	0.31 \pm 0.02	0.085*
	Above	109	0.4 \pm 0.03	
Right main bronchus intubation	No	121	0.31 \pm 0.02	0.841*
	Yes	39	0.4 \pm 0.03	
Prognosis	Discharged	123	0.37 \pm 0.03	0.159*
	Death	37	0.36 \pm 0.03	

ETT: Endotracheal tube, SEM: Standard error of mean, *: Independent Samples t-test was used (Initial depth-mid-tracheal distance)/mid-tracheal distance, **: ANOVA test was used, ^{ab,ab:} Same uppercase letters indicate insignificant difference within the same column ($p<0.05$), NICU: Neonatal intensive care unit, MTD: Monthly tax deduction, ID: Identity

Table III. Birth weight groups distribution according to location of endotracheal tube for the ideal depth

Birth weight group	Location of ETT		Total	p value
	Above n (%)	Below n (%)		
1000 g or less	5 (29.4)	12 (70.6)	17 (100)	0.442
1001 to 2000 g	18 (25.7)	52 (74.3)	70 (100)	
2001 to 3000 g	19 (38)	31 (62)	50 (100)	
≥3001 g	9 (39.1)	14 (60.9)	23 (100)	
Total	51 (31.9)	109 (68.1)	160 (100.0)	

ETT: Endotracheal tube, pearson chi-square test was used

guidelines (16). The present study determined that the depths of the ETT in neonates weighing more than 3000 g were more close to the ideal and more accurately inserted than those in 2001 to 3000 g neonates. Peterson et al. (13) reported that although this rule is sufficient to ensure accurate tube position in infants over 750 g body weight, it may lead to overestimation of the intubation depth for infants less than 750 g. In line with this view, Amarilyo et al. (17) reported that the application of Tochen's rule in extremely low birth weight infants led to inadequate tube placement in almost half the infants. The present study was consistent with these reports since the 7-8-9 rule was accurate and gave correct figures for ideal depth of insertion length of ETT for infants above 3000 g. While the ratio of the depth of ETT insertion length in infants of less than 1001 g was higher than in infants of above 3000 g, the difference was not statistically significant. This statistical insignificance might be due to the low number of infants weighing less than 1001 g. Additionally, infants of less than 1001 g had been intubated by expert neonatology staff rather than by pediatrician residents. The decreased exposure of endotracheal intubation during both residency and fellowship training is a major concern (4,18). Leone et al. (4) reported that the average number of intubation attempts per resident during training decreased from 38 to 12 during an eight year period. Also, noninvasive respiratory support methods may reduce the number of intubation attempts (19). There are a few limitations of the present study. Due to a disparity between the practitioners, the accuracy of ETT intubation may be influenced by the skill of practitioners. Another limitation of this study is that because of the retrospective nature of this study, the fact that we do not know how the infant's weight was estimated or obtained in order to decide on the insertion length of ETT. Weight is often not known at the time of intubation at birth and a rough prediction is used to determine the depth of the ETT insertion. Hence, that is a major disadvantage for this method. At the same time, infants of body weight between 2001 and 3000 g had a higher ratio of the depth of ETT insertion length than other infant groups. There is no conclusive explanation for

this discrepancy, it might be because the intubations were done by different practitioners. When the intubation in neonates are done in an urgent or emergency situation in the NICU or delivery room, it should be performed in the shortest amount of time possible. Therefore, because determining or estimating the weight of the infant may be impossible or at least not accurate, the 7-8-9 rule has been unreliable in determining the ETT length in neonates requiring intubation (13,20). Trained NICU personnel have also been shown to make errors of 22% to 33.6% in weight estimations (21). In addition, it has been suggested that the ETT depth may also be affected by the head position on the chest radiography, some methods have been proposed for correcting this (15). Guidance using the gestational age may be particularly useful in the delivery room, where the gestational age is usually accurate but the newborns have not been weighed yet (8). Kempley et al. (20) determined that the ETT length in neonates was related to gestation in a linear manner, an inconsistency with Tochen's rule, but the relationship with weight was non-linear. Other methods are based on physical markers like NTL, sternal length or head circumference. These may be faster and more accurate to assess the depth of ETT in neonates (9,22). Because the malposition of the ETT can cause serious complications, the rapid determination of tube placement is a very important goal. For this purpose, however, the gold standard method is currently chest radiography. Despite this, various new techniques have been suggested, e.g., measuring air going in and out of the lung (using a respiratory function monitor) (23), measuring the amount of exhaled CO₂ (1,24), and using ultrasound to image the tube within the windpipe (3). The purpose of this study was to verify our clinical experience and its agreement with the currently available reference values. We believe that these efforts will provide objective and scientific information for the optimal resuscitation of neonates.

Study Limitations

There are a few limitations of the present study. Because of the disparity between the practitioners, the accuracy of ETT intubation may be influenced by the skill of practitioners. Another limitation of this study is, because of the retrospectively nature of this study, we do not know how the infant's weight was estimated or obtained to decide the insertion length of ETT.

Conclusion

Based on this study, in neonates who need intubation, particularly for those over 3 kg, the 7-8-9 rule can be used to determine ETT length. Although this rule has been implemented for many years, as it is open to practitioner differences, especially in weight estimation, its accuracy and sensitivity are unclear in newborns less than 3 kg in weight.

Otherwise, the expertise of the practitioners may affect the accuracy of the ETT location.

Ethics

Ethics Committee Approval: Retrospective study.

Informed Consent: Not applicable.

Peer-review: External and internal peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: Ş.T., D.A.İ., Concept: A.G., Ş.T., D.A.İ., Design: Ş.T., A.G., Data Collection and Processing: Ş.Ü., Ş.T., A.G., Analysis and Interpretation: Ş.T., A.G., Literature Search: Ş.T., A.G., Writing: A.G.

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Determining Risk Factors of Epilepsy in Children with Cerebral Palsy: A Retrospective Study

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ABSTRACT

Aim: The aim of this study is to determine the risk factors of epilepsy development in children with cerebral palsy.

Materials and Methods: Data of 234 cerebral palsy patients treated at Ege University Pediatrics Department, Child Neurology Division between January 2008 and December 2015 were evaluated retrospectively. All patients were classified into two groups; Group I: cerebral palsy without epilepsy (n=116) and Group II: cerebral palsy with epilepsy (n=118). The clinical and laboratory findings of the groups were compared to each other, a p value of less than 0.05 was considered as statistically significant.

Results: There was no significant difference between the two groups in terms of gender, gestational age, birth type, birth weight, risk factors for cerebral palsy development (pre-/peri-/postnatal), duration of neonatal intensive care stay and the need for mechanical ventilation ($p>0.05$). The risk factors of epilepsy were determined as the following; the presence of neonatal convulsions, focal clonic and generalized tonic neonatal seizures, an abnormal baseline rhythm on neonatal electroencephalography (EEG), discharge from neonatal intensive care unit with at least one antiepileptic drug, spastic bilateral (tetraplegic) cerebral palsy, epileptic activity on the sixth month EEG, abnormal cranial magnetic resonance imaging findings, mental retardation, microcephaly and visual problems.

Conclusion: Epilepsy is a common problem in children with cerebral palsy. Therefore, cases of cerebral palsy, especially those with the determined risk factors should be closely monitored for epilepsy in order to ensure a timely diagnosis and proper treatment.

Keywords: Cerebral palsy, epilepsy, risk factor

Introduction

Cerebral palsy (CP) is a non-progressive, mainly postural, motor impairment disorder of the developing brain which develops due to various causes during the intrauterine period, or shortly after birth. The incidence of CP has been reported to be 2 to 5 per 1.000 live births (1). In a study conducted in Turkey, the prevalence of CP was reported to be 4.4 per 1.000 live births (2). Epilepsy is common in children with CP with a varying rate of 15 to 60% (3-5). However, there are few studies which extensively investigated this topic in the literature. In the present study, we aimed to identify the risk factors for epilepsy development in children with CP.

Materials and Methods

In this study, the data of 234 CP patients treated at Ege University Faculty of Medicine, Department of Pediatrics, Division of Child Neurology between January 2008 and December 2015 were evaluated retrospectively. The diagnosis of CP was based on the definition of motor dysfunction caused by a non-progressive, static lesion in the developing brain (6). The patients were classified according to their gestational age (GA) and birthweight (BW) for GA (7). Newborns who were born prior to 37 weeks and between 37 and 42 weeks were accepted as preterm and term babies,

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respectively. Newborns weighing less than 10th percentile and weighing between 10th and 90th percentile were defined as small for GA and appropriate for GA (AGA) respectively. Pre-/peri-/postnatal risk factors for CP were as follows:

Prenatal Risk Factors

- Intrauterine infections
- Central nervous system (CNS) malformations
- Genetic syndromes
- Placental insufficiency
- Teratogenic factors
- Multiple pregnancy
- Maternal chronic illness

Perinatal Risk Factors

- Premature birth
- Complications during birth
- Maternal infection
- Meconium aspiration syndrome
- Perinatal asphyxia
- Kernicterus

Postnatal Risk Factors

- Sepsis
- Intracranial hemorrhage
- Ischemic stroke
- Hypoglycemia
- Other metabolic disorders

The duration of neonatal intensive care unit (NICU) stay and neonatal convulsions classified according to the Volpe classification were recorded (8). The electroencephalogram (EEG) during the neonatal period was evaluated in terms of background and epileptic activity. The background activity was accepted as abnormal if the expected characteristics of the post-conceptual age were absent or diffusely decreased or asymmetric in amplitude. Cranial magnetic resonance imaging (MRI) findings were also evaluated. The patients who were discharged from NICU with antiepileptic drug therapy were noted. The type of CP was assessed according to the Surveillance of CP in Europe classification (9). Spastic bilateral type CP patients were also divided into tetraplegic and diplegic according to the predominant involvement of the upper and lower limbs (10). Accompanying problems such as mental retardation, microcephaly, vision problems and hearing problems were also recorded. Epilepsy was defined as ≥ 2 afebrile seizures occurring beyond the neonatal period (11).

All patients were classified into two groups (Group I: CP without epilepsy, Group II: CP with epilepsy). Seizure and epileptic syndromes were evaluated according to the International League Against Epilepsy classification (12). In addition, EEG findings at six months, antiepileptic drug use and duration, response to therapy and final EEGs of Group II were recorded. The study was approved by the Ege University Local Ethics Committee under the reference number 16-3/3

and was conducted in accordance with the principles of the Declaration of Helsinki.

Statistical Analysis

Statistical analysis was performed using the SPSS Statistics version 23 software (IBM Corp., Armonk, NY, USA). The chi-square test and Fisher's exact test, where appropriate, were used to compare categorical variables. The odds ratio (OR) with confidence intervals (CI) was calculated to evaluate the effects on prognosis. Independent two-group t-test and Mann-Whitney U test were used to compare the numerical variables. Multiple logistic regression analyses were used to identify the factors affecting prognosis using variables which were significant in the univariate analysis or were below a p

	Group I (n=116)	Group II (n=118)	p value
Current age, months, (SD)	109.62 (59.65)	119.94 (70.19)	0.22
Sex (female/male)	46/70	50/68	0.673
Parental consanguinity	20	23	0.871
Seizure in first-degree relatives	5	8	0.709
Mode of delivery	-	-	0.240
Normal vaginal delivery	48	49	
Caesarian section	63	68	
Instrumental delivery	5	1	
Gestational age, weeks, (SD)	35.89 (4.75)	36.95 (4.03)	0.111
Birth weight, g, (SD)	2565 (1010)	2725 (944)	0.248
Prenatal risk factors*	27	31	0.596
Perinatal risk factors*	72	71	0.766
Postnatal risk factors*	24	20	0.464
Stay in NICU	74	62	0.081
Duration in NICU, day, (SD)	32.7 (26.82)	32.08 (24.62)	0.783
Need for mechanical ventilation	39	35	0.515
Neonatal convulsion	20	45	0.000
Cerebral palsy type			
- Spastic bilateral (tetraplegic)	42	66	0.002
- Spastic bilateral (diplegic)	38	20	0.005
- Spastic unilateral	32	29	0.6
- Dyskinetic	4	3	0.5

*Patients with more than one risk factor, NICU: Neonatal intensive care unit, SD: Standard deviation

value of 0.1. A p value of 0.05 was considered statistically significant.

Results

Group I (CP without epilepsy) and Group II (CP with epilepsy) consisted of 116 (49.6%) and 118 patients (50.4%) respectively. The demographic and clinical characteristics of both groups are shown in Table I.

In both groups, the rate of prematurity was similar (39.7% vs 32.2%) ($p=0.235$). The majority of all patients were AGA infants (77.8%, $n=182$). There was no statistically significant difference in the BW for GA between the two groups ($p=0.817$). In all patients, there was at least one risk factor for CP development. Among the risk factors, perinatal risk factors were the most common ($n=143$, 61.1%), followed by prenatal risk factors ($n=58$, 24.8%). The frequencies of pre-, peri- and postnatal risk factors were similar in both groups ($p>0.05$). A history of NICU hospitalization was reported in a total of 136 patients (58.1%) with a similar rate in both groups. There was no significant difference between the groups in terms of the length of stay in the NICU and the need for mechanical ventilation. Neonatal convulsion was observed in 20 and 45 patients in Group I and Group II respectively (17.2 vs 38.1%). A history of neonatal convulsion was found to be a significant risk factor for epilepsy [OR=2.959, 95% CI (1.610-5.437), $p=0.000$]. The seizure type was also important. Focal clonic and generalized tonic seizures were identified as significant risk factors for the development of epilepsy [OR values, 5.918, 95% CI (1.241-28.221), $p=0.026$ and 11.8, 95% CI (1.466-95.526), $p=0.02$]. Thirty-four of 65 EEGs recorded during the neonatal period were available and they were re-evaluated by the author, S.G. Abnormal background activity was observed in 4 and 11 patients in Group I and Group II respectively. Its presence increased the risk of epilepsy by six times in patients with CP [OR=5.958, 95%CI (1.332-26.662), $p=0.02$].

The most frequent abnormality of the EEGs recorded in the neonatal period was focal or multifocal epileptic activity ($n=20$, 58.8%). This ratio was identical in both groups (10 vs 10), as well as the generalized epileptic activity (3 vs 3). The suppression burst pattern was only seen in three patients (17.6%) in Group II. There were no statistically significant differences in the epileptic activity on neonatal EEG between the groups ($p=0.291$).

Cranial MRI scans were obtained within the neonatal period in 40 patients, and all of them revealed abnormal findings. Hydrocephalus, cerebral abnormalities, intracranial hemorrhage and periventricular leukomalacia were the most frequent findings in order of occurrence. There were no significant differences in the neuroimaging findings between the two groups ($p>0.05$). Fifty-eight of 65 patients (89.2%) with neonatal convulsion were discharged from the NICU with at least one antiepileptic drug. The number of these patients

was 16 and 42 in Group I and Group II respectively, indicating a statistically significant difference [OR=3.454, 95% CI (1.806-6.606), $p=0.000$]. Spastic bilateral (tetraplegic) type CP was the most common type of CP, and the incidence was significantly higher in Group II ($p=0.011$). The second most common type was spastic unilateral CP. The spastic bilateral (diplegic) type was found in 58 patients and the frequency was significantly higher in Group I (38 vs 20, $p=0.01$). The risk of epilepsy in spastic bilateral (tetraplegic) CP patients was found to be 2.986 times higher than other CP types [95% CI (1.535-5.808), $p=0.001$]. Control EEGs at six months were performed on 53 of the 65 patients with neonatal seizures (Group I: $n=18$, Group II: $n=35$). The background activity was normal in 94.4% and 68.5% patients in Group I and Group II respectively ($p=0.12$). Focal or multifocal epileptic activity on EEG at six months was observed in 3 of 18 patients (16.6%) in Group I and 17 of 35 patients in Group II (48.5%). Generalized epileptic activity and hypsarrhythmia were found in 4 and 6 patients in Group II respectively. At six months, the presence of epileptic activity on EEG was found to increase the risk of epilepsy by 16.875 fold [95% CI (3.882-73.347), $p=0.000$]. The patients were first evaluated at the child neurology clinic between 1 and 209 months of age (mean age: 8.7 months). The overall median epilepsy onset age was 6 months (1 to 174 months). The median epilepsy onset age was 3 months, 8.5 months, 24.5 months and 33 months in the patients with spastic bilateral (tetraplegia), spastic unilateral, spastic bilateral (diplegia) and dyskinetic type CP respectively. However, it did not reach statistical significance ($p=0.069$). Generalized seizures (46.6%) were the most common type of seizures, followed by focal and secondary generalized seizures (39%). Infantile spasm was observed in nine patients (10.1%). Febrile seizure was present in one patient, while both febrile and afebrile seizures were present in seven patients (6%). West syndrome was identified in nine patients (7.6%) and two of these progressed into Lennox-Gastaut syndrome during follow-up. Final EEGs of Group II revealed normal background activity in 83 patients (70.3%) and decreased activity in 30 patients (25.4%). In five patients (4.3%), amplitude asymmetry was observed. Epileptic activity was seen in all but 24 patients. Focal or multifocal epileptic activity was the most common finding ($n=66$, 55.9%). Generalized epileptic activity and hypsarrhythmia were found in 19 (16.1%) and 9 patients (7.7%) respectively. In Group II, antiepileptic treatment was discontinued in 9 patients. The remaining patients continued to use antiepileptic drugs either as mono- or combined therapy (47.5% vs 24.6%). Drug resistant epilepsy was observed in 24 patients (20.3%).

In 209 patients, cranial MRI was performed at the end of the first year of life. The frequency of abnormal findings was similar in the two groups (86.3% vs 93.5%; $p=0.084$). Periventricular leukomalacia was the most frequent finding

in both groups (41.2% vs 52.3%; $p=0.219$). The rate of cerebral atrophy, cerebral abnormality, and hydrocephalus were significantly higher in Group II. These findings were also significantly related to epilepsy development in CP patients. The OR values for cerebral atrophy, cerebral abnormality and hydrocephalus were found to be 4.545, 4.000 and 4.889 respectively [95% CI (1.437-14.378), $p=0.01$, 95% CI (1.277-12.528), $p=0.01$, 95% CI (1.482-16.128), $p=0.009$]. Intracranial hemorrhage and ischemic changes were observed in 10 patients (9.8%) in Group I and in 5 patients (4.7%) in Group II. However, the difference was not statistically significant ($p=0.062$). In addition, mental retardation (65%) was the most common accompanying problem in CP patients, which affected 50% and 79.7% of the patients in Group I and Group II respectively ($p=0.000$). The presence of mental retardation was found to increase the risk of epilepsy by 3.9 times [95% CI (2.199-6.977), $p=0.000$]. Microcephaly was found in 43.6% among all patients including 27.6% of the patients in Group I and 68.6% of the patients in Group II. In the patients with microcephaly, the risk of epilepsy increased 3.828 fold [95% CI (2.212-6.627), $p=0.000$]. Furthermore, visual problems (i.e., refractive error, strabismus, reduced vision) were detected in 45 of the patients (19.2%). In these patients, the risk of epilepsy increased about 2.948 fold [95% CI (1.456-5.969), $p=0.003$]. Risk factors for epilepsy in children with CP are shown in Table II.

Discussion

In our study population, the prevalence of epilepsy was 50%, which is consistent with the literature data (3,4,13-17). There was no significant difference between CP and CP with epilepsy groups in terms of gender, parental consanguinity, family history of epilepsy and birth type ($p>0.05$). In the present study, there were no significant differences in terms of GA and prematurity between Group I and Group II. Although Zelnik et al. (15) reported that epilepsy frequency was higher in term infants with CP similar to our study, no correlation was found between GA and the risk of epilepsy in other studies (17). In addition, there was no significant difference in terms of BW for GA between the groups in our study ($p=0.817$). Similar results were previously reported in the literature (15). Also, there were no significant differences in the risk factors related to the development of CP between the groups ($p>0.05$). However, Carlsson et al. (5) reported that epilepsy was seen more frequently in patients with CNS infections, CNS malformation and gray matter injury. Similar to our results, Sellier et al. (18) found no significant association between the risk of epilepsy and the need for hospitalization and treatment with mechanical ventilation in the NICU. Review of the literature revealed several studies indicating that neonatal convulsion was a significant risk factor for epilepsy (15,17,19-21). In the present study, we also found a similar relationship. Compared to those without

Table II. Risk factors for epilepsy development in children with cerebral palsy

Risk factor	Grup I (n=116)	Grup II (n=118)	Odds ratio	95% Confidence interval	p value
Neonatal convulsion	20	45	2.959	1.610, 5.437	0.000
Neonatal focal clonic seizure	2	8	5.918	1.241, 28.221	0.02
Neonatal generalized tonic seizure	1	9	11.836	1.466, 95.526	0.02
Neonatal EEG (n=34) abnormal background activity	n=17 4	n=17 11	5.958	1.332, 26.662	0.02
Discharge from NICU with at least one antiepileptic drug	16	42	3.454	1.806, 6.606	0.000
Spastic bilateral (tetraparesis)	42	66	2.986	1.535, 5.808	0.001
Epileptiform discharge in the 6 th month EEG (n=53)	n=18 3	n=35 27	16.875	3.882, 73.347	0.000
MRI at one year of age	n=102	n=107			
- Cerebral atrophy	11	25	4.545	1.437, 14.378	0.01
- Cerebral abnormality	12	24	4	1.277, 12.528	0.01
- Hydrocephalus	9	22	4.889	1.482, 16.128	0.009
Mental retardation	58	94	3.917	2.199, 6.977	0.000
Microcephaly	32	70	3.828	2.212, 6.627	0.000
Visual problems	13	32	2.948	1.456, 5.969	0.003

MRI: Magnetic resonance imaging, EEG: Electroencephalography, NICU: Neonatal intensive care unit

neonatal convulsions, focal clonic and generalized tonic neonatal seizures were found to increase the risk of epilepsy 6 and 12 times respectively. In the present study, we also found that the presence of abnormal background activity in the neonatal EEG increased the risk of epilepsy 6 times. However, there are no data on this subject in the literature. Our study showed that cases discharged from the NICU with antiepileptic medication was linked to an increased risk of epilepsy by 3.4 times. More interestingly, to the best of our knowledge, our study is the first to show this finding in the literature.

Spastic bilateral (tetraplegic) CP was the most common type in both groups, and its presence increased the risk of epilepsy by about three times compared to other CP types ($p=0.001$). In addition, tetraplegic CP has been shown to be a risk factor for epilepsy in previous studies (5,15,19). However, Singhi (14) reported that the rate of epilepsy was the highest in spastic hemiplegic patients. Although there was no significant difference in the background activity on EEG at six months between the two groups, we found a significant difference in terms of focal or generalized epileptic activity ($p=0.000$). In addition, the presence of epileptic activity on EEG increased the risk of epilepsy by 16.875 times in patients with CP ($p=0.000$). In epileptic cases, the median and mean age of seizure onset was 6 months and 21.4 months respectively. In most of the epileptic cases (62%), recurrent seizures first occurred within the first year of life. A similar rate was previously reported in the literature as 49 to 79% (14,15,19). However, seizure onset age may vary depending on the CP type. Carlsson et al. (5) reported a mean age of epilepsy onset in tetraplegic, diplegic and hemiplegic CP patients as 6 years, 1 year and 2.5 years respectively. In our study, the median epilepsy onset age was 3 months, 8.5 months, 24.5 months and 33 months in the patients with spastic bilateral (tetraplegic), spastic unilateral, spastic bilateral (diplegic) and dyskinetic type CP respectively. However, it did not reach statistical significance ($p=0.069$). In the present study, the most common seizure type was generalized seizure (46.6%), followed by focal and secondary generalized seizures (39%). Infantile spasms were observed in 7.6% of epileptic patients. However, Gururaj et al. (19) reported that partial seizures were the most frequent seizures in their patients (39.3%). Similar to our results, Singhi (14) found generalized tonic-clonic seizures (38.1%) to be the most frequent seizure type among their study population. In another study, Hadjipanayis et al. (22) reported typical and atypical absence seizures in their cases. West syndrome and Lennox-Gastaut syndrome were found in nine and two patients respectively. Kulak and Sobaniec (17) reported that Lennox-Gastaut syndrome developed in six patients with spastic tetraplegic and dyskinetic CP in their study. Furthermore, EEG recordings of the patients obtained in the final visit revealed a rate of epileptic activity of 79.7% in Group II. The most frequent

finding was focal/multifocal epileptic activity (55.9%). This ratio varied between 66 and 92.7% in previous studies (14,17). However, in these studies, generalized activity was found to be more common. In one study, epileptic activity was found to be a significant and independent risk factor affecting the prognosis of epilepsy (20). In Group II, antiepileptic therapy was discontinued in 7.6% of the cases and the remaining cases continued to use at least one antiepileptic drug. Seizure control with single or multiple antiepileptic drugs were 47.5% and 24.6%, respectively. The rate of drug-resistant epilepsy was 20.3%. Previous studies also reported a similar rate as 35.7-45% (17,19). In the present study, cranial MRI revealed abnormal findings in 86.3% and 93.5% in Group I and Group II, respectively. Gururaj et al. (19) found similar rates of 94% and 97%. The presence of cerebral atrophy, cerebral abnormality and hydrocephalus were significantly associated with the increased epilepsy development ($p<0.01$). In previous studies, abnormal cranial MRI findings, mainly cerebral atrophy, were more frequent in CP+ epilepsy group than in the CP group (15,19). In the current study, we found that microcephaly also increased the risk of epilepsy by 3.8 times in CP patients ($p=0.000$). In contrast, Zelnik et al. (15) found that the ratio of microcephaly did not differ among the CP and CP+ epilepsy patients. Similar to the present study, developmental delay and mental retardation were also found to be more frequent in patients with CP+ epilepsy, compared to those with CP (15,19,21). In one study, Mert et al. (20) reported that mental retardation was a risk factor for epilepsy in CP cases. Singhi (14) found no significant difference between the CP and CP+ epilepsy groups in terms of social quotient, although seizures were more frequent and difficult to manage in the patients with mental retardation. Finally, we found that visual problems significantly increased the risk of epilepsy in CP cases, although there are no data in the literature on the association between visual problems and increased risk of epilepsy.

Study Limitations

This is a retrospective study. Information was obtained from families and medical records.

Conclusion

The presence of neonatal seizures in patients with CP, the use of antiepileptic drugs at discharge from the NICU, the presence of bilateral spastic (tetraplegic) CP, abnormal background activity on neonatal EEG, the presence of epileptic activity on the sixth-month EEG, the presence of cerebral atrophy, hydrocephalus and cerebral abnormality on cranial MRI, the presence of associated problems such as visual deficits, microcephaly and mental retardation are significant risk factors for the development of epilepsy in CP cases. Therefore, patients with these risk factors should be closely monitored in order to provide timely diagnosis and proper treatment.

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Ethics

Ethics Committee Approval: The study was approved by the Ege University Local Ethics Committee (approval number: 16-3/3).

Informed Consent: Consent form was filled out by parents of patient.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Concept: S.G., G.A. H.T, Design: S.G, F.G., Data Collection and Processing: F.G, H.M.S., Analysis and Interpretation: S.G. H.T. G.A, Literature Search: F.G. S.Y. H.M.S, Writing: F.G., S.Y. S.G.

Conflict of Interest: The authors have stated that they have no interests which might be perceived as posing a conflict

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The Effect of Music Listened to During the Recovery Period After Day Surgery on the Anxiety State and Vital Signs of Children and Adolescents

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ABSTRACT

Aim: To evaluate the effect of music listened to during the recovery period after day surgery on the anxiety state and vital signs of child and adolescent patients.

Materials and Methods: A pre-test/post-test control group design. Intervention group (listened music) and control group were compared.

Results: Patients (n=65) who listened to music demonstrated less anxiety than those who did not listen to music (n=65). Also, in the intervention group, pulse rates, diastolic and systolic blood pressure values and respiratory rates decreased after music therapy.

Conclusion: Music listened to during the post-operative recovery period decreases the anxiety level of patients. Music therapy is a method which shows a positive effects on pulse rate, diastolic and systolic blood pressure values and respiratory rate without any side effects. Music therapy may be included in nursing care procedures applied to patients after day case surgery during the recovery period.

Keywords: Music, anxiety, vital signs, day surgery, child and adolescent

Introduction

It has been reported that the decision to make a surgical intervention makes individuals feel anxious regardless of the type of surgical procedure. Anxiety may also result from a fear of the unknown, a fear of the inability to wake up or death after anesthesia, a loss of control, pain, being isolated, leaving loved ones and being isolated from social life (1-3). Many reasons such as the strange hospital environment, the health team using medical terms and the application of strange devices have also been reported to be effective in anxiety levels of individuals (4). Surgical interventions make children feel stressed, which is expressed as anxiety, fear

or anger. This situation may cause negative physiological and psychological reactions throughout the surgical process and increases pain and the need for analgesia in the early post-operative period (5-7). Complementary treatment modalities are applied in addition to medical treatment to support patient care and increase the quality of life. Complementary treatment modalities provide relaxation by activating sensory perceptions. In addition to decreasing some physiological indicators such as pulse rate, blood pressure and respiration, the relaxing effect may also be beneficial in controlling or preventing some intensive care related complications such as sleep disorder, pain and anxiety. Music is one of the complementary treatment methods (8-10).

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Music therapy makes individuals express their emotions such as pain, stress and fear. It helps in meeting individuals' physical, emotional and psychological requirements (6,11). Furthermore, it is an alternative treatment modality which decreases blood pressure, the heart rate, body temperature and the respiratory rate. Many recent studies revealed that music decreased the level of anxiety, pain, analgesic need and stress hormone levels of patients (4,10,12-21). Studies which examined the effect of music listened to by children in the preoperative period revealed that their level of anxiety decreased (1,4,15,22). In the literature, it is stated that the vital signs and anxiety levels of patients who listened to music in the post-operative period were lower than the control group (1,10,13,17,20,23-26). At present, music is used in palliative care for therapeutic purposes, surgical operations, pediatric departments, intensive care units, departments of psychiatry, oncology, obstetrics and gynecology, coronary care, radiotherapy and chemotherapy procedures to treat some symptoms such as pain and anxiety (6,10,18).

The aim of this study was to evaluate the effect of music listened to during the recovery period after day case surgery on the anxiety state and vital signs of child and adolescent patients.

Materials and Methods

This study is a pre-test post-test and control group design. This study examined the effect of music listened to during the recovery period after day case surgery performed in the pediatric surgery department on the anxiety states and vital signs of children.

Setting and Data Collection

The participants in this study were children and adolescents aged 9-17 years who underwent day case surgery at Ege University, Pediatric Surgery Clinic between June-September 2014. The inclusion criteria were as follows: 1) those who understood the purpose of the study and who voluntarily agreed to participate; 2) between the ages of 9-17, 3) no mental retardation in the child, 4) patient's daily surgical intervention, 5) the patient is operated on with general anesthesia. A power analysis was used to calculate the sample size for a finite population. In order to ensure a sample size for 80% power, a pilot study was performed on 15 subjects from an experimental group and 15 subjects from a control group at the beginning of the research. In both groups, pulse, diastolic blood pressure, systolic blood pressure, saturation, body temperature, total duration of sleep in the recovery room and the mean anxiety scores obtained before and after music therapy/operation were evaluated. Power analysis determined a total number of 130 children and adolescents, with 65 in the experimental group and 65 in the control group, to be involved in the study sample. The children were randomly assigned to either the

study or the control group (Figure 1). Inclusion criteria were that the patient: 1) wake up from surgery and be aged 9-17 years, 2) had not undergone surgery before, 3) had not been diagnosed with a hearing impairment, 4) had been operated on with general anesthesia.

Measuring Instruments

The socio demographic characteristics of the participants included gender, age, level of education, place of residence, income status. "State-Trait Anxiety Inventory (STAI) for Children" to evaluate anxiety states of children and

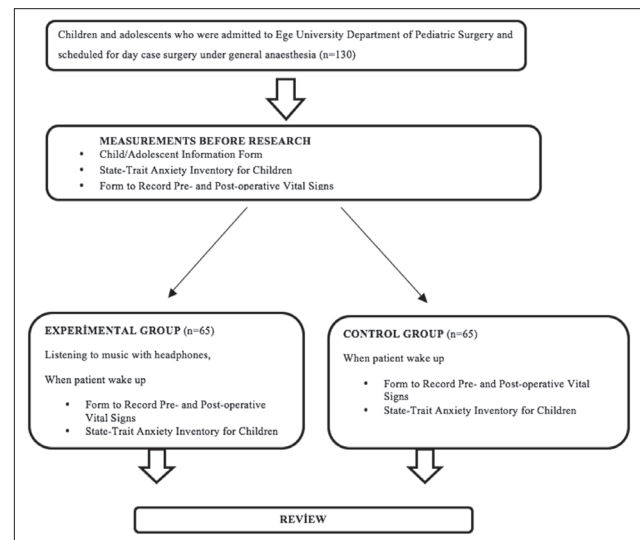


Figure 1. Flow-chart of the study

adolescents, a music player and "Form to Record Pre- and Post-operative Vital Signs" were used.

State-Trait Anxiety Inventory for Children

In the State Anxiety scale, the children were requested to mark one of 3 choices about how they felt at that time point. The aim of the scale is to evaluate the emotions related to their state of anxiety such as feeling of tightness, nervousness, hurry and uneasiness. Half of the items indicate the presence of some situations such as tightness, hurry and uneasiness, while the others do not. The presence of a feeling of tightness, hurry and uneasiness is rated as 3 when children feel them "much", while 1 point is given if these are not felt by children at all. Maximum and minimum scores that can be obtained from the State Anxiety scale are 60 and 20 points respectively. The aim of the Trait Anxiety scale is to measure permanent individual differences in the predisposition to anxiety. The scale consists of 20 items. The child is requested to score how he/she "usually" feels. He/she is requested to choose the most appropriate choice considering the order of frequency of the situation given in the item. When the choice "very often" is chosen, the highest point 3 is scored, the lowest point 1 is scored when the choice "almost never"

is selected. The highest and lowest scores are 60 and 20 respectively (27,28).

Listening to Music Tool

The classical music to be listened to by the study group ("The Art of The Fugue" by Bach) was chosen by a professor from a university department of musicology. The experimental groups listened to the music at the same volume with same type of headphone and music player for 20 minutes during the recovery period. We ensured that the headphones were externally covering all parts of the ear and filtered all external voice and noise. The Art of the Fugue is more than an hour and consists of 18 episodes. The patients listened to Contrapunctus Episode 3 of this work. This section consists of 4 sound bangs. It is preferred because the piece moves slowly and smoothly (29).

Form to Record Pre- and Post-operative Vital Signs

A form was prepared to record the pre- and post-operative vital signs of the patients (pulse, systolic-diastolic blood pressure, oxygen saturation, body temperature) and the duration of recovery in post-anesthesia care unit.

Procedure

The interventions for each of the experimental and control groups were as follows:

Control group: In the preoperative period, following the explanation of the aim of the study, the sociodemographic form and STAI Scale for Children were filled out by a researcher 15 minutes before the operation. And then, we recorded the vital signs (diastolic and systolic blood pressure, pulse, respiratory rate and body temperature). When the participants came to the ambulatory unit, the time was recorded. Their vital signs were measured after waking up. The patients in the control group did not listen to music. The STAI Scale for Children was re-applied when the patients in the control group woke up. The STAI scale was filled out about 20 minutes after the surgery was over.

Experimental group: Following the explanation of the aim of the study, the headphone and music player that were to be used were introduced. The patients were informed that they would be wearing the headphone when they woke up. After giving information, the information form and STAI for Children were filled out by a researcher 15 minutes before the operation. The pre-operative vital signs of the patients who accepted enrolment in the study were recorded on the pre- and post-operative Vital Signs form. In the postoperative period, participants listened to the chosen classical music from the headphones. When they came to the ambulatory unit, we recorded the time. Until the doctors said that participants had woken up fully, they continued to listen to music for about 20 minutes. The music was stopped in the cases of early recovery. Vital signs were measured and the time of recovery was recorded after the procedure. "State Anxiety Scale for Children" was re-applied when the patients woke

up. This study's protocol was approved by the Institutional Review Board of Ege University Faculty of Nursing, Scientific Ethics Committee (approval no: 2014/59) and The Hospital of Ege University Scientific Ethics Committee (approval no: 14-5/13). Participation in the survey was on a voluntary basis. All participants were informed that they could withdraw from the study at any time before the commencement of the study.

Statistical Analysis

The data were analysed using the Statistical Package for the Social Sciences for Windows (SPSS for Windows, Client Version 16.0). The socio-demographic characteristics of the children included in the study were assessed in numbers and percentages. In the evaluation of the children and adolescents in the study and control groups, number and percentage distribution and homogeneity test (χ^2) for gender distribution, Mann-Whitney U test, significance test for difference of two means, t-test and chi-square test were used. The results were evaluated within a 95% confidence interval, while a p value <0.05 was accepted as significant.

Results

In the study group, 38.5% of the children and adolescents were girls and 61.5% of them were boys, while these percentages were 38.5% and 61.5% in control group respectively (Table I). The economic condition of the children and adolescents in the study group was low for 30.8%, medium for 53.8% and high for 15.4%, while these values were 36.9%, 50.8% and 12.3% in control group respectively (Table I).

Comparison of the Groups in Terms of Vital Signs

In the analysis of the pre-operative groups' diastolic blood pressure, there was no difference between the groups (Table

Demographic information	Experimental group (n=65) n (%)	Control group (n=65) n (%)	Total (n=130) n (%)
Gender			
Girl	25 (38.5)	25 (38.5)	50 (38.5)
Boy	40 (61.5)	40 (61.5)	80 (61.5)
Economic situation			
Low	20 (30.8)	24 (36.9)	44 (33.8)
Middle	35 (53.8)	33 (50.8)	68 (52.3)
High	10 (15.4)	8 (12.3)	18 (13.8)
Place of residence			
City center	53 (81.5)	50 (76.9)	103 (79.2)
Town	10 (15.4)	12 (18.5)	22 (16.9)
Village	2 (3.1)	3 (4.6)	5 (3.8)

II). However, systolic blood pressure, pulse and respiratory rate values of the experimental group were found to be significantly higher when compared to the control group ($p < 0.05$ for each value) (Table II).

In the analysis of the pre-operative and post-operation experimental group, the vital signs of the groups, namely the diastolic and systolic blood pressure, pulse and respiratory rate values of the study group were found to be significantly lower when compared to control group ($p < 0.05$ for each value) (Table II). When the analysis of differences between groups were tested, it was found that the difference in the diastolic and systolic blood pressure, pulse and respiratory rate measurement values before and after surgery for those who listened to music was statistically significant. The analysis of the pre-operative and after operation experimental group's body temperature ($p > 0.05$) and saturation ($p > 0.05$) measurement values revealed no statistically significant difference. The duration music listened to of the study

group was 16.24 minutes, while it was 17.46 minutes in the control group. There was no statistically significant difference between the groups ($p > 0.05$).

Comparison of the Groups in Terms of Anxiety State

There was no significant difference in the pre-operative State Trait Anxiety scale total scores of the children. The analysis of the trait scale total scores of the groups demonstrated no statistically significant difference ($p > 0.05$). (Table III). The mean pre-operative state anxiety scale total score was 38.5 in the study group, while it was 38.32 in the control group (Table III). No statistically significant difference was detected between the pre-operative state anxiety levels of the study and control groups ($p > 0.05$). In the analysis of the post-operative experimental group mean total points of state anxiety scale of the groups, it was found to be 35.01 in the study group and 41.23 in control group (Table III). The anxiety level of the study group was seen to be lower than that of the control group ($p > 0.05$).

Discussion

Music has psychological and physiological effects on individuals. Music sometimes allows the intensification of emotions, while it sometimes causes relaxation and calmness. Music activates the parasympathetic nervous system and by this way, it causes a decrease in some physiological signs such as blood pressure, pulse and respiration (6,10,18). The hospital environment, hospital stay or invasive procedures cause anxiety in the patients. The physiological response of the body given in case of anxiety may differ. It was reported that anxiety causes an increase in heart rate, blood pressure, body temperature and respiratory rate of individuals (13-16). Studies in the literature detected positive effects of music on anxiety and vital signs (17,20,23). It has been shown that listening to relaxing, calming music positively affects the pulse rate in the studies mentioned in the literature (1,10,13,17,20,23-25). In our study, it has been found that the pre-operative heart rate of the experimental group was higher than the control group. After surgery, the pulse rate in the control group was increased. Also, there was a decrease in the pulse rate in the study group after listening to music. As the change between the groups was statistically significant, it was concluded that the music played to the awakening children and adolescents had a positive effect on the pulse rate. The results of the research are consistent with our study. In line with these results, it is concluded that the music played during awakening of the children and adolescents from the operation have a positive effect on the pulse rate. When the studies in the literature are examined, only Hatem et al. (17) investigated the effects of music on fever. In this study, there was no statistically significant difference between the control and the study group when the fever rate was compared. According to the

Table II. Comparison of the groups in terms of vital signs (n=130)

		Experimental group (n=65) M ± SD	Control group (n=65) M ± SD	P value
Pre-operative	Pulse	103.01±20.24	92.98±18.55	0.000
	*DKB	70.70±9.74	68.46±12.43	0.066
	**SKB	112.90±10.82	106.06±16.84	0.010
	***RR	26.73±3.78	23.16±3.38	0.000
Post-operative/ music	Pulse	90.98±13.78	102.92± 17.29	0.000
	DKB	69.47±10.78	74.30±10.59	0.011
	SKB	107.16±11.92	115.78±23.68	0.000
	RR	22.89±2.84	25.32±3.94	0.001

*DKB: Diastolic pressure, **SKB: Systolic blood pressure, ***RR: Respiratory rate, SD: Standard deviation, M: Mean

Table III. Comparison of the groups in terms of anxiety state (n=130)

		Experiment group (n=65) M ± SD	Control group (n=65) M ± SD	F value	p* value
Pre-operative	Trait anxiety	42.03±4.06	42.65±4.57	1.00	0.419
	State anxiety	38.58±4.41	38.32±3.79	5.12	0.718
Post-operative	State anxiety	35.01±3.19	41.23±4.34	4.08	0.000

*Student t test results, SD: Standard deviation, M: Mean

research done, it was concluded that the music played to the children in the intensive care of the cardiology unit is not effective on the fever rate (17). The results of this research are in line with our research. According to the result of the research, music has no effect on the patients' fever rate. In the studies performed, it was stated that the experimental group's diastolic and systolic blood pressure was lower than the control group (1,10,20,21,24-26). However, Sabzevari et al. (23) found that the systolic blood pressure was lower in the group in which the music was listened to, but the diastolic blood pressure was not different. The results of our study are the music played during the awakening of the children and adolescents had a positive effect on the diastolic and systolic blood pressure. In studies investigating the effect of music on respiratory rate, it was determined that the respiration rates of the experimental groups were lower in comparison with the control group (1,10,13,17,25). In our study, there is also a positive effect of music on the respiratory rate. There was no difference found between the experimental and control groups in terms of saturation values similar to the results of our study. There was no difference between the experimental and control groups in terms of oxygen saturation values (13,17,25). Our study shows that the groups are similar in terms of oxygen saturation values. No change in the oxygen saturation value of the control group was observed after listening to music. In the study group, the music ensured the oxygen saturation level remained within the normal limits. The postoperative measurement showed minimal change in the oxygen saturation value of the control group, but this change is not statistically significant. In line with these results, there is no effect on the oxygen saturation value of children and adolescents who listened to music while awakening. There was no difference between the groups in terms of the pre-operative state anxiety score. These results suggest the similarity of the groups in our study. The results of the analysis demonstrated that anxiety levels of the control group increased, while decreases were observed in the anxiety levels of the study group. Music was found to prevent an increase in the post-operative anxiety levels and contribute to a decrease of anxiety. In their study, Pitmann and Kridli (4) re-evaluated 12 studies. As a conclusion, they reported that music caused a significant decrease in anxiety scores of patients and lowered anxiety levels (4). Klassen et al. (9) analysed research examining the effect of music on children who have undergone medical intervention. They assessed 12 data bases and 393 studies. They analysed 19 randomized controlled studies aged 1-18 years which matched the research criteria. The results of the analysis showed that music was an effective method in decreasing anxiety levels of children after medical interventions (9). A study by Hatem et al. (17) revealed that, in children who have undergone pediatric cardiac surgery, classical music listened to for 30 minutes decreased pain and anxiety levels. In the study

by Cooke et al. (22), music was reported to have a positive effect on anxiety levels. Fenko and Loock (15) found that the group who listened to music indicated a lower anxiety score. In a study by Han et al. (25), the music intervention group was found to have a lower anxiety score than the control group. Phumdoung and Good (11) found that music was an effective way to reduce the stress of patients. Nilsson (6) reported that patients who underwent surgery with general anesthesia were played music intraoperatively or postoperatively. According to the result of this research, they stated that the music played during the postoperative period reduced the level of anxiety (6). Kahloul et al. (24) reported that music has a positive effect on anxiety levels in patients undergoing abdominal surgery. Nelson et al. (26) found that music reduced anxiety levels in patients undergoing spinal fusion surgery. Our finding was consistent with the results of other studies and it was concluded that music therapy applied during the recovery period after pediatric day case surgery decreased anxiety levels. We suggest that similar pre-operative state and trait anxiety scores of the groups, enrolment of only the patients who underwent day case surgery and normal gender distribution of the groups might have increased the effect of the music.

Study Limitations

Our work has several limitations. The first study was conducted in a single center with children who underwent only single day surgical intervention. No evaluation was done in children undergoing intervention with local anesthesia or in younger age groups. Also, children listened to the music we chose. Another limitations of the research was that the vital findings before and after listening to music were not recorded in the post-operative period. For these reasons, the findings of study may not apply to other centers.

Conclusion

In this study, there was no difference between the groups in terms of their initial state and trait anxiety total scores. In the post-operative period, the State Anxiety scores of control group increased, while the State Anxiety scores of the experimental group decreased. Following music therapy, pulse, respiratory rate, systolic and diastolic blood pressure values of the study group significantly decreased. Music listened to by the children and adolescents during the post-operative recovery period decreased the level of anxiety. It was concluded that music therapy is a method with a positive effect on pulse, diastolic and systolic blood pressure and respiratory rate values. Listening to music may be included in nursing care procedures applied to patients after day case surgery during the recovery period. In order to utilize music therapy which is one of the independent nursing interventions applied in the recovery unit, in-service training activities may be organized and continuity may be ensured. The findings

provide further evidence to support the practice of listening to music to reduce post-operative anxiety and lower systolic and diastolic blood pressure, respiratory rate and heart rate in patients after a day surgery in Turkey. Studies can also be carried out for different groups undergoing different surgery. Music can be listened to for younger age groups who also have daily surgical intervention. The music of the patients themselves or other relaxing music can be used.

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Ethics

Ethics Committee Approval: The Institutional Review Board of Ege University Faculty of Nursing Scientific Ethics Committee (approval number: 2014/59) and Hospital of Ege University Scientific Ethics Committee (approval number: 14-5/13).

Informed Consent: A consent form was filled out by all participants.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: Z.B.B., A.K., Concept: Z.B.B., A.K., Design: Z.B.B., A.K., Data Collection and Processing: A.K., Analysis and Interpretation: A.K., Literature Search: Z.B.B., A.K., Writing: Z.B.B., A.K.

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Comparison of Burn Depth at Different Temperatures on *Ex Vivo* Human Skin with Standardized Model and Comparison of the Results with Rat Contact Burn Model

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ABSTRACT

Aim: Burns are still an important mortality and morbidity problem worldwide. Clinical studies are limited, owing to ethical concerns and an inability to achieve standardization. Therefore, studies are concentrated on experimental models. However, there are still a lot of questions that await resolution. Additionally, the relevance of animal models on human skin (HS) is unknown. From this point of view, this study aims to evaluate the depth of burn on *ex vivo* HS and to compare the HS results with those of rats.

Materials and Methods: Skins of patients, after obtaining informed consent, that underwent full thickness healthy skin excision (abdominoplasty), except for experimental purposes, have been included. A total of three different temperatures (60, 80 and 100 °C) using two different weight forces (0.88 kg/cm² for high and 0.21 kg/cm² for low) using standardized apparatus facilitated the formation of study groups. In all groups, healthy dermis-epidermis burn depth was compared.

Results: No difference was detected between healthy HS depths from the various samples taken from different donors that were to be tested. The lowest result (10.5±0.7% burn depth) was seen in the 60 °C low weight force group and the highest was seen in the 100 °C high weight force group (92.0±2.7). As for the 80 °C high pressure group vs the 100 °C low pressure groups, a significant difference was noted.

Conclusion: *Ex vivo* HS can be used as an experimental burn model. It has been shown that standardized depth of burn can be achieved using standardized apparatus. However, the different depth of burn indicates that control of parameters (pressure, time, temperature) is mandatory.

Keywords: Burn, *ex vivo*, human skin, rat

Introduction

Burns are still a frequent trauma worldwide. According to the American Burn Association statistics, between 2006-2015, 205.033 individuals have suffered from burn trauma and 3.3% of them lost their lives (1,2). Since the mid-20th

century, owing to numerous experimental or clinical studies, treatment modalities have been improved. However, due to ethics and standardization problems in clinical studies, experimental studies have been mostly preferred for physiopathology and healing procedures (3-9). Therefore, various scalding and contact burn models have been defined

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(3,10-14). However, infeasible real-time contact temperatures and applied weight force (WF) measurements were the weak points of these models (3,14). For this reason, in 2016 we designed a standardized contact burn model in which the real-time contact temperature and pressure could be controlled (15). A standardized second degree burn can be achieved in rats using custom designed apparatus (15). However, although the created wounds were second degree, the burn percentages were significantly different from each other. Moreover, an experimental model on human skin (HS) that defines the degree of burn has not been put forward before. With this goal in mind, this study aims to answer the following questions;

- What will be the degree of burn depth under the standardized experimental burn model?
- What are the responses and nuances of rat and HS in a standardized burn model?

Materials and Methods

This study has been conducted following approval by the human Ethics Committee (approval number: 20/02/2017-80558721/71) of Eskişehir Osmangazi University. HSs, which were assessed as waste material, were obtained from the discarded tissue of patients undergoing abdominoplasty. Before surgery informed consent was obtained from all individuals. Following excision in the operating theatre, skins were wrapped in the fresh frozen plasma (FFP) soaked gauze; transported in a vacuum bottle at +4 °C and kept at +4 °C until the end of procedure. All experimental steps (burns and biopsy) were performed on the same day (0 day following excision). Custom designed apparatus was used for the *ex vivo* HS model (Figure 1). Three temperature groups (60, 80 and 100 °C) and two WF groups were designed, while the elapsed time was set at 10 sec. in all groups. The burns were created using two levels of pressure upon the skin sample, with light contact being applied for the first group, defined as the Low WF group (LWFG), and 1.000 gr of WF being applied for the second group, defined as the (HWFG). However, real time WF force was measured in all burns due to a spring-loaded design of apparatus. Healthy normal skins of all individuals were used for a control group to measure dermis and epidermis thicknesses (Figure 2).

- Group 0. Healthy HS (control)
- Group 1. 60 °C LWFG (G60LWFG)
- Group 2. 60 °C HWFG (G60HWFG)
- Group 3. 80 °C LWFG (G80LWFG)
- Group 4. 80 °C HWFG (G80HWFG)
- Group 5. 100 °C LWFG (G100LWFG)
- Group 6. 100 °C HWFG (G100HWFG)

In the laboratory, the excised skin samples were cut into strips of 10x5 cm in length and width, and also defatted under the dermal component. These standardized tissue pieces

were fixed onto a flat platform to get a perpendicular angle between the burning bar and skin for accurate measuring of WF (Figure 1) with an electronic scale. A 10 mm diameter cylindrical burning bar (that has 0.78 cm² surface area) was used and at least 7 burns were created in all groups (Figure 3). One hour after the procedure, the burns were totally excised and specimens were fixed with formaldehyde.

Statistical Analysis

Slices were stained with hematoxylin eosin and examined by a blinded anatomist under light microscopy (Nikon) (Figure 4). Photographs of the burns were taken. Skin thicknesses (dermis, epidermis) and burn depths were measured from three different lines (Figure 4). Mean values and burn ratios (burned/healthy skin) were calculated for each wound using the Microsoft Excel program. Graphpad Prism 7 software was used for statistical analysis. The normality distribution of the data was assessed by the Shapiro-Wilk test. Groups were compared using a Two-Way ANOVA test with a post hoc test of Tukey's multiple comparisons. P values less than 0.05 were considered as statistically significant.

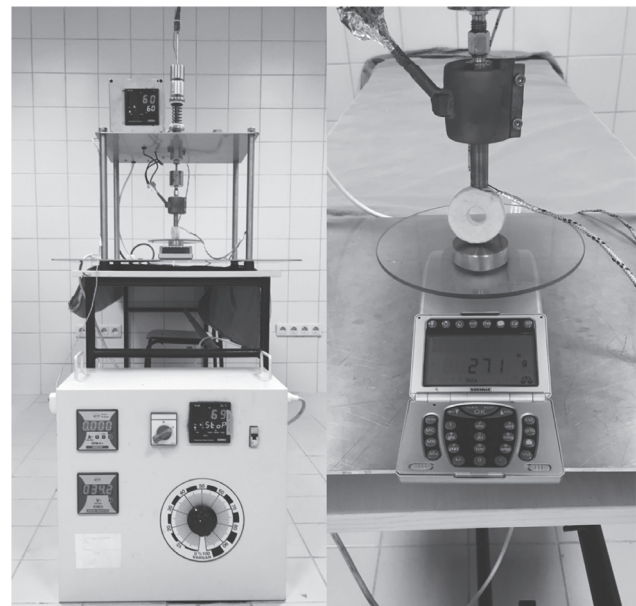


Figure 1. Custom designed apparatus

Table I. Percentages of burn depth in all groups	
Groups (°)	Burn depth (%)
60 LWFG	10.5±0.7
60 HWFG	25.8±2.4
80 LWFG	52.9±2.6
80 HWFG	71.1±2.1
100 LWFG	66.7±2.1
100 HWFG	92.0±2.7

LWFG: Low weight force group, HWFG: High weight force group

Results

The discarded healthy skin of 4 patients were used. No difference was detected in the *ex vivo* healthy HS (dermis and epidermis) thickness of the patients ($p>0.05$). A mean of

Abdominoplasty specimen

- ➔ Full thickness skin
- ➔ Epidermis
- ➔ Dermis
- ➔ Hypodermis
- ➔ Burned skin

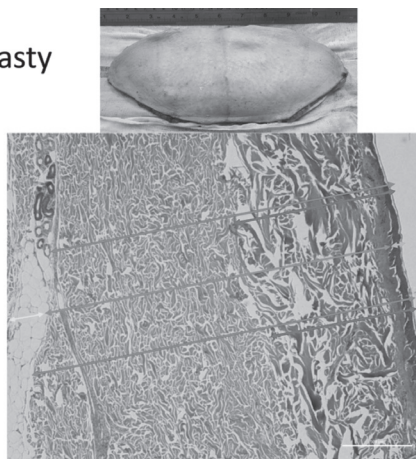


Figure 2. Skin material and histological measurements (scale=500 μm)

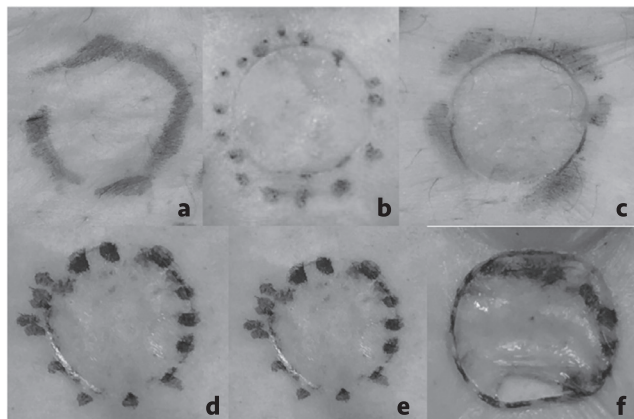


Figure 3. Macroscopic photographs of burns a) 60 °C, low weight force group, b) 60 °C, high weight force group, c) 80 °C, low weight force group, d) 80 °C, high weight force group, e) 100 °C, low weight force group, f) 100 °C, high weight force group

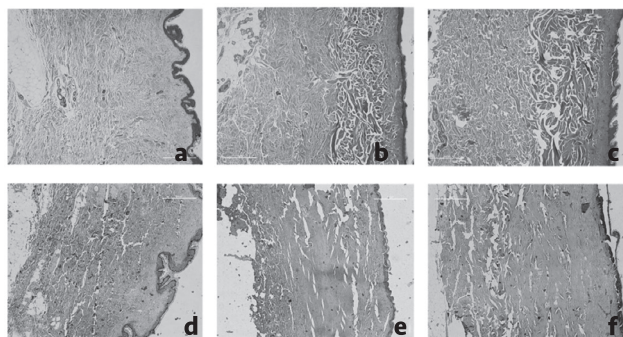


Figure 4. Representative hematoxylin&eosin stained sections of groups. Histological appearance of a) 60 °C low weight force group, b) 80 °C low weight force group, c) 100 °C low weight force group, d) 60 °C high weight force group, e) 80 °C high weight force group, f) 100 °C high weight force group, scale bar shows 100 microns

0.21 kg/cm^2 WF was applied in the LWFG and 0.88 kg/cm^2 in HWFG. In addition, neither in the LWFG nor in the HWFG was any difference detected ($p>0.05$). The percentage of burns is given in Table I. Comparing the G80HWFG vs G100LWFG groups, highly significant different depth of burns was noted between them ($p<0.001$). Furthermore, on *ex vivo* HS, in case of LWF force at 60 °C, first degree burns could be created; superficial second-degree burns could be achieved if HWF is applied at the same temperature. Borderline superficial/deep second-degree burns were detected in the G80LWFG. Deep second-degree burns were confirmed in both the G80HWFG and G100LWFG groups. Third degree burns were ascertained in the G100HWFG group (Figure 3, 4).

Discussion

Burns are the most frequent trauma with an incidence of 1.1/100.000 worldwide (2). According to trauma statistics, burns are the underlying reason for approximately 5% of the patients who lose their lives due to trauma worldwide (1,2). Therefore, studies concerning burns have been going on to evaluate prevention, physiopathology and treatment modalities. Cetin et al. (16) compared the survival of *ex vivo* HS in FFP soaked gauze and saline. And found that HS lives on in FFP for approximately thirty days. Therefore, all study procedures were performed in day 0 following excision as it is believed that results of the study would best simulate a living HS contact burn wound. Thus has not been reported on previously. Consequently, *ex vivo* HS and a custom designed standardized contact burn model have been used to depict the depth of burn on HS in a controlled manner. It was hoped that this study could provide a basis for a new experimental model on HS. What's more, this study could be helpful in understanding the correlation between temperature and WF on HS.

Herein, this study has shown that different statistically significant depths of burn, from 10.5% to 92% under a strict control of variables (time, temperature and WF), on *ex vivo* HS. In comparison to the animal model, more superficial burn depths have been noted on *ex vivo* HS, although there was no difference between the steps of experimental model (15). And it was realized that for Groups 1 and 6, variable depths of second degree burns were created as in the animal model. Moreover, they all have significantly different percentages of burn wounds from each other such as superficial, borderline deep/superficial and deep second degree. This might be due to different skin thicknesses or might suggest that HS is much more resistant than the skin of the rat. Finally, we believe that such different percentages of burns might cause variable inflammatory responses and that might affect the healing capacity as well. Hence, this might play an important role in inflammatory and/or healing procedures that should be evaluated.

Study Limitations

The *ex vivo* nature of the study-that is without a blood supply-is its limitation. Although the skin is alive, it is impossible to account for immune reactions and put forward treatment studies. This model could be extended to become the basis for cell culture studies.

Conclusion

Due to custom designed apparatus, standard depth of burn on *ex vivo* HS could be investigated. The percentage of burn depth changes according to accurately controlled variables (time, WF and temperature) during the contact burn *ex vivo* HS has been presented. As a result, variables should be strictly under control. Especially for experimental healing models, for standardization of burns, percentage of burns might be a better indicator for classification.

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Ethics

Ethics Committee Approval: The study was approved by the Eskişehir Osmangazi University Local Ethics Committee (approval number: 20/02/2017-80558721/71).

Informed Consent: Consent form was filled out by all participants.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Concep: M.S.A., A.E.K., Design: M.S.A., A.E.K., Supervision: M.S.A., A.E.K., H.İ., Fundings: M.S.A., A.E.K., N.K., Materials: M.S.A., A.E.K., N.K., Data collection and/or Processing: M.S.A., A.E.K., N.K., E.S., Analysis and/or Interpretation: M.S.A., A.E.K., N.K., E.S., H.İ., Literature Search: M.S.A., A.E.K., N.K., Writing: M.S.A., A.E.K., N.K., E.S., H.İ., Critical review: M.S.A., A.E.K., N.K., E.S., H.İ.

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The Attitude of Female Pediatricians Towards Birth, Breastfeeding and Child Care on Their Own Children in Turkey

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ABSTRACT

Aim: Although pediatricians are one of the leading professionals in public to consult with on childbearing, breastfeeding and child care, there is a lack of data about the attitude, choice and practice of pediatricians towards these issues. The aim of this study is to determine female pediatricians' practices on childbearing, breastfeeding and child care and to discuss the possible differences from the general population.

Materials and Methods: This is a descriptive study of women pediatricians' attitudes who have children between 2 and 6 years old, about childbearing, breastfeeding and child care. The study group was surveyed about their demographic characteristics; breastfeeding practices and their general attitude toward mothering. The data were compared with the general population and similar groups in terms of education and socioeconomic status, previously reported in Turkey Demographic and Health Survey in 2013 (TDHS-2013).

Results: The study group included 146 women pediatricians (mean age: 35.49±3.4) mothering children between 2 and 6 years [median age 3.5 (1.5)]. The median age at first birth of the study group [30 (4)] was significantly higher than in the general population. The rate of caesarean delivery of the study group was 91.8% and was significantly higher than reported previously. The median duration of exclusive and total breastfeeding were 5 (2) months and 13 (11) months respectively. The median duration of exclusive breastfeeding was significantly higher while the total breastfeeding duration was significantly lower than both groups reported in TDHS-2013.

Conclusion: Women pediatricians' choices on and experiences of childbearing, breastfeeding and child care differ from the general population in Turkey. This specific group of health professionals' decisions must be well evaluated worldwide as they have an undeniable role on families, on children and thus on public health.

Keywords: Pediatricians, female, childbearing, breastfeeding, child care

Introduction

Women in the work life have increased in both medical training and practice (1). Female physicians are more likely to practice in primary care fields and to pay more attention to preventive services, health education counselling and the psychosocial needs of their patients (2-4). Pediatrics and pediatric subspecialties are one of the most often practiced

fields for female physicians (5,6). Although pediatricians spend most of their daily practice on childbearing, breastfeeding and child care, there is lack of data about the attitudes, choices and practices of female pediatricians concerning these issues. Considering that physicians can act as role models (7), it is important to describe pediatricians' experiences and choices with their own children. The aim of this study is to determine women pediatricians' practices on

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childbearing, breastfeeding and child care and to discuss the differences from the general population.

Materials and Methods

Design, Setting and Participants

The study was designed as a descriptive study of women pediatricians' attitude as mothers in Turkey. Women pediatricians, including general and specialists, pediatric researchers and educators were chosen as the study group. Those mothers with children younger than 2 years old were excluded in order to evaluate total breastfeeding time and those with children older than 6 years old were excluded to assure the data collected was up-to-date. Totally, 596 women pediatricians were interviewed face to face or by mail as to whether they had children between 2 and 6 years and 146 women with children in the defined age range were surveyed. The mothers were included as participants for only their younger child if they had more than one. Those mothers who stated that they do not recall the relevant matters before or during the survey were excluded from the study. The study was approved by the Local Ethics Committee of University of Health Sciences, İzmir Dr. Behçet Uz Children's Diseases and Surgery Training and Research Hospital, Clinic of Social Pediatrics, İzmir, Turkey (approval number: 26.01.2012/9).

Survey Questionnaire

The questionnaire included demographic characteristics; choices about pregnancy and delivery; breastfeeding and feeding practices and the general attitude toward mothering and personal comment on increased empathy and change of career plans.

Statistical Analysis

The data were evaluated with SPSS 18 (PASW Statistics for Windows, Version 18.0, Chicago, Illinois, United States of America). Normally distributed data were presented as mean \pm standard deviation, whereas skewed data were presented as median (interquartile range). The data including caesarean section (C/S) rates and breastfeeding durations were compared with available data of both the general Turkish population and a population with similar educational and socioeconomic properties reported in the latest report of Turkey Demographic and Health Survey (TDHS-2013) (8). The difference between the numerical data of the study population were evaluated using the Mann-Whitney U test while the Binomial test was used to evaluate the difference between the numerical data and the data from TDHS-2013. The chi-square test was used to evaluate the difference between proportions. The difference between the proportions of the study group and data in TDHS-2013 were tested with the One Proportion Z test. A p value of <0.05 was accepted as significant.

Results

The study group included 146 pediatricians (mean age=35.49 \pm 3.4) with children between 2 and 6 years [median age 3.5 (1.5)]. The mean age of the study group at first birth was 30 \pm 3 years and the median number of children that a mother has was 1 [minimum (min)=1, maximum (max)=3; interquartile range (IR)=1]. Table I presents the socio-demographic data of the study group. The median age at first birth of the study group [30 (4)] was significantly higher than in the general population (median age: 23, $p<0.01$) reported in TDHS-2013. The median time spent in pediatrics was 10 years. 62% (91/146) of the study group were general pediatricians while 19% (28/146) were specialists and 15% (23/146) were educators of pediatrics. Although there were no pediatric residents in our study group, 63 (43%) of the participants had had children during residency. The frequency of planned pregnancy was 77%. 94% of the women were followed up by a gynaecologist during pregnancy. Only 12 (8%) of the study group performed vaginal delivery. Furthermore, 73% of caesarean deliveries (C/S) were performed upon maternal request. The rate of C/S of the study group was 91.8% and was significantly higher than reported in TDHS-2013 for both the general population (48.1%; $p<0.01$) and the population with similar education (66.1%; $p<0.01$) (Table II). The median duration of exclusive breastfeeding and total breastfeeding were 5 (2) months and 13 (11) months, respectively. The data of the study group on exclusive and breastfeeding durations and comparison with TDHS-2013 is exclusive and total breastfeeding given in Table II. The most frequent type of feeding in the first 6 months was exclusively breastfeeding (45%), followed by predominant breastfeeding (36%) and mixed feeding with complementary food (19%). There were no mothers in the study group that had never breastfed but 17 (11%) of the mothers had stopped breastfeeding during the first 6 months for some reason. All of the participants were working at the time of the study. The median duration of maternal leave in the study group was 6 (IR=5.5) months. Seventy seven (53%) mothers in the study group returned to work in the first six months after giving birth and the median durations of exclusive and total breastfeeding were significantly lower in this group than for others who returned to work after 6 or more months (median=6 months; IR=1)

Table I. The socio-demographic data of the study group

Age*	35.49 \pm 3.4
Marital status (married/single)	144/2
Number of children**	1 (1)
Age at first birth*	30.4 \pm 3.1
Educational status in pediatrics** (years)	10

*Mean \pm standard deviation, **Median (interquartile range)

Table II. The rate of caesarean delivery on maternal request, duration of exclusive and total breastfeeding of the study group and comparison with Turkey Demographic and Health Survey in 2013

	Study group	General population*	p value	Similar population**	p value
CDMR (%)	91.8	37	<0.001	59.5 ^b	<0.001
Exclusive breastfeeding [#]	5	1.8	<0.001	0.7 ^a 0.6 ^b	<0.001 <0.001
Total breastfeeding [#]	13	15.7	0.016	16.6 ^a 16.5 ^b	0.002 0.002

CDMR: Caesarean delivery on maternal request, *The data of all Turkey Demographic and Health Survey in 2013 population, **The data concerning a population with similar socioeconomic^a and educational^b status in Turkey Demographic and Health Survey in 2013, [#]Median months

(p=0.02). The rate of mothers who stated that their babies were looked after by nannies (not relatives) was 59% while 39% of the mothers trusted only grandmothers when they first returned to work after maternal leave. The median time that a mother spent with her child was 3 (2) hours/day. 68% of the mothers had nobody to help with housework or childcare when they were at home. Nevertheless, 84% of the mothers stated that their medical knowledge developed after being a mother especially about breastfeeding, weaning and the physical, cognitive and emotional development of children because they experienced what they had previously learned about. Most of the women (98%) believed that they had an increased sense of empathy towards the children they examine and their families after having a child.

Discussion

Although it has recently been reported that women have a significant impact in pediatrics (9), there is lack of data about pediatricians' experiences as mothers. There are a few studies reporting the experiences of women physicians as mothers (10-12) but this current study is the first in the literature documenting female pediatricians' attitudes towards the most common issues of pediatric practice; childbearing, breastfeeding and childcare.

Pregnancy and Delivery

Mothering starts with planning the pregnancy. The frequency of planned pregnancy was 77% in the study group. Although the median age of the first birth is higher in the study group than reported in TDHS-2013, it is similar with those previously reported in the literature. Sells and Sells (13) reported that the mean age at delivery of a group of women pediatricians in Washington was 29 while Levinson et al. (14) reported a mean age of 30.6 years at the birth of their first child and 32.9 years for their second child. It is known that women physicians make many decisions to shape their path in medicine and determine how to balance home and work (9). The long education period of medical schools and pediatrics are potentially related factors in the study group for the increased age of childbearing. As for the type of delivery, 92% of the participants had C/S

performed while only 8% performed vaginal delivery. The rate of C/S of the study group was significantly higher than reported in TDHS-2013 for both the general population (48%; p<0.001) and the population with similar education (66%; p<0.001). In recent years, demographic and health surveys reported from different countries show that there is a considerable increase in the rates of C/S, both in developing (15) and developed countries (16). Although the reasons for this remain unclear, defensive medicine due to malpractice lawsuits may be playing a role (17). This also may be a reason in our study group because most of the participants (94%) were followed up by an obstetrician during pregnancy. Caesarian delivery on maternal request (CDMR), a subset of elective C/S, is defined as a C/S for a singleton pregnancy at term in the absence of any medical or obstetric indications, performed only upon maternal request (18). The estimated rate of CDMR is reported to range from 4% to 18% of all C/Ss (18). The rate of CDMR in our study group (73%) is much higher than reported in the literature. Geary et al. (19), has already reported a trend towards a greater number of CDMR among doctors in their relatively small group. As a matter of fact, there are conflicting reports on this issue. Gabbe and Holzman (20) reported that 46% of a sample of obstetricians personally would prefer C/S while studies from the Netherlands (21) and Israel (22) reported that very few obstetricians would choose C/S for themselves or their partners. In a recent report, Finsen et al. (23) reported that the rate of C/S was higher among surgeons (26%) than among physicians in nonsurgical fields (18%) and highest of all among specialists in obstetrics and gynaecology (27%). The high rate of CDMR in our study group (73%) is significantly higher than all groups and represents the highest rate reported in the literature. Although we have not evaluated the reasons for this, we speculate that the training period of pediatricians in neonatal intensive care units and dealing with perinatal asphyxia may be an additional factor in choosing C/S.

Breastfeeding and Feeding Practices

The American Academy of Pediatrics recommends exclusive breastfeeding for a min of 4 months, preferably for 6 months and The World Health Organization recommends exclusive breastfeeding up to 6 months of age, with continued

breastfeeding along with appropriate complementary foods up to two years of age or beyond (24,25). The breastfeeding initiation rate in our study group was 100% while continuation rates are 88% and 58% at 6 months and 12 months respectively; exceeding the rates of the healthy people 2020 goal (82% ever-breastfed, 61% at 6 months, and 34% at 1 year) (26). The rate of exclusive breastfeeding in the study group at 6 months was 66%. In the study group, the median duration of exclusive breastfeeding and total breastfeeding were higher than reported in TDHS-2013. A recent study from Canada reported higher breastfeeding initiation rates among female physicians than the general population (27), similar to our results. As a matter of fact, our results represent the highest rates reported in the literature conducted among female physicians (27-30). However, this study is the only one conducted among female pediatricians. We suggest that although the benefits of human milk are taught during medical teaching, the residency in pediatrics make doctors believe more keenly in breastmilk and this leads to the high initiation rate and long exclusive breastfeeding duration when they become mothers. A recent review provided strong support that C/S has a significant negative correlation with early breastfeeding, but if once initiated, rates of breastfeeding at 6 months are not affected by the mode of delivery (32). Our results support that the initiation of breastfeeding is important and suggest that if the mother really intends to breastfeed, the problems brought up with C/S can be overcome. However, the success in continuing breastfeeding depends on other factors including returning to work. Maternal employment has been attributed as a major obstacle to exclusive breastfeeding and breastfeeding continuation for the general population (32,33). Riggins et al. (34) has recently reported that even mothers who are physicians receive inadequate support in the workplace and although they initiate breastfeeding, their breastfeeding rates at 12 months are below the healthy people 2020 goal. In our study group, both exclusive and total breastfeeding durations were significantly lower in those participants who had returned to work before the median time (6 months) than in those returning to work after 6 months ($p=0.02$). These findings indicate that pediatricians initiate breastfeeding successfully and care about exclusive breastfeeding in the first 6 months due to what they had learnt but cannot overcome the problems facing continued breastfeeding especially after returning to work. All of the women in the study group returned to work at some time after giving birth (min=1.5 months, max=20 months). The median time of returning to work was 6 (5.5) months in our study group although the duration of maternal leave paid by the government was 2 months. Findings from the Hawkins et al. (35) showed that women working full-time were less likely to initiate breastfeeding and suggested that policies to protect breastfeeding are needed to enable women to choose

to delay their return to the workplace. Guendelman et al. (36) showed that short postpartum maternity leave among full-time working mothers is associated with higher risks of early breastfeeding cessation. Our results support the literature that returning to the workplace influences breastfeeding continuation even if breastfeeding is initiated successfully and also support the current literature that policies are needed to promote breastfeeding in working mothers.

Child Care

All of the participants were employed and had returned to work after birth. Only 2% of the mothers preferred day care centres when they first returned to work. Although the type of child care selected is reported to be related with the child and family characteristics as well as maternal attitudes and beliefs (37), it is often necessary to choose other alternatives because of the lack of on-site day care. 59% of the participants had non-relative carers for their children while 39% had relatives including grandmothers. There were no children under only their fathers' care in our study group because all of the fathers were working too. The mean time that a mother spent with her child was 3.3 ± 1.4 hours/day. 68% of these mothers had nobody to assist with housework or childcare except for husbands when they were at home. Thus, 76% of the mothers stated that they could not allow time to study medicine, to read or write medical articles etc in the first year after giving birth while this rate decreased to 38% in the second year. In addition, 55% of participants confessed that they had a change in career plans after having a child. These findings show that mothers continue to bear the primary responsibility for child care and housework especially, although 35% of them reported that their husbands 'help' them in child care. Cooksey et al. (38), reported that dealing with time pressures to assure productivity in workplace and to take care for the family affects mothers negatively. Although employment can lead to the empowerment of women and have a positive effect on child health and well-being (39,40), it has recently been reported that work and family conflict may be a negative risk factor for young children's mental health (41). Both employed mothers including pediatricians and politicians need to be aware of this risk and suggest plans to do the best for mothers and their children to maintain public health (42).

Study Limitations

The most important limitation of this research is the lack of knowledge about the number of female pediatricians with children between 2-6 years old in Turkey, thus we are not sure of the rate of the study sample we have covered. Statistics on doctors from the Ministry of Health do not include the active status of their children's age and number, thus it was not possible to obtain the required data. The only way was to survey female pediatricians. The second limitation is the recall element as the study concept depends on a retrospective

design although the mothers who stated that they did not recall were excluded from the study. Further studies prospectively conducted with this group will help to understand the attitudes of pediatricians when they become mothers.

Conclusion

Female paediatricians with children are a specific group of women physicians and it is important to understand their decisions about childbearing, breastfeeding and child care because they have an undeniable role on families, on children and thus on public health. The very high rate of CDMR among pediatricians is remarkable and the reasons for this must be evaluated to understand and reduce the rate of CDMR. The higher rate of exclusive breastfeeding among pediatricians than both the general population and other female physicians is also remarkable and shows that knowledge about and belief in breastfeeding is an important issue. However, female pediatricians need to be supported to balance home and work in order to maintain their continued presence in the pediatric work force so that they do not have to choose between their children and their careers as both should be possible.

Ethics

Ethics Committee Approval: The study was approved by the Local Ethics Committee of University of Health Sciences, İzmir Dr. Behçet Uz Children's Diseases and Surgery Training and Research Hospital, Clinic of Social Pediatrics, İzmir, Turkey (approval number: 26.01.2012/9).

Informed Consent: Not applicable due to the study design.

Peer-review: Internally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: Ö.B., U.K., Concept: Ö.B., U.K., Design: Ö.B., U.K., Data Collection and Processing: U.K., Analysis and Interpretation: Ö.B., U.K., Literature Search: Ö.B., Writing: Ö.B.

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Progressive Pseudorheumatoid Chondrodysplasia, an Unusual Cause of Joint Swelling and Stiffness

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ABSTRACT

Progressive pseudorheumatoid chondrodysplasia (PPRC) is a rare autosomal recessive skeletal dysplasia characterized by joint swelling, stiffness, generalized progressive joint contractures and progressive arthropathy with the negative laboratory markers of juvenile idiopathic arthritis. It is caused by mutations of the Wnt1-inducible signalling pathway protein 3 (*WISP3*) gene located on chromosome 6q22, encoding a cysteine-rich connective tissue growth factor, which preserves cartilage integrity in chondrocytes. Here, we describe two new patients from same consanguineous family. The diagnosis was made by clinical and radiologic findings, molecular analysis of the *WISP3* gene revealed a c.793-794 delTG (p.C265Lfs*31) mutation. Although life expectancy is normal, the prognosis of PPRC can be very poor, most patients are wheelchair-bound from an early age. Early recognition and appropriate genetic counselling is essential in order to avoid unnecessary treatment and further recurrence.

Keywords: Progressive pseudorheumatoid chondrodysplasia, joint swelling, Wnt1-inducible signalling pathway protein 3

Introduction

Progressive pseudorheumatoid chondrodysplasia (PPRC) (OMIM #208230) is a rare progressive skeletal disorder due to autosomal recessive loss-of-function mutations of the Wnt1-inducible signalling pathway protein 3 (*WISP3*) gene on chromosome 6q22 (1,2). The *WISP3* gene is a member of the connective tissue growth factor gene family and encodes a secreted cysteine-rich protein expressed by synoviocytes and chondrocytes (3). These proteins have roles in cell growth, differentiation and are essential for normal postnatal skeletal growth and cartilage homeostasis. The typical clinical manifestations and radiographic findings are progressive deformities, bone pain, stiffness and swelling of multiple joints with the absence of systemic or synovial inflammation, especially in the hips, knees, wrists and fingers, a limitation of motion, short stature, widened epiphyses, vertebral flattening, narrow joint spaces and osteoporosis

(4). Despite the lack of systemic and synovial inflammation, most of these patients are initially misdiagnosed as juvenile idiopathic arthritis (JIA). Here, we report on 2 siblings from a Turkish family diagnosed with PPRC.

Case Report

Patient 1 was a 7-year-old girl and patient 2 was a 6-year-old boy. There was consanguinity in the family, both parents were healthy. The birth weight, early mental and motor developmental milestones were normal for both siblings. Difficulty in walking appeared at the age of five in patient 1 and at the age of four in patient 2. Subsequently, joint pain, joint swelling, stiffness and enlargement of the proximal interphalangeal joints (Figure 1a) developed over time. The stature of the patients was in the normal range. The rheumatological serology and routine biochemical tests were normal. The irregular acetabular roof, arthrotic changes of the femoral heads, anterior ossification defects in vertebral

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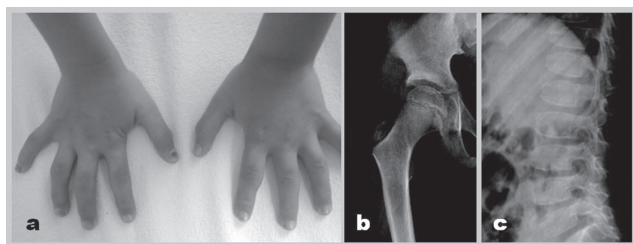


Figure 1. a) Clinical photographs and X-ray films of patient 1 show an enlargement of the proximal interphalangeal joints, b) irregular acetabular roof, c) flattening and anterior beaking on the thoraco-lumbar spine

bodies and expanded articular ends of the tubular bones with mild narrowing joint space were seen in X-rays (Figure 1b, c). Diagnosis was made combining clinical and radiographic findings. The genomic DNA of both siblings and parents were screened for mutations using a Sanger sequencing. The mutational analysis of *WISP3* revealed a known disease causing homozygous c.793-794 delTG (p.C265Lfs*31) mutation in both siblings. The parents have the same heterozygous state *WISP3* mutation.

Discussion

PPRC can be defined as non-inflammatory chondropathy affecting mainly articular cartilage. Any depletion or dysfunction of *WISP3* can result in cartilage lesion (5). The relationship between phenotype and genotype of PPRC is still unclear. The characteristic clinical findings are as follows; platyspondyly and progressive arthropathy resulting in short stature, pain, stiffness and swelling of the joints without synovitis. The characteristic radiographic features are narrow joint space with wide metaphyses, flat epiphyses, enlarged femoral heads with irregular acetabular margins. In the patients presented in this study, the phenotypic, radiographic and serologic features of the patients were in accordance with the literature; both siblings had multiple joint deformities (stiffness and swelling), slightly undersized long bones, progressive loss of joint space, mild osteoporosis, widened epiphyses, vertebral flattening and anterior beaking and normal blood laboratory findings. Similar to the literature, the age of onset was 5 years in the patients presented in this study. In PPRC, joint stiffness usually first affects the hips and progressively involves the other joints, especially the proximal and distal interphalangeal joints. In the patients presented in this study, both siblings had stiffness and osteoarthritis on both hip joints and an enlargement of interphalangeal joints. Growth is retarded in PPRC, with a final height between 135 and 150 cm but these siblings did not exhibit short stature at the time of the study. PPRC is often misdiagnosed as JIA. The differential diagnosis includes rheumatic diseases of childhood but in PPRC, there is an absence of soft tissue involvement. In PPRC, there is no

synovitis or joint inflammation. The other conditions that may be considered in the differential diagnosis are spondylo-epiphyseal dysplasia, spondylo-metaphyseal condrosyplasia and lysosomal storage disorders. Unlike other congenital skeletal disorders, patients with PPRC are often asymptomatic in the first years of life. Although life expectancy is normal, the prognosis of PPRC can be very poor. As a result of progressive arthropathy, most patients are wheelchair-bound from an early age (5). The appropriate differential diagnosis and early recognition of PPRC is critical for treatment management and genetic counselling because anti-inflammatory drugs are not efficient in PPRC (5). In conclusion, early recognition and genetic counselling are essential for families with PPRC in order to avoid unnecessary treatment and further recurrence. Pediatricians, rheumatologists, endocrinologist and orthopaedists should be familiar with the phenotypic and radiographic features of PPRC, especially when dealing with sero-negative arthritis in consanguineous families. Accurate diagnosis of PPRC is essential to avoid misdiagnosis and unnecessary treatment for JIA. Early recognition and genetic counselling is vital for families where there is risk of a birth of a second affected child before the first one is diagnosed.

Ethics

Informed Consent: Was obtained from parents.

Peer-review: External and internal peer reviewed.

Financial Disclosure: This study has received no financial support.

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Triple X Syndrome with a Rare Finding: Cleft Palate

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ABSTRACT

Triple X syndrome (trisomy X) is a sex chromosomal anomaly caused by the presence of an extra X chromosome. The patients with Triple X syndrome have a wide range of phenotypic variability. Some individuals are only mildly affected or asymptomatic. Epicanthal folds, clinodactyly, tall stature and hypotonia are the most common phenotypic features. Patients also may have seizures, genitourinary abnormalities and premature ovarian failure. We report a patient with Triple X syndrome and cleft palate. By describing this case, we want to draw attention to the association between cleft palate and Triple X syndrome.

Keywords: Triple X, trisomy X, cleft palate, seizure

Introduction

Triple X syndrome (47,XXX) is a sex chromosomal abnormality. Affected females have an extra X chromosome. This syndrome was described by Jacobs et al. (1). Incidence is approximately 1/10.000 females (2). There is a wide phenotypic variability of patients with triple X. Phenotypic findings include epicanthal folds, clinodactyly, tall stature and hypotonia. Also, clinical findings are seizures, genitourinary abnormalities, premature ovarian failure, intentional tremor, congenital hip dysplasia, constipation/abdominal pains (2,3). However, most of the woman with Triple X syndrome presents indistinct clinical signs. Herein, we report on a patient with Triple X syndrome and cleft palate (CP). Cleft lip and palate were described only in one paper describing two patients with Triple X syndrome. There is only one paper in the literature describing cleft lip and palate in two patients with Triple X syndrome (4). In the light of these findings, co-occurrence of cleft lip and palate and Triple X syndrome should be considered.

Case Report

A 11-year old girl was admitted to our neurology clinic with seizure. She was the second child of healthy unrelated parents. The age of mother at conception was 31 years old. There was no problem during the antenatal period and ultrasound scans were reported as normal. CP was identified in the first examination after delivery. She required 1 week of neonatal care for feeding difficulties. She was operated on for CP. She was able to sit without support at 8 months and walk without support at 14 months of age. She had delayed milestones in speech-language development. She pronounced her first words at the age of 3 years after speech therapy. She was able to produce her first sentences at 4 years of age. She also had mild learning disabilities and a poor academic performance. Wechsler Intelligence scale for Children-Revised was used for the assessment of her cognitive skills. Her verbal, performance and full-scale scores were 57, 79 and 66 respectively. There was no family history of either epilepsy or neurodevelopmental disorders. On physical examination, she was 133 cm (3 percentile) with a weight of

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27 kg (3-10 percentile) and a head circumference of 54.6 cm (50-98 percentile). She had a long face with an open mouth appearance (Figure 1, 2). She had received dental treatment. She did not have hypertelorism, epicanthal folds, clinodactyly, overlapping digits, pes planus or pectus excavatum.

The patient had generalized tonic-clonic seizure with a prolonged post-ictal period. Wake and sleep electroencephalogram showed normal background activity and no epileptic discharge. Brain magnetic resonance imaging was normal. Sodium valproate treatment was started and her epilepsy was well controlled. She was referred to a genetic

department as her findings included CP, learning disabilities and seizure. Chromosome analysis using G-band technique revealed a 47,XXX karyotype (Figure 3). The fluorescent *in situ* hybridization analysis (FISH) of 22q11.2 locus was normal signal pattern with no deletion. After the diagnosis of Triple X syndrome, in order to investigate the abnormalities associated with this syndrome, an abdominal ultrasound and echocardiography were performed and both of them were normal. Genetic counselling was provided to the patient and her family. Her family was informed about the recurrence rate, which is estimated to be below 1%.



Figure 1. Patient with long face with open mouth appearance



Figure 2. Patient with operated cleft palate

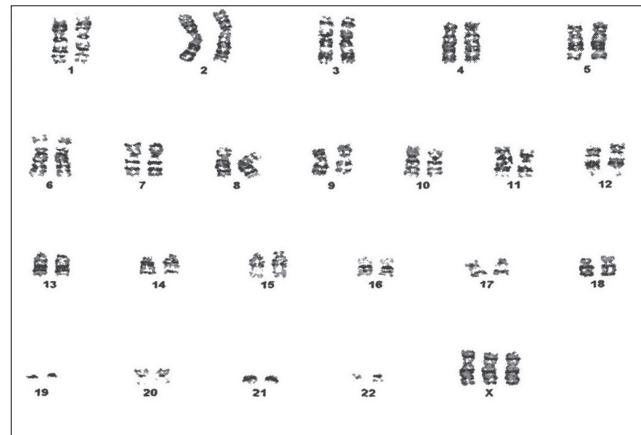


Figure 3. 47,XXX karyotype of the patient

Discussion

Triple X syndrome is the most common female chromosomal abnormality. Due to a nondisjunction event in the cell division, during gametogenesis or after conception, X chromosomes fail to properly separate resulting in a numerical abnormality. Triple X has a significant correlation with advanced maternal age (2). Most patients with Triple X syndrome are asymptomatic or mildly affected so approximately only 10% of patients are diagnosed (2). Minor physical findings including hypertelorism, epicanthal folds, up-slanting palpebral fissures, clinodactyly, overriding digits, pectus excavatum and pes planus can be seen (2,3). Genitourinary malformations including renal dysplasia, unilateral kidney, ovarian malformations, premature ovarian failure, primary amenorrhea and congenital heart defects such as atrial and ventricular septal defects, pulmonic stenosis and aortic coarctation have also been described (2). Seizure disorders can be seen in 15% of patients. Different seizure types including absence, partial and generalized tonic clonic seizures have been described but complex partial seizures are the most commonly seen type. A good response to standard anticonvulsant treatment has been described. The most preferred antiepileptic drugs are carbamazepine, sodium valproate and clobazam (2,5). Our patient also presented with generalized seizures and seizure control

was achieved with sodium valproate treatment. Patients with Triple X syndrome also have developmental and psychological problems in variable degrees. Early milestone delays in motor and speech-language development can be seen. Speech and language deficits can continue during the school and adolescent period (3). There is a wide variation in full-scale intelligence quotients of children with triple X ranging from 55-115 (2). Our patient also had mild learning difficulties. In cleft lip and CP, the upper lip and roof of the mouth are affected. When CP is associated with two or more malformations, then it is called syndromic CP. If it is isolated or cannot be associated with a recognizable pattern, it is called non-syndromic CP. Environmental and genetic factors may be responsible for cleft lip and palate. Several genes causing syndromic CP have been discovered. The T-box transcription factor-22 gene, located on chromosome Xq21, is important in the etiology of syndromic cleft lip and palate (6). Maternal smoking, maternal alcohol use, folate deficiency and anticonvulsant (phenytoin/hydantoin, valproic acid and topiramate) treatment during pregnancy are environmental factors associated with orofacial clefts. Palatal anomalies were found in approximately 70% of patients with 22q11.2 Deletion syndrome so the FISH of 22q11.2 locus was performed for our patient, a normal signal pattern with no deletion was detected. According to the Lyon hypothesis, one of the X chromosome in females is randomly selected and inactivated early in the embryonic development so each female has only one active X chromosome. But in the majority of human triploid cells, more than one X chromosome is active (7). Fryns et al. (8) and Ramaekers et al. (9) suggested that the over expression of genes located on the X chromosome may have a gene dosage effect and may cause the developmental anomalies in the genitourinary system of triple X patients. This presumed dosage effect may also be applicable as the genesis of CP. Previously, two Triple X syndrome cases with cleft lip and palate were defined (4). The first described report with triple X was a foetus; hydramnios, unilateral cleft lip and palate and also a sandal gap in both feet were detected prenatally at 26-27 weeks of gestation. Diagnosis was confirmed by karyotype and FISH analyses. The foetus was terminated and autopsy findings were compatible with the prenatal sonographic findings. Other features of this foetus were hirsutism, bronchogenic cyst, syndactyly, bilateral postaxial polydactyly, abnormal cervical vertebra and absent sacral tapering. Another reported case with Triple X syndrome was a 7-year-old girl with multiple congenital anomalies including curved bushy eyebrows, small palpebral fissures, a broad nasal bridge, a bilateral cleft lip and palate, camptodactyly, sacral meningocele and bilateral talipes equinovarus. She had Grade III vesicoureteral reflux, recurrent

urinary tract infections and mullerian abnormalities. Brain computed tomography revealed parietal bone agenesis. She had developmental delay and had been receiving speech therapy. There were differences between our case and that reported by Jagadeesh et al. (4), these two patients have multiple phenotypic and clinical findings, but our patient has indistinct clinical signs. The only similarity between our patient and the reported second case was a delay in speech development. Our case provides a rare example of Triple X syndrome with CP. We cannot conclude that there is a causal relationship between these two but we want to draw attention to the possible association between triple X and CP.

Ethics

Informed Consent: Was obtained from the patient and his parent.

Peer-review: External and Internal peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: E.G., H.M.G., E.K., Design: E.G., H.M.G., E.K., Data Collection and Processing: E.G., H.M.G., E.K., Analysis and Interpretation: E.G., H.M.G., E.K., Literature Search: E.G., H.M.G., E.K., Writing: E.G., H.M.G., E.K.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study has received no financial support.

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Sturge-Weber Syndrome Type III

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ABSTRACT

Sturge-Weber syndrome (SWS) is a neurogenetic disease with an incidence of 1 in 20.000-50.000 live births. The less common form, which can be difficult to diagnose and only involves leptomeningeal angioma, has been defined as Type III SWS. A 5.5-month-old male patient with normal neuromotor development presented with right sided partial seizures, which had been occurring frequently for the previous two days and could not be controlled. A cranial magnetic resonance imaging showed pathological contrasts in the cortical regions involving the left hemisphere and in the leptomeningeal structures. We aim to present the case of an infant with SWS, which unlike the classical form was unidentifiable in physical examination and diagnosed using imaging methods.

Keywords: Sturge-Weber, without nevus, epilepsy, children

Introduction

The classical triad of Sturge-Weber syndrome is a port-wine stain on the face, glaucoma and leptomeningeal angiomas. While Type I might include the whole triad, Type II presents with the involvement of the skin without leptomeningeal angiomas. Type III Sturge-Weber syndrome is the rarest subtype and presents with leptomeningeal involvement without the port-wine stain on the face (1-3). Only a few cases of this type have been reported, and its incidence is unknown (4-7). This subtype is generally diagnosed based on the findings of leptomeningeal angiomas in contrast brain magnetic resonance imaging (MRI) scans and calcifications in the same region via brain computed tomography (CT) scans of patients presenting with seizures (4,5). Here, we present the case of a 5.5-month-old patient with Type III Sturge-Weber syndrome presenting with seizures.

Case Report

A 5.5-month-old male patient with age-appropriate mental and motor development was referred to our hospital with right sided partial seizures occurring several times a day. His physical examination and neurological examination were normal. The partial seizures were unresponsive to intravenous diazepam, diphenylhydantoin and midazolam. Intravenous levetiracetam was administered and the seizures were partially controlled. His electroencephalogram showed isolated sharp wave discharges in the temporal regions of the left hemisphere, and a slow back-ground rhythm of the left hemisphere compared to the right hemisphere (Figure 1). Cranial MR imaging of the patient revealed pathological contrasts in the cortical regions involving the left hemisphere and in the leptomeningeal structures (Figure 2a). Brain MR angiography and venography were normal. Lumbar puncture was performed and serum samples were taken with the

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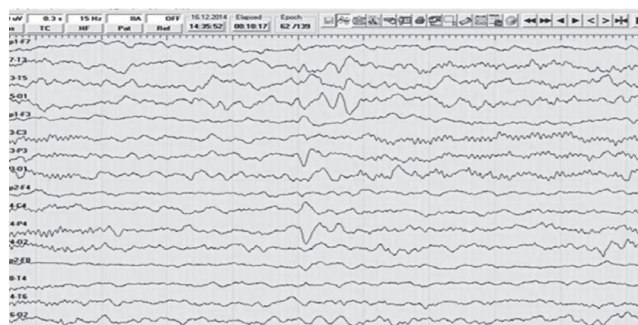


Figure 1. Electroencephalogram; isolated sharp wave discharges in the temporal regions of the left hemisphere, and slow back-ground rhythm of the left hemisphere compared to the right hemisphere

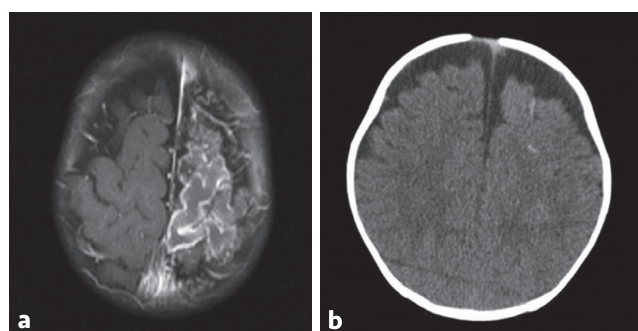


Figure 2. a) Cranial magnetic resonance; pathological contrasts in the cortical regions involving the left hemisphere and in the leptomeningeal structures, b) brain computed tomography; calcifications in the left hemisphere

pre-diagnosis of meningoencephalitis. Intravenous acyclovir therapy was started. Biochemical and serological tests were normal. Repeated contrast brain MR imaging on the 7th day indicated no change. Brain CT which was performed with the pre-diagnosis of Sturge-Weber syndrome revealed calcifications in the involved hemisphere (Figure 2b). The ophthalmological examination was normal, glaucoma was not determined. The patient's antiviral treatment was ceased and antiepileptic treatment was continued. The patient has been followed-up and diagnosed with Sturge-Weber syndrome Type III. His seizures are under control using diphenylhydantoin and levetiracetam.

Informed family consent was taken from parents before publishing his diagnosis and treatment details.

Discussion

Sturge-Weber syndrome is a neurocutaneous disorder characterized by facial and leptomeningeal angiomas, glaucoma, hemiparesis, stroke-like attacks, seizures and also atrophy and calcifications in the brain. Abnormal intrauterine arterial and venous flow pattern, abnormal connections between deep and superficial veins, associated stasis and subsequent thrombosis and ischemia are blamed in the etiology (1). Type III Sturge-Weber syndrome is the

rarest subtype and it is difficult to diagnose as it does not involve skin abnormalities. Similar to our patient, 75-90% of patients with this subtype present with seizures and receive diagnosis using imaging methods. While glaucoma is seen in approximately 30% of the patients with classical Sturge-Weber syndrome, it is often not seen in patients with Type III Sturge-Weber syndrome, which is attributed to the absence of facial angiomas. However, headache and migraine-like attacks are frequently seen (7,8). Atrophy, neuronal losses and astrogliosis can be seen in the brain tissue underlying the leptomeningeal angiomas, which may lead to structural impairments in the cortex. Proteins and Ca²⁺ entering cells through increased vascular permeability cause a crystallization, which helps diagnosis. Gadolinium-enhanced T1-weighted imaging and susceptibility-weighted imaging performed at the early pre-symptomatic phase are useful in the detection of leptomeningeal angiomas (9). Recently developed post contrast fluid-attenuated inversion recovery imaging and high-resolution blood oxygen level dependent MR venography may also increase sensitivity in detecting the leptomeningeal angioma (10). In the presented case, although there was no other finding compatible with Sturge-Weber syndrome, the absence of other clinical clues for meningoencephalitis and no change in the radiological findings after antiviral therapy raised the suspicion for Sturge-Weber syndrome. Radiological findings are of great importance in the diagnosis of this subtype, since these patients do not present with dermatological symptoms. Leptomeningeal angiomas detected in patients can be confused with viral encephalitis and arteriovenous anomalies. Although cranial MRI is performed in most patients, this subtype is diagnosed via calcifications observed in cranial CT. It will be possible to establish a rapid and definitive diagnosis with the identification of genetic causes of the disorder. Sturge-Weber Type III can mimic different neurological diseases. Radiological findings are of great importance in the diagnosis of this subtype since these patients do not present with dermatological symptoms. Cranial CT and MR may be useful if the diagnosis is uncertain.

Ethics

Informed Consent: Informed family consent was taken from parents before publishing his diagnosis and treatment details.

Peer-review: External and internal peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: H.G.T., Concept: H.G.T., S.Y., G.S., Design: H.G.T., H.T., Data Collection and Processing: H.G.T., Analysis and Interpretation: S.G., G.S., Literature Search: H.G.T., H.T., Writing: H.G.T., G.S.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study has received no financial support.

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Relationship of Attention Deficit-hyperactivity Disorder on the Spectrum of Anorexia Nervosa to Obesity: A Case Report

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ABSTRACT

Eating disorders are a growing health problem among adolescents and have increasingly become the focus of studies due to their prevalence. Both obesity and anorexia nervosa are associated maladaptive eating behaviours that may be relevant to development. With this case report, it is intended to discuss the diagnosis and management of a female adolescent patient, diagnosed with obesity and attention deficit-hyperactivity disorder (ADHD). A 16-year-old, female, obese adolescent was referred to our in-patient clinic due to maladaptive eating styles, depressive symptoms and ADHD symptoms. Her early course of illness, diagnostic process, treatment and short-term outcome are described. At the time of discharge, the patient's Clinical Global Impression (CGI) scale severity item score was 2 (borderline mentally ill) and CGI improvement item score was 2 (much improved). We report the present case with the purpose of establishing a pediatric approach to obesity, a disease not included in Diagnostic and Statistical Manual-5 under eating disorders, yet we believe it shares common underlying genetic and environmental causes.

Keywords: Anorexia, obesity, attention deficit hyperactivity disorder, adolescent

Introduction

The prevalences of both obesity (OB) and, at the other end of the spectrum, anorexia nervosa (AN), a severe and complex biological and psycho-social illness, have increased dramatically in the past few decades (1). Both OB and AN are associated with maladaptive eating styles that may be relevant to their development (2). Previous research has therefore addressed the problem of children's eating behaviour and has highlighted a number of key factors such as personality traits, obesogenic environment and peer bullying. This report aims to examine particularly the impact of the mother's own eating behaviour with a focus

on parental control and the attention deficit-hyperactivity disorder (ADHD) of the case.

Case Report

A 16-year-old female patient was referred to our outpatient clinic for psychiatric evaluation prior to a procedure of gastric bariatric surgery relating to morbid OB. The patient and her mother had been seeking surgical treatment for the case's morbid OB for several months. She was born in term without any medical problem and her neurodevelopment milestones were within normal limits. She was the only child of her parents who divorced when she was a 2-year-old. During her

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toddlerhood and preschool years, her grandmother was the principal caregiver. Her mother was working as a nurse in a hospital and had no leisure time to share with her daughter because of her occupation. The case did not present any psychosocial problems during elementary and secondary school years but was over-weighted during both of these terms. However, she was exposed to peer victimisation due to her physical appearance in high school. At the time of her first psychiatric examination, she weighed 122 kilograms and her body mass index (BMI), kg/m^2 was 42.2 (>97 percentile) (Figure 1). It was noticed that she had attention deficiency, impulsivity and problems of executive functions, therefore she was diagnosed with ADHD. According to Turgay (3) Diagnostic and Statistical Manual (DSM) of Mental Disorders, Fourth Edition-Based Child and Adolescent Behavior Disorders Screening and Rating scale-Parent Form DSM-5 Parent form (4), ADHD symptom severity score was 37. The patient was hospitalized for observation and regulation of her eating attitudes/behaviors and psychoeducation for her eating disorders. Methylphenidate treatment was started and gradually titrated up to 54 mg/day long acting form without any adverse effect. Worthy of note, her mother was so thin, to the degree of a similar appearance to AN. Her mother's BMI was 17.2 (Figure 1). She expressed her strong wish to restrain herself from binge eating and excessive sport training after having meals. Interestingly her mother was trying to prevent the patient's school attendance because of her increased eating when she was at school as the patient was not under her mother's control at school. Additionally, her mother's determination for the patient to have surgical intervention made us to consider excessive parental controlling behaviour on her daughter. She was referred to adult psychiatry and diagnosed with AN and ADHD. To understand the psychodynamic basis of the case and the patient's relationship with her mother, a Thematic



Figure 1. Case and her mother

Apperception test was administered and resulted in the findings of the oral stage of the psychosexual development and autonomy problems. During the patient's inpatient days, her mother was educated concerning her over-protective control over her child. The patient lost 5 kilograms in a week and major improvements were observed regarding her impulsive eating attitudes. The Clinical Global Impressions (CGI) scale (5) severity score at the time of in-patient treatment was 6 (severely ill). At the time of discharge, the patient's CGI severity item score was 2 (borderline mentally ill) and CGI improvement item score was 2 (much improved).

Discussion

The increase in the scientific literature about eating disorders and OB have many things in common. To date, OB has been considered as primarily a somatic disorder and is not classified as an eating disorder in DSM-5. However, OB, like AN, is considered a growing problem, and is thought to be generally increasing in Western countries. There are a range of suggestions about the etiology of OB such as underlying genetic, endocrine and metabolic factors. Barkley (6) has described ADHD as a disorder of behavioral inhibition, a component of which is the ability to self-regulate. Also, increasing evidence points to a significant association between ADHD and OB (7). It is possible that the behavioral and cognitive features of ADHD give rise to pathological eating patterns as in our case. Also, parental attitudes are particularly important in psychiatric disorders, including ADHD (8). Parents who have higher levels of parental control, expressed emotionally critical comments, hostility, or emotional over involvement and negate their child's emotional needs are more likely to have children who develop eating disorders (9-11). There have also been several suggestions concerning family variables in the development of OB. One of these is that of a family being characterised by a dominant mother and a submissive father. As in the case of this patient, it can be assumed that children living in an unfavourable home environment will have less access to regular eating attitudes and healthy interactions, which may in turn affect their risk of becoming overweight. Also, highly controlling and restrictive parental feeding behaviour contributes to a positive energy balance and higher BMI by interfering with children's ability to self-regulate their energy intake (12,13). Therefore, promoting a child's ability to self-regulate their intake and to develop sensitivity to internal needs is crucial. In addition, people with eating disorders tend to misjudge their own body shapes, believing that they are fatter than they actually are, and have a strong desire to be thinner. Therefore, it is conceivable that parents with eating disorders may misjudge their children's size or want them to be thin and thus limit their food intake (14). The relation between maternal eating behavioural characteristics and

childhood OB remains an important field of research. There are considerable implications for clinical work on mothers with eating disorders and it is likely that early intervention may be important in order to prevent the intergenerational transmission of such issues. In conclusion, the aim of this case study is to point out the possibility of demonstrating AN and OB as two polarities on the same disease spectrum; and the role of ADHD comorbidity in eating disorders, which presents itself both in the child and in the parent.

Ethics

Informed Consent: Informed consent was given by all parties prior to this study.

Peer-review: External and internal peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: T.K., B.B., B.Ö., S.K., Concept: B.Ö., Design: T.K., Data Collection and Processing: T.K., B.B., Analysis and Interpretation: B.Ö., S.K., Literature Search: T.K., B.B., Writing: T.K., B.B.

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Acute Ophthalmoplegia; Same Disease, Different Variants: Anti GQ1b Antibody Syndrome

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ABSTRACT

Patients with Miller Fisher syndrome (MFS) are characterized by acute ophthalmoplegia (AO) and areflexia. MFS is an immune mediated process, triggered by an infection and includes incomplete forms, such as ophthalmoplegia, ataxia and a central nervous system subtype known as Bickerstaff brainstem encephalitis (BBE). We present two cases admitted to our hospital on the same day. The first case was presented as AO, with elevated levels of anti GQ1b. The second case was presented as AO, oropharyngeal palsy and sensory motor polyneuropathy with borderline levels of anti GQ1b, diagnosed as BBE. There are atypical forms of MFS with different clinical symptoms and elevated levels of antibodies called "Anti GQ1b Antibody syndrome". The cases of the two patients diagnosed as MFS variants' AO and BBE.

Keywords: Bickerstaff brainstem encephalitis, Miller Fisher syndrome, acute ophthalmoplegia, anti GQ1b antibody

Introduction

Guillain-Barré syndrome (GBS) is characterized by muscle weakness and a loss of deep tendon reflexes (1). Miller Fisher syndrome (MFS) is a variant of GBS and its clinical triad includes ophthalmoplegia, ataxia and areflexia. It is likely that GBS, MFS and Bickerstaff brainstem encephalitis (BBE) form a continuous spectrum. MFS includes incomplete forms, such as acute mydriasis, acute ataxic neuropathy, acute oropharyngeal palsy, AO and BBE (2). In this report we present two cases admitted to hospital on the same day presenting acute ophthalmoplegia diagnosed as BBE and AO.

Case Reports

Case 1

A 3-year old previously healthy girl was admitted to hospital due to difficulty in walking and sitting, hoarseness and

a deviation of bilateral eyes. Two days prior to admittance, she experienced sudden bilateral eye deviation and subsequently her clinical status worsened so that she could not walk or sit without support. Three weeks before the admission, she had been diagnosed with acute tonsillitis. On admission, somnolence and sudden hoarseness developed and signs of meningeal irritation were positive. Deep tendon reflexes were active and the Babinski sign was positive bilaterally. She had bilateral sixth nerve palsy (Figure 1). Her muscle strength was diminished in all extremities (medical research council: 3/5). The rest of her general physical examination was unremarkable. Brain and spine magnetic resonance (MR) imaging detected no abnormal signals. Cerebrospinal fluid (CSF) cytochemical analysis findings were as follows; no cells detected, protein 104 mg/dL, glucose 56 mg/dL confirming albumin cytological dissociation. Serological CSF tests were negative for *Mycoplasma pneumoniae*,

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Figure 1. a) Left eye abduction paresis, b) right eye abduction paresis

Enterovirus, *Cytomegalovirus* and *Epstein Barr virus*. Blood and CSF cultures were sterile. Five days after admission, electromyoneurography revealed sensory motor axonal polyneuropathy and electrophysiological studies revealed an absence of H reflex. Intravenous immunoglobulin (IVIg) therapy (2 gr/kg) was administered one day after admission. The symptoms of hoarseness and somnolence regressed but she was unable to do coordination tests adequately and her gait was abnormal. She had truncal ataxia and could not sit or walk without support. Her meningeal irritation symptoms were still positive. Pulse steroid therapy was started, two days after the therapy she clinically and could sit and walk without any support. Her meningeal irritation signs were then seen to be negative. Corticosteroid treatment (2 mg/kg/d) was maintained for 4 weeks. One month after her discharge, her neurologic examination was normal. Testing for anti-ganglioside antibodies resulted in borderline levels of serum anti GQ1b antibodies. Our patient was diagnosed with BBE, including impaired consciousness, muscle weakness with positive CSF and electrophysiological findings. Informed consent was obtained from the patient's parents.

Case 2

A 6-year-old previously healthy girl was admitted to hospital with a four-day history of diplopia. A few weeks previously, the child had an episode consisting of coughing, fever, diarrhea and vomiting. On admission, she was afebrile and well oriented. Her light reflex was normal. She had limited abduction, adduction, up-gaze and down-gaze paresis of the right eye and abduction paresis of the left eye (Figure 2). Her deep tendon reflexes and muscle strength were normal. The Babinski sign was negative. The results of blood investigation were normal. A lumbar puncture was performed, CSF cytochemical analysis showed



Figure 2. a) Abduction, adduction, up-gaze and down-gaze paresis of the right eye, b) abduction paresis of the left eye

no abnormality. Serological CSF tests were negative for *Mycoplasma pneumoniae*, *Enterovirus*, *Cytomegalovirus* and *Epstein Barr virus*. Blood and CSF cultures were sterile. Electrophysiological studies were normal. Anti-acetylcholine receptor antibodies were negative. Cerebral imaging by MR and MR angiography revealed no abnormality. Testing for anti-ganglioside antibody panel were done and revealed high levels of serum anti GQ1b++ and GD1b+. IVIg therapy was started six days after the onset of the symptoms. Two days after starting IVIg therapy, paresis of up-down gaze and adduction of the right eye regressed and movements of the left eye were normal. Diplopia proceeded and steroid therapy (2 mg/kg/day) was administered for four weeks. One month after her discharge, her neurologic examination was almost normal except for limited abduction paresis of the right eye.

Informed consent was obtained from the patient's parents.

Discussion

MFS is an inflammatory neuropathy with clear consciousness and BBE is a central nervous system disease characterized by consciousness disturbance. Acute ophthalmoplegia can be seen in both BBE and MFS and it is associated with the presence of ganglioside GQ1b and called Anti GQ1b Antibody syndrome (3,4). We describe two patients admitted at the same time with bilateral ophthalmoplegia. One of the patients had isolated AO with high levels of anti GQ1b. The other case had additional symptoms; impaired consciousness, AO, hyperreflexia, neck stiffness, pharyngeal palsy and positive electrophysiological findings (sensorimotor polyneuritis, radiculopathy, absence of H reflex). Because of impaired consciousness and

sensorimotor polyneuritis meant both peripheral and central nervous system involvement. She had borderline levels of anti GQ1b. We speculated that taking a blood sample after the initiation of steroid treatment could be responsible for the low levels of anti GQ1b. Akinci et al. (5) described an MFS case with a pattern of pure sensory polyneuropathy concomitant with anti GQ1B antibody. For patients with acute isolated ophthalmoplegia with an unknown etiology, Anti GQ1b Antibody syndrome should be considered and anti-ganglioside antibody panel testing should be done. Also testing for this panel could be done in case of an unknown etiology of encephalitis; diagnosis of BBE can be helpful in the administration of the appropriate treatment.

Ethics

Informed Consent: Consent form was filled out by all participants.

Peer-review: External and internal peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: M.P., S.A., Concept: M.P., Design: M.P., Data Collection or Processing: S.A., A.C.E., Analysis or Interpretation: M.P., S.A., Literature Search: A.C.E., S.A., Writing: S.A., A.C.E.

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