T.C.
YEDITEPE UNIVERSITY
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DEPARTMENT OF PUBLIC HEALTH

THE EFFECT OF NOISE, ILLUMINATION, AND ELECTROMAGNETIC FIELD EXPOSURE ON THE NEURODEVELOPMENT OF NEWBORNS IN A NEONATAL INTENSIVE CARE UNIT: A RANDOMIZED CONTROLLED TRIAL

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BEYAN

Bu tezin kendi çalışmam olduğunu, planlanmasından yazımına kadar hiçbir aşamasında etik dışı davranışımın olmadığını, tezdeki bütün bilgileri akademik ve etik kurallar içinde elde ettiğimi, tez çalışmasıyla elde edilmeyen bütün bilgi ve yorumlara kaynak gösterdiğimi ve bu kaynakları kaynaklar listesine aldığımı, tez çalışması ve yazımı sırasında patent ve telif haklarını ihlal edici bir davranışımın olmadığını beyan ederim.

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İmza

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DECLARATION

I hereby declare that this thesis is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which has been accepted for the award of any other degree except where due acknowledgment has been made in the text.

Date 10.18.2022

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I hope that my research should always be useful and serve good purposes for occupational health and safety, public health and health screening program of newborn.

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LIST OF SYMBOLS AND ABBREVIATIONS

dB SPL	Sound pressure level
dB SIL	dB sound intensity level
dB SWL	dB sound power level
dB A, dB B and dB C are abbreviations of different weighting filters	
dB HL	dB hearing level
dB Q	is sometimes at the weighted noise level
dBG	G - weighted spectrum
Pa- Pascal	Sound pressure
Leq	equivalent continuous sound pressure level
Lp or SPL	Sound Pressure Level
Lp(A)	A-weighted sound pressure level
MV	Mechanical Ventilation
PTB	Preterm birth
LBW	Low birth weight
VLBW	Very low birth weight
sPTB	Spontaneous premature birth
NICU	Neonatal Intensive Care Unit
MRI	Magnetic Resonance İmaging
USG	Ultrasonography
GA	Gestation Age
BW	Birth weight
SL	Subdivision of Level
AAP	American Academy of Pediatrics
CIE	Commission Internationale de l'Eclairage
CPAP	Continuous Positive Airway Pressure
WHO	World Health Organization
F	Frequency
Ftc	Foot-candil
Hz	Hertz
KHz	KiloHertz
lx	Lux
NREM	Non-rapid Eye Movement
REM	Rapid Eye Movement

EMA	Electromagnetic field
VLF-EMF	Very low frequency Electromagnetic field
LF-EMF	Low frequency Electromagnetic field
ABR	Auditory Brainsteam Response
ROP	Retinopathy of Prematurity
UV	Ultraviolet
SAR	Specific absorption rate
AAPM	American Association of Physicists in Medicine
RDS	Respiratory Distress Syndrome
PDA	Patent Ductus Arteriosus
IVH	Intraventricular Hemorrhage
ECMO	Extracorporeal Membrane Oxygenation
ANSD	Auditory Neuropathy Spectrum Disorder
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IVK	Intraventricular hemorrhage
PVL	Periventricular Leukomalacia
NEC	Necrotizing Enterecolitis
BPD	Bronchopulmonary Dysplasia
MV	Mechanical Ventilation
ARDS	Acute Respiratory Distress Syndrome
PSS	Perceived Stress Scale
MDD	Major depressive disorder
PEC	Preeclempsia
IDA	Iron deficiency anemia
CKD	Chronic kidney disease
HT	Hypertension
DM	Diabetes Melllitus
PE	Pulmonary embolism
AML	Acute Myeloid Leukemia
NCPAP	Nasal Continue Positive Airway Pressure
MAS	Macrophage activation syndrome

ABSTRACT

Er, H. (2022). The effect of noise, illumination, and electromagnetic field exposure on the neurodevelopment of newborns in a neonatal intensive care unit: a randomized controlled trial. Yeditepe University Institute of Health Sciences

This study aims to compare the illuminate, noise, and electromagnetic field exposure caused by the physical and operational conditions of neonatal intensive care units (NICU) and analyze how these factors on the neurodevelopment of prematurity According to the Occupational Hygiene and Safety regulations, the legal conformity of NICU was evaluated by these standards. It was ensured that the consent form was read by 68 volunteer preterm mothers actively receiving a treatment a university hospital authorized by the Ministry of Health. The Mann-Whitney U test, p value, crosstabs and logistic regression analysis were conducted to evaluate these questionnaires.

In this study, the environmental factors of the NICU were carried out by an accredited laboratory. Serving as a calibration and test laboratory authorized by the Ministry of Labor and Social Security and TÜRKAK (TR MINISTRY OF FOREIGN AFFAIRS TURKISH ACCREDITATION AGENCY). Data collected according to regulations and standards.

It was observed that, the content of the standards was examined, they were prepared for adult intensive care and healthcare professional. It contains a very high risk for premature infants' population and a low risk for health professionals. The standards should improve, the neonatal intensive care is been spesific and privatizied.

Keywords: Neonatal Intensive Care Unit, Electromagnetic Field, Noise, Light, ROP, Development of the Newborn

ÖZET

Er, H. (2022). Yenidoğan yoğun bakım ünitesinde gürültü, aydınlatma ve elektromanyetik alana maruz kalmanın yenidoğanların nörogelişimi üzerindeki etkisi: randomize kontrollü bir çalışma. Yeditepe Üniversitesi Sağlık Bilimleri Enstitüsü

Bu çalışma, yenidoğan yoğun bakım ünitelerinin (YDYBÜ) fiziksel ve operasyonel durumlarından kaynaklanan ışık, gürültü ve elektromanyetik alan maruziyetlerini karşılaştırmayı, prematürelerin nörogelişimine etkisini ve bu faktörlerin iş hijyeni ve güvenliği yönetmeliklerine göre YDYBÜ 'nin yasal uygunluğunun bu standartlarla nasıl değerlendirildiğini analiz etmeyi amaçlamaktadır. Sağlık Bakanlığı tarafından yetkilendirilmiş bir üniversite hastanesinde aktif olarak tedavi gören 68 gönüllü preterm anne tarafından onam formunun okunması, onamlarının alınması ve medikal bilgilerin alınması sağlanmıştır. Bu anketlerde Mann-Whitney U testi, p value, corsstabs ve lojistik regresyon analizi yapılmıştır.

Bu çalışmada, YDYBÜ çevresel faktörlerinin ölçümü akredite bir laboratuvar tarafından yürütülmüştür. Çalışma ve Sosyal Güvenlik Bakanlığı ve TÜRKAK (T.C. Dışişleri Bakanlığı Türk Akreditasyon Kurumu) tarafından yetkilendirilmiş kalibrasyon ve test laboratuvarı olarak hizmet veren, çalışmanın en başında onaylı kalibrasyon test laboratuvarı, akreditasyon sistemi belgesine sahip olması ve standart formlar kullanılarak ölçümler gerçekleştirmesi, benzeri yönetmelik ve standartlara göre veriler toplanmıştır.

Standartların içeriği incelendiğinde yetişkin yoğun bakım ve sağlık profesyonelleri için hazırlandığı gözlenmiştir. Prematürler için çok yüksek risk taşırken sağlık profesyonelleri için düşük risk içerir. YDYBÜ standartlar iyileştirilmeli, spesifik ve özelleştirilmelidir.

Anahtar sözcükler: Yenidoğan Yoğun Bakım Ünitesi, Elektromanyetik Alan, Gürültü, Aydınlatma, Maruziyet, ROP, yrnidoğanın nörogelişimi

1. INTRODUCTION AND PURPOSE

1.1. Introduction

The incidence of preterm birth is forecasted to be nearly 10 percent in the world. Every year, nearly 15 million babies are born preterm before term completed weeks of gestation age [1]. According to the Turkey Demographic and Health Survey results, the rate of low birth weight (LBW) in infants is 11% [2].

The major source of the premature birth leads neonatal mortality, morbidity, hearing loss (HL), and retinopathy of prematurity (ROP) [3]. In addition, premature infants are commonly exposed to many stressful perform and painful interferences that may result to differentness in their stress response in the neonatal intensive care unit (NICU) [4]. The environmental factors of the NICU lead to trigger of stress response in premature infants. Developmental care interventions of the prematures enhance their nervous system development and to adapt to their extra uterine ambiance [3]. World Health Organization (WHO) recommend the noise, illuminate and electromagnetic fields levels of NICU threshold. The American Academy of Pediatrics (AAP) is other quarter about it. The noise level is kept in NICU of hospitals about 40 dB(A) all day long and 30 dB (A) at the night [5]. The AAP, in a report published in 1997, states that confident sound level ranges for the NICU should not overcome the level of 45 dB (A) for 1 hour [6]. At the same time, the AAP recommends that the lighting in the NICU be adjustable and also between 1 lx and 600 lx in order to be convenient environmental condition [7]. Another stressor factor is electromagnetic fields and radiation. The American Association of Physicists in Medicine (AAPM) recommends and agrees to use the lowest dose of radiation in obtaining the desired medical information in medical imaging procedures. In order to prevent the effects of radiation used for medical diagnostic purposes on humans, some protocols have been developed [8].

The normal process of brain maturation is disconnected by preterm birth. At major risk of neurological impairment is the leading cause plasticity, fragility and vulnerability by the way [9]. The plasticity of the brain improvements approximately 2.7- fold between 29 to 41 weeks postconception. The ELBW have a dramatically smaller whole brain volume than their term-born [10]. In addition, newborns should be exposed to the external environment in the NICU while the immature infant brain is not yet mature to process noise, diversified stimulus, involving illuminates and painful interventions [11]. The development, structure, and function of the brain may cause negative effects on sensory experience of the infants this period. [12]. According to academic study, the brain'

placticity is used to expecting at approximately 3 months before term age [13]. These crucial period, important and susceptible tertiary periods of brain development can form for NICU enviroment based on interventions that may be beneficial for neurodevelopment [14]. Moreover, preterm infants who stayed in silent and dark environment provided to have more arranged sleep cycles. The state of alertness and quiet sleep is aimed by physicians [15]. Research showed that sleep cycle pattern triggers melatonin hormone and it triggers brain development. There are studies showing that the positive effects of the hormone melatonin influences recovery of the newborn and their development. There are warnings that constant lighting exposure affects the recovery of the newborn negatively [16].

Retinopathy of prematurity (ROP) is a developmental vascular proliferative disease that happens entirely in the vascularized retina. The severity of ROP incidence goes up whereas gestational age (GA) or birthweight (BW) declines. The condition typically begins at approximately from 30 to 32 of GA. ROP proceeds unevenly, up to 40 to 45 weeks of GA. In most infants, it resolves on its own [17].

Hearing loss (HL) sources frequently from 0.5 to 2.4 percent of infants with very low birth weight (<1500 g) and develops SNHL (sensory neural hearing loss) [18,19]. The incidence of hearing loss risk rises while the BW and GA cut down [19]. The hearing loss occurs high risk ratio due to the aplication of aminoglycoside antibiotics, and enviroment noise of NICU [20] and incubator, and perinatal complications (hypoxia, acidosis, and hyperbilirubinemia) [21,22]. Abnormal ABR results of infants who could not pass neonatal hearing screening were referred for further audiological examinations. The babies with ANSD has been observed unilateral auditory neuropathy spectrum disorder in 0.04% (U-ANSD). ANSD is a congenital or acquired later heterogeneous disease [23].

Although progresses in obstetric have led to a decrease in mortality in premature infants, studies showed that at least 20-25% of these infants had neuro plasticity, neurological impairment and functional limitations. They need to have requiring kind of services range early infancy from adulthood [24,25].

1.2 Purpose and Scope

This study aimed to decrease environmental stress factors of the NICU and to support neurodevelopment of the preterm infants. Additional target is to prevent ROP and SNHL or ANSD of the preterm infants. A secondary aim is to approve and regulate Work

Hygiene and Safety Standards of the NICU such as noise, illuminate and electromagnetic field.

Hypothesis

H0; There is no association between the level of ROP, hearing loss and neurodevelopmental of the preterm infants and the intervention.

H1: Incubator with special cover and care will significantly reduce the level of ROP, hearing loss and neurodevelopmental of the preterm infants

2. GENERAL INFORMATION

2.1 Preterm Definitions

In using these definitions, the definition of low birth weight (LBW), and the description of very low birth weight (VLBW) infants includes extremely low birth weight (ELBW) infants, and the classification of very preterm infants also consists of extremely preterm ones. This is a vital consideration when one is reviewing published data on VLBW and extremely preterm infants.

According to the Gestational Age (GA) (see Table 2.1.1) and the Birth Weight (BW) (see Table 2.1.2) is categorized by different degrees of prematurity [26,27,28].

Table 2.1.1 Classification of Prematurity According to the Gestational Age (GA)

Classification	GA
Late preterm birth	from 34 to less than 37 weeks
Moderate preterm birth	range 32 to <34 weeks
Very preterm (VPT) birth	less than 32 weeks
Extremely preterm (EPT) birth	GA at or below 28 weeks

Table 2.1.2 Classification of Prematurity According to the Birth Weight (BW)

Classification	BW
Low birth weight (LBW)	below 2500 g
Very low birth weight (VLBW)	below 1500 g
Extremely low birth weight (ELBW)	below 1000 g

2.2 Definition of Levels of Care

Preterm infants who necessity a higher level of medical and nursing support are cared in NICU. The NICU include special care scope which is identified phototherapy, breathing support, parenteral nutrition, hypothermia, perform minor and major surgical procedures [26,28].

The neonatal levels of care (NICU) was categorized by American Academy of Pediatrics (AAP) in 2004. The NICU levels are three definite levels and two subdivisions [26]. Preterm is looked after who require madical care than term newborns at the first level.

The second level is divided by specialty care preterm infants who need more advanced support such as parenteral nutrition and continuous positive airway pressure (CPAP). And third level, this type of care is provided by skilled nurses, surgeons and neonatologists. They look after critical condition of premature infants who need long-term intensive care such as mechanical ventilation [28]. Some concepts that need to be known about main components of the neonatal care levels are explained in Table 2.2.

Table 2.2 Categories of preterm infants requiring neonatal care [26,27,28].

Neonatal Care (NC)	Sub-divison	Gestational Age (GA)	Birth Weight (BW)	Patient Symptoms/ Intervention
I / Basic NC	I	35 to 37 weeks	≥2500 gr 1500-2500 gr	Cleft palate lip, parenteral glucose support, hypothermia, hypoglycemia that responds to enteral feeding, no oxygen requirement or mild respiratory distress.
II / Specialty NC	II A	> 32 weeks	≥ 1500 g	Apnea, inability body temparature, inability feedings, Resuscitation and stabilization of premature and / or sick infants
	II B	> 32 weeks	≥ 1500 g	Mechanical ventilation for short periods of time (>24 hours), continuous (+) airway pressure. Mechanic ventilation, Nasal CPAP, ROP diagnosis and treatment.
III/ Subspecialty NC	III A	>28 weeks’	>1000 g	Life support, conventional MV, performing inconsiderably interventions
	III B	≤28 weeks’	≤ 1000 g	Advanced respiratory, high frequency ventilation (HFV) and inhaled nitric oxide Advanced imaging, with interpretation on an urgent basis, echocardiography, ultrasonography, including computed tomography (CT), and magnetic resonance imaging (MRI)
	III C	≤28 weeks’	≤ 1000 g	Surgical repairment of complex congenital cardiac malformations (cardiopulmonary bypass) and ECMO

2.3 Environment Factors

2.3.1 Sound

Sound is both the name given to the hearing organs of living beings, and also the definition that describes vibrations. Perceptual and physical properties of sound wave are associated with audiology directly [29].

Sound sources are studied in two separate categories: natural (sounds produced by nature) and artificial sound sources (sounds of machines) [30]. A sound wave is defined with the amplitude of pressure changes (Pa-Pascal), period (T) , frequency(f), wavelength(ʎ) , propagation speed(m/s), rms value of the sound [31,32].

Some concepts that need to be known about main components of the sound wave is explained in Figure 2.3.1

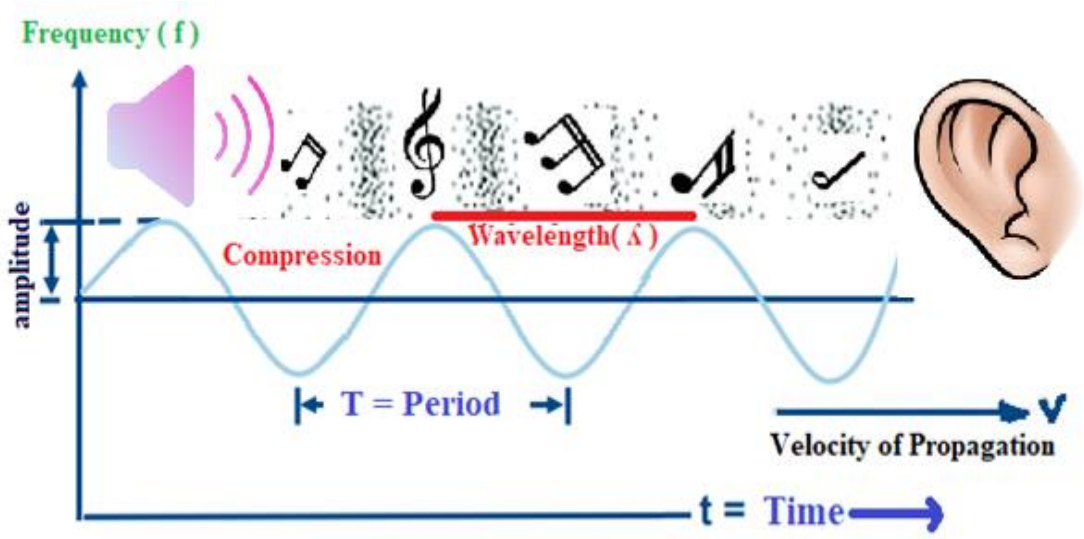

Figure 2.3.1 The main components of the sound wave

2.3.2 Noise

Sounds that are undesirable or cause a feeling of discomfort are defined as noise. Music that a person listens to with pleasure can be perceived according to another person as noise. For example, it can create a feeling of pleasure for someone who loves classical music, and according to the another a feeling of noise. Therefore, there is a subjective side of noise. However, industrial noise is considered noise in all conditions for everyone [31,33].

All sounds that lead to hearing loss, are harmful to health, or pose other dangers are defined as noise. However, they can also significant medical problems effects, such as: physiological, psychological and performance (Table 2.3.2) [32].

Table 2.3.2 The effects of noise exposure on human health

Physical Effects	Psychological Effects	Performance Effects
İnitially temporary HL/ permanent hearing loss,	Behavioral disorders,	Decrease business activity,
A fast or slow heart rate, circulatory disorders,	Excessive irritability-reactions,	İmpairment of concentration
Respiratory system	Discontent, uneasiness,	Slowing of movements
Muscle contraction	Stres	Disruption of relaxation,

Not only loud sounds but also period of exposure, fatigue of the ear's sensory cells provoke initially temporary then permanent hearing loss or tinnitus. The negative effect on the auditory system is cumulative, irreversible and effective treatment is restricted.

Noise exposure measurements are categorised indoor and personal noise exposure. Noise measurement is characterized hourly of 24 exposure level of 70 decibels as the environmental noise level that will prevent measurable hearing loss for a lifetime.

In a similar way, indoor level is identified 45 decibels as inconvenience noise, avoiding activity and interference. These levels of noise are considered those which will permission communication and other activities such as sleeping, working and recreation, which are part of the daily human condition [34]. These noise levels are considered to be the levels that will allow communication and other actions such as working, walking, eating, sleeping and resting, which are part of the daily human condition [34].

Some concepts that need to be known about noise exposure measurements are explained below.

Short-term measurement is particularly useful if noise is highly variable. It is identified a short of period of time. Equivalent sound level is measured 3 successive and 1 minute.

Exposure measurement, is made with a dosimeter. In order to determine the noise that employees are exposed to during the 8-hour working period and when determining exposure limits for work shift such as a 8-hour shift, one must take into account information on health effects related to noise exposure. In accordance with the

regulation on the protection of employees from noise-related risks is rearranged workplace.

Laeq, Equivalent continuous, A-weighted sound pressure level (SPL), the sound level (SL) in decibels is to definitioned continuous SL, having the same total sound energy as the fluctuating level measured. LAeq is the A-weighted Leq sound level. LAeq, T is the A-weighted Leq, measured over a specified period of time (T). A-weighted scale are approved such as the LAeq, and T desriptions by most association, industrial and environment noise measurements. According to the hearing curve of the human ear calibrates the A scale.

LCpeak, means C-weighted noise level of the peak. This peak hold SPL in decibels (dB (C)) sourced to 20 micropascals [31].

dB(A): a term of the relative loudness of sounds as perceived by the human ear. It is most sensitive, particularly emphasized and evaluated [33].

Lmax means that, the maximum measured sound level at any instant in time.

Lmin- means that, the minimum measured sound level at any instant in time.

LEX, 8 hours / dB(A), 20 µPa, daily noise exposure level is the time-averaged, A-weighted noise level for a nominal 8-hour working day. LEX,8h used for assessing the noise exposure of a employee during a working day [36].

LEX, 8h- Weekly noise exposure level, is measure of the total noise received by an employee during a working week. It is calculated for a 40-hour week (five 8-hour days) instead of an 8-hour day.

According to the WHO, it recommends the use of the dB(A) weighting unit when measuring environmental noise [33,35,36,37,38].

2.3.2.1 Noise exposure measurement

This meausure method is rooted in the mean sound pressure level (SPL) on a measurement surface. The SPL measured at a specified position, and either the equivalent resorption area of the test unit or an environmental correction. The measurement results can be compared with the specified limit values, the measurement is performed for a period of at least one minute. The measurements were taken from the source of indoor noise to be 30 cm depending on distance. The measurement is repeated 3 times consecutively. The personal noise exposure measurements are taken at the ear level during the five minutes [36,37].

2.3.3 Electromagnetic Field (EMF)

Electromagnetic field (EMF) is the movement of waves formed by both electric and magnetic fields together in space at a right angle of 90 degrees to each other. If an electric charge is stationary, it creates an electric field around itself. If the electric charge is moving, it creates a magnetic field in addition to the electric field. The waves of the electric and magnetic field see photographs in Figure 2.3.2 [39].

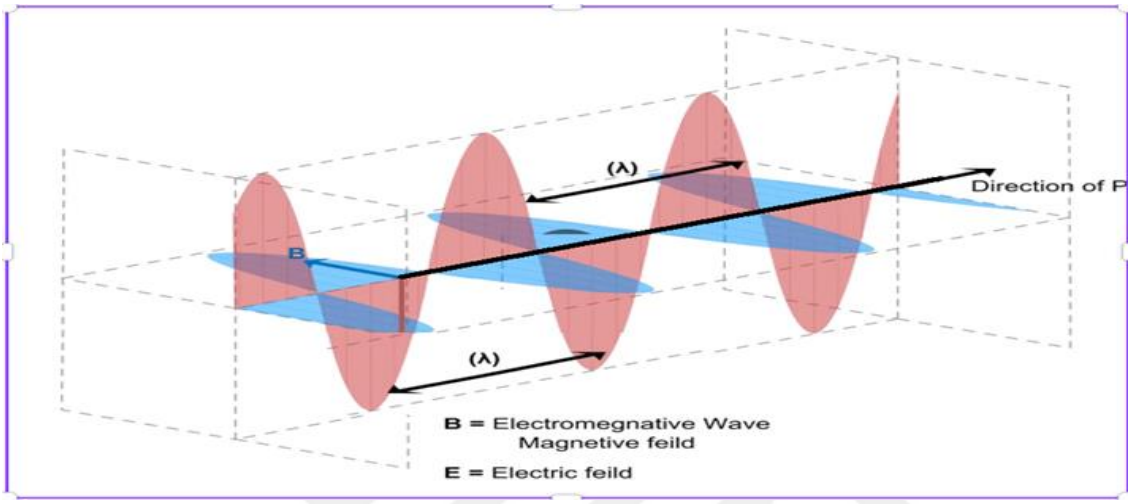

Figure 2.3.2 Electric and magnetic field

The electromagnetic field is created each electrically powered device while it is in operation. In daily life, it is known that these systems emit electric and magnetic fields. Certain conditions can cause damage to living organisms, causing disease or genetic damage. Some concepts that need to be known about electromagnetic field exposure is explained in Table 2.3.3.

Table 2.3.3 The effects of electromagnetic field on human health

Short-Term	**Long-term**
Narrowing of the field of view,	Genetic structure impairments
Stress	Brain tumor and ischemia
Hyperaemia of the auircle,	White blood cell (lymphoma) cancer,
Risk of failure of the pacemaker,	Blood - brain barrier damages
Tinnitus,	Heart diseases,
Fatigue,	Memory impairment,
Concentration deficits,	Permanent hearing impairments,
Headaches,	Damage of embryo development
Temporary hearing impairments,	Increased risk of miscarriage,
Stagger	Destruction of blood cells

International Commission on Non-Ionizing Radiation Protection (ICNIRP), World Health Organisation (WHO), International Organization for Standardization (ISO) and Occupational hygiene and safety legal regulations, establishes guidelines for the protection of workers moving in static magnetic fields or being exposed to magnetic fields with frequencies below 1 Hz. Mandatory regulation is made in workplaces according to the limit values [40].

2.3.3.1 Electromagnetic Field (EMFF) Exposure Measurement Methods

The electromagnetic field of gsm telephones must measure to be 1 cm, 10 cm base upon on the length. The measurements are taken other equipments such as gsm watches, lung graphy between 30 cm, 60 cm and 100 cm subjecting on the distance. Electromagnetic field measurements of gsm phones are obliged to do in the incoming call, during the call and in three cases within call. The EMF sources on the ambient and the measuring person are removed before the measurement is made and the trusty of the measurement is ensured. The results are checked against the electromagnetic field limit values viable in Turkey [41]. Some frequency- based limit values that need to be known about electric, magnetic and electromagnetic fields are identified in Table 2.3.4**.**

Table. 2.3.4 Frequency-based limit values in our country

Frequency Range f(Hz)	E-Field Intensity (V/m)	H-Field Intensity (A/m)	B-Magnetic Flux Density (μT)	Equivalent Trace Wave Power density Seq(W/m^2)
1Hz'e Kadar	-	32 000	40 000	-
1Hz-8Hz	10 000	$32\ 000/f^2$	$40\ 000/f^2$	-
8Hz-25Hz	10 000	4 000/f	5 000/f	-
0.025kHz-0.8kHz	750/f	8/f	10/f	-
0.8kHz-3kHz	250/f	5	6.25	-
3kHz-150kHz	87	5	6.25	-
0,15MHz-1MHz	87	0.73/f	0.92/f	-
1MHz-10MHz	$87/f^{1/2}$	0.73/f	0.92/f	-
10MHz-400MHz	28	0.073	0.092	2
400MHz-2000MHz	$1.375f^{1/2}$	$0.0037f^{1/2}$	$0.0046f^{1/2}$	f/200
2GHz-300GHz	61	0.16	0.20	10

2.3.4 Lighting

The International Commission on Lighting (Commission Internationale de l'Eclairage, CIE) defines it as "applying light to ensure that objects and their surroundings are visible". The form of electromagnetic radiation contains light. Its visible spectrum is only a part of the electromagnetic spectrum. The human eye can describe according to wavelength (Figure 2.3.3) [42].

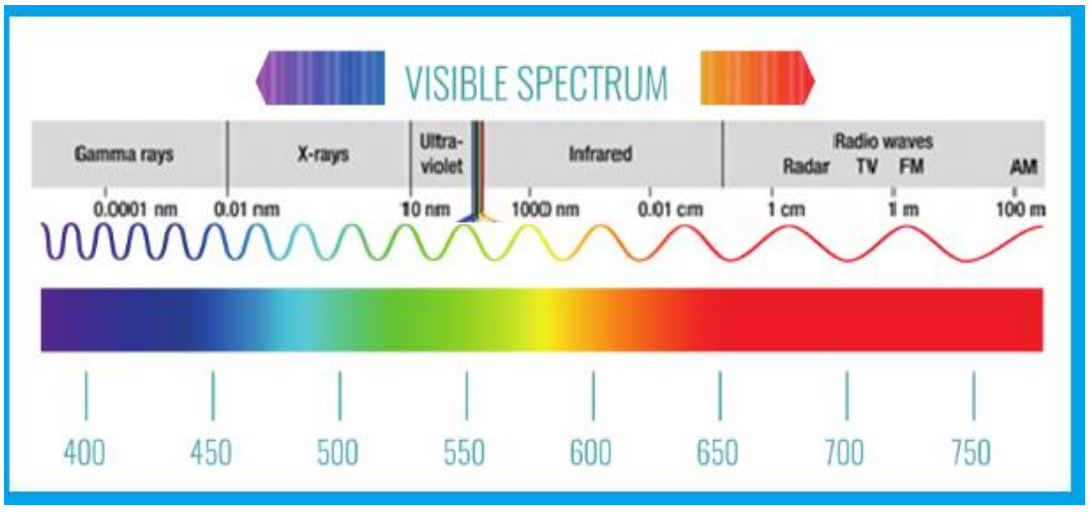

Figure 2.3.3 Visible Spectrum

A typical human eye will react to wavelengths of about 390 to 700 nm 50. Normally, the human eye can detect a visual dec december 0.01 lx on a moonless, starry night and

between 20,000 to 50,000 lx on a bright sunny day in an open area. Its former unit as a lighting unit was Foot-candil (ftc). Currently, Lux (lx) is used [43].

We should know the basic concepts of light current, luminous flux (Ø), light intensity(I), illumination intensity (E), glare, reflections, contrast, visual field, viewing distance related to lighting.

In order to understand the problems of lighting technique with its effect on eye strain and fatigue, it is necessary to know some basic concepts of this technique [44,45]. The ability to perform all kinds of work flawlessly in workplaces and, most importantly, to protect the eye health of those who work, requires a good lighting technique. First of all, lighting is necessary in order to see all the details required by quality standards in the work and operations performed. Working the employees in the most appropriate lighting conditions also serves the same purpose as it protects their eye health and visual clarity.

It provides good lighting, increases visual acuity (eye distinctiveness), reduces the number of work accidents, increases the success of employees and provides quickness of mind while working [42].

According to the occupational hygiene and safety legal regulations, enterprises should be adequately illuminated by daylight. If sufficient daylight is not provided due to the nature of the business or the construction of the business facility, or if night work is required, appropriate and adequate illumination may be provided by artificial light. TS EN 12464-1 [46] and 12464-2 standards are based on the lighting of workplaces [48].

2.3.4.1 Ligting Measurement Methods

The light meter require laid down on the horizontal surface from the light lamp facing up held during measurements. Four measurements are laid down as a condition both various spots exemplfy of the level of lighting at the work optimal position and at kind of spots sample of the level of lighting, 1 m upon the floor of the unit. The total of the four point measurement results is after divided by four [42].

2.4 Environment Factors Effects to the Neonatal Intensive Care Units

According to research, the cause of exposure of NICU is construction materials and working environment. The sources created by employees, equipments are operational (incubator or alarm sounds) [51,52]. The agents originating from the building and the

environment itself (ventilation, fluorescent lamp) are physical [51,53]. NICU is characterized by constant bright lighting, electromagnetic fields sources, bedside monitoring alarms, and a high level of noise [48,49,50]. In addition, preterm infants are exposed to ventilation and air conditioning systems, the opening and closing of doors, conversations with staff, family visits, shouts and laughter of staff [54,59,60,61].

Nowadays, the variety of devices of neonatal intensive care has increased. Despite these improvements, there are problems related to noise, lighting, radiofrequency and extremely low frequency electromagnetic fields. The monitored preterm infants are exposed to amounts of stimuli exceeding the limit values in these areas [54,55,56]. The cell phone use in the NICU has been reported as the source of the noise [61].

Excessive noise, bright lighting and electromagnetic fields of the NICU, trigger negative effect both the preterm infants and the health staff [56,57,58,59].

2.5. Health Problems Related to Prematurity

There are many vital health causes that preterm infants face but are not restricted. They include complications, Hypothermia, Respiratory abnormalities, Bronchopulmonary dysplasia (Chronic lung disease), Prematurity apnea, pulmonary hemorrhage, Cardiovascular anomaliees, Patent ductus arteriosus (PDA) [62], Intraventricular hemorrhage (IVH), Glucose abnormalities, Necrotizing enterocolitis (NEC), Infection, Neonatal sepsis, Retinopathy of prematurity (ROP) and Hearing loss [63].

In this study, we based on one of them hearing loss releated to the NICU environment exposure and prematurity. Sudden noise exposures trigger stress responses in preterm infants and thereby bring about instability in the emerging frameworkes. Awake from noise and activity levels of the NICU environment therefore result in problems with physiological stability in the more delicate infants, and avoid immature preterm infants from succeeding sleep cycle and alertness.

The World Health Organization (WHO) recommends that the noise level of hospitals be kept at a noise level of about 40 dB(A) during the day and 30 dB (A) at night. The American Academy of Pediatrics (AAP), in a report published in 1997, states that safe sound levels in the NICU should not exceed the hourly level of 45 dB (A) [6].

Sudden and constantly increased noise levels, such as monitor and other equipment noise, preterm infants crying, background personnel voices and footsteps, can also cause the infant to be aroused and under menace, restraining vital systems stability,

recovery and development. Depending on the work of the incubators, they also have their own internal sounds [67]. The internal sound range of incubators varies according to the brand and model. Some studies are measured values between 57.0 and 88.8 dB (A), respectively. These results are taken from inside the incubators by the researchers. Other researchers reported values of 66.8 and 84.1 dB (A) respectively. Noise levels increase during the use of incubators. For instance, placing a food bottle on top of the incubator is 72.5 dB (A). The closing of the incubator cabinet is 98.4 dB (A) [68]. There remains also the possibility of damage to the developing cochlea and auditory systems as the levels of noise that cause permanent hearing loss in preterm infants is unknown.

At the same time, the AAP recommends that the lighting in the NICU be adjustable between 1 lx and 600 lx for advanced and adequate maintenance [7]. AAP recommends that to protect the eyes during the procedures performed. In some studies, it has been observed that the lighting preference is made more intense at night in order to make better observations [69,70]. Illuminating should be appropriate in units of the NICU where health profession apply crucial or critical employs; care must be taken, nevertheless, to ensure that bright light from these placeses does not achieve eyes of the infants. In the studies carried out, it has been seen that the application of different lighting levels to support circadian formation supports the development of preterm infants [6,71]. It has been suggested that the environmental illumination values for the circadian rhythm of the newborn should be between 50 and 100 lx decently at night. To create a generally accepted circadian, the reflected light effect of 30 lx is enough [72]. İn contrast, Occupational Hygeiene and Safety standards is not recommended these illuminating levels for intensive care units. According to the standards, recommended illumination levels during the procedures and including daytime are in the range of 1000 lx [42].

In the design of NICU of hospitals, the lighting preference was made in favor of fluorescent lamps. There are publications that Pulse Oximetry is affected by fluorescent lighting [73].

There are main steps in different kinds of direct x-ray, Fluoroscopy, Cranial Tomography (CT), Cardiac catheterization, and radioisotopes that can be applied in the NICU.

In some studies, it is recommended that there is a distance of 1 m between the other incubators if there is no insulating lead cover between decubitus during X-ray exposure. Incubator designs are important because they produce very low frequency EMR. EMF

values range from 2 to 100 mG (0.2-10 μT). It may also vary according to the proximity of the bearing to the power distance and the material used. Medical personnel working in the unit may also be exposed to EMF up to 200 mG (20 μT). the amount of radiation received from infans born > 1000 g can reach annual limit values [74,75,76].

The source of RF-EMF is wireless communication systems. It can be sampled with incubator engines, transport incubators, radiant heaters and with syringe pump systems in NICU. Extremely low-frequency and low-frequency electromagnetic fields (ELF-EMF, LF-EMF) different non-ionizing radiation sources and optical radiation sources of mechanical ventilators, vital parameters monitoring systems, oxygen therapy equipment, medical aspirators to clear secretions, portable wireless devices (such as tablets and laptop computers), hyperbilirubinaemia and phototherapy for treatment of dermis diseases, there are lights [77,78]. In addition, the use of mobile phones by employees should also not be forgotten in the units. It has been seen in academic studies that the current EMF values in the environment affect the melatonin level of premature infants [79]. For this reason, changes have been made to the incubator designs. In addition, studies are ongoing within the EMF values caused by the alarm systems in the environment [80,81]. Electromagnetic fields (EMF) between the frequency range 0 Hz to 300 GHz increasing widespread use has led to some concerns about the biological effects on human health [8].

There are many applied ways in which noise, lighting, electromagnetic field and activity can be modified without making structural changes, but they work best in conjunction with better understanding of preterm infant behaviour [82]. Equipment manufacturers and distrubutors are taking into consideration incubator and alarm noise, and waste baskets with softly closing covers are available.

3. MATERIALS and METHODS

This prospective Urn (α, β) randomization [83] controlled clinical trial was conducted on 68 stable preterm neonates with gestational age between 25 and 37 weeks at the Neonatal Intensive Care Units (NICU) of Tekirdag Namik Kemal University Hospitals. Neonates with major congenital anomalies, not stable condition were excluded.

3.1 Study Design

A total of 88 preterm neonates were assessed for eligibility. The flowchart in Fig.3 shows patient enrollment, allocation, and analysis numbers. Initial perinatal medical

severity score, called the Critical Risk Index for Babies (CRIB) Score, was recorded and only stable neonates were included [84]. Sixty-nine neonates were excluded: 5 had hemodynamic instability, 3 had Syndrome and 12 mothers declined to participate.

The study data were collected between 27 November 2021 and 28 September 2022. The included 68 preterm infants were enrolled on the first day of life and were randomized into two groups; 34 preterm infants received to stayed with insulating cover in the incubator. Intervention group, with standard and daily care, was treated minimum five consecutive days 34 preterm infants received to stayed with conventional incubator. The incubator of the control group was standard state with no intervention.

CONSORT 2010 Flow Diagram

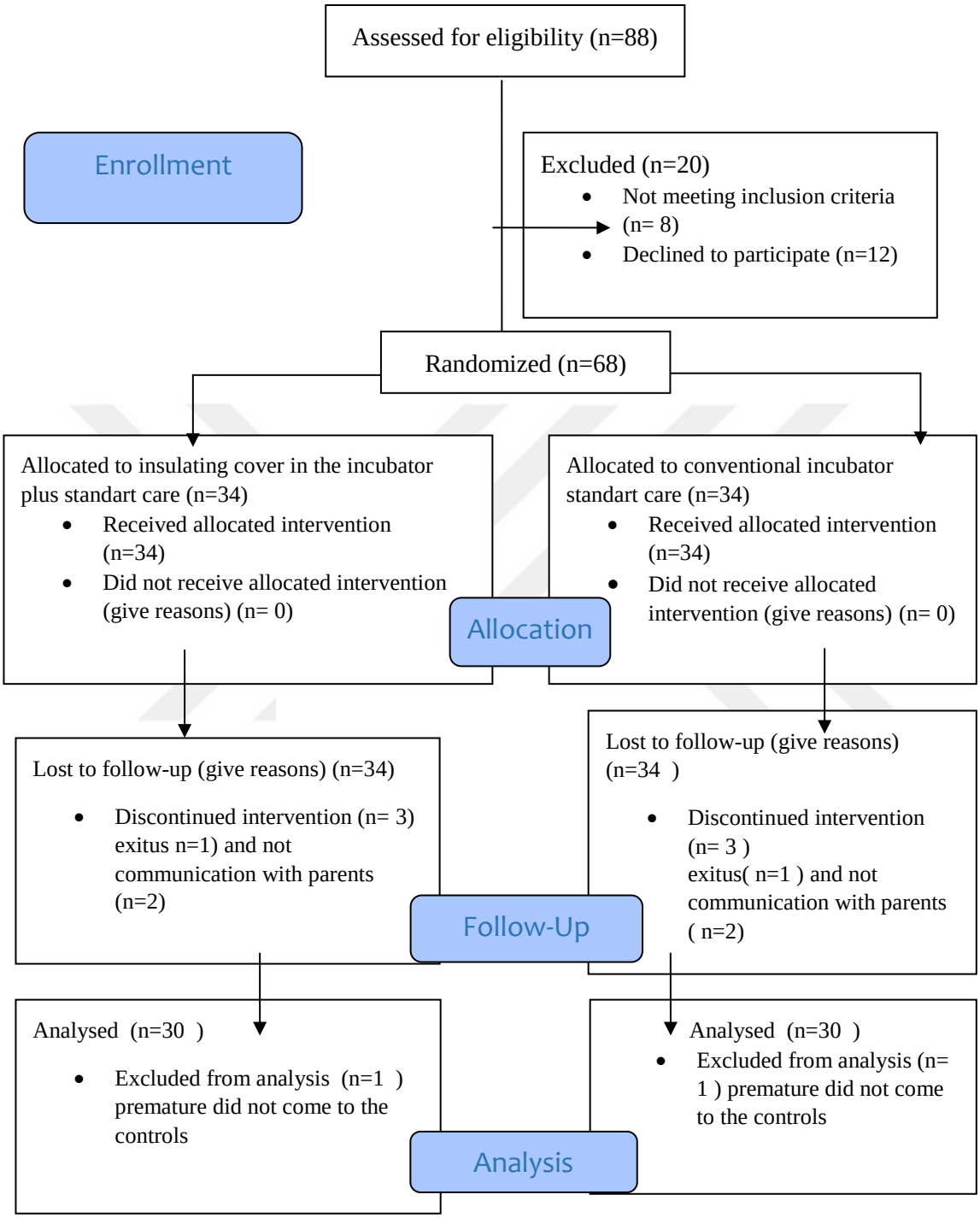

Figure 3 Process of the study according to the CONSORT flow diagram

Not only control group but also intervention group who received traditional neonatal care and participants families were allowed to feed for 15–30 minutes and touch their

infants. Reporting of the study conforms to Consolidated Standards of Reporting Trials (CONSORT) 2010 statement [85].

Inclusion criteria were neonates with gestational age between 25 and 37 weeks; medically relatively stable and mature are for 24–72 hours and with signed informed consent forms from legal guardians. Exclusion criteria were neonates who had congenital anomalies and hospitalization duration of fewer than 5 days.

3.2 Sample size and randomization

Sample size and randomization G-power package version 3.1.9.2 was used for determine the sample size. An estimated minimum total sample size of 60 was calculated with a 0.4 effect size, 0.05 type I error, and 95% power. The study was carried out with a total of 62 newborns, including 31 in the intervention group and 31 in the control group (Fig.3).

Participants were divided into intervention and control groups by Urn (α, β) randomization method [83]. A staff nurse who was not included in the study put two balls, one yellow and the other purple, in a black bag. The newborns assigned to the intervention group were put in insulated incubators. In the delivery room, the nurse worked who had no knowledge of the study, was asked to pick a ball from the black bag. This identification of groups ensured participant blinding. The preterm infants were assigned to the intervention group in the case of a purple ball and to the control group in the case of a yellow ball. This process is repeated in each assignment process.

3.3 Outcome measures

The data were collected using a questionnaire form such as the parents sociodemographic and addiction survey, preterm questionnaire form, and Mothers' Perceived Stress Scale (PSS-10) were filled out [86].

The parents sociodemographic form included the ages, the mother's educational level, parity, gravidity, her profession, workplace noise according to her working status, and the duration of gsm mobile phone use. It covered the parental medical condition form, degree of affinity, RH disease, febrile illness and trauma status during pregnancy, systemic illness of the parents, medication use.

The preterm questionnaire form: It comprised of articles questioning preterm infants such as gender, birth weight, gestational week, Apgar score, medical diagnosis, enteral position, surgical operation state, phototherapy state, asphyxia, mechanical ventilation

status, ototoxic drugs used in the treatment, infection condition, cyanosis state, blood gas and blood tests. The questionnaire was filled out by physician assistants from their medical records. Different physician assistants filled out each record.

The environment measurements were also carried out by different engineers of the authorized laboratory. Measurements were made on different dates with the same devices. The results were reported by authorized engineers at the end of the study.

ROP and ABR (hearing loss) data were obtained from the child, adolescent, women's and reproductive health (CEKUS) unit of the Ministry of Health. This identification of test results provided blinding of the study.

3.4 Procedure and Data Collection

The study was conducted in the neonatal care unit of Tekirdag Namik Kemal University Hospitals, where more than 100 LBW infants are being treated per year.

After the ethics committee permission, the NICU was visited. NICU was located on the second floor of the hospital, which has the capacity of 9 pieces of Giraffe Incubator Carestation opened the from sides, 4 pieces of Giraffe OmniBed Carestation infant's incubator opened from the top. Giraffe is known GE Healthcare products brand name. NICU consists of 2 separate intensive care wards. Intensive care is called I and II addition there were the main areas, the intermediate area and the parts where there is one quarantine (isolation) room. There were 2 phototherapy devices, monitors, a mobile x-ray unit and ultrasonography. With more than 3 pediatrician assistants, 2 staff physicians and 13 nurses were performed in the service.

Figure 3.1 The pre-intervention status of the TNKU Neonatal Intensive Care Unit

It was visited for the first time on September 15, 2021 by authorized engineer. (Fig. 3.1).

Table 3.1 Initial Measurement at the neonatal care unit

Exposure Type	Place	Time / Date 15.09.2021	The recommended upper limit is according to AAP	According to the Ministry of Health, the NICU exposure upper limit	ISO Standards used in measurements	The recommended upper limit is according to ISO	Result
Indoor Noise	NICU I	11:10	≤ 45 dB	≤ 55 dB	TSE-EN ISO-11204	≤ 80 dB	58 dB
	NICU II	11:55	≤ 45 dB	≤ 55 dB	TSE-EN ISO-11204	≤ 80 dB	57 dB
Illuminating level	NICU I	11:20	1-600 lux	No limit	TSE-EN 12464-1	1000 lux	325-1025 lux
	NICU II	12:10	1-600 lux	No limit	TSE -EN 12464-1	1000 lux	250-975 lux
Extremely Electromagnetic Field-Electromagnetic Field (ELF-EMF)	NICU I	11:41	0 Hz to 300 kHz	No limit	TSE EN 50413	≤ 10.000 V/m	3 Hz
	NICU II	12:29	0 Hz to 300 kHz	No limit	TSE EN 50413	≤ 10.000 V/m	1 Hz

Initial measurements were provided and analyzed (Table 3.1).Insulation materials were selected according to these results. There wasn't insulating cover of the incubators on the market. Even in our country, there was a problem of production and use. Suitable insulation materials were selected such as antistatic fabric, cotton cloth and acoustic insulation single ply cloth were supplied from the distributor or manufacturer.

Washable and colored cotton fabrics were preferred. According to the literature, white fabric was not preferred owing to reflect of the light. Purple, pink, blue, turquoise colors were preferred for cotton fabrics.

The measurements of the incubators were taken and the design was modeled, then 15 special insulated covers were sewn. There was a high probability of contamination of blood and other body fluids during the intervention. For this reason, a large number of incubator covers were sewn.

The electrical supply of the incubators was in the unit located under the incubator in one model and in the preterm infants' head in the other model. The unit at the bottom was insulated in control and there was a distance between it and the preterm. To cut off the exposure around the incubator, insulation was applied all over it. At the other model, the

application was made between the preterm infants' head and the unit, outside the cover, with insulating material.

The first mother to participate in the study was assigned to the control group on November 27, 2021 by the urn randomization method. During the study, two preterm died, not only from the control group, but also from the intervention group. The mothers who wanted to participate in the research were of Arab nationality. There were refugees, those who entered Turkey illegally and families who had no identity. The regional dialect they used was different.

They were excluded due to the possibility of not being checked after discharge because of they could not respond to detailed questionaire forms or they did not have an identity card.

All participating neonates were subjected to detailed parental questionnaire form. The gestational age was definite by maternal last menstrual period. and further confirmed by using the Ballard scoring system [87].

The mean vital data including blood gas, blood tests, presence of neurological reflexes were recorded. All participants are received the standard neonatal care. According to traditional NICU protocols, these are checked adequate nutritional intake (calories) and are followed-up clinically with at least two physical examinations daily (one in the morning and the other in the afternoon).

Ultrasound procedures was preferred than Radiological was performed on postnatal days.

3.4.1 Data collection

Three researchers will gather up the available data, which will be withold in a locked drawer in the NICU. The data is accessible by one of the researchers and inaccessible by others.The following clinical data will be collected: (first researcher) participants sociodemographics status, collected from the hospital medical record, condition during hospitalization; (second researcher) infants' screening of ROP and Auditory Brainstem Response (ABR) results with the accomplished data and stored by the Google Drive and SPSS 25.0 version; (third researcher) measuring data of extremely low-frequency fields (ELF-EMF), noise and illuminate securely stored by the PC.

3.4.2 Data analysis

After the data collection process was completed, the participant data in the intervention and control groups were encoded into the IBM SPSS Statistics Version 25.0 package program as group 1 (intervention) and 2 (control). The data was blinded without enlightenment the statistical consultant. Significant differences in baseline characteristics were informed, using percentages for categorical variables, frequencies, and mean ± SD or median (P25, P75) for continuous variables.

The Mann-Whitney U test, crosstabs and logistic regression analysis were conducted to evaluate these questionnaires. P values less than 0.05 will be considered significant.

Ethical considerations

The study was conducted in accordance with the Declaration of Helsinki, and the Hospital School of Medicine Tekirdag Namık Kemal University Non-Interventional Clinical Research Ethics Committee has approved the study protocol (ethics approval number E-46048792.050.01.04-57101, (Appendix – 8.1). The physician assistant was filled the medical forms of this study to the mothers who is recruited. Written consent was obtained at admission. The informed consent form is provided as Appendix – 8.2. The study was approved by the Tekirdag Provincial Health Directorate Education Committee.

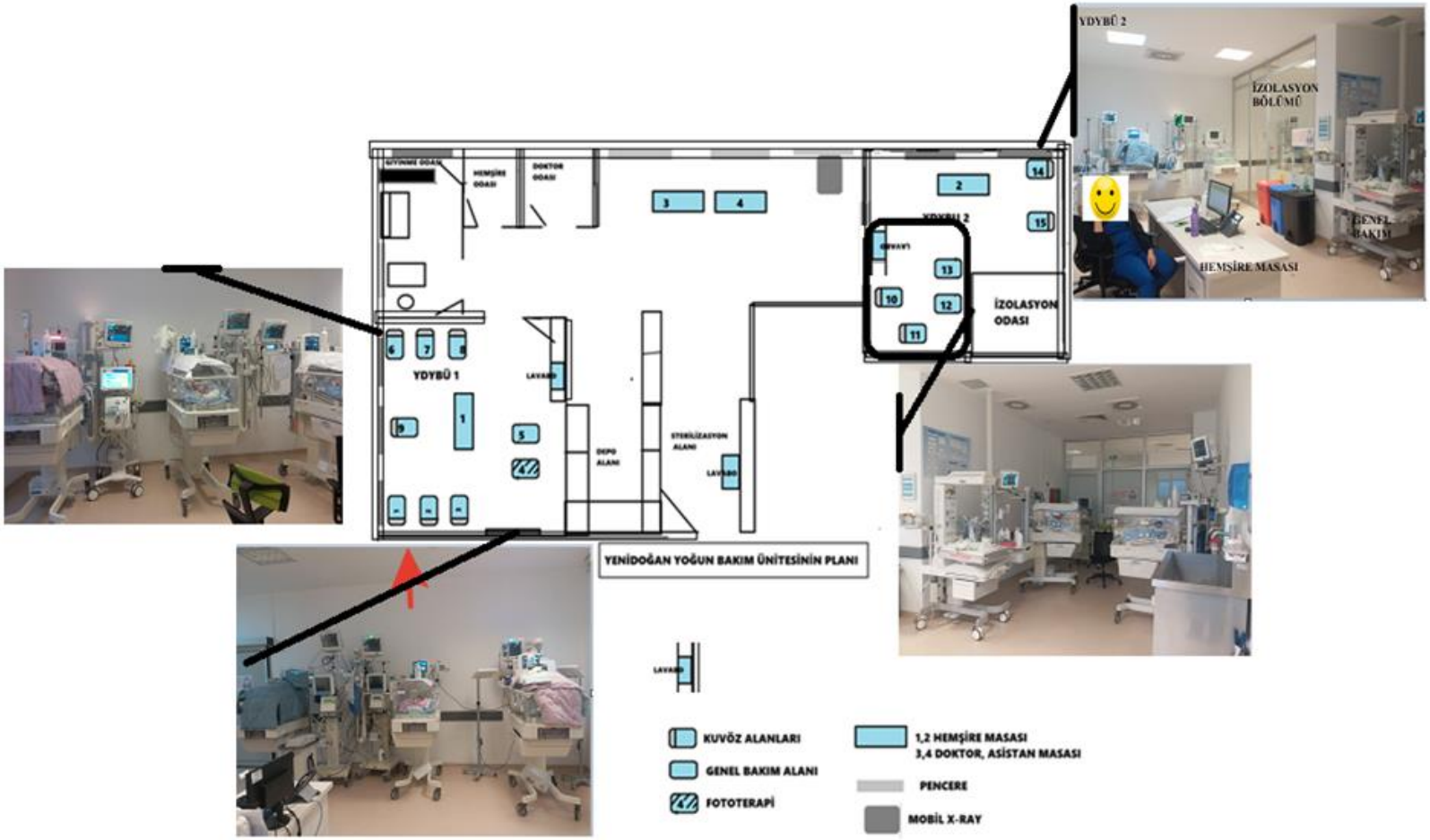

Figure 3.2 The post-intervention status of the TNKU Neonatal Intensive Care Unit

4. Results

4.1 Descriptive Findings

4.1.1 Socioeconomic status variables of the research participants

Table 4.1.1 Socioeconomic status variables of the research participants

Variable	**Intervention Group (IG)**				**Control Group (CG)**				
	n=31	**%**	***M***	***SD***	***n=31***	**%**	***M***	***SD***	**p-value***
Mother Age			29.19	6.91		%	29.74	6.419	>0.05
Between 15-25 years	11	35.4			9	29.1			
Between 26-35 years	13	42.1			15	48.4			
Between 36-45 years	7	22.5			7	22.5			
Father Age	*n=31*	%	32.87	6.355	*n=31*	%	32,97	7,282	>0.05
Between 15-25 years	3	9.7			4	12.9			
Between 26-35 years	19	61.3			18	58.1			
Between 36-45 years	8	25.8			8	25.8			
Between 46-55 years	1	3.2			1	3.2			
Marital Status	*n=31*	%			*n=31*	%			>0.05
Married	29	93.5			30	96.8			
Cohabit	2	6.5			1	3.2			
Mother Education Status	*n=31*	%			*n=31*	%			>0.05
Not literate	1	3.2			2	6.5			
Literate	0	0			2	6.5			
Elementary school	3	9.7			9	29.0			
Elementary school drop-out	0	0			3	9.7			
Secondary school	7	22.7			2	6.5			
Secondary school drop-out	1	3.2			2	6.5			
High school	5	16.2			4	12.8			
High school drop-out	2	6.5			2	6.5			
Vocational School	1	3.2			0	0			
Faculty graduate	10	32.2			4	12.8			
Postgraduate	1	3.2			1	3.2			
Mothers' job status	*n=31*	%			*n=31*	%			>0.05
Full-time	3	9.7			3	9.7			
Unemployed	2	6.5			1	3.2			
Student	1	3.2			0	0			
Housewife	22	70.9			25	87.1			
Officer	3	9.7			2	3.0			
Mother's Parity	*n=31*	%			*n=31*	%			>0.05
1	1	3.2			1	3.2			
2	14	45.3			9	29.0			
3	10	32.2			9	29.0			
4	4	12.8			7	22.5			
>**5**	2	6.5			5	16.2			
Mother's Gravidity	*n=31*	%			*n=31*	%			>0.05
1	14	45.3			8	25.8			
2	7	22.5			9	29.1			
3	7	22.5			5	16.2			
4	2	6.5			7	32.2			
>**5**	1	3.2			2	6.5			

Mann Whitney U test, p Value, SD: Standard Deviation M: Mean n:number

Depicts the participant parents' distribution by demographic characteristics. The mean age of the mothers was 29.19±6.91 years in the IG, whereas it was 29.74±6.419weeks in CG (p >0.05). The fathers' age was 32.87±6.355 years in the IG, whereas it was 32.97±7.282 years in CG (p>0.05).

When the sociodemographic status variables were compared, the relationship between marital status, mother job status and mother education status was found to be statistically significant (p>0.05). The parity and gravidity was detected no significant relationship between other groups (p>0.05). (Table 4.1.1)

4.1.2 Distribution of the research participants parents' general health conditions findings

Table 4.1.2 Distribution of the research mother participants health status variables during the pregnancy

Variable	**Intervention Group**				**Control Group**				
		%	***M***	***SD***		**%**	***M***	***SD***	**p-value***
First degree of kinship	*n=31*		1.83	.379	*n=31*	%	1.83	.379	>0.05
Yes	5	16.1			5	16.1			
No	26	83.9			26	83.9			
RH Factor	*n=31*		1.97	.183	*n=31*		1.90	.305	>0.05
Yes	1	3.2			3	9.7			
No	30	96.8							
Fever	*n=31*		5.95	,407	*n=31*		5.83	.379	>0.05
Yes	6	19.3			5	16.1			
No	25	80.7			26	83.9			
Complications	*n=31*		4.90	2.354	*n=31*		4.63	2.442	>0.05
Yes	18	58.0			20	64.5			
Hypertension (HT)	4	12.9			7	22.5			
Diabetes Mellitus (DM)	4	12.9			1	3.2			
Iron deficiency anemia(IDA)	1	3.2			2	6.5			
Preeclempsia (PEC)	3	9.7			2	6.5			
Major depressive disorder (MDD)	0	0.0			2	6.5			
Other	6	19.5			6	19.5			
No	13	42.0			11	35.5			
Use of medication during pregnancy	*n=31*		2.33	1.241	*n=31*		2.13	1.252	>0.05
Yes	11	35.5			9	29.0			
Yes medical condition	9	29.0			5	16.1			
Non medical Condition	2	6.5			4	12.9			
No	20	64.5			22	71.0			
The presence of travma	*n=31*		1.93	.254	*n=31*		1.97	.183	>0.05
Yes	2	6.5			1	3.2			
No	29	93.5			30	96.8			
The presence of mother systemic disease	*n=31*		1.83	.379	*n=31*		1.83	.379	>0.05
Yes	5	16.1			5	16.1			
No	26	83.9			26	83.9			
The presence of father systemic disease	*n=31*				*n=31*				
Yes	1	3.2			0	0.0			
HT	1	3.2							
No	30	96.8			31	100			

Characterization of the study population (n=62). The presence of parents medical history was questioned to investigate the health status variables of the research participants. Not only IG but also CG mean, SD and p values were same. It was investigated statistically significant difference between the parents in IG and CG in terms of their first degree of kinship, RH factor,fever, complications,travma and mother systemic dieases (p value >0.05) . According to mothers used to medication there was no statistically significant difference between the participants in IG group and CG (p >0.05).

4.1.3 Findings on the Addictive Characteristics of Parents

Table 4.1.3 Distribution of consumption status of the parents participating in the study during the gestational period

Consumption status	**IG**		**CG**		
Mother Smoker status	***n* =31**	**%**	***n=31***	**%**	***p-value****
Yes, 1 per day	1	3.2	6	19.3	>0.05
Yes, rarely	3	9.7	2	6.5	
Quit	5	16.1	2	6.5	
Never	21	67.6	20	64.4	
No answer	1	3.2	1	3.2	
Father Smoker status					>0.05
Yes, 1 per day	14	45.1	13	41.9	
Yes, rarely	1	3.2	3	9.7	
Quit	2	6.5	0	0.0	
Never	12	38.6	13	41.9	
No answer	2	6.5	2	6.5	
Duration of smoking addiction (year) mother	*n =5*		*n =6*		
Between 1-5 years	4		2		
Between 6-10 years	1		3		
≥ 11 years	0		1		
Duration of smoking addiction (year) father	*n =8*		*n =7*		
Between 1-5 years	2		4		
Between 6-10 years	3		0		
≥ 11 years	3		3		
The Age Of Starting Smoking (ages) (for mother)	*n =5*		*n =5*		
Between 10-15 years	0		3		
Between 16-20 years	3		1		
≥ 21 years	2		1		
The Age Of Starting Smoking (ages) (for father)	*n =7*		*n =5*		
Between 10-15 years	1		1		
Between 16-20 years	3		2		

≥ 21 years	3		2		
How many cigarettes per day for mother	*n =4*		*n =5*		
Between 1-5 pieces	4		2		
Between 6- 10 pieces	0		4		
Between 11-15 pieces	0		0		
Between 16-20 pieces	0		1		
How many cigarettes per day for Father Smoker	*n =17*		*n =10*		
Between 1-5 pieces	1		2		
Between 6- 10 pieces	12		5		
Between 11-15 pieces	0		2		
Between 16-20 pieces	4		1		
Quit time period (month) (for mother)	*n =5*		*n =2*		
Between 0-10 months	1		1		
Between 11-20 months	2		0		
Between 21-30 months	0		0		
Between 31- 40 months	1		0		
Between 41-50 months	0		0		
Between 51-60 months	1		1		
Quit time period (month) (for father)	*n =2*		*n =0*		
Between 0-10 months	1		0		
Between 11-20 months	0		0		
Between 21-30 months	0		0		
Between 31- 40 months	1		0		
Between 41-50 months	0		0		
Between 51-60 months	0		0		
Alcohol user(for mother)	*n =30*		*n =31*		
Never	28	93.4	29	93.5	
Yes, rarely	2	6.6	2	6.5	
Alcohol user(for father)	*n =30*		*n =31*		
Never	28	93.4	29	93.5	
Yes, rarely	2	6.6	2	6.5	
Drug user(for mother)	*n =30*		*n =31*		>0.05
Never	30	100.0	31	100.0	
Yes, rarely	0	0.0	0	0.0	
Drug user(for father)	*n =30*		*n =31*		>0.05
Never	29	96.7	30	96.8	
Yes, rarely	1	3.3	1	3.2	

Smoking consumption questions were based on whether the respondents had ever smoked at least 100 cigarettes in their lifetime or if they were current smokers. Current smokers of parents were asked how many cigarettes they smoke per day and categorized as follows: current daily smokers, rarely smokers, quitted smokers, and never smokers. It indicated that, mother smokers were 12.9 % (*n=4*) of the IG and 25.8% (*n=8*) of the CG cigarette smokers. In comparison, 38.7% (n=12) of the intervention group and 41.9% (*n=13*) of the control group never smoked cigarettes.

Because of the low social acceptability and cultural norms towards females who smoke, the majority of respondents were hesitant and ashamed to answer the smoke, alcohol

and drug use questions. As a result, there may be biases in the number of females who smoke and alcohol consumption.

Alcohol consumption was questioned to investigate the research participant parents, it observed that not only 6.6% (n=2) of the IG but also 6.5% (n=2) of the CG parents used alcohol. In comparison, 93.4% (*n=28*) of the intervention group and 93.5% (*n=29*) of the control group never drunk alcohol. In both groups, one of the fathers was using drugs while the mothers were not using drugs. There was statistically significant difference between the preterm infants in intervention group and control groups in terms of their cigarette smoke addiction, drug user and alcohol user scores (p >0.05) (Table 4.1.3).

Table 4.1.4 Distribution of the frequency of smoking in the home of the families participating in the study

Variables	**IG**		**CG**		
	n 30	**%**	**n 31**	**%**	***p* value***
The smoking status of the smoker in the participant's residence					>0.05
At home	2	6.6	0		
Balcony	14	46.7	17	54.7	
Out of home	14	46.7	14	45.3	
Frequency of smoking at home					>0.05
Never	24	80.0	23	74.0	
Rarely	3	9.9	7	22.8	
Frequency	1	3.3	0		
Very frequency	2	6.8	1	3.2	

All participants were asked about smoking in their homes. It was observed that, smoker of the IG are only 6.6% (n=2) inside the house, 46.7 % on the balcony and 46.7 % outside the house. On the contrary, CG never used to smoke in their house. The frequency of smoking responses of the IG were investigated 6.8 % (*n=2*) very frequency, 3.3% (n=1) frequency, 9.9% (*n=3*), and 80.0% (*n=24*) never used. In the CG were replied that 3.2% (*n=1*) very frequency, 22.8% (*n=7*), and 74.0% (*n=23*) never (p >0.05) (Table 4.1.4).

4.2 Descriptive Findings of the pereterm infants

4.2.1 Introduction of Preterm Infants and Findings Related to Medical Conditions

Table 4.2.1 Demographics variables of neonates between two groups

	Intervention Group frequency			**Control Group frequency**		
Gender	**(n: 31)**	%	**Mean**	**(n: 31)**	%	**Mean**
Female	16	51.5		15	48.5	
Male	15	48.5		16	51.5	
GA (Gestation Age)	25-36		31.97±3.11	25-37		30.13±2.95
Delivery method (n, %)						
C-Section (CS)	29	93.5		27	87.1	
Instrumental delivery	2	6.5		4	12.9	
Natural Vaginal Delivery (NVD)						
BW (gr)	730-3065		1700.32±510.43	495-2890		1901.61±557.10

According to the female gender, the intervention group 51.5% (*n=16*) and the control group 48.5% (*n=15*) borned. In comparison to the male gender of the preterms, 48.5% (*n=15*) of the the IG and 51.5% (*n=16*) of the CG borned. Concerning the type of delivery, the intervention group 93.5% (*n=29*) and the control group 87.1% (*n=27*) delivered by caesarean section. The mean gestational age of the newborns was 31.97±3.11 weeks in the IG, whereas it was 33.13±2.95 weeks in CG ($p > 0.05$). Birth weight was 1700.32±510.43 and 1901.61±557.10 grams in the IG and CG, respectively ($p > 0.05$) (Table 4.2.1).

Significant differences in baseline characteristics are not between the two groups. Table 4.2.1 presents the characteristics of the final sample of preterm infants. No adverse events occurred that were related to the intervention.

Table 4.2.2 Inter-group comparisons of participants' characteristics at the baseline

Initial Findings	**IG**		**Mean**	***SD***	**CG**		**Mean**	***SD***	**p value ***
	***n* 31**	**%**			***n* 31**	**%**			
APGAR1 MHC7	2 - 9		6.52	1.610	3 - 8		6.35	1.427	>0.05
APGAR5 MHC7	5 - 10		7.68	1.137	5 - 9		7.71	1.006	>0.05
Hyperbilirubinemia MHC8			1.58	.502			1.65	.486	>0.05
Exist	13	42.0			11	35.6			
Absent	18	58.0			20	64.4			
Cyanosis MHC9			1.65	.486			1.68	.475	>0.05
Exist	11	35.6			10	32.2			
Absent	20	64.4			21	67.8			
Incubator presence MHC10			1.03	.180			1.03	.180	>0.05
Exist	30	96.8			30	96.8			
Absent	1	3.2			1	3.2			
CPR history MHC12			1.94	.250			1.87	.341	>0.05
Exist	2	6.5			4	12.9			
Absent	29	93.5			27	87.1			

When the first examination findings of the permatures were examined, the APGAR score of 1 minute is 2 - 9 in the IG and 3 - 8 in the CG. The APGAR scores of 5 minutes were found to be 5 - 10 in the IG and 5 - 9 in the CG. (p >0.05) As for the presence of hyperbilirubinemia, 42.0% (n=13) of the IG and 35.6 % (n=11) were seen infants (p >0.05). Cyanosis was observed in 35,6 % (n=11) of the IG and 32.2% (n=10) of the CG (p >0.05) (Table 4.2.2). When the presence of an incubator was investigated, it was the same in both groups (p >0.05). During the neonatal care period, 2 (6.5%) infants in the IG had CPR, whereas 4 (12.9%) infants had CPR in the CG (p >0.05).

As a result of the examinations of the preterm infants for follow-up at the NICU, it was seen that the common diagnosis of all the preterm infants whose medical observations were made not only in the intervention group, but also in the control group at the same time, was prematurity. The medical diagnosis of the treated premature infants was found to be extremely prematurity, PM-IUGR, Oligohydramnios, PM-RDS, RDS, congenital pneumonia and pneumopathy, respectively.

Table 4.2.3 Comparison of baseline characteristics of patients in two groups

NICU monitorization	IG			CG			
Respiratory status MHC15	***n* 31**	**%**	**Mean**	***n* 31**	**%**	**Mean**	***p value***
NCPAP	15	48.3		16	51.6		>0.05
Intubated CPAP	2	6.5		0			
Non invasiv MV	0			1	3.2		
Tachypnea	2	6.5		0			
Tracheostomy	1	3.2		2	6.5		
Spontan	11	35.4		12	38.6		
Nutrition state MHC16			2.97 ±1.52			3.03±1.47	>0.05
Breast milk	8	25.8		9	29.0		
Drip-feed	5	16.2		2	6.5		
Gastric tube	2	6.5		2	6.5		
Breast milk / infant formula	16	51.5		18	58.0		
Surgical operation MHC17			1.97± .180			1.90±.301	>0.05
Exist	1	3.2		3	9.7		
Absent	30	96.8		28	90.3		
Phototherapy stay MHC18							
Yes	16	51.7		13	42.0		
No	15	48.3		18	58.0		
Asphyxia MHC19			1.87 ±.341			1.94± .250	>0.05
Exist	4	12.9		2	6.5		
Absent	27	87.1		29	93.5		
MV (Mechanical Ventilation) MHC20			1.35 ± .486			1.39 ± .495	>0.05
Exist	20	64.4		19	61,2		
Absent	11	35.6		12	38.8		
Ototoxic Drug (Gentamicin) MHC21			1.06±.250			1.13± .341	>0.05
Exist	29	93.5		27	87.1		
Absent	2	6.5		4	12.9		
Infection MHC22			1.43±.504			1.45 ± .506	>0.05
Exist	17	54.7		17	54.7		
Absent	14	45.3		14	45.3		

During the follow-up of the premature infants in NICU, when the respiratory conditions, nutritional status, surgical operation, presence of the phototherapy, asphyxia, MV and peresence of the infection were examined ($p < 0.05$). Ototoxic drug use was detected 93.5% (n=29) of the IG and 87.1% (n=27) of the CG ($p > 0.05$).

Table 4.2.4 Comparison of blood gases results in two groups

Blood Gas (1-5 days) *n*=62	**Intervention frequency *n*: 31**	***Mean***	**Control frequency *n* :=31**	***Mean***	***p-value****
Ph	7.1 - 7.51	7.3213± .09259	7.17 - 7.47	7.3337±.08046	>0.05
Base gap (mmol/L)	-11.1 – 0.8	-4.348 ± 3.3063	-12.4 – 60.5	-1.490 ± 11.9789	>0.05
HCO3 (meq/L)	16.2 – 31.2	21.372 ± 3.7110	-4.8 – 26.9	20.758 ± 5.2899	>0.05
Lactate	0.9 – 10.19	3.3084 ± 2.07496	1.19 – 23.7	3.8626 ± 4.00288	>0.05

There was no statistically significant difference between the preterm infants in intervention group and control groups in terms of their PH, base gap, HCO3, and lactate scores (p >0.05).

Table 4.2.5 Comparison of biochemistry results in two groups

Preterm infants (n:62)	**Normal Values**	**IG N=31**	**CG N= 31**	**p-value***
Glucosis	**50 - 80 mg/dL**	53 - 149	40 – 146	>0.05
BUN	**4 - 19 mg/dL**	2.34 – 67.29	3.27 – 23.83	>0.05
AST	**0 - 40 U/L**	24.9 – 210.4	16.5 – 199.6	>0.05
Potassium	**3.5-5.1 mmol/L**	3.55 – 6.89	3.33 – 14.00	>0.05
Phosphorus	**3.9 – 7.7 mmol/L**	2 – 8	4 – 7	>0.05
T. Bilirubin	**0 – 1.2 mg/dL**	1.56 – 8.53	1.82 – 10.2	>0.05
TSH	**0.27 – 4.2 mU/L**	1.12 – 8.16	0.79 – 18.58	>0.05
Heel Lance		n=31	n=31	
Calcium	**9 - 11 mg/dL**	6.3 – 9.86	6.6 – 10.1	>0.05
Creatinin	**0.7 - 1.2 mg/dL**	0.41 – 3.42	0.64 – 7.77	>0.05
ALT	**0 - 41 U/L**	1 – 71	3 – 25	>0.05
Sodium	**135-145 mmol/L**	125 – 152	134 – 143.5	>0.05
Dir. Bilirubin	**0.001 - 0.3 mg/dL**	0.07 – 0.61	0.14 – 0.85	>0.05
FT4	**0.93 – 1.7 ng/dL**	0.97 – 2.21	1.17 – 2.21	>0.05

There was no statistically significant difference between the preterm infants in intervention group and control groups in terms of their TSH hormone scores (p >0.05) (Table 4.2.5). Other scores were occured glucosis, BUN, AST, potassium, phosphorus, total Bilirubin, calcium, creatinin, ALT, sodium, direct Bilirubin, and FT4 scores (p >0.05).

Table 4.2.6.1 Comparison of screening ABR test results in two groups before discharge

Screening ABR ***N* 124 ears**	**RIGHT EAR**				**LEFT EAR**				
	IG ***N*** **31**		**CG** ***N*** **31**		**IG** ***N*** **31**		**CG** ***N*** **31**		**p value**
Pass	16	51.6%	13	41.9%	17	55.0%	12	38.6%	>0.05
Remained	15	48.4%	18	58.1%	14	45.0%	19	61.4%	>0.05

Screening ABR were performed before hospital discharge. The control group had poor hearing performance compared to the intervention group relatively. The results showed that 12.1% of intervention group have hearing losses of the right ear, 11.2% had hearing loses of the left. There was 14.5% of control group right ear and 15.2% left ear suffering from hearing losses.

Table 4.2.6.2 Comparison of screening ABR test results in two groups (after discharge)

Screening ABR ***N* 120 ears**	**RIGHT EAR**		**LEFT EAR**		
	IG **n 30**	**CG** **n 30**	**IG** **n 30**	**CG** **n 30**	**p value ***
Pass	25 83.3%	23 76.7%	20 66.7%	25 83.3%	>0.05
Remained	5 16.7%	7 23.3%	10 33.3%	5 16.7%	>0.05

Follow-up screening ABR could not be performed two preterms' discharged from the hospital. In the hearing loss screening, 5 (16.1%) and 7 (22.6%) newborns had a problem in the right ear in the IG and CG, respectively (p>0.05). We could not reach the participating families by phone. When clinical ABR results could not be obtained, healthy hearing performance could not be evaluated. Secondary ABR scores were interpreted as follows: analysis of covariance arranged for baseline ABR was used to assess the mean distinction in the mean ABR between the two groups;

the Mann-Whitney U test was used to assess the difference in maturation of the preterm infants. All data were double entered and checked, and any discrepancies were resolved by referring to the original data. The level of significance was set at 0,01.

Table 4.2.7 Comparison of screening ROP results in two groups

ROP ***N*** **60**	**IG**		**CG**		
	n: 29	**%**	**n: 31**	**%**	**p-value***
Stage 1	2	6.5	4	12.9	>0.05
Stage 2					
Stage 3					
No	27	93.5	27	87.1	

At the end of the follow-up period, 2 (6.5%) newborns in the intervention group had ROP, whereas 4 (12.9%) newborns had ROP in the control group (p< 0.001).

Table 4.2.8 Comparison of newborn reflexes in two groups.

Preterm infants **(n:62)**	**RIGHT**		**LEFT**	
	Intervention (n=31)	**Control (n =31)**	**Intervention (n=31)**	**Control (n =31)**
Moro Reflex *p* value	*>0.05 (1.000)*	*>0.05*		
Normal	31 100%	31 100%		
pathologic				
Rooting versus sucking reflex *p* value	*>0.05 (1.000)*	*>0.05*	*>0.05 (.157)*	*>0.05*
Normal	31 100%	31 100%	29 93,6%	31 100%
patolojik	0	0	2 6,4%	0
Patellar tendon reflex *p* value	*>0.05 (.317)*		*>0.05 (.317)*	
Normal	30 96,8%	31 100%	30 96,8%	31 100%
Weakness	1 3,2%		1 3,2%	
Clonus *p* value	*>0.05*	*>.05 (.317)*	*>0.05*	*>0.05 (1.000)*
No	30 96,8%	31 100%		
Yes	1 3,2%	0		
Palmar grasping reflex *p* value	*>0.05 (.317)*	*>0.05*	*>0.05 (.317)*	*>0.05*
Normal	30 96,8%	30 96,8%	30 96,8%	30 96,8%
pathologic	1 3,2%	1 3,2%	1 3,2%	1 3,2%
Plantar reflex *p* value	*>0.05 (.317)*	*>0.05*	*>0.05 (.317)*	*>0.05*
Normal	30 96,8%	31 100%	30 96,8%	31 100%
pathologic	1 3,2%	0	1 3,2%	0
Intracranial Hemorrhage presence and stage *p* value	*>0.05 (.317)*	*>0.05*		
normal	30 96,8%	31 100%		
Pathologic	1 3,2%	0		
Hydrocephalus *p* value	*>0.05 (1.000)*	*>0.05*		
normal	30 96,8%	31 100%		
Stage 1				

Stage 2			
Stage 3	1 3,2%	0	

When the presence of Moro Reflex was examined, 62 of the infants in both the intervention and control groups had a 100% normal moro reflex. No pathological problem was found. When the Rooting versus sucking reflex was examined, it was normal on the right side of 62 preterm infants in both the intervention and control groups. On the contrary, the left side of the IG of 6.5% (n=2) was weak (p *>0.05).* During the examination for the presence of patellar tendon reflex, 3,2% (n=1) preterm infants in the IG had both right and left weak. The newborns of the CG were normal *(*p >0.05*)* (.317) . When the presence of clonus, palmar grasping reflex**,** palantar reflex, intracranial hemorrhage and hydrocephalus were investigated, in the IG had pathological score, while there was none in the CG (p >0.05) (Table 4.2.8).

4.3 Findings on the Mother's Perception of Stress

Table 4.3 Comparison of Perceived Stress Scale 10 test during the pregnancy period

Questions	**Research Group**	**Mean**	***SD***	***p-value****	
1. How often have you been upset because of something that happened unexpectedly?	Intervention	1.45	1.261	p >0.05	.049
	Control	1,52	1,363	p >0.05	,073
2. How often have you felt that you were unable to control the important things in your life?	Intervention	1.00	1.000	p >0.05	.987
	Control	1.42	1.089	p >0.05	.008
3. How often have you felt nervous and stressed?	Intervention	1.58	1.119	p >0.05	.009
	Control	1.61	1.054	p >0.05	.067
4. How often have you felt confident about your ability to handle your personal problems?	Intervention	1.65	1.050	p >0.05	,003
	Control	1.65	1.112	p >0.05	.095
5. How often have you felt that things were going your way?	Intervention	1.55	1.091	p >0.05	.011
	Control	1.48	1.092	p >0.05	.023
6. How often have you found that you could not cope with all the things that you had to do?	Intervention	1.48	1.122	*P >0.05*	
	Control	1.58	.992	*p>0.05*	
7. How often have you been able to control irritations in your life?	Intervention	1.19	.833	p >0.05	.201
	Control	1.45	.995	*p >0.05*	
8. How often have you felt that you were on top of things?	Intervention	1.19	.980	p >0.05	.294
	Control	1.55	.995	*p >0.05*	
9. How often have you been angered because of things that happened that were outside of your control?	Intervention	1.68	.979	*p >0.05*	
	Control	1.94	.629	p >0.05	.564
10. How often have you felt difficulties were piling up so high that you could not overcome them?	Intervention	1.45	.995	p >0.05	
	Control	1.58	.886	p >0.05	

The exact measure of the personal stress scale (PSS) can be defined using various tools designed to help measure individual stress levels.The PSS is called the first of these. The questions in this scale aim ask about your feelings and thoughts during the last month. During the pregnancy period of the mother with this test determines how often feel or think a certain way for.

For each question chooses from the following alternatives by mothers : 0 - never 1 - almost never 2 - sometimes 3 - fairly often 4 - very often

You can find out your PSS score by following these directions. You reverse your scores for questions 4, 5, 7, and 8. On these 4 questions, change the scores like this: 0 = 4, 1 = 3, 2 = 2, 3 = 1, 4 = 0. Now add up your scores for each item to get a total. Individual scores on the PSS can between 0 and 40 with higher scores presenting higher perceived stress. Scores between 0 and 13 would be accounted low stress, from 14-26 would be contemplated moderate stress and from 27 to 40 would be delibareted high perceived stress.

The standard deviation, minimum and maximum values of the mothers for the pregnancy period according to the average of the scores obtained from the PSS-10 scales are presented in Table 4.3. Between the participant families are no statistically significant difference in intervention group and control groups in terms of their PSS (SAT) scores ($p > 0.05$) (Table 4.3).

4.4 Comparison of Neonatal Intensive Care Unıt Exposure Conditions

4.4.1 Indoor Noise Sources and Sound Level Findings

Table 4.4.1 Comparison of indoor noise measurement distribution (in different seasons, average daily dose)

Record Number	Date	Measured time	Place	LA peak (SR) (dB)	LAE(SEL) (SR) (dB)	LAeq(SR) (dB)	LAeq (TH) (dB)	**Net Result (dB)**
2591	31.03.2022	08.18	I	94.2	76.8	55.2	53.4	**50.1**
2592	31.03.2022	08.29	II	96.5	75.4	54.7	52.8	**47.4**
2593	31.03.2022	11.19	I	84.0	74.5	59.3	58.9	**51.2**
2594	31.03.2022	11.29	II	86.4	70.5	55.6	55.7	**48.3**
2595	31.03.2022	16.51	I	106.2	83.1	62.9	62.5	**51.1**
2596	31.03.2022	16.58	II	100.8	83.6	59.0	60.2	**52.0**
2597	31.03.2022	17.03	I	86.9	73.3	57.1	57.3	**47.1**
2598	31.03.2022	17.10	II	103.3	79.7	60.3	62.1	**53.8**
2599	31.03.2022	17.17	I	74.8	69.9	55.1	55.1	**53.8**
2600	31.03.2022	19.10	I	85.4	59.1	52.1	51.2	**44.7**
2601	31.03.2022	19.19	II	97.1	81.9	57.8	73.4	**49.6**
2602	31.03.2022	22.25	I	88.5	74.7	57.7	55.8	**49.6**
2603	31.03.2022	22.34	II	85.	72.1	50.6	49.1	**44.7**
2604	01.04.2022	15.02	I	100.3	88.4	60.6	59.7	**52.9**
2605	01.04.2022	15.15	II	100.5	83.7	56.0	55.2	**49.0**
2606	01.04.2022	16.38	I	85.1	73.6	51.8	50.2	**45.0**
2607	01.04.2022	16.49	II	87.5	70.9	55.0	46.4	**46.8**
2608	01.04.2022	17.56	I	96.0	72.1	57.0	40.1	**49.8**
2609	01.04.2022	18.01	II	116.5	81.6	67.5	66.2	**59.8**
2610	02.04.2022	15.57	I	113.0	88.0	62.9	61.8	**56.8**
2611	02.04.2022	16.03	II	92.0	80.6	62.3	60.7	**54.9**
2612	02.04.2022	17.20	I	81.2	70.7	58.4	57.2	**51.6**
2613	02.04.2022	17.31	II	95.0	83.2	58.5	56.8	**51.2**
2614	02.04.2022	18.05	I	86.0	60.3	49.4	43.5	**40.9**
2615	02.04.2022	18.14	II	65.6	59.2	46.7	48.8	**39.6**
2616	02.04.2022	20.19	I	98.3	90.0	63.6	61.7	**56.2**
2617	02.04.2022	20.28	II	100.5	77.5	62.2	61.8	**54,6**
2618	02.04.2022	21.13	I	102.8	83.0	58.4	57.6	**50,4**

2619	03.04.2022	02.15	I	75.0	60.1	48.4	42.6	**39.5**
2620	03.04.2022	02.22	II	64.7	59.3	45.7	46.7	**38.6**
2621	03.04.2022	07.50	I	109.2	84.7	59.9	58.7	**51.1**
2622	03.04.2022	08.01	II	82.0	64.7	55.0	45.3	**46.6**
2623	03.04.2022	11.41	I	81.2	63.8	45.3	44.7	**36.7**
2624	03.04.2022	11.54	II	99.3	77.3	66.5	64.3	**57.3**
2625	03.04.2022	13.20	I	98.4	78.0	62.0	61.7	**53,9**
2626	03.04.2022	13.38	II	107.9	82.5	62.8	60.2	**54,6**

Corrections are made by adding background noise and environmental correction factors in the environment. These record number are from 2591 to 2626. Both NICU I and NICU II measured indoor noise sources and sound level. The data obtained at the end are tabulated as follows. The result value was calculated according to the TS EN ISO 11204 standard forms and placed in the Table 4.4.1. The result of the the indoor noise exposure assessment were measured by Swantek program.

4.4.2 Personal Noise Exposure Level Findings

ISO 9612 Ölçüm Belirsizliklerinin Değerlendirilmesi (Ek_C) Görev Tabanlı Ölçüm

TALEP NO:

Ölçüm Yapılan Bölüm:

Her bir görev için:	
Sarı hücreyi kullan	Ölçülen değerleri (Lp, A, eqT, m) ve görev isimlerini girmek için
Yeşil hücreyi kullan	Günlük süreyi saat bazında girmek için (örneğin 7 saat 30 dakikayı 7,5 saat şeklinde gir); en az bir değer girmelisin
Mor hücreyi kullan	Ölçüm cihazından kaynaklanan belirsizliği (u2) girmek için **(Ek_C' de Tablo C' ye bak u2: 0,7 veya 1,5)**

Veri girişinden elde edilen sonuçlar	
Günlük gürültü seviyesi $L_{EX,8h}$ =	**56,2**
Tanımlanan görevler Sayı	**1**
Süre toplamı (saat)	**0,5**

Görev adı	Görev 1		Görev 2		Görev 3		Görev 4		Görev 5		Görev 6		Görev 7	
Örnek numarası	Gürültü seviyesi (dB)	Görev süresi (saat)	Gürültü seviyesi (dB)	Görev süresi (saat)	Gürültü seviyesi (dB)	Görev süresi (saat)	Gürültü seviyesi (dB)	Görev süresi (saat)	Gürültü seviyesi (dB)	Görev süresi (saat)	Gürültü seviyesi (dB)	Görev süresi (saat)	Gürültü seviyesi (dB)	Görev süresi (saat)
1	64,6	0,25												
2	61,1	0,25												
3	66,1	0,25												
4	57,3	0,25												
5	74,2	0,25												
6	61,6	2												
7														
8														
9														
10														
11														
12														
13														
14														
15														
Ölçüm cihazı	u2		u2		u2		u2		u2		u2		u2	
	0,7		0,7											
#DEĞER!	6		0		0		0		0		0		0	
Lp, A, eqT, m: Enerji ortalaması	**67,8**													
Standart belirsizlik u1a	2,4													
Tm: m görevinin süresi (saat)		**0,5**												
Standart belirsizlik u1b		0,3												

HESAPLAYAN (Adı-Soyadı/Tarih/İmza)	KONTROL EDEN (Adı-Soyadı/Tarih/İmza)
GULKAN CAN -03.06.2022	YUNUS TASDEMIR 06.06.2022

Figure 4.4.1 The personal noise exposure assessment table is shown in NICU

It is not appropriate for us to intervene in incubators due to the pandemic, so it was not possible to record on prematures noise exposure. Instead, the personal noise exposure assessment of working nurses was recorded. Premature feeding, food distribution, changing of guard, visits, day and night were determined.

These record number are from L 927 to L936. Both NICU I and NICU II measured indoor noise sources and sound level. The data obtained at the end are tabulated as follows. The table of the indoor noise exposure assessment of the NICU is given in the Table 4.4.1. The result value was calculated according to the TS 2607 ISO 1999 ve TS EN ISO 9612 standard forms and placed in the table.

The result of the the personal noise exposure assessment were measured by Swantek program.

4.4.3 Lighting Sources and Lighting Level Findings

Table 4.4.3 Comparion of Neonatal Intensive Care lighting levels findings

Documentary Number: TA-13-04 Published Date: 30.09.2020 TNKU MF HOSPİTAL NICU Lighting									
				1	**2**	**3**	**4**	**AVG**	**Hour**
1	**NICU I**	**L**	Incubator 1	493	474	360	352	419.8	**16.51**
2			Incubator 2	350	493	380	360	395.75	**March**
3			Incubator 3	144	108	81	156	122.25	
4			Incubator 4	144	160	211	153	167	
5		**R**	Incubator 5	278	498	468	132	344	
6			Incubator 6	460	458	453	161	383	
7			Incubator 7	481	470	490	190	407.75	
8	**NICU II**	**R**	Incubator 8	411	472	491	351	431.25	**17:05**
9			Incubator 9	402	295	302	475	368.5	
10		**L**	Incubator 10	16	18	17	15	16.5	
11			Incubator 11	13	12	6	5	9	
12	**NICU I**	**L**	Incubator 1	13	15	16	14	14.5	**19:15**
13			Incubator 2	14	13	12	12	12.75	
14			Incubator 3	144	151	78	35	102	
15			Incubator 4	218	225	203	182	207	
16	**NICU II**	**R**	Incubator 5	222	186	441	165	253.5	**19:11**
17			Incubator 6	17	15	12	18	15.5	
18			Incubator 7	201	180	448	160	247.25	
19			Incubator 8	24	22	14	12	18	
20			Incubator 9	411	351	491	472	431.25	
21			Incubator 10	402	475	302	295	368.5	
22		**L**	Incubator 11	16	18	17	15	16.5	
23			Incubator 12	13	12	6	5	9	**March**
24	**NICU I**	**L**	Incubator 1	353	566	624	462	501.25	**10:43**
25			Incubator 2	291	154	355	460	315	
26			Incubator 3	210	160	320	410	275	
27			Incubator 4	300	295	410	275	320	
28		**R**	Incubator 5	506	498	393	127	381	
29			Incubator 6	381	410	370	118	319.75	
30			Incubator 7	360	350	320	130	290	

31	**NICU II**	**L**	Incubator 8	307	447	186	102	260.5	**10:55**
32			Incubator 9	199	435	285	49	242	
33	**NICU I**	**L**	Incubator 1	470	430	380	240	380	**15:01**
34			Incubator 2	485	495	470	380	457.5	
35			Incubator 3	97	101	99	85	95.5	
36		**R**	Incubator 4	475	427	396	252	387.5	
37			Incubator 5	499	505	495	403	475.5	
38	**NICU II**	**L**	Incubator 6	150	210	195	55	152.5	
39			Incubator 7	289	157	175	88	177.25	
40		**R**	Incubator 8	210	440	290	62	250.5	
41			Incubator 9	112	217	98	69	124	
42	**NICU I**	**L**	Incubator 1	501	541	430	107	394.75	**17:48**
43			Incubator 2	284	257	83	63	171.75	
44			Incubator 3	80	87	63	61	72.75	
45		**R**	Incubator 4	455	413	422	180	367.5	
46			Incubator 5	422	447	435	142	361.5	
47			Incubator 6	536	500	405	141	395.5	
48	**NICU II**	**R**	Incubator 7	68	61	51	38	54.5	**17:56**
49		**L**	Incubator 8	352	478	297	158	321.25	
50			Incubator 9	271	363	287	93	253.5	
51	**NICU I**	**L**	Incubator 1	761	670	540	129	525	**15:38**
52			Incubator 2	347	185	124	72	182	
53		**R**	Incubator 3	673	549	475	264	490.25	
54			Incubator 4	629	566	419	179	448.25	
55			Incubator 5	577	554	471	186	447	
56	**NICU II**	**R**	Incubator 6	117	64	74	63	79.5	
57			Incubator 7	147	107	73	83	102.5	
58		**L**	Incubator 8	338	205	106	114	190.75	
59			Incubator 9	97	80	61	64	75.5	
60	**NICU I**	**L**	Incubator 1	528	551	360	110	387.25	**17:24**
61			Incubator 2	322	205	135	89	187.75	
62		**R**	Incubator 3	547	450	415	220	408	
63			Incubator 4	490	483	406	179	389.5	
64			Incubator 5	480	529	446	261	429	
65	**NICU II**	**R**	Incubator 6	289	218	106	125	184.5	
66		**L**	Incubator 7	380	189	93	126	197	
67			Incubator 8	148	128	75	71	105.5	**April**
68	**NICU I**	**L**	Incubator 1	568	505	354	101	382	**11:46**
69			Incubator 2	294	245	83	58	170	
70		**R**	Incubator 3	464	300	384	128	319	
71			Incubator 4	480	377	78	129	266	
72			Incubator 5	156	155	126	76	128.25	
73	**NICU II**	**R**	Incubator 6	30	27	24	26	26.75	**11:56**
74			Incubator 7	23	14	10	15	15.5	
75		**L**	Incubator 8	253	390	214	216	268.25	
76			Incubator 9	240	491	324	87	285.5	
77	**NICU I**	**L**	Incubator 1	180	15	17	14	56.5	**05:46**
78			Incubator 2	15	13	12	11	12.75	
79			Incubator 3	12	51	78	35	44	
80	**Phytotherapy**		Incubator 4	220	225	201	183	207.25	
81		**R**	Incubator 5	15	16	18	15	16	
82			Incubator 6	13	58	95	33	49.75	
83			Incubator 7	110	201	317	94	180.5	
84	**NICU II**	**L**	Incubator 8	17	14	12	18	15.25	**05:59**

85			Incubator 9	23	22	14	12	17.75	
86		**R**	Incubator 10	430	486	460	175	387.75	
87			Incubator 11	280	448	160	151	259.75	
88	**NICU I**	**L**	Incubator 1	18	15	17	14	16	**02:54**
89			Incubator 2	16	13	11	13	13.25	
90			Incubator 3	12	75	124	36	61.75	
91	**Phytotherapy**		Incubator 4	230	220	198	175	205.75	
92		**R**	Incubator 5	16	15	19	13	15.75	
93			Incubator 6	13	94	96	22	56.25	
94			Incubator 7	112	193	185	54	136	
95	**NICU II**	**L**	Incubator 8	18	13	14	16	15.25	**03:11**
96			Incubator 9	22	91	15	12	35	
97		**R**	Incubator 10	13	85	78	73	62.25	
98			Incubator 11	19	110	115	24	67	**June**
99	**NICU I**	**Window**		1041	1250	1200	1100	1147.75	**12:41**
100		**L**	Incubator 1	781	562	395	217	488.75	
101			Incubator 2	328	322	311	114	268.75	**Sunny Day**
102			Incubator 3	409	416	310	117	313	
103	**CENTRAL**	**Window**	Incubator 4	340	324	223	210	274.25	
104		**R**	Incubator 5	333	322	423	129	301.75	
105			Incubator 6	426	505	420	175	381.5	
106			Incubator 7	538	495	517	136	421.5	
107	**NICU II**	**L**	Incubator 8	44	45	41	36	41.5	
108			Incubator 9	40	33	25	19	29.25	
109		**R**	Incubator 10	253	424	285	95	264.25	
110			Incubator 11	257	212	149	86	176	
111	**NICU I**	**Main Area**		5	4	6	3	4.5	**20:10**
112		**L**	Incubator 1	5	7	6	4	5.5	**19: 04**
113			Incubator 2	4	5	6	2	4.25	
114			Incubator 3	4	6	5	2	4.25	
115		**Central**	Incubator 4	5	7	6	3	5.25	
116		**R**	Incubator 5	4	3	5	2	3.5	
117			Incubator 6	5	4	3	4	4	
118			Incubator 7	4	3	3	1	2.75	
119	**NICU II**	**L**	Incubator 8	580	570	565	320	508.75	**19:02**
120			Incubator 9	498	478	475	297	437	
121			Incubator 10	485	477	469	387	454.5	
122		**R**	Incubator 11	510	590	580	421	525.25	
123			Incubator 12	550	580	492	430	513	
124		**Main Area**		200	195	230	227	213	
125		**Corridor**		350	345	324	311	332.5	

L: Left, R:Right

Measurements were taken from all incubators at different times. The weekends, weekdays, winter, spring, morning, midday and night were measured by authorized engineer. The results of Neonatal Intensive Care Units are shown in the Table 4.4.3. The result value were calculated according to the COHSR 928-I-IPG-039 standard forms and placed in the table.

4.4.4 Comparison of Neonatal Intensive Care Unıt Electromagnetic Field Exposure Assessment Findings

Table 4.4.4 Comparion of Neonatal Intensive Care Electromagnetic Field sources findings

Number	Unit	Measured Enviroment or device	Measure Result (V/m)	Limit Value (V/m)	Frequency (MHz)
1	S.T	Iphone 11		10000	1109
2	OZ	Iphone Promax 11		10000	2530
3		Watch		10000	2075
4	V.B.	Iphone 8 Plus		10000	3600
5	G.Y.C.	Iphone 7 Plus		10000	3561
6		Watch		10000	7990
7	H.S.A	Iphone Xr		10000	4047
8		Watch		10000	7720
9	C	Iphone 11		10000	346
10		Lg		10000	668.4
11		Iphone 8 Plus		10000	1375
12	E A	Iphone 12		10000	1242
13	NICU I	PA Lung Graphy		10000	3992
14	NICU I	Left I opened from the top		10000	3409
15	NICU I	Left II		10000	3862
16	NICU I	Left III opened from the top		10000	4289
17	NICU I	Drager Evite V 300		10000	2740
18	NICU I	Monitor		10000	2792
19	NICU I	Midmost Incubator		10000	2515
20	NICU I	Right I opened from the top of the incubator		10000	1971
21	NICU 1	Right 1 below measured		10000	1710
22	NICU 1	Right II top of the incubator		10000	2229
23	NICU 1	Right II below measured		10000	1925
24	NICU 1	Drager Evite V 300		10000	2672
25	NICU 1	Drager Evite V 300		10000	3372
26	NICU II	Left I		10000	4775
27	NICU II	Left II		10000	7317
28	NICU II	Drager Resusıtaır		10000	9447
29	Enviroment			10000	2781

Electromagnetic Field Sources and EMF exposure assessment level findings were investigated in NICU. The measurements were taken especially during the day shifts of

working doctors, nurses and other personnel. The GSM phones and the watches of the staff connected to them via bluetooth were also measured. The monitors, incubators, phototherapy devices, USG and portable X-ray device of the neonatal intensive care units were measured. The monitors, incubators, phototherapy devices, Used and portable X-ray device of the neonatal intensive care units were measured. The devices were working during the EMF measurements. The result value was calculated according to the TS EN 50413 standard forms and placed in the Table 4.4.4.

Table 4.4.5 Exposures Finally Report of the Neonatal Intensive Care Unit

Timeline of the measurement	**Exposure Type Measurement**	**Place of measurement**	**The recommended upper limit is according to AAP**	**According to the Ministry of Health, the NICU exposure upper limit**	**ISO Standards used in measurements**	**The recommended upper limit is according to ISO**	**Result**
31.03.2022 01.04.2022 02.04.2022 03.04.2022 11.05.2022 03.06.2022	Indoor Noise	NICU I	≤ 45 dB	≤ 55 dB	TSE-EN ISO-11204	≤ 80 dB	39.5 – 56.2 dB (average) 53 dB
		NICU II	≤ 45 dB	≤ 55 dB	TSE-EN ISO-11204	≤ 80 dB	39.6 – 57.3 dB (average) 52,8 dB
	Illuminating level	NICU I	1-600 lux	No limit	TSE-EN 12464-1	1000 lux	12.75 – 501.25 lux (Average) 261 lux
		NICU II	1-600 lux	No limit	TSE -EN 12464-1	1000 lux	9 – 525.25 lux (Average) 191 lux
	ELF-EMF	NICU I	0 Hz to 300 kHz	No limit	TSE EN 50413	≤ 10.000 V/m	346-9447 V/m (av) 3358 V/m
		NICU II	0 Hz to 300 kHz	No limit	TSE EN 50413	≤ 10.000 V/m	
	Personal Noise Exposure (no infants)	NICU		No limit	TSE EN 9612	≤ 80 dB	(av.)64.2 dB

5. Discussion

During the critical period of perinatal brain development, infants are fragile to abnormal brain myelination from developmental disruption. Because of the infants must be exposed to the extternal environment in the NICU, preterm birth interrupts adversily the normal process of brain maturation,. Neonatal circadian rhythms have been recorded from the beginning zero to three days after birth and interrupted triggering of the fetal circadian [88] clock owing to exposure of the preterm infant to near darkness or continuous bright light in the NICU. NICU environment condition sleep-cycle, nutrition, growth factor and long-term may negatively influence neurodevelopment outcome of the preterm infants. In fact, traditional NICU environments and practices, exposure to bright lights, excessive sound levels and frequently painly interferences can negatively affect the development of the newborn brain. [89] Many studies were documented that, preterm infants preferred cycled light compared with near darkness and continuous bright light [88].

It was proved in this study, the intervention group was dark in the incubator, the control group was in the environment of cyclic lighting. The study was conducted by Ergenekon E, et al. 2010, Istanbul University Istanbul Faculty of Medicine Department of Ophthalmology. It was shown ROP proportion in Turkey.In this study carried out within 2,950 cases, the incidence of ROP was reported as 40.7%. During the study that included all cases with <32 of the GA and/or birth weight <1,500 grams, risk factors of >32 weeks [90].

The review article was published by AMANTAI et al., 2021, The incidence of ROP in any of the stages in premature infants in Turkey was found to be 27%, and the incidence of severe ROP was 6.7%. In addition, of all the babies who needed treatment, 414 were preterm, 395 of them (95.4%) had a birth weight of less than 1500 g [91].

In our study, the ROP propotion was recorded as 10% in all cases. In the data obtained, cyclic illumination was also evaluated in the control group in favor of a significant difference. It has been reached that lighting as well as noise constitutes a serious exposure. It is necessary to continue work on this issue with a more advanced design. Distribution of the number of preterm, which is ≤1500 gr, there are 11 cases in the intervention group, 5 cases in the control group.

The preterm of the Intervention group with 2 ROPS is ≤32 GA and ≤1500 gr. Preterm infants in the control group with 4 ROP were 3 of them ≤32 GA and ≤1500 gr and 1 of them 37 GA and 1700 gr.

The distribution of preterm infants with ≤32 GA was found to be 12 preterm infants in the intervention group and 8 preterm infants in the control group. In the control group, the presence of ROP was observed in 4 of the 8 preterm infants. ROP was detected in the intervention group, ≤32 GA and ≤1500 gr, although they were more numerous than in the control group, but less frequent. In our study, no severe cases of ROP were found in both groups. These data were interpreted markedly significantly in favor.

The technology of the noise exposure control and measurement in NICU is now accessible and ergonomic. The main sources of noise production is NICU design problems and including staff behavior is significant. This study indicated that, decreases in noise exposure after physical space change as compared to staff behavioral change. Other studies have aimed to restrict noise [88] exposure by using earplugs and earmuffs of the preterm infants [92].

The birth weight and gestational age decrease whereas the risk of sensorineural hearing loss increases [19]. The high rate of hearing loss is due to the administration of ototoxic drugs, such as aminoglycoside antibiotics, and noise exposure of NICU enviroment [20] and incubators, and perinatal complications such as hypoxia, acidosis, cynosis and hyperbilirubinemia [21,22]. Hearing loss is often observed due to these reasons. In the world, newborn hearing screening programs are followed approximately by cases, which determines.

Screening tests are easy and very important information in the early recognition of hearing loss. The childhood hearing loss makes difficult to adapt to normal society. The age of between 0 to 4 years is of critical importance for speech learning. Therefore, the use of these tests is very important [93,94,95].

The first hearing test in high-risk infants is performed by scanning auditory brainstem response (S-ABR). If it remains, the S-ABR test is repeated. In infants who also remain from the retest, audiological evaluation should be performed within 3 months. In the neonatal period, even if the hearing tests of risky infants are normal, audiological evaluation should be performed again 12th month. A circular was published by the Ministry of Health General Directorate of Public Health on November 24, 2017. A decision was made to apply ABR as a screening test in all newborns [96].

In our study, screening ABR was performed instead of clinical ABR, it was difficult to fully understand the maturation. Pre-discharge screening ABR results were significantly higher in both groups. It remained from the hearing test, 15 cases in the intervention group, 19 cases in the control group. In 60 cases who continued the hearing follow-up program, the results of the second screening ABR are better in favor of normal hearing. In this, it was concluded that auditory neural maturation continues, with an increase in findings in favor of normal hearing.

In addition to clinical ABR, combined studies with OAE, EAI tests should be performed to see the continuity of maturation.

In a study carried out by Sungur, et al. 2015; these infants are high risk preterm infants with corrected ages ranging from 0 to 6 months, having normal hearing scores and the remaining are healthy newborns. In the present study, Wave V. latency and amplitudes are measued by means of CE-Chirp stimulus. The result of the sudy, the comparison of the high-risk premature infants and healthy newborns had statistically significant difference in the latency and amplitude of the V. wave measurements ($p > 0.05$). It is acquainted with that auditory neural maturation develops in women from previous published research [97].

It is known that clinical ABR changes the result even with the stimulus factor. In this study, S-ABR scores limited the knowledge of hearing and auditory neural maturation. Obtained values may be used as references for auditory neural maturation, diagnose and treatment protocol in the future studies.

The immature preterm brain is not yet ready to process multiple stimuli, including lights, noise, and painful interventions [9,98]. The sensory experience in the NICU, the brain structure of the preterm infants may cause negative effects [12]. During the critical period of perinatal brain development are triggered abnormal brain myelination with developmental disruption.

Studies carried out that analyzed exposure to EMF in premature infants are mainly based on ELF-EMF. Extremely low frequency (ELF) frequency range between 0 Hz to 300 kHz according to scientific literature. Electromagnetic fields (EMF) are from 5 Hz to 100 kHz is often referred [89]. Incubators are cots made of closed transparent material. There is a padded mattress heated by conventional, an external air filter and advanced systems for monitoring breathing status, heartrate and brain activity. The engine of the incubators uses radiofrequency energy to work [79]. Lamps used in phototherapy are also EMF sources. Incubator motors is emitted EMF source [4].

The incubators' EMF fields may alternate biological rhythms during perinatal period. Infants are sensitive, fragile and vulnerable thus EMF having a negative impact on the autonomous nervous system, in newborns [77]. It was documented the acquisition of a melatonin circadian rhythm that takes place at the age of 6–8 months, additionally vulnerable REM (Rapid Eye Movement) and No-REM sleep cyrcadian rhythms.

We did not take EMF from preterm infants for exposure, such as urine. The data obtained were insufficient, the relationship between exposure and neurodevelopment was not successful, with future study designs that should be edited.

Due to maturation and other health problems, we have achieved poor results in reflex findings. And after discharge, the fact that families did not bring them to control examinations made it difficult to determine the neurodevelopmental status of infants. The lack of participation in follow-up programs suggested that there is/will be recovery. In an abnormal situation, they would apply to the pediatric neurology or children's service of the hospital. We did not come across new applications in the patient registration system during repeated checks. We also did not receive invitations by phone from the family and preterm infants.

6.Conclusion

According to the TSE-EN ISO-11204 standard, the indoor noise exposure value is regulated only for hospital personnel [36]. Preterm infants who are treated and monitored in NICU are ignored in measurements. It is high according to the 45 dB noise limit values of the AAP [89] and below according to the NICU noise regulation of the Ministry of Health [99]. There is no personal protective equipment for noise control used by premature infants [100].

It complies with the lighting levels recommended by the AAP [69, 70, 101]. Different lighting levels are applied to support circadian formation. However, it has been determined that the limit value in each chart related to the TSE-EN 12464-1 standard is much lower [46].

Legal regulations should be regulated, especially for preterm infants. It was seen that occupational hygiene exposures were regulated only for those who work at work, neonatal intensive care units were not observed in treatment groups. Measurement standards provide legal regulations all over the world. It is clear that there are shortcomings in the basis of measurement standards. First of all, ISO standard setters need to correct this scope. As academic studies increase, there will be increased

awareness about it. As we continue to work together multidisciplinary, the burden on the national economy of persistent diseases will decrease. It will also reduce the costs paid for health care, education and rehabilitation.

More research is needed on this topic, with advanced and advanced designs. It is appropriate to decide together industrial designers, doctors, occupational health and safety specialists, academics, engineers, bureaucrats and relevant ministries.

7. Limitations

The strength of our research is that to date no study has evaluted the measure technique of indoor noise, personal noise, EMF and illuminate exposure in neonates. This study is the first study with a reasonable sample size to address the role of NICU environment conditionals in the success of ROP in the neonatal age group. This study contains some limitations: (1) we studied the neonates of a single-center, so it is suggested to carry out a multicenter research to make a better conclusion, (2) the number of our preterms limited in some weight categories. This is possible due to the lack of the number of infants in each group relating to urn randomization and enrolment, (3) The ethic committee didn't permission for personal noise exposure. Only the incubators of preterm infants were allowed outside intervention. Therefore, it was applied to nurses working in the service instead of preterm infants. (4) The clinical ABR in the ENT service of the university was impaired. Clinical ABR could not be evaluated because spare parts supply was not possible under pandemic conditions. Five, preterm infants were invited to the hospital for neurodevelopment follow-up, but were not brought. The pre-discharge findings were included in the study. Therefore further research rely upon the use of this research in various weight categories of infants with larger sample sizes and longer follow-up is called for.

Studies with more participants should be planned, with the participation of multiple centers, with different ambient units, in different GA and different BW groups. Randomization should be carried out blind and double-blind in a large group of participants. 5 days and more in the NICU should be included in all GA and in all BW groups.

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APPENDIX-9.1.

TEKİRDAĞ NAMIK KEMAL ÜNİVERSİTESİ
GİRİŞİMSEL OLMAYAN KLİNİK ARAŞTIRMALAR
ETİK KURULU KARAR FORMU

BAŞVURU BİLGİLERİ	**Araştırmanın Açık Adı**	Yenidoğan yoğun bakım kaynaklı elektro manyetik alan,gürültü ve aydınlık maruziyetinin yenidoğanın gelişimine etkisi				
	Koordinatör / Sorumlu Araştırmacı	Dr. Öğr. Üyesi Sinan Tüfekci / TNKÜ Tıp Fakültesi Çocuk Sağlığı ve Hastalıkları				
	Etik Kurul Toplantı Tarihi	**27.07.2021**				
	Araştırma Protokol Numarası	2021.212.07.20				
	Araştırmanın Türü	**Prospektif** ☒	**Retrospektif** ☐	**Diğer:**		
	Araştırmanın Destekleyicisi	**TÜBİTAK** ☐	**TNKÜ BAP** ☐	**Araştırmacı** ☒	**Diğer:**	
	Araştırmanın Bütçesi	100 ₺				
	Araştırmanın Merkezi	**Tek Merkezli** ☒	**Çok Merkezli** ☐			
KARAR BİLGİLERİ	Yukarıda bilgileri verilen başvuru dosyası ile ilgili belgeler araştırmanın/çalışmanın gerekçe, amaç, yaklaşım ve yöntemleri dikkate alınarak incelenmiş ve uygun bulunmuş olup, **araştırmanın/çalışmanın başvuru dosyasında belirtilen merkezlerde gerçekleştirilmesinde etik bilimsel sakınca bulunmadığına**, toplantıya katılan etik kurul üye tam sayısının oy birliği ile karar verilmiştir.					

ETİK KURULUN ÇALIŞMA ESASI	İlaç ve Biyolojik Ürünlerin Klinik Araştırmaları Hakkında Yönetmelik, İyi Klinik Uygulamaları Kılavuzu

Unvanı/Adı/Soyadı	**Uzmanlık Alanı**	**Araştırma ile İlişkili**		**Katılım ***		**İmza**
Prof. Dr. Ali Rıza KIZILER	Biyofizik	E ☐	H ☒	E ☒	H ☐	
Prof. Dr. M. Metin DONMA	Çocuk Sağlığı ve Hastalıkları	E ☐	H ☒	E ☒	H ☐	
Prof. Dr. Savaş GÜZEL	Tıbbi Biyokimya	E ☐	H ☒	E ☐	H ☒	
Prof. Dr. Yakup ALBAYRAK	Ruh Sağlığı ve Hastalıkları	E ☐	H ☒	E ☒	H ☐	
Doç. Dr. Sibel ÖZKAN GÜRDAL	Genel Cerrahi	E ☐	H ☒	E ☒	H ☐	
Dr. Öğr. Üyesi Ayşin NALBANTOĞLU	Çocuk Sağlığı ve Hastalıkları	E ☐	H ☒	E ☒	H ☐	
Dr. Öğr. Üyesi Aliye ÇELİKKOL	Tıbbi Biyokimya	E ☐	H ☒	E ☒	H ☐	
Dr. Öğr. Üyesi Berna ERDAL	Tıbbi Mikrobiyoloji	E ☐	H ☒	E ☒	H ☐	
Dr. Öğr. Üyesi Birol TOPÇU	Biyoistatistik	E ☐	H ☒	E ☒	H ☐	
Dr. Öğr. Üyesi Mehmet Ümit ÇETİN	Ortopedi ve Travmatoloji	E ☐	H ☒	E ☒	H ☐	
Dr. Öğr. Üyesi Naile Esra SAKA	Adli Tıp	E ☐	H ☒	E ☒	H ☐	
Dr. Öğr. Üyesi Sonat Pınar KARA	İç Hastalıkları	E ☐	H ☒	E ☒	H ☐	
Dr. Öğr. Üyesi Zeynep KURTULUŞ TOSUN	İç Hastalıkları Hemşireliği	E ☐	H ☒	E ☒	H ☐	
Dr. Öğr. Üyesi Mahluga JAFAROVA DEMİRKAPU	Tıbbi Farmakoloji	E ☐	H ☒	E ☐	H ☒	
Dr. Öğr. Üyesi Ayhan ŞAHİN	Anesteziyoloji ve Reanimasyon	E ☐	H ☒	E ☒	H ☐	

*: Toplantıda bulunma.

Etik Kurul Başkanının

Ünvanı/Adı/Soyadı: Prof. Dr. Ali Rıza KIZILER

İmza:

9.2

TEKIRDAG IL SAGLIK MUDURLUGU - TEKIRDAG
EĞİTİM HİZMETLERİ BİRİMİ
13/06/2022 17:04 / 12641312 / 044 / E-12641312-044.345
00167404307

T.C.
TEKİRDAĞ VALİLİĞİ
İl Sağlık Müdürlüğü

Sayı : E-12641312-044
Konu : Araştırma İzin Talebi/Habibe ER

DAĞITIM YERLERİNE

İlgi : Habibe ER'in 23/05/2022 tarihli dilekçesi.

İlgide kayıtlı dilekçe ile Yeditepe Üniversitesi Halk Sağlığı Yüksek Lisans öğrencisi Habibe ER tarafından Tekirdağ Namık Kemal Üniversitesi Tıp Fakültesi Hastanesinde tıbbi tedavisi yapılan preterm bebeklerin **"YenidoğanYoğun Bakım Kaynaklı Gürültü, Aydınlatma ve Elektromanyetik Alan Maruziyetinin Yenidoğanların Gelişimine Etkisi "** konulu yüksek lisans çalışmasında çalışma ve kontrol grubu olarak seçilen altmış (60) preterm bebeğin işitme ve ROP tarama değerlerinin uzman hekimin olmaması ve hastaların başka merkezlere sevki neticesinde elde edilemediği, bu nedenle çalışmaya dahil olan pretermlerin sonuçlarını Halk Sağlığı tarama biriminden almak için gerekli izin talebinde bulunulmuştur.

Araştırma başvurusu komisyon tarafından incelenmiş ve mevcut kayıtların elinizde bulunması halinde ve hasta onamlarının görülmesi kaydıyla kayıtların verilmesine, uygulamanın hizmeti aksatmayacak şekilde yürütülmesi, katılımın gönüllülük esasına göre yapılması, çalışma sonucunun Müdürlüğümüz bilgisi dışında ilan edilmemesi, tamamlanan araştırma raporunun 2 nüsha olarak ve ayrıca CD formatında araştırmacı tarafından Müdürlüğümüz Eğitim Birimine teslim edilmesi şartıyla çalışmanın yapılmasının uygun olduğuna karar verilmiştir.

Gereğini ve bilgilerinizi arz ederim.

Zafer SOYKIRLI
Başkan

Ek:
1. Bilgilendirilmiş Onam Formu (2 Sayfa)
2. Protokol (2 Sayfa)

Dağıtım:
Halk Sağlığı Hizmetleri Başkanlığı
Habibe ER e-posta:

Bilgi için: EDA ÖZEL
PSİKOLOG
Telefon: Faks No:
e-Posta: eda.karacay2@saglik.gov.tr İnternet Adresi:
Telefon No: (0 282) 258 22 58

9.3

T.C.
SAĞLIK BAKANLIĞI
TEKİRDAĞ İL SAĞLIK MÜDÜRLÜĞÜ

ARAŞTIRMA İZİNLERİ İŞBİRLİĞİ PROTOKOLÜ

Taraflar:

Bu protokol **Tekirdağ İl Sağlık Müdürlüğü ve TNKÜ Tıp Fakültesi Hastanesi** arasında düzenlenmiştir.

Çalışmanın gerçekleştirileceği kurum/kuruluşlar:
Tekirdağ İl Sağlık Müdürlüğü Halk Sağlığı Hizmetleri birimi TNKÜ Tıp Fakültesi Hastanesi Yenidoğan Yoğun Bakım Ünitesi

Çalışmanın Adı: "Yenidoğan Yoğun bakım kaynaklı elektromanyetik alan, gürültü, aydınlık maruziyetinin yenidoğanın gelişimine etkisi"

Bu çalışmayı yürütecek kişi/kişiler: Dr. Öğr. Üyesi Sinan Tüfekçi/ Habibe Er

Protokol Hükümleri

a) Bu protokol Tekirdağ İl Sağlık Müdürlüğüne bağlı kurum ve kuruluşlarda verilen hizmetleri, yapılan koruyucu sağlık hizmeti çalışmalarını ya da yapılan kayıtlar sonucu elde edilen istatistik verileri içeren ve kurum personeli ve/veya kuruma başvuran kişilerle yapılacak anket veya bilimsel çalışmaları kurala bağlamak amacı ile düzenlenmiştir.
b) Yapılacak bilimsel çalışma proje aşamasında iken Tekirdağ İl Sağlık Müdürlüğü Bilimsel Çalışma Değerlendirme Komisyonu tarafından değerlendirilecektir.
c) Çalışma uygulanırken kapsam dışı hiçbir veri toplanmayacaktır.
d) Veri toplama sırasında Tekirdağ İl Sağlık Müdürlüğü personelinden de yararlanılacaksa bunun için ayrıca Tekirdağ İl Sağlık Müdürlüğünden onay alınacaktır.
e) Çalışma yayın/tez haline getirilmeden önce İl Sağlık Müdürlüğünün ilgili birimi tarafından verilerin analizi değerlendirilecektir. Yasal mevzuat ve Müdürlüğümüz hizmet gerekleri açısından sakıncalı verilerin yayınlanması kısıtlanabilecektir.
f) Çalışma üniversite veya kurum tarafından kabul edildikten sonra **kitapçık halinde** ve ayrıca **elektronik ortamda CD/DVD üzerine kayıtlı** olarak Tekirdağ İl Sağlık Müdürlüğüne teslim edilecektir.
g) Çalışmayı yapacak olan kişi **(e)** ve **(f)** maddelerini yerine getirmediği takdirde kurumumuza ait veriler yayın/proje/tez vs. gibi bilimsel bir çalışmada kullanılamayacaktır.
h) Çalışma esnasında her tür ilaç uygulaması veya girişim için gerek hastanın kendisi ya da yasal vasisinden gerekse de etik kuruldan onay alınacaktır.
i) Araştırma verileri, sözel ya da yazılı olarak kullanıldığında ilgili kurum/kurumların (hastane, ağız ve diş sağlığı merkezi vb.) ismi zikredilmeyecektir.
j) Çalışma esnasında her tür ilaç uygulaması, girişim veya anket uygulamaları için hastanın kendisi ya da yasal vasisinden **Aydınlatılmış Onam Formu** alınacaktır.

Protokolün süresi:

a) Bu çalışmanın yürütücüsü kurumlarımızda on iki (12) ay/~~yıl~~ süre ile çalışmasını yürütecektir.
b) **Başlangıç** 31.10.2021 **/Bitiş** 31.10.2022

Belge Doğrulama Kodu: 08b41761-f31b-4ff7-a2f8-0726ad3ee5db Belge Doğrulama Adresi: https://www.turkiye.gov.tr/saglik-bakanligi-ebys
Bu belge, güvenli elektronik imza ile imzalanmıştır.

c) Protokol, çalışmanın taraflarca planlanan ve kabul edilen süresi ile sınırlıdır. Uzatılması ancak yeni bir protokole bağlıdır.
d) Şartlarda oluşabilecek değişikliklere bağlı olarak İl Sağlık Müdürlüğü protokolü daha önceden de sonlandırabilecektir.

Sözleşme Şartlarına Aykırılık:

Protokol süresince yapılacak çalışmalar sırasında, yapılan çalışmayı devam ettiren kişi ya da kişiler protokolde ismi belirtilen aynı kişiler olacaktır. Saha çalışmasına katılan ve protokolle tespit edilen kişide değişiklik yapılması ya da yeni kişinin çalışmaya dâhil edilmesi ancak Tekirdağ İl Sağlık Müdürlüğü onayı ile mümkün olabilecek, ya da protokol iptal edilecektir. İlgili hükümler ihlal edildiğinde, protokolde imzası ve beyanı bulunan ilgili kişiler hakkında Tekirdağ İl Sağlık Müdürlüğünce; kamu kurumlarının çalışmalarına ait verilerin kamudaki gizlilik ilkelerine ve resmi işleyiş esaslarına aykırı davranıldığı gerekçesiyle adli merciler nezdinde suç duyurusunda bulunulacaktır.

İhtilafların çözümü:

Protokolün uygulanması ile ilgili çıkabilecek sorunların çözümü konusunda, Tekirdağ İli Mahkemeleri yetkilidir.

İlgili protokol hükümlerini ve cezai müeyyideleri okudum ve kabul ettim.

23/05./2022

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9.4 YENİDOĞAN YOĞUN BAKIM KAYNAKLI ELEKTRO MANYETİK ALAN, AYDINLIK VE GÜRÜLTÜ MARUZİYETİNİN YENİDOĞANIN GELİŞİMİNE ETKİSİ

YENİDOĞAN BİLGİ FORMU / ANNE VE BABA BİLGİ FORMU

Sayın anne – babalar araştırma için bebeğinizin ve sizin bilgilerini almamız gerekiyor. Bu form yapılacak araştırmaya bilgi sağlaması için hazırlanmıştır. Araştırmaya katılan kimsenin bilgileri korunacak ve saklı kalacaktır. Formu doldurduğunuz, ilginiz ve izniniz için teşekkür ederiz.

Dr.Sinan Tüfekci
TNKÜ Yenidoğan Yoğunbakım Ünitesi

Habibe Er
Yeditepe Üniversitesi Halk Sağlığı Yüksek Lisans Öğrencisi

Form No:

Tarih: / / 202

GÖRÜŞEN KİŞİ: **ANNENİN İSİM – SOYADI:**

SOSYODEMOGRAFİK ÖZELLİKLER

SDC1. Annenin doğum tarihi (gg/ay/yyyy): __ __ /__ __ /__ __ __ __ Yaşı: __ __
SDC2. Babanın doğum tarihi (gg/ay/yyyy): __ __ /__ __ /__ __ __ __ Yaşı: __ __
SDC3. Ebeveynlerin medeni durumu ?
1 Evli 2 Boşanmış 3 Ayrı yaşıyor 4 Birlikte yaşıyor
SDC4. Hamilelik esnasında biyolojik anne baba birlikte mi yaşıyorlardı ?
1 Evli 2 Boşanmış 3 Ayrı yaşıyor 4 Birlikte yaşıyor

SDC5 ANNENİN EĞİTİM DURUMU		
1 **Okuryazar değil**	2 Okuryazar	3 ilkokul
4 ilkokul terk	5 Ortaokul	6 Ortaokul terk
7 Lise	8 Lise terk	9 MYO
10 Universite terk	11 Fakülte mezunu	12 Yüksek lisans
13 Doktora		

SDC6. Annenin çalışma durumu				
1 Full time (30 saat haftada)	2 Part time (30 saatten az)	3 Esnaf	4 İşsiz	5 Öğrenci
6 Ev hanımı	7 Memur	8 işçi	9 çiftçi	10 Evden çalışıyor

SDC7.Yaşayan çocuk sayınız?				
1 1	2 2	3 3	4 4	5 Diğer (…..)
SDC8. Gebelik sayınız				
1 1	2 2	3 3	4 4	5 Diğer (…..)

SDC9. Annenin çalıştığı işyeri ortamı gürültülü ise?		
1 **Kulaklık kullanıyor**	2 Tıkaç kullanıyor	3 Hayır kullanmıyorum
SDC10. Cep telefonu kullanım süreniz saat / günlük :		**saat/ 1 gün**

AİLE TIBBİ HİKAYESİ

TBH1 .Anne baba akrabalık:	1 **EVET**	2 **HAYIR**
TBH2. Rh UYUŞMAZLIĞI	1 **EVET**	2 **HAYIR**

TBH3. Hamilelik esnasında ateşli bir hastalık geçirdiniz mi?

1☐ Hepatitit B 2☐ Hepatitit C
3☐ Intra uterine enfeksiyonu 4☐ HIV 5☐Diğer.....

TBH 4. Hamilelikte gelişen komplikasyon?

1☐ Hipertansiyon 2☐ Diabet 3☐ Anaemia
4☐ Preeclempsi 5☐ Depresyon 6☐ Diğer

TBH 5. Hamilelik esnasında ilaç kullanımı?

1 Hayır
2 Evet, tıbbi nedenlerle gelişen durum nedeniyle
3 Evet, tıbbi nedenlerden dolayı gerekli olanlar dışındaki ilaçlar
4 Reçeteli ilaçlar

TBH6. Hamilelik esnasında karın bölgesini etkileyen darbe/ travma oldu mu?	1 **EVET**	2 **HAYIR**

TBH7. Annenin hastalık öyküsünün varlığı

KRONİK HASTALIKLAR	**VARLIĞI?**		**İLAÇ KULLANIMI?**	
CD1. Hipertansiyon	1☐ Evet	2☐ Hayır	1☐ Evet	2☐ Hayır
CD2. Diyabet	1☐ Evet	2☐ Hayır	1☐ Evet	2☐ Hayır
CD3. Kalp damar (UAP/AP, History of by-pass, MI)	1☐ Evet	2☐ Hayır	1☐ Evet	2☐ Hayır
CD4. inme	1☐ Evet	2☐ Hayır	1☐ Evet	2☐ Hayır
CD5. yüksek kolesterol	1☐ Evet	2☐ Hayır	1☐ Evet	2☐ Hayır
CD6. Otoimmün hastalık	1☐ Evet	2☐ Hayır	1☐ Evet	2☐ Hayır
CD7.Astım, bronşit	1☐ Evet	2☐ Hayır	1☐ Evet	2☐ Hayır
CD8. talasemi	1☐ Evet	2☐ Hayır	1☐ Evet	2☐ Hayır
CD9.böbrek hastalıkları	1☐ Evet	2☐ Hayır	1☐ Evet	2☐ Hayır
CD10. Diğer	1☐ Evet	2☐ Hayır	1☐ Evet	2☐ Hayır

TBH8. Babanın hastalık öyküsünün varlığı

KRONİK HASTALIKLAR	**VARLIĞI?**		**İLAÇ KULLANIMI?**	
CD1. Hipertansiyon	1☐ Evet	2☐ Hayır	1☐ Evet	2☐ Hayır
CD2. Diyabet	1☐ Evet	2☐ Hayır	1☐ Evet	2☐

				Hayır
CD3. Kalp damar (UAP/AP, History of by-pass, MI)	1 Evet	2 Hayır	1 Evet	2 Hayır
CD4. inme	1 Evet	2 Hayır	1 Evet	2 Hayır
CD5. yüksek kolesterol	1 Evet	2 Hayır	1 Evet	2 Hayır
CD6. Otoimmün hastalık	1 Evet	2 Hayır	1 Evet	2 Hayır
CD7.Astım, bronşit	1 Evet	2 Hayır	1 Evet	2 Hayır
CD8. talasemi	1 Evet	2 Hayır	1 Evet	2 Hayır
CD9.böbrek hastalıkları	1 Evet	2 Hayır	1 Evet	2 Hayır
CD10. Diğer	1 Evet	2 Hayır	1 Evet	2 Hayır

BAĞIMLILIK ÖYKÜSÜ

BÖ1. SİGARA KULLANIMI : ANNE	**BABA**
1 **Evet** , Hergün 1 kez **[Tablo 1]**	1 **Evet** , Hergün 1 kez **[Tablo 1]**
2 Evet nadiren **[Tablo 3]**	2 Evet nadiren **[Tablo3]**
3 **Bıraktım** ___ ay ___ yıl **[Tablo 2]**	3 **Bıraktım** ___ ay ___ yıl **[Tablo 2]**
4 **Asla içmem (** Tablo 4 **)**	4 **Asla içmem** (Tablo 4)

BÖ2 MADDE KULLANIMI : ANNE	**BABA**
1 **Evet** , Hergün 1 kez **[Tablo 1]**	1 **Evet** , Hergün 1 kez **[Tablo 1]**
2 Evet nadiren **[Tablo3]**	2 Evet nadiren **[Tablo3]**
3 **Bıraktım** ___ ay ___ yıl **[Tablo 2]**	3 **Bıraktım** ___ ay ___ yıl **[Tablo 2]**
4 **Asla içmem**	4 **Asla içmem**

BÖ3 ALKOL KULLANIMI : ANNE	**BABA**
1 **Evet** , Hergün 1 kez **[Tablo 1]**	1 **Evet** , Hergün 1 kez **[Tablo 1]**
2 Evet nadiren **[Tablo3]**	2 Evet nadiren **[Tablo3]**
3 **Bıraktım** ___ ay ___ yıl **[Tablo 2]**	3 **Bıraktım** ___ ay ___ yıl **[Tablo 2]**
4 **Asla içmem**	4 **Asla içmem**

Tablo 1 Düzenli kullananlar ANNE	**BABA**
1 günde ne kadar içersin ? adet/ gün	1 günde ne kadar içersin ? adet/ gün
Ne kadar süre içtin ? ay/ yıl	Ne kadar süre içtin ? ay/ yıl

Düzenli içmeye başladığında yaş kaç yaşındaydın ?	Düzenli içmeye başladığında yaş kaç yaşındaydın ?

TABLO 2 BIRAKMIŞ OLANLAR ANNE	**BABA**
Ne zaman bıraktın ? ay / yıl	Ne zaman bıraktın ? ay / yıl

TABLO 3 NADİREN İÇENLER ANNE	**BABA**
Ne sıklıkla içersin ? adet / /gg /ay /yıl	Ne sıklıkla içersin ? adet / /gg /ay /yıl
Kaç yıldır? Ay/ yıl	Kaç yıldır? Ay/ yıl

TABLO 4 TÜM KATILIMCILAR CEVAP VERECEK

1.Eğer sigara bağımlısı varsa evde içebilir mi? Nerede?		
1 ☼ Evin içinde	2 ☼ Balkonda	3 ☼ Evin dışında

2. Evin içinde ne sıklıkla sigara içilir?			
1 ☼ Asla	2 ☼ Nadiren	3 ☼ Sıklıkla	4 ☼ Çok sık

9.5 **ANAMNEZ FORMU** **YENİDOĞANIN ADI:**

MHC1. Cinsiyeti :	1 **Erkek**	2 **Kız**
MHC2. Doğum Tarihi (GG/AA/YYYY): __ __ / __ __ / 202 __		
MHC3. Nerede doğdu ?_____		
MHC4. Bebeğin doğum haftası nedir ? _____ hafta		
MHC5. Doğum kilosu nedir ? _____gram		
MHC6. Doğum şekli : Normal doğum Sezaryen Normal doğuma yardımcı aletlerle		
MHC7. APGAR Skoru : 1. Dakika_____ 5.Dakika _____		
MHC8. Yenidoğan sarılığı var mı ?	1 **EVET**	2 **HAYIR**
MHC9. Siyonozu var mıydı ?	1 **EVET**	2 **HAYIR**
MHC10. Doğar doğmaz küvöze alındı mı?	1 **EVET**	2 **HAYIR**
MHC11. Yatış tarihi : (GG/AA/YYYY): __ __ / __ __ / 202 __		
MHC12. CPR Canlandırma öyküsü :	1 **EVET**	2 **HAYIR**
MHC13. Yoğun bakım ünitesinde yatış nedeni :		
MHC14. Tibbi tanısı :		
MHC15: Solunum durumu :		
MHC16. BESLENME DURUMU :		
Anne sütü / Damardan besleniyor (TPN) / Midesine sokulan sonda ile besleniyor / Anne sütü ve mama karışık besleniyor		
MHC17. CERRAHİ İŞLEM ÖYKÜSÜ	1 **EVET**	2 **HAYIR**
MHC18. FOTOTERAPİ VE SÜRESİ _____ gün _____ saat		
MHC19. ASFİKSİ :	1 **EVET**	2 **HAYIR**
MHC20. MEKANİK VENTİLASYON :	1 **EVET**	2 **HAYIR**
MHC21. OTOTOKSİK İLAÇ ÖYKÜSÜ :	1 **EVET**	2 **HAYIR**
MHC22. ENFEKSİYON VARLIĞI :	1 **EVET**	2 **HAYIR**

MHC23. KAN GAZI (1- 5 GÜN)

pH:_____baz açığı:_____HCO3:_____laktat:_____

MHC24. BİYOKİMYA SONUÇLARI :

GLUKOZ		**KALSİYUM**	
BUN		**KREATİNİN**	
AST		**ALT**	
POTASYUM		**SODYUM**	
FOSFOR			
TOTAL BİLİRUBİN		**DİREKT BİLİRUBİN**	
TSH		**FT4**	
TOPUK KANI			

MHC25. DİĞER ÖNEMLİ NOTLAR

MHC26. KBB MUAYENESİ :	**SAĞ**	**SOL**

MHC27. ABR :

	I.	**III**	**V.**	**I-III**	**III-V**	**I-V**	**ms**
SAĞ							
SOL:							

MHC28. OAE:

SAĞ	
SOL:	

MHC29. YÜKSEK FREKANS EAİ:

SAĞ	
SOL:	

MHC30. AKUSTİK REFLEKSLERİ :

	500 Hz	**1000 Hz**	**2000 Hz**	**4000 Hz**	
SAĞ					**İPL**
					CL
SOL:					**İPL**
					CL

MHC31. ROP :

	Evre 1	Evre 2	Evre 3
SAĞ			
SOL			

MHC32. MORO REFLEKSİ:	
MHC33. ARAMA VE EMME REFLEKSİ:	
MHC34. PATELLAR TENDON REFLEKSİ:	
MHC35. KLONUS:	
MHC36. EL VE AYAKLARDA BİLATERAL YAKALAMA REFLEKSİ:	_____/_____/ VE /_____/_____
MHC37. İNTRAKRANİYAL KANAMA VE EVRESİ:	
MHC38. HİDROSEFALİ:	
MHC39. DİĞER ÖNEMLİ NOTLAR :	

9.6

STRES ALGI TESTİ

	Asla	**Neredeyse hiçbir zaman**	**Bazen**	**Odukça sık**	**Çok sık**
1. Hamileliğinizde beklenmedik bir şey yüzünden ne sıklıkta üzüldün ?					
2. Hamileliğinizde hayatınızdaki önemli şeyleri kontrol edemediğinizi ne sıklıkla hissettiniz ?					
3. Hamileliğinizde hangi sıklıkla gergin ve "stresli" hissettiniz?					
4. Hamileliğinizde kişisel sorunlarınızla başa çıkma yeteneğinizden ne sıklıkla emin oldunuz?					
5. Hamileliğinizde , işlerin yolunda gittiğini ne sıklıkla hissettin?					
6. Hamileliğinizde yapman gereken her şeyle başa çıkamadığını ne sıklıkla buldun?					
7. Hamileliğinizde hayatınızdaki zorlukları ne sıklıkla kontrol edebildiniz?					
8. Hamileliğinizde ne sıklıkla işlerin üstesinden geldiğini hissettin??					
9. Hamileliğinizde kontrolünüz dışındaki şeyler yüzünden ne sıklıkla sinirlendiniz??					
10. Hamileliğinizde zorlukların üstesinden gelemeyeceğiniz kadar biriktiğini ne sıklıkla hissettiniz?					

9.7

Bu Raporda Kullanılan Standartlar
Standarts of the Test

Aydınlatma Ölçümü	COHSR 928-I-IPG-039
İç Ortam Gürültü Ölçümü	TS EN ISO 11204
Kişisel Gürültü Maruziyeti Ölçümü	TS 2607 ISO 1999 TS EN ISO 9612
Elektromanyetik Alan Ölçümü	TS EN 50413

Bu Raporda Kullanılan Yönetmelikler
Rules and Regulations Used in Reporting

• Aydınlatma	• İşyeri Bina Ve Eklentilerinde Alınacak Sağlık Ve Güvenlik Önlemlerine İlişkin Yönetmelik • TS EN 12464-1 "Işık ve Aydınlatma – Çalışma Yerlerinin Aydınlatılması – Bölüm 1: Kapalı Çalışma Alanları" • TS EN 12464-2 "Işık ve Aydınlatma – Çalışma Yerlerinin Aydınlatılması – Bölüm 2: Açık Çalışma Alanları"
• Gürültü	• Çalışanların Gürültü İle İlgili Risklerden Korunmalarına Dair Yönetmelik
• Elektromanyetik Alan	• Elektronik Haberleşme Cihazlarından Kaynaklanan Elektromanyetik Alan Şiddetinin Uluslararası Standartlara Göre Maruziyet Limit Değerlerinin Belirlenmesi, Kontrolü ve Denetimi Hakkında Yönetmelik

9.8

TÜRK STANDARDI
TURKISH STANDARD

TS EN 12464-1
Şubat 2013

ICS 91.160.10

IŞIK VE AYDINLATMA - ÇALIŞMA YERLERİNİN AYDINLATILMASI - BÖLÜM 1: KAPALI ÇALIŞMA ALANLARI

Light and lighting - Lighting of work places - Part 1: Indoor work places

TÜRK STANDARDLARI ENSTİTÜSÜ
Necatibey Caddesi No.112 Bakanlıklar/ANKARA

Çizelge 5.44 - Sağlık hizmetleri tesisleri - Doğumhaneler

Ref. no.	İç kısım, iş veya faaliyet tipi	$\bar{E}_m$ lx	UGR_L -	U_o -	R_a -	Açıklama
5.44.1	Genel aydınlatma	300	19	0,60	80	
5.44.2	Muayene ve tedavi	1000	19	0,70	80	

Çizelge 5.45 - Sağlık hizmetleri tesisleri – Tedavi odaları (Genel)

Ref. no.	İç kısım, iş veya faaliyet tipi	$\bar{E}_m$ lx	UGR_L -	U_o -	R_a -	Açıklama
5.45.1	Diyaliz	500	19	0,60	80	Aydınlatma kontrol edilebilir olmalıdır.
5.45.2	Dermatoloji	500	19	0,60	90	
5.45.3	Endoskopi odaları	300	19	0,60	80	
5.45.4	Alçı odaları	500	19	0,60	80	
5.45.5	Tıbbi banyolar	300	19	0,60	80	
5.45.6	Masaj ve radyoterapi	300	19	0,60	80	

Çizelge 5.46 - Sağlık hizmetleri tesisleri - Ameliyat alanları

Ref. no.	İç kısım, iş veya faaliyet tipi	$\bar{E}_m$ lx	UGR_L -	U_o -	R_a -	Açıklama
5.46.1	Ameliyat öncesi ve kendine gelme odaları	500	19	0,60	90	
5.46.2	Ameliyathane	1000	19	0,60	90	
5.46.3	Vücutta ameliyatın yapıldığı boşluk			-		$\bar{E}_m$ 10000lx'ten 100000lx'e.

Çizelge 5.47 - Sağlık hizmetleri tesisleri - Yoğun bakım ünitesi

Ref. no.	İç kısım, iş veya faaliyet tipi	$\bar{E}_m$ lx	UGR_L -	U_o -	R_a -	Açıklama
5.47.1	Genel aydınlatma	100	19	0,60	90	Zemin seviyesinde.
5.47.2	Basit muayeneler	300	19	0,60	90	Yatak seviyesinde.
5.47.3	Muayene ve tedavi	1000	19	0,70	90	Yatak seviyesinde.
5.47.4	Gece nöbeti	20	19	-	90	

Çizelge 5.48- Sağlık hizmetleri tesisleri - Dişçiler

Ref. no.	İç kısım, iş veya faaliyet tipi	$\bar{E}_m$ lx	UGR_L -	U_o -	R_a -	Açıklama
5.48.1	Genel aydınlatma	500	19	0,60	90	Aydınlatma hasta için göz kamaşması olmaksızın yapılmalıdır.
5.48.2	Tedavideki kişide	1000	-	0,70	90	
5.48.3	Ağız boşluğunda	5000	-	-	90	Özel kurallar EN ISO 9680'de verilmiştir.
5.48.4	Diş renginin uyumlaştırılması	5000	-	-	90	Özel kurallar EN ISO 9680'de verilmiştir.

Çizelge 5.49 - Sağlık hizmetleri tesisleri - Laboratuvarlar ve eczaneler

Ref. no.	İç kısım, iş veya faaliyet tipi	$\bar{E}_m$ lx	UGR_L -	U_o -	R_a -	Açıklama
5.49.1	Genel aydınlatma	500	19	0,60	80	
5.49.2	Renk muayenesi	1000	19	0,70	90	6000 K $\leq T_{cp} \leq$ 6500 K

10. CURRICULUM VITAE

Personal Information

Name	Habibe	**Surname**	ER
Place of Birth		**Date of Birth**	
Nationality		**T.R. Identification Number**	
E-mail		**Phone number**	

Educational Background

Degree	**Department**	**Name of the Institution Graduated From**	**Year of Graduation**
Doctorate			
Master's Degree			
Undergraduate	Emergency aid and disaster management Occupational Health and Safety Audiometry	Ataturk University Ataturk University Hacettepe University	2018 2016 1992
High School	Anatolian High School -	Sehremini	1989

Foreign Languages Known	**Foreign Language Exam Grade (#)**
English	61,25

Work Experience (Sort from present to past)

Position	**Institution**	**Duration (Year - Year)**
Academician	Istanbul Aydın University Faculty of Health Sciences Audiology Department	2022- at present
Occupational Health and Safety Owner	Akulab OSGB	2007- at present
Owner- Audiologyst	Akulab İşitme ve Denge Laboratuarı	2005-2007
Audiologyst	Odyovest İşitme ve Denge Merkezi	1997-2005
Audiologyst	Sonamed İşitme ve Denge Merkezi	1996-1997
Audiologyst – Hospital Manager	İstanbul KBB Hastanesi	1992-1996
Screening Program Audiology	UNİCEF	1992

Computer Skills

Program	**Usage skill**
Microsoft Office	good
Spss	good

Scientific Works

Others (Projects/Certificates/Rewards)

April 2000-American Academy of Audiology Congress, Chicago
November 2001 –National ENT Kongress
October 2002 – National ENT KOngress
Novembe2021 İETOX
November 2021- TURKAK 17020 Standard Education

THE EFFECT OF NOISE, ILLUMINATION, AND ELECTROMAGNETIC FIELD EXPOSURE ON THE NEURODEVELOPMENT OF NEWBORNS IN A NEONATAL INTENSIVE CARE UNIT: A RANDOMIZED CONTROLLED TRIAL

ORİJİNALLİK RAPORU

%18	%14	%12	%7
BENZERLİK ENDEKSİ	İNTERNET KAYNAKLARI	YAYINLAR	ÖĞRENCİ ÖDEVLERİ

BİRİNCİL KAYNAKLAR

1	Şefika Dilek Güven, Nazan Çalbayram. "The effect of Helfer skin tap technique on hepatitis B vaccine intramuscular injection pain in neonates: A randomized controlled trial", EXPLORE, 2022 Yayın	%1
2	www.nature.com İnternet Kaynağı	%1
3	I. Calvente, A. Vázquez-Pérez, M.F. Fernández, M.I. Núñez, A. Múñoz-Hoyos. "Radiofrequency exposure in the Neonatal Medium Care Unit", Environmental Research, 2017 Yayın	%1
4	Xuyan Ren, Li Li, Siya Lin, Chunxia Zhong, Bin Wang. "Effects of white noise on procedural pain-related cortical response and pain score in neonates: A randomized controlled trial",	%1