THE EFFECT OF ELECTROMAGNETIC FIELD EXPOSURE ON HEALTH PARAMETERS AND OCCUPATIONAL PERFORMANCE: A SCALE STUDY

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Introduction

- Electromagnetic fields (EMFs), produced by electrically charged particles, vary in frequency and intensity and are commonly generated by household and workplace devices.
- Fibromyalgia is a chronic disorder characterized by widespread musculoskeletal pain, fatigue, sleep disturbances, and cognitive difficulties. It is believed to involve abnormal pain processing in the nervous system, often triggered or exacerbated by stress, infections , or physical trauma.
- Prolonged EMF exposure has been linked to health issues such as stress, cancer, Alzheimer's, and Parkinson's due to its potential to disrupt cellular processes and damage DNA.
- Additionally, EMFs can impact mental health and productivity, particularly in occupational settings.
- ***This study explores*** the effects of workplace EMF exposure on health and productivity while highlighting the need for preventive measures to reduce long-term risks.

Methods

- This cross-sectional study was conducted at Bezmialem Foundation University Health Practice and Research Hospital with 98 participants from various departments. Participants were categorized into three groups based on their EMF exposure levels: low, medium, and high.
- **EMF Measurement:** Conducted using the WAVECONTROL SMP2 device.
- **Health Assessments:**
  - **Pain Levels:** Measured using the VAS scale.
  - **Mental Health:** Depression and anxiety evaluated with Beck Depression II and Beck Anxiety scales.
  - **Quality of Life:** Assessed using the SF-36 scale.
  - **Work Productivity:** Evaluated using the WPAI questionnaire.

Results

- Electromagnetic Field Exposure Categories
- **Low Electromagnetic Field Intensity Areas:**
- BVU Physical Therapy Department
- -1st Floor: Cardiovascular Surgery (CVS) Intensive Care Unit
- **Moderate Electromagnetic Field Intensity Areas:**
- 1st Floor: Call Center
- -1st Floor: Operating Room
- Ground Floor: Internal Medicine EKG Department
- **High Electromagnetic Field Intensity Areas:**
- Ground Floor: Radiology Department
- -1st Floor: Biochemistry Laboratory
- 6th Floor: Coronary Care Unit (CCU)

Results

- The study population was evenly distributed in terms of age and gender, with no significant differences observed (**p=0.760** and **p=0.352**, respectively).

	SIDDETGRUP	Mean	Std. Deviation	Percentiles 25	50	75	p
Yaş	1,00	32,52	5,400	27,00	33,00	37,50	0,760
	2,00	32,21	4,545	28,00	32,50	36,25	
	3,00	31,40	5,766	28,00	32,00	36,00	

Crosstab

			SIDDETGRUP düşük(1+2)	orta(3+4+5)	yüksek(8+7+6)	p
Cinsiyet	1	Count	9	26	20	0,352
		% within SIDDETGRUP	42,9%	61,9%	57,1%	
	2	Count	12	16	15	
		% within SIDDETGRUP	57,1%	38,1%	42,9%	
Total		Count	21	42	35	98

The study included 98 participants. No statistically significant differences were observed in age averages and gender among the groups (p=0.760 for age, p=0.352 for gender). This indicates a homogeneous distribution in terms of gender and age across the groups,

suggesting that the study is free from the misleading effects of heterogeneous age and gender distributions.

Key findings include:

- **Mental Health:** Beck Anxiety scores showed significant differences among exposure groups (**p=0.005 for both**).

beckanksiyete across SIDDETGRUP

Pairwise Comparisons of SIDDETGRUP

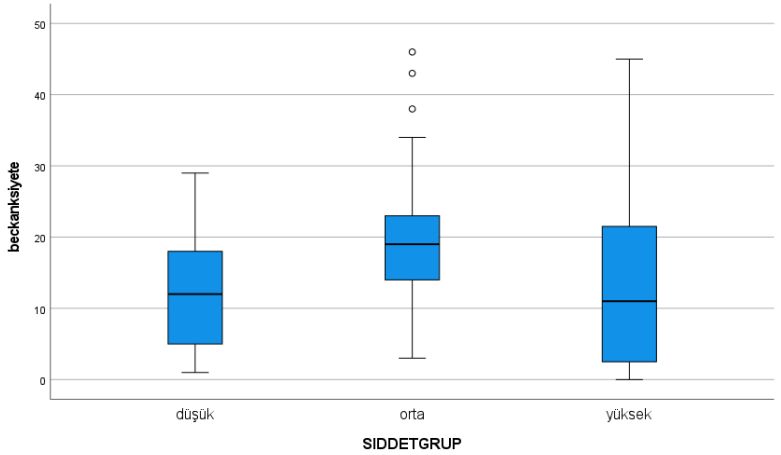
Sample 1-Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig.*
düşük(1+2)-yüksek(8+7+6)	-3,019	7,842	-,385	,700	1,000
düşük(1+2)-orta(3+4+5)	-21,095	7,593	-2,778	,005	,016
yüksek(8+7+6)-orta(3+4+5)	18,076	6,502	2,780	,005	,016

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.

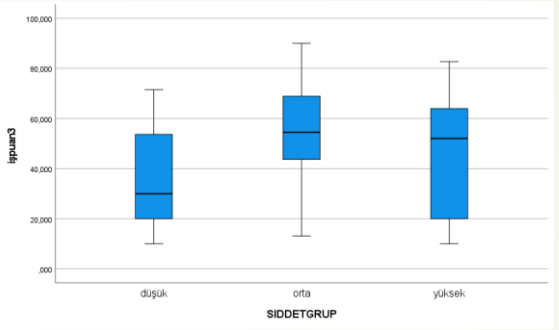
Asymptotic significances (2-sided tests) are displayed. The significance level is ,050.

a. Significance values have been adjusted by the Bonferroni correction for multiple tests.

- Individuals exposed to moderate electromagnetic fields had significantly higher Beck Anxiety scores compared to those exposed to low and high levels (p=0.005 for both comparisons). However, there was no statistically significant difference between high and low exposure groups in terms of average Beck Anxiety scores (p=0.700).



- **Work Productivity:** Significant differences were observed in WPAI Work Score-1 (**p= <0.001 for low, p= 0.033 for high**) and Work Score-3 (**p=0.007**).



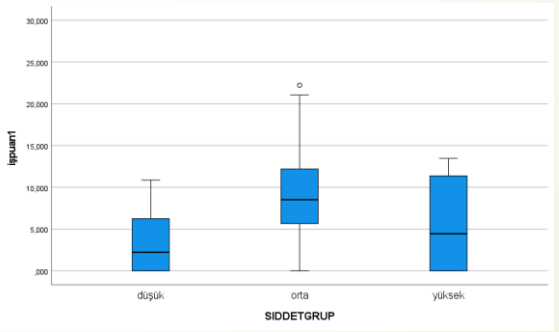
işpuan3 across SIDDETGRUP

Pairwise Comparisons of SIDDETGRUP

Sample 1-Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig.[a]
düşük(1+2)-yüksek(8+7+6)	-11,081	7,842	-1,413	,158	,473
düşük(1+2)-orta(3+4+5)	-20,655	7,593	-2,720	,007	,020
yüksek(8+7+6)-orta(3+4+5)	9,574	6,503	1,472	,141	,423

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is ,050.
a. Significance values have been adjusted by the Bonferroni correction for multiple tests.

- The average Work Score-3 (WPAI) for those exposed to moderate levels was significantly higher compared to those with low exposure (p=0.007). No statistically significant differences were observed between the low and high, and high and moderate groups (p=0.158 and p=0.141, respectively).



işpuan1 across SIDDETGRUP

Pairwise Comparisons of SIDDETGRUP

Sample 1-Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig.[a]
düşük(1+2)-yüksek(8+7+6)	-14,724	7,746	-1,901	,057	,172
düşük(1+2)-orta(3+4+5)	-28,452	7,500	-3,794	<,001	,000
yüksek(8+7+6)-orta(3+4+5)	13,729	6,422	2,138	,033	,098

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is ,050.
a. Significance values have been adjusted by the Bonferroni correction for multiple tests.

- The average Work Score-1 (WPAI) for individuals exposed to moderate levels was significantly higher compared to those exposed to low and high levels (p= <0.001 for low, p= 0.033 for high). However, no statistically significant difference was found between the high and low exposure groups for Work Score-1 average scores (p=0.057).

- **Physical Function:** SF-36 Physical Function scores differed significantly (**p=0.032 for both**).

fizikselfonk across SIDDETGRUP

Pairwise Comparisons of SIDDETGRUP

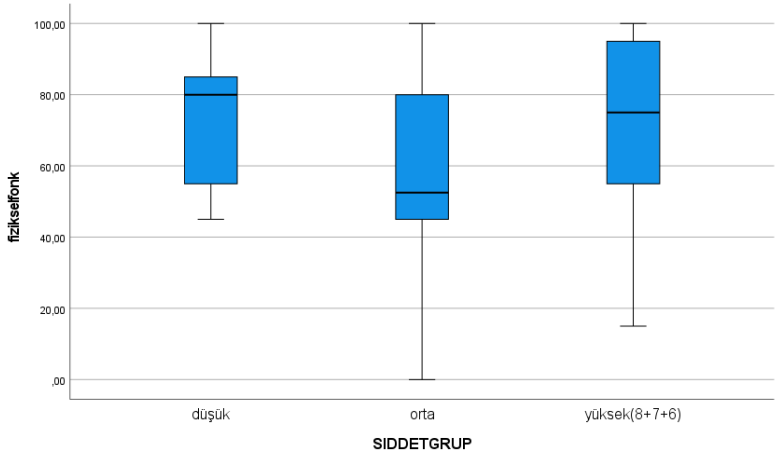
Sample 1-Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig.[a]
orta(3+4+5)-yüksek(8+7+6)	-13,886	6,478	-2,144	,032	,096
orta(3+4+5)-düşük(1+2)	16,190	7,565	2,140	,032	,097
yüksek(8+7+6)-düşük(1+2)	2,305	7,813	,295	,768	1,000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.

Asymptotic significances (2-sided tests) are displayed. The significance level is ,050.

a. Significance values have been adjusted by the Bonferroni correction for multiple tests.

- The average Physical Function score (SF-36) for individuals exposed to moderate levels was significantly lower compared to those exposed to high and low levels (p=0.032 for both). However, no statistically significant difference was observed between the high and low exposure groups (p=0.768).



Conclusion

Participants with **moderate EMF exposure** demonstrated:

- Higher anxiety levels.
- **Greater impairments** in work productivity.
- **Lower physical function** scores compared to low and high exposure groups.

- These results highlight a nuanced relationship between EMF exposure and health, with **moderate exposure levels posing the highest risks.**

Middle Zone Paradox in EMF Exposure

- **Why Middle Zones Are Worse**
  Fluctuating electromagnetic field (EMF) levels in middle zones interfere with cellular adaptation due to **irregular and unpredictable changes in intensity.** Unlike consistent exposure, where cells can adjust and maintain homeostasis, these fluctuations—**periods of high intensity followed by low intensity**—create a challenging environment for cellular systems.

- **Why High Zones Perform Better**
  High zones have consistent EMF exposure and strict safety protocols (e.g., regular breaks,protective gear), enabling effective adaptation and recovery.

- **Why Low Zones Are Healthier**
  Low exposure zones align with the body's natural ability to handle minor stressors, minimizing harm.

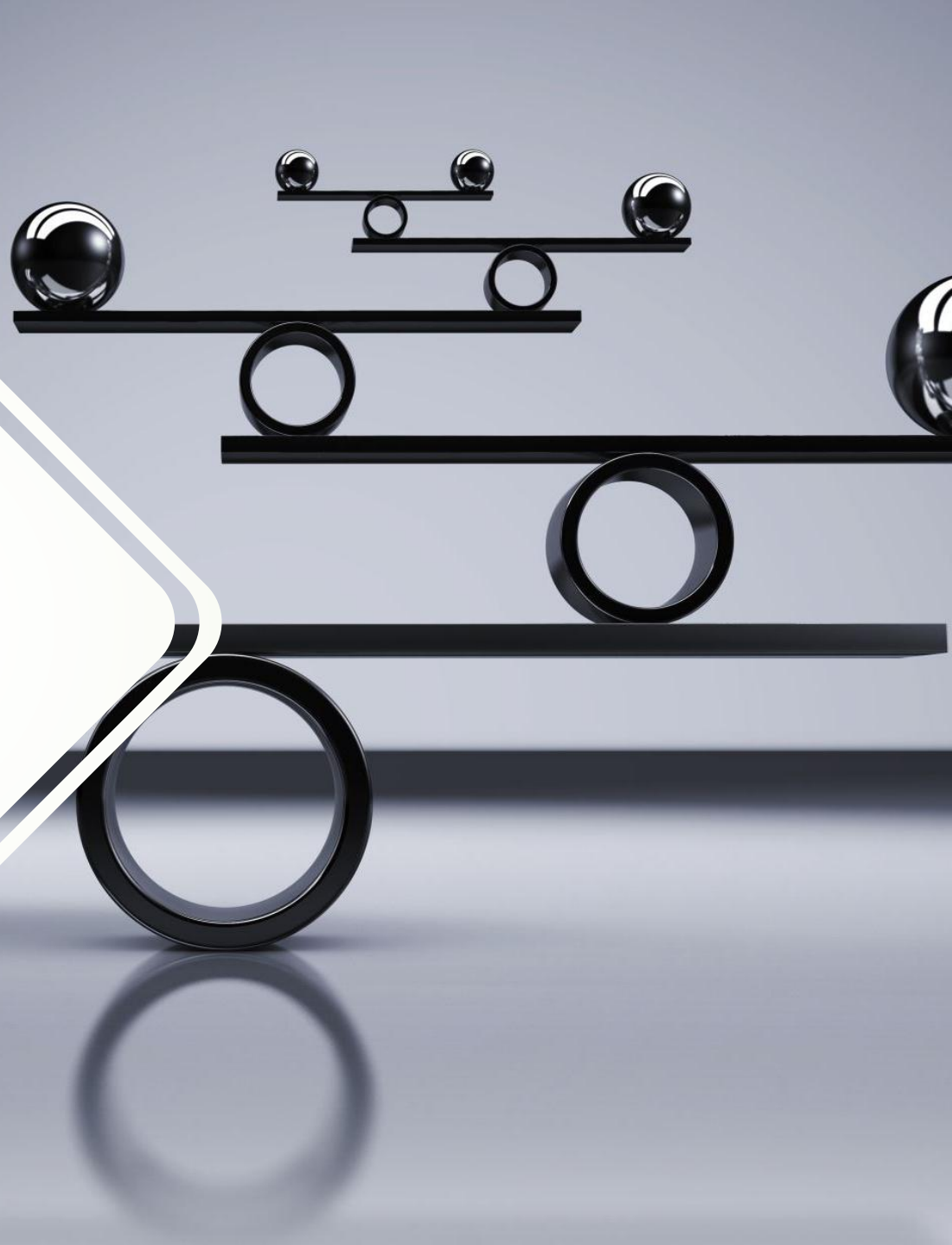
Implications for Cancer and Fibromyalgia

Cancer Therapy: Fluctuating EMF could disrupt cancer cells' circadian rhythms, triggering selective apoptosis.

Fibromyalgia: Fluctuating EMF may impair neural communication, offering insights into fibromyalgia's elusive mechanisms.

Broader Lesson: Balance Is Key

- Consistency, whether in EMF exposure or relationships, is vital for resilience.
- **“Health is not merely the absence of disease but the harmonious balance of all forces within and around us. True healing lies in equilibrium—of body, mind, and life itself.” – Hippocrates**



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