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Analysis of Correlation between Sleep, Fatigue, and Free Radicals in Women

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Abstract. The goal of this study is to obtain data on detoxification by analyzing the correlation between sleep, fatigue, and the level of free radicals in women. There were significant differences in the level of free radicals according to age, economic status, level of education, and occupation. There was a statistically significant correlation between age, sleep, and fatigue and free radicals. A comprehensive analysis that includes free radical-related variables, such as diet, exercise, life style habits, and environment, needs to be carried out in the future.

Keywords: Sleep, Fatigue, Free Radicals

1 Introduction

1.1 The Necessity of Research

The accumulation of toxic material inside the body increases the likelihood of chronic disease, and the concept of well-being has become increasingly important in modern society as people strive to maintain good health and prevent the occurrence of chronic diseases.

Knowledge about toxins and efforts to eliminate toxins that may have accumulated in the body has led to a greater interest in the process of detoxification, or detox [1]. Detox focuses on preventing disease by discharging the toxic material and waste that accumulates inside the body [2]. Toxins are substances that interfere with normal physiological functions and that have negative effects on bodily functions when they enter and accumulate in the body [3]. In particular, free radicals refer to oxygen molecules that are more active, less stable, and higher in energy than normal oxygen, which could make them an important indicator of toxin levels inside the body [4]. Because free radicals are unstable and have high energy, they can easily oxidize with other molecules inside the body, damaging cells and tissues in the process[5].

Despite the fact that free radicals are associated with diverse factors, there have been very few studies conducted that analyzed the connection or relationship between free radicals and variables related to social demographics, and sleep and fatigue. Therefore, this study aims to analyze differences in the level of free radicals with respect to general characteristics and the correlation between free radicals and

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sleep and fatigue.

1.2 Purpose of Study

The detailed objectives are as follows.
-Analyze the differences in the level of free radicals according to general characteristics
-Analyze the correlation between sleep, fatigue, and the level of free radicals of the participants in the study

2 Methods

2.1 Research Design

This study is a descriptive study that seeks to determine if there is any correlation between sleep, fatigue, and free radical levels in women.

2.2 Research Participants

Surveys and examinations were conducted on 155 women who voluntarily submitted consent forms after the purpose, content, and methods of the study was explained to them.

2.3 Data Collection

Data were collected from November 2014 to February 2015 from women between 20 and 65, and around 30 subjects were recruited for each age group according to age. Completing the questionnaire took around 10 minutes, and after it was completed the free radical levels were measured through urine tests.

2.4 Research Tools

Free Radical. Urine samples were analyzed to measure the level of free radicals. Urine was collected from individual subjects in paper cups, a dipstick was dipped into the urine and removed within one second, residual urine was removed using tissues, and free radicals were measured using free radical measuring instruments. The paper cups and dipsticks used in the examination were collected in medical waste bags and were disposed of in accordance with the appropriate and correct procedures. The free radical analyzer (BS-201 Bio Doctor, Bionics: Yongin, South Korea) used in this study analyzed the amount of Malondialdehyde (MDA) in urine. The higher the

number obtained, the higher the level of free radicals in the body.

Sleep. The subjects were asked to respond to the question "how would you rate your sleep satisfaction?" using a visual analogue scale that is composed of 100 points.

Fatigue. The subjects were asked to respond to the question "how would you rate your fatigue?" using a visual analogue scale that is composed of 100 points.

2.5 Data Analysis

The differences in the level of free radicals according to general characteristics were analyzed using the independent t-test and ANOVA.The relationship between age, sleep, fatigue, and free radicals in the subjects was analyzed with Pearson's correlation using SPSS 21.0.

2.6 Ethical Considerations

To comply with ethical considerations, the researcher explained the goals and the content of the study to the participants, as well as their right to refuse to participate at any stage, how their personal information would be protected, and what compensation they would receive for their participation.

3 Results

3.1 Differences in the level of Free Radicals according to General Characteristics

Free radical levels were significantly different according to age($F=8.84$, $p<.001$), economic status($F=10.12$, $p<.001$), education level($F=6.79$, $P=.001$), and occupation($F=4.30$, $P=.006$).

3.2 Relationship between Age, Sleep, Fatigue, and Free Radicals

Age ($r=.437$, $P<.001$), sleep ($r=-.199$, $p=.013$), and fatigue ($r=.159$, $p=.049$) revealed statistically significant correlations with free radicals, with age having an especially strong correlation.

4 Discussion

The levels of free radicals were especially high in people in their 40s and 60s, those with low economic status, high school graduates, and blue collar workers. It is

thought that people in their 60s have high a free radical level due to ageing, and that people in their 40s have high levels because they have children attending middle and high school and are busy with work or housework, situations in which they would receive a great deal of stress.

Table 1. Differences in free radical levels according to general characteristics

Characteristics	Category	n (%)	Free radical M ± SD	t or F (*p*)
Age (yr)	20–29[a]	30 (19.4)	476.13±305.22	8.84 (*.000*) a,b<c,e
	30–39[b]	30 (19.4)	451.03±212.46	
	40–49[c]	34 (21.9)	741.71±345.80	
	50–59[d]	32 (20.6)	686.25±382.95	
	60–65[e]	29 (18.7)	871.83±369.30	
Health status	Bad[a]	20 (12.9)	724.15±463.36	.78 (*.459*)
	Average[b]	99 (63.9)	649.12±322.28	
	Good[c]	36 (23.2)	598.06±403.75	
Marital status	Single	94 (60.6)	673.77±315.80	1.08 (*.283*)
	Married	61 (39.4)	605.61±422.74	
Economic status	Low[a]	17 (11.0)	996.06±537.37	10.12 (*.000*) a>b,c
	Average[b]	99 (63.9)	593.01±270.96	
	High[c]	39 (25.2)	631.67±369.86	
Education	Middle school[a]	13 (8.4)	595.85±182.83	6.79 (*.001*) b>c
	High school[b]	38 (24.5)	828.16±462.27	
	College[c]	104 (67.1)	587.12±314.81	
Job	Mental labor[a]	55 (35.5)	520.38±278.04	4.30 (*.006*) a<b
	Physical labor[b]	21 (13.5)	805.29±534.58	
	Mental & physical[c]	24 (15.5)	711.38±438.99	
	Home maker[d]	55 (35.5)	684.93±280.89	
Mean			646.94 361.90	

Low economic status increases the possibility of people being exposed to toxic material from inadequate living environments or diet. The study revealed that high school graduates had higher free radical levels than college graduates, and this is thought to be so because high school graduates are more likely to be working in labor-intensive occupations. In our study those engaged in physical labor had higher levels of free radicals compared to those engaged in intellectual labor, and this strongly suggests that physical overwork from manual labor causes an increase in free radical

levels. Indeed, excessive use of muscles seems to lead to an increase in free radical levels [6].

The results of this study revealed that there was a statistically significant correlation between age and free radical levels, and this would seem to corroborate findings [7] that ageing is closely related to the activity of free radicals. In conclusion, socio-demographic variables such as age, economic status, and education levels should be taken into account when studying free radicals.

Table 2. Correlations between free radicals, age, fatigue and sleep

	Free Radical	Age	Fatigue	Sleep
	r (p)	r (p)	r(p)	r (p)
Free Radical	1			
Age	.437 (*p*<.000)	1		
Fatigue	.159 (*p*=.049)	.096 (*p*=.236)	1	
Sleep	-.199 (*p*=.013)	-.090 (*p*=265	-.362 (*p*<.001)	1

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