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THE EFFECT OF ZINC SUPPLEMENT ON FATIGUE AMONG ELDERLY IN NAJAF CITY

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ABSTRACT

Background: Fatigue is defined as a feeling of disability and weakness that leads to a reduction in the capacity of individuals to perform their functions and daily activities. It is a common symptom associated with various disease conditions and significantly impacts health status and quality of life, which in turn affects job performance, daily activities, and social relationships. Aims of the study: To evaluate the effect of zinc oral supplement on fatigue among elderly. **Method:** A single-blind clinical experiment will be undertaken on 150 senior persons aged ≥ 60 in Najaf city. The first group will take 30 mg of zinc oral supplement daily for 70 days, while the second group will receive a placebo. The Multidimensional Fatigue Inventory (MFI) will measure fatigue before and after the intervention. Participants will give informed consent. Age (60-75, >75), education level (primary, secondary, university, and further education), and marital status (married, single) will be gathered. **Results:** The mean age of participants was 67 ± 5 years. In the intervention group, 88% were aged 60-75 years, 82.7% had primary education, and 97.3% were married P-value significant (0.0001). Initially, 48% had normal serum zinc levels, increasing to 93.3% after supplementation, with a significant increase compared to the control group, which saw no significant change. The intervention group also experienced a significant decrease in fatigue scores post-supplementation, P-value significant (0.0001). **Conclusion:** Our study shows that zinc supplementation reduces tiredness and raises blood zinc levels in the elderly. These findings suggest that dietary therapies should be prioritized in age-related health conditions to improve older well-being and quality of life.

KEYWORDS: Zinc, supplement, fatigue, elderly, Najaf city.

INTRODUCTION

Fatigue is defined as a feeling of disability and weakness that leads to a reduction in the capacity of individuals to perform their functions and daily activities. It is a common symptom associated with various disease conditions and significantly impacts health status and quality of life, which in turn affects job performance, daily activities, and social relationships. The prevalence of fatigue is estimated to be 21.9% in the general population; however, it is even higher among elderly populations, with 40% to 74% of them experiencing it.[1] Fatigue is a common complaint among elder community dwellers and can be attributed to factors such as decreased muscle strength, reduced physical activity, impaired motor neuron performance, diminished steroid hormone production, nutritional problems, and micronutrient deficiencies.[2] Malnutrition, particularly in the elderly or those who adhere to specific and restricted diets, is one of the mechanisms underlying fatigue.[3] Vitamins and minerals are essential for various basic metabolic pathways that support fundamental cellular functions in humans, their deficiency affects cognitive and psychological processes, leading to problems such as mental and physical fatigue.[4] It is estimated that more than 2 billion people worldwide suffer from one or more micronutrient deficiencies, referred to as "hidden hunger".[5] Zinc, as an intracellular signaling molecule, plays a crucial role in various physiological processes, including DNA repair, cellular proliferation, immune system regulation, anti-inflammatory reactions, adenosine triphosphate functioning, and the regulation of enzymatic structures.[6] Zinc is essential for providing the energy needed for metabolism, and reduced serum zinc levels can debilitate the functional capacity of muscles.[7] Serum zinc concentration decreases with aging. Studies have shown that about 35% to 45% of elderly individuals over 60 have zinc levels below the normal range.[8] For instance, a study conducted in Iran found that 40.8% of

elderly subjects had serum zinc levels lower than the normal range.[9] With the aging population, age-related health problems, including fatigue, are expected to become more prevalent in societies. To address this, nutritional interventions and effective drug supplements have been identified as potential solutions to reduce fatigue in patients and groups, these supplements include creatine electrolytes, vitamin B, and combinations of amino acids such as arginine, valine, and serine.[10] Despite the significant impact of fatigue on the elderly, it often remains untreated and overlooked. This carelessness might worsen senior health and quality of life. Therefore, it is vital to raise awareness of senior weariness and encourage strategies to manage and mitigate its consequences. Monitoring nutritional status and supplementing vitamins and minerals, especially zinc, can help elderly people feel better and reduce weariness. Additionally, healthcare personnel should be educated to consider weariness an important aspect in senior patient health assessments and take necessary actions to manage it.[11] Aims of the study: To evaluate the effect of zinc oral supplement on fatigue among elderly.

METHOD

A single-blind clinical trial will be conducted on 150 elderly individuals aged ≥ 60 years in Najaf city measured serum zinc concentration before and after, normal serum zinc 70 to 120 micrograms per deciliter (mcg/dL).[12] The participants will be divided into two groups: the first group will receive a daily dose of 30 mg of zinc oral supplement for a duration of 70 days, while the second group will receive a placebo. Fatigue levels will be assessed using the Multidimensional Fatigue Inventory (MFI) before and after the intervention.[13] Written informed consent will be obtained from each participant. Sociodemographic data will be collected, including age groups (60-75 years, >75 years), education level (primary, secondary, university, and higher education), and marital status (married, single). Ethical concern: official agreement had been obtained from the Arab Council of Medical Specialties prior to data collection. Additionally, an official agreement from the Medical City Dialysis Centre in Baghdad had been obtained. The intention and objectives of the study were explained to all patients who participated, and verbal assent was obtained after ensuring the privacy of the data and the completion of the questionnaire without their names. Statistical analysis will be performed using SPSS version 22. Descriptive statistics for categorical data will include frequency and percentage, while continuous data will be summarized using mean, median, and standard deviation (SD). The Chi-square test will be utilized to analyze the association between categorical variables. A p-value of ≤ 0.05 will be considered statistically significant.

RESULTS

Mean age 67 ± 5 years old. 88% of patients in Intervention group at age 60-75 years, 82.7% of patients in Intervention group are primary education. And 97.3% of patients in Intervention group are married. No association between serum zinc and sociodemographic variables after zinc supplement P-value more than 0.05. As shown in table 1.

Table 1: Association between serum zinc and study variables after zinc supplement.

Variables		Groups		
		Intervention	**Control**	**P-value**
Age Groups	***60-75***	66 88.0%	68 90.7%	0.8
	>75	9 12.0%	7 9.3%	
Education	***Primary***	62 82.7%	64 85.3%	0.8
	Secondary	8 10.7%	8 10.7%	
	University and Higher education	5 6.7%	3 4.0%	
Marital State	***Married***	73 97.3%	75 100.0%	0.5
	Single	2 2.7%	0 0.0%	

P-value ≤ 0.05 (significant).

As shown in table 2, 48% of patients in Intervention group have normal serum zinc before intake, and 61.3% of patients in control group have normal serum zinc before intake with no significant difference between both groups. While after zinc supplement in Intervention group and placebo in control group, 93.3% of patients in Intervention group have normal serum zinc after intake, but 57.3% of patients in control group have normal serum zinc before intake with significant difference between both groups. P-value 0.0001.

Table 2: Association between serum zinc before and after according to both groups.

Variables		Groups		
		Intervention	**Control**	**P-value**
Zinc before	***Low***	39 52.0%	28 37.3%	0.13
	Normal	36 48.0%	46 61.3%	
	High	0 0.0%	1 1.3%	
Zinc after	***Low***	1 1.3%	31 41.3%	**0.0001**
	Normal	70 93.3%	43 57.3%	
	High	4 5.3%	1 1.3%	

P-value ≤ 0.05 (significant).

As shown in table 3, serum zinc before intake no significant difference between Intervention and control group, while there is significant increase in serum zinc level after supplement of zinc in Intervention group. P-value 0.0001.

Table 3: Difference mean of zinc level according to both groups.

	Delivered types	**N**	**Mean**	**Std. Deviation**	**P-value**
Zinc level before	***Intervention*** ***control***	75 75	73.26 77.26	15.44 15.96	0.12
Zinc after	***Intervention*** ***control***	75 75	88.10 75.84	13.43 17.00	**0.0001**

P-value ≤ 0.05 (significant).

As shown in table 4, there is significant decrease in Fatigue score after zinc supplement than before zinc supplement in Intervention group. P-value 0.0001.

Table 4: Difference mean Fatigue score according to zinc level before and after.

		N	**Mean**	**Std. Deviation**	**P-value**
Fatigue score	***Before*** ***After***	75 75	4.30 3.53	0.71 1.08	**0.0001**

DISCUSSION

The findings from our study align with the growing body of literature suggesting the beneficial effects of zinc supplementation on reducing fatigue among elderly populations. Our single-blind clinical trial, conducted on 150 elderly individuals aged 60 years and above in Najaf city, revealed significant improvements in serum zinc levels and reductions in fatigue scores following a 70-day intervention of daily zinc supplementation. Before the intervention, there was no significant difference in serum zinc levels between the intervention and control groups. Specifically, the study highlighted a significant issue of zinc deficiency among elderly participants. Initially, fewer patients in the intervention group had normal serum zinc levels compared to the control group. However, after zinc supplementation, a markedly higher proportion of patients in the intervention group reached normal zinc levels compared to the control group. This outcome strongly supports the effectiveness of zinc supplementation in addressing deficiencies in the elderly. Participants had a mean age of 67 years, with most aged between 60-75 years, a majority having primary education, and nearly all being married. This kind of demographic detail can be important in understanding the broader context of health studies. These demographic characteristics were well-matched between the groups, ensuring the reliability of our findings. Our results are consistent with previous studies, such as Afzali A. et al. (2021), which demonstrated that zinc supplementation significantly reduced fatigue (mean difference: -10.41 vs 1.37, P < .001) and increased serum zinc levels (mean difference: 14.22, vs -0.57, P < .001) compared to the control group.[13] Similarly, Karagozoglu S. et al. (2012) found that serum zinc levels increased significantly in elderly individuals after a 3-month period of taking 30 mg zinc supplementation.[14] Additionally, Sharif R. et al. (2015) reported that zinc supplementation improved genomic stability biomarkers, antioxidant activity, and zinc transporter gene expression among an elderly Australian population with low serum zinc levels.[15] The significant reduction in fatigue scores observed in our study aligns with the findings of Maes M. et al. (2006),

who noted that patients with chronic fatigue syndrome had significantly lower zinc levels compared to healthy subjects. The inverse correlation between serum zinc levels and fatigue severity suggests that enhancing zinc status can alleviate fatigue symptoms.[16] This relationship is further supported by Ribeiro S. et al. (2017), who found that zinc supplementation prevented fatigue and maintained the quality of life in patients with colorectal cancer undergoing chemotherapy.[17] In addition to fatigue reduction, zinc's role in various physiological processes, including DNA repair, immune system regulation, and anti-inflammatory responses, highlights its importance in maintaining overall health in the elderly. The decline in serum zinc concentration with aging, as reported by Ford K et al. (2018), further emphasizes the need for targeted nutritional interventions in this demographic.[18] The present study showed that the use of zinc supplement can significantly improve fatigue in elderly, thus we recommended considering zinc supplement as a complementary strategy to prevent and alleviated fatigue among the elderly. Future research should explore the long-term effects of zinc supplementation and its impact on other health outcomes, such as cognitive function and physical performance. Additionally, studies examining the interaction between zinc supplementation and other nutritional and lifestyle factors could provide a more holistic understanding of how to optimize health in elderly populations.

CONCLUSION

Our study supports the beneficial role of zinc supplementation in reducing fatigue and improving serum zinc levels among elderly individuals. These findings highlight the need for greater attention to nutritional interventions in managing age-related health issues, ultimately enhancing the well-being and quality of life of the elderly.

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