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Status Gizi dan Komposisi Tubuh berdasarkan Konsumsi Junk Food, Tingkat Stress, dan Kulitas Tidur Staff Administratif Universitas

Nutritional Status and Body Composition Based on Junk Food Consumption, Stress, and Sleep Quality among University Administrative Staff

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ARTICLE

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ABSTRAK

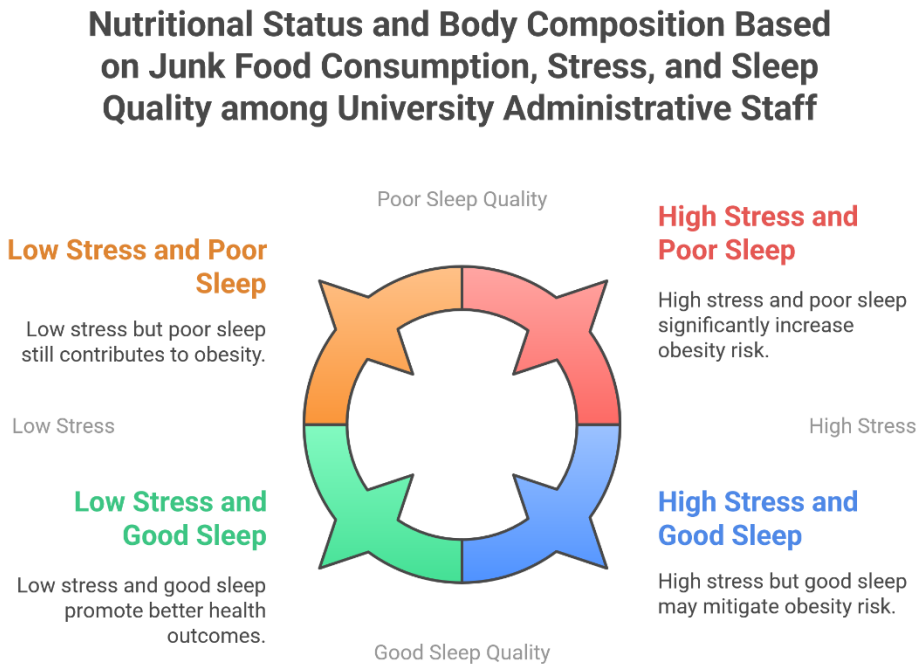
Obesitas masih menjadi masalah gizi utama pada usia produktif. Faktor asupan salah satunya konsumsi junk food serta gaya hidup seperti tingkat stress dan kualitas tidur dapat menjadi faktor risiko penguat bagi pekerja dengan aktivitas minim untuk mengalami obesitas baik berdasarkan pengukuran status gizi ataupun komposisi tubuh. Tujuan penelitian ini untuk menganalisis hubungan antara konsumsi junk food, tingkat stres, dan kualitas tidur dengan status gizi dan komposisi tubuh pada staff administratif universitas. Penelitian ini merupakan penelitian kuanititatif dengan desain penelitian cross-sectional. Subjek penelitian ini adalah staff administratif di universitas di Jakarta sebanyak 98 orang dengan teknik simple random sampling. Data status gizi dan komposisi tubuh diukur menggunakan microtoise dan Bioelectric Impedance Analysis (BIA), konsumsi junk food diambil dengan wawancara menggunakan Semi-Quantitative Food Frequency Questionnaire (SQ FFQ), tingkat stres menggunakan kuesioner Depression Anxiety Stres Scale-42 (DASS-42), dan kualitas tidur menggunakan kuesioner Pittsburgh Sleep Quality Index (PSQI). Analisis data yang dilakukan adalah univariat dan bivariate dan menggunakan Uji Chi Square. Hasil penelitian ini menunjukkan bahawa sebagian besar subjek (68.4%) mengalami obesitas. Terdapat hubungan signifikan antara tingkat stress dan kualitas tidur dengan status gizi, persen lemak tubuh, dan visceral fat (P<0.05), tetapi tidak berhubungan dengan persen massa otot. Kualitas tidur yang buruk dan tingkat stress yang tinggi menjadi faktor risiko obesitas baik berdasarkan IMT maupun persen lemak tubuh dan visceral fat.

Keyword:
Junk Food; Body Composition; Sleep Quality; Worker; Stress

ABSTRACT

Obesity remains a major nutritional issue among individuals of productive age. Dietary factors, including the consumption of junk food, along with lifestyle aspects such as stress levels and sleep quality, may serve as reinforcing risk factors for obesity, particularly among workers with low levels of physical activity, both in terms of nutritional status and body composition measurements. This study analyses the relationship between junk food consumption, stress levels, and sleep quality with nutritional status and body composition among university administrative staff. This research employed a quantitative approach using a cross-sectional study design. The study population consisted of 98 administrative staff from a university in Jakarta, selected through simple random sampling. A microtoise and Bioelectrical Impedance Analysis (BIA) assessed nutritional status and body composition. Junk food consumption was measured through interviews using a Semi-Quantitative Food Frequency Questionnaire (SQ-FFQ), stress levels were assessed using the Depression Anxiety Stress Scale-42 (DASS-42), and sleep quality was evaluated using the Pittsburgh Sleep Quality Index (PSQI). Data were analysed using univariate and bivariate methods, with Chi-square tests applied. The results showed that most of subjects (68.4%) were obese. There were significant associations between stress levels and sleep quality with nutritional status, body fat percentage, and visceral fat (P<0.05), although no significant relationship was found with muscle mass percentage. Poor sleep quality and high stress levels emerged as risk factors for obesity, as indicated by BMI, body fat percentage, and visceral fat.

GRAPHICAL ABSTRACT



INTRODUCTION

The primary nutritional issue among individuals of productive age in Indonesia is obesity. Obesity is characterised by excessive body weight resulting from an imbalance between energy intake and expenditure. In obese individuals, fat accumulates within adipose tissue. This condition can be confirmed through nutritional status assessments and body composition measurements. (Fatmawati, 2019).

Obesity has far-reaching implications across various sectors. Fat accumulation in adipose tissue is a known risk factor for numerous non-communicable diseases, such as type 2 diabetes mellitus and cardiovascular diseases. Elevated morbidity rates can reduce attendance and work productivity. Furthermore, individuals with obesity are more susceptible to mental health disorders, including depression and anxiety. The condition also has psychosocial consequences that may negatively impact quality of life. Obese individuals—particularly women—often experience low self-esteem and may withdraw from social environments. In addition, obesity imposes economic burdens. (Lam et *al.*, 2023). The estimated annual economic loss due to obesity in Indonesia is approximately IDR 78,478 billion. (Wulansari et *al.*, 2016).

In recent years, the prevalence of obesity in Indonesia has continued to rise. In 2018, 21.8% of Indonesian adults were classified as obese, increasing to 23.4% by 2023. Jakarta currently records the highest obesity prevalence among all regions in the country (Balitbangkes, 2018; BKPK Kemenkes, 2023). Unfortunately, several national surveys in Indonesia have assessed adult obesity solely by BMI. There remains paucity literature examining obesity in terms of body composition among workers—particularly university administrative staff in Jakarta—in relation to its determinants.

Lifestyle changes have influenced patterns of alcohol consumption, smoking, poor dietary habits, and levels of physical activity, all of which can ultimately affect job performance. Dietary behaviours such as the consumption of junk food have been shown to contribute significantly to obesity. Junk food refers to food or beverages high in energy, sugar, or fat but low in dietary fibre and micronutrients. The frequent consumption of such foods is a dietary habit that may increase an individual's risk of developing obesity (Zulkarnain & Alvina, 2020). The palatability and large portions typically associated with junk food lead to excessive caloric intake (Nisa et al., 2020). Consuming junk food more than three times a week has been found to significantly increase the risk of overweight among adolescents significantly (Nugraha &

Yunieswati, 2024). Moreover, the consumption of high-calorie fast food has shown a significant positive correlation with body fat percentage (Zulkarnain & Alvina, 2020). However, research examining the association between junk food consumption and body composition among workers remains limited.

In addition, high stress levels among workers may also contribute to the development of obesity. Hormonal changes induced by stress can stimulate an increase in appetite (Mattioli et al., 2020). One study reported that 82.4% of employees at a university in Jakarta experienced high levels of stress (Mattioli et al., 2020). However, the relationship between stress levels and nutritional status varies across studies, and few have investigated the link between stress and body composition.

Heavy workloads may also impair sleep quality, which in turn can compromise immune function and diminish job performance (Karlinda *et al.,* 2021). Office workers with poor sleep quality are 1.156 times more likely to be obese than those with good sleep quality (Mattioli et al., 2020). A separate study found that 94% of university staff in Jakarta experienced poor sleep quality (Tam et al., 2021). Therefore, this study aims to analyse the relationship between junk food consumption, stress levels, and sleep quality with nutritional status and body composition among workers.

METHOD

This study employed a quantitative approach with a cross-sectional research design. The study population consisted of university employees in Jakarta. Based on the calculation, the minimum number of subjects required was 89. An additional 10% was included to account for potential dropouts, resulting in a total sample of 98 individuals who met the inclusion and exclusion criteria. The inclusion criteria for study subjects were: aged between 18 and 65 years, and willingness to participate. The exclusion criteria included: individuals currently on a low-calorie diet, those taking weight loss supplements, and respondents who were pregnant at the time of the study.

Nutritional status and body composition data were obtained using measurement tools, specifically a microtoise and Bioelectrical Impedance Analysis (BIA) Omron Karada Scan. Nutritional status was categorized as underweight (BMI<18,5 kg/m^2); normal (BMI=18,5-25 kg/m^2); overweight (BMI=25,1-27 kg/m^2); and obese (BMI>27 kg/m^2). The body composition data included total body fat, visceral fat, and muscle mass. The percentage of total body fat was classified into the following categories: 1) low (<20%); 2) normal (≥20% - <30%); and 3) high (≥30%). The percentage of visceral fat was classified into: 1) normal (0.5% - 9.9%); and 2) high (≥10%). Muscle mass percentage was classified as: 1) low (<24.3%); 2) normal (24.3% - 30.3%); and 3) high (≥130.4%). Junk food consumption data were collected using the Semi-Quantitative Food Frequency Questionnaire (SQ-FFQ). Junk food refers to food or beverages high in energy, sugar, or fat but low in dietary fibre and micronutrients like fried chicken, burger, pizza, french fries, donut, sausage, fried rice, etc. The frequency of junk food consumption was categorized as infrequently (<3 times/week) and frequently (≥3 times/week). Stress level data were measured using the Depression Anxiety Stress Scales (DASS-42), and sleep quality data were assessed using the Pittsburgh Sleep Quality Index (PSQI) questionnaire.

Data processing was conducted using the Statistical Package for the Social Sciences (SPSS) version 23. Statistical analyses included univariate analysis for each variable, and bivariate analysis using the Chi-square test to examine the relationships between junk food consumption, stress levels, and sleep quality with nutritional status and body composition.

Code of Health Ethics

Ethics approval for this study was obtained from The Ethics Committee of Prof. Dr. Hamka Muhammadiyah University (approval number: 03/22.0701993).

RESULTS

Table 1 indicates that the majority of subjects were male and belonged to the adult age group. More than half of the subjects (63.3%) frequently consumed junk food, with a median intake of 3.5 times per week. On average, junk food consumption contributed only 4.56% to the subjects' daily energy requirements. Most subjects experienced stress, with the majority categorised as having a moderate level of stress (70.4%). The majority of subjects (78.6%) had poor sleep quality. Most of them reported

insufficient sleep duration (<7 hours), often resulting in daytime dysfunction at work, characterised by drowsiness and difficulty concentrating during activities.

Table 1 Characteristics, Junk Food Consumption, Stress Level, and Sleep Quality of Subjects

Variable	n	%	Median (min-max)
Sex			
Male	60	61.2%	
Female	38	38.8%	
Age			
Adults (19-44 years)	72	73.5	36 (21-56) years old
Pre-elderly (45-59 years)	26	26.5	
Frequency of Junk Food Consumption			
Infrequently	36	36.7%	5 (1-24) times
Frequently	62	63.3%	
Energy Contribution of Junk Food			
Low (≤4.9% RDA)	49	50%	116 (17-329) kkal
High (>4.9% RDA)	49	50%	4.9 (0.8-12.4) % RDA
Stress Level			
Normal	21	21.4%	19 (0-30)
Mild stress	3	3.1%	
Moderate stress	69	70.4%	
Severe stress	5	5.1%	
Sleep Quality			
Good	21	21.4%	6 (4-12)
Poor	77	78.6%	
Total	**98**	**100%**	

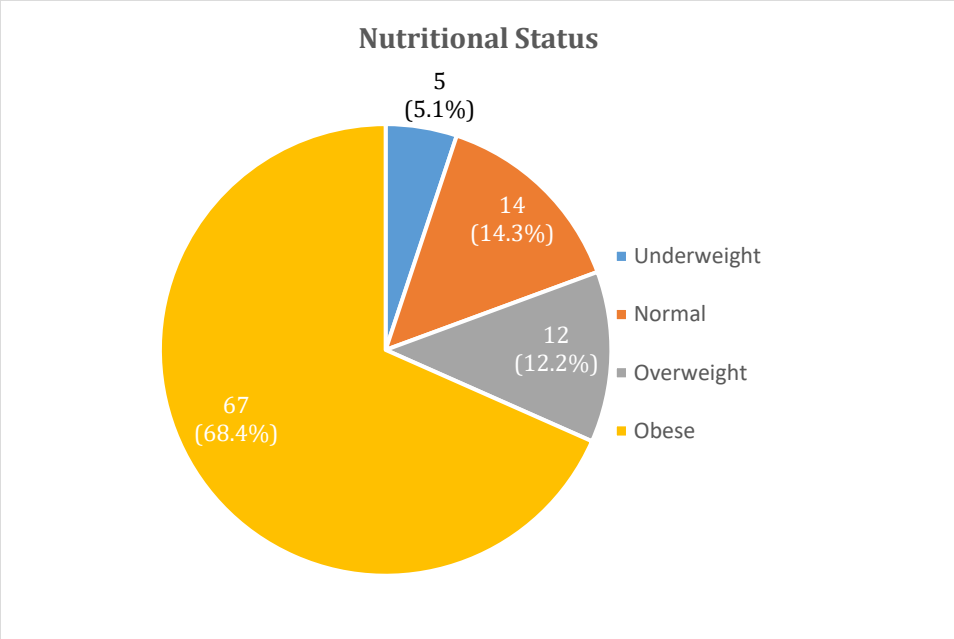


Figure 1. Graph of Subject's Nutritional Status

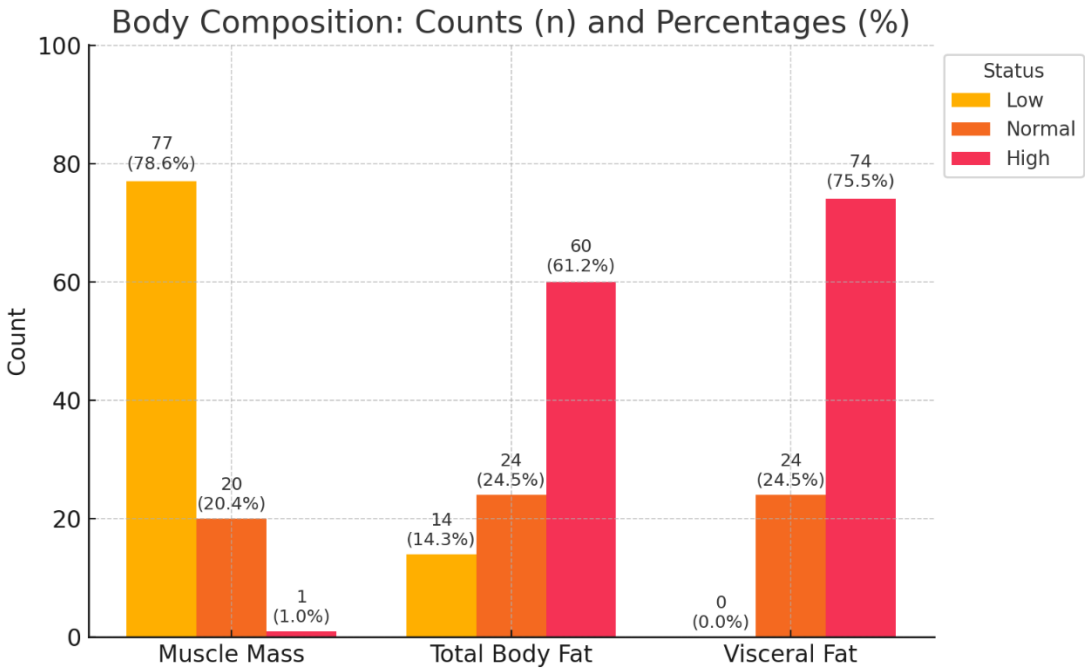


Figure 2. Graph of Subject's Body Composition

Figures 1 and 2 present data on the nutritional status and body composition of the subjects. The primary nutritional issue identified was obesity (68.4%), with a median Body Mass Index (BMI) of 27.13 kg/m^2. In terms of body composition, the majority of subjects had high levels of total body fat and visceral fat. Nutritional status and body composition based on junk food consumption, stress levels, and sleep quality are presented in Tables 2–5.

Table 2. Nutritional Status of Subjects Based on Junk Food Consumption, Stress Level, and Sleep Quality

Variable	Nutritional Status				Total		*P*	OR
	Non-Obesity		Obesitas		n	%		
	n	%	n	%				
Junk Food Consumption								
Frequency of Consumption								
Infrequently	8	22.2	28	77.8	36	100	0.127	0.484
Frequently	23	37.2	39	62.9	62	100		
Energy Contribution of Junk Food								
Low (≤median)	14	28.6	35	71.4	49	100	0.515	0.753
High (>median)	17	34.7	32	65.3	49	100		
Stress Level								
Normal	20	95.2	1	4.8	21	100	0.000	**120**
Stress	11	14.3	66	85.7	77	100		
Sleep Quality								
Good	20	95.2	1	4.8	21	100	0.000	**120**
Poor	11	14.3	66	85.7	77	100		

According to Table 2, more than half of the subjects, regardless of whether they consumed junk food infrequently or frequently, and whether the energy contribution from junk food was low or high, were classified as obese. Statistical analysis indicated no significant association between junk food consumption habits and nutritional status in relation to obesity. The majority of subjects (95.2%) who did not experience stress and had good sleep quality were not obese. In contrast, the majority of subjects (85.7%) who experienced stress and had poor sleep quality were obese. The Chi-Square test revealed a significant

relationship between stress levels and sleep quality with nutritional status. Subjects who experienced stress and had poor sleep quality were found to be 120 times more likely to be obese at 95% confidence intervals (CIs).

Table 3. Total Body Fat of Subjects Based on Junk Food Consumption, Stress Level, and Sleep Quality

Variable	Total Body Fat				Total		*P*	OR
	Low-Normal		High		n	%		
	n	%	n	%				
Junk Food Consumption								
Frequency of Consumption								
Infrequently	5	13.9	31	86.1	36	100	0.932	0.950
Frequently	9	14.5	53	85.5	62	100		
Energy Contribution of Junk Food								
Low (≤median)	7	14.3	42	85.7	49	100	1.000	1.000
High (>median)	7	14.3	42	85.7	49	100		
Stress Level								
Normal	13	61.9	8	38.1	21	100	0.000	123.5
Stress	1	1.3	76	98.7	77	100		
Sleep Quality								
Good	14	66.7	7	33.3	21	100	0.000	0.333
Poor	0	0	77	100	77	100		

Table 3 shows that the majority of subjects, regardless of whether they consumed junk food infrequently or frequently, and regardless of whether the energy contribution from junk food was low or high had total body fat. There was no significant association between junk food consumption and total body fat. More than half of the subjects who did not experience stress (61.9%) had total body fat within the low or normal range. In contrast, almost all subjects who experienced stress (98.7%) had high total body fat. A significant association was found between stress level and total body fat. Subjects who experienced stress were 123.5 times more likely to have high total body fat at 95% CIs. The majority of subjects with good sleep quality (66.7%) had total body fat within the low or normal category. However, all subjects with poor sleep quality had high total body fat. Statistical analysis showed a significant association between sleep quality and total body fat among workers.

Table 4. Visceral Fat of Subjects Based on Junk Food Consumption, Stress Level, and Sleep Quality

Variable	Visceral Fat				Total		*P*	OR
	Normal		High		n	%		
	n	%	n	%				
Junk Food Consumption								
Frequency of Consumption								
Infrequently	5	13.9	31	86.1	36	100	0.063	0.365
Frequently	19	30.6	43	69.4	62	100		
Energy Contribution of Junk Food								
Low (≤median)	10	20.4	39	79.6	49	100	0.347	0.641
High (>median)	14	28.6	35	71.4	49	100		
Stress Level								
Normal	17	81	4	19	21	100	0.000	42.5
Stress	7	9.1	70	90.9	77	100		
Sleep Quality								
Good	17	81	4	19	21	100	0.000	42.5
Poor	7	9.1	70	90.9	77	100		

The majority of subjects, regardless of whether they rarely or frequently consumed junk food, exhibited visceral obesity, characterised by elevated levels of visceral fat. No significant association was found between junk food consumption and visceral fat levels. Most subjects who did not experience stress and reported good sleep quality (81%) had normal levels of visceral fat. In contrast, nearly all subjects (90.9%) who reported experiencing stress and poor sleep quality had elevated visceral fat levels. The results of the Chi-Square test indicated a significant association between stress levels and sleep quality with visceral fat level (Table 4).

Table 5. Muscle Mass of Subjects Based on Junk Food Consumption, Stress Level, and Sleep Quality

Variable	Muscle Mass				Total		*P*	OR
	Low-Normal		High		n	%		
	n	%	n	%				
Junk Food Consumption								
Frequency of Consumption								
Infrequently	5	13.9	31	86.1	36	100	0.063	0.365
Frequently	19	30.6	43	69.4	62	100		
Energy Contribution of Junk Food								
Low (≤median)	10	20.4	39	79.6	49	100	0.347	0.641
High (>median)	14	28.6	35	71.4	49	100		
Stress Level								
Normal	17	81	4	19	21	100	0.000	42.5
Stress	7	9.1	70	90.9	77	100		
Sleep Quality								
Good	17	81	4	19	21	100	0.000	42.5
Poor	7	9.1	70	90.9	77	100		

Table 5 shows almost all subjects, whether categorized by junk food consumption, stress levels, or sleep quality, have muscle mass within the low and normal ranges. The results of the statistical tests did not indicate a significant relationship between junk food consumption, stress levels, and sleep quality with the muscle mass of the subjects.

DISCUSSION

Junk food refers to foods and/or beverages characterised by high levels of fat, sugar and calories, yet low in fibre, vitamins and minerals. Frequent and excessive consumption of such products may result in a positive energy balance and, ultimately, obesity. Intake of junk food has been shown to impair health by elevating the risk of non-communicable diseases, promoting addictive eating behaviours and inducing excessive weight gain. Moreover, the high energy density of these products contributes further to caloric surplus (Septiana et al., 2018). However, the present study found no significant association between junk food consumption and nutritional status, total body fat, visceral fat or muscle mass indicative of obesity. This concurs with previous study that similarly reported no relationship between high-calorie junk or fast food intake and either general or visceral obesity (Nugraeni et al., 2023). Despite an average energy contribution from junk food of only 119 kcal/day (4.56 % RDA), it is important to consider other dietary and behavioural factors that may modulate this non-association. For example, overall dietary patterns—such as the ratio of macronutrients or the frequency of home-cooked meals—may attenuate the impact of occasional junk food intake (Drewnowski & Fulgoni, 2020). Total daily energy intake, which we did not track in detail, could also counterbalance the modest calories from junk food if participants compensated by reducing intake elsewhere. Similarly, physical activity levels were not objectively measured; variations in incidental exercise or occupational movement may have influenced body composition outcomes (Kirk et al., 2025). Finally, portion size and type of junk food (e.g., sugar-sweetened beverages versus deep-fried snacks) can yield widely differing metabolic effects that were not fully captured by our questionnaire.

Although most subjects were classified as frequent consumers of junk food, this pattern was not exclusive to those with obesity; non-obese subjects also reported similar frequencies. Furthermore, portion sizes varied: some subjects consumed only half or minimal servings of typical junk food portions.

Beyond dietary intake, nutritional status and body composition may be influenced by other factors such as stress. Stress arises when there is a perceived discrepancy between environmental demands—such as work obligations—and an individual's capacity to meet them, leading to feelings of threat, disruption or loss of control. In this study, most subjects experienced stress, predominantly at a moderate level (70.4 %). Commonly reported stress-related issues included difficulty relaxing, irritability and trouble calming down after upsetting events. Statistical analysis revealed a significant association between stress levels and obesity, percentage body fat and visceral fat. This result aligns with previous study which found that elevated stress conferred a 1.23-fold increased risk of obesity (Mattioli et al., 2020). Workplace pressures—such as being tasked with two jobs in one day when only one can be managed—have been identified as key stressors (Sutrisno & Suhendi, 2019). Physiologically, stress triggers the hypothalamus to stimulate the pituitary gland to secrete cortisol, which in turn enhances appetite via central nervous system pathways. A primary consequence of stress is altered eating patterns, notably increased consumption of energy-dense foods (Mattioli et al., 2020), which may culminate in obesity (Nurrahmawati & Fatmaningrum, 2018). Correspondingly, individuals who become obese often exhibit increases in both body fat percentage and visceral fat (Gámez-nava *et al.,* 2020).

Statistical tests further indicated no significant relationship between stress level and muscle mass among worker. Given that continuous rhythmic physical activity enhances circulatory and respiratory function—thereby augmenting oxygen delivery for muscular work—muscle mass is more directly influenced by habitual exercise. Regular physical training increases muscle hypertrophy and fitness (Siregar et al., 2018). Hence, stress appears not to exert a direct effect on muscle mass.

Sleep quality represents another determinant of nutritional status and body composition, with poor sleep implicated in obesity. Sleep quality is defined by ease of initiating sleep, obtaining sufficient duration to awaken refreshed, and maintaining wakefulness throughout the day without excessive daytime sleepiness (Stefan *et al.,* 2018). In the present study, poor sleep quality was significantly associated with obesity, body fat percentage and visceral fat. Office worker with poor sleep quality had a 1.156-fold greater likelihood of obesity compared with those sleeping well. Good sleep is essential for both physical and mental health, as well as overall quality of life. Subjects attributed their poor sleep to late-night coffee consumption whilst working and, in some cases, the use of hypnotics to induce sleep (Nurmadinisia et al., 2020).

Mechanistically, inadequate sleep decreases leptin and melatonin levels while increasing ghrelin, thereby heightening appetite and elevating the risk of overweight and obesity (Simon et al., 2021). Leptin, secreted by adipose tissue, normally suppresses appetite; melatonin, produced by the pineal gland, signals sleep onset. When melatonin production is reduced, ghrelin rises, stimulating hunger (Sweatt et al., 2019).

Finally, statistical analysis showed no significant association between sleep quality and muscle mass in this study. Other factors—such as protein intake and resistance training habits—exert stronger influences on muscle hypertrophy. Protein requirements increase during strength training to repair muscle micro-damage, and consumption of high-protein milk, rich in whey and the branched-chain amino acid leucine, supports muscle synthesis (Siska & Putri, 2019). Thus, while sleep quality affects numerous health outcomes, it does not directly influence muscle mass in this population.

This study's cross-sectional design precludes inference of causality. Portion sizes of junk food were estimated rather than weighed. Additionally, the sample was drawn from a single university's administrative staff, potentially limiting generalisability to other occupational or cultural contexts.

Our findings suggest that interventions for university administrative staff should not focus solely on reducing junk food intake, given its low caloric contribution, but rather adopt a holistic approach. Such programs might include structured nutrition education that emphasizes overall dietary patterns and portion control, objective monitoring of physical activity levels with follow-up coaching, stress-management workshops (e.g., mindfulness or time-management training), and sleep hygiene promotion.

By addressing multiple determinants of obesity—including stress and sleep quality—workplace wellness initiatives can more effectively support healthy body composition among university staff.

CONCLUSION

There was no significant association between junk food consumption and either nutritional status or overall body composition. In this study, junk food consumption, averaging 116 kcal/day, was not associated with the measured obesity indicators. However, stress levels and sleep quality were both significantly correlated with nutritional status, body fat percentage and visceral fat, all of which predispose to obesity. No independent variable demonstrated a significant relationship with muscle mass. Future research should include longitudinal studies to evaluate causal relationships, interventions targeting stress management and sleep improvement, and investigations incorporating objective measures of dietary intake and physical activity. It is therefore recommended that employees manage their stress levels and ensure sufficient sleep duration and quality in order to maintain nutritional status, total body fat and visceral fat within healthy limits and thus avert the onset of obesity.

REFERENCES

BKPK Kemenkes. (2023). Survei Kesehatan Indonesia (SKI) dalam Angka. Jakarta: Badan Kebijakan Pembangunan Kesehatan Kementrian Kesehatan Republik Indonesia.

Balitbangkes. (2018). *Laporan Nasional Riset Kesehatan Dasar*. Badan Penelitian dan Pengembangan Kesehatan.

Drewnowski, A., & Fulgoni, V. L. (2020). New Nutrient Rich Food Nutrient Density Models That Include Nutrients and MyPlate Food Groups. *Frontiers in Nutrition*, *7*(July), 1–8. https://doi.org/10.3389/fnut.2020.00107

Fatmawati, I. (2019). Asupan gula sederhana sebagai faktor risiko obesitas pada siswa-siswi sekolah menengah pertama di Kecamatan Pamulang, Kota Tangerang Selatan. *Ilmu Gizi Indonesia*, *2*(2), 147. https://doi.org/10.35842/ilgi.v2i2.113

Gámez-nava, J. I., Germán, E., Alejandro, J., Nérida, E., & Guillermina, A. (2020). The Effect of Visceral Abdominal Fat Volume on Oxidative Stress and Proin fl ammatory Cytokines in Subjects with Normal Weight , Overweight and Obesity. *Departement of Physiology, University Health Science Centre, University of Guadalajara, Jalisco, Mexico*, *13*, 1077–1087.

Karlinda, L., Aini, F., & Wakhid, A. (2021). Jurnal Ilmu Keperawatan Jiwa. *Jurnal Ilmu Keperawatan Jiwa*, *4*, 645–652.

Kirk, B. J. C., Mavropalias, G., Blazevich, A. J., Cochrane-Wilkie, J. L., Molan, A., & Nosaka, K. (2025). Effects of a daily, home-based, 5-minute eccentric exercise program on physical fitness, body composition, and health in sedentary individuals. *European Journal of Applied Physiology*, *0123456789*. https://doi.org/10.1007/s00421-025-05757-7

Mattioli, A. V., Sciomer, S., Cocchi, C., Maffei, S., & Gallina, S. (2020). Quarantine during COVID-19 outbreak: Changes in diet and physical activity increase the risk of cardiovascular disease. *Nutrition, Metabolism and Cardiovascular Diseases*, *30*(9), 1409–1417. https://doi.org/10.1016/j.numecd.2020.05.020

Nisa, H., Fatihah, I. Z., Oktovianty, F., Mardiah, T. R., & Azhari, R. (2020). Konsumsi Makanan Cepat Saji , Aktivitas Fisik , dan Status Gizi Remaja di Kota Tangerang Selatan. *Media Penelitian Dan Pengembangan Kesehatan*, *31*(April 2009), 63–74.

Nurrahmawati, F., & Fatmaningrum, W. (2018). Hubungan Usia , Stres , dan Asupan Zat Gizi Makro dengan Kejadian Obesitas Abdominal pada Ibu Rumah Tangga di Kelurahan Sidotopo , Surabaya. *Amerta Nutrition*, *2*(3), 254–264. https://doi.org/10.20473/amnt.v2.i3.2018.254-264

Septiana, P., Nugroho, F. A., & Wilujeng, C. S. (2018). Konsumsi Junk food dan Serat pada Remaja Putri Overweight dan Obesitas yang Indekos. *Jurnal Kedokteran Brawijaya*, *30*(1), 61. https://doi.org/10.21776/ub.jkb.2018.030.01.11

Simon, Yustina, I., & Siregar, F. A. (2021). Hubungan Kualitas Tidur Dengan 5 Indikator Sindroma Metabolik Pada Perawat Di Rumah Sakit Umum Pusat Haji Adam Malik Medan. *VISIKES: Jurnal Kesehatan Masyarakat*, *20*(2), 391–400. https://doi.org/10.33633/visikes.v20i2.5076

Siregar, N. F., Nuzrina, R., Gifari, N., Kuswari2, M., & Rontawati, P. (2018). Hubungan Indeks Massa Tubuh, Massa Otot, dan Persen Lemak Tubuh dengan Kebugran Atlet Futsal Putri di Club Jaya Kencana Tangerang. *Jurna Prodi Ilmu Gizi , Fikes, Universitas Esa Unggul*.

Siska, M. T., & Putri, F. (2019). Pengaruh Kombinasi Latihan Beban dengan Metode Pyramid set dan Konsumsi Susu Tinggi Protein Terhadap Peningkatan Massa Otot. *Jurnal Ilmu Kedokteran*, *13*(2), 107–116.

Sutrisno, & Suhendi, D. A. (2019). Pengaruh Stres Kerja Terhadap Kinerja Karyawan pada PT. Bangun Sinar Indonesia Jakarta. *Jurnal Ekonomi Efektif*, *1*(2), 147–157.

Sweatt, S. K., Gower, B. A., Chieh, A. Y., Liu, Y., Li, L., & Neurobiology, B. (2019). Sleep Quality is Differentially Related to Adiposity in Adults. *HHS Public Access*, *98*, 46–51. https://doi.org/10.1016/j.psyneuen.2018.07.024.Sleep

Tam, A. B., Chairani, A., & Bustamam, N. (2021). Gambaran Kualitas Tidur Keluhan Muskuloskeletal dan Hubungannya Pada Staf Akademik Tahun 2020. *Prepotif Jurnal Kesehatan Masyarakat*, *5*(4), 195–203.

Zulkarnain, A., & Alvina, A. (2020). Hubungan kebiasaan berolahraga dan merokok dengan obesitas abdominal pada karyawan usia produktif. *Jurnal Biomedika Dan Kesehatan*, *3*(1), 21–27. https://doi.org/10.18051/jbiomedkes.2020.v3.21-27