RESEARCH ARTICLE

The influence of the nutrients consumed by health workers during the period of COVID-19 pandemic on hedonic hunger

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Abstract

Objective: To examine the effects of macro- and micro-nutrient intake of health workers on hedonic hunger.

Method: The descriptive, cross-sectional study was conducted at Kahramanmaras Necip Fazil City Hospital, Turkey, from May to December 2021, and comprised all types of healthcare professionals of either gender aged >18 years. Data was collected using a 22-question survey form to record three-day food consumption, and the Power of Food Scale. Data was analysed using SPSS 22.

Results: Of the 516 participants, 255(49.4%) were males and 261(50.6%) were females. The overall mean age was 41.28±7.598 years. Body mass indiex was the only factor significantly associated with hedonic hunger (p<0.05), while gender, age, meal-skipping status, the most skipped meal, and the occupational status had no such association (p>0.05). Nurses consumed high-energy macronutrients (p<0.05).

Conclusion: Overweight health professionals were found to have the highest rate of hedonic hunger, while nurses' consumption of high-energy macronutrients was signficantly higher.

Keywords: Nutrients, Body mass index, Health personnel, Hunger, Eating. (JPMA 73: 521; 2023)

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Introduction

Thanks to their social roles and occupational responsibilities, healthcare workers (HCWs) can influence the people they serve and be role models for society.[1] Factors such as shift work, workload, sleep quality irregularity and insufficient physical activity in HCWs cause obesity and health problems caused by obesity. This affects the quality of service provided by HCWs to their patients and their health status.[2] That is why adequate and balanced nutrition and lifestyles of HCWs are of great importance.[1] Stress factors, such as shifts, intense working conditions, and emotional situations affect the nutrition of HCWs and can change their diets.[2] Many factors, such as environmental, genetic, metabolic, and psychological status, affect food intake.[3] Additionally, purchasing power, social and cultural environment, food consumption habits, taste and taste perception of foods, nutrition policies of countries and food accessibility also affect food preferences and feeding behaviours.[4] Visual of the food and food presentation affects people's perception of taste and appetite as well as their consumption behaviour. The formation of hedonic hunger and nutritional stimulation are effectively stimulated by sense organs related to smell, taste and sight.[5] Hedonic hunger is defined as intake of energy-dense and tasteful food with the expectation of pleasure when the body does not have a physiological need. In hedonic food intake, with the release of dopamine, endocannabinoids and opioids, brain reward circuits get activated.[6] When brain reward circuits are activated, hypothalamic hunger signals are stimulated while satiety signals are inhibited. Therefore the urge to eat without the need for energy is preserved.[7] Hedonic mechanisms are triggered by flavour signals, such as the smell and taste of food. The brain reward system is activated faster by foods high in sugar and fat.[8] Excessive food consumption is a behaviour that is triggered and sustained by an increase in easily accessible tasteful foods and increases energy intake and hedonic hunger.[9] It increases the activation of the reward centre of the brain and causes an increase in hedonic hunger.[10] A recent study showed that there was an association between hedonic hunger and body mass index (BMI).[11] A similar study showed that individuals classified as obese were more sensitive to food cues when they were satiated than those classified as normal, and in obese individuals in a fasting state, there is an increased neural activation in areas known to be related to reward expectation.[5]

The current study was planned to examine the effects of macro- and micro-nutrient intake of HCWs on hedonic hunger.

Subject and Methods

The descriptive, cross-sectional study was conducted at

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Kahramanmaraş Necip Fazil City Hospital, Turkey, from May to December 2021, After approval from the ethics research committee of Kahramanmaraş Sütçü İmam University, Turkey, the sample size was calculated with 0,005 sample error and 95% confidence interval (CI).[12] The sample was raised using simple random sampling technique from among the HCWs working at the study site. Those included were HCWs of either gender aged >18 years. Occupational subgroups were classified as doctor, nurse, allied health personnel; technician, midwife, assistant technician, nursing staff, psychologist, pharmacist, child development expert, physiotherapist, audiometrician, dietitian, and other health personnel, such as data-collection personnel, cleaning personnel, security, data processor, medical secretary, translator, assistant manager, accountant, and technical service.

Those having any psychiatric diagnosis, having a congenital cleft palate or tongue problem that prevents food intake, being aged <18 years, being pregnant or lactant, having a mental deficiency, or any physical disability that prevents mobility were excluded.

After taking informed consent from the subects, body weight measurements were performed with a weighing machine (Tefal 1603, Premiss) and height was measured with a non-flexible tape measure fixed to the wall, without shoes and feet together, on the Frankfurt platform-. Waist circumference (WC) was measured with a 0.1cm sensitive non-flexible tape, without applying pressure from the midpoint between the lowest rib bone and the cristailiac while standing up and abdomen relaxed, arms at both sides and feet together.[13]

BMI values of the participants were calculated by dividing body weight (kg) to the square of height (m) (kg/m^2). It was classified according to the BMI classification of the World Health Organisation.[14]

Data was collected using a 22-question survey form exploring age, gender, marital status, department, working type, smoking-alcohol usage, as well as nutritional status, including water and food intake status. The Power of Food Scale (PFS) was used for measuring hedonic hunger. PFS is a scale developed to reveal the impulse of hedonic hunger. It originally consisted of 21 items. Turkish validity and reliability study of the scale reduced it to 15 items by removing the 2nd, 4th, 7th, 9th, 12th and 13th items, which increased the reliability coefficient of the scale from 0.76 to 0.85.[15] PFS is used for calculating the irresistible impulse towards delicious food apart from calculating daily food intake rate and amount.[16] PFS is answered on a 5-point Likert scale, ranging 1-5. Food accessibility, food availability, and tasting of the food domains are targetted. Scoring is done by dividing the sum of the values by the number of questions, with a score of 2.5 indicating hedonic hunger, and higher scores indicating an individual's sensitivity to the food environment and that the person is psychologically controlled by food.[17]

Daily energy and nutritional intake of the subjects was asessed using a 3-day food consumption record (2 weekdays and 1 weekend) was generated using the

Table-1: Hedonic hunger status with respect to demographic and general characteristics.

Characteristic	Hedonic hunger increase[n(%)]	Hedonic hunger decrease [n(%)]	Total n(%)	Test	*p*-value
Gender				x^2: 0,148	* 0,701
Male	159(48.8)	96(50.5)	255(49.4)		
Female	167(51.2)	94(49.5)	261(50.6)		
Age Group				x^2: 4.839	* 0.304
18-25 years	6(1.8)	2(1.1)	8(1.6)		
26-33 years	53(16.3)	21(11.1)	74(14.3)		
34-41 years	107(32.8)	66(34.8)	173(33.5)		
42-49 years	122(37.4)	70(36.8)	192(37.2)		
50+ years	38(11.7)	31(16.2)	69(13.4)		
BMI Classification				x^2:8.222	* 0.042
Underweight (<18.5 kg/m^2)	46(14.1)	26(13.7)	72(14.0)		
Normal (18.5-24.9 kg/m^2)	100(30.6)	73(38.4)	173(33.5)		
Overweight (25.0-29.9 kg/m^2)	112(34.4)	69(36.3)	181(35.1)		
Obese (≥30 kg/m^2)	68(20.9)	22(11.6)	90(17.4)		
Meal Skipping Status				x^2: 1.250	*0.264
Yes	117(35.9)	59(31.1)	176(34.1)		
No	209(64.1)	131(68.9)	340(65.9)		
Most Skipped Meal				x^2: 5.010	*0.286
Breakfast	158(48.5)	76(40.0)	234(45.3)		
Lunch	138(42.3)	92(48.4)	230(44.6)		
Dinner	6(1.8)	2(1.1)	8(1.6)		
Brunch	16(4.9)	12(6.3)	28(5.4)		
Tiffin	8(2.5)	8(4.2)	16(3.1)		
Toplam	326(100)	190(100)	516(100)		
Occupational Subgroup				x^2: 2.310	*0.511
Doctor	80(24.5)	40(21.1)	120(23.3)		
Nurse	102(31.3)	53(27.9)	155(30.0)		
Allied Health Personnel	78(23.9)	53(27.9)	131(25.4)		
Other Health Personnel	66(20.3)	44(23.1)	110(21.3)		
Total	326(100)	190(100)	516(100)		

*:Pearson Ki-Kare; Litre: lt.; BMI: Body mass index.

retrospective recall method, and individual data was analysed using Computer-Aided Nutrition Programme for Turkey, Nutrition Package Information Systems Programme BEBIS,which is a data-bank of more than 20,000 foods and is a software platform used for calculating the nutritional values of foods, recipes and diet plans with more than 130 nutrient analyses.[18] The daily average of the macro- and micro-nutrient needs of an individual was Based on the Dietary Reference Intakes (DRI).[19]

Data was analysed using SPSS 22. P<0.05 was considered statistically significant.

Results

Of the 516 participants, 255(49.4%) were males and 261(50.6%) were females. The overall mean age was 41.28±7.598 years. Of the total, 155(30%) were nurses, 192(37,2) were aged 42-49 years, 181(35,1) were overweight, 340(65.9) did not skip meals, and breakfast was the skipped meal for 234(45.3) subjects. Hedonic hunger was found in 326(63.2%) subjects; 159(48.8%) males and 167(51.2%) females. BMI was the only factor significantly associated with hedonic hunger (p<0.05), while gender, age, meal-skipping status, the most skipped meal, and the occupational status had no such association (p>0.05) (Table 1).

Comparison of energy, macro- and micro-nutrient values of individuals according to occupational groups with DRI recommendations showed that intake of vitamins A, E and B2, phosphorus and zinc was in line with the recommended values; that of water, fibre, polyunsaturated fatty acids (PUFAs), carotene, vitamin B1 and B6, and folate was below the recommended values; and the intake of macro-nutrient fat and micro-nutrient sodium was above the recommended values (Table 2).

Comparison of energy, macro- and micro-nutrient values of individuals according to hedonic hunger status showed that intake micro-nutrients, such as vitamins A, B2, C, phosphorus, iron and zinc was according to the recommended values; the intake of water, fibre, PUFAs, carotene, vitamins E, B1, B6, folate, potassium, calcium and magnesiumwas below the recommended values; and the intake of protein, fat, carbohydrates (CHO) and micro-nutrient sodium was above the recommended values (Table 3).

Table-2: Comparison of energy. macro- and micro-nutrient values of individuals according to occupational groups.

	Nurse **Median** (min-max)	**Other Health Personnel** **Median** (min-max)	**Allied Health Personnel** **Median** (min-max)	**Doctor** **Median** (min-max)	**F - KW**	***p*-value**
Energy (kcal)	1380.7a (225.3-3046.4)	1446ab (831.6-2276.3)	1485.9b (568.8-2562.7)	1439.2ab (773.2-3384.9)	6.236	0.044*
Water (gr)	974.7 (215.5-2498.3)	928.9 (269.6-1787.7)	973.3 (365.9-3205)	923.5 (405.9-2387.3)	1.517	0.468
Protein (gr)	51.6 (9.1-106.7)	53.9 (23.6-100.7)	54.5 (19.8-93.8)	57.8 (25.1-107.6)	4.009	0.135
Protein (%)	15 (11-23)	15 (10-22)	15 (9-24)	16 (11-24)	0.642	0.725
Fat (gr)	69.9 (11.2-173.1)	73.8 (31.8-136.3)	73.4 (30.8-166)	76.1 (23.2-190.9)	2.325	0.313
Fat (%)	47 (32-73)	46 (25-62)	46 (25-66)	45 (23-65)	2.327	0.312
CHO (gr)	37s (11-53)	39b (22-60)	38ab (20-62)	38ab (16-56)	6.944	0.031*
CHO (%)	37.23±6.48	38.49±7.57	38.05±7.22	38.00±7.03	0.752	0.522
Fibre (gr)	11.8a (2.8-36.2)	12.5ab (5.3-27.9)	13.1b (4.5-27.2)	12.4ab (4.5-37.9)	6.321	0.042*
Alcohol (gr)	0 (0-6.6)	0 (0-28.4)	0 (0-1.5)	0 (0-26.4)	1.257	0.533
Alcohol (%)	0 (0-3)	0 (0-12)	0 (0-1)	0 (0-20)	1.024	0.599
Polyunsaturated Fat (gr)	13.2 (0.7-39.2)	13.8 (4.2-40.5)	15.2 (4.5-41.5)	14.6 (4.9-44.6)	4.502	0.105
Cholesterol (mg)	326.5 (32.9-838.3)	318.2 (65.8-671.3)	311.9 (55.3-847.8)	316.8 (28.6-710.7)	0.063	0.969
Vitamin A (mcg)	941.3 (217.9-3046.2)	965.9 (349.3-7073.4)	1012.4 (274.5-4138.7)	979.1 (277.8-2112.1)	0.810	0.667
Carotene (mg)	3.1 (0.7-15.9)	2.8 (0.6-23.5)	3.1 (0.4-21.7)	2.9 (0.6-16.6)	2.502	0.286
Vitamin E (mg)	13.2 (1-45.8)	14.3 (2.7-30.5)	13.9 (3.3-41.1)	13.7 (4-38.9)	1.894	0.388
Vitamin B1 Thiamine (mg)	0.6a (0.1-1.4)	0.6a (0.3-1.3)	0.7b (0.3-1)	0.6a (0.3-1.9)	7.356	0.025*
Vitamin B2 Riboflavine (mg)	1.2 (0.2-2.1)	1.2 (0.3-2.1)	1.3 (0.5-2.3)	1.2 (0.5-2.7)	1.870	0.393
Vitamin B6 Pyridoxine (mg)	0.9 (0.2-1.9)	0.9 (0.4-2.4)	1 (0.2-1.6)	0.9 (0.4-2.3)	6.005	0.050
Folate (mcg)	234.8 (56.7-541.7)	229.2 (89.3-524.7)	257.5 (125.3-418.2)	235.8 (78.3-767)	5.315	0.070
Vitamin C (mg)	75.3 (13.8-179.9)	67.3 (10.2-205.8)	77.2 (15.1-204.6)	65.1 (19.2-220.7)	2.185	0.335
Sodium (mg)	2941.5 (665.5-35981.9)	2768.7 (1034.7-20419.7)	3159.7 (912-20185.8)	3299.8 (1119.2-37809.8)	5.488	0.064
Potassium (mg)	1754.2 (431.9-3564.9)	1818.7 (743.6-3336.3)	1901.8 (588.7-2958.4)	1720.8 (821.3-3771.6)	4.362	0.113
Calcium (mg)	567.2 (137.8-1213.9)	619.2 (151.3-1106.27)	613.6 (232.6-1353.2)	642.4 (163.7-1404.5)	2.091	0.351
Magnesium (mg)	178.7 (31.6-398.3)	191.5 (75.6-372.5)	193 (49.6-314.9)	191.2 (59.1-566.7)	5.928	0.052
Phosphorus (mg)	822.3 (147.6-1703.9)	863 (310-1569.5)	904.1 (348.1-1518.4)	902.6 (420.6-2059.9)	5.102	0.078
Iron (mg)	6.9 (1-14.9)	7.3 (3.1-15.6)	7.6 (1.9-11.7)	7.6 (3.59-17.9)	5.490	0.064
Zinc (mg)	8.24±2.28^{a}	8.70±2.4^{ab}	8.68±2.52^{ab}	9.36±2.75^{b}	4.579	0.004**

F: One-Way ANOVA Test. KW: Kruskal-Wallis Test *:<0.05; **:<0.01 The difference between the medians without a common letter is significant (p<0.05). CHO: Carbohydrates.

Table-3: Comparison of energy. macro and micro-nutrient values of individuals according to hedonic hunger classification.

	Hedonic Hunger Classification				U	*p*-value
	HedonicHunger Increase		HedonicHunger Decreased			
	$\bar{X}\pm SS$	**Median** (min-max)	$\bar{X}\pm SS$	**Median** (min-max)		
Energy (kcal)	1504.10±388.36	1466.4 (225.3-3384.9)	1415.19±351.22	1366.5 (773.5-2274.3)	26499.5	0.006**
Water (gr)	1059.15±382.36	1000.5 (215.5-3205)	950.23±280.30	905.9 (269.6-1886)	26294.5	0.004**
Protein (gr)	56.89±15.34	54.1 (9.1-107.6)	53.83±14.52	52.6 (23.6-97.2)	27558.5	0.037*
Protein (%)	15.59±2.40	15 (9-24)	15.67±2.70	16 (9-24)	30323.5	0.690
Fat (gr)	77.67±23.32	75 (11.2-190.9)	74.28±20.24	70.1 (32.7-133.9)	28067.5	0.076
Fat (%)	46.01±6.73	46 (23-66)	46.96±6.75	46.5 (33-73)	28935	0.212
CHO (gr)	141.02±45.68	137.2 (21.17-319.8)	130.02±44.65	124.7 (29.8-283.9)	26509	0.006**
CHO (%)	38.22±6.85	38 (20-62)	37.32±7.33	37 (11-55)	29008	0.229
Fibre (gr)	13.21±4.43	12.6 (2.8-37.9)	12.41±4.23	11.9 (4.2-33.2)	27714	0.046*
Alcohol (gr)	0.27±2.43	0 (0-28.4)	0.04±0.14	0 (0-1.5)	30430	0.581
Alcohol (%)	0.13±1.37	0 (0-20)	0.01±0.07	0 (0-1)	30751	0.429
Polyunsaturated Fat (gr)	15.06±6.54	14.2 (0.7-44.6)	14.37±5.70	13.8 (4.2-40.5)	29570.5	0.392
Cholesterol (mg)	335.43±144.25	319.8 (28.6-838.3)	322.56±128.96	319 (55.3-847.8)	29642.5	0.416
Vitamin A (mcg)	1138.94±604.49	976.1 (217.9-4402.7)	1126.87±689.19	981.1 (349.3-7073.4)	30034.5	0.567
Carotene (mg)	3.91±3.09	2.9 (0.4-23.5)	3.84±2.98	2.9 (0.4-20.7)	30028.5	0.564
Vitamin E (mg)	14.65±6.90	13.7 (1-45.8)	14.04±6.03	13.6 (2.7-33.9)	30087	0.589
Vitamin B1 Thiamine (mg)	0.65±0.18	0.6 (0.1-1.9)	0.62±0.18	0.6 (0.3-1.5)	28084.5	0.077
Vitamin B2 Riboflavine (mg)	1.23±0.36	1.2 (0.2-2.7)	1.19±0.33	1.2 (0.3-2.1)	28890.5	0.203
Vitamin B6 Pyridoxine (mg)	0.93±0.25	0.9 (0.2-2.3)	0.89±0.28	0.8 (0.4-2.4)	26806.5	0.011*
Folate (mcg)	248.41±77.04	241.7 (56.7-767)	242.71±69.65	232.7 (89.3-524.7)	29606	0.404
Vitamin C (mg)	79.59±37.35	71.6 (10.2-220.7)	76.08±37.39	68.9 (15.6-204.6)	29048.5	0.239
Sodium (mg)	4076.30±4459.98	3159.7 (665.5-37809.9)	3898.62±4260.01	2897.3 (1034.7-35576.2)	27743.5	0.048*
Potassium (mg)	1905.99±503.38	1830.9 (431.9-3771.6)	1803.15±479.80	1753.1 (743.6-3421.9)	27246	0.023*
Calcium (mg)	631.74±200.04	616.8 (137.9-1404.5)	601.76±183.10	596.8 (151.3-1237.1)	28289	0.101
Magnesium (mg)	198.52±59.40	190.7 (31.6-566.7)	183.28±51.41	179.9 (75.6-405.7)	26533.5	0.007**
Phosphorus (mg)	914.02±256.14	889.1 (147.6-2059.9)	866.15±241.81	842.9 (310-1664.2)	27447.5	0.031*
Iron (mg)	7.74±2.14	7.5 (1-17.9)	7.34±2.08	7.1 (3.1-15.4)	27214.5	0.022*
Zinc (mg)	8.85±2.49	8.5 (1-18.9)	8.47±2.56	8 (2.8-15.3)	28124.5	0.082

CHO: Carbohydrates. U: Mann-Whitney U Test; *:<0.05; **:<0.01.

Discussion

In the current study, majority of HCWs were slightly obese and normal in BMI terms. In similar studies, the majority of HCWs were in the normal category.[2,20]

In the current study, hedonic hunger of female participants was higher in genderterms, which is in line with earlier studies.[16,21] Females generally do the cooking which may explain hedonic hunger on their part.

The age group with the highest hedonic hunger was 42-49 years In the present study,. A study in 2019 reported decrease in hedonic hunger with increasing age.[17]

Individuals who were in the slightly obese BMI category had the highest hedonic hunger, which increased as the BMI value increased. However, hedonic hunger was lower only in individuals who were obese. The findings are in conformity with literature.[11,22] The small sample size, especially of those found obese, may be a reason for this specific finding.

In the present study, hedonic hunger was higher in those who did not skip meals compared to those who skipped. A study in 2018 found that PFS total score increased as the number of snacks increased.[15] A study in 2022 showed that PFS total score decreased as the number of main meals increased, but the PFS score of those who consumed 3 snacks was significantly higher than those who consumed 1-2 snacks.[23]

The current study observed that more than half of those who skipped breakfast were in the slightly obese and obese groups and hedonic hunger was highest among them. A study in 2020 showed that the hedonic hunger of men who skipped breakfast was higher, whereas it was higher among females who skipped dinner.[24]

The current study found that nurses in terms of an occupational subgroup had highest hedonic hunger. Nurses may skip meals due to intense working conditions and doing shift work, which results in hunger and they may get affected by the sight and smell of food.

In the current study, protein intake of HCWs met the recommended DRI requirement, but CHO intake was higher than the recommended value. A study observed that while HCWs get sufficient protein, they get almost half

of their daily calorie intake from CHO.[25]

In the current study, doctors, as an occupational subgroup, had more energy, protein, CHO and fat intake compared to the other subgroups. Doctors can consume food which is based on high-quality protein sources, such as meat and fish, and high-quality fat sources, such as walnuts, almonds, hazelnuts and peanuts, as they have better socioeconomic status and more money to spend on food.

The current study found that individuals with increased hedonic hunger consumed more nutrients, and their energy intake was also higher. A study in 2020 reported a positive association between nutrients and energy intakes and PFS scores in both men and women.[24]

The current study has limitations having being done at a single centre. Considering the realism of the answers given by the participants to the survey questions, the antagonist factors that may lead to a decrease in the absorption of nutrients, or the absorption disorders, the inability to calculate how much of the dietary nutrients are actually metabolized by the body in line with the principle of bioavailability are the further limitations of this study.

Conclusion

Hedonic hunger was found to affect food consumption, and increased hedonic hunger increased food consumption and the intake of macro- and micro-nutrients.

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