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Health Promoting Behaviors (HPBs) and the Metabolic Indicators of Red Crescent Society Employees in Iran

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Abstract

Background: Disease patterns have changed from communicable to non-communicable diseases, which are the leading causes of mortality around the globe. Health-promoting behaviors (HPBs) could be effective in the prevention of disease and the development of metabolic syndrome.
Objectives: The objectives of the current study are (1) determination of the level of the HPBs and; (2) understand the predictive role of the HPBs of the metabolic indicators in the employees of the Red Crescent Society (RCS) based in Shiraz in Iran.
Methods: This is a descriptive and analytical study, in which all 402 employees of the RCS participated. This study used a Census method and was done in 2018. The validation of this HPBs model was confirmed by confirmatory factor analysis (CFA) model. Relationships between the HPBs dimensions and metabolic indicators were obtained with Pearson correlation. Data analyzed with the SPSS and Amos software.
Results: We found that the goodness of fit of the HPBs model was acceptable, which is indicated by the value of equal to 1.22 and the RMSEA value equal to 0.025. In addition, the standard estimated effect of physical activity on the levels of triglyceride, cholesterol, body mass index, and hypertension was significant ($P < 0.01$). Regarding the aspects of the HPBs, the health responsibility had a higher mean score (24.92 ± 5.23), than the other parameters. In this study, physical activity had the strongest role in the HPBs model.
Conclusions: We can suggest interventions regarding lifestyle, especially physical activity to improve the employees' health.

Keywords: Employees, Health-Promoting Behaviors, Metabolic Index, Structural Equation Modeling

1. Background

Non-communicable diseases have caused the death of more than 36 million people worldwide; among which 48% deaths were attributed to coronary heart diseases (1). In Iran, non-communicable diseases are responsible for 76% of all deaths. Among these, coronary heart diseases and nutritional conditions are responsible for 46% and 10% of all deaths respectively (2). The WHO has recommended a healthy lifestyle, healthy nutrition, reduction in sugar and salt consumption, and assessment of obesity and overweight through the body mass index in order to ensure the prevention of these diseases (1). Health-Promoting Behaviours (HPBs) could be effective in improving and maintaining health (1, 3). Walker defined these HPBs in six categories including nutrition, health responsibilities, physical activity, stress management, interpersonal relationships, and self-actualization (4).

In addition, HPBs could be effective in the prevention and the development of Metabolic Syndrome (MetS) (5). In fact, the metabolic factors are the risk factors of non-communicable diseases, which include high blood pressure, high total cholesterol, high glucose, and obesity and overweight (6-8). The MetS is a cluster of conditions including abdominal obesity, impaired glucose regulation, dyslipidemia, and hypertension (6). In America, more than 33% of all adults fulfilled the MetS criteria in 2012 (9), in the Asia-Pacific countries, the prevalence of MetS in urban Pakistan was 49%. Also, in China, South Korea, and Taiwan, the prevalence trend of MetS was increasing (10). In Iran, overall, the prevalence of MetS is 31%, which is 29% and 37% women and men, respectively (11). In addition, Mohebbi et al. (12) revealed that the prevalence of MetS was 30.5% among the Iranian professional drivers.

MetS are prevalent not only in Iran but also around the globe. Several studies have been done with regard to MetS, HPBs, and healthy lifestyles. The study by Chiou et al. (13) indicated that the cognitive factors including social support, perceived control of health, self- efficacy, perceived risk factors, non-obesity, and no smoking, predicted a 46% variation in the health-promoting behaviours. Another study done on Taiwanese adults indicated that MetS was prevalent in the 60% of the adults, while cognitive factors explain that HPBs were varying by approximately 50% (5). In Iran, Hosseini et al. (14) attempted to understand HPBs through a locus of control in adolescents in Bandar Abbas. Their study predicted that the health locus of control had a variation of 12% regard to health-promoting behaviours. In addition, the study done on the Iranian women indicated that regarding social support and sociodemographic factors, a 29.8% variance was predicted with respect to health-promoting behaviours (15). In addition, indicated that the highest and lowest mean scores for HPBs aspects related to social responsibility and nutritional status, respectively, and stress management and social responsibility indicated the most and least direct impact on lifestyle, respectively, in that case, physical activity with a total effect of 0.62 predicted the Walker lifestyle pattern (15).

Other studies considered the relationships between lifestyle and MetS. The study conducted in Japan demonstrated that the risk of MetS was related to a sedentary lifestyle; hence, the risk of MetS in the highest tertile was 2.27 times more than the participants in the lowest tertile (16). In addition, a study done by Wu et al. (5) indicated that 2% of the HPBs predict by MetS. Furthermore, in another study done by Huang et al. (17), which was conducted among workers in Taiwan, indicated that physical activity decreases obesity in drinkers and plays the most important role in regulating the lipid parameters. The study was performed by Sutherland et al. (18) on Latinos, which measured the HPBs and biophysical indicators, thus indicating that the relationships between these elements were not significant except physical activity.

In order to design effective interventions, the collection of data and information is very crucial (19). Therefore, understanding the constructs that might affect health status is important. There are few studies that consider the relationships and predictive roles of the HPBs of the metabolic indicators, especially among employees and workers in Iran.

2. Objectives

The objectives of the current study are (1) determination of the level of HPBs and; (2) understand the predictive role of the HPBs of the metabolic indicators in the employees of the Red Crescent Society (RCS) based in Shiraz in Iran.

3. Methods

We obtained Health-Promoting Behavior (HPBs) and metabolic indicators from all 402 employees of the RCS located in the Fras Province, Iran, during the year 2018. All participant were informed and written consent was taken before enrolment. Shiraz University of Medical Sciences and the RCS approved the study.

We used a standard and validated questionnaire (health-promoting lifestyle Profile-II) to collect the health behaviors of the participant, which was developed by Walker (15). This scale consists of 52 questions with six subscales including health responsibility, spiritual health, nutrition, physical activity, interpersonal relations, and stress management. This questionnaire records the HPBs in a 4-point Likert scale ranging from one to four; the lowest and highest scores were 52 to 208, respectively. A higher score indicates a better lifestyle (4). In Iran, the HPLP-II scale ranged from 0.64 - 0.91 and the alpha coefficient was 0.82 (20). In addition, Walker et al. (4) reported the alpha coefficient as 0.99 when the range of the total scale was from 0.702 - 0.904. Metabolic data including Triglyceride (TG), High-Density Lipoprotein (HDL) levels, Fasting Blood Sugar (FBS), and cholesterol were collected from a laboratory. A trained technician measured the weight, height, and blood pressure using validated and reliable instruments. A trained interviewer instructed the participants to answer the questions in the HPBs questionnaire within 15 minutes.

3.1. Data Analysis

We described the data with the mean and standard deviation. Through modeling, first, the relationship between HPBs constructs and validation of this model was confirmed by confirmatory factor analysis (CFA) model. The relationships between the HPBs dimensions and metabolic indicators were obtained with Pearson correlation. The level of "0.05" and "0.95" were considered for the significant level (P values) and level of confidence, respectively. According to the SEM's goodness of fitness, we widely considered as many indices as we could including, the ratio of the χ^2 divided by degree of freedom (χ^2/df), Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), Adjusted Goodness of Fit Index (AGFI), Tucker-Lewis Index (TLI), the P value of χ^2 test, P value of RMSEA, and the Goodness-of-Fit Index (GFI) (21). The data were analyzed with SPSS and AMOS software (version 24). In addition, we have represented the acceptable rates of these indicators in Table 1.

Table 1. The Goodness of Fit Indices of the HPBs Model

Goodness of Fit Indices	Acceptable Goodness of Fit Indices Range	Observed Goodness of Fit Indices in HPBs Model
χ^2/df	Less than 2 and less than 5 (22)	1.22
P value of χ^2 test		< 0.001
RMSEA	Less than 0.07 (22)	0.025
P value of RMSEA		1.00
CFI	More than 0.95 (22)	0.98
TLI	0 to 1 (no fit to perfect fit) (23)	0.90
GFI	0 to 1 (no fit to perfect fit) (23)	0.85
AGFI	0 to 1 (no fit to perfect fit) (23)	0.84

4. Results

Among 402 employees, the reported results are based on the 378 questionnaires that were answered completely. In this study, 288 (76.2%) men and 90 (23.8%) women participated. Majority of the participants in our study were married (82%), 41.6 % had graduated from a college. In job categories, the operators were most common (32.8%). 53.4% and 63.5% of the participants reported normal electrocardiogram and health examinations, respectively. 72.2% of the participants had not undergone chest radiography. Pre-hypertension and over-weight were found in 56.2% and 48.9% of the participants respectively. In contrast, 64.8 % and 74.1 % of the participants had desirable levels of triglyceride and cholesterol, respectively. Table 2 indicates the health status and background information of the participants.

4.1. HPBs Dimensions

The confirmatory factor analysis was done and the results showed that the confirmatory model was achieved the criteria of acceptance for being the goodness-of-fit model among the population. After the confirmation, we can tell about the HPBs' aspects in which health responsibility had a higher mean score (24.92 $\pm$ 5.23) than the other parameters. Both the stress management and physical activity had lower scores (20.79 $\pm$ 5.36) and (20.94 $\pm$ 4.74), respectively. In this study, the mean score of the HPBs (139.45 $\pm$ 190.35) was closer to the mean score of the HPBs scale (52 - 208) (Table 2).

The results indicated that among the dimensions of the HPBs, physical activity had a significant correlation with several metabolic indicators. Thereby, the strongest significant correlation was with BMI (r = -0.84, P < 0.01). Among the other dimensions of HPBs, there was a significant correlation between physical activity and nutrition (r = 0.13, P < 0.01) (Table 3).

4.2. Structural Equation Modeling

In general, the goodness of fit of the HPBs model was accepted, which is indicated by the value of χ^2/df equal to 1.22 and the RMSEA value equal to 0.025; the values of the other acceptable range of criteria are mentioned in Table 1. In the structural equation modeling (SEM), the standard estimated effect of physical activity on the levels of triglyceride, cholesterol, BMI, and hypertension was significant (P < 0.01). In addition, the effect of nutrition on BMI was significant (P < 0.01) among the HPBs dimensions (Table 4). In this model, the squared multiple correlations of BMI, hypertension, cholesterol, triglyceride, blood sugar, were 0.76, 0.053, 0.054, 0.046, and 0.013, respectively. Consequently, the HPBs model explains the variations of 76 % in regard to BMI and 1.3 % in regard to blood sugar (Figures 1 and 2).

5. Discussion

This study aimed to understand the efficacy of the HPBs dimensions in predicting the metabolic indicators. In general, we found that 76 and the RMSEA value equal%, 5%, 4%, and 1.2% of the variations in regard to BMI, hypertension, cholesterol, and blood sugar, respectively, which could be explained by the HPBs. In fact, this model predicted the pre-obesity indicator in about half of the participants (Table 2). The participants, in regard to the other indicators, were categorized in the normal range, except pre-hypertension (mean = 118.8 mm/Hg). Therefore, these results demonstrate that this model can help us to understand or predict any abnormal, though we suggest more comparative studies are done regarding the normal and abnormal situations. While comparing the present study with the previous studies, we did not find any study directly pertaining to the current work; however, Mohammadi et al. (15) examined the importance of different lifestyle aspects and demonstrated that 34% of the variation in lifestyle could be explained by stress management and 24.3% could be explained by social responsibilities. In addition, Kamran et al. (24), indicated that the Pender's Health Promotion Model predicted 71.4% of the variations in systolic blood pressure, which is not in agreement with the present study. In comparison, the Pender's Health Promotion Model emphasizes on the cognitive factors, such as self-efficacy (24) more than the model (HBPs model) used in the present study, which lays more emphasis on the health-promoting behaviors besides the cognitive factors (4).

Table 3. The Correlation of HPBs Dimensions with BMI and Hypertension

	BMI	Hypertension	Blood sugar	cholesterol	Triglyceride	Physical activity	Nutrition	Spiritual growth	Interpersonal relationship	Health responsibility	Stress management	HPBS
BMI	1											
Hypertension	0.16[a]	1										
Blood sugar	0.007	0.11[a]	1									
cholesterol	0.11	0.04	0.25[a]	1								
triglyceride	0.127[b]	0.06	0.23[a]	0.45[a]	1							
Physical activity	-0.84[a]	-0.20[a]	-0.03	-0.18[a]	-0.19[a]	1						
Nutrition	-0.02	-0.05	0.08	0.07	0.03	0.13[a]	1					
Spiritual growth	0.19	-0.06	0.03	-0.01	0.003	-0.02	-0.01	1				
Interpersonal relationship	-0.06	0.03	-0.01	-0.09	-0.06	-0.06	-0.06	-0.02	1			
Health responsibility	0.05	0.07	-0.04	0.03	0.01	0.05	-0.01	0.08	-0.05	1		
Stress management	-0.008	0.01	-0.02	0.04	0.06	0.06	-0.02	-0.09	0.01	0.04	1	
HPBs	0.09	0.08				0.85[a]	0.83[a]	0.85[a]	0.94[a]	0.91[a]	0.89[a]	1

Abbreviations: BMI, body mass index; HPBs, health promoting behavior.
[a] Correlation is significant at the 0.01 level.
[b] Correlation is significant at the 0.05 level.

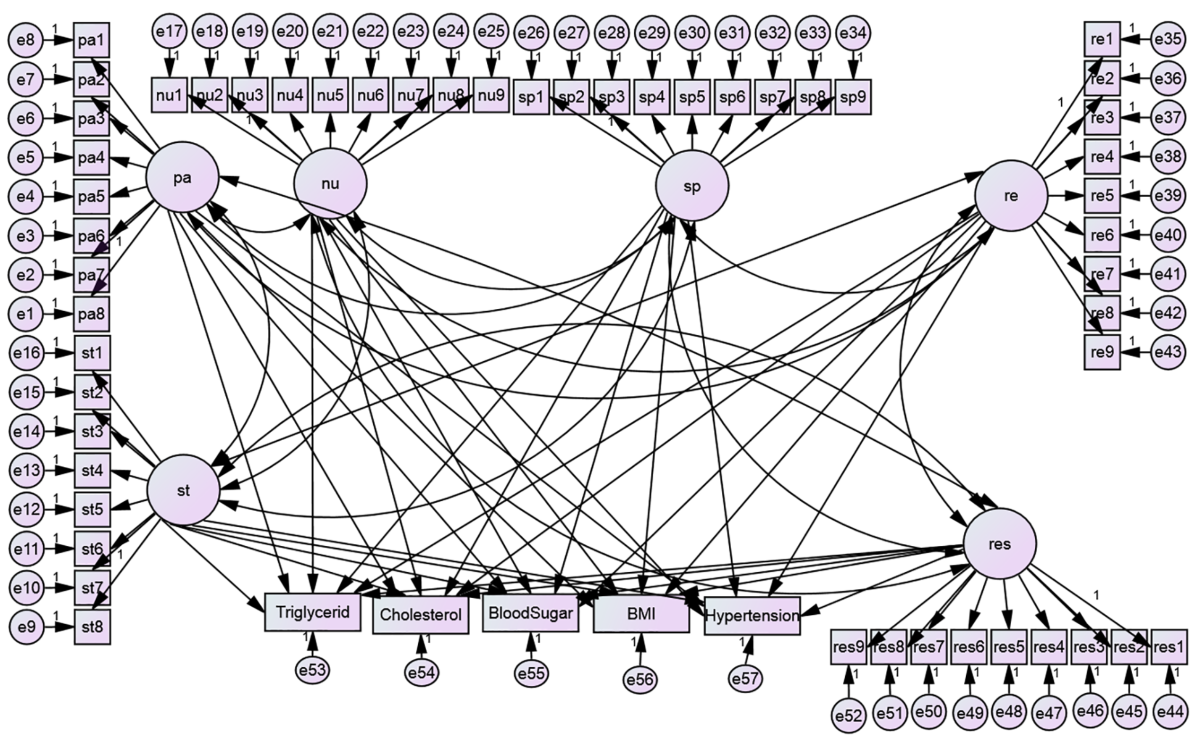

Figure 1. Structural equation molding of the HPBS and metabolic indicators. Pa, physical activity; Nu, nutrition; St, stress management. SP, spiritual health; Res, health responsibility; Re: relationships.

Specifically, physical activity and nutrition estimated the metabolic indicators in the HPBs structural equation modeling; wherein, a physical activity played the strongest role in the estimation of the BMI. Our results are in partial agreement with that of the study done by Sutherland et al. (18), which indicated that among the HPBs dimensions, only physical activity was related to the level of risk of the MetS. In addition, other studies have indicated that

Table 4. The Effect of the HPBs Dimensions on Metabolic Indicators in the Structural Equation Model

HPBs' Dimensions	Estimated Effect	Standard Estimated Effect	Standard Error (SE)	t Value	P Value
Physical activity					
Triglyceride	37.21	0.19	10.07	3.69	
Cholesterol	15.88	0.19	4.33	3.66	***[a]
Blood sugar	0.34	0.006	2.83	0.12	0.90
BMI	8.44	0.88	0.42	19.54	***[a]
Hypertension	5.39	0.20	1.40	3.84	***[a]
Nutrition					
Triglyceride	9.56	0.06	8.00	1.19	0.23
Cholesterol	6.73	0.1	3.44	1.95	0.05
Blood sugar	3.86	0.09	2.27	1.69	0.90
BMI	0.78	0.10	0.22	3.53	***[a]
Hypertension	0.20	0.009	1.11	0.17	0.85
Stress management					
Triglyceride	7.21	0.04	7.60	0.94	0.34
Cholesterol	1.95	0.03	3.26	0.59	0.54
Blood sugar	0.73	0.01	2.15	0.34	0.73
BMI	0.46	0.06	0.21	2.25	0.02
Hypertension	0.22	0.01	1.06	0.21	0.83
Spiritual growth					
Triglyceride	1.57	0.009	8.91	0.87	0.86
Cholesterol	0.83	0.01	2.83	0.21	0.82
Blood sugar	2.16	0.04	2.53	0.85	0.39
BMI	0.37	0.04	0.24	1.51	0.13
Hypertension	1.55	0.06	1.24	1.2	0.21
Interpersonal relationship					
Triglyceride	7.03	0.04	7.5	0.92	0.35
Cholesterol	4.90	0.07	3.26	1.5	0.13
Blood sugar	0.36	0.009	2.1	0.17	0.86
BMI	0.01	0.001	0.20	0.052	0.95
Hypertension	1.02	0.05	1.06	0.97	0.33
Health responsibilities					
Triglyceride	0.56	0.003	8.5	0.06	0.94
Cholesterol	1.40	0.02	3.6	0.38	0.70
Blood sugar	2.16	0.04	2.42	0.89	0.37
BMI	0.02	0.002	0.23	0.087	0.93
Hypertension	1.66	0.07	1.19	1.39	0.16

[a] ***, correlation is significant at the 0.01 level.

a sedentary lifestyle plays a role in causing MetS (16, 25). Furthermore, Huang et al. (17) found that physical activity determined the risk of abdominal obesity in workers, and Morrell et al. (26) indicated that low levels of physical activity would increase the risk of obesity in adults. In our model, physical activity estimated the levels of triglyceride

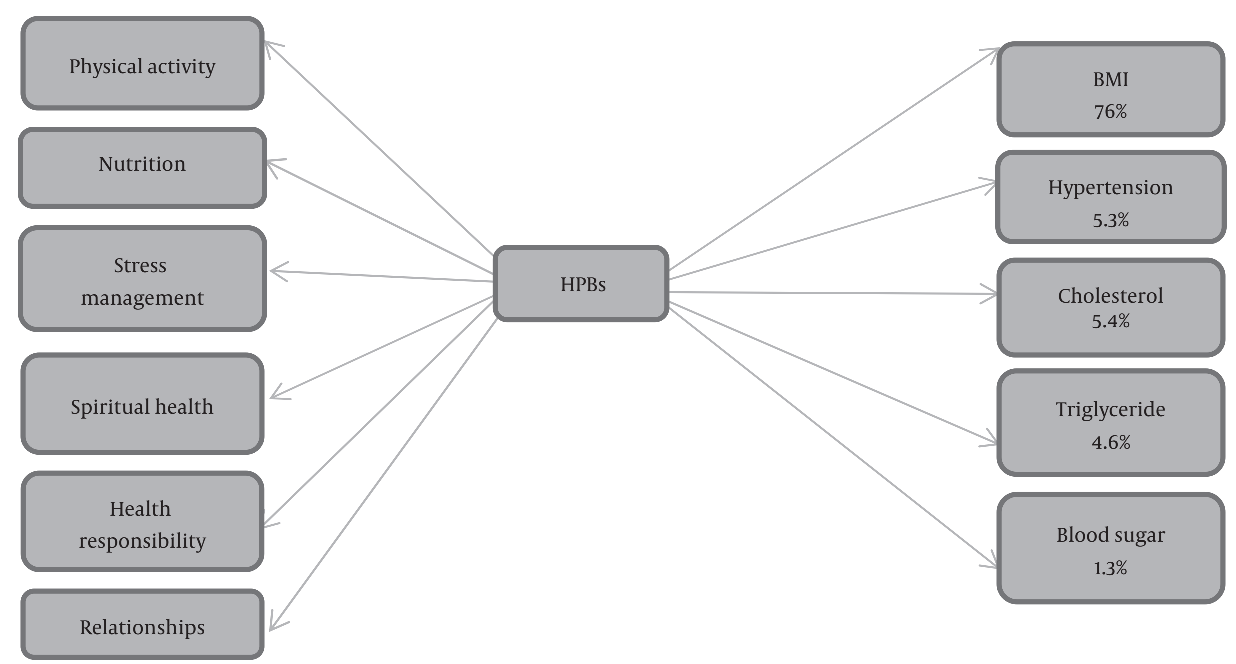

Figure 2. The predictive role of the HPBs on the Metabolic Indicators (BMII, hypertension, cholesterol, triglyceride, and blood sugar), based on the SEM.

and cholesterol. The results of the present study are partially consistent with the general liner model mentioned in the study done by Sutherland et al. (18), who found that physical activity is related to the HDL but not to triglyceride. Finally, the results of the present study are not consistent with that of the study done by Cuschieri et al. (27), who did not indicate the relationship between physical activity and MetS. Although our study is in agreement with most of the reported researches that considered MetS, in general, we considered the metabolic indicators in detail.

In the present study, among the HPBs dimension, nutrition estimated the BMI for 10% of the variations (Table 4). In fact, the status of nutrition estimated the values of the BMI (28, 29). This result is not consistent with that of the study done by Sutherland et al. (18), who found that nutrition is related to HDL but not to obesity. In addition, he reported no conclusive relationships between the other lifestyle dimensions and the factors related to MetS (18).

We understood that the level of HPBs in the employees is approximately moderate. We can observe this situation in all subscales, including physical activity, nutrition, health responsibility, stress management, interpersonal relationship, and spiritual health. These findings might indicate the levels of some of the healthy lifestyle programs in a workplace; however, this is not sufficient, hence, more lifestyle interventions are necessary. These results are consistent with the results of the study done by Mehri et al. (30), who indicated a moderate level of a healthy lifestyle in university students. On the other hand, our results are not consisted of the study done by Mohammadi et al. (15), which indicated low scores for healthy lifestyles. This could be explained by the fact that the participants in our study consisted wholly of employees enrolled for measuring the metabolic indicators as compared to the participants of the previous study wherein, all patients were having metabolic syndrome (15). In addition, our study is not consistent with that of Wu et al.'s (5) study, which indicated that the HPBs score was lower than the mean score and the highest standard mean score was in regard to interpersonal relationships and physical activity had a lower score. One of the reasons for this inconsistency might be due to the mean age of the participants, which was 39.99 in the present study and 72.50 in the referred study.

Among the HPBs subscales, stress management had the lowest score but it was not lower than the mean score. This finding is not consistent with that of Mohammadi et al. (15) and Wu et al. (5), who reported that the lowest score was for stress management and it was lower than the mean score. Our result is consistent with that of Mehri et al. (30), who reported a low score for stress management and not lower than the mean score. In all organizations, stress is common among employees (31, 32), therefore, in regard to the lowest score obtained in stress management, it is indicated that the workplace might affect the level of stress in the employees; hence, more interventions are suggested for improving the stress management skills of the employees and to promote a healthy work environment.

Physical activity had lower scores but not lower than the mean score. These results are in agreement with that of Mehri et al. (30) and Mohammadi et al. (15), who reported low scores for physical activity; in addition, in their study, the scores of physical activity were lower than the mean score besides being the lowest score among all subscales. In contrast, in our study, the scores of physical activity were low but greater than the mean score. One reason for this inconsistency might be explained by the nature of the participants; in the present study, they were selected from one of the relief organizations, hence, some level of physical fitness is already present as part of the job requirement and the other reason could be that most of the participants were men. In contrast, in the study by Mehri et al. (30) the half of the participants were women, which might affect the level of physical activity. In addition, in the study by Mohammadi et al. (15), the participants consisted of patients who had been referred to health centers and the mean age was 56.19 years; these factors could affect the level of physical activity. Moreover, our finding is consistent with that of Wu et al. (5), which demonstrated that the level of physical activity was low among the participants.

The nature of a cross-sectional study limited the scope of our study, especially in regard to the interference causality of the factors.

5.1. Conclusions

In our knowledge, this is the first study that considers the healthy lifestyle profile and Metabolic indicators in the apparently healthy employees of a relief organization in Iran. Our findings indicated the importance of a healthy lifestyle, which is indicated by the 76% variation predicted by our model concerning BMI. In addition, physical activity had the strongest role in the HPBs model. Therefore, the importance of interventions regarding an improvement in lifestyle, especially physical activity, is indicated.

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Footnotes

Authors' Contribution: Tayebeh Rakhshani did designing and planning this project, collecting data, and write the article. Zahra Sadat Asadi did design this study and write the article critically. Mehdi Akbarzade analyzed the data and wrote the article.

Conflict of Interests: Respecting to the authorship, data access and explanation, and all aspects of the present research, the authors declared no conflict of interests.

Ethical Approval: This project was approved in Shiraz University of Medical Sciences Committee.

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Table 2. The Health Status and Background Information of the Participants (N = 378)[a]

	Range of Scores	Values
Age		39.99 ± 8.95
Gender		
Male		288 (76.2)
Female		90 (23.8)
Marital status		
Single		67 (17.7)
Married		310 (82)
Level of education		
Middle school		94 (24.9)
High school		128 (33.9)
College graduate		156 (41.6)
Job categories		
Servant		103 (27.2)
Operator		124 (32.8)
Officer		92 (24.3)
Manager		58 (15.3)
Job experience in years		10.94 ± 8.96
Disease history		
Yes		219 (57.9)
No		159 (42.1)
Family disease history		
Yes		295 (78)
No		83 (22)
Vaccination		
Yes		273 (72.2)
No		105 (27.8)
Electrocardiogram		
Normal		202 (53.4)
Need to fallow		10 (2.6)
Not performed		166 (43.9)
Initial examination		
Healthy		240 (63.5)
Need to fallow		137 (36.2)
Chest radiography		
Normal		97 (25.7)
Need to fallow		1 (0.3)
Not performed		273 ± 72.2
BMI		25.83 (4.92)
BMI status, kg/m²		

Normal(18.50 - 24.99)		142 (37.6)
Pre-obesity(25.00 - 29.99)		185 (48.9)
Obesity-class I (30.00 - 34.99)		42 (11.1)
Obesity-class II (35.00 - 39.99)		9 (2.4)
Blood pressure		118.80 (13.64)
Systolic blood pressure status		
Normal (< 120 mmHg)		150 (39.7)
Pre-hypertension (120 - 130 mmHg)		199 (52.6)
High blood pressure I (140 - 150 mmHg)		18 (4.8)
High blood pressure II (> 160 mmHg)		11 (2.9)
Cholesterol		180.26 ± 42.02
Cholesterol status		
Desirable (< 200 mg/dL)		280 (74.1)
Borderline (200 - 239 mg/dL)		72 (19)
High (> 240 mg/dL)		26 (6.9)
Triglyceride		143.54 (97.36)
Triglyceride status		
Optimal (< 150 mg/dL)		245 (64.8)
Borderline (150 - 199 mg/dL)		60 (15.9)
High (200 - 499 mg/dL)		69 (18.3)
Very high (> 500 mg/dL)		4 ± 1.1
Hemoglobin		14.59 ± 1.76
BUN		13.35 ± 4.18
Fasting blood sugar		91.16 ± 27.22
HPBs' dimensions		
Physical activity	8 - 32	20.94 ± 4.76
Nutrition	9 - 36	23.34 ± 6.05
Health responsibility	9 - 36	24.92 ± 5.23
Stress management	8 - 32	20.79 ± 5.36
Interpersonal relationships	9 - 36	23.65 ± 6.08
Spiritual growth	9 - 36	23.69 ± 5.49
Total	52 - 208	139.45 ± 190.35

[a]Valeus are expressed as No. (%) or mean ± SD.