Ethiopian Journal of Natural and computational Science(EJNCS)

Ethiop J Nat Comp Sci 2023, Volume 3, Issue 1

Original Research Article

Relationships between Healthy Lifestyle Behaviors and Body Composition among Administrative Staffs in DebreMarkos University, Ethiopia

Anguache Yasabu and Getu Teferi*

Department of Sport Science, Debre Markos University, Ethiopia
*Corresponding author email: teferigetu@gmail.com

Article History:

Received: October 18, 2022
Accepted: January 14, 2023
Published: February 19, 2023

Print ISSN 2710-0200
Electronic ISSN 2710-0219

ABSTRACT

Healthy life-styles enhance lifelong health, quality of life increase, and morbidity and mortality decrease associated with the development of chronic diseases. The study purpose was to investigate the relationship between body composition and behaviors of healthy lifestyle (HLBs). A cross-sectional study design was employed as the study design. 332(174 male and 158 women) administrative staffs were recruited for the study by using simple random sampling technique. HLB Questionnaire for HLBs and skinfold caliper for body composition were used as data collection tools. The data analyzed with, simple descriptive statics, Pearson's correlation and linear regression though IBM SPSS software, version 24. Majority of study subjects 174 (57.6%) were over-fat or obese. From the six dimensions of HLBs; from sub-dimensions the participants scored the highest in health responsibility, spiritual development and interpersonal relation. The lowest mean scores were in physical activity habit, stress management and nutritional habit. A significant negative correlation ($r = -0.69$, $P<0.001$) found between overall HLBs and body fat percentage (BFP). With regard to the effect of HLBs and socio-demographic characteristics on body composition jointly explained 32 % variation in BFP. Health responsibility, physical activity habit and nutritional habit have statistically significant inverse association with body fat percentage and body mass index. The independent variables (components of HLBs) significantly predict the body fat percentage: $F (6, 295) = 18.73$, $p < 0.001$, body mass index: $F (6, 295) = 30.44$, $p < 0.001$, and body weight: $F (6, 295)= 16.8$, $p < 0.001$ (i.e., the regression models are a good fit of the data). This study attests there was a significant correlation between overall HLBs and body composition parameters. Sub- dimensions of healthy lifestyle behavior and socio-demographic characteristics of participants had significant effect on body composition parameters. To sum up, from healthy life style behavior domains, physical activity, nutritional and physical activity habit were the dominant factors that highly affect body composition.

Keywords: body composition, body fat percentage, healthy lifestyle behavior, physical inactivity, non-communicable disease

INTRODUCTION

Individuals in the community must create a healthy lifestyle to maintain good health. Healthy lifestyle comprises controlling one's actions and choosing attitudes and behaviors that improve health by maintaining daily activities (Özveren &Yılmaz, 2018). Healthy lifestyle behaviors On the other hand, refer to "maintaining a healthy state of mind and developing healthy activity behaviors." Özveren & Yılmaz stated that healthy lifestyle behavior include adequate and balanced nutrition, stress management, regular exercise, not smoking or drinking alcohol, hygienic measures, spiritual development, healthy interpersonal relationships, and the responsibility for protecting and improving one's health. Creating healthy lifestyle behaviors is the first steps that are taken in the family and society and are followed by development through education. 70–80% of deaths in developed countries and 40–50% of deaths in underdeveloped countries according to World Health Organization estimate, are from diseases that occur associated with unhealthy lifestyles. For this reason, the health services provided should be in the direction of protecting, maintaining, and improving health (Zhang et al., 2021). Body composition problem specifically in obese adults, the main treatment for body weight loss is lifestyle modification through physical exercise and diet (Wharton et al., 2020). The goal in general is to reduce 5 to 10% of the actual weight. Weight loss has been observed increases quality of life (Dorling et al., 2021). Duvigneaud et al., (2007) reported that lack of PA combined with a high energy intake results in a structural, chronic energy imbalance which collectively contribute to the risk of developing obesity and an unfavorable body composition.

The prevalence of chronic non- communicable diseases (NCDs) is on the rise globally, with the majority of the growth occurring among populations in developing countries. Sub-Sahar African countries, NCDs are projected to surpass infectious diseases by 2030. In recent years, obesity has become one of the biggest public health concerns in the world. Stefan (2017) stated that obesity represents a well- known cause for coronary heart disease, premature death, hypertension, sleeping problems and lower quality of life. Insufficient level of physical activity is the biggest public health problem of the 21st century resulting in the growing problem of people suffering from being overweight or obese (Agyapong, et al., 2020). Obesity has been described as a global pandemic with approximately 50% of adults worldwide expected to be obese by 2030 (Paley and Johnson, 2018; Ciolac and Guimaraes, 2004). In local studies conducted in different Ethiopian cities, the overall prevalence of overweight/obesity among adults in Gondar, Addis Ababa, Dessie, Hawassa, and Bahir Dar are found to be 48.6%, 35.9%, 28.5%, 28%, and 11.3%, respectively (Hailemariam, Ethiopia, Alamdo, & Hailu, 2020).

The relationship between a healthy life style and regular exercise is undeniable. Regular physical activity can have beneficial health results. The general health-related behaviors and health-related fitness is considered as relate to health outcomes, i.e., health responsibility, stress management, nutrition, physical activity, inter personal relationships and spiritual growth. OZKAN (2015) argues that healthy life- styles enhance lifelong health, increase quality of life, and decrease morbidity and mortality associated with the development of chronic diseases, specifically heart disease, cancer, stroke, and diabetes. In addition to this Abou (2016) stated as health-promoting life-styles include activities that are focused on improving the level of well-being. These activities focused on the development of positive potential for physical, social, mental, intellectual or spiritual health. The developing technology currently let the individuals pursue sedentary activities and become physically less active. These Sedentary life-style leads to a greater risk of developing NCDs (Abou, 2016; OZKAN, 2015; Wubale, 2006). This clearly elucidates how the problem is becoming widespread and an important area of research.

Some studies on the other hand found demographic variables to be related to the practice of health behaviors. OZKAN (2015), suggested that age and education affected healthy life-style behaviors. Health-promoting behaviors increased with increase in age, education, work experience, status, and income. Physical activity and exercise in addition, play important roles in prevention and improvement of mild to moderate depressive disorders, anxiety, and stress management. Healthy lifestyle choices should be viewed as a critical and urgent issue for developing nations like Ethiopia because these nations face several health issues and are unable to combat them through budgeting or funding due to their low resources. Therefore, these countries should minimize and save more money that they could use for their countries' health care by promoting and supporting fitness programs at any scale, from tiny centers to national levels. To put it another way, funding a country's physical activity program is incredibly cost-effective (Wubale, 2006). Chronic non-communicable diseases (NCDs) are increasing, with most of the growth taking place among populations in developing nations, according to Karacabey (2014). These diseases are the most significant issues in both industrialized and developing nations, and they are caused by people's lifestyle choices. As previously said, a major concern is health issues brought on by sedentary lifestyle choices and low levels of physical activity.

Healthy lifestyle choices help people stay strong, prevent illness, and preserve their physical and mental well-being, all of which enhance quality of life (Hafner et al., 2020). On the other hand, there is proof that fewer people regularly exercise and eat healthily. Unhealthy behaviors are implicated in up to 40% of premature deaths (Saint, 2017).

This study investigates the relationship between body composition and healthy lifestyle behaviors among Debre Markos University administrative staffs. Besides, currently, the advancement and development in science and technology leads in to sedentary or inactive lifestyle behavior which adversely affects health and quality of life and leads to risk of some diseases. Sedentary lifestyle behavior includes, devoting leisure time on the things that immobilize, computers, watching television, cell phones, and internet, which canalize them to adapt inactive lifestyle. Higher institution administrative staffs deliver most of their job activities by sitting which exposed them to sedentary lifestyle (Karacabey, 2014; Sahin, 2019). However, there is limitation of studies on the relation between body composition and healthy lifestyle behavior in Ethiopia as well as in the study area. Therefore, the objective of this study was to find out the association between healthy lifestyle and body composition among Debre Markos university administrative staffs.

MATERIALS AND METHODS

Study design, setting, and population

An institution-based Cross- sectional survey research design was employed for this study. Cross-sectional design can evaluate current attitudes, beliefs, opinions, and practices (Creswell, 2012). All administrative staffs of Debre Markos University, who were available during the study period, were the study population. The source population was all adult men and women aged 20–64 years who are working as administrative staff of the university during the study period. Thus, during the study period, as information obtained from the university human resource directorate there was about 1240 administrative staffs of who were working at Debre Markos University.

Sample size determination: There were no similar studies on body composition and healthy lifestyle-related factors in the study area; the sample is calculated based on the assumptions that the magnitude of body composition is 50.0%, at 95% confidence interval, the margin of error 5%. Based on these assumptions, the actual sample size is determined using Slovin's formula (Slovin, 1960). By adding 10% (30) non-response rate the total sample size for this study was 332. The

study participants were chosen using a simple random selection procedure, especially the lottery method, to ensure that each participant had an equal chance of being included in the sample.

Healthy Lifestyle Behavior

In this study, to assess healthy lifestyle behavior, a healthy lifestyle questionnaire was used as a data collection tool (Aygar et al., 2019; Sn, Kr, & Nj, 1987). This questionnaire on healthy living features a 4-point Likert scale (1 being never, 2 being sometimes, 3 being often, and 4 being regularly). It consists of 52 questions divided into six sub-dimensions, including physical activity (4, 10, 16, 22, 28, 34, 40 and 46), health responsibility (3, 9, 15, 21, 27, 33, 39, 45, and 51), and nutrition (2, 8, 14, 20, 26, 32, 38, 44 and 50), spiritual growth (6, 12, 18, 24, 30, 36, 42, 48 and 52), interpersonal relations (1, 7, 13, 19, 25, 31, 37, 43 and 49), and stress reduction (5, 11, 17, 23, 29, 35, 41 and 47). The scale has scores ranging from 52 to 208, and it is accepted that the higher the score, the healthier living behavior there is (Aygar et al., 2019; Sn et al., 1987). Each respondent was given a Likert scale to rate each item on, with 1 indicating never, 2 sometimes, 3 often, and 4 regularly. The Alpha coefficient was used to assess the scale's reliability.

Body Composition

Body composition was measured by a skinfold caliper. When a skilled expert uses a skinfold caliper, the skinfold measurement of body fat percentage can be fairly precise. According to estimates, age and gender have an impact on the ratio of subcutaneous to total fat (Medicine, 2013). We employed the Jackson-Pollock 3-Site Skinfold Formula for Body Density J-P 3-Site (Jackson & Pollock, 1985) for this investigation, in accordance with the specific recommendations of (Medicine, 2013). Thus, with sex specific body site for body fat measurement of women was three –Site on triceps, suprailiac and abdominal with three- site formula: Body Density = 1.089733 - 0.0009245 (sum of three skinfolds) + 0.0000025 (sum of three skinfolds)2 - 0.0000979 (age), on the other hand for men the three- site on chest, triceps and subscapular with three-site formula: Body Density = 1.1125025 - 0.0013125 (sum of three skinfolds) + 0.0000055 (sum of three skinfolds)2 - 0.000244 (age). Moreover, once the body density is obtained using the above gender-specific formulas of the three body site skinfold measurement, as per the American College of Sport Medicine (Medicine, 2013), using Siri Equation, percent of body fat can be determined using Body Density (BD):

$$\%\text{Body Fat} = \frac{495}{\text{BD}} - 450$$

Body weight and Body mass index

Body mass index, which is computed as weight in kilograms divided by height in meters squared, was determined by measuring height and body weight using a standard stadiometer (Height & Weight Scale ZT-160-NSL) (Medicine, 2013).

Data processing and analysis

The data obtained in the current study was in evaluated by using SPSS version 24 package software. Descriptive statistics (frequency, percentage, mean and standard deviation) were used in identifying socio-demographic and main variables. Pearson moment correlation was used to show the association between body composition parameters and healthy lifestyle behavior, and multiple linear regression analysis was applied to evaluate the effect of independent variables on

body composition (body fat percentage, body mass index and body weight. P values < 0.05 were considered significant level.

Ethical consideration

Ethical issues were taken into consideration when carrying out the study. After the proposal was approved, the researcher obtained a supportive letter to undertake this study from Sport Science department, DebreMarkos University. Then, the letter was submitted to respective administrative bodies of DebreMarkos University and permission was assured. Informed consent from study participants was got. All information collected from each participant was kept strictly confidential and the names of the participants were not included in the data collection tool. They were also informed that the study had no harm or danger on them. Generally, the nature of the study has no risk on participants.

RESULTS

Respondents Socio-demographic characteristics

As shown in Table 1, out of a total of 332 respondents, 52.65 % (174) were male while the remaining 158 (47.35 %) were females. This study results also showed the average (mean) age of the study participants was 35.4(4.96) years and majority (n=245, 81.1%) of the respondents were in the age group of between 20-39 years old and about 57 (18.9%) of them were in the age group between 40-59 years old. In addition, the study also indicated that most of the respondents were 204 (67.5%) first degree holders while the 69 (22.8 %) had master's degree. With regard to marital status, 233 (77.2 %), 67(22.2 %) and 2 (0.7 %) respondents were married, single and divorce, respectively. From the total of 332 respondents, majority of them 291 (96.4 %) had a small (less than or equal to 5) family size.

Table 1 also has presented basic descriptive statistics of numerical variables (body composition and healthy lifestyle behavior components), from the six dimensions of healthy lifestyle behaviors, the respondents received the highest scores were in health responsibility, spiritual development and interpersonal relation of sub-dimensions; the lowest mean scores were in physical activity habit, stress management and nutrition.

Table 1. Descriptive statistics of the study participants

Study Variables		Frequency	Percent
Categorical variables			
Sex	Male	174	52.65%
	Female	158	47.35%
Age	20-39 years old	245	81.1%
	40-59 years old	57	18.9%
Level of education	Diploma	29	9.6%
	Degree	204	67.5%
	Masters	69	22.8%
Marital status	Single	67	22.2%
	Married	233	77.2%
	Divorce	2	0.7%
Family size	small (less than or equal to 5)	291	96.4%

	large (greater than or equal to 6	11	3.6%
Monthly income	< 1650	3	1.0%
	3251-5250	57	18.9%
	5251-7800	161	53.3%
	7801-10900	70	23.2%
	>10900	11	3.6%
Work experience	0-5 service years	78	25.8%
	6-10 service years	142	47.0%
	11-15 service years	60	19.9%
	16- 20 service years	13	4.3%
	> 20 service years	9	3.0%

Table 1. Continued…

Numerical Variables	Total sample Mean (SD)	Men Mean (SD)	Women Mean (SD)
Body fat percentage	24.24 (5.76	23.50 (5.33)	27.29 (6.46)
Body mass index	29.56 (4.90)	27.87 (4.96)	29.73 (4.96)
Body weight	75.48 (9.433)	78.04 (9.540)	72.93 (9.055)
PA habit	17.21 (7.74	17.22 (7.83)	17.14 (7.38)
Nutrition	19.54 (5.71	24.63 (6.52)	16.29 (8.46)
Spiritual growth	22.33 (7.02	18.68 (7.04)	25.98 (6.98)
Interpersonal relation	20.46 (8.46	19.77 (5.78)	18.59 (5.33)
Stress management	18.87 (8.19)	26.85 (8.24)	20.41 (8.38)
Health responsibility	23.63 (8.26	18.83 (8.28)	19.05 (7.92)

*Data presented as mean (SD) for continuous variables and number of participants (%) for categorical variables.

Body Composition of Participants

Body fat percentage category of the participants as under fat, healthy, over-fat and obese was do ne based on their age and sex using body fat ranges for adults (Medicine, 2013). The result of body fat percentage of respondents based on age and sex are presented (T able 2). I n relation to age-based body fat category 40.80% (100) of the respondents were found between the ages of 20 to 39 years fall under the category of healthy. And also, among the respondents aged between 40 to 59 years, 29 (50.9%) of participants were obese.

From Table 2 one can infer that 41.20 % of men participants were healthy whereas 39 % of women participants were fall in obese. Generally, the result revealed that from the total respondents 37.3% of participants were categorized under over fat. Moreover, the overall body fat percentage of staff indicated that majorities were over-fat or obese (37.3 + 21.3 = 57.6%).

Table 2. Body fat percentage among respondents with respect to age and sex.

Demographical variable	Body fat category				
	Under fat	Healthy	Over fat	Obese	Total

	N	%	n	%	N	%	n	%	N	%
20-39 years old	15	6.1%	100	40.80%	49	20.00%	81	33.1%	245	100%
40-59 years old	1	1.8%	12	21.10%	15	26.30%	29	50.9%	57	100%
Total	16	5.3%	112	37.10%	64	21.20%	110	36.4%	302	100%
Body fat percentage among respondents with respect to sex										
Male	4	1.60%	112	41.20%	105	35.60%	16	21.70%	237	Male
Female	10	16.30%	13	20.60%	23	39.00%	12	20.90%	58	Female
Total	14	8.95%	125	30.9%	128	37.3%	28	21.3%	295	Total

The Relationship between Body Composition and Healthy Lifestyle Behaviors

The relationship between healthy lifestyle and body composition through Pearson Product moment correlation was presented in Table 3. Results showed that there was significant negative correlation of body fat percentage with overall healthy lifestyle behaviors ((r= -0.69, p< 0.05), physical activity (r= -0.84), nutrition (r= -0.39), spiritual growth (r= -0.28), interpersonal relationship (r= -0.29), stress management (r= -0.83), and health responsibility (r= -0.75). Based on (Cohen, 1988) strength of relationship between variables, correlation coefficients between .10 to .29 considered as weak, .30 to .49 moderate and between .5 to 1.0 strong. Based on the above correlation coefficient norm, the result of this study revealed that the correlation coefficient of body fat percentage with overall healthy lifestyle, physical activity, stress management and health responsibility have showed strong negative relationship but with interpersonal relationship and nutrition were weak and moderate respectively. In addition, body mass index and body weight have negative correlation with healthy life style dimensions but health responsibility and spiritual development have not statistically significant correlation with body mass index.

Table 3. Correlation between Healthy lifestyle behavior sub scales with body composition parameters.

Variables	BF% r Coefficient	BMI r Coefficient	BW r Coefficient
Physical Activity (PA)	-.84**	-.48**	-.29***
Nutrition(N)	-.39***	-.47**	-.30**
Spiritual growth (SG)	-.28**	-.08	-.21**
Inter personal relations (IPR)	-.29***	-.17**	-.25**
Stress management (SM)	-.83***	-.26**	-.42**
Health responsibility (HR)	-.75**	-.04	-.17**
Overall healthy lifestyle (HLS)	-.69***	-.42**	-.33***

To determine the effect of healthy lifestyle behaviors and socio-demographic characteristics on body composition, linear regression analysis was done. Here, assumptions of liner regression were tested and all assumptions were satisfied. Hence, results in Table 4 indicated that the combined effect of independent variables of healthy lifestyle behaviors and socio-demographic characteristics (marriage, sex, income, family size, age, experience, and qualification) contributed 32% (R^2 = 0.320) of the variation in dependent variable (body fat percentage). Since independent variables included in the study are various, in order to examine individual contribution of each variable, the coefficients are shown in Table 4. Therefore, specifically, age (β = 0.26), income (β =

0.34), and sex (β = 0.44) had positive significant contribution to body fat ($p < 0.05$). It implied that increases in age and income caused increasing in participant's body fat percentage. More importantly, educational qualification (β = -0.18), and healthy life style behaviors (β = -0.49) had negative effect on body fat percentage. This implied that improved healthy life style behaviors and education level of staffs resulted in lowering body fat percentage. On the other hand, marriage, family size and work experience of administrative staff had no significant effect on their body fat percentage (Table 4). Further, the multiple linear regression analysis showed that age had positive significant contribution to body fat percentage of the respondents.

Table 4. Multiple regression analysis between the Socio-demographic variables and body fat percentage.

Socio-demographic variables	Unstandardized β Coefficient	Standardized β Coefficient	Std. Error	Sig.
(Constant)	28.62		1.47	.000
Age	.26	.079	.26	.00
Educational qualification	-2.49	.86	-.18	.004
Marriage	-.12	.92	-.01	.903
Family size	-1.86	2.19	-.05	.398
Income	1.23	.57	.34	.033
Work experience	-.42	.44	-.05	.342
Sex	8.59	.96	.44	.000

Table 5. Multiple linear regression analysis of healthy lifestyle behavior components with BMI, body fat percentage and body weight.

Study variables	Unstandardized β Coefficient	Standardized β Coefficient	Std. Error	Sig.
BMI				
(Constant)	28.62		1.477	.000
Health responsibility	-.38	-.394	.141	.000
Physical activity	.301	-.269	.044	.000
Nutritional habit	-.199	-.351	.057	.000
Spiritual growth	-.384	.328	.216	.054
Interpersonal relationship	.292	-.712	.130	.177
Stress management	-.576	-.042	.064	.000
Body fat percentage				
(Constant)				
Health responsibility	-.289	-.411	.140	.041
Physical activity	-.194	-.285	.043	.000
Nutritional habit	-.252	-.250	.057	.000
Spiritual growth	.021	.026	.216	.921
Interpersonal relationship	-.069	-.093	.129	.592
Stress management	-.057	-.081	.064	.377
Body weight				
(Constant)	94.190		3.114	.000
Health responsibility	-.280	-.191	.297	.346

Physical activity	-.046	-.032	.092	.619
Nutritional habit	-.475	-.226	.120	.000
Spiritual growth	.486	.284	.456	.287
Interpersonal relationship	-.520	-.335	.273	.058
Stress management	-.711	-.489	.136	.000

Table 5 shows the association between the healthy lifestyle behavior sub scales and body composition parameters. Body fat percentage was inversely associated with healthy lifestyle behavior components: health responsibility ($\beta = -0.41$, $p < 0.05$), physical activity ($\beta = -0.285$, $p < 0.001$), nutritional habit ($\beta = -0.250$, $p < 0.001$), spiritual growth ($\beta = -0.026$, $p > 0.05$), interpersonal relationship ($\beta = -0.093$, $p > 0.05$), and stress management ($\beta = -0.081$, $p > 0.05$). Table 5 shows the association between the healthy lifestyle behavior sub scales and body composition parameters. Body fat percentage was inversely associated with healthy lifestyle behavior components: health responsibility ($\beta = -0.41$, $p < .05$), physical activity ($\beta = -0.285$, $p < 0.001$), nutritional habit ($\beta = -0.250$, $p < 0.001$), spiritual growth ($\beta = -0.026$, $p > 0.05$), interpersonal relationship ($\beta = -0.093$, $p > 0.05$), and stress management ($\beta = -0.081$, $p > 0.05$). Here, health responsibility, physical activity habit and nutritional habit have statistically significant inverse association with body fat percentage. Body mass index also has inverse association with health responsibility ($\beta = -0.394$, $p < 0.001$), physical activity ($\beta = -0.269$, $p < 0.001$), and nutrition ($\beta = -0.351$, $p < 0.001$), and stress management ($\beta = -0.042$, $p < 0.001$).

Regarding to how well the model fits, R considered to be one measure of the quality of the prediction of the dependent variable; in this case a value of 0.32 indicates a good level of prediction body fat percentage. The R^2 value (also known as the coefficient of determination) is shown in the R^2 column. The proportion of the variance of the dependent variable that can be explained by the independent variables is indicated by this number. It can be seen (Table 6) from the value of 0.32 that the independent variables explain 32% of the variability of percent body fat, healthy life style sub scales explain 38.2% of the variability body mass index, and 25.5% of the variability body weight.

Table 6. Multiple linear regression analysis of model summery for body fat percentage, body mass index and body weight.

Dependent Variables	R	R^2	Adjusted R Square	Std. Error of the Estimate
Body weight	.505a	.255	.239	10.466
BMI	.618a	.382	.370	4.96402
Percent body fat	0.57a	0.32	.301	6.51

*Key: Predictors (Constant), stress management, nutritional habit, physical activity, health responsibility, interpersonal relationship, spiritual growth

Regarding to the regression models are a good fit of the data or not, the F-ratio in the ANOVA tests have shown that the percentage: $F(6, 295) = 18.73$, $p < 0.001$, body mass index: $F(6, 295) = 30.44$, $p < 0.001$, and body weight: $F(6, 295) = 16.8$, $p < 0.001$ (i.e., the regression models are a good fit of the data).

To determine the difference between men and women on body composition and healthy life style behavior of subscales, independent t-test was applied. The mean difference of body fat percentage, body mass index and stress management scores between men and women were -

3.79, -1.91 and -2.56 with a standard error mean difference of 0.81, 0.93 and 0.87 respectively. The computed t-test between men and women were statistically significant in body fat percentage ($t(30) = -4.69$, $p < 0.001$), body mass index ($t(30) = -9.07$, $p < 0.05$) and in stress management ($t(30) = -6.08$, $p < 0.05$). These results indicated that women have high mean scores in body fat percentage and body mass index and men has high mean score of stress management. However, women and men have not showed statistically significant mean difference in body weight and other sub scales of healthy life style sub scales.

DISCUSSION

The participants in our study scored best on sub-dimensions related to health responsibility, spiritual growth, and interpersonal relationships; the lowest mean scores were found in the areas of nutritional habit, stress management, and physical activity habit. Accordingly, Turkol and Gunes (2012) found that among assistants practicing at Inonu University Medical Faculty Hospital, the sub-dimensions of healthy lifestyle behavior that received the highest scores were spiritual growth and interpersonal relationships. Physical activity and stress management showed the lowest marks in the same study. In the research conducted by Curcani et al. (2010) similar research on nurses, they reported as there was the highest mean score in the spiritual development sub-dimension, and the lowest average score in the physical activity sub-dimension. Similar report was made by Ozkan & Yilmaz (2008) for spiritual development and for the physical activity sub-dimension.

The results of this study indicated that women have high mean scores in body fat percentage and body mass index. However Pengpid & Peltzer (2014) conducted similar study and they reported that male employees were more overweight or obese than female employees. According to Beaudry et al., (2019), female and male have different patterns of body weight and body composition, relatively male employee gains significant amount of body weight than female employee. Our study result bis consistent with the findings reported by Gropper, et al., & (2012). Gropper, et al reported that female employee have higher BMI than male employee. They also reported that there was a higher prevalence of cardiovascular disease and non-communicable disease. Consistent report was made by Lemamsha, et al., (2019) that stated as female tend to have higher BMI compared to male.

In the current study findings revealed that, the majority of administrative staffs were over-fat or obese, specifically, with regard to age category, between 20-39 years old adults had lower body fat accumulation as compared with old ages. Similar to this finding Meeuwsen et al., (2010), stated that percentage of body fat increases as age increasing. In addition, a study conducted in Jimma University by Sinaga, et al., (2019) disclosed similar findings with the current study. They found that prevalence of obesity among age groups >40 years was higher than the age groups 20-30 years. Consistent with this study findings, previous studies have shown that with advancing age there is an increase in fat mass (Masoro, 2010). This study revealed that sex difference has influence in body fat percentage. As compared with male, female had more fat accumulation. According to the study findings by Mavingire, (2018) and Yoneshiro et al., (2011), females possessed higher body fat percentage than their counter parts males.

In this study, from the healthy life style behaviors dimensions, health responsibility, spiritual development and interpersonal relation of sub-dimensions had highest scores. However, lowest scores found on physical activity habit, stress management and nutritional habit. In the previous study that conducted by Azami Gilan et al., (2021) in Iran reports as the dimensions of healthy lifestyle behaviors, the highest and lowest scores by the study subjects on interpersonal relationships and physical activity respectively. Mehri et al., (2016) on similar study found the

highest score on interpersonal relationship dimension followed by stress management, spiritual growth and health responsibility. However, the scores for nutrition and exercise were found to be lower as compared to other dimensions. From the above findings, it is possible to infer that health lifestyle behaviors of participants were different in different studies. These variations of the report can be because of the differences in socio-cultural background of participants.

Our study findings also revealed that there was a significant negative correlation between overall healthy lifestyle behaviors and body composition. This implied that as healthy lifestyle behaviors improved, body fat percentage decreased. In this regard Bozlar & Arslanoglu (2016) conducted in Turkey found that those who had lower body fat accumulation leads to healthy lifestyle behavior. Similarly Muros et al., (2017) who conducted a study in Spanish adolescents, revealed that a higher body fat accumulation was related with lower health life behavior. Correspondingly Macek et al., (2020) also found that body fat has association with overall health lifestyle behaviors and particularly with nutrition sub-dimension. In general, improvements in health lifestyle behaviors resulted in decreased body fat accumulations.

Alzahrani et al. (2008) reported that a negative correlation found between the mean interpersonal relations subgroup score of the healthy life style components and body mass index. Similar research report also made by Al-Kandari et al. (Alzahrani et al., 2019) in Kuwait according there report a negative correlation was found between the nutrition subgroup scores of healthy life style components and body mass index. Our study result is consistent with previously reported result that there was a negative correlation between healthy life style subscales and body composition.

The proportion of fat-free mass was positively correlated with physical activity habits, a sub-dimension of a healthy lifestyle, but it was negatively correlated with body weight, BMI, and fat-mass percentage for both men and women. Our findings are consistent with some earlier research particularly that of Zaccagni et al. (2014), who found that men had a lower BMI and fat-free mass and that physically active people had greater values of this percentage than less active people. Lohman et al. (2006) and Tudor-Locke et al. (2001) were reported that there was an inverse relationship between fat-mass percentage and physical activity habits.

Our findings reported that nutrition habits of participants have inverse relationship with body composition parameters (body fat %, body weight and body mass index). Similar to this, there is mounting evidence that eating dairy products has a negative correlation with both body weight and body composition. Dairy consumption helped to reduce weight gain and increases in body fat, according to Poddar et al. (Poddar et al., 2009).

Regarding to the effect of healthy lifestyle behaviors and socio-demographic characteristics on body composition, this study revealed that independent variables jointly explained 32% variation in body fat accumulation. Particularly, age and income had positive significant contribution to body fat. Moreover, as age and income levels increased their body fat accumulation also increased. Studies have shown that with increasing age there is an increase in fat mass and a decrease in muscle mass. In this regard, a study conducted in China (Macek et al., 2020) revealed that body fat increased with ages in both males and females. Likewise (Gába & Pridalova, 2014) found that significant increase in body fat as age increased. The present study also revealed that body fat prevalence increases as income increases, similar to this Bentley et al., (2018) and Talukdar et al. (2020) using 40 years of data across 147 countries, found that a positive relationship found between national income and population obesity prevalence. In the contrary Lopez et al., (2021) found a negative association between obesity and income. Our study has some limitations that due to a cross-sectional design, we cannot exclude the possibility of reverse causality. Secondly, we conducted the study on a small sample of a university administrative staffs.

Future studies should take into account administrative staffs from other institutions with different professions and lifestyle habits with physical activity intervention.

CONCLUSIONS

The study was examined the association between body composition and healthy lifestyle behaviors among Debre Markos University administrative staffs. It is possible to conclude that there was a significant negative correlation between healthy life style behavior dimensions and body composition parameters: body fat percentage, body mass index and body weight. Generally, sub-dimensions of healthy lifestyle behavior and socio- demographic characteristics of participants had significant effect on body composition parameters. To sum up, from healthy life style behavior domains, physical activity, nutritional and physical activity habit were the dominant factors that highly affect body composition. According to the study results, the staffs working in the university keeps healthy life style behavior which is effective for protecting body composition. Thus, the university personnel's are required to engage in certain activities like in exercises, physical activities, diet habits and health responsibilities to have healthy lifestyles

ACKNOWLEDGMENTS

The authors would like to thank the Debre Markos University for permission and administrative staffs for their enthusiastic participation in the study.

REFERENCES

Abou Elmagd, M. (2016). Benefits, need and importance of daily exercise. Int. J. Phys. Educ. Sports Health, 3: 22-27.

Agyapong, N. A. F., Annan, R. A., Apprey, C., Aduku, L. N., & Swart, E. C. (2020). The association between dietary consumption, anthropometric measures and body composition of rural and urban Ghanaian adults: a comparative cross-sectional study. BMC nutrition, 6: 1-12.

Al-Kandari, F., Vidal, V. L., & Thomas, D. (2008). Health-promoting lifestyle and body mass index among College of Nursing students in Kuwait: A correlational study. Nursing & Health Sciences, 10: 43-50.

Alzahrani, S. H., Malik, A. A., Bashawri, J., Shaheen, S. A., Shaheen, M. M., Alsaib, A. A., . . . Abdulwassi, H. K. (2019). Health-promoting lifestyle profile and associated factors among medical students in a Saudi university. SAGE open medicine, 7, 2050312119838426.

Aygar, H., Zencirci, S. A., Emiral, G. O., Alaiye, M., Soysal, A., Onsuz, M. F., Metintas, S. (2019). Assessment of health-promoting lifestyle behaviors of adults living in the semi-rural area. Northern clinics of Istanbul, 6:13.

Azami G. B., Janatolmakan M., Ashtarian H., Rezaei M., Khatony A. (2021). Health- Promoting Lifestyle and Associated Factors among Medical Sciences Students in Kermanshah, Iran: A Cross-Sectional Study. J Environ Public Health. 2021:6691593. doi: 10.1155/2021/6691593.

Beaudry, K. M., Ludwa, I. A., Thomas, A. M., Ward, W. E., Falk, B., & Josse, A. R. (2019). First-year University is associated with greater body weight, body composition and adverse dietary changes in males than females. Plos one, 14(7), e0218554.

Bentley, R. A., Ormerod, P., & Ruck, D. J. (2018). Recent origin and evolution of obesity-income correlation across the United States. Palgrave Communications, 4: 1-14.

Bozlar, V., & Arslanoglu, C. (2016). Healthy Life Style Behaviors of University Students of School of Physical Education and Sports in Terms of Body Mass Index and Other Variables. Universal Journal of Educational Research, 4: 1189-1195.

Ciolac, E. G., & Guimaraes, G. V. (2004). Physical exercise and metabolic syndrome. Revista Brasileira de Medicina do Esporte, 10: 319-324.

Cohen, J. (1988). Statistical power analysis for the social sciences.

Creswell, J. W. (2012). Educational research: planning. Conducting, and Evaluating, 260, 375-382.

Cürcani, M., Tan, M., & Özdelikara, A. (2010). Healthy life style behaviours of the nurses and the determination of affecting factors. Türk Sİlahlı Kuvvetlerİ, Koruyucu Hekİmlİk Bültenİ, 9: 487-492.

Dorling, J.L., Van Vliet, S., Huffman, K.M., Kraus, W.E., Bhapkar, M., Pieper, C.F., Roberts, S. B. (2021). Effects of caloric restriction on human physiological, psychological, and behavioral outcomes: highlights from CALERIE phase 2. Nutrition Reviews, 79: 98-113.

Duvigneaud, N., Wijndaele, K., Matton, L., Philippaerts, R., Lefevre, J., Thomis, M., Duquet, W. (2007). Dietary factors associated with obesity indicators and level of sports participation in Flemish adults: a cross-sectional study. Nutrition Journal, 6: 1-12.

Gába, A., & Přidalová, M. (2014). Age-related changes in body composition in a sample of Czech women aged 18–89 years: a cross-sectional study. European journal of nutrition, 53: 167-176.

Gropper, S. S., Simmons, K. P., Connell, L. J., & Ulrich, P. V. (2012). Weight and body composition changes during the first threeyears of college. Journal of Obesity, 2012: ID 634048 doi:10.1155/2012/634048

Hafner, M., Yerushalmi, E., Stepanek, M., Phillips, W., Pollard, J., Deshpande, A., Van Stolk, C. (2020). Estimating the global economic benefits of physically active populations over 30 years (2020– 2050). British journal of sports medicine, 54: 1482-1487.

Hailemariam, T. W., Ethiopia, S. S., Alamdo, A. G., & Hailu, H. E. (2020). Emerging Nutritional Problem of Adult Population: Overweight/ Obesity and Associated Factors in Addis Ababa City Communities, Ethiopia—A Community-Based Cross-Sectional Study. Journal of Obesity, 2020.

Jackson, A. S., & Pollock, M. L. (1985). Practical assessment of body composition. The Physician and sportsmedicine, 13: 76-90.

Karacabey, K. (2014). Evaluation of healthy life style behaviors of academicians. European Journal of Experimental Biology, 4: 689-692.

Lemamsha, H., Randhawa, G., & Papadopoulos, C. (2019). Prevalence of Overweight and Obesity among Libyan Men and Women. BioMed researchinternational, 8531360. https://doi.org/10.1155/2019/8531360

Lohman TG, Ring K, Schmitz KH, TreuthMS, Loftin M, Yang S, Sothern M, Going S. (2006). Associations of body size and composition with physical activity in adolescent girls. Med Sci Sports Exerc. 38:1175-81. doi:10.1249/01.mss.0000222846.27380.61.

Lopez, D. I., Chacon, L., Vasquez, D., & Brown, L. D. (2021). Body composition outcomes of Healthy Fit and the role of acculturation among low-income Hispanics on the US-Mexico border. BMC public health, 21: 1-11.

Macek, P., Terek-Derszniak, M., Biskup, M., Krol, H., Smok-Kalwat, J., Gozdz, S., & Zak, M. (2020). Assessment of age- induced changes in body fat percentage and BMI aided by Bayesian modelling: A cross-sectional cohort study in middle- aged and older adults. Clin Interv Aging.15:2301-2311. doi: 10.2147/ CIA.S277171.

Masoro, E. J. (2010). Physiology of Aging. In: Howard M. Fillit, Kenneth Rockwood and Kenneth Woodhouse, Brocklehurst's Textbook of Geriatric Medicine and Gerontology (7th Edi). Pp. 51- 58. ISBN 978-1-4160-6231-8 Elsevier

Mavingire, C. (2018). Health-related physical fitness, anthropometry and physical activity levels of

Zimbabwean children aged 10-12 years old: the Zimbabwe Baseline Survey. North-West University,

Medicine, A. C. o. S. (2013). ACSM's health- related physical fitness assessment manual: Lippincott Williams & Wilkins.

Meeuwsen, S., Horgan, G., & Elia, M. (2010). The relationship between BMI and percent body fat, measured by bioelectrical impedance, in a large adult sample is curvilinear and influenced by age and sex. Clinical nutrition, 29: 560- 566.

Mehri, A., Solhi, M., Garmaroudi, G., Nadrian, H., & Sighaldeh, S. S. (2016). Health promoting lifestyle and its determinants among university students in Sabzevar, Iran. International journal of preventive medicine, 7, 65. https:// doi.org/10.4103/2008-7802.180411

Muros, J. J., Salvador Pérez, F., Zurita Ortega, F., Gámez Sánchez, V. M., &Knox, E. (2017). The association between healthy lifestyle behaviors and health-related quality of life among adolescents. Jornal depediatria, 93: 406-412.

OZKAN, A. (2015). The relationship between physical activity level and healthy life-style behaviors of distance education students. Educational Research and Reviews, 10: 416-422.

Ozkan, S., & Yilmaz, E. (2008). The health-promoting lifestyles of nurses working at hospital. Journal of Firat Health Services, 3: 89-105.

Özveren, H., & Yılmaz, E. D. (2018). Investigation of the healthy life style behaviours and the exercise behaviours of the nursing students Hemsirelik ogrencilerinin saglıklı yaşam biçimi davranışları ile egzersiz davranışlarının incelenmesi. Journal of Human Sciences, 15(3), 1505-1518.

Paley, C. A., & Johnson, M. I. (2018).Abdominal obesity and metabolicsyndrome: exercise as medicine? BMC Sports Science, Medicine and Rehabilitation, 10: 1-8.

Pengpid, S., & Peltzer, K. (2014).Prevalence of overweight/obesity andcentral obesity and its associated factors among a sample of university students in India. Obesity research & clinical practice, 8: e558-e570.

Poddar, K. H., Hosig, K. W., Nickols- Richardson, S. M., Anderson, E. S., Herbert, W. G., & Duncan, S. E. (2009). Low-fat dairy intake and body weight and composition changes in college students. Journal of the American Dietetic Association, 109: 1433-1438.

Sahin, S., Sahin, S., Yildirim, D., & Kirkaya, I. (2019). Evaluation of Body Composition and Quality of Life of University Students. Asian Journal of Education and Training, 5: 454-458.

Saint Onge, J. M., & Krueger, P. M. (2017).Health lifestyle behaviors among US adults. SSM-Population Health, 3: 89-98.

Sinaga, M., Yemane, T., Tegene, E., Lidstrom, D., & Belachew, T. (2019). Performanceof newly developed body mass index cut-off for diagnosing obesity among Ethiopian adults. Journal of Physiological Anthropology, 38: 1-9.

Slovin, E. (1960). Slovin's formula for sampling technique. Retrieved on February, 13, 2013.

Sn, W., Kr, S., & Nj, P. (1987). The Health Promoting Lifestyle Profile Development and Psychometric Characteristics. Nursing Research, 36: 76-80.

Stefan, L., Cule, M., Milinovic, I., Juranko,D., & Sporis, G. (2017). The relationship between lifestyle factors and body composition in young adults. International Journal of Environmental Research and Public Health, 14: 893.

Talukdar, D., Seenivasan, S., Cameron, A.J., & Sacks, G. (2020). The association between national income and adultobesity prevalence: Empirical insights into temporal patterns and moderators of the association using 40 years of data across 147 countries. Plos One, 15(5), e0232236.

Tudor-Locke, C., Ainsworth, B. E., Whitt, M.C., Thompson, R., Addy, C. L., & Jones,D. (2001). The

relationship between pedometer determined ambulatory activity and body composition variables. International Journal of Obesity, 25:1571-1578.

Turkol, E., & Gunes, G. (2012). Healthy lifestyle behaviors of resident assistantworking at Inonu University Medical Faculty Hospital.

Wharton, S., Lau, D. C., Vallis, M., Sharma,A. M., Biertho, L., Campbell-Scherer,D., Boulé, N. (2020). Obesity inadults: a clinical practice guideline.Cmaj, 192: E875-E891.

Wubale, A. A. (2006). The Impact of Physical Fitness Training on Health Related Fitness Trainees: The Case of Assosa Town Fitness Centers. Addis Ababa University.

Yoneshiro, T., Aita, S., Matsushita, M., Okamatsu-Ogura, Y., Kameya, T., Kawai, Y. Saito, M. (2011). Age- related decrease in cold-activated brown adipose tissue and accumulation of body fat in healthy humans. Obesity, 19: 1755-1760.

Zaccagni, L., Barbieri, D., & Gualdi-Russo, E. (2014). Body composition and physical activity in Italian university students. Journal of Translational Medicine, 12: 1-9.

Zhang, Y.-B., Chen, C., Pan, X.-F., Guo, J., Li, Y., Franco, O. H., Pan, A. (2021). Associations of healthy lifestyle and socioeconomic status with mortality and incident cardiovascular disease: two prospective cohort studies. BMJ 373. doi: https://doi.org/10.1136/