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ORIGINAL RESEARCH

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

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ABSTRACT

Healthy life-styles enhance lifelong health, increase quality of life, and decrease morbidity and mortality associated with the development of chronic diseases. The purpose of this study was to investigate the relationship between body composition and healthy lifestyle behaviors (HLBs). The study design was a cross-sectional study design, 332(174 male and 158 women) administrative staffs were included in 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 were 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; the participants 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 nutritional habit. The study also found a significant negative correlation ($r = -0.69$, $P<0.001$) 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 creat a healthy lifestyle to maintain good health. A healthy lifestyle comprises controlling one's actions and choosing attitudes and behaviors that improve health by maintaining daily activities (Özveren & Yılmaz, 2018). On the other hand, healthy lifestyle behaviors refer to "maintaining a healthy state of mind and developing healthy activity behaviors." Healthy lifestyle behaviors 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 (Özveren & Yılmaz, 2018). The first steps toward creating healthy lifestyle behaviors are taken in the family and society and are followed by development through education. According to World Health Organization estimates, 70–80% of deaths in developed countries and 40–50% of deaths in underdeveloped countries are from diseases that occur due to unhealthy lifestyles. For this reason, the health services provided should be in the direction of protecting, maintaining, and improving health this direction(Zhang *et al*., 2021). For body composition problem specifically in obese adults, the first treatment for body weight loss is lifestyle modification through diet and physical exercise (Wharton *et al*., 2020). In general, the goal is to reduce 5 to 10% of the actual weight. Weight loss has been observed increases quality of life (Dorling et al., 2021). A high energy intake combined with lack of PA results in a structural, chronic energy imbalance which collectively contribute to the risk of developing obesity and an unfavorable body composition (Duvigneaud *et al*., 2007).

The global prevalence of chronic non-communicable diseases (NCDs) is on the rise, with the majority of the growth occurring among populations in developing countries. In sub-Saharan Africa, NCDs are projected to surpass infectious diseases by 2030. Thus, in recent years, obesity has become one of the biggest public health concerns in the world. It represents a well-known cause for premature death, coronary heart disease, hypertension, sleeping problems and lower quality of life (Štefan, 2017). The biggest public health problem of the 21st century is an insufficient level of physical activity, 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 (Ciolac and Guimaraes, 2004; Paley and Johnson, 2018). Additionally, in local studies conducted in different Ethiopian cities, the overall prevalence of overweight/obesity among adults in Gonder, 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).

It is clear that the relationship between a healthy life style and regular exercise is undeniable. Regular physical activity can have beneficial health results. We considered the general health-related behaviors and health-related fitness as these relate to health outcomes, that is, 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. Similar to this (Abou, 2016) health-promoting life-styles include activities that are focused on improving the level of well- being. The focus of these activities is on the development of positive potential for physical, social, mental, intellectual or spiritual health. Currently, with developing technology, many individuals pursue sedentary activities and become physically less active. 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.

On the other hand, some studies found demographic variables to be related to the practice of health behaviors. According to OZKAN (2015), suggested that age and education affected healthy life-style behaviors. Moreover, with increase in age, education, work experience, status, and income, health-promoting behaviors also increased. In addition, physical activity and exercise play important roles in prevention and improvement of mild to moderate depressive disorders, anxiety, and stress management. For developing countries like Ethiopia, healthy life style behaviors should be considered as a crucial and burning issue because developing countries have so many health problems and they could not able to resist them by funding or budgeting money, since have limited resources. Thus, by facilitating and supporting fitness program at any level from small center to nationwide, these countries should minimize and save more money which they could spend for the health care of their nations. In other words, investing in physical activity program of a nation is absolutely cost effective (Wubale, 2006). According to Karacabey (2014) chronic non-communicable diseases (NCDs) are on the rise, with the majority of the growth occurring among populations in developing countries. And these diseases arise from life style behaviors of individuals and these diseases emerge as the most important problems in both developed and developing countries. As stated above, health problems due to sedentary lifestyle behavior and low physical activity is a crucial issue.

Healthy life style behaviors maximizes the quality of life by helping people to avoid diseases, remain strong, and maintain their physical and mental health (Hafner et al., 2020). However, there is evidence that fewer people eat healthily and engage in regular physical activity. Unhealthy behaviors are implicated in up to 40% of premature deaths (Saint, 2017).This study will investigate 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, watching television, computers, 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 relationship 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 relationship between healthy lifestyle and body composition among Debre Markos university administrative staffs.

2. MATERIALS AND METHODS

2.1 Study design, setting, and population

For this study an institution-based cross-sectional survey research design was employed. Cross-sectional design can examine 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. Simple random sampling technique, specifically lottery method was used to select the study participants in order to give equal chance for all participants to be included as a sample.

Healthy Lifestyle Behavior

In this study, to assess healthy lifestyle behavior, healthy lifestyle questionnaire was used as a data collection tool (Aygar et al., 2019; Sn, Kr, & Nj, 1987). Healthy lifestyle questionnaire has 4-point Likert type scale (1 = never, 2 = sometimes, 3 = often and 4 = regularly) and composed of 52 items of questions categorized in to six sub-dimensions, such as health responsibility (3, 9, 15, 21, 27, 33, 39, 45 and 51), physical activity (4, 10, 16, 22, 28, 34, 40 and 46), 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 management (5, 11, 17, 23, 29, 35, 41 and 47). The scores that can be obtained from the scale vary between 52 and 208 points, and it is accepted that the level of healthy lifestyle behavior increases as the score increases (Aygar et al., 2019; Sn et al., 1987). Each respondent was asked to rate each item on Likert scale 1 to 4 response scale where 1 corresponds to never, 2 sometimes, 3 often and 4 regularly. Reliability of the scale was done by Alpha coefficient.

Body Composition

Body composition was measured by skinfold caliper. Skinfold determination of percent body fat can be quite accurate when performed by a properly trained technician with skinfold caliper. It is estimated that the proportion of subcutaneous to total fat varies with gender and age (Medicine, 2013). For this study, we used Jackson-Pollock 3-Site Skinfold Formula for Body Density J-P 3-Site (Jackson & Pollock, 1985), based on 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):

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

Body weight and Body mass index

Body weight and height were measured using a standard stadiometer (Height & Weight Scale ZT-160 - NSL) to calculate body mass index, which was calculated as weight in kilograms divided by height in meters squared (Medicine, 2013).

2.2. Data processing and analysis

The SPSS version 24 package software was used in evaluating the data obtained in the current study. Descriptive statistics (frequency, percentage, mean and standard deviation) were used in identifying socio-demographic and main variables. Pearson correlation was used to show the relationship 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.

2.3. 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 Department of Sport Science, Debre Markos University. Then, the letter was submitted to

respective administrative bodies of Debre Markos 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.

3. RESULTS

3.1 Socio-demographic characteristics of respondents

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 35.49 (4.96) years and majority 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 of 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 participants 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 nutritional

Table 1. Basic 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%

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

Table 1. Continued ...

Study Variables		Frequency	Percent
Categorical variables			
	< 1650	3	1.0%
	3251-5250	57	18.9%
	5251-7800	161	53.3%
	7801-10900	70	23.2%
Monthly income	>10900	11	3.6%
	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%
Work experience	> 20 service years	9	3.0%
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.

3.2 Body Composition of Participants

Body fat percentage category of the participants as under fat, healthy, over-fat and obese was done based on their age and sex using body fat ranges for adults (Medicine, 2013). Thus, the result of body fat percentage of respondents based on age and sex are presented (Table 2). In 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

3.3 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 = -.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 0.10 to 0.29 considered as weak, .30 to .49 moderate and between 0.5 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.

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

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)	-0.84**	-0.48**	-0.29***
Nutrition(N)	-0.39***	-0.47**	-0.30**
Spiritual growth (SG)	-0.28**	-0.08	-0.21**
Inter personal relations (IPR)	-0.29***	-0.17**	-0.25**
Stress management (SM)	-0.83***	-0.26**	-0.42**
Health responsibility (HR)	-0.75**	-0.04	-0.17**
Overall healthy lifestyle (HLS)	-0.69***	-0.42**	-0.33***

BMI = body-mass index, * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

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<.005). 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	0.000
Age	0.26	0.079	0.26	0.000
Educational qualification	-2.49	0.86	-0.18	0.004
Marriage	-0.12	0.92	-0.01	0.903
Family size	-1.86	2.19	-0.05	0.398
Income	1.23	0.57	0.34	0.033
Work experience	-0.42	0.44	-0.05	0.342
Sex	8.59	0.96	0.44	0.000

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	0.000
Health responsibility	-0.38	-0.394	0.141	0.000
Physical activity	0.301	-0.269	0.044	0.000
Nutritional habit	-0.199	-0.351	0.057	0.000
Spiritual growth	-0.384	.328	0.216	0.054
Interpersonal relationship	0.292	-0.712	0.130	0.177
Stress management	-0.576	-0.042	0.064	0.000
Body fat percentage				
(Constant)				
Health responsibility	-0.289	-0.411	0.140	0.041
Physical activity	-0.194	-0.285	0.043	0.000
Nutritional habit	-0.252	-0.250	0.057	0.000
Spiritual growth	0.021	0.026	0.216	0.921
Interpersonal relationship	-0.069	-0.093	0.129	0.592
Stress management	-0.057	-0.081	0.064	0.377
Body weight				
(Constant)	94.190		3.114	0.000
Health responsibility	-0.280	-0.191	0.297	0.346
Physical activity	-0.046	-0.032	0.092	0.619
Nutritional habit	-0.475	-0.226	0.120	0.000
Spiritual growth	0.486	0.284	0.456	0.287
Interpersonal relationship	-0.520	-0.335	0.273	0.058
Stress management	-0.711	-0.489	0.136	0.000

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 (β -.41, $p < .05$), physical activity (β -.285, $p < .001$), nutritional habit (β -.250, $p < .001$), spiritual growth (β -.026, $p > .05$), interpersonal relationship (β -.093, $p > .05$), and stress management (β -.081, $p > .05$). 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 (β -.41, $p < .05$), physical activity (β -.285, $p < .001$), nutritional habit (β -.250, $p < .001$), spiritual growth (β -.026, $p > .05$), interpersonal relationship (β -.093, $p > .05$), and stress management (β -.081, $p > .05$). 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 (β -.394, $p < .001$), physical activity (β -.269, $p < .001$), and nutrition (β -.351, $p < .001$), and stress management (β -.042, $p < .001$).

Regarding to how well the model fits, R can be 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 Square" column represents the R^2 value (also called the coefficient of determination), which is the proportion of variance in the dependent variable that can be explained by the independent variables. You can see (Table 6) from our value of 0.32 that our 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 square	Adjusted R Square	Std. Error of the Estimate
Body weight	0.505a	0.255	0.239	10.466
BMI	0.618a	0.382	0.370	4.96402
Percent body fat	0.57a	0.32	0.301	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 independent variables statistically significantly predict the body fat percentage: $F(6, 295) = 18.73$, $p < .001$, body mass index: $F(6, 295) = 30.44$, $p < .001$, and body weight: $F(6, 295) = 16.8$, $p < .001$ (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 sub scales, 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.

4. DISCUSSION

In our study, the participants 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 nutritional habit. In line with this; in studies conducted by Turkol & Gunes(2012), in assistants practicing at İnönü University Medical Faculty Hospital, the highest scores were in the spiritual development and interpersonal relationships sub-dimensions of healthy life style behavior. In this same study, the lowest scores were related to physical activity and stress management. In the research conducted by Cürcani *et al*. (2010) on nurses, the highest mean score was in the spiritual development sub-dimension, and the lowest average score was in the physical activity sub-dimension. Similarly Ozkan & Yilmaz(2008) determined that the highest score for nurses was for spiritual development, and the lowest score was 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. But a study conducted with Pengpid & Peltzer, (2014); male employees were significantly more overweight or obese than female employees. According to Beaudry et al., (2019) study, the findings of this research stated that female and male have different patterns of body weight and body composition, but male employee gains significant amount of body weight than female employee. In line with our findings, a study conducted by Gropper, et al., & (2012), reported that female employee have higher BMI than male employee and found a higher prevalence of cardiovascular disease and non-communicable disease. Based on another study conducted by Lemamsha, et al., (2019) stated that 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), states 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. Pertinent to this study finding Mavingire, (2018) and Yoneshiro et al., (2011) found that females tend to possess higher body fat percentage than their male counter parts.

In the current study, from the six dimensions of healthy life style behaviors, health responsibility, spiritual development and interpersonal relation of sub-dimensions had highest scores. On the other hand, physical activity habit, stress management and nutritional habit had lowest scores. However, previous study conducted by Azami Gilan et al., (2021) in Iran found that, of the dimensions of healthy lifestyle behaviors, the highest and lowest scores of study subjects belonged to interpersonal relationships and physical activity respectively. On the other study Mehri et al., (2016) found the highest score in interpersonal relationship dimension followed by spiritual growth, stress management 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 may be due to the differences in socio-cultural background of participants.

This study finding also revealed that there was a significant negative correlation between overall healthy lifestyle behaviors and body composition (body fat percentage, body mass index and body weight). 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, a study conducted in Spanish adolescents by Muros et al., (2017) 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.

In a study conducted by Alzahrani *et al*. (2008) , a negative correlation was found between the mean interpersonal relations subgroup score of the healthy life style components and body mass index. In a study conducted by Al-Kandari et al. (Alzahrani et al., 2019) in Kuwait, a negative correlation was found between the nutrition subgroup scores of healthy life style components and body mass index. In our study, there was a negative correlation between healthy life style sub scales and body composition (body mass index, body fat percentage and body weight).

Physical activity habits, sub-dimension of healthy life style was positively associated with fat-free mass percentage in both genders, yet inversely associated with body weight, BMI and fat-mass percentage in both men and women. Our results are similar with some previous findings specifically, Zaccagni et al., (2014) findings showed that physically active individuals had higher values of fat-free mass percentage compared to the less active individuals, while men showed a lower fat-mass percentage and BMI. Both Lohman *et al*. (2006) and Tudor-Locke *et al.* (2001) reported 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 percentage, body weight and body mass index). Similarly, there is increasing evidence that dairy intake is negatively related to body composition and body weight. Poddar *et al*. found that, dairy consumption helped to prevent weight gain and increases in body fat (Poddar *et al*., 2009).

With regard 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 & Přidalová, 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 population obesity prevalence exhibits a positive relationship with national income. In the contrary Lopez et al., (2021) found a negative correlation between obesity and income. Our study has some limitations. First, due to a cross-sectional design, we cannot exclude the possibility of reverse causality. Second, we conducted a 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.

5. CONCLUSIONS

This study examined the relationship 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 results of this research, it can be said that the staff working in university keep healthy life style behavior is effective for protecting body composition. That's why, university personnel are required to join in necessary activities in order to have healthy lifestyles (exercises, physical activities, diet habits and health responsibilities).

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