History of Medicine, 2024, 10(2): 741-769
DOI: 10.48047/HM.V10.I2.2024.53

EFFECT OF DIETARY INTAKE AND PHYSICAL ACTIVITY ON NUTRITIONAL STATUS AND LIPID PROFILE OF SCHOOL TEACHERS

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ABSTRACT

Background:

School teachers can play a major role in health promotion and disease prevention, with their positive and negative behaviors significantly affecting the behaviors of students.

Aims and objectives:

To determine the effect of dietary intake and physical activity on nutritional status and lipid profile of school teachers

Study design:

A cross-sectional study was designed to assess the dietary intake and physical activity level of the teachers.

Research tool:

A pre-planned questionnaire was used to collect the data from the teachers.

Methodology:

A total of 100 male and female school teachers were enrolled for the study from different government and private schools of district Charsadda. Data regarding socio demographic, anthropometric parameters, physical activity, lipid profile and dietary intake were collected.

Statistical analysis:

Statistical package for social sciences (SPSS) Version 21 was used to analyze the data.

Results:

The results showed that mean age of male was 38.2±9.2 (years) and that of female school teachers was 40.8±10.2 (years) A total of 31.5% male and 54.3% female were physically active. Exercise on daily basis was observed for only 9.3% of the male and 23.9% of the female teachers. A significant difference ($p<0.05$) was found in the triglycerides, cholesterol level, LDL level of male and female school teachers while non-significant difference ($p>0.05$) was found in HDL level A total of 50.0% of males and 43.5% of females consumed milk products up to 3 days in a week however, 16.7% of males and 26.1% of females consumed beverages and juices on daily basis. Majority of the subjects consumed unhealthy food like fast food, beverages while the intake of fruits, milk and meat products on daily basis were very low. The carbohydrate intake of male and female school teachers was 225.1±47.1 (g/day) and 240.4±44.7 (g/day) while protein intake was recorded as 49.8±19.9 (g/day) and 44.7±21.9 (g/day) respectively.

Key words: Physical activity, Dietary status assessment, School teachers, Lipid profile

INTRODUCTION:

The assessment of nutritional status of school teachers is of vital importance. Studies have shown that school teachers have a greater potential to influence a child's health than anyone else outside the home (Forrest et al., 2013). Dietary diversity has long been recognized as a key factor in assessing food quality. Majority of the dietary guidelines recommends that a variety of food should be added from the food groups because eating a variety of foods ensures adequate amounts of essential nutrients that promote good health. Teacher's eating habits, lifestyle and nutritional status can have a huge effect on health and well-being of children's and could also serves as a role model for school children and adolescents (He et al., 2014). Teachers to serve as role models of positive nutrition. They need to understand and follow a healthy lifestyle and make healthy food choices that will ultimately reflect their good nutritional status and health.

Previous studies (Lui et al, 2006, Everett et al, 2006) showed that high concentrations of LDL-cholesterol were associated with increased risk of coronary heart disease mainly for obese populations with higher concentrations of LDL-cholesterol, whereas little evidence is available for less obese populations with lower concentrations of LDL- cholesterol. It therefore remains unclear whether a similar association as for obese populations is also observed at lower ranges of LDL-cholesterol levels.

As the metabolism of obese populations is affected by different environmental factors than those affecting less obese population, it is of major importance to examine the effect of LDL-cholesterol on the risk of coronary heart disease for populations with its lower ranges. First, it is difficult to examine the threshold values in the lower ranges of LDL-cholesterol amongst obese populations, because of their higher concentrations of LDL-cholesterol. Seven countries study confirmed the positive association between total cholesterol and mortality from coronary heart disease for high cholesterol populations, including Americans, but not for Japanese, who had the lowest population mean levels of total cholesterol levels (Verschuren et al., 2005). Previous studies

(Lui et al, 2006, Everett et al, 2006) of participants with a higher mean level of LDLcholesterol could not examine the effect of LDL-cholesterol amongst individuals in the lower LDL-cholesterol ranges.

The assessment of teacher`s diet is also of great importance because their diet throughout the early stage has an impact on their future lives as a result of an unhealthy dietary pattern could cause osteoporosis and abnormal cell division and cardiovascular diseases (WHO, 2003) while, good dietary habits in early life, on the other hand, have a significant impact on later life. Teaching staff require a diet that provides both sufficient calories and micronutrients in order to maintain their overall health.

Anthropometric measurements such as measuring height, weight, MUAC, waist circumference, hip circumference, WHR, and BMI and bio chemical tests such as Lipid profile are indicators use to describe the nutritional status of adult. For the measurement of under nutrition and over nutrition, the weight to height ratio in meter square is used (Woodruff and Duffield, 2000). In this regard the current research designed to assess the nutritional status and dietary intake of school teachers in district charsadda.

METHODOLOGY:

A quantitative community based cross-sectional study was performed in various government and private schools in district Charsadda. A total of 16 different schools were enrolled, with 100 male and female teachers. The enrolled individual provided information on socio demographic and anthropometric parameters, and dietary pattern. The purpose of the study was explained in a clear and understandable manner to the principals of each government and public school, as well as to the subjects. Teachers who were under the age of 60 and were local of the study area and had no chronic diseases such as diabetes, cardiovascular disease, kidney failure, or any other disease were included in the study. Teachers were asked about their age, gender, family type, family size, income, and socioeconomic status to acquire socioeconomic and demographic data (Nwosu et al., 2021). The anthropometric data of the selected participants was measured by using scientific equipment, including height, weight, BMI, waist circumference, hip circumference, and waist to hip ratio (Oliveira et al., 2015).

The nutritional status of the study participants was assessed by using BMI. (World Health Organization, 2003). The serum lipid profile of the participants was determined by using blood samples after serum samples were analyzed. On CLINDIAG SA-20, the levels of triglycerides, total cholesterol, high density lipoproteins, and low density lipoproteins were determined using a kit approach (Mastoi et al., 2010). The four fundamental characteristics of the test are total cholesterol, HDL cholesterol, LDL cholesterol, and triglycerides. Dietary status was assessed using a questionnaire that included several questions to determine their eating status and patterns. SPSS (statistical package for social science) version 21 was used for statistical analysis. For categorical data, descriptive statistics were used, whereas for continuous data, the t-test was used. The Chi-square test was used to examine the relationship between numerous variables.

RESULTS:

The current cross-sectional study was performed in different government and private schools of district Charsadda to evaluate the effect of dietary intake and physical activity on nutritional status and lipid profile of school teachers. The study concluded with the following results.

Table 1: Socio-demographic parameters of the subjects.

Variables		Means±S.D/ N (%)		
		Total (n=100)	Male (n=54)	Female (n=46)
Age (years)		39.7±9.7	38.8±9.2	40.8±10.2
Age categories	< 30 years	24 (24.0)	14 (25.9)	10 (21.7)
	31 to 40 years	32 (32.0)	18 (33.3)	14 (30.4)
	41 to 50 years	23 (23.0)	13 (24.1)	10 (21.7)
	> 50 years	21 (21.0)	9 (16.7)	12 (26.1)
School	Government	50 (50.0)	28 (51.9)	22 (47.8)
	Private	50 (50.0)	26 (48.1)	24 (52.2)
Marital status	Single	26 (26.0)	15 (27.8)	11 (23.9)
	Married	74 (74.0)	39 (72.2)	35 (76.1)
Family income (Rs.)	Less than 50000	63 (63.0)	33 (61.1)	30 (65.22)
	More than 50000	37 (37.0)	21 (38.9)	16 (34.88)

Fig 1:

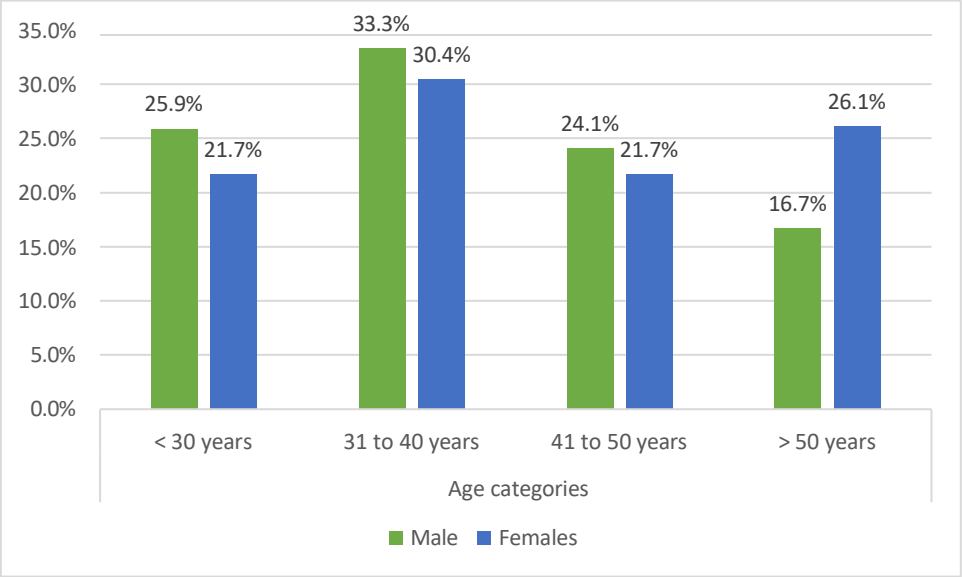

Table 1 shows the socio-demographic parameters of the school teachers. The results showed that 54.0% were male subjects while 46.0% were female subjects. The mean age of the male was 38.8±9.2 (years) and that of female school teacher was 40.8±10.2 (years) whereas total mean age was 39.7±9.7.

According to school distribution male (51.9%) and female (47.8%) were government school teachers. However, 72.2% of the male and 76.1% of the female school teachers were married. The monthly income of male (61.1%) and female (65.22%) was less than 50000 PKR per month.

Table 2: Anthropometric measurement and body fat composition of the subjects.

Variables		Means±SD/ N (%)		
		Total (n=100)	Male (n=54)	Female (n=46)
Weight (kg)		77.3±8.6	75.2±8.5	79.5±8.7
Height (cm)		159.5±8.8	167.7±11.2	148.2±13.2
Body mass index		27.0±4.8	24.1±4.4	30.0.±5.3
BMI Categories	Underweight	6 (6.0)	4 (7.4)	2 (4.3)
	Normal	33 (33.0)	28 (51.9)	5 (10.9)
	Overweight	30 (30.0)	16 (29.6)	14 (30.4)
	Obese	31 (31.0)	6 (11.1)	25 (54.3)
Visceral fat		8.7±4.4	6.4±4.2	11.1±4.7

Waist to hip ratio		0.88±0.01	0.88±0.02	0.89±0.02
Waist to hip ratio categories	Normal	45 (45.0)	25 (46.3)	20 (43.5)
	At risk	55 (55.0)	29 (53.7)	26 (56.5)

Fig no 2

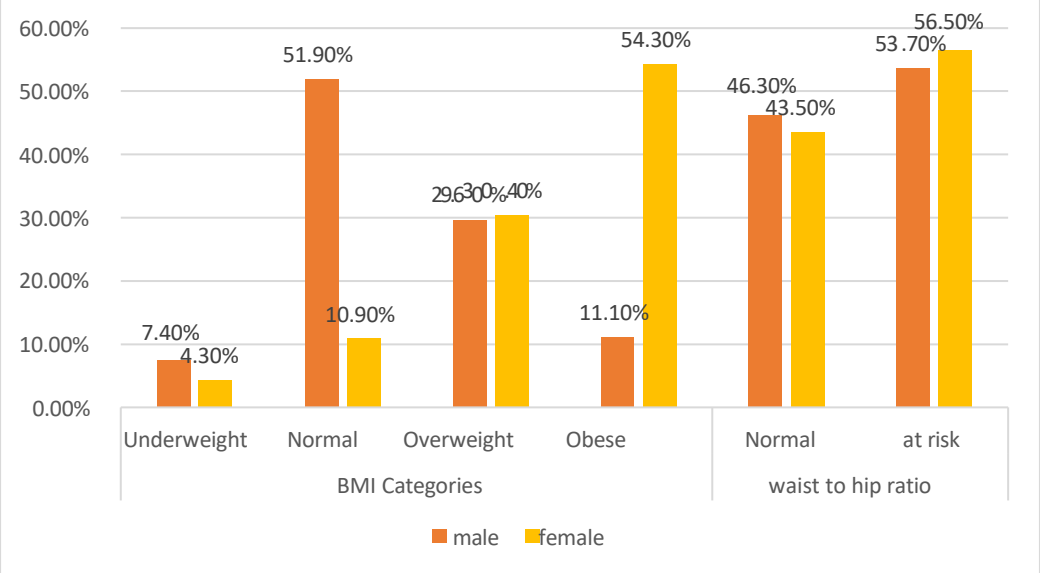

Table 2 shows the anthropometric measurement of the enrolled subjects. The mean weight of the male school teacher was 75.2±8.5 (kg) and female school teacher was 79.5±8.7 (kg) while the mean height of the male and female school teachers was 167.7±11.2(cm) and 148.2±13.2(cm). The mean total weight and height was 77.3±8.6 kg and 159.5±8.8 cm. The mean body mass index of the male was 24.1±4.4 and female was 30.0±5.3. Similarly, mean visceral fat of the male 6.4±4.2 was less than that of female school teachers 11.1±4.7. According to BMI categories, Male with normal weight was 51.9% while the female was 10.9%, for male teachers, (7.4%) were underweight, (29.6%) were overweight and (11.1%) were Obese whereas for female teachers 4.3% were underweight, 30.4% were overweight and (54.3%) were Obese.

Table 3: Lipid profile of the school teachers.

Variable	Means±S.D			P-value
	Total (n=100)	Male (n=54)	Female (n=46)	
Triglyceride (mg/dl)	144.5±12.3	139.6.±14.2	151.1±12.5	**<0.001**
Cholesterol (mg/dl)	180.0±41.6	160.9±44.5	199.2±38.7	**<0.001**
High density lipo-protein (mg/dl)	49.7±7.2	50.7±8.5	48.4±5.2	0.125
Low density lipo-protein (mg/dl)	127.6±11.5	123.7±13.8	133.1±8.7	**<0.001**

Table 3 shows the lipid profile of the enrolled subjects. A highly significant variation ($p<0.001$) was recorded for the triglyceride, cholesterol and LDL. The mean triglyceride level of male and female school teachers was 139.6±14.2 (mg/dl) and 151.1±12.5 (mg/dl) with significant difference ($p<0.05$). The mean cholesterol level of male and female school teachers was 160.9.4±44.5 (mg/dl) and 199.2±38.7 (mg/dl) with significant difference ($p<0.05$).

The mean HDL was 50.7±8.5 (mg/dl) and 48.4±5.2 (mg/dl) with non- significant difference ($p<0.05$). The mean LDL was 123.7±13.8. (mg/dl) and 133.1±8.7 (mg/dl). The mean total cholesterol, triglycerides, HDL and LDL was 144.5±12.3, 180.0±41.6, 49.7±7.2 and 127.6±11.5 respectively, which concludes that the mean of triglyceride, cholesterol and LDL levels was high in female whereas the mean of HDL was high in males.

Table 4: Physical activities of the school teachers.

Variable		N (%)			P-value
		Total (n=100)	Male (n=54)	Female (n=46)	
Exercise/Physical	**Yes**	54 (54)	39 (72.2)	15 (32.6)	**0.017**

Activity	**No**	46 (46)	15 (27.8)	31 (67.4)	
Frequency of Exercise	**1 to 3 days**	28 (28.0)	19 (35.2)	9 (19.6)	**0.019**
	4 to 6 days	19 (19.0)	16 (29.6)	3 (6.5)	
	Daily	7 (7.0)	4 (7.4)	3 (6.5)	
	Never	46 (46.0)	15 (27.8)	31 (67.4)	
Intensity of Exercise	**Sedentary**	66 (66.0)	31 (57.4)	35 (76.1)	**0.048**
	Moderate	8 (8.0)	5 (9.3)	3 (6.5)	
	Active	2 (2.0)	2 (3.7)	0 (0)	
	Highly active	24 (24.0)	16 (29.6)	8 (17.4)	

Fig no 3

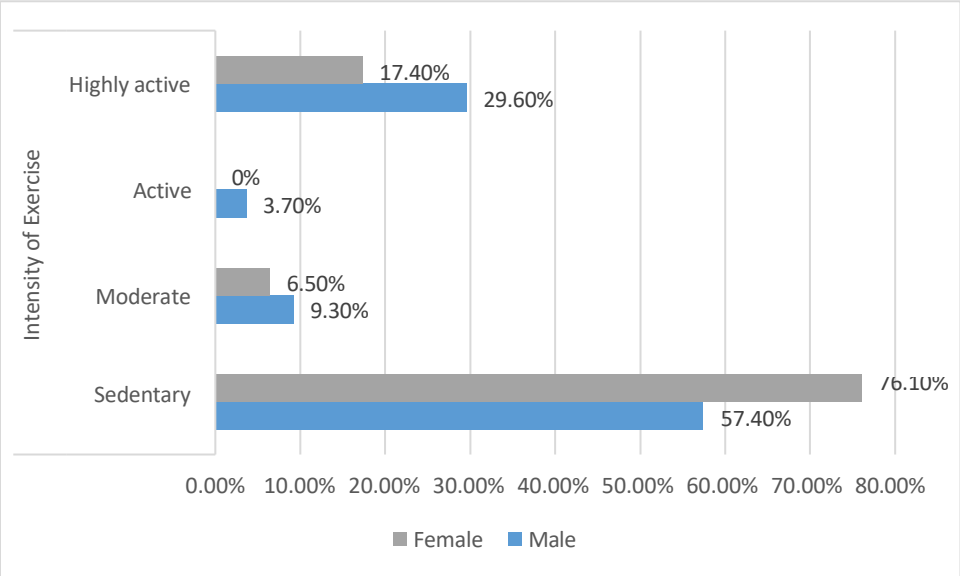

Table 4 shows the physical activities of the subjects. A significant change ($p<0.05$) was recorded for the physical activity, frequency of physical activity between the two groups. Male (72.2%) and female (32.6%) were doing physical activity. Exercise on daily basis was observed for only (7.4%) of male and (6.5%) of female teachers whereas the rest of teachers were doing physical activity 1 to 3 or 4 to 6 times per week. Male (29.6%) and female (17.4%) teachers were highly active whereas only 3.7% of male were active, 9.3% male and 6.5% female were moderate active and the rest of teachers were having sedentary physical activity. The total percentages of sedentary, moderate and very active physical activity

of the subjects are 66%, 8% and 24%.

Table 5: Frequency of food being consumed by the subjects.

Variables		N (%)		
		Total (n=100)	Male (n=54)	Female (n=46)
Cereals	Never/monthly/scarcely	0 (0)	0 (0)	0 (0)
	1 to 3 days in a week	0 (0)	0 (0)	0 (0)
	4 to 6 days in a week	22 (22.0)	9 (16.7)	13 (28.3)
	Daily	78 (78.0)	45 (83.3)	33 (71.7)
Fast food	Never/monthly/scarcely	0 (0)	0 (0)	0 (0)
	1 to 3 days in a week	75 (75.0)	39 (72.2)	36 (78.3)
	4 to 6 days in a week	13 (13.0)	10 (18.5)	3 (6.5)
	Daily	12 (12.0)	5 (9.3)	7 (15.2)
Fruits	Never/monthly/scarcely	0 (0)	0 (0)	0 (0)
	1 to 3 days in a week	48 (48.0)	25 (46.3)	23 (50.0)
	4 to 6 days in a week	32 (32.0)	18 (33.3)	14 (30.4)
	Daily	20 (20.0)	11 (20.4)	9 (19.6)
Vegetable	Never/monthly/scarcely	0 (0)	0 (0)	0 (0)
	1 to 3 days in a week	33 (33.0)	20 (37.0)	13 (28.3)
	4 to 6 days in a week	23 (23.0)	13 (24.1)	10 (21.7)
	Daily	44 (44.0)	21 (38.9)	23 (50.0)
Meat products	Never/monthly/scarcely	0 (0)	0 (0)	0 (0)
	1 to 3 days in a week	51 (51.0)	27 (50.0)	24 (52.2)
	4 to 6 days in a week	33 (33.0)	17 (31.5)	16 (34.8)
	Daily	16 (16.0)	10 (18.5)	6 (13.0)
Milk products	Never/monthly/scarcely	0 (0)	0 (0)	0 (0)
	1 to 3 days in a week	47 (47.0)	27 (50.0)	20 (43.5)
	4 to days in a week	33 (33.0)	17 (31.5)	16 (34.8)
	Daily	20 (20.0)	10 (18.5)	10 (21.7)
Beverages	Never/monthly/scarcely	0 (0)	0 (0)	0 (0)
	1 to 3 days in a week	48 (48.0)	27 (50.0)	21 (45.7)
	4 to 6 days in a week	31 (31.0)	18 (33.3)	13 (28.3)
	Daily	21 (21.0)	9 (16.7)	12 (26.1)

Table 5 shows the frequency of food consumed by the teachers. However less percentage of male and female teachers consume fruits, milk and meat products in daily basis. Males (83.3%) and females (71.7%) teachers were daily consuming cereals while males (46.3%) and females (50.0%) had consumed fruits up to 3 days in a week. Some of the teachers (24.1%) of males and (21.7%) female had consumed vegetables up to 4 days

in a week while males (50.0%) and females (43.5%) had consumed milk and dairy products up to 3 days in a week respectively. The total intake of milk and milk products were recorded as 47% 3 time a week. Males (16.7%) and females (26.1%) had daily consumed beverages and juices. The fast-food consumption was high in females than males. The meat consumption on daily basis was recorded 18.5% in males and 13.0% in females.

Table 6: Macronutrient and energy intake of the subjects.

Variables	Means±S.D		
	Total (n=100)	Male (n=54)	Female (n=46)
Carbohydrate (g/day)	242.7±45.9	225.1±47.1	260.4±44.7
Protein (g/day)	47.2±20.9	49.8±19.9	44.7±21.9
Fats (g/day)	58.5±13.6	41.4±11.8	75.7±15.4
Energy	2035.2±587.1	1850.6±603.0	2135.7±470.3

Table 6 shows the macronutrient and energy intake of the subject. Male and female school teachers consumed 225.1±47.1 and 260.4±44.7 grams of carbohydrates per day, respectively. The protein intake was 49.8±19.9 (g/day) and 44.7±21.9 (g/day), respectively. Male and female teachers consumed 41.4±11.8 (g/day) and 75.71±5.4 (g/day) of fat, respectively. The individual used 1850.6±603.3 (kcal/day) and 2135.7±470.3 (kcal/day) of energy each day. The total mean of carbohydrates, proteins, fats and energy was 242.7±45.9, 47.2±20.9, 58.5±13.6 and 2035.2±587.1.

Table 7: Correlation between dietary intake and lipid profile.

Variable	Tgl	Chl	HDL	LDL
Carbs	.198*	.027*	-.054*	.038*
Protein	-.021	-.016	.129*	-.143*
Fats	.048	.071*	-.067*	.076*
Energy	.106*	.003	.154	.105

Table 7 describe the correlation between the dietary intake and lipid Profile. A Significant association was recorded for carbohydrate with all variables of lipid profile accept the HDL. Protein was highly correlated with HDL and negatively correlate with LDL. Fats showed positive correlation with the cholesterol and LDL while negative correlation with HDL. Energy showed positive correlation with triglycerides.

Table 8: Frequencies of food consumed in relation to body mass index.

Variable		Body mass index (%)				P-value
		Underweight	Normal	Overweight	Obese	
Cereals	Never/monthly/scarcely	0 (0)	0 (0)	0 (0)	0 (0)	0.348
	1 to 3 days in a week	0 (0)	0 (0)	0 (0)	0 (0)	
	4 to 6 days in a week	0 (0)	8 (24.2)	8 (25.8)	6 (20.0)	
	Daily	6 (100)	25 (75.8)	23 (74.2)	24 (80.0)	
Fast food	Never/monthly/scarcely	0 (0)	0 (0)	0 (0)	0 (0)	**0.017**
	1 to 3 days in a week	6 (100)	27 (81.8)	21 (67.7)	21 (70.0)	
	4 to 6 days in a week	0 (0)	3 (9.1)	6 (19.4)	4 (13.3)	
	Daily	0 (0)	3 (9.1)	4 (12.9)	5 (16.7)	
Fruits	Never/monthly/scarcely	0 (0)	0 (0)	0 (0)	0 (0)	0.554
	1 to 3 days in a week	3 (50.0)	13 (39.4)	15 (48.4)	17 (56.7)	
	4 to 6 days in a week	2 (33.3)	12 (36.4)	9 (29.0)	9 (30.0)	
	Daily	1 (16.7)	8 (24.2)	7 (22.6)	4 (13.3)	
Vegetable	Never/monthly/scarcely	0 (0)	0 (0)	0 (0)	0 (0)	0.100
	1 to 3 days in a week	2 (33.3)	11 (33.3)	10 (32.3)	10 (33.3)	
	4 to 6 days in a week	1 (16.7)	8 (24.2)	7 (22.6)	7 (23.3)	
	Daily	3 (50.0)	14 (42.4)	14 (45.2)	13 (43.3)	
Meat products	Never/monthly/scarcely	0 (0)	0 (0)	0 (0)	0 (0)	**0.027**
	1 to 3 days in a week	4 (66.7)	16 (48.5)	15 (48.4)	16 (53.4)	
	4 to 6 days in a week	2 (33.3)	12 (36.4)	11 (35.5)	8 (26.7)	
	Daily	0 (0)	5 (15.2)	5 (16.1)	6 (20.0)	
Milk product	Never/monthly/scarcely	0 (0)	0 (0)	0 (0)	0 (0)	**0.043**
	1 to 3 days in a week	2 (33.3)	15 (45.5)	14 (45.1)	16 (53.3)	
	4 to 6 days in a week	2 (33.3)	10 (30.3)	10 (32.3)	11 (36.7)	
	Daily	2 (33.3)	8 (24.2)	7 (22.6)	3 (10.0)	

Beverages and juice intake	**Never/monthly/scarcely**	0 (0)	0 (0)	0 (0)	0 (0)	**0.049**
	1 to 3 days in a week	4 (66.6)	16 (48.5)	14 (45.1)	14 (46.6)	
	4 to days in a week	1 (16.7)	12 (36.4)	10 (32.3).	8 (26.7)	
	Daily	1 (16.7)	5 (15.2)	7 (22.6)	8 (26.7)	

Table 8 illustrates the frequency of foods consumed in relation to the body mass index. Intake of fast food, meat, milk, and beverages was found to have a significant relation ($p<0.05$) with BMI. Intake of cereals, fruits and vegetables have non-significant relation ($p>0.05$) with body mass index. Cereals, milk, fruits and vegetable consumption are high among normal, underweight and obese group on daily basis as compared to the underweight group while the consumption of fast food, meat and beverages are also high among normal, underweight and obese group on daily basis. Those who were taking cereals on daily basis were 6 (100%) underweight, 25 (75.8%) were normal,
23(74.2%) were overweight, 24(80%) were obese.

Table 9: Body mass index in relation to the energy and macronutrient intake.

Variables	**Body mass index (Mean±S.D)**				**P-value**
	Underweight	**Normal**	**Overweight**	**Obese**	
Carbohydrate (g/day)	198.6±50.6	208.8±38.8	216.0±52.1	217.3±32.7	**0.027**
Protein (g/day)	51.1±17.1	53.7±20.5	53.2±21.4	59.7±21.3	0.345
Fat (g/day)	41.4±11.7	43.0±12.4	45.0±18.4	45.3±13.6	**0.015**
Energy (Kcal/day)	1439.1±467.4	1638.1±397.2	1918.5±748.4	2069.5±492.9	**0.029**

Table 9 shows the macronutrient intake in relation to the

body mass index of the subjects. A significant association ($P<0.05$) was recorded for carbohydrate, fats and energy in relation to the body mass index whereas a non- significant relation ($p>0.05$) as found between protein and BMI. The carbohydrate intake was observed high in overweight and obese groups as compare to normal and underweight. The protein intake was found high in overweight and obese groups. The fat intake was found almost the same in overweight and obese groups. The calories intake was also high in overweight and obese groups.

Table 10: Body mass index in association with intensity of physical activity.

Variable		Body mass index (%)				P-Value
		Underweight	Normal	Overweight	Obese	
Intensity of Physical Activity	Sedentary	2 (33.3)	24 (72.7)	16 (53.3)	24 (77.4)	0.025
	Moderate	0 (0)	5 (15.2)	2 (6.7)	1 (3.2)	
	Active	0 (0)	1 (3.0)	1 (3.3)	0 (0)	
	Highly Active	4 (66.7)	3 (9.1)	11 (36.7)	6 (19.4)	

Table 10 shows the BMI in relation with intensity of physical activity. A significant relation ($p<0.05$) was observed for intensity of physical activity in relation to BMI. Finding suggests that as the intensity of physical activity increases, the body mass index changes, and vice versa as the intensity decreases, the body mass index rises.

DISCUSSION:

According to the findings of current study the mean age of the male and female school teachers was 38.8±9.2 and 40.8±10.2 (years). The results also showed that 54.0% were male subjects while 46.0% were female subjects. Oliviera et al., (2015) reported that the mean age of enrolled teachers was 43.2 ± 10.2 years. Another similar study has been conducted by Shreta and Shrestha, (2016) whose findings are also similar to our results, according to that the mean age of the participants was 42.0 (years) and 47% were men and 53% were women teachers. Bandpei et al., (2016) reported that 33.6% male and 66.4% female teachers were enrolled in the study.

According to this study findings the total mean weight of the male and female school teacher was 77.3±8.6 kg and the total mean height of the male and female school teachers was 159.5±8.8 (cm) which is similar to those of Saraiva et al., (2019) who reported that mean weight of the teachers was 70.2±15.3 kg and their height were 170±10.0cm. Another study performed by Fabunmi et al., (2019) shows that the average weight was 72.49±14.3kg. The subject's mean height was 165±8.44 (cm) which also shows resemblance to our study. The mean BMI of the urban school teachers was 26.70±5.55 which is Sedentary PA was observed high in normal, overweight and obese groups whereas the moderate PA level was found high in normal group. The active PA level was found high in normal and overweight group. The highly active PA level was observed in underweight and overweight groups.

similar to the finding of this study. Another study conducted by Fadupin et al., (2014) reported that female teachers were heavier but shorter than male teachers and their BMI (28.0±5.4 Kg/m) was significantly greater (<0.05) than that of male teachers (23.3±14.0 Kg/m) hence strongly support this study. Samanta, (2020) reported in a study that males had a BMI of 23.85±1.982 while females had a BMI of 28.02±1.018 which strongly supported this study. In another study Fadupin et al., (2014) reported on the base of BMI that the proportion of male teachers with normal weight were (62.5%) almost doubled the number of female colleagues (30.1%). For male teachers, (10.4%) were underweight, (25.0%) were overweight and (2.1%) were Obese. For female teachers 39.8% were overweight and (20.4%) were Obese hence

strongly support this study.

According to another study performed by Oloviera et al., (2015) reported that greater BMI was found in 58 percent of the teachers, in which 21.3% of female were being obese while 37.4 percent of female were overweight. For men, these figures were 42.3 percent and 11.5 percent, respectively but in terms of abdominal obesity, the percentages of "high" and "very high" hip circumference was 26.4 percent and 25.9% for women, while males had 15.4 percent and 3.8 percent respectively, which shows that female teachers had more fat and visceral fat than male teachers. The finding showed that the values come from this study is less than those of our study.

The findings of our study is also similar to that of Fabunmi et al., (2018) who reported that the fat percentage of enrolled subjects were 30.68 ± 9.49. Another similar study Fadupin et al., (2014) showed that the body fat percentage was twice high for females as for male teachers shows high significance ($p < 0.05$) and also the visceral fat was recorded high in female than male teachers.

The current study concluded that Males (83.3%) and females (71.7%) teachers were daily consuming cereals while males (46.3%) and females (50.0%) had consumed fruits up to 3 days in a week. Some of the teachers (24.1%) of males and (21.7%) female had consumed vegetables up to 4 days in a week while males (50.0%) and females (43.5%) had consumed milk and dairy products up to 3 days in a week respectively. The total intake of milk and milk products were recorded as 47% 3 time a week. Males (16.7%) and females (26.1%) had daily consumed beverages and juices. The fast-food consumption was high in females than males. The meat consumption on daily basis was recorded 18.5% in males and 13.0% in females. The findings of this study are similar to those of Kanggil et al., (2017) who reported that the milk and dairy products are consumed by 23.5 percent of teachers up to 3 days in a week, In which 37.5 percent of teachers consume yoghurt and 75.5 percent of teachers consume white cheese on a daily basis. Eggs are consumed by 52.5 percent of teachers while 60.5 percent of teachers consume red meat, 66.5 percent of teachers consume chicken and 38.5 percent of teachers consumed fish 1-2 times per week respectively. Green leafy vegetables consumption on daily basis was reported (39.0 percent) and for citrus fruits it was (56.0 percent) and other fruits were recorded (52.5) percent. Although the majority of the teachers (77.0%) ate white bread on a daily basis, the proportion of those who ate whole wheat or whole-grain breads are (18.0%). The outcomes are similar to our study. In another study conducted by Findholt et al., (2016) investigated that fast food had been consumed by 38.0 percent of elementary school teachers. Middle school teachers (43.0 percent) reported eating fruits up to three times each week and middle school teachers (12.0 percent) said they had never eaten meat. It was concluded from these studies that very a smaller number of teachers consume fruits, meat on daily basis and the fast-food intake was high on daily basis which resembles this study.

The current study concluded that Male and female school teachers consumed 225.1±47.1 and 260.4±44.7 grams of carbohydrates per day, respectively. The protein intake was 49.8±19.9 (g/day) and 44.7±21.9 (g/day), respectively. Male and female teachers consumed 41.4±11.8 (g/day) and 75.71±5.4 (g/day) of fat, respectively. The individual used 1850.6±603.3 (kcal/day) and 2135.7±470.3 (kcal/day) of energy each day. The total mean of carbohydrates, proteins, fats and energy was 242.7±45.9, 47.2±20.9, 58.5±13.6 and 2035.2±587.1.

The study's findings are similar to those of Ross et al., (2002), who reported that the carbohydrate intake of teachers was 198.5±43.8 (g/day). The protein intake was recorded as 55.6±17.6 (g/day) and the

fat intake was 32.8±13.5 (g/day). However, the energy intake of the subject was 1685.4±467.4 (kcal/day). The study findings showed high means for carbohydrates, fats and energy as compare to this study. According to another study conducted by Ross et al., (2008) reported that the mean energy intake was 1576 kcal/day. The mean protein intake of the subjects was 58.5g/day and the mean carbohydrate intake was 199.4g/day. The mean fats intake was recorded as 36.3g/day. Hence the findings supported this study.

A highly significant variation ($p<0.001$) was recorded for the triglyceride, cholesterol and LDL. The mean triglyceride level of male and female school teachers was 139.6±14.2 (mg/dl) and 151.1±12.5 (mg/dl) with significant difference ($p<0.05$). The mean cholesterol level of male and female school teachers was 160.9.4±44.5 (mg/dl) and 199.2±38.7 (mg/dl) with significant difference ($p<0.05$). The mean HDL was 50.7±8.5 (mg/dl) and 48.4±5.2 (mg/dl) with non-significant difference ($p<0.05$). The mean LDL was 123.7±13.8. (mg/dl) and 133.1±8.7 (mg/dl). The mean total cholesterol, triglycerides, HDL and LDL was 144.5±12.3, 180.0±41.6, 49.7±7.2 and 127.6±11.5 respectively, which concludes that the mean of triglyceride, cholesterol and LDL levels was high in female whereas the mean of HDL was high in males. These outcomes of the study correlates to the work of Taiwo et al., (2020) who reported that the average total cholesterol of teachers was 171.5±44.37 while the mean triglyceride (TG) was 154.78mg/dl±12.64. The mean low- density lipoprotein (LDL) was 133.68mg/dl±14.82 whereas the mean of high-density lipoprotein(HDL) was 54.32mg/dl±13.88. These findings are similar to our results. In another similar study conducted by Saro et al., (2018) reported that the average total cholesterol of secondary school teachers was 178.24 ± 25.37 mg/dl. The mean triglyceride (TG) was 149.75mg/dl±15.64 while the mean low-density lipoprotein (LDL) was 121.68mg/dl±16.81 and the mean high density lipoprotein (HDL) was 53.36mg/dl±12.77. The means for cholesterol, triglycerides and HDL are greater than those of our findings.

A significant change ($p<0.05$) was recorded for the physical activity, frequency of physical activity between the two groups. Male (72.2%) and female (32.6%) were doing physical activity. Exercise on daily basis was observed for only (7.4%) of male and (6.5%) of female teachers whereas the rest of teachers were doing physical activity 1 to 3 or 4 to 6 times per week. Male (29.6%) and female (17.4%) teachers were highly active whereas only 3.7% of male were active, 9.3% male and 6.5% female were moderate active and the rest of teachers were having sedentary physical activity. The total percentages of sedentary, moderate and very active physical activity of the subjects are 66%, 8% and 24%. The present research findings show resemblance to that of Bretto et al., (2012) who reported that low, moderate, and high levels of physical activity were found in 46.3 percent, 42.7 percent, and 11 percent of the population, respectively. In other studies, conducted by Monteiro et al., (2005), Matsudo et al., (2002) reported a low PA of 47.4 percent, a moderate PA of 12% percent and a high PA of 30.4 percent in study subjects. Another study on leisure-time reported that the subjects were have similar results as compare to our study while 8.9% of them were experiencing low PA A Significant association was recorded for carbohydrate with all variables of lipid profile accept the HDL. Protein was highly correlated with HDL and negatively correlate with LDL. Fats showed positive correlation with the cholesterol and LDL while negative correlation with HDL. Energy showed positive correlation with triglycerides. The findings of this study resemble to those of Kelly et al., (2021) who reported that free sugar consumption was linked to higher triglycerides. As opposed to triglycerides, SFA intake is linked to LDL-C (low- density lipoprotein, cholesterol) and omega-3 fatty acid diets. Polyunsaturated fatty acids are connected with decreased cholesterol, LDL-C, and triglycerides when saturated fatty acids are

replaced. Some of the results showed resemblance with the findings of this study.

According to Nasseri et al., (2020) who reported significant correlations between energy consumption and low-density lipoprotein cholesterol, carbohydrate intake and total cholesterol, carbohydrate intake and triglyceride, HDL-C and (LDL-C) respectively. Furthermore, there was a negative connection between HDL-C and carbohydrate and calorie intake respectively.

Intake of fast food, meat, milk, and beverages was found to have a significant relation ($p<0.05$) with BMI. Intake of cereals, fruits and vegetables have non-significant relation ($p>0.05$) with body mass index. Cereals, milk, fruits and vegetable consumption are high among normal, underweight and obese group on daily basis as compared to the underweight group while the consumption of fast food, meat and beverages are also high among normal, underweight and obese group on daily basis. Those who were taking cereals on daily basis were 6 (100%) underweight, 25 (75.8%) were normal, 23(74.2%) were overweight, 24(80%) were obese. These findings are similar to that of Holland et al., (2014) who reported that the frequency of fast-food, meat, milk and beverages was found to be strongly related to BMI. BMI shows a non-significant relation with vegetables, fruits and cereals. (10 fast food linked to an increase of 1 kg body weight; $p<0.001$). According to another similar study Shori et al., (2017) reported that more than half of the participants ate fast food at least once a week. Despite the fact that 59 percent of the individuals were overweight or obese. These findings show strong support to this study. Findings from the study of Duffy et al., (2007) reported that 40% of the participants increased their weekly fast food, beverages and meat intake. Fast food consumption is linked to BMI. Similarly, increased fast food consumption and beverages consumption in year 7 was linked to a 0.16-unit higher BMI in year 10

A significant association ($P<0.05$) was recorded for carbohydrate, fats and energy in relation to the body mass index whereas a non-significant relation ($p>0.05$) as found between protein and BMI. The carbohydrate intake was observed high in overweight and obese groups as compare to normal and underweight. The protein intake was found high in overweight and obese groups. The fat intake was found almost the same in overweight and obese groups. The calories intake was also high in overweight and obese groups. These findings are similar to those of Herrera et al., (2003) who reported that males had a greater BMI and EI than females, and the two variables were positively associated in the male and female subgroups tested. Except for fats, calorie intake was found to have a significant impact on BMI in the analyzed sample. Hence support this study Fesken et al., (1991) who reported the BMI and carbohydrate intake were found to have a positive connection with pastries. These findings imply that energy balance and a high carbohydrate diet in the elderly may be linked to the development of glucose intolerance.

A significant relation ($p<0.05$) was observed for intensity of physical activity in relation to BMI. Finding suggests that as the intensity of physical activity increases, the body mass index changes, and vice versa as the intensity decreases, the body mass index rises. Sedentary PA was observed high in normal, overweight and obese groups whereas the moderate PA level was found high in normal group. The active PA level was found high in normal and overweight group. The highly active PA level was observed in underweight and overweight groups. According to the study's the findings are similar to those of Kim et al., (2005) who reported that decrease in activity of metabolic equivalent [MET] 10 times per week was linked with BMI increased by 0 .14 kg/m^2 and skin thickness increased by 0.62 mm (0.17 skin thickness) for black participants and 0.09 kg/m^2 and 0.63 mm (0.13) for white participants. For black participants, the difference in BMI between active and inactive individuals aged 18 or 19 years was 2.98 kg/m^2, while for white girls it was 2.10 kg/m^2.The amount of changes in BMI and skin thickness for moderately active participants was nearly

equal between active and sedentary subjects. The findings correlate with the findings of our study that intensity of physical activity are in relation with BMI. Fuentas et al., (2018) reported that LTPA levels are proportional to BMI and WC. Between the quintuple excess of LTPA (Q1 to Q5), the difference in BMI and WC was 2.1 kg/m^2. Low- power LTPA has a negative relationship with BMI but not WC, whereas moderate/strong LTPA has a negative relationship with both BMI and WC. The lowest LTPA correlated with the prevalence of normal obesity, and the quintile of complete and moderate/severe LTPA was associated with a lower risk of recurrent obesity and gastrointestinal problems

Carbohydrates was significantly correlated with waist circumference, hip circumference and waist to hip ratio. Proteins was negatively correlated with BMI, WC, HC, and WTH. Fats and energy were highly correlated with weight, BMI, waist circumference, hip circumference and waist to hip ratio. The findings of this study are comparable to those of Moon et al., (2020) who reported that in both genders, the predictor BMI was positively connected with protein and animal protein intake in its range, but adversely correlated with vegetable protein. In men, the negative relationship between BMI and polysaccharide intake was linked to overall BMI. Only in normal-weight women does there appear to be a weak link between BMI and total and saturated fat levels. Finally, depending on BMI, the link between BMI and macronutrient diet differs. In both sexes, animal protein diet was positively linked with BMI without calorie consumption, however polysaccharide intake was negatively associated with BMI only in males. The findings correlate with the results of this study. Yucheng et al., (2005) who reported that the glycemic index and glycemic reaction rate was associated with diverse carbohydrate diets these were found to be favorably correlation with body weight index, but not with daily carbohydrate intake, percentage of calories from carbohydrates, or glycemic load. The findings demonstrate correlation between carbohydrate type and body weight.

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RECOMMENDATION:

The following few recommendations are proposed to adults (School teachers) on the basis of current research.

CONCLUSION

It was concluded that the female school teachers had a greater body mass index as compared to the male School teacher. The Intake of cereals, fruits, and meat on daily basis was high among male whereas the intake of fast food, vegetable, beverages was high among females. The intake of milk on daily basis was recorded the same. Fast food, meat, milk, and beverage consumption were found to have a significant relationship with body mass index and waist-to-hip ratio. The lipid profile including triglyceride, cholesterol and low density lipo protein was high in female school teachers. A Significant association was recorded for carbohydrate with all variables of lipid profile accept the HDL. Protein was highly correlated with HDL and negatively correlate with LDL. Fats showed positive correlation with the cholesterol and LDL while negative correlation with HDL. Energy showed positive correlation with triglycerides. Physical activity, intake of carbohydrate, fats and energy showed a significant relation with body mass index

1. Intake of nutrient dense food should be more as compared to energy dense food and intake of fast food and beverages should be limited.
2. To maintain a healthy

body weight, an adequate amount of protein, minerals, and vitamins, as well as a sufficient amount of calories, should be consumed.

3. In addition to fruits and vegetables, milk and dairy products, bread and cereals, and other foods, Dietary fat, refined sugar, and salt must all be reduced.

4. Nutrition-related seminars/symposiums, and workshops should be held in schools and colleges to raise community knowledge of the importance of nutrition and to teach employees to get optimum nutrients in their daily meals.

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