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Impact of Lifestyle Factors on Nutritional and Physiological Indicators among Adults: A Cross-sectional Study of North 24 Parganas, West Bengal, India

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ABSTRACT: *In India, the prevalence of overweight and hypertension is rising due to rapid changes in lifestyle. Various lifestyle factors, such as physical activity, sleep length, and calorie consumption, affect nutritional and physiological health. To evaluate peoples' nutritional (BMI, WHR, PBF) and physiological (SBP, DBP, MAP) status and investigate the relationship between these two and lifestyle factors a total of 500 participants (250 men and 250 women) between the ages of 18 and 60 participated in a cross-sectional study. BMI ($r = 0.782$), WHR ($r = 0.707$), and SBP ($r = 0.591$) were strongly positively connected with calorie consumption ($p < 0.001$), while sleep duration was adversely correlated with these measures ($p < 0.001$). The strongest predictor of BMI, according to multiple regression, was calorie intake ($\beta = 0.767$, $p < 0.001$), followed by sleep time ($\beta = -0.164$, $p < 0.001$). Exercise had some protective effects, but excess body weight and high blood pressure were found to be significantly influenced by high calorie intake and sleep deprivation. In order to prevent obesity and hypertension in adult populations, these findings emphasize the necessity of integrated lifestyle interventions that include a balanced diet, enough sleep, and regular physical activity.*

KEYWORDS: Body mass index, Percentage body fat, Diastolic blood pressure, Systolic blood pressure, Waist-hip ratio

I. INTRODUCTION

In the modern setting, lifestyle choices have become important factors influencing adult populations' nutritional consumption and physiological functioning. Food choices, dietary structure, physical activity habits, and general health behavior are constantly influenced by shifting socioeconomic structures, urbanization, and changing daily needs. A person's nutritional quality and long-term physiological programming, especially with regard to metabolic and cardiovascular health, are determined by the interaction of lifestyle factors like food choices, physical activity, sleep, stress, and substance use with socioeconomic level and education.Rapid urbanization has changed the food environment, frequently leading to a greater reliance on outside foods that are high in calories but low in nutrients. This can upset a balanced nutrient intake and have negative physiological and nutritional effects. Both macro- and micronutrient status are impacted by these imbalances, which can show up as changes in physiological parameters like blood pressure indices as well as anthropometric markers like Body Mass Index (BMI), Waist-Hip Ratio (WHR), and Percent Body Fat (PBF). Daily nutritional intake and normal lifestyle behaviors are often undervalued in clinical and public health decision-making, despite growing knowledge.The existing literature emphasizes the significance of regular exercise and a good diet in enhancing both physical and mental well-being and lowering the risk of chronic illnesses including cancer, diabetes, and heart disease. It has been demonstrated that evidence-based dietary changes improve long-term health outcomes when combined with counseling and active engagement. However, most research focus either on dietary determinants or physical activity in isolation, with minimal integration of nutritional, anthropometric, and physiological markers into a unified analytical framework.There is a dearth of thorough empirical data that concurrently assesses lifestyle factors alongside nutritional and physiological status markers in urban people, despite earlier research acknowledging the relevance of lifestyle determinants in determining food quality and health outcomes. Furthermore, only a small amount of research has methodically determined which lifestyle factors have the greatest impact on both physiological and nutritional characteristics. The creation of focused, evidence-based lifestyle treatments is hampered by this gap. In order to close this gap and explicitly link lifestyle behavior analysis with quantifiable health outcomes, the current study looks at lifestyle factors in connection to BMI, WHR, PBF, SBP, DBP, and MAP.

Lifestyle determinants of nutrition form a dynamic and multidimensional network influenced by biological, psychological, social, and environmental forces. Socioeconomic status, education, food environment, physical activity, sleep, stress, and substance use are interrelated elements that jointly define dietary quality and nutritional outcomes. The macro and micro nutrients of the body are affected by the accumulation of over-consuming unhealthy outside food. Sometimes it will malfunction along with a bifilarly absorbed environment to achieve a general dietary programme. People with greater metabolic rates have shorter lifespans because the metabolic rate per lifespan is a species-specific trait (Sohal and Allen, 1985).This theory was developed upon observations of negative associations between mammalian metabolic rate (per body weight per day) and lifespan (R^2= 0.26) (Hulbert et al., 2007).

Research on lifestyle factors affecting nutrition relies heavily on evidence from various fields, including public health, sociology, behavioural science, and nutritional epidemiology. Important theories like *Ajzen's* "*Theory of Planned behaviour*" (Ajzen, 1991) have helped examine how personal attitudes, perceived control over actions, and social norms shape health-related behaviours, such as food choices. Over time, research has shown that socioeconomic and educational factors create a foundation for dietary inequalities. Previous study explored that dietary intake affected due to socio-economic status such as education, household income meaning that socio-economic determinants strongly related to quality of diet (Beydoun & Wang, 2008).Income, education level, age, calorie intake, food diversity, physical activity are all favourably correlated with high diet quality in terms of vitamin, mineral,and trace element consumption (Thiele et al., 2004).

It was projected that 27.5% of adults worldwide were physically inactive in 2016. To provide more evidence, the WHO revealed in June 2018 that 1 in 5 adults and 4 in 5 teenagers had decreased physical activity (Kapoor, 2022).Regular exercise has several physical advantages. Physical activity has been shown to lower the risk of colon cancer by as much as 50%. Constipation and Cholelithiasis have less compelling evidence. Although this cannot be conclusively shown, physical activity may lower the incidence of diverticulosis, gastrointestinal bleeding, and inflammatory bowel disease (Peters et al., 2001).

To maintain a healthy figure, balanced height – weight measurement grows in the Body Mass Index (BMI), Waist-Hip Ratio (WHR). The findings demonstrated a strong correlation between the degree of physical activity and a number of anthropometric parameters. Regarding BMI,13.76% of people with normal BMI, which ranges from 18.5 to 24.9 kg/m^2 were extremely active as opposed to just 1.54% of people with a high BMI (>30kg/m^2),the majority of them are somewhat active or inadequately engaged. Likewise, 10.88% of people with a typical waist circumference participated in really vigorous physical activity as opposed to 0% of those with a high-risk Waist circumference who primarily had mild or inadequate activity level (29.63%) (Sharma et al., 2024). There is an association between inadequate lifestyle factors with peripheral arterial disease (PAD), and similarly anthropometric parameters of body fat percentage and waist-hip ratio were associated with PAD (Chávez-Sosa et al., 2021).

There is still little integration of dietary status, anthropometric markers, and physiological measures within a single study design, despite the fact that the many prior study offers extensive information on individual lifestyle components. The majority of research does not pinpoint the lifestyle factors that have the greatest combined impact on physiological and nutritional health. This deficiency in integrated analysis emphasizes the need for studies that concurrently assess many health indicators and lifestyle behaviors, especially in urban adult populations.

II. OBJECTIVES

1. To evaluate nutritional and physiological status of urban adults' including BMI, WHR, PBF, SBP, DBP, and MAP
2. To examine the association between lifestyle factors and both nutritional status and physiological indicators.
3. To identify the best lifestyle determinants which influencing both nutritional and physiological status.

III. MATERIALS AND METHODS

The present study is based on empirical data, a cross-sectional study was conducted on 500 adults' (250 males and 250 females) aged between 20-29 years of North 24 Parganas, West Bengal, India. The population is selected by simple random sampling. The nutritional indicators such as Body mass index (BMI), Waist-hip ratio (WHR), and Percentage Body Fat (PBF) were calculated through standardized formula. BMI is divided into four categories, underweight (<18.5 kg/m^2), normal (18.5-24.9 kg/m^2), overweight (≥25.0 kg/m^2), and obesity (≥ 30.0 kg/m^2). The other nutritional indicator WHR breaks down into two categories that are normal (for male < .95, for female < .85), at risk (for male ≥ .95, for female ≥.85) and PBF also divided into four categories such as underfat (for male < 8%, for female < 21%), normal (for male 8%-<19%, for female 21%-<32%), overfat (for male ≥19%-25%, for female 21%-<32%), and obese (for male ≥25%, for female ≥38%). Physiological indicators; Systolic blood pressure (SBP) and diastolic blood pressure (DBP) were measured accurately using an automated blood pressure monitor to minimize error and to take multiple readings at different times to account for variations & to avoid relying on a single measurement and another physiological indicator, Mean arterial pressure (MAP) formulated as 2*DBP+SBP/3. SBP cleft into three categories such as low (<90 mmHg), normal (<120 mmHg), high (≥120 mmHg), and for DBP, low (<60mmHg), normal (<80mmHg), high (≥80 mmHg). MAP is divided into three groups such as low (<60), normal (<100) and high (≥100). All nutritional indicators, BMI, WHR, and PBF were taken as dependent variables. Whereas lifestyle-related factors such as calorie intake, sleeping duration, physical exercise and screen time were taken as independent variables.

To find out the association between lifestyle-related factors and the nutritional indicator and physiological indicator statistical methods such as correlational and regression analysis were performed to determine the significant determinant of all these indicators. All statistical analysis was done through SPSS.

IV. RESULTS

Table 1 represents sex-wise distribution of status of nutritional and physiological indicators of the population. The average BMI of the 500 participants (250 men and 250 women) was 25.18 ± 4.13 kg/m^2, suggesting a propensity for overweight. Females were more likely to be obese (20.40%)) than males (6%), and females were more likely to be underweight (10%) than males (4.40%).

The WHR showed that women had higher central adiposity, with 52.4% of females at risk and all males (100%) falling within the normal range. Women's mean PBF was significantly greater than men's (19.30 ± 4.56%) at 29.86 ± 5.46%. Males were more likely to be obese (8%) than females (0.4%) and nearly 43% of both sexes were overfat. A high prevalence of hypertension risk was shown by the physiological indicators, which showed raised SBP in 67.4% of the individuals and high DBP in 36%. Overall, the study group's blood pressure measurements were borderline high, with mean SBP, DBP, and MAP of 120.18 ± 10.48 mmHg, 75.63 ± 6.25 mmHg, and 90.48 ± 6.88 mmHg, respectively.

Table 1: Sex-wise distribution of Nutritional and physiological status indicators (n =500)

Nutritional indicator:						
1. *Body mass index(BMI) (kg/m²)*						
	Male		Female		Total	
	N	%	N	%	N	%
Underweight	11	4.40	25	10	36	7.20
Normal	114	45.60	100	40	214	42.80
Overweight	110	44	74	29.60	184	36.80
Obesity	15	6	51	20.40	66	13.20
Total	250	100	250	100	500	100
Mean(SD)	25.20(3.71)		25.15(4.51)		25.18(4.13)	
2.*Waist-hip Ratio(WHR)*						
Normal	250	100	119	47.60	369	73.80
At risk	00	00	131	52.40	131	26.20
Total	250	100	250	100	500	100
Mean(SD)	0.87(0.05)		0.84(0.06)		0.86(0.05)	
3.*Percentage Body Fat (PBF)*						
Underfat	4	1.60	20	8	24	4.80
Normal	120	48	121	48.40	241	48.20
Overfat	106	42.40	108	43.20	214	42.80
Obese	20	8	1	0.40	21	4.20
Total	250	100	250	100	500	100
Mean(SD)	19.30(4.56)		29.86(5.46)		24.58(7.28)	
Physiological Indicators:						
1.*Systolic blood pressure(SBP)* *(mmHg)*						
Low	00	00	1	0.40	1	0.20
Normal	79	31.60	83	33.20	162	32.40
High	171	68.40	166	66.40	337	67.40
Total	250	100	250	100	500	100
Mean(SD)	120.83(9.37)		119.53(11.49)		120.18(10.48)	
2.*Diastolic blood pressure(DBP)* *(mmHg)*						
Low	00	00	2	0.80	2	0.40
Normal	167	66.80	151	60.40	318	63.60
High	83	33.20	97	38.80	180	36
Total	250	100	250	100	500	100
Mean(SD)	74.91(6.59)		76.36(5.81)		75.63(6.25)	
3.*Mean arterial pressure(MAP)*						
Low	00	00	00	00	00	00
Normal	248	99.20	237	94.80	485	97
High	2	0.80	13	5.20	15	3
Total	250	100	250	100	500	100
Mean(SD)	90.29(6.88)		90.74(6.88)		90.48(6.88)	

Table 2 shows the Pearson's correlation Coefficients (r value) between a number of nutritional and physiological indicators and lifestyle variables. All of the assessed markers, including BMI (r =0.782, p<0.001), WHR (r = 0.707, p<0.001), PBF (r = 0.422, p<0.001), SBP (r = 0.591, p<0.001), DBP (r = 0.551, p<0.001) and MAP (r = 0.634, p<0.001), point out a strong positive and a very significant connection with calorie consumption. This suggest that increases in body mass, fat distribution and blood pressure measurements are all closely correlated with increasing calorie intake. MAP (r = -0.181, p<0.001), SBP (r = -0.145, p<0.001), DBP (r = -0.178, p<0.001), BMI (r = -0.189, p<0.001) and PBF (r = -0.286, p<0.001), on the other hand, all significantly correlated negatively with the amount of sleep. This implies that greater blood pressure and body fat are linked to shorter sleep duration. BMI (r =0.162, p<0.001), WHR (r = 0.171, p<0.001), PBF (r = 0.099, p=0.026), SBP (r = 0.157, p<0.001), DBP (r = 0.127, p=0.004) and MAP (r = 0.157, p<0.001) all showed a weak but significant positive connection with physical exercise. Although exercise is linked to physiological measures, its independent influence may be restricted or regulated by other lifestyle factor like nutrition and sleep, as suggested by the poor size of these connection. Finally, no indicators demonstrated significant correlation with screen time that suggest sedentary-screen based activities may not have any direct relationship with any indicators in this population.

Table 3 exhibits the findings of the multiple linear regression analysis used to determine the important lifestyle factors that predict BMI. To investigate the role of various lifestyle factors in BMI variance, three models were built. Based solely on calorie consumption, Model 1 explained 61.2% of the variance in BMI in the regression model table (R^2 = 0.612, F = 783.972, p<0.001). The explanatory power rose to 63.7% when sleep duration was included in Model 2 (R^2 = 0.637, F= 435.352, p<0.001). An excellent overall model fit was indicated by the final Model 3, which included calorie consumption, sleep duration, and physical exercise. It explained 63.9% of the variance in BMI (R^2 = 0.639, F=293.225, p<0.001).Calorie intake was the most powerful positive predictor of BMI in the final model (β=0.767, t=28.032, p<0.001), indicating a significant correlation between higher calorie intake and elevated BMI. On the other hand, there was a strong negative correlation between sleeping duration and BMI (β= -0.164, t= -6.038, p<0.001), suggesting that higher BMI values are a result of shorter sleep duration. Additionally, there was a modest but significant positive correlation between physical exercise and BMI (β=0.054, t= 1.974, p=0.049). This suggests that those who are more physically active typically had somewhat higher BMIs, which may be due to variations in body compositions or increased muscle mass. Other lifestyle variable such as screen time were tested but found non-significant (p>0.05) that's why this predictor was excluded from the model.

Table 2: Pearson's Correlation Analysis between Lifestyle Factors and Nutritional and physiological indicators of the study population (n=500)

Indicators	Lifestyle Factors							
	Calorie intake		Sleeping duration		Physical exercise		Screen time	
	r value	p-value	r value	p-value	r value	p-value	r value	p-value
BMI	0.782***	<0.001***	-0.189***	<0.001***	0.162***	<0.001***	-0.006	0.886
WHR	0.707***	<0.001***	-0.097*	0.031*	0.171***	<0.001***	-0.040	0.370
PBF	0.422***	<0.001***	-0.286***	<0.001***	0.099*	0.026*	0.032	0.473
SBP	0.591***	<0.001***	-0.145***	<0.001***	0.157***	<0.001***	0.028	0.326
DBP	0.551***	<0.001***	-0.178***	<0.001***	0.127**	0.004**	-0.039	0.384
MAP	0.634***	<0.001***	-0.181***	<0.001***	0.157***	<0.001***	-0.009	0.838
P<0.05(Significant), p<0.01**(very significant), p<0.001***(highly significant)*								

Table 3: Multiple Linear Regression Analysis Predicting BMI on Lifestyle Factors among the population (n=500)

Regression model			
Model	R^2	F value	p-value
Model 1	0.612	783.972	<0.001***
Model 2	0.637	435.352	<0.001***
Model 3	0.639	293.225	<0.001***

Coefficients of Final model

	Unstandardized Coefficients		Standardized Coefficients		
Predictors	B	SE	Beta(β)	t-value	p-value
Constant	9.859	1.189	-	8.289	<0.001***
Calorie intake	0.008	0.000	0.767	28.032	<0.001***
Sleeping duration	-0.721	0.119	-0.164	-6.038	<0.001***
Physical exercise	0.009	0.005	0.054	1.974	0.049*

P<0.05(Significant), p<0.01**(very significant), p<0.001***(highly significant)*

Table 4 shows, the results of a multivariate linear regression analysis that predicted the study population's (n =500) WHR based on lifestyle characteristics. With R^2 values rising from 0.499 in Model 1 to 0.509 in Model 3, the regression models were statistically significant (p<0.001), meaning that included predictors accounted for roughly 50.9% of the variation in WHR which was found to be strongly positively and significantly correlated with calorie intake (β= 0.693, p<0.001) in the final model, indicating that a higher calorie intake raises WHR. There was a significant negative correlation between sleeping duration (β= -0.075, p=0.018) and WHR, suggesting that longer sleep is linked to lower WHR. Although the correlation was less, physical activity also shown a significant favourable effect on WHR (β= 0.067, p= 0.036). As in BMI, in case of WHR screen time also found as a non-predictor.

Table 4: Multiple Linear Regression Analysis Predicting WHR on Lifestyle Factors among the population (n=500)

Regression model

Model	R^2	F value	p-value
Model 1	0.499	496.923	$<0.001^{***}$
Model 2	0.504	252.673	$<0.001^{***}$
Model 3	0.509	171.068	$<0.001^{***}$

Coefficients of Final model

	Unstandardized Coefficients		Standardized Coefficients		
Predictors	B	SE	Beta(β)	t-value	p-value
Constant	0.621	0.020	-	31.149	$<0.001^{***}$
Calorie intake	0.000	0.000	0.693	21.698	$<0.001^{***}$
Sleeping duration	-0.005	0.002	-0.075	-2.373	0.018^{*}
Physical exercise	0.000	0.000	0.067	2.098	0.036^{*}

$P<0.05^{*}$(Significant), $p<0.01^{**}$(very significant), $p<0.001^{***}$(highly significant)

Table 5: Multiple Linear Regression Analysis Predicting PBF on Lifestyle Factors among the population (n=500)

Regression model

Model	R^2	F value	p-value
Model 1	0.178	107.967	$<0.001^{***}$
Model 2	0.251	83.200	$<0.001^{***}$

Coefficients of Final model

	Unstandardized Coefficients		Standardized Coefficients		
Predictors	B	SE	Beta(β)	t-value	p-value
Constant	20.796	2.997	-	6.940	$<0.001^{***}$
Calorie intake	0.008	0.001	0.411	10.586	$<0.001^{***}$
Sleeping duration	-2.099	0.302	-0.270	-6.943	$<0.001^{***}$

$P<0.05^{*}$(Significant), $p<0.01^{**}$(very significant), $p<0.001^{***}$(highly significant)

In table 5, It is find out that two models were highly significant ($p<0.001$), explaining 17.8% of the variance in PBF in Model 1 and 25.1% in Model 2 after additional predictors were added. The final model (Model 2) revealed that a strong positive correlation between calorie intake and PBF (β= 0.411, p <0.001), suggesting that a larger calorie intake raises the percentage of body fat. On the other hand, PBF was negatively correlated with sleeping length (β= -0.270, p <0.001), indicating that greater sleep duration is associated with lower levels of body fat. Interestingly in case of PBF, physical exercise and screen time had no role on it as they weren't to be predictors consequently, they were not included in the model.

In table 6, SBP was predicted using regression models that were statistically significant (p <0.001), 37% the variance in SBP was explained by the final model (Modal 3) (R^2 = 0.370). Among the predictors, calorie intake had a considerable positive correlation with SBP (β= 0.574, p <0.001), suggesting that consuming more calories raises SBP significantly. Longer sleep time appears to be linked to lower SBP, as seen by the substantial negative influence of sleeping duration (β= -0.129, p=0.018). Physical exercise also shown a weak but significant positive correlation with SBP (β= = 0.077, p = 0.035). As usual screen time (p =0.423) eliminate from the regression model that proved it had no impact on SBP of the studied population.

Table 6: Multiple Linear Regression Analysis Predicting SBP on Lifestyle Factors among the population (n=500)

Regression model			
Model	R^2	F value	p-value
Model 1	0.350	267.988	<0.001***
Model 2	0.365	142.593	<0.001***
Model 3	0.370	97.227	<0.001***

Coefficients of Final model

	Unstandardized Coefficients		Standardized Coefficients		
Predictors	B	SE	Beta(β)	t-value	p-value
Constant	91.419	3.994	-	22.890	<0.001***
Calorie intake	0.015	0.001	0.574	15.879	<0.001***
Sleeping duration	-1.443	0.401	-0.129	-3.598	0.018*
Physical exercise	0.033	0.016	0.077	2.119	0.035*

P<0.05(Significant), p<0.01**(very significant), p<0.001***(highly significant)*

Table 7 demonstrate that final model (Model 2) explained 32.8% of the variance (R^2 = 0.328), and the models predicting DBP were significant (p <0.001). DBP was positively correlated with calorie consumption (β= 0.545, p <0.001), which indicate that a higher calorie intake upraise DBP. Conversely, an opposite correlation observed between sleeping duration (β= -0.156, p <0.001) and lower DBP. Regarding DBP physical exercise (p =0.133) and screen time (p =0.339) had no influence in it while these two were non-predictors of the present population.

Table 8 depict that Map regression models explained 43.1% of the variation (R^2 = 0.431) in the final model (Model 3) and were highly significant (p <0.001). Sleeping time span had a significant negative impact on MAP, whereas calorie intake (β=0.616, p <0.001) was strong favourable predictor. Exercise had a slight but significant positive association with MAP (β=0.073, p = 0.034).In this population, Screen time had no role on Map as it shown statistically non-significant value (p = 0.810).

Table 7: Multiple Linear Regression Analysis Predicting DBP on Lifestyle Factors among the population (n=500)

Regression model

Model	R^2	F value	p-value
Model 1	0.304	217.015	<0.001***
Model 2	0.328	121.180	<0.001***

Coefficients of Final model

	Unstandardized Coefficients		Standardized Coefficients		
Predictors	B	SE	Beta(β)	t-value	p-value
Constant	61.250	2.434	-	25.165	<0.001***
Calorie intake	0.009	0.001	0.545	14.799	<0.001***
Sleeping duration	-1.040	0.246	-0.156	-4.237	<0.001***

P<0.05(Significant), p<0.01**(very significant), p<0.001***(highly significant)*

Table 8: Multiple Linear Regression Analysis Predicting MAP on Lifestyle Factors among the population (n=500)

Regression model

Model	R^2	F value	p-value
Model 1	0.402	334.760	<0.001***
Model 2	0.426	184.679	<0.001***
Model 3	0.431	125.489	<0.001***

Coefficients of Final model

	Unstandardized Coefficients		Standardized Coefficients		
Predictors	B	SE	Beta(β)	t-value	p-value
Constant	71.639	2.490	-	28.771	<0.001***
Calorie intake	0.011	0.001	0.616	17.928	<0.001***
Sleeping duration	-1.199	0.250	-0.163	-4.793	<0.001***
Physical exercise	0.021	0.010	0.073	2.122	0.034*

P<0.05(Significant), p<0.01**(very significant), p<0.001***(highly significant)*

V. DISCUSSION

The study revealed that the mean BMI was 25.18 ± 4.13 kg/m^2. The categories were as follows: underweight (7.20%), normal (42.80%), overweight (36.80%) and obese (13.20%).These findings suggest that the population has changed toward being overweight. It is observed that the combined prevalence of overweight and obesity (~50.0% for females and males both) is in line with recent national estimates of rising overweight and obesity in India; NFHS-5 reported significant increases in overweight and obesity when compared to NFHS-4, with some analyses placing overall adult overweight/obesity estimates in the 40% range. This agreement implies that this population is representative of the broader national trend of rising adiposity linked to dietary and lifestyle changes (Verma et al., 2023).

A notable sex differences is present in the present population. Higher female body fatness (Female mean PBF 29.86% vs. 19.30% in males) and a higher percentage of female classed as “at-risk” by WHR (52.40% of females at risk vs. 0% of males of this categorization) are two significant sex differences in this data. It helps explain the higher female WHR risk in this adult population. This pattern-higher central/overall adiposity observed among women in India, is similar to recent analyses that show high abdominal-obesity prevalence among Indian women (reported ~40% abdominal obesity in women vs. ~12% men in national surveys) (Chaudhary, Monika et al., 2023).

The current findings indicate that blood pressure, body fat percentage, and BMI are all significantly predicted by calorie consumption aligns with the core ideas of energy balance. This findings aligns with the study of Kevin D. Hall et al.’s, emphasizes that body weight fluctuations are caused by an imbalance between energy expenditure and consumption, and it is crucial to comprehend the dynamics and constituents of this balance (Hall et al., 2012).

The results, which indicate a substantial inverse relationship between sleep duration and physiological and anthropometric measurements, are consistent with a large body of research. Short sleep duration was linked to a relative risk (RR) of 1.35 (95% CI :1.22-1.50) for obesity, according to a meta-analysis of adult cohort studies. Both short and long sleep duration raised the risk of weight gain in adults (RR =1.26 for short, RR =1.12 for long) (Zhang et al., 2015). For instance, short sleeper (5-6 h) acquired an average of ~1.98 kg more than typical sleepers (7-8 h) and were around 35% more likely to gain ≥5 kg over the 6-year Quebec Family study (Chaput et al., 2008).

Similarly a study suggest, those who slept fewer than 7 hours had approximately 1.83 times greater odds of being obese (OR = 1.832, 95% CI: 1.215-2.762) than those who slept 7-9 hours, according to cross-sectional data from the National Health and Nutrition Examination Survey (NHANES 2015-16) in the US (Li, 2021). These results lend credence to the idea that getting too little sleep could be a modifiable risk factor for gaining weight and becoming obese.

VI. CONCLUSION

The current study thoroughly investigated the association between several lifestyle factors and nutritional and physiological indicators. The results showed a significant population-wide trend toward overweight and obesity, with women more likely to have central adiposity. Additionally, borderline-high blood pressure and an elevated body fat percentage suggested a growing risk of cardiovascular and metabolic issues.

Calorie intake emerged as the most robust and reliable predictor among the lifestyle determinants across all measures (BMI, WHR, PBF, SBP, DBP, and MAP), demonstrating the direct impact of excessive calorie intake on cardiovascular health and body composition. All of these marker, on the other hand, showed a substantial negative correlation with sleep duration, indicating that a lack of sleep is associated with increased blood pressure, body fat, and body mass. Even while there was a slight but positive correlation between physical activity and several measures, its independent impact seemed to be limited, perhaps due to sleep and food habits. Remarkably, there was no significant correlation found between screen time and the examined health outcomes in this population, indicating that screen exposure, a form of sedentary behaviour, may not have an independent effect.

When combined, the study emphasizes how dietary intake, sleep habits, and activity levels interact dynamically to determine nutritional and physiological health. The findings highlight how crucial it is to adopt a holistic lifestyle strategy that balances consuming enough calories, getting enough sleep, and engaging in regular physical activity in order to prevent overweight, obesity, and hypertension. To encourage optimum health and lessen the rising burden of non-communicable illnesses, public health programs emphasizing dietary awareness, behavioural change, and lifestyle education are essential.

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