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Health-Related Dietary And Lifestyle Factors Among Obese And Non-Obese People In An Urban Population Of Puducherry-A Case Control Study

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Abstract

Background:
WHO has described Non-communicable diseases as one of the leading global causes of death and are responsible for 74% of deaths worldwide. This study aimed to assess the health-related dietary & lifestyle factors associated with obese when compared to Nonobese individuals in an urban population of Puducherry

Methods: A Case-Control Study was carried out using pre-designed, semi-structured questionnaire to collect information from the study populations. By Simple Random Sampling technique, 108 cases and 108 controls were randomly selected. The analysis was done using SPSS version 29

Results: In case of cases 97.2% of people consume vegetables, but 38% only consume them for 1-2 days /week. 88% consume fruits, but 81.5% only consume them for 1-2 days. There is an increased intake of soft drinks and junk food among the cases, whereas in the control group, only 32.4% and 25.9% consume soft drinks and junk food, respectively. Additionally, 76.9% of cases do not engage in any form of exercise, while among the control group, 47.2% are active.

Conclusion: This study identified several lifestyle factors like increased intake of junk foods, physical inactivity & diet-related factors like decreased intake of fruits, and vegetables associated with obesity that may be valid targets for the focused community interventions in this population.

Keywords: NIL

Introduction

Obesity is a significant public health concern globally, with its prevalence rising at an alarming rate, particularly in urban settings. This complex condition is associated with a multitude of adverse health outcomes, including cardiovascular diseases, type 2 diabetes, and various cancers, which contribute to increased morbidity and mortality rates[1]. Rapid urbanization, characterized by sedentary lifestyles and dietary shifts towards high-calorie, processed foods, has been identified as a critical driver of the obesity epidemic[15].

Studies highlight the multifactorial nature of obesity, pointing to the interplay between genetic predisposition, environmental influences, and individual behaviours[12]. Within the urban Indian context, dietary habits have undergone significant transformation, with increased consumption of energy-dense, nutrient-poor foods, and a decline in traditional, healthier dietary practices[15]. Concurrently, physical activity levels have decreased due to the mechanization of labour, increased use of motorized

transport, and a general shift towards more sedentary forms of leisure and work [14].

Puducherry, a union territory in South India, exemplifies these trends. With its unique blend of cultural heritage and modern urban development, Puducherry provides a pertinent context for examining the determinants of obesity. The transition towards a more sedentary lifestyle and the proliferation of fast food and high-calorie diets are evident in this region, mirroring broader national trends[11]. According to NFHS 5 data, the overall prevalence of overweight & obesity increased from 36.7% to 46.4% in men, 37.1% to 43.3% in women in Puducherry, 47.3 % living in urban areas[4]. This study aims to explore the health-related dietary and lifestyle factors among obese and non-obese individuals in the urban population of Puducherry. By focusing on this urban setting, the study seeks to identify specific dietary patterns, physical activity levels, and other lifestyle behaviours that distinguish obese individuals from their non-obese counterparts. Such insights are crucial for developing targeted public health interventions tailored to the unique socio-cultural and economic context of Puducherry.

Methodology:

From August 2023 to October 2023, a Case-Control Study was conducted, involving 108 cases and 108 controls. Data was collected from the study populations using a pre-designed, semi-structured questionnaire. In Ariyankuppam, there are 28 Anganwadi centers, and each Anganwadi is considered a cluster. The Thulasingam Nagar Anganwadi center was selected using the Simple Random Sampling technique. 108 cases and 108 controls were randomly chosen from our routine NCD survey list in Thulasingam Nagar AWC, Ariyankuppam, Puducherry. The study included individuals of both genders aged over 18 residing at Thulasingam Nagar Anganwadi with a BMI of 25 and above as cases. Meanwhile, individuals of both genders aged over 18 with a BMI of 18.5 to less than 25 were considered as controls. People over 60 years of age, critically ill patients, pregnant women, lactating mothers, and those with eating disorders were excluded from the study. Age and sex matching was performed at the time of analysis. SPSS version 29 was used for statistical analysis. We obtained approval from the Institutional Ethical Committee before starting the study.

Sample size calculation

A similar study conducted by Vijaya Karthikeyan M et al was referenced[6]. The prevalence of obesity was found to be 11.4% with a level of significance set at 5%. The sample size was calculated using the formula $n = Z^2(1-\alpha/2)\ p(1-p)/d^2$, where p= 11.4% (expected proportion) and d= 6% (absolute precision). The sample size calculation resulted in 108 cases and 108 controls.

Operational definition:

BMI classification is as follows: Underweight (<18.5), Normal weight (18.5–24.9), Pre-obesity (25.0–29.9), Obesity class I (30.0–34.9), Obesity class II (35.0–39.9), Obesity class III (>40)[3].

Results:

TABLE 1: Socio-demographic characteristics of cases (n=108) & controls (n=108)

Character	Case Frequency (%)	Control Frequency (%)	Chi square	P value
Age				
18-25	8 (7.4%)	12 (11.1%)	2.052	0.562
26-40	30 (27.8%)	25 (23.1%)		
40-60	53 (49.1%)	49 (45.4%)		
>60	17 (15.7%)	22 (20.4%)		

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Gender				
Male	52 (48.1%)	56 (51.9%)	0.296	0.586
Female	56 (51.9%)	52 (48.1%)		
Occupation				
Professional	10 (9.3%)	15 (13.9%)	3.914	0.141
Skilled	42 (38.9%)	29 (26.9%)		
Unskilled	56 (51.9%)	64 (59.3%)		
Socio Economic Status				
Upper	46 (42.6%)	33 (30.6%)	5.425	0.246
Upper middle	19 (17.6%)	27 (25%)		
Middle	24 (22.2%)	23 (21.3%)		
Lower middle	10 (9.3%)	17 (15.7%)		
Lower	9 (8.3%)	8 (7.4%)		

The table provides the socio-demographic characteristics of 108 obese cases and 108 non-obese controls. The majority of participants were aged 40-60 years: Cases (49.1%) and controls (45.4%). There is no significant difference in age distribution between cases and controls. In terms of gender, there were slightly more males in the control group (51.9%) compared to the cases (48.1%), while the majority of females were in the cases (51.9%) compared to the controls (48.1%). There is no significant difference in gender distribution between cases and controls. Regarding occupation, the majority were in unskilled occupations - Cases (51.9%), Controls (59.3%), followed by skilled occupations: Cases (38.9%), Controls (26.9%), and professional occupations: Cases (9.3%), Controls (13.9%). There is no significant difference in occupation distribution between cases and controls. Finally, the majority belonged to upper socio-economic status - Cases (42.6%), Controls (30.6%), followed by middle: Cases (22.2%), Controls (21.3%), and upper middle: Cases (17.6%), Controls (25%). There is no significant difference in socio-economic status between cases and controls.

In the case group, 52% of the individuals have a BMI between 25-30, 33% have a BMI between 30-35, and 15% have a BMI between 35-40. In the control group, 34% have a BMI between 18.5-20, 28% have a BMI between 20-23, and 38% have a BMI between 23-25.

Table 2: Diet related factors comparison among cases & control

Diet related factors	**Case (n-108)**	**Control (n-108)**	**Chi square**	**OR (95% CI)**	**P value**
	Frequency (%)	**Frequency (%)**			
Diet type					
Non vegetarian	105 (97.2%)	99 (91.7%)	3.176		0.075
Vegetarian	3 (2.8%)	9 (8.3%)			
Calorie consumption (Kcal/day)					

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<1660	16 (14.8%)	18 (16.7%)	12.703	Ref	**0.013***
1660-2000	14 (13%)	22 (20.4%)		1.397 (0.540-3.612)	
2000-2500	40 (37%)	52 (48.1%)		1.156 (0.525-2.545)	
2500-3000	29 (26.9%)	11 (10.2%)		0.337 (0.128-0.887)	
>3000	9 (8.3%)	5 (4.6%)		0.494 (0.137-1.783)	
Protein consumption (gm/day)					
40-60	46 (42.6%)	56 (51.9%)	9.076	0.609 (0.259-1.429)	**0.011***
60-80	52 (48.1%)	32 (29.6%)		0.308 (0.128-0.740)	
>80	10 (9.3%)	20 (18.5%)		Ref	

Table 2: Diet-Related Factors Comparison Among Cases and Controls

Diet related factors	**Case (n-108)**	**Control (n-108)**	**Chi square**	**OR (95% CI)**	**P value**
	Frequency (%)	**Frequency (%)**			
Vegetable intake					**<0.001***
Yes	105 (97.2%)	68 (63%)	39.751	Ref	
No	3 (2.8%)	40 (37%)		20.588 (6.125-69.199)	
Frequency of vegetable intake / week					
<1	13 (12%)	2 (1.1%)	26.136	-	**<0.001***
01-02	41 (38%)	20 (19.2%)		0.31 (0.136-0.703)	
03-04	39 (36.1%)	60 (55.6%)		0.888 (0.418-1.884)	
05-07	15 (13.9%)	26 (24.1%)		Ref	
Fruits intake					

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Yes	95 (88%)	78 (72.2%)	8.391	Ref	**0.004***
No	13 (12%)	43 (19.9%)		2.811 (1.373-5.754)	
Frequency of fruits intake/ week					
01-02	88 (81.5%)	35 (32.4%)	56.277	0.221 (0.093-0.526)	**<0.001***
03-04	10 (9.3%)	55 (50.9%)		3.056 (1.096-8.520)	
05-07	10 (9.3%)	18 (16.7%)		Ref	

*0.05 – Statistically significant, Ref – Reference value

This table presents a comparison of diet-related factors between cases and controls. Factors like type of diet, calorie consumption, protein consumption, vegetable intake, and fruit intake were included. The majority of the participants were non-vegetarian, with 97.2% of cases and 91.7% of controls. Only 2.8% of cases and 8.3% of controls identified as vegetarian.I n terms of calorie consumption, 37% of cases consumed 2000-2500 kcal compared to 48.1% of controls. Regarding protein consumption, 42.6% of cases consumed 40-60 g, while 51.9% of controls fell into this category. The percentage of cases consuming vegetables was notably higher at 97.2% compared to 63% of controls. In terms of frequency of vegetable intake per week, 38% of cases consumed vegetables 1-2 times, whereas only 19.2% of controls did so. For 3-4 times a week, 36.1% of cases consumed vegetables compared to 55.6% of controls. As for fruit intake, 88% of cases and 72.2% of controls reported consuming fruits. In terms of frequency of fruit intake per week, 81.5% of cases consumed fruits 1-2 times, while only 32.4% of controls did so. For 3-4 times a week, 9.3% of cases consumed fruits compared to 50.9% of controls.

Table 3 Lifestyle related factors comparison among cases & control

Character	Case (n-108) Frequency (%)	Control (n-108) Frequency (%)	Chi square	OR (95% CI)	P value
Soft drinks intake					
Yes	44 (40.7%)	35 (32.4%)	1.617		0.204
No	64 (59.3%)	73 (67.6%)			
Junk food intake					
Yes	78 (72.2%)	28 (25.9%)	46.312	0.135 (0.07- 0.246)	**<0.001***
No	30 (27.8%)	80 (74.1%)		Ref	
Exercise					

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Yes	25 (23.1%)	52 (47.2%)	13.723	Ref	**<0.001***
No	83 (76.9%)	57 (52.8%)		0.337 (0.187-0.604)	
Frequency of exercise / week					
<1	83 (76.9%)	57 (52.8%)	20.334	0.749 (0.309-1.815)	**<0.001***
1-3	4 (3.7%)	22 (20.4%)		6 (1.56-22.98)	
4-5	9 (8.3%)	18 (16.7%)		2.18(0.695-6.852)	
6-7	12 (11.1%)	11 (10.2%)		Ref	

*0.05 – Statistically significant, Ref – Reference value

This table compares lifestyle-related factors between the 108 obese cases and 108 non-obese controls, including soft drink intake, junk food intake, exercise, and frequency of exercise. The consumption of soft drinks was higher among cases (40.7%) compared to controls (32.4%), while 59.3% of cases and 67.6% of controls didn't consume soft drinks. Junk food intake was higher among cases (72.2%) than controls (25.9%), and 27.8% of cases and 74.1% of controls didn't consume junk food. In terms of exercise, 23.1% of cases and 47.2% of controls engaged in exercise, while 76.9% of cases and 52.8% of controls did not. The frequency of exercise per week was as follows: <1 day - cases (76.9%), controls (52.8)

Discussion:

Obesity is a multifactorial health issue influenced by a complex interplay of dietary habits, lifestyle choices, socioeconomic factors, and environmental influences. Understanding these factors within specific populations is essential for developing targeted interventions to address the rising prevalence of obesity[24].

This study found that decreased physical activity, low fruit consumption, and increased intake of soft drinks & junk food were identified as risk factors for obesity. Similar results were found in a study conducted by Selvaraj et all (2019) [20]. In our study, we found high obesity rates among people from higher socioeconomic classes. Similar results were found in a study conducted by Fernald et al in 2003[25], while another study conducted by Luhar et al (2007) [10] found that people with lower socioeconomic status have a high percentage of obesity.

Puducherry has more proportions of migrants and where the access to health care is optimal, reorienting the health system for escalating NCD-related healthcare delivery needs a better understanding of patterns of various coexisting NCD risk factors[20]. Several lifestyle-related risk factors for NCDs are interrelated, and they often act synergistically to accelerate the disease process[19].

A study by Patel et al. (2020) conducted in a similar urban setting in India found that cultural norms, such as preferences for fried snacks and sweetened beverages, contribute to unhealthy dietary practices among urban residents. Understanding these cultures is essential for tailoring interventions that resonate with the local population and promote sustainable behavior change[19].

A systematic review by Sallis et al. (2021) emphasizes the importance of creating supportive environments that facilitate healthy eating and active living, including urban planning strategies that promote walkability, access to fresh produce, and recreational spaces. Such environmental interventions can complement individual-level interventions, reinforcing healthy behaviors and promoting long-term adherence[22].

A meta-analysis by Hall et al in 2019 says that the effectiveness of structured exercise programs in

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reducing adiposity and improving metabolic health among obese individuals. Incorporating culturally appropriate physical activities, such as traditional dances or community-based sports, can enhance engagement and sustainability of interventions within the local context[21].

Conclusion:

The present study identified several lifestyles like increased intake of junk foods, physical inactivity & diet-related factors like decreased intake of fruits, and vegetables associated with obesity that may be valid targets for the focused community interventions in this population.

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