

Study of lifestyle diseases (obesity and diabetes mellitus) among employees of an electronics manufacturing unit at Tumakuru.

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Abstract

Background: The world has experienced an epidemiological transition due to urbanisation, increased food and tobacco consumption, and reduced physical activity, leading to a shift from communicable to non-communicable diseases (NCDs). This transition has heightened the prevalence of lifestyle-related diseases, particularly in industrial workforces.

Objectives: This study aims to assess the knowledge, attitude, and practice (KAP) on lifestyle diseases among employees of an electronics manufacturing company in Tumakuru district, Karnataka State.

Materials & Methods: A total of 502 employees aged 30-60 were selected using systematic random sampling from a pool of 1,448 employees. Data were collected using a structured questionnaire based on the NIOSH worker well-being questionnaire (WellBQ) and the WHO STEPS Surveillance Manual for NCDs. The questionnaire evaluated participants' knowledge of lifestyle diseases, attitudes towards prevention, and lifestyle practices.

Results: Of the 502 respondents, 458 (91.2%) were male, with the majority (58%) in the 40-49 age group. Only 56% of participants were aware of the major causes of diabetes, while 68% were unaware of preventive measures. Additionally, 30% lacked knowledge about diabetes and its diagnosis, 43% were unaware that lifestyle diseases are chronic, and 38% did not recognise that these conditions could lead to premature death. Notably, 60% of respondents reported no regular physical activity.

Conclusion: The findings indicate a significant risk of developing lifestyle diseases among employees, underscoring the need for targeted health policies and educational programs to promote healthy lifestyles and mitigate the rising trend of NCDs in this industrial workforce

Keywords: Diabetes mellitus; Employees; Lifestyle disease; Non-communicable diseases

1. Introduction

The global health landscape has witnessed a significant epidemiological transition, particularly in the latter part of the 20th century. This transition is characterized by a shift from communicable diseases to non-communicable diseases (NCDs) as the predominant cause of morbidity and mortality.¹ This change is closely associated with urbanization and lifestyle modifications, including increased consumption of unhealthy foods, higher tobacco use, and decreased physical activity. These factors have contributed to the surge in lifestyle diseases such as hypertension, type 2 diabetes mellitus, obesity, and cardiovascular diseases, which have become major public health challenges worldwide^{1,18}.

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Lifestyle is defined as the habits and customs that are influenced, modified, encouraged, or constrained by the lifelong socialisation process. These habits and customs include dietary habits, exercise, and use of substances such as alcohol and tobacco, which have important implications for health². Lifestyle diseases include diseases such as hypertension, type 2 diabetes mellitus, obesity, stroke and diseases associated with smoking, alcohol, and drug abuse.

A significant upward trend has been observed in lifestyle diseases with increased blood pressure and glucose levels as brought out by the latest research in the field^{3,4}. In addition, among the borderline normal individuals, i.e. high-normal blood pressure, impaired fasting glucose, and impaired glucose tolerance, there is evidence suggestive of increased vascular risk^{5,6}. These individuals with borderline parameters have shown a high rate of conversion from at-risk status to disease, viz. hypertension and type 2 diabetes mellitus. Lifestyle diseases are part of the metabolic syndrome, which exposes vulnerable individuals to twice the risk for future cardiovascular morbidity and mortality^{7,8}.

In industrialised settings, particularly in rapidly developing countries like India, the impact of lifestyle diseases is profound⁹. The nature of work in industries, such as long hours of sedentary activities, high levels of occupational stress, and limited access to nutritious food, exacerbates the risk factors associated with lifestyle diseases^{9,10}. For example, studies have shown that hypertension is highly prevalent among industrial workers, with significant associations with factors such as age, body mass index (BMI)^{13,17}, and tobacco use. However, awareness and management of these conditions remain alarmingly low, with many workers unaware of their health status.

This research study assessed the prevalence, awareness, and management of lifestyle diseases among employees in the electronic manufacturing industry in Tumakuru, Karnataka. The findings will provide valuable insights into the health status of industrial workers and guide the development of targeted interventions to improve their health and productivity, thereby contributing to the overall well-being of the workforce and the economy

2. Material and methods

- **Sample size:** 502
- **Sampling technique:** systematic sampling technique

2.1. Sample

Employees of an electronics manufacturing unit at Tumakuru, Karnataka. Both male and female employees aged above 30 years were included in the study, and employees who were absent / not available at the time of data collection and not willing to participate were excluded from the study

2.2. Description of instruments

Structured questionnaire, which was framed using NIOSH National Institute for Occupational Safety & Health (NIOSH) worker well-being questionnaire (WellBQ),¹⁴ WHO STEPS Surveillance Manual for Non-Communicable diseases,¹⁵ and modified Kuppaswamy SES scale¹⁶. The tool used for the data collection was a structured questionnaire consisting of 2 parts. Where in 1st part consisted of Demographic variables, such as age, sex, education, occupation etc., and the 2nd part consisted of Structured knowledge attitude and practice questionnaire regarding lifestyle diseases (obesity and diabetes mellitus)

2.3. Method of data collection

The data was obtained from a total of 502 employees aged 30 to 60 years. This group constitutes a subset of the 1448 employees employed by the company, and the selection of the 502 participants was systematically executed utilising the company's employee database. The sampling process was carried out using Google Forms, and participants who fulfilled the inclusion criteria were chosen through systematic random sampling methods. The data collection occurred over a 2-week period in May 2023.

2.4. Method of Data Analysis

Data analysis was done using Microsoft Excel

3. Results

3.1. Description of the Socio-Demographic Variables Of The Employees

Table 1 Distribution of employees based on age group and education vs gender

n= 502

Age group	Female		Male		Grand Total	
	No	Percentage	No	Percentage	Total	Percentage
30-39	21	4.2	201	40.04	222	44
40-49	8	1.6	239	47.61	247	49
50-59	8	1.6	15	2.99	23	5
above 59	7	1.4	3	0.60	10	2
Grand Total	44	8.8	458	91.2	502	100
Education Status of the employees						
Graduation	16	3.2	21	4.2	37	7
Intermediate / ITI/ Diploma	10	2.0	431	86	441	88
PG/ Profession / Honours	18	3.6	6	1.2	24	5
Grand Total	44	8.8	458	91.2	502	100

The above table reveals that there were 502 respondents, 44 (8.8%) of whom were females and 458 (91.2%) males. The respondents were categorised into four age groups in this age group, 7 (1.4%) of whom were females and 3 (0.60%) of whom were males. Overall, the majority of the respondents were males, and the highest number of respondents belonged to the 40-49 age group. And 88% have completed intermediate/ITI/diploma, and 5% have a PG / professional/honours degree.

3.2. Assessment of KAP on lifestyle diseases (obesity and diabetes mellitus) among employees

Table 2 Knowledge about causes, symptoms, lifestyle modification and range of BMI of diabetes mellitus among employees working in an electronic manufacturing company at Tumakuru

n= 502

Knowledge item	Response	Frequency	Percentage %
Significant causes of diabetes mellitus	Hereditary	90	18
	Life style	57	11
	Obesity	16	3
	Don't know	58	12
	All the above	281	56
Knowledge about symptoms of diabetes mellitus	Excess Hunger	36	7
	Frequent urination	148	29
	Increased thirst	36	7
	All of the above	266	53
	Don't know	16	3
	Changes in eating habits	170	34

Knowledge on the lifestyle modification required to prevent diabetes mellitus	Regular physical activity	124	25
	Regular screening	34	7
	All the above	163	32
	Don't know	11	2
Awareness on normal range of BMI	Less than 18	102	20
	18-25	229	46
	25-30	82	16
	Above 30	23	5
	Don't know	66	13

The data suggests that while a majority (56%) correctly identified the major causes of diabetes, 12% demonstrated unawareness of any causal factors. Moreover, over half (53%) recognized the principal symptoms, with 3% lacking knowledge of any symptoms. Regarding lifestyle modifications, 34% grasped the importance of dietary changes, but only 32% were aware of the complete spectrum of essential lifestyle adjustments. With regard to BMI awareness, less than half (46%) accurately identified the normal range, signaling a significant proportion with misinformation or uncertainty. This underscores the need for improved diabetes education among the company's employees.

Table 3 Awareness of diagnosis of Diabetes mellitus among employees working in an electronic manufacturing company at Tumakuru.

n= 502

Awareness on diagnosis of Diabetes	No		Yes		Grand Total
	Frequency	%	Frequency	%	
Aware of HbA1c	350	70	152	30	502
Got it tested for themselves in past 3 months	348	69	154	31	502

The table shows that out of the 502 respondents, 70% were aware of the diagnosis of diabetes while 30% did not know. Of those aware, 70% knew about HbA1c as a diagnostic tool for diabetes. Regarding personal testing, 69% of respondents had tested themselves for diabetes in the past three months, while 31% had not. These results indicate that there is a substantial level of awareness and personal testing for diabetes, which is crucial for early detection and management of the condition.

Table 4 Attitude level regarding lifestyle disease (obesity and diabetes mellitus) among employees working in an electronic manufacturing company at Tumakuru

n= 502

Sl no	Questions on attitude	Don't know		No		Yes		Grand Total
		NO	%	NO	%	NO	%	
1	Do you think overweight/ obesity can be corrected by lifestyle modification	84	17	113	23	305	61	502
2	Do you think stress (workload/ family / financial issues) can increase the risk of diabetic mellitus	50	10	51	10	401	80	502

3	Do you think regular weight and blood sugar level monitoring after the age of 30 years, will help in prevention of diabetes mellitus	44	9	112	22	346	69	502
4	Do you think changes in eating habits and physical activity can help control and prevent any life style disease	63	13	158	31	281	56	502
5	Do you think it is important to seek treatment once diagnosed for any life style diseases	75	15	127	25	300	60	502
6	Do you think that life style diseases are chronic diseases and one should suffer lifelong after being diagnosed	96	19	119	24	287	57	502
7	Do you know that life style diseases can cause premature death / early deaths	88	18	105	21	309	62	502
8	Do you think obesity is one of the co- morbidity for diabetes mellitus	99	20	96	19	307	61	502
9	Do you think practicing yoga / meditation / recreation / spending time with loved ones can reduce the stress and life style disease	10	2	49	10	443	88	502

The table shows that a significant majority, 61%, of employees believed that overweight/obesity could be corrected through lifestyle modifications, and 80% recognised that stress (from workload, family, or financial issues) could increase the risk of diabetes, with 10% either disagreeing or being unsure. 56% of employees think that changes in eating habits and physical activity can prevent or control lifestyle diseases. Additionally, 60% of the participants believed that seeking treatment upon diagnosis and practicing healthy habits can control and prevent lifestyle diseases.

Table 5 Diet practice- consumption of fruits and vegetables on a normal day of employees working in an electronic manufacturing company at Tumakuru

n= 502

Diet - consumption of fruits and vegetables on a normal day	Less than 1 serving		1 serving		2 servings		3 servings		5 or more servings		Grand Total
	No	%	No	%	No	%	No	%	No	%	
1 cup raw leafy greens about the size of a small fist	305	60.8	188	37.5	7	1.4	0	0.0	2	0.4	502
1/2 cup of other vegetables cooked or raw	320	63.7	171	34.1	7	1.4	3	0.6	1	0.2	502
1 medium piece of fruit about the size of a baseball	316	62.9	168	33.5	15	3.0	1	0.2	2	0.4	502
1/2 cup chopped, cooked, or canned fruit	330	65.7	158	31.5	9	1.8	1	0.2	4	0.8	502
3/4 cup vegetable or fruit juice	306	61.0	183	36.5	8	1.6	1	0.2	4	0.8	502

The data indicates that the majority 60.8-65.7% of the employees, eat less than one serving of various types of fruits and vegetables. Only 0.4-1.8% consume three or more servings daily. A small portion (0.2-0.8%) reaches the recommended five or more servings, suggesting that overall fruit and vegetable intake among employees is low, with room for improvement in their dietary habits.

Table 6 Practice of moderate or intense physical activity of employees working in an electronic manufacturing company at Tumakuru in a week

n= 502

Physical activity	Never	One	Two	Three	Four	Five	Six	Seven	Total
At least 30 minutes of moderate intensity physical activity in a week									
Brisk walking or Jogging	198	171	26	10	2	3	5	87	502
Gardening	282	180	16	2	1	2	3	16	502
Lifting of light objects	281	149	40	21	1	3	2	5	502
At least 20 minutes of high intensity physical activity in a week									
Running	287	184	18	8	4	0	1	0	502
Fast Cycling	324	160	13	1	1	0	1	2	502
Continuous lifting of heavy objects	287	135	58	19	1	2	0	0	502

The table shows that in the electronic manufacturing company in Tumakuru, a significant portion of employees engage in physical activity infrequently, with 39-64% never participating in various activities. Only 17.3% engage in brisk walking or jogging daily, while most employees (26.9-36.7%) do physical activities just once a week. Daily high-intensity activities like running or lifting heavy objects are rare, with 0-1% participation. This indicates a need for increased regular physical activity among employees.

4. Discussion

The study on knowledge, attitudes, and practices (KAP) concerning lifestyle diseases among employees in an electronic manufacturing company in Tumakuru provides a nuanced understanding of the health challenges faced by this workforce. The findings point to specific areas of concern as well as opportunities for targeted interventions to improve employee health outcomes.

4.1. Socio-Demographic Characteristics

The gender distribution among the respondents is heavily skewed towards males, who constitute 91.2% of the workforce, with females making up only 8.8%. This significant gender disparity might reflect broader industry trends, particularly in manufacturing sectors where male dominance is common. The age distribution shows that nearly half of the employees (49%) are in the 40-49 age group, followed by 44% in the 30-39 age group. This concentration in middle age suggests that the workforce is at a critical point where lifestyle diseases such as diabetes and obesity are more likely to manifest, given the natural progression of age-related health risks⁹.

4.2. Knowledge about Diabetes Mellitus

The data reveals a mixed level of understanding regarding the causes and symptoms of diabetes mellitus. While 56% of respondents correctly identified multiple factors (heredity, lifestyle, obesity) as contributors to diabetes, and 53% were aware of all major symptoms (frequent urination, increased thirst, excess hunger), a significant proportion either did not know or only recognised one or two of these factors. This partial knowledge is concerning, as a comprehensive understanding is crucial for effective prevention and early management. The finding that 12% of respondents "don't know" what causes diabetes highlights the need for enhanced education on this condition.

4.3. Lifestyle Modifications and Preventive Measures

The study shows that 34% of respondents believe that changes in eating habits are essential for preventing diabetes, with 25% emphasising regular physical activity. However, only 7% recognised the importance of regular screening, a key element in early detection and management of diabetes. This indicates a need to shift the focus towards the importance of regular health check-ups and screenings as part of a comprehensive approach to prevention. The fact that 32% identified all three factors (diet, exercise, screening) as important suggests a growing recognition of a holistic approach to health, but also underscores that more work is needed to increase awareness across the board¹⁸.

4.4. Attitudes Towards Lifestyle Diseases

Attitudes towards the prevention and management of lifestyle diseases are generally positive, with a majority of respondents believing in the efficacy of lifestyle modifications. For example, 61% believe that obesity can be corrected by changes in lifestyle, and 80% recognize that stress can increase the risk of diabetes. These attitudes are encouraging as they indicate a willingness to adopt healthier behaviors. However, the data also reveal some concerning beliefs, such as 57% thinking that lifestyle diseases are chronic and inevitably lead to lifelong suffering, which could potentially discourage proactive management and treatment efforts¹².

4.5. Dietary Practices & Physical Activity Levels

The dietary habits of the employees reveal a significant shortfall in fruit and vegetable consumption, with many consuming less than the recommended daily intake. This deficiency is closely linked to the development of lifestyle diseases. Encouraging healthier eating habits and regular physical activity through workplace initiatives or wellness programs could significantly impact the overall health of the workforce^{9,13}.

4.6. Awareness of BMI and Risk Factors

The study reveals that while a majority of respondents are aware of the connection between being overweight and the risk of developing diabetes, there is still a significant gap in knowledge about BMI. Only 46% of respondents correctly identified the normal BMI range (18-25), with 13% admitting they did not know the normal range at all. This lack of awareness about BMI, a crucial measure of health, underscores the need for more targeted education on maintaining a healthy weight and understanding its implications for overall health^{10,11}.

5. Conclusion

This study comprehensively analyses the knowledge, attitudes, and practices related to lifestyle diseases, specifically obesity and diabetes mellitus, among employees at an electronics manufacturing company in Tumakuru District. The research reveals several key findings that underscore the need for targeted health interventions and educational programs. Despite the high level of awareness regarding the general causes of diabetes and its complications, notable gaps exist in specific knowledge areas. Many participants lacked awareness about the full spectrum of diabetes symptoms and complications, such as liver and skin diseases. Furthermore, a substantial proportion of employees were unfamiliar with the normal BMI ranges and preventive measures for diabetes, including the importance of regular screening, diet and physical activities. The study highlights the critical need for comprehensive health education and policy interventions. There is a clear opportunity to enhance employee awareness and promote healthier lifestyle practices through targeted educational programs and preventive health initiatives. By addressing these gaps, the company can contribute to reducing the prevalence of lifestyle diseases and improving overall employee health and well-being.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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