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## **Smart approach in impact of cumin powder on obesity among adults in urban area of Puducherry, India**

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**Abstract:** The research study targeted to limit the effect of cumin powder on physical and biological parameters among adults with obesity in the urban area of Pondicherry. Cumin may be effective in lowering cholesterol and in weight loss. Cumin may be helpful for people trying to lose weight in lower total cholesterol, LDL or 'bad' cholesterol, and triglyceride levels with type 2 diabetes and the body handle stress. In this true experimental design is used. A total of 40 adults with obesity for control and experimental, BMI value of  $\geq 25$ , Total cholesterol  $>200$  mg/dl, and age group of 20 to 60 years were selected. After evaluating the lipid profile, a bag of cumin powder with warm water was administered for 70 days (10 weeks). Prior to and post-action, all anthropometric and biochemical parameters were measured. Warm water with cumin powder decreased serum total cholesterol, slightly reduced BMI ( $p < 0.05$ ). In both anthropometric and biochemical parameters of overweight in adults, cumin powder with hot water showed a drop.

**Keywords:** overweight; obesity; cholesterol; body mass index; anthropometric and biochemical parameters; performance measures.

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## 1 Introduction

Globally, the fifth largest cause of death is overweight and obesity, indicating an abnormal or an unnecessary accumulation of fat that may be detrimental to the preservation of optimal health. Due to population, technological, social and dietary shifts in the last decades, there has been a significant boost in the prevalence of weight increase and obesity in nearly all ages around the globe [1]. Obesity has reached a worldwide crisis, with at least 2.8 million people dying of obesity last year. Obesity, once connected to high-income nations today often prevails in low- and middle-income countries. In helping to prevent obesity, states, foreign partners, civil society, non-governmental organisations and the private sector all have a crucial role to play [2]. Ginger and other products were not selected for this study because they may create ulcer or taking continuously may give adverse reaction, that is why cumin powder took this study.

Obesity holds medicinal duties despite a widely faced medical condition. The shortage of time and expertise to train for the proper care plan for obesity faced by most Indian doctors and patients suffering prolonged weight gain while being under medical supervision [3]. The strain of obesity, the main risk factor leading to non-communicable diseases, needs to be addressed urgently. Obesity is one of the physiological conditions caused by the build-up of extra body fat to a degree that has a detrimental health effect [4].

The World Health Organization reports that, due to unhealthy or irregular deposition of fat in the human body, obesity and corpulence are marked as a health risk to the body. The current research was performed in the metropolitan region of Puducherry to find out the impact of cumin powder among adults with obesity [5]. Many studies have illustrated

the relevance of capricious parameters in the production of obesity, such as physical exercise, diet, alcohol, BMI, body fat, visceral fat and total cholesterol.

Overweight and obesity prevalence has been exceptionally high in recent decades, affecting both developed and developing countries such as India. It has a dietary shift from conventional diets of carbohydrates to the lifestyles of fast food, primarily among young adults impacted [6–8]. Numerous debilitating and life-threatening illnesses, including coronary, metabolic and other non-communicable conditions, are linked with obesity. There are different causative factors for adult obesity, including diet, natural propensity, less physical activities and other lifestyle factors [9]. In India, the prevalence in the upper class of society is more than 50% in women and 32.2% among adults. The prevalence of obesity in urban women is 33.4% and in Delhi, 21.3% for men. Children and teenagers are a matter with obesity and overweight globally, not just adults. In India, until recently, little attention was given to childhood and teenage obesity. Type 2 diabetes, stroke, coronary heart disease, asthma, gall bladder disease, arthritis, neurological issues and so on are the barriers to obesity. The societal effects of obesity are a significant topic of focus that is frequently underestimated. The obese have worse job chances and weaker self-esteem, and perform less well rationally. This obesity, meanwhile, turns out to be a disturbing indication that young adult- based interventions such as improvements in diet and behaviour improvement communication need to stop this.

A study was conducted on the effects of cumin cyminum plus lime administration on obesity among women in Chennai, Tamilnadu. Women who met the inclusion criteria were selected by using non-probability convenience sampling technique. The study indicates that administration of cumin cyminum plus lime water is effective in reducing overweight. The present study showed that cumin cyminum plus lime was not only beneficial but also safe and effective in the treatment of obesity.

A study was conducted to assess the effects of combined administration of Cumin cyminum L. and lime on weight loss and metabolic profiles among subjects with overweight. It is randomised double-blind placebo- controlled clinical trial on 72 subjects with overweight, aged 18–50 years old. After eight weeks of intervention, compared with low-dose C. cyminum L. plus lime and placebo, taking high-dose C. cyminum L. plus lime resulted in significant weight loss. In addition, administration of high-dose C. cyminum L. plus lime compared with low-dose C. cyminum L. plus lime and placebo, led to a significant reduction in fasting plasma glucose and a significant rise in Quantitative Insulin sensitivity Check Index (QUICKI). Moreover, a significant decrease in serum triglycerides, total-cholesterol and Low-Density Lipoproteins-(LDL)-cholesterol levels. The study concluded that taking high-dose C. Cyminum L. plus lime for eight weeks among subjects with overweight had beneficial effects on weight, BMI, FPG, QUICKI, triglycerides, total-cholesterol and LDL-cholesterol levels.

The health implications linked to obesity are numerous and complex. It is also a major risk factor for non- communicable disorders, such as diabetes mellitus that is not insulin related, cardiovascular diseases and cancer as well.

Respiratory issues, chronic musculoskeletal conditions, skin disorders and infertility are the non-mortal, yet debilitating health problems associated with obesity. The more bullying in life, the more obesity-related chronic health complications: cardiovascular complications plus asthma, coronary heart disease and stroke, insulin resistant conditions,

e.g., diabetes mellitus non-insulin-dependent, some types of cancers, particularly hormonally-allied and large-bowel cancers.

One of the spices extracted from a plant called *C. cyminum* is cumin. It has Asian, African, and European origins, but it is commonly used worldwide in cuisine. It is still medically used in all of the world for a few years, after the black pepper is the second leading common spice.

The new cumin study could be effective in lowering cholesterol and gaining weight. Cumin may be beneficial for individualised weight loss, and is exasperating. A study involving weighty adults correlated the benefits of cumin with a weight losing drug and weight management. The researchers found that the cumin and weight loss drug classes all lost large quantities of weight after 8 weeks. People have experienced a decrease in their insulin level in the cumin community. One more research found that overweight and obese women who consumed 3 grams (g) of cumin powder mixed with yogurt every day for 3 months had significant reductions in body weight, waist circumference, and body fat.

The above-mentioned study observed that consumption of 3 g of cumin powder per day resulted in lower total cholesterol, LDL or 'bad' cholesterol levels, and triglyceride levels in women who are overweight and obese, and also showed higher levels of HDL or 'good' cholesterol.

An analysis of the impact of cumin essential oil on blood sugar levels in adults with type 2 diabetes. Samples were taken on a daily basis of 100 milligrams (mg) of cumin oil and on a daily basis of 50 mg of cumin oil or placebo. There were slightly lower levels of blood sugar, insulin, and haemoglobin A1c in both cumin-oil groups 8 weeks later, as well as improvement in the symptoms of insulin resistance and inflammation in the cumin-oil groups. Diverse outcomes of the cumin in blood sugar levels have been demonstrated in several human trials.

Cumin can help to relieve stress management in the body. Another study of the influence of the cumin extract on alternating stress signals seen in rats. The animal bodies displayed considerably less discomfort when, prior to traumatic operation, the animals received a cumin extract than when they did not receive medication. By acting as an antioxidant, cumin can combat the effects of stress shown in Table 1. In the rats that were analysed by the same researchers, cumin was a more powerful antioxidant than vitamin C.

Cumin seeds consist of different photochemicals considered to have fibre. Active values in cumin can increase intestinal motility and aid digestion by increasing secretions of gastrointestinal juices (enzyme).

The BMI provides the most useful, though crude, an indicator of obesity at the population level. It can be used to measure the prevalence of obesity and the dangers associated with it within a population. BMI does not, however, account for the large variance in the distribution of body fat and does not lead to the same degree of obesity or health risk associated with it in various persons and populations. It is now commonly accepted that a BMI of 30 or more signifies obesity.

In some tests, however, other BMI cut-off points both above and below 30 has been used. Determining BMI, measuring abdominal girth and assessing the presence of coronary disease, diabetes mellitus, gall bladder disease and hypertension in the family at the functional level offer useful knowledge to evaluate the obese patient.

**Table 1** Cumin powder's nutritive value

Nutrition	Value per 5 gm
Energy	19 kcal
Protein	0.89 g (16%)
Fat	94g (91%)
Cholesterol	0 mg
Sodium	8 mg (0%)
Potassium	89 mg
Carbohydrate	2.21g

Nutrition	Value per 5 gm
Dietary fibre	2%
Calcium	5%
Iron	18%
Zinc	0.2/8.0 mg (3%)
Thiamine	1.1 mg (3%)
Riboflavin	1.1 mg (1%)
Folate	0.5/400 m

## 2 Materials and methods

In this study, true experimental design is used to find the effectiveness of cumin powder on obesity among adults shown in Table 2.

**Table 2** Experimental design of pre and post test

<i>Pre test</i>	<i>Intervention</i>	<i>Post test</i>
Blood samples for lipid profile was drawn from the selected study participants in an empty stomach at PHC.	Participants were consumed 3gm of cumin powder mixed with hot water in the early morning on an empty stomach for a period of 10 weeks.	After 10 weeks Blood samples for lipid profile was drawn from the selected study participants in an empty stomach at PHC.

Based on the sample, the 40 participants randomly selected 90% confident, 10% margin error among the total population of 93 obese adults with a BMI value of 24 kg/m<sup>2</sup> based on ICMR classification, total cholesterol above 200mg/dl and the age group of 20 to 60 years of both sexes were selected following a clinical survey in the Puducherry urban region of Muthialpet. Metabolic diseases, metabolic imbalances and cardiovascular disorders, learning disabilities and those who do not read and write English and Tamil were omitted from the study for people with chronic disease in Table 3. Ethical consent has been received from the Institutional Review Board, the College of Nursing, the Pondicherry Institute of Medical Sciences, and permission from the Puducherry Health and Family Welfare Services Directorate. Division of two group control and experimental to find out the exact difference of cumin powder.

**Table 3** Experimental design of pre and post test for group

<i>Group</i>	<i>Pre-test</i>	<i>Intervention</i>	<i>Post test</i>
Control Group	Blood samples for lipid profile was drawn from the selected study participants in an empty stomach at PHC	No intervention (Lifestyle counselling)	After 10 weeks Blood samples for lipid profile was drawn from the selected study participants in an empty stomach at PHC
Experimental Group	Blood samples for lipid profile was drawn from the selected study participants in an empty stomach at PHC	Participants consumed 3gms of cumin powder with hot water in the early morning on an empty stomach for a period of 10 weeks.	After 10 weeks Blood samples for lipid profile was drawn from the selected study participants in an empty stomach at PHC.

Following approval by the Institutional Ethics Committee of Saveetha University, Institutional Review Board, College of Nursing, Pondicherry Institute of Medical Sciences, Puducherry (Approval No: IRB-PIMS/F/1830 dated 21/11/2018), pilot and key studies were performed and permission was received from the Directorate of Health and Family Welfare Services, Government of Puducherry (No. 594/DHFWS/PA/2020).

The tool consists of three parts, Part I, Part II and Part III

*Part-I:* Consist of personal identification data: include participant ID, address and form number. Demographic data include age, gender, educational status, occupation, family monthly income, religious, marital status, type of family, dietary pattern, type of worker, family history. Based on urban circumstances researcher took this demographic data to find out exact influence with obesity.

*Part-II:* Questionnaire to assess the associated risk factors of the study variables.

*Lifestyle:* Rice items, wheat items, raagi/millet items, maida items, vegetables, non veg, fast foods.

*Physical activity:* Walking, slow jogging running exercise, sitting, standing.

*Personal behaviour:* Smoking, chewing, tobacco, alcohol family history: obesity, dyslipidemia cardiovascular disease, diabetes, thyroid.

*Part-III:* Observation schedule to assess the effectiveness of cumin powder on selected bio-physiological parameters of obesity.

*Physiological measurements:* Omeon HBF 212 body composition monitor to measure the BMI, proportion of body fat, level of visceral and skeletal muscle percentage.

*Biological measurements:* Lipid profile: Total cholesterol value in mg/dl (milligrams per decilitre) and are based on fasting measurement (Indian Heart Association, 2019) shown in Table 4.



**Table 4** Levels and cholesterol

<i>Level</i>	<i>Total cholesterol</i>
Good	<200 (but lower the better)
Borderline high	200 and 239 mg/dL
High	240 mg/dL and above

Data collection was done on following phase,

*Phase I:* The Directorate General of Health Care, Government of Puducherry, obtained formal permits. From 27.05.19 to 31.05.19 biological measurements were assessed for 14 participants. The study involved 40 participants with a BMI value of 25 and above, total cholesterol above 200 mg/dl, and an age range between 20 and 60 years with both sexes and without co-morbid conditions such as hypertension, diabetes and stroke, as well as those able to enroll in this study, among 148 adults with elevated risk ratings. Waist circumferences were measured using 0.1 cm precision anthropometric tape measurement.

*Phase II:* Data was obtained from the time between 3.4.19 and 4.6.19. Using the Stratified Random Sampling process, selected research subjects were split into two categories. Before enrolling the participants in the study, the specifics of the analysis were clearly outlined in the Tamil language.

Of the 40 study participants, written consent in Tamil was received. Based on the previous report, 3 g of Cumin Powder with hot water was given. The research participants were explained on the spot with a description of the intervention and monitoring sheet protocol. Cumin Powder (3 g) Pack (50 microns insect safe polyethylene food product storage cover) was distributed on the spot for 7 days and distributed via home visit for the remaining days. Via cell phone and home visits, follow-up was achieved.

*Phase III:* The post test was performed for a total of 4 days on the 70th day (10 weeks) (05.08.19 to 10.08). In post test 40 research participants gave blood samples for testing; all study participants were followed up, none of them had dropped out. Biological measurements were recorded for Pre and Post Intervention. Clients did not register any concerns and they extended the treatment for 10 weeks. Minimum 70 days only the cumin powder will give some change to reduces cholesterol level.

### 3 Results and discussion

Table 5 shows the distribution of participants according to the demographic variables. The variables assessed in this study are age, gender, education, occupation, income per month, religion, marital status, type of family, dietary pattern and type of worker. The majority of the participants were 41–50 years of age, married and had undergraduate. Most of them were home maker and monthly income was between Rs. 10,000–15,000 rupees. Most of the participants were living in nuclear families and non-vegetarian food pattern. And all the participants belonged to the sedentary type of workers.

**Table 5** Distribution of participants according to the demographic variables

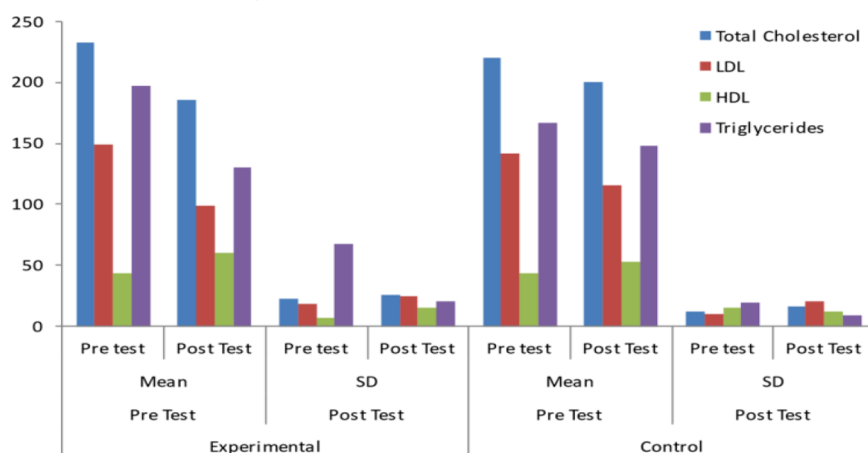
<i>Demographic variables</i>		<i>Group</i>			
		<i>Experimental group</i>		<i>Control group</i>	
		<i>F</i>	<i>%</i>	<i>F</i>	<i>%</i>
Age in years	20–30 years	5	25	4	20
	31–40 years	5	25	5	25
	41–50 years	6	30	6	30
	51–60 years	4	20	5	25
Gender	Female	10	50	10	50
	Male	10	50	10	50
Education	Higher secondary education	9	45	9	45
	Under graduate	10	50	11	55
	Postgraduate	1	5	0	0
Occupation	Government sector	0	0	5	25
	Private sector	4	20	2	10
	Self employed	5	25	0	0
	Home maker	11	55	13	65
Income per month	Rs. 10,000–15000	16	80	13	65
	Rs. 15,000–20,000	4	20	2	10
	Above Rs. 25,000	0	0	5	25
Religion	Hindu	16	80	16	80
	Muslim	2	10	2	10
	Christian	2	10	2	10
Marital status	Married	20	100	20	100
Type of family	Nuclear	16	80	16	80
	Joint	4	20	4	20
Dietary pattern	Vegetarian	3	15	3	15
	Non vegetarian	17	85	17	85
Type of worker	Sedentary worker	20	100	20	100

Demographic data could provide the base line information and to associate with pre test. Mean HDL level of Experimental Group was 43.35 mg/dl with SD of 6.5 and Control Group was 44 mg/dl with SD of 15.3. Post interventional Mean Lipid levels of Experimental Group were 60.5 mg/dl with SD of 15.29 and Control Group was 53.25 mg/dl with SD of 11.79. Mean Triglycerides level of Experimental Group was 197.5 mg/dl with SD of 67.1 and Control Group was 166.35 mg/dl with SD of 19.14 Post interventional Mean Lipid levels of Experimental Group was 130.35 mg/dl with SD of 20.14 and Control group was 147.55 mg/dl with SD of 8.6. Mean Triglycerides level of

Experimental Group was 197.5 mg/dl with SD of 67.1 and that of Control Group was 166.35 mg/dl with SD of 19.14 Post interventional Mean Lipid level of Experimental Group was 130.35 mg/dl with SD of 20.14 and that of Control Group was 147.55 mg/dl with SD of 8.6.

Figure 1 shows the cholesterol level distinction of the Experimental and Control Community in Pre test and Post test. It was highly significant ( $p < 0.05$ ), showing the effectiveness of cumin power in decreasing the level of cholesterol among patients. The comparisons of means of cholesterol, LDL, HDL and triglycerides carried out by parametric test (paired t test).

**Figure 1** Distribution of mean and SD of cholesterol levels of adults with obesity (see online version for colours)



**Table 6** Comparison of pre-test cholesterol levels between experimental and control groups of adults with obesity

Lipids levels	Experimental		Control		t-value	p-value
	Mean	SD	Mean	SD		
Total cholesterol	232.9	22.21	219.95	12.27	2.282	0.03
LDL	149.3	18.25	141.6	9.87	1.66	0.11
HDL	43.35	6.5	44	15.3	-0.348	0.73
Triglycerides	197.5	67.1	166.35	19.14	1.997	0.05

Table 6 shows that Pre interventional Mean cholesterol level of Experimental Group was 232.9 mg/dl with SD of 22.21 and Control Group was 219.95 mg/dl with SD of 12.27. Post interventional Mean Lipid level of Experimental Group was 185.25 mg/dl with SD of 25.85 and Control Group was 200.15 mg/dl with SD of 16.11.

Table 7 shows a Mean LDL level of Experimental Group was 149.3 mg/dl with SD of 18.25 and Control Group was 141.6 mg/dl with SD of 9.87. Post interventional Mean Lipid level of Experimental Group was 98.45mg/dl with SD of 24.35 and Control Group was 115.7 mg/dl with SD of 20.9.

**Table 7** Comparison of post-test cholesterol levels between experimental and control groups of adults with obesity

<i>Lipids levels</i>	<i>Experimental</i>		<i>Control</i>		<i>t-value</i>	<i>p-value</i>
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>		
Total cholesterol	185.25	25.85	200.15	16.11	-2.88	0.35
LDL	98.45	24.35	115.7	20.9	-2.40	0.02
HDL	60.5	15.29	53.25	11.79	1.68	0.10
Triglycerides	130.35	20.14	147.55	8.6	-3.51	.001

Latest reports show that cumin could be effective in reducing cholesterol and losing weight. For individuals seeking to lose weight, cumin can be beneficial. People have experienced a drop in their insulin levels in the cumin community. Higher HDL or 'good' cholesterol levels were also present in the women who ate the cumin powder.

The research found that the cumin powder has an impact on the amount of cholesterol in urban areas among adults with obesity in Puducherry. Ten weeks of hot water, cumin powder consumption resulted in a substantial reduction in overall cholesterol of 47.65 mg/dl ( $p < 0.05$ ) in the study community compared with 19.8 mg/dl ( $p < 0.05$ ) in the control group. Results have shown that hot water cumin powder is efficient in reducing the amount of total cholesterol, LDL, HDL and triglycerides. In the 21st century, lifestyle decisions are frequently based on convenience practises for individuals and families, rather than sound lifestyles and well-being, and have resulted in an obesogenic (environmental factors that foster unnecessary weight gain) and chronic disease society that is responsible for declining health in children and potential adults today.

A similar research was carried out on the effect of cumin cyminum + lime water on the removal of excess weight, using the non-probability comfort sampling method. The investigator clarified the intent of the analysis after choosing the sample and informed consent was obtained. For the student community, water on an empty stomach for three weeks in the early morning. Descriptive and inferential statistics were used to tabulate and interpret the results. At  $p < 0.005$ , the measured 't' value is important.

In this current research with regard to the comparison of the level of total cholesterol in the pre-test and the level of the post-test at  $p < 0.000$ , it is shown that the efficacy of cumin powder in reducing the level of cholesterol among patients is highly important.

A review to determine the influence of cumin powder in overweight and obese women on body shape and lipid profile. Health therapy for weight loss was offered to both patients in a similar way. Results showed that cumin powder decreased serum levels and raised HDL levels. In type 2 diabetes, the results were compared with antidiabetic medications in patients with type 2 diabetes, the beneficial benefits of cumin seeds have been tested.

### 3.1 Strengths and limitations of the study

The present study found that cumin powder has an impact on the level of cholesterol in urban areas among adults with obesity in Puducherry. Ten weeks of ingestion of cumin powder with hot water resulted in a substantial 33.725 mg/dl drop in total cholesterol

( $p < 0.000$ ). The outcome revealed that the hot water, cumin powder is effective in lowering total cholesterol and BMI.

*Limitations:* overweight adults as regards the weakness of our study. Thus, it was not possible to generalise the findings to other groups.

### *3.2 Interpretation and implications*

Latest studies have established that cumin can be effective in cholesterol letdown and weight loss. Those trying to reduce weight can lose weight with cumin. People have experienced a drop in their insulin levels in the cumin community.

One other study showed that overweight and obese women who consumed 3 grams (g) of cumin powder incorporated in yoghurt per day for 3 months had substantial decreases in body weight, waist conditions, and body fat. Similar to the current research, overweight and obese women have concluded that eating 3 g of cumin powder every day resulted in a reduction in overall cholesterol levels. Controversies raised by this study: No controversies were raised by this study.

#### *3.2.1 Future research directions*

Studying the effects of cumin among diverse people groups such as diabetic and dyslipidemia patients with various amounts (dose) of cumin seeds, measuring various lipid profiles, parameters, effect of cumin power in Kidney function, Liver function and interval will provide good results.

## **4 Conclusion**

Overweight and obesity have been prevalent over the past few years, affecting developed and emerging countries like India. There is a nutritional change from a traditional starch diet to rapid eating patterns in India, which has influenced young adults in particular. A significant number of debilitating and life-threatening diseases, such as coronary heart disease, metabolism and other non-communicable diseases, are linked to obesity. A combination of factors such as diet, genetic predisposition, lack of physical exercise and other life-style factors are the causes of obesity in adults. In India, obesity is 50% prevalent among women and 32.2% among men in the upper classes of society. The prevalence of obesity in Delhi is 33.4% of urban women and 21.3% for men. Obesity is not only a problem for adults, but for children and young people around the world as well. In India, until recently, little attention was given to obesity among children and teenagers. Type 2 diabetes, asthma, stroke, coronary heart attack, gall bladder disease, asthma, psychiatric disorders and so on are risks of obesity. The societal effects of obesity are a significant topic of focus that is frequently underestimated. The obese have fewer job chances and weaker self-esteem, and perform less well academically. If this obesity becomes a troubling sign, young adult-based interventions such as improvements in diet and physical education need to stop this.

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