

Review Article

Dyslipidemia and obesity management; lifestyle modification: an Indian perspective

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ABSTRACT

In India, obesity is an emerging health problem, along with its co morbidities. This is due to change in life style and dietary patterns of people in developing world. In India, there is rapid rise in number of deaths due to CVD and its prevalence in society is at an alarming rise. Around half of these deaths are of the people in there productive years leading to loss of productive workforce. This has occurred not only due to reduction in physical activity but also due to increased intake of saturated fats and decreased intake of staple foods. There is a rapid increase in cholesterol, triglycerides, and LDL levels while HDL levels are low. This can be curbed at an early stage by changes in lifestyle and diet. Though various diets have been advised and are being used in western individuals but it is a less looked upon topic in Indians, so in this article we try to look upon physical activity guidelines and dietary patterns advised for Indian population.

Keywords: Dyslipidemia, Life style modification, Obesity

INTRODUCTION

In both developed and developing countries around the world, the prevalence of obesity is rising at an alarming rate and many Indian epidemiological studies have shown that the prevalence of overweight and obesity ranged between 30% and 65% among the urban population.¹ In India, rise in obesity is posing as an emerging health problem, particularly in urban areas, paradoxically co-existing with under nutrition.² The rising prevalence of overweight and obesity in India has led to the increasing prevalence of obesity-related co-morbidities such as hypertension, the metabolic syndrome, dyslipidemia, type 2 diabetes mellitus (T2DM) and cardiovascular disease (CVD).^{3,4} In India, there has been an increase in the prevalence of CVD over the past two decades at an

alarming rate so that it accounts for 24% of all deaths among adults aged 25-69 years.⁵ Asian Indians develop CVD at a younger age than other populations.⁶ The likely causes for the increase in the CVD rates include lifestyle changes associated with urbanization and the nutritional changes that accompany economic development.⁷ Dyslipidemia has been independent modifiable risk factor for cardiovascular disease, which is also linked to its pathophysiology.^{8,9} According to the report, jointly prepared by the World Health Organization and the World Economic Forum 60% of all deaths worldwide in 2005 (35 million) resulted from non-communicable diseases and of these 44% were premature deaths.¹⁰ Almost half of the people who die from chronic diseases should be in their productive years. The report also reveals the fact that countries like Brazil, China, Russia

and India currently lose more than 20 million productive life-years annually to chronic diseases and the number is expected to grow by 65% by 2030. The report, also says India will incur an accumulated loss of \$236.6 billion by 2015 on account of unhealthy lifestyles and faulty diet. According to a survey conducted by the Associated Chamber of Commerce and Industry (ASSOCHAM) 68% of working women in the age bracket of 21-52 years were found to be afflicted with lifestyle ailments such as obesity, depression, chronic backache, diabetes, hypertension and dyslipidemia. In many developing countries, peoples' diet has changed radically in the second half of the twentieth century with increase in consumption of meat, dairy products, vegetable oils, fruit juice, and alcoholic beverages, and decrease in consumption of starchy staple foods such as bread, potatoes, rice, and maize flour.¹¹ Along with large reductions in the amount of physical activity, there is increased prevalence of obesity. Sedentary lifestyle is associated with the increased occurrence of obesity and metabolic syndrome. Increase in Regular physical activity along with low saturated fat in diet would help curb the growing menace of obesity and its co morbidities the available studies suggests that the cholesterol levels are steadily rising among Indians.¹² When compared with the western populations, Indians tend to have higher TG levels and lower HDL-C levels but the total cholesterol and LDL-C levels are generally lower. Among various lipid markers, the ratio of Apo B: Apo A-I appears to be the best indicator of CV risk.¹³

Prevention is better than cure so in article we will look upon lifestyle management which includes both dietary and physical activity guidelines for management of obesity and dyslipidemia which is much less researched topic in Indian patients.

CUT OFFS FOR OBESITY IN INDIANS

World Health Organization currently recommends BMI cut-offs as 18.5 - 24.9 kg/m² for normal, 25.0 - 29.9 for overweight and >30 kg/m² for obesity.¹⁴ These values are largely based on the data from the white Caucasian populations and may not be applicable to Asian Indians.¹⁵⁻¹⁷ Asian Indians when compared to Caucasians have higher percentage body fat, abdominal adiposity at lower or similar BMI levels.^{15,18-20} According to consensus statement for diagnosis of obesity published in 2009 the cut off for BMI for Asian Indians is Normal BMI: 18.0-22.9 kg/m², Overweight: 23.0-24.9 kg/ m², Obesity: >25 kg/m².

According to consensus statement for diagnosis of obesity published in 2009 the cut off value for waist circumference as recommended by IDF (>102 cm in men and >88 cm in women) are not applicable to all the populations due to heterogeneity in the average levels of measurements and different relationship with cardiovascular risk.

According to the consensus statement

- Methodology of WC Measurement: WC should be measured using non-stretchable flexible tape in horizontal position, just above the iliac crest, at the end of normal expiration, in the fasting state, with the subject standing erect and looking straight forward and observer sitting in front of the subject
- Based on the current evidence, WC is preferred over WHR as a measure of abdominal obesity with Asian Indian specific cut-offs.
- Both BMI and WC should be used together (with equal importance) for population- and clinic-based risk stratification.
- WC Cut-offs for Asian Indians.
 - a) Action level 1: Men: 78 cm, women: 72 cm. Any person with WC above these levels should avoid gaining weight and maintain his or her physical activity to avoid acquiring any of the cardiovascular risk factor. These cut-offs need to be researched further.
 - b) Action level 2: Men: 90 cm, women: 80 cm. Subject with WC above this should seek medical help so that obesity-related risk factors could be investigated and managed.²¹

DYSLIPIDEMIA IN INDIAN POPULATION

According to lipid association of India expert consensus statement on management of dyslipidemia in Indians 2016: Part 1, it is suggested that the cholesterol levels are steadily rising among Indians, when Compared with the western populations, Indians tend to have higher TG levels and lower HDL-C levels but the total cholesterol and LDL-C levels are generally lower. Among various lipid markers, the ratio of Apo B: Apo A-I appears to be the best indicator of CV risk.

According to ICMR-INDIAB study Over three fourth (79%) of the general Indian adult population was covered in this survey. they had abnormalities in at least one of the following lipid parameters, Hypercholesterolemia was found in 13.9%, hypertriglyceridemia in 29.5%, low HDL-C in 72.3% and high LDL-C in 11.8% of the population. Despite the regional differences, low HDL-C was the most common lipid abnormality in all the four regions which were studied and 44.9% had isolated low HDL cholesterol higher mean concentrations of cholesterol in urban subjects (178-201 mg/dl) compared with rural subjects (166-178 mg/dl), with a low mean concentration of HDL cholesterol.³⁰

Although these levels are low when compared to other population but studies have shown that South Asians manifest CVD at lower levels of total cholesterol when compared with other ethnic groups.³¹

MANAGEMENT OF OBESITY AND DYSLIPIDEMIA

Physical activity

Physical activity is defined as any activity leading to calorie consumption. Physical inactivity should be avoided. Prior to participation medical consultation is recommended for those with chronic conditions or those who are symptomatic with CVD. Inactive people should start exercise slowly and then gradually increase their physical activity. Brisk walking is defined as walking at an intensity wherein an individual find speaking difficult but not impossible; it is preferred initial mode of exercise and as this does not require any special training. A total of 60 minutes of physical activity is recommended every day, which includes aerobic activity, work-related activity and muscle strengthening activity.²²

This Physical activity can be accumulated throughout the day in short blocks of 10 minutes. We should encourage Work-related physical activity wherever possible. For more extensive health benefits, adults can increase their aerobic physical activity to 300 minutes that is 5 hours per week in case of moderate-intensity aerobic activity, or 150 minutes per week of vigorous-intensity aerobic physical activity. But this topic needs to be researched among Asian Indians. The decision for the amount of Physical activity must be individualized on the basis of personal capabilities and associated comorbidities. Just like pharmacological therapy it requires careful prescription with consideration of both appropriate dosage and frequency.²³⁻²⁶ In Children outdoor playing activity recommended for at least 60 min and Screen time for children should be limited to less than 2 hours a day. The physical activity guidelines have been given in Table 1.

Table 1: Summary of consensus physical activity guidelines for Asian Indians⁴²

Disorders	Physical activity* guidelines
Obesity	Moderate-intensity aerobic activity: 60 min/day. Vigorous-intensity activity: 60 min for 3 or more days/week
Coronary heart disease (CHD) and HTN	The activity should be individualized according to the cardiac and physical status of the patient, usually 210 min/week of moderate-intensity physical activity should be achieved as recommended. Depending on the clinical condition of the individual, a low-intensity, individualized, supervised exercise program could also be devised
Diabetes	Daily physical activity of at least 60 min duration including 10-15 min of resistance exercises and work-related activity
Box	
1	Low-intensity physical activity elicits when there is a slight increase in breathing rate relative to a given individual (e.g. strolling <3 km/h on level firm ground, tidying the house, leisurely stationary cycling <50 W or <16 km/h and cooking)
2	Moderate-intensity physical activity elicits when there is a moderate, but noticeable increase in depth and rate of breathing while still allowing comfortable talking relative to a given individual (e.g. purposeful walking 3–6 km/h on level firm ground, water aerobics, cycling outdoors for pleasure at 19–23 km/h, cleaning the house, hiking and gardening)
3	Vigorous-intensity physical activity elicits when there is a noticeable increase in depth and rate of breathing and will not allow an individual to speak more than a few words without pausing for breath (e.g. walking 1 km in less than 10 min, jogging, cycling outdoors at 23-26 km/h, aerobic dancing and jumping rope)

* Definitions of physical activity intensity levels are provided in the box below.

Table 2: Calculation of ideal body weight.

Build	Women	Men
Medium	100 lbs (45.5 kg) for first 5 ft (152 cm) height, plus 5 lb (2.3 kg) for each additional inch	106 lbs (48 kg) for first 5 ft (152 cm) of height, plus 6 lbs (2.7 kg) for additional inch
Small	Subtract 10%	Subtract 10%
Large	Add 10%	Add 10%

Source: Adapted from Committees of the American Diabetes Association Inc. and American Dietetics Association, 1977 A Guide for Professionals: The Effective Application of "Exchange Lists for Meal Planning." New York: American Diabetes Association; Chicago: American Dietetic Association, 1977.⁴³

Dietary management

There is a rapid change in dietary patterns in developing world particularly in South Asians that has resulted in excessive consumption of calories, saturated and trans-fatty acids, simple sugars and salt, and low fibre consumption.²⁷

The energy requirements that are suggested are based on the activity profile included sedentary, moderate or heavy, age, gender and physiological status of an individual. Ideally, BMI should be maintained between 18 and 22.9 among Asian Indians. Energy intake should be managed such that it is enough to support daily energy needs, and still allowing for a 5%-10% body-weight loss, if needed.²⁸ Energy requirement for any individual is calculated by multiplying the activity factor by ideal body weight of that individual (please see the Tables 2 and 3).

Table 3: Calculation of energy requirement.

Energy requirement (Kcal/Kg IBW/day)			
Activity	Obese	Normal	Underweight
Sedentary	20-25	30	35
Sedentary	30	35	40
Heavy	35	40	45-50

Source: Williams, 1989 Williams SR: Nutrition and Diet Therapy, 6th ed. St. Louis: Times Mirror/Mosby, 1989.⁴⁴

CARBOHYDRATES

Carbohydrates which form an important component of the diet are divided into simple and complex carbohydrates. Complex carbohydrates, as consumed by Asian Indians include whole wheat, brown rice, millets and legumes and these should be preferred over refined carbohydrates. Preference should be given to foods with a low glycemic index such as oats, unpolished rice, whole pulses, beans and legumes while foods with a high glycemic index such as refined flour and root vegetables should be avoided. Simple sugars which consist of crystalline sugar, sugarcane juice, sweetened carbonated beverages, fruit juices and sugar syrups should be completely avoided.²⁸ The daily carbohydrate intake of an individual should be approximately 50-60% of the total calorie intake. For example, in an 1800 and 2000 calorie diet, the carbohydrate intake for a sedentary to moderately active individual should be 225-270 g/day and 250-300 g/day, respectively.³²

DIETARY FIBER

The total dietary fiber requirement in the daily diet should be at least 25-40 g/day.²⁸ Diets higher in soluble fiber can lead to total cholesterol reductions of 5% to 19% and low-density lipoprotein cholesterol (LDL-C) reductions of 8% to 24%. Foods which contain high soluble fiber include oat bran, oatmeal, beans, peas, rice bran, barley, citrus fruits, strawberries, and apple pulp.³³ A minimum of four to five servings per day of fruits and

vegetables are recommended by dieticians, i.e., approximately 400-500 g/day including 3 vegetables and 2 fruit portions. [e.g., 100g (one katori) raw vegetables = 20-30 Kcal, 100 g fruit = 59 Kcal]. Fruits should be eaten as a whole preferably with the skin, avoid fruit juices.³²

PROTEIN

The recommended protein intake should provide 10-15% of the total calories per day in sedentary to moderately active individuals.²⁸ It should be up to 1gm/Kg/day in accordance with Indian diet.³² However, in cases with renal problems, its consumption needs to be closely monitored under strict medical supervision and modified accordingly. Red meats should be replaced with lean meat such as chicken or fish. South Asians are predominantly vegetarians, so high-quality protein is not available to the body; so it is recommended to include low-fat dairy products such as milk, buttermilk, cottage cheese or curd, along with other vegetarian sources of protein (soy, pulses or whole grams).²⁷

FATS

Fat consumption in India ranges from 13 to 59 g/d. In rural areas in India fat consumption is 17% of energy intake is from dietary fat as compared to urban population where it is 22%.³⁴ Although it has not been well investigated in healthy individuals, long-chain n-3 fatty acids supplementation clearly lowers levels of serum triglycerides.³⁶ It is recommended Fats should not provide more than 30% of total energy per day and saturated fatty acids should not provide no more than 10% of the total energy per day. For people's having LDL-c levels ≥ 100 mg/dl, foods containing saturated fatty acids such as butter, clarified butter or full-fat dairy products should be $<7\%$ of the total energy intake per day. Essential polyunsaturated fatty acids (PUFA) such as linoleic acid (LA) should provide 5-8% of the total energy intake per day and α -linolenic acid (ALA) should be 1-2% of the total energy intake per day. Preferred combinations of vegetable oil(s) along with ALA containing oil(s) or vegetable oil containing high LA along with moderate or low LA containing oil(s) are listed below. However, the latter combination would ensure moderation in LA intake only and it is recommended only when other dietary components that provide high ALA intake such as fish, wheat, millet, fenugreek, flaxseeds, etc should be consumed. It is seen that Improvement of n-3 PUFA nutritional status in Indian adults has been shown with two of these oil combinations (groundnut oil/sunflower oil and canola).³⁶ Consumption of butter and ghee (clarified butter) should be kept to minimum or avoided. Use of vanaspati, as cooking medium should be totally avoided. Coconut oil, palm kernel oil, palm oil and palmolein or their solid fractions should be substituted for PHVO (Vanaspati) in foods that require solid fats such as bakery fats. These oils are high in SFAs but are TFA free in order to ensure correct balance of fatty acids from dietary components

other than visible fat regular consumption of foods with high ALA content such as wheat, pearl millet, pulses, green leafy vegetables, fenugreek, flaxseed, mustard seeds are encouraged.³⁶ Partial substitution of visible fat and invisible fats from animal foods with whole nuts such as pistachios and almonds is recommended. There should be Moderation in the use of animal foods containing high fat, SFAs and cholesterol. For non-vegetarians, recommended consumption of fish is 100-200 g fish i.e. 4-6 pieces per week. Reduce the consumption of premixed, ready-to eat, fast foods, bakery foods and processed foods prepared in PHVO (hydrogenated fat) like savory (namkeen). It is recommended to use low fat dairy foods such as double toned milk (fats <1.5%) or curd which is prepared from such milk. The preference of low fat dairy foods would also reduce ruminant TFAs.³⁶⁻³⁸ Cis-monounsaturated fatty acids such as olive, mustard, rapeseed, rice bran and groundnut oil should provide 10-15% of the total energy intake per day. Trifluoroacetic acids (partially hydrogenated vegetable oils: vanaspati, margarine and reheated oils) are best avoided. Recommended Cholesterol intake is 200-300 mg/day.²⁸ It is recommended to use two or more vegetable oils for optimal intake of fatty acids.²⁹ Some recommended oil combinations are Groundnut/rice bran/cotton seed + Mustard/ Soyabean.³²

Safflower/sunflower +olive/Groundnut/ Rice bran

Patients at risk for the metabolic syndrome are advised to avoid excessive carbohydrate intake and to consume diets containing relatively more unsaturated fats.^{39,40}

SALT

It is recommended that the total salt intake of an individual should be <5 g of sodium chloride per day.²⁸ Dietary intake of sodium from pickles, chutneys, processed foods snacks, bakery items, sauces, preserved meat products, other pre-prepared and preserved foods, soups or cheese should be decreased.²⁷

Free sugars should provide only less than 10% of total calories/day, which includes all added sugars and sugars present in honey, syrups and fruit juices whose alternatives should be used.⁴¹ Alternatives to sweetened beverages can be water, skimmed buttermilk, tender coconut water, low fat milk and they should be used. Indian sweets, halwa, kheer, puddings, ice creams, sweetened biscuits, cakes, pastries and baked goods are high in added sugars and their use should be restricted.³² Regular excessive intake of alcohol is harmful. Till more data are available for Asian Indians, non-consumers of alcohol should not have alcohol.³²

Numerous studies have been done in the developed countries for weight loss in individuals with obesity using different diets targeted at weight reduction, e.g. the Pritikin Principle, Nutrisystem advanced, Ornish Diet or

Weight Watchers Diet; however, the efficacy of these or similar diets is yet to be researched in South Asians.^{29,44}

CONCLUSION

Indians are facing epidemic of obesity leading to dyslipidemia and increased cardiovascular morbidity and mortality. Successful management of dyslipidemia and obesity is needed for primary prevention of cardiovascular diseases as well as diabetes. Management includes a good dietary and lifestyle intervention. Currently good evidences are available for effective dietary approaches as well as physical activity guidelines for prevention of obesity and dyslipidemia. It is better to act before the obesity epidemic runs out of proportion.

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