Chapter II

REVIEW OF RELATED LITERATURE

A careful review and exploration of the related literature and research studies are essential to have an insight into the work already been done in the field. The research scholar has given these studies a deep thinking and has gained theoretical frame from their research findings which were of great help in developing the present research work. The research has reviewed all the available research studies and has presented below:

Regular exercise programs have been shown to increase the HDL fraction. One of the reasons why HDLs are not harmful is that they do not collector adheres to the inner linings of arteries. In fact, they may actually help break down the fatty deposits already present. The fatty atherosclerotic deposits are composed of low-density lipoprotein (LDL) and very low density (VLDL) lipoprotein cholesterol fraction. The LDL is the primary carrier of cholesterol in the bloodstream, whereas the principal lipid components of VLDL are triglycerides. The possible mechanisms by which HDL cholesterol decreases athero sclerosis include: (1) a reversal of cholesterol
transport from peripheral cells to the liver for removal from the body, and (2) inhibition of LDL cholesterol level, with low LDL AND VLDL fraction plus a high HDL fraction, appears to be a healthy balance with respect to blood cholesterol. Ratios of 4.0 (total cholesterol: HDL cholesterol) or alternatively, 0.25 (HDL cholesterol: total cholesterol) have been suggested as healthful standards. The reader is referred to a recent review summary of the effects of physical activity on these lipid and lipoprotein sub fractions.¹

Recent research has shown that exercise not only lowers total blood cholesterol, but also increases the fraction of cholesterol known as high-density lipoproteins (HDL) and decreases the low-density lipoprotein (LDL) fraction. As mentioned previously, HDL cholesterol is thought to be protective against coronary heart disease whereas LDL is not.²

Exercise training causes a decrease in blood pressure, particularly in those subjects who are hypertensive. 13,14,42,49 The results of one of these studies is shown in Figure of one of these studies is shown in Figure 15-10. Notice that blood pressure at rest as

²Ibid: p. 430
well as during exercise was reduced following 6 months of exercise training. Before training, the subjects were considered border line hypertensives, after training, they had normal blood pressures.¹

In a recent review of the literature concerning the effects of exercise on blood pressure, the following conclusions were noted.

1. In epidemiological surveys, men in physically active occupations had lower systolic and diastolic blood pressures than did those in sedentary work.

2. Men identified as physically fit by a bicycle ergometer test had lower systolic and diastolic blood pressures than did those identified as unfit.

3. Two studies showed decreases (one did not) in both blood pressures from participation in exercise regimens of the walk jog type. In one of these studies, the subjects had multiple coronary heart attack risk factors, including high blood pressure.

4. In one study, hypertensive men lowered their blood pressures following participation in isometric exercise over a period of 5 to 8 weeks.

5. Two studies reported improved blood pressure of post coronary patients with elevated blood pressures as a result of aerobic-type training over a period of 3 to 8 months. Matched control groups did not improve.

6. As might be expected, the effects of exercise on systolic and diastolic blood pressures of hypertensive individuals are greater than for those with blood pressures within the normal range.

7. One investigator concluded that the physiological advantages from lowering blood pressure through exercise in hypertensive populations are sufficient to encourage the inclusion of exercise within most therapeutic programs designed to manage this disease.

Cardiac dysrhythmias, or disturbances in the rhythm (beating) of the heart, may lead to serious cardiac problems, including heart attack and even death. It has been suggested that regular exercise tends to reduce the susceptibility of the heart to rhythm disturbances. The
physiological mechanism involved is not clear however it may be related to a lesser production of epinephrine and other catecholamines.⁴

Back problems are the most common physical complaints among American adults. Non-specific back pain is a leading cause of lost job time, to say nothing of the time and money spent in search of relief. And it’s all because of one characteristic that makes us different from other animals – our upright posture.⁵

The spinal column is an extraordinary mechanism, providing the stability we use to stand upright and the flexibility we need for active movement. The spine, or backbone, is actually a stack of 24 individual bones called vertebrae. A healthy spine is S-shaped when viewed from the side, curving back at the shoulders and inward at the neck and small of the back. As well as being the body’s main structural member, it houses the spinal cord – the intricate sensory network that runs through the vertebrae to transmit feeling and control movement throughout the entire body.


The main reason late-20th-century Americans suffer from back problems is that we are increasingly defying our evolutionary heritage and becoming sedentary creatures. The upright posture is designed for walking, and for most of human history that's what people did. Only in this century, with the advent of motor vehicles, have most people gone from place to place while sitting down. In much the same way, our work habits are changing. Most of our ancestors worked standing up — hunting, gathering, working on farms or at workbenches. Today, a high proportion of people spend the better part of their working day sitting at desks, at work stations, or in cars and trucks. These recent but momentous changes in human behavior have had a profound — and largely negative — impact on human physiology.

People who walk a lot or do physical labor develop good muscle tone in their backs and legs. People who sit most of the day lose that muscle tone, and their backs are the first place to show it. To compensate, many of us turn to exercise programs: In some instinctual way, we are hearing our bodies cry out for the old ways that demanded more activity. If you are a healthy, active adult and your normal activities keep you on the go, you may not need a special exercise routine; if you work in a sedentary job or if you aren't building several
hours of walking or other physical activity into your weekly routine, you should exercise regularly, with emphasis on toning up those muscles that keep your back strong.

Most of us experience the discomfort of tired, stiff, aching legs every now and then. Many people, however, must cope with this sensation on a daily basis. This condition, called intermittent claudication, results from blocked arteries in the pelvis, thighs, or calves and most often is caused by atherosclerosis, commonly known as hardening of the arteries. But circulatory problems come in many other forms as well. Most can be treated effectively at home and in consultation with a doctor. In severe cases, though, a corrective surgical procedure may be appropriate.⁶

Blood circulates through the body via a complex system of vessels. Arteries carry oxygen-rich blood from the heart to the rest of the body; veins return oxygen-depleted blood from distant reaches of the body to the heart. Circulatory problems arise when these vessels become blocked or overly constricted. Such interruptions in normal blood flow can be brought on by a variety of conditions. Weakened

arterial walls, for example, can balloon out and form pockets that trap blood. Veins can stretch, causing their internal valves to malfunction, and vascular disease can cause vessels to constrict. Most of the time, the discomfort caused by circulatory irregularities is confined to the buttocks and legs, but it can also affect other parts of the body.

Your digestive system is remarkably efficient: In the space of a few hours it extracts nutrients from the foods you eat and drink, processes them into the bloodstream, and prepares leftover material for disposal. That material passes through 20 or more feet of intestine before being stored temporarily in the colon, where water is removed. The residue is excreted through the bowels, normally within a day or two.

Some people – including many alternative therapists – say we should move our bowels one to three times a day to remain healthy, but this opinion is not backed by scientific studies. Depending on your diet, your age, and your daily activity, regularity can mean anything from three bowel movements a day to one every three days. Nonetheless, the longer fecal material sits in the colon, the harder the

stool becomes and the more difficult it is to pass. A normal stool should not be either unusually hard or soft, and you shouldn’t have to strain unreasonably to pass it.

Almost all of us feel low sometimes, usually because of a disturbing event in our lives. But ongoing depression – suffering a period of what is known as major depression – is another matter. Depression in some form affects 25 percent of all women, 10 percent of all men, and 5 percent of all adolescents worldwide. It is the most common psychological problem in the United States, afflicting some 17.6 million people each year. 8

**Depressive reaction** (minor and often temporary depression) encompasses the normal depressed feelings that arise because of a specific life situation. The symptoms can be severe, but they usually do not need treatment and abate over time – anywhere from two weeks to six months.

**Dysthymia** (minor, chronic depression), similar to depressive reaction in its symptoms and degree of suffering, lasts longer – at least two years.

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Major depression, or depressive illness, is a serious condition that can lead to an inability to function or even to suicide. Sufferers experience not only a depressed mood but also more harmful symptoms, including disinterest in their usual activities, extreme fatigue, sleep problems, or feelings of guilt and helplessness. They are more likely to lose touch with reality, sometimes having delusions or hallucinations. Depressive illness can be treated but often goes undiagnosed because it is confused with depressive reaction. It is a cyclical illness, so though most patients recover from their first depressive episode, the recurrence rate is high – perhaps as high as 60 percent within 2 years and 75 percent within 10 years. Major depression often appears spontaneously, is seemingly unprovoked, and often disappears spontaneously as well, usually in 6 to 12 months. Because of its disabling effects or the possibility of suicide, major depression needs treatment.

Depression can strike at any age, including in childhood. Studies in the United States show that 1.8 percent of prepubertal children and 4.7 percent of 14 to 17 years – olds have some form of depression. However, the common time of onset is early middle age, and depression is particularly rife among the elderly, as a reaction to the
facts of growing older – the death of a spouse or friends, the physical limitations of age, and the impending confrontation with death. Elderly widowers are particularly susceptible to suicide.

Diabetes mellitus, the most common disorder of the endocrine system, affects between 10 million and 20 million people in the United States alone. The disease is brought on by disorders in blood levels of insulin, a pancreatic hormone that helps your system convert blood glucose, or blood sugar, into energy. **Type 1 diabetes** – sometimes called insulin-dependent diabetes mellitus (IDDM). Or juvenile or juvenile onset diabetes – results from a shortage of insulin. **Type 2 diabetes** – also known as non-insulin dependent diabetes mellitus (NIDDM) or adult onset or stable diabetes – results from the body’s inability to process the hormone effectively. About 90 percent of all diabetics have this form.\(^9\)

Regardless of what type of diabetes you have, you need to work closely with your doctor to manage your diet, medication, and activity on a day-to-day basis. Your ability to oversee your own care will make

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a huge difference in whether you can control the condition and avoid its potentially serious effects.

The many short- and long-term complications of diabetes can demand as much attention as the disease itself. Most important, you need to watch your blood sugar levels every day to prevent an attack of hypoglycemia, in which available levels of blood sugar are too low to fulfill your body's energy needs. Hypoglycemia can easily be remedied, however, once you recognize its symptoms.

**Hyperglycemia**, or high blood sugar, can bring on a serious diabetic condition known as ketoacidosis, in which the blood becomes increasingly acidic from the accumulation of toxic by-products called ketones that are produced as the body breaks down fat for energy. Ketoacidosis occurs in Type 1 diabetics if they do not receive adequate supplementary insulin and their bodies are starved for energy sources. Ketoacidosis can also occur in diabetics if glucose and insulin levels are not properly balanced, or if the body comes under sudden physical stress, perhaps from an accident or illness. (Any sort of illness increases the body's need for insulin to process blood glucose into the energy required to fight illness or infection.)
If you are diabetic, be especially alert for the warning signs of ketoacidosis: nausea, excessive thirst, frequent urination, extreme weakness, abdominal pain, and rapid deep breathing. Failure to respond immediately with injections of insulin and intravenous salt solutions (to replenish lost body fluids) can result in coma or death.

Long-term complications of diabetes can damage the eyes, nervous system, kidneys, and cardiovascular and circulatory systems, as well as hinder the body's overall resistance to infections. Cuts and sores heal more slowly for people with diabetes, and diabetics are also prone to gum problems, urinary tract infections, and mouth infections such as thrush, caused by an overgrowth of yeast organisms. (See also Urinary Problems and Yeast Infections).

Complications from diabetes are the primary cause of adult blindness in the United States. Within 10 years after their condition is diagnosed, about half of all diabetics develop an eye disorder called diabetic retinopathy, which can weaken the capillaries that supply blood to the retina, and eventually affect vision. Almost all of those who have had the disease for at least 30 years experience some degree of diabetic retinopathy. Diabetics are also more likely to develop cataracts and glaucoma.
People with diabetes stand a higher than normal chance of developing heart disease and circulatory problems such as high blood pressure, hardening of the arteries (See Atherosclerosis), heart attacks, and strokes. Poor circulation also makes diabetics more susceptible to skin ulcers, cramps, and gangrenous (tissue-destroying) infections. Damage to the blood vessels in the kidneys from diabetes may lead to kidney failure.

A number of people with diabetes suffer from a condition known as diabetic neuropathy, which causes a gradual deterioration of the nervous system. The condition appears to begin early in both types of diabetes mellitus and affects motor nerves as well as sensory nerves. As a result, diabetics commonly experience a variety of aches and pains. Some develop slowed reflexes, loss of sensation, numbness and tingling in the legs, impotence, and circulatory problems.

If someone were to take your blood pressure immediately after you’d delivered a speech or jogged five miles, the reading would undoubtedly seem high. This is not necessarily cause for alarm: it’s natural for blood pressure to rise and fall with changes in activity or emotional state. It’s also normal for blood pressure to vary from person
to person, even from one area of your body to another. But when blood
pressure remains consistently high, corrective steps should be taken.\textsuperscript{10}

High blood pressure, or hypertension, is the most common of all
cardiovascular diseases in the industrialized world. It is the leading
cause of stroke and a major cause of heart attack. In the United States
alone, approximately 40 million people have high blood pressure. This
figure includes more than half of all Americans over the age of 60, and
about 64 percent of those over 70.

Blood pressure refers to the force of blood pushing against artery
walls as it courses through the body. Like air in a tire, blood fills
arteries to a certain capacity. Just as too much air pressure can threaten
healthy arteries.

If you consume more calories than you burn, you will gain
weight. The tricky part of the equation is that some people metabolize
food differently from others. Why this happens is complex and not
entirely clear to researchers, who continue to be surprised by each new
finding. For example, one recent study concluded that heavy people
actually burn calories faster than under-weight people because their

metabolism speeds up as they put on pounds, and slows if they try to take them off. For obese people – generally defined as those weighing 20 percent more than their ideal weight, or “set point” – the average-sized meal really isn’t very filling. Not only do these people have more fat cells sending out signals for food, but their faster metabolism burns more calories as well.\textsuperscript{11}

Despite such obstacles, if you are obese, you should make every effort to lose weight. If left unchecked, obesity places you at much greater risk for developing a variety of extremely serious, often life-threatening conditions, from cancer to heart disease. Be particularly concerned if your body tends to store fat around your waist (most common in men). Unlike fat around the thighs, which is more common in women and is more likely to serve as an energy reservoir, abdominal deposits deliver fatty acids directly into the bloodstream for immediate short-term energy; doctors remain uncertain why this can prove to be detrimental to your health.

Unfortunately, many people never take off- and keep off – the extra pounds. According to charts developed by the Metropolitan Life

\footnote{The Southwestern Company Nashville, TN “Health and Wellness Handbook” Published in (2001):p. 628.}
Insurance Company more than 50 years ago, which many of today’s doctors consider too forgiving, anywhere from a quarter to a third of the adults in the United States are overweight.

A more reliable measuring system, the body mass index (BMI), determines obesity based on body-fat content rather than weight. Determining your body-fat level (something your healthcare practitioner can do for you) is the best way to assess your weight status. For example, you may be the same height and weight as someone considered to be obese, but if you have relatively thick bones and a lot of muscle – and therefore less body fat – you will not merit the same diagnosis.

If you are overweight, you need to realize that you have a lifelong condition that requires not only a special diet and exercise but possibly some counseling and medications to bring under control. Keeping obesity in check requires constant vigilance – no easy task in the high-fat, high-sugar, high-volume nutritional landscape of the United States.

Stress is the reaction of our bodies and minds to something that upsets their normal balance. The human response to stressful events is
an ancient one, dating back to a time which life was a constant struggle for survival. A good example of stress in action is the way you react when you are frightened or threatened. Your adrenal glands release epinephrine – or adrenaline – a hormone that activates your body’s defensive mechanisms: Your heart pounds, your blood pressure rises, you muscles tense, the pupils of your eyes open wide. This cluster of reactions – the flight response – concentrates all your body systems on the apparent danger and helps you take the next step, which is either to resist or to retreat.\(^{12}\)

Of course, not all stressful events are so sudden or so obvious as the treat of bodily harm. Any challenge that overwhelm us – a serious illness, the death of a family member, the loss of a job or a lover – can be stressful to the point of physical and psychological dysfunction. Some of us are especially vulnerable to stressful situations or events, responding in extreme ways to everyday decisions – what do buy at the supermarket, what to wear to the wedding, or how to ask for a raise. But while some people fall to pieces if they are pressed too hard, others are highly productive under pressure. The difference may lie partly in our constitutions, and partly in how we manage our lives.

Continued stress can eventually deplete the body’s resources and produce chronic fatigue, loss of appetite or overeating, and other reactions. Coping ability may diminish, causing feelings of insecurity and inadequacy, and possibly leading to depression. At the same time, the body’s immune system becomes disrupted, increasing vulnerability to illness and disease. Unrelieved stress—from real or imagined caused—may bring on hypertension, a recognized factor in heart disease and some cancers. Posttraumatic stress disorder, in which symptoms appear immediately or months after a stressful event, can be a protracted and difficult problem.

According to Roohi and Nia, the problem was obesity and fitness in college males and females, the purpose of this study was to investigate obesity and fitness of the staff of Ardebil Azad University, sixty nine staffs (32 males and 37 females) of Ardebil Azad University participated in this study voluntarily. Primary measurements of interest in the present study were height, body mass index, subcutaneous skin folds, and cardio-respiratory fitness determined by 1 mile walk test. There weren’t any significant differences in BMI between males and females. Fat percentage were significantly higher (P<0.05) in women.

13B. Nakhostin Roohi and F. Rahmani Nia. Islamic Azad University of Ardebil, Ardebil, Iran, and University of Guilan, Rasht, Iran.
than men. Adversely, VO₂ max was significantly higher (P<0.05) habits, dietary habits and smoking habits may be related to overweight/obesity in both genders in Ardebil. It was concluded that there were not sufficient sport facilities and equipments for female in Ardebil Azad University and there were some cultural some cultural problems leading to females be less active than males.

Reduced level of physical activity and sports participation among Taiwanese, Filipino and Thai adolescent girls compared to boys: Increasing evidence of a global and worldwide health concern. The purpose of the study was to determine gender differences in physical activity and sports participation among the adolescents in three samples of Southeast Asian youth from Taiwan, Thailand, and the Philippines. The results showed significant gender differences in vigorous physical activity (aerobic activity) and muscle-strengthening exercise in each of the three samples. There were also significant gender differences on sports team participation among the Thai and Philippine samples. Sports team participation, however, did not differ between Taiwanese boys and Taiwanese girls. The gender differences that were observed we all characterized by higher participation among

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14 Randy M.Page, et.al. Department of Health Science, 221 Richards Building, Brigham Young University, Provo. Utah, 84602, USA.
boys than girls. Our findings are similar to those reported in the studies conducted in western countries as well as non-western countries, showing lowered physical activity among girls relative to boys. The trend towards lower levels of physical activity for females appears to be global and represents a worldwide health concern. Because regular physical activity is associated with both short and long term health benefits, effort encouraging female adolescents to adopt a physically active lifestyle or remain physically active are critical. However, there are many barriers which detract girls and women from physical activity. Possible barriers which detract young females from physical activity are discussed as well as are the need for better policies, strategies and programs that can help reduce these barriers. The need for research is advocated to identify the specific social, psychological, and environmental barriers that influence the physical activity behaviors of Asian adolescent boys and girls.

To test the hypothesis\textsuperscript{15} that certain lifestyles may affect cardiovascular regulatory mechanisms, heart rate variability (HRV) among three age-matched groups with different lifestyles (smoking, sedentary and aerobically fit) were compared. Heart rate variability

\textsuperscript{15} Dymphna Gallagher, Thomas Terenzi and Ronald de Meersman. Applied Physiology, Teachers College, Columbia University, 323E Thompson Hall, Box 199, 10027 New York, NY, USA.
was defined as the difference in heart rate during inhalation vs. exhalation. Heart rate was obtained from normal RR intervals, using a continuous electrocardiogram recording, while subjects were seated and breathing at an augmented tidal volume, and also while subjects were standing and breathing at normal tidal volumes. In the physically active group, heart rate variability was significantly elevated at rest as well as during some of the autonomic tests, when compared to the sedentary and smoker groups \( p < 0.05 \). A hypothesis to explain this finding is that smoking or a sedentary lifestyle reduces vagal tone, whereas a physically active lifestyle, resulting in enhanced aerobic fitness, increases vagal tone. These findings may have cardiovascular health implications.

Physical activity levels in young adults are low. Research\textsuperscript{16} supports the use of the Transtheoretical Model of behavior change (TM) in designing physical activity interventions. This study used a pre–post randomized control design to investigate the effectiveness of a self-instructional intervention for helping sedentary young adults to initiate physical activity. Post-intervention, significantly more of the

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\textsuperscript{16} Catherine Woods, Nanette Mutrie and Marian Scott. "Physical activity intervention: a Transtheoretical Model-based intervention designed to help sedentary young adults become active" Centre for Sports Science and Health, Dublin City University, Dublin 9, Eire, and MRC Social and Public Health Sciences and Department of Statistics, University of Glasgow, Glasgow G12 8QQ, UK.
experimental group (80%), in comparison to the control group (68%), improved their exercise stage of change (SOC) from baseline \( P < 0.05 \). Discriminate analyses revealed that discrimination between stage improvement/non-improvement was possible using the processes of change data. Stage improvers scored significantly higher on all of the behavioral and four out of five of the cognitive processes of change. For stage improvers, the processes of self-re-evaluation and self-liberation were most frequently used, whilst social liberation was used significantly more by the experimental than the control group. This inexpensive, self-instructional intervention, based on the TM and the ‘active living message’, is an effective method of assisting sedentary young adults to progress through the exercise SOC.

The objective\(^7\) of the study, the relationships of time spent in sedentary occupations with the National Cholesterol Education Program–defined metabolic syndrome (MS), taking into account the

\(^7\) Sandrine Bertrais, Jean-Paul Beyeme-Ondoua, Sébastien Zermichow Pilar Galan, Serge Hercberg and Jean-Michel Oppert “Sedentary Behaviors, Physical Activity, and Metabolic Syndrome in Middle-aged French Subjects” UMR INSERM Unit 557/INRA/CNAM, Scientific and Technical Institute for Nutrition and Food, Paris, France.


American Journal of Epidemiology 2006 163(8):709-716; doi:10.1093/aje/kwj098 American Journal of Epidemiology Copyright © 2006 by the Johns Hopkins Bloomberg School of Public Health All rights reserved; printed in U.S.A.
habitual level of physical activity (PA). This was a cross-sectional analysis in 1902 men and 1932 women 50 to 69 years of age participating in the French Supplementation with Antioxidant Vitamins and Minerals study. We assessed past-year PA, television watching or computer use, and reading during leisure with the Modifiable Activity Questionnaire. Subjects who performed at least 150 min/wk of moderate-intensity PA (3 to 6 metabolic equivalent tasks) or 60 min/wk of vigorous PA (>6 metabolic equivalent tasks) were considered as meeting recommended levels. The frequency of most MS components increased with time spent in front of a screen and decreased with increasing PA levels. The likelihood to have MS, adjusted for age, education, and smoking, was decreased by one-third in subjects meeting moderate PA guidelines and by two-thirds in subjects meeting vigorous PA recommendations [odds ratio (95% CI), 0.34 (0.17 to 0.66) in women, 0.44 (0.28 to 0.68) in men] compared with those with insufficient PA. Independently of PA levels, time spent in front of a screen was positively associated with the likelihood to have the MS in women [odds ratio (95% CI), 3.30 (2.04 to 5.34)], whereas in both sexes, no association was found with time spent reading. The relationship of the MS with a sedentary lifestyle differs according to sex and type of sedentary occupation. These results suggest the need to
assess selected indicators of sedentary behavior in preventive programs.

A decrease in physical activity affects appetite, energy, and nutrient balance in lean men feeding ad libitum.\(^{18}\) It is not clear how decreased activity quantitatively affects energy balance (EB) in subjects feeding ad libitum. We assessed the effect of an imposed sedentary routine on appetite, energy intake (EI), EB, and nutrient balance in lean men for 7 d. Six men with a mean (±SD) age of 23.0 ± 2.3 y, weight of 69.2 ± 11.4 kg, and height of 1.76 ± 0.07 m were each studied twice during a sedentary [1.4 x resting metabolic rate (RMR)] and a moderately active (1.8 x RMR) regimen. During each treatment, they resided in the whole-body indirect calorimeter for the 7 d and had ad libitum access to a medium-fat diet of constant, measurable composition. Meal size, frequency, and composition were continually monitored. Motivation to eat was recorded during waking hours. Subjects were weighed in light clothing each morning, and their weight was corrected to nude. Energy expenditure was 9.7 and 12.8 MJ/d \([P < 0.01; \text{SE of the difference between means (SED) = 0.41}]\) during the sedentary and active regimens, respectively. EI was 13.5 and 14.4 MJ/d

(P = 0.463, SED = 1.06), respectively. There was no regimen effect on hunger, appetite, or body weight. By day 7, cumulative EB was 26.3 and 11.1 MJ, respectively. Reducing a level of physical activity from 1.8 to 1.4 x RMR can markedly affect EB. A sedentary routine does not induce a compensatory reduction of EI and le ads to a significantly positive EB, most of which is stored as fat.

Recreational physical activity and sedentary behavior in relation to ovarian cancer risk in a large cohort of US women. Factors that influence circulating sex hormones, such as physical activity, have been proposed to influence ovarian cancer risk; however, results from previous epidemiologic studies have been inconsistent. The authors examined the association among physical activity, sedentary behavior, and ovarian cancer risk in the American Cancer Society Cancer Prevention Study II Nutrition Cohort, a prospective study of cancer incidence and mortality, using information obtained at baseline in 1992. From 1992 to 2001, 314 incident ovarian cancer cases were identified among 59,695 postmenopausal women who were cancer free at enrollment. Cox proportional hazards modeling was used to compute

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19 Alpa V. Patel, Carmen Rodriguez, Alexandre L. Pavluck, Michael J. Thun and Eugenia E. Calle. From the Department of Epidemiology and Surveillance Research, American Cancer Society, Atlanta, GA
hazard rate ratios while adjusting for potential confounders. No overall association was observed between measures of past physical activity or with recreational physical activity at baseline and risk of ovarian cancer in this study (for the highest category of physical activity compared with none: hazard rate ratio = 0.73, 95% confidence interval: 0.40, 1.34). However, a prolonged duration of sedentary behavior was associated with an increased risk (for ≥6 vs. <3 hours per day: hazard rate ratio = 1.55, 95% confidence interval: 1.08, 2.22; \( p_{\text{trend}} = 0.01 \)). Results from this study suggest that high levels of sedentary behavior may increase the risk of ovarian cancer, but they do not support a major impact of light and moderate physical activity on ovarian cancer risk.

This\(^{20}\) ecological study used two data sources—mortality data from the National Underlying cause of death files for 1988 and risk factor data from the 1988 Behavioral risk factor surveillance system (BRFSS). Mortality data for men and women between ages 20 and 74 year of death, sex, ad 5 year age groups for the CHD cause of death categories. They considered three potentially confounding variables related to sedentary lifestyle or CHD mortality — hypertension, smoking and overweight. Using linear regression, the authors

demonstrated a strong association between state specific coronary heart disease mortality rates and state prevalence of sedentary lifestyle ($r = 0.34; \ P=0.0002$) that remained significant after controlling for the prevalence of diagnosed hypertension, smoking and overweight among the state's population. This ecological analysis suggests that sedentary lifestyle may explain state variation in coronary heart disease mortality and reinforces the need to include physical activity promotion as a part of programs in the states to prevent heart disease.

From March 2002 through August 2005\textsuperscript{21}, researchers at Polytechnic University Department of Humanities & Social Sciences (Brooklyn, N.Y.) investigated the effects of commuting by car versus train on physical activity and stress among commuters traveling from New Jersey to Manhattan. Commuting by car is likely to result in less walking than commuting by train, according to researchers at Polytechnic University in Brooklyn, N.Y. Both types of commuting can be stressful; both car and train studies have found that predictability of the trip and commuters' sense of control are key elements in modulating stress. The researchers found no studies, however, that directly compared these two transportation modes'\textsuperscript{21}

\textsuperscript{21} Wener RE and Evans GW. "A Morning Siroll: Levels of Physical Activity in Car and Mass Transit Commuting," Unpublished
effect on physical activity level or stress, particularly under natural commuting conditions. Researchers at Polytechnic University Department of Humanities & Social Sciences planned to conduct a longitudinal study of people who commuted by car into Manhattan and who expected to switch to the train with the new Montclair Direct service. They planned to measure drivers' commute-related physical activity and stress levels before the switch (when they were still driving) and after (when they were taking the train). Recruiting car commuters proved very difficult since there was no single place to connect with these drivers. In addition, few car commuters switched to the train, even though they had expected to do so. So the researchers modified the study to use a cross-sectional design that compared car and train commuters matched for town of residence, income and other factors. A total of 122 car commuters and 55 train commuters’ participated. The researchers measured physical activity levels by asking participants to fill out questionnaires and wear a pedometer (an instrument worn on the waist band that counts steps) for five consecutive weekdays. For measuring stress, they depended on questionnaires.
The researchers presented findings at the Environmental Design Research Association 34 International Conference in 2003 and at the Cornell University Ecology of Obesity: Linking Science and Action Conference in 2005. Train commuters were four times more likely to walk 10,000 steps each workday than were car commuters. The commuters the researchers compared had similar incomes, education levels and commuting time and were of the same gender.

From November 2004 to May 2006, researchers\textsuperscript{22} at the Harvard School of Public Health analyzed data from the Centers for Disease Control and Prevention (CDC) to estimate how changes in "energy balance" — i.e., the relation between energy intake and expenditure, expressed in calories — have contributed to increasing levels of obesity among children. Researchers also examined how specific interventions targeting energy balance — including reducing the consumption of sugar-sweetened beverages and time spent watching television — could help halt the rise in overweight among children. U.S. overweight teen's ages 12 to 17 consumed an average of 700 to 1,000 calories more than required each day over a 10-year

period, leaving them 58 pounds over their recommended weight, on average. Compared with the "normal growth scenario" — in which weight gain occurs only in proportion to height gain — boys and girls ages 2 to 7 gained an excess of 0.95 pounds per year, on average, over the 10-year period. Assuming that 3,500 unused calories leads to an average of one pound of weight gain, a reduction of 110–165 calories per day (or an equivalent increase in activity) could have prevented this increase. Children should take longer and more frequent physical education classes that require them to be physically active for at least half of the class time. Children should reduce the consumption of sugar-sweetened beverages in schools and at home. Children should consume less fast food and decrease the time spent watching television.

Researchers\(^{23}\) from the Bloustein School of Planning and Public Policy at Rutgers University, CDC, the Surface Transportation Policy Project (a public interest group focused on transportation reform, located in Washington) and Smart Growth America (a coalition of nearly 100 advocacy organizations that call attention to

the effect of metropolitan expansion on quality of life, located in Washington) conducted a national study of the relationship between sprawl and health. Sprawl refers to urban and suburban development patterns characterized by poor accessibility and lack of public open spaces. The researchers compared the degree of sprawl in 448 counties and 83 metropolitan areas nationwide to the health characteristics of 382,602 residents of those areas. To measure the degree of sprawl, they used a metropolitan sprawl index, designed by Smart Growth America, and a county sprawl index, designed for this study. These indexes use data from the U.S. Census Bureau and other federal sources to rank areas on sprawl factors such as residential density and street accessibility. Areas with more sprawls receive a lower score. County sprawl scores ranged from 63 for the most sprawling counties (e.g., Geauga County in Ohio) to 352 for the least sprawling counties (e.g., Manhattan in New York City). Researchers drew data on physical activity, obesity, body mass index (a mathematical formula to measure weight in relation to height), hypertension (high blood pressure) and diabetes from the CDC's Behavioral Risk Factor Surveillance System, a large national health survey. Under a subcontract, Burness Communications, a public
relations firm in Bethesda, Md., coordinated the national release of
the study findings.

Heterogeneity of coronary heart disease risk factors in Indian, Pakistanis, Bangladeshi, and European origin populations: cross sectional study. To compare coronary risk factors and disease prevalence among Indians, Pakistanis, and Bangladeshis, and in all South Asians (these three groups together) with Europeans. The subjects were selected 259 Indian, 305 Pakistani, 120 Bangladeshi, and 825 European men and women aged 25-74 years. The various measurements were done to measure their social and economic circumstances, lifestyle, self reported symptoms and diseases, blood pressure, electrocardiogram, and anthropometric, hematological, and biochemical measurements. There were differences in social and economic circumstances, lifestyles, anthropometric measures and disease both between Indians, Pakistanis, and Bangladeshis and between all South Asians and Europeans. Bangladeshis and Pakistanis were the poorest groups. For most risk factors, the Bangladeshis (particularly men) fared the worst: smoking was most common (57%)

in that group and Bangladeshis had the highest concentrations of triglycerides (2.04 mmol/l) and fasting blood glucose (6.6 mmol/l) and the lowest concentration of high density lipoprotein cholesterol (0.97 mmol/l). Blood pressure, however, was lowest in Bangladeshis. Bangladeshis were the shortest (men 164 cm tall vs 170 cm for Indians and 174 cm for Europeans). A higher proportion of Pakistani and Bangladeshi men had diabetes (22.4% and 26.6% respectively) than Indians (15.2%). Comparisons of all South Asians with Europeans hid some important differences, but South Asians were still disadvantaged.

Kamath SK et al\textsuperscript{25} studied the cardiovascular disease risk factors in 2 distinct ethnic groups: Indian and Pakistani compared with American premenopausal women. Although people from the Indian subcontinent have high rates of cardiovascular disease (CVD), studies of such in Indian and Pakistani women living in the United States are lacking. This study accounted for variability in serum lipid (total cholesterol and triacylglycerol) and lipoprotein [LDL cholesterol, lipoprotein (a), and HDL cholesterol] concentrations in Indian and Pakistani compared with American premenopausal women in the

\textsuperscript{25} Kamath SK, Hussain EA, Amin D, Mortillaro E, West B, Peterson CT, Aryee F, Murillo G, Alekel DL. College of Health and Human Development Sciences, University of Illinois at Chicago, 60612, USA. savitri.kamath@uic.edu Am J Clin Nutr 1999 Apr;69(4):621-31
United States. Body composition, regional fat distribution, dietary intake, and energy expenditure were compared between groups. The 2 groups were 47 Indian and Pakistani and 47 American women. Health was assessed via medical history, physical activity, body composition (via anthropometry and dual-energy X-ray absorptiometry), dietary intake (via 7-d food records), and serum lipids. RESULTS: Serum total cholesterol, triacylglycerol, LDL cholesterol, lipoprotein(a), the ratio of total to HDL cholesterol, and the ratio of LDL to HDL cholesterol were greater (P < 0.03), whereas HDL-cholesterol values were lower (P = 0.011) in Indians and Pakistanis than in Americans. Multiple regression analysis indicated that approximately 18% of the variance in total cholesterol (P = 0.0010) and LDL cholesterol (P = 0.0009) was accounted for by ethnicity, energy expenditure, and the ratio of the sum of central to the sum of peripheral skin fold thicknesses. Ethnicity, sum of central skin fold thickness, ratio of polyunsaturated to saturated fat, and monounsaturated fat intake accounted for approximately 43% of the variance in triacylglycerol concentration (P < 0.0001). Monounsaturated fat, percentage body fat, and alcohol intake accounted for approximately 26% of variance in HDL cholesterol. Ethnicity contributed approximately 22% of the 25% overall variance in lipoprotein (a). Results suggest that these Indian and Pakistani
women are at higher CVD risk than their American counterparts, but that increasing their physical activity is likely to decrease overall and regional adiposity, thereby improving their serum lipid profiles.

Physical Exercise Improves Glucose Metabolism in Lifestyle-Related Diseases. The beneficial effects of physical exercise on the decreased insulin sensitivity caused by detrimental lifestyle were reviewed based on experimental evidences. In epidemiological studies, disease prevention has been considered at three levels: primary (avoiding the occurrence of disease), secondary (early detection and reversal), and tertiary (prevention or delay of complications). The major purpose of physical exercise for primary prevention and treatment of lifestyle-related diseases is to improve insulin sensitivity. It is known that, during physical exercise, glucose uptake by the working muscles rises 7 to 20 times over the basal level, depending on the intensity of the work performed. However, intense exercise provokes the release of insulin-counter regulatory hormones such as glucagon and catecholamines, which ultimately cause a reduction in the insulin action. Continued physical training improves the reduced
peripheral tissue sensitivity to insulin in impaired glucose tolerance and Type II diabetes, along with regularization of abnormal lipid metabolism. Furthermore, combination of salt intake restriction and physical training ameliorates hypertension. In practical terms, before diabetic patients undertake any program of physical exercise, various medical examinations are needed to determine whether they have good glycemic control and are without progressive complications. Because the effect of exercise that is manifested in improved insulin sensitivity decreases within 3 days after exercise and is no longer apparent after 1 week, a continued program is needed. For a safety practice, moderate- or low-intensity exercise is preferable. In conclusion, we have found sufficient evidences that support the theory that combined with other forms of therapy, mild exercise training increases insulin action despite no influence on body mass index or maximal oxygen uptake. Along with evident benefits in health promotion, moderate-intensity exercise might play an important role in facilitating treatment of various diseases.
To evaluate the effects of mild physical training (i.e., walking) combined with diet therapy (1000–1600 kcal/day) on insulin sensitivity in obese patients with Type II diabetes, the following studies were performed. Subjects were divided into two groups: 10 patients were treated by diet alone (Group D) and 14 patients practiced dietary restriction and walking at least 10,000 steps/d monitored by pedometers (Group DE (diet and exercise), 19,200 ± 2,100 steps/day). Group D was instructed to maintain a normal daily routine (4500 ± 290 steps/day). After an intervention period of 6 to 8 weeks, body weight (BW) in both groups was significantly decreased, and GIR in group D did not change markedly, while it increased significantly in group DE. A significant correlation was observed between ΔMCR (ΔMCR represents the positive changes in metabolic clearance rate of glucose (MCR) after training) and average daily steps ($r = 0.7257$, $P < 0.005$). Another significant correlation was observed between ΔBW ($ΔBW$ represents BW reduction after training) and ΔMCR ($r = 0.5410$, $P < 0.05$). These results suggest that walking, which can be safely performed and easily incorporated into daily life, can be recommended

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as an adjunct therapy to diet treatment in obese Type II diabetic patients, not only for reducing BW, but also for the improving insulin sensitivity.

Recent results of the Diabetes Prevention Program (DPP; Fig.1)\textsuperscript{28} are more impressive. IGT persons (mean body mass index (BMI): 34.0) were randomly assigned to placebo, metformin (850 mg twice daily), or a lifestyle modification program with the goals of at least a 7% weight loss and physical activity of moderate intensity, such as brisk walking, for at least 150 min per week. After an average follow-up for 2.8 years the lifestyle intervention reduced the incidence of diabetes by 58% and metformin by 31% as compared with placebo. The authors concluded that lifestyle changes and treatment with metformin reduced the incidence of diabetes in IGT persons and that lifestyle intervention was more effective than metformin. The Japan Diabetes Prevention Program (JDPP; directed by Dr. H. Kuzuya, Kyoto National Hospital), supported by the Ministry of Health, Labor and Welfare of Japan, is still under way.

Obesity and type 2 diabetes have reached epidemic proportions in the United States. It is well-established that increasing physical activity plays an important role in reducing risk of obesity and diabetes. Few studies, however, have examined the association between sedentary behaviors such as prolonged television (TV) watching and obesity and diabetes. Using data from a large prospective cohort study, the Health Professionals’ Follow-up Study, we have demonstrated that increasing TV watching is strongly associated with obesity and weight gain, independent of diet and exercise. Also, prolonged TV watching is associated with a significantly increased risk of type 2 diabetes. Men who watched TV more than 40 h per week had a nearly threefold increase in the risk of type 2 diabetes compared with those who spent less than 1 h per week watching TV. The increased risk was not entirely explained by the decreased physical activity and unhealthy eating patterns associated with TV watching. Thus, public health campaigns to reduce the risk of obesity and type 2 Diabetes should promote not only increasing exercise levels but also decreasing sedentary behaviors, especially prolonged TV watching.

29Frank B. Hu. Dept. of Nutrition, Harvard School of Public Health, 665 Huntington Ave., 02115 Boston, MA
To assess\textsuperscript{30} the prevalence of cardiovascular risk factors and their level of detection and management in three ethnic groups. It was a Population based survey during 1994 to 1996. 1578 men and women, aged 40 to 59 years; 524 white, 549 of African descent, and 505 of South Asian origin. Age adjusted prevalence of hypertension, diabetes, obesity, raised serum cholesterol, and smoking. Ethnic minorities of both sexes had raised prevalence rates of hypertension and diabetes compared to white people. Age and sex standardized prevalence ratios for hypertension were 2.6 (95% confidence interval 2.1 to 3.2) in people of African descent and 1.8 (1.4 to 2.3) in those of South Asian origin. For diabetes, the ratios were 2.7 (1.8 to 4.0) in people of African descent and 3.8 (2.6 to 5.6) in those of South Asian origin. Hypertension and diabetes were equally common among Caribbean’s and West Africans and among South Asian Hindus and Muslims. Prevalence of severe obesity was high overall, but particularly among women of African descent (40% (35% to 45%)). In contrast, raised serum cholesterol and smoking rates were higher among white people. Of hypertensive’s, 49% (216 of 442) had adequate blood pressure

\textsuperscript{30} Cappuccio FP, Cook DG, Atkinson RW, Strazzullo P. Prevalence, detection, and management of cardiovascular risk factors in different ethnic groups in south London. Department of Medicine, St George’s Hospital Medical School, London, UK. f.ecappuccio@sphms.ac.uk. Heart 1997 Dec;78(6):555-63
control. Overall, 18% (80 of 442) of hypertensives and 33% (62 of 188) of diabetics were undetected before our survey. Hypertensive subjects of African descent appeared more likely to have been detected ($p = 0.034$) but less likely to be adequately managed ($p = 0.085$). Hypertension and diabetes are raised two- to threefold in South Asians, Caribbean’s, and West Africans in Britain. Detection, management, and control of hypertension have improved, but there are still differences between ethnic groups. Obesity is above the Health of the Nation targets in all ethnic groups, particularly in women of African descent. Preventive and treatment strategies for different ethnic groups in Britain need to consider both cultural differences and underlying susceptibility to different vascular diseases.

Cardiovascular disease and cancer$^{31}$ are important health problems worldwide, yet our knowledge of these conditions is derived principally from populations of European descent. To investigate ethnic variations in major causes of death in Canada, the authors examined total and cause-specific mortality among European, south Asian, and Chinese Canadians. Canadians of European, south Asian

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and Chinese origin was identified in the Canadian Mortality Database by last name and country of birth and in the population census by self-reported ethnicity. Age-standardized death rates by cause, per 100,000 population, were calculated for ages 35 to 74 years from 1979 to 1993 and in 5-year intervals grouped around census years (1979/83, 1984/88 and 1989/93). Rates of death from ischemic heart disease were highest among Canadians of south Asian origin (men 320.2, women 144.5) and European origin (men 319.6, women 109.9) and were markedly lower among Canadians of Chinese origin (men 107.0, women 40.0); the rates declined significantly in all 3 groups over the study period. Rates of death from cerebrovascular disease were relatively low and showed less ethnic variation (Canadian men of European, south Asian and Chinese origin 49.5, 47.0 and 45.8 respectively; Canadian women of European, south Asian and Chinese origin 34.8, 39.0 and 42.2 respectively) and declined similarly in all groups over time. Rates of death from cancer were highest among Canadians of European origin (men 343.6, women 236.2), intermediate among those of Chinese origin (men 258.1, women 161.6) and lowest among those of south Asian origin (men 122.3, women 131.3). Over time, cancer mortality increased in Canadians of European origin but remained constant or declined in those of south Asian and Chinese origin. Substantial
differences exist in rates of death from ischemic heart disease and cancer among European, south Asian and Chinese Canadians.

To compare coronary risk factors and disease prevalence among Indians, Pakistanis, and Bangladeshis, and in all South Asians (these three groups together) with Europeans\textsuperscript{32}. It was a Cross sectional survey. The subjects for the study were 259 Indian, 305 Pakistani, 120 Bangladeshi, and 825 European men and women aged 25-74 years. Social and economic circumstances, lifestyle, self reported symptoms and diseases, blood pressure, electrocardiogram, and anthropometric, hematological, and biochemical measurements. There were differences in social and economic circumstances, lifestyles, anthropometric measures and disease both between Indians, Pakistanis, and Bangladeshis and between all South Asians and Europeans. Bangladeshis and Pakistanis were the poorest groups. For most risk factors, the Bangladeshis (particularly men) fared the worst: smoking was most common (57\%) in that group and Bangladeshis had the highest concentrations of triglycerides (2.04 mmol/l) and fasting blood glucose (6.6 mmol/l) and the lowest concentration of high density

lipoprotein cholesterol (0.97 mmol/l). Blood pressure, however, was
lowest in Bangladeshis. Bangladeshis were the shortest (men 164 cm
tall v 170 cm for Indians and 174 cm for Europeans). A higher
proportion of Pakistani and Bangladeshi men had diabetes (22.4% and
26.6% respectively) than Indians (15.2%). Comparisons of all South
Asians with Europeans hid some important differences, but South
Asians were still disadvantaged in a wide range of risk factors.
Findings in women were similar. Risk of coronary heart disease is not
uniform among South Asians, and there are important differences
between Indians, Pakistanis, and Bangladeshis for many coronary risk
factors. The belief that, except for insulin resistance, South Asians
have lower levels of coronary risk factors than Europeans is incorrect,
and may have arisen from combining ethnic subgroups and examining
a narrow range of factors.

To determine\textsuperscript{33} the association of social class with prevalence of
coronary risk factors and coronary artery disease (CAD). Total
community cross sectional survey of 20 randomly selected streets in
the city of Moradabad. 1806 urban (904 men and 902 women)

\textsuperscript{33} Singh RB, Niaz MA, Thakur AS, Janus ED, Moshiri M. “Social class and coronary artery disease in a urban population of North India in the Indian Lifestyle and Heart Study” Centre of Nutrition, Medical Hospital and Research Centre, Moradabad-10, India. Int J Cardiol 1998 Apr 1;64(2):195-203
randomly selected subjects aged 25-64 years for the study. The survey methods were physician and dietitian administered questionnaire, physical examination and electrocardiography. All subjects were divided into social classes 1-5 based on attributes of education, occupation, per capita income, housing condition and consumer durables and other family assets. Social classes 1, 2 and 3 were mainly high and middle socioeconomic groups and 3 and 4 low income groups. The prevalence of CAD and coronary risk factors hypercholesterolemia, hypertension, diabetes mellitus and sedentary lifestyle were significantly higher among social classes 1, 2 and 3 in both sexes compared to lower social classes. Mean serum cholesterol, triglycerides, low density lipoprotein cholesterol and blood pressure were significantly associated with higher and middle social classes. Smoking was significantly associated with lower social classes. Multivariate logistic regression analysis after adjustment of age revealed that social class was positively associated with CAD (odds ratio: men 0.84, women 0.86), hypercholesterolemia (men 0.87, women 0.85), hypertension (men 0.91, women 0.89), diabetes mellitus (men 0.71, women 0.68) and sedentary lifestyle (men 0.68, women 0.66). Smoking was significantly associated with CAD in 1 Social class 1, 2 and 3 in an urban population of India have a higher
prevalence of CAD and coronary risk factors hypercholesterolemia, hypertension, diabetes mellitus and sedentary lifestyle in both sexes.

To measure\textsuperscript{34} the prevalence of hypertension and age-specific blood pressure in urban populations from five Indian cities. Cross-sectional surveys were conducted in six-twenty urban streets in different cities from five different corners of India, using similar methods of sample selection and criteria. There were 3212 randomly selected women from Moradabad (n=902), Trivandrum (n=760), Calcutta (n=365), Nagpur (n=405) and Bombay (n=780), aged 25-64 years, inclusive. Evaluation was by a physician and a dietitian, an administered questionnaire, a physical examination and using a sphygmomanometer. The diagnosis of hypertension was based on old World Health Organization criteria and new World Health Organization/International Society of Hypertension criteria. The prevalence of hypertension (>140/90 mm Hg) was significantly (P<0.01) high in Trivandrum, South India (30.7%), and Bombay, West India (28.0%), compared to Moradabad, which is in northern India.

\textsuperscript{34} Singh RB, Beegom R, Mehta AS, Niaz MA, De AK, Haque M, Bhattacharyya PR, Dube GK, Pandit RB, Thakur AS, Wander GS, Janus ED, Postiglione A, Moshiri M. “Prevalence and Risk Factors of Hypertension and Age-Specific Blood Pressures In Five Cities: a Study of Indian Women” NKP Salve Institute of Medical Sciences, Nagpur, India. Five City Study Group. Heart Research Laboratory, Medical Hospital and Research Centre, Moradabad, India. Int J Cardiol 1998 Jan 31;63(2):165-73
(22.6%), Nagpur, in central India (24.2%), and Calcutta, in east India (19.1%). Mean systolic and diastolic blood pressures were significantly higher in Trivandrum and Bombay compared to the other three cities. The overall prevalence of hypertension was 25.6% (n=823) and isolated diastolic hypertension was the most common form of hypertension (50.5%, n=1506) in the five Indian cities. According to old criteria, the overall prevalence of hypertension (>160/95 mm Hg) was 14.8% (n=481). Multivariate logistic regression analysis on pooled data from the five cities, after adjustment for age, showed that age (odds ratio 1.16), body mass index (1.68) and obesity were strongly associated with hypertension. A Sedentary Lifestyle and salt intake were weakly associated and alcohol intake was not a factor with these women.

These cross-sectional surveys\textsuperscript{35} included 1769 rural (894 men and 875 women) and 1806 urban (904 men and 902 women) randomly selected subjects between 25-64 years of age from Moradabad in North India. The total prevalence of coronary artery disease based on clinical history and electrocardiogram was significantly higher in urban

\textsuperscript{35} Singh RB, Niaz MA, Ghosh S, Bægøm R, Rastogi V, Sharma JP, Dube GK. "Association of Trans fatty acids (vegetable ghee) and clarified butter (Indian ghee) intake with higher risk of coronary artery disease in rural and urban populations with low fat consumption" Heart Research Laboratory, Medical Hospital and Research Centre, Moradabad, India. Int J Cardiol 1996 Oct 25:56 (3):289-98; discussion 299-300.
compared to rural men (11.0 vs. 3.9%) and women (6.9 vs. 2.6%), respectively. Food consumption patterns showed that important differences in relation to coronary artery disease were higher intake of total visible fat, milk and milk products, meat, eggs, sugar and jaggery in urban compared to rural subjects. Prevalence of coronary artery disease in relation to visible fat intake showed a higher prevalence rate with higher visible fat intake in both sexes and the trend was significant for total prevalence rates both for rural and urban men and women. Subgroup analysis among urban (694 men and 694 women) and rural (442 men and 435 women) subjects consuming moderate to high fat diets showed that subjects eating trans fatty acids plus clarified butter or those consuming clarified butter as total visible fat had a significantly higher prevalence of coronary artery disease compared to those consuming clarified butter plus vegetable oils in both rural (9.8, 7.1 vs. 3.0%) and urban (16.2, 13.5 vs. 11.0%) men as well as in rural (9.2, 4.5 vs. 1.5%) and urban (10.7, 8.8 vs. 6.4%) women. Univariate and multivariate regression analysis with adjustment for age showed that sedentariness in women, body mass index in urban men and women, milk and clarified butter plus trans fatty acids in both rural and urban in both sexes were significantly associated with coronary artery disease. It is possible that lower intake of total visible fat (20 g/day),
decreased intake of milk, increased physical activity and cessation of smoking may benefit some populations in the prevention of coronary artery disease.

Exercise training has many health benefits; often active individuals, perhaps you included, claim they feel better and are healthier than their sedentary friends. They claim these benefits not just because they have altered their risk factors for major diseases, but also because they have experienced fewer colds, flu, sore throats, and other common illnesses. On the other hand, it is not unusual to hear that an Olympic or professional athlete has gotten out of a sick bed to compete or isn't competing because of illness not injury.36

Many studies suggest that aerobic exercise sustained exercise that increases heart and lung fitness can reduce stress, depression, and anxiety. People who regularly exercise cope with stressful events better, exhibit more self-confidence, and are less often depressed than those who exercise less. But when stated that other way around-stressed and depressed people exercise less-cause and effect become unclear. Other research reveals that exercise also benefits health. One

16 year study of 17,000 middle aged Harvard alumni found that those who exercised regularly were likely to live longer. A study of 15,000 control data corporation employees found that those who exercised had 25 percent fewer hospital days than those who didn’t, and a digest of data from 43 studies revealed that, compared with inactive adults, people who exercise suffer half as many heart attacks. The movement is repeating dividends. So off your duffs, couch potatoes.\(^\text{37}\)

A correlation study of TV watching and obesity was conducted. In one study of 12 to 17 year olds, obesity was more common among those who watched the most television. Of course, overweight people may avoid activity, preferring to sit and watch TV. But the association between TV watching and obesity remained when many other factors were controlled, suggesting that the inactivity of TV watching contributes to obesity.\(^\text{38}\)

The major focus of Researchers against Inactivity related Disorders (RID) is to educate others that physical inactivity such as a sedentary lifestyle, increases the risk of multiple chronic disorders. Physical inactivity increases the prevalence of over 25 chronic health


disorders. 25% of adults receive no physical activity each day and another 50% undertake less than the 30 minutes of daily, moderate physical activity that is recommended by the US producing over 300,000 premature deaths each year. The direct costs of physical inactivity are $77 billion annually. We invite you to examine the material on this WEB site for more information on inactivity-related diseases.

Evidence from epidemiological studies shows that a sedentary life-style increases the incidence of more than 20 chronic diseases. For example, among 70,000 female nurses aged 40 to 65 years in the Nurses' Health Study, when nurses who walked the equivalent of three or more hours per week at a brisk pace had 30 percent less coronary artery disease, ischemic stroke and type-2 diabetes compared to sedentary nurses. Some site-specific cancers are also more prevalent when moderately active females become inactive. Breast cancer rates rose 25 percent among the sedentary in one study, and each one-hour decrease of recreational physical activity per week during adolescence was associated with a 3 percent increased risk of breast cancer. In a Scandinavian study of twins, life-style caused 58 to 100 percent of

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39 Charting and Changing the Policy Landscape: "Promoting Physical Activity & Reversing Physical Inactivity through Policy Solutions" (ACSM Scientific Roundtable, April 27, 2006)
sporadic cancers. Such research underlies the recent decision by the U.S. Centers for Disease Control and Prevention (CDC) to designate sedentary life-style as an actual cause of most chronic diseases. Indeed, physical inactivity is now the third leading cause of death in the United States and contributes—to a great extent, we argue—to the second leading cause (obesity). Physical inactivity is the cause of least 1 in 8 deaths.

Lack of exercise is only one of many life-styles killing people in affluent nations. The major three current life-style factors (tobacco, poor nutrition and physical inactivity) account for 1 in 3 deaths in the U.S. However, other data place this percentage higher. Ninety-one percent of the cases of type-2 diabetes and 82 percent of the coronary artery disease cases in 84,000 female nurses in the Nurses' Health Study were attributed to unhealthful habits and so-called high-risk behaviors. (A high-risk life-style is defined in the study cited as a body mass index of greater than 25, a diet low in cereal fiber and polyunsaturated fat and high in trans-saturated fat and glycemic load, a sedentary life-style and current smoking.) Obese males and females live an average of 6 and 7 years less, respectively, than their trim counterparts.
It is also worth emphasizing that deadly life-styles that produce chronic diseases are a relatively recent development. Since 1900 there has been a dramatic shift from a preponderance of infectious disease to a preponderance of chronic disease affecting both morbidity and mortality. As a society, we have not adapted well to this change. We ignore not only the prevention but also the progression of chronic diseases. Even if we take action before the diseases prove fatal, full recovery is often impossible.

The link between physical inactivity and coronary heart disease (CHD) was established in 1953 by Professor Jeremy Morris of London. It was reported that physically active conductors of double-deck buses had significantly less CHD than the sedentary drivers. Over the past three decades numerous studies have supported this finding, including the often cited epidemiological studies of San Francisco longshoremen and Harvard University Alumni. More recently, a prospective study by Dr. Steven Blair, the Cooper Institute for Aerobics Research, demonstrated that individuals with higher levels of cardio respiratory fitness had lower mortality rates which include death from CHD and cancer than those with lower fitness levels. The strong association established between physical inactivity and CHD has prompted the
American Heart Association to now recognize physical inactivity as a key independent risk factor for CHD, along with hypertension, smoking, and elevated blood cholesterol (American Heart Association, 1990.)

Preliminary findings from a WHO study suggest that a sedentary lifestyle is one of the ten leading causes of death and disability in the world. Currently less than 1/3 of young people worldwide are sufficiently active to benefit their present and future health and well being. Physical inactivity is prevalent in North America with 40% of American adults reporting that they are not active at all and 60% not getting enough physical activity to provide health benefits. The numbers are similar in Canada where 64% of Canadians are not active enough to reap the health benefits of physical activity. This endemic lack of physical activity is associated with many of the leading causes of death in the US, where nearly as many people die from diseases and health conditions related to physical inactivity and poor eating habits as from smoking cigarettes (300,000 per year). Diseases related to physical inactivity include type II diabetes, coronary heart disease, cardiovascular disease, stroke, osteoporosis, and certain cancers. Physical inactivity also contributes to obesity, the rate of which is
increasing worldwide. Studies show that more than 60% of adults in
the US are overweight or obese. Increasing numbers of children and
adolescents are also overweight. Thirteen percent of American children
aged 6-11 years and 14% of adolescents aged 12-19 years are
overweight, representing a tripling of the rate in adolescents over the
past 20 years. In the past 15 years in Canada, the rate of obesity in
children and youth has increased by 50%.

Physical inactivity and its associated health problems have
substantial economic consequences for the U.S. health care system. In
the long run, physical inactivity threatens to reverse the decades-long
progress that has been made in reducing the morbidity and mortality
associated with many chronic conditions such as cardiovascular
disease. A physically inactive population is at both medical and
financial risk for many chronic diseases and conditions including heart
disease, stroke, colon cancer, diabetes, obesity, and osteoporosis.

The increasing prevalence of chronic medical conditions and
diseases related to physical inactivity are associated with two types of
costs. First, there are health care costs for preventative, diagnostic, and
treatment services related to these chronic conditions. These costs may

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include expenditures for physician visits, pharmaceuticals, ambulance services, rehabilitation services and hospital and nursing home care. In addition, there are other costs associated with the value of lost wages by people unable to work because of illness and disability, as well as the value of future earnings lost by premature death. In 2000, the total cost of overweight and obesity was estimated to be $117 billion. In addition, the total estimated cost from chronic diseases is substantial.

Individuals suffering from chronic diseases bear a substantial portion of these medical costs. A recent study demonstrated that obese individuals spend approximately 36 percent more than the general population on health services and 77 percent more on medications. Furthermore, the study found that the effects of obesity on health spending were significantly larger than effects of current or past smoking.\footnote{Strum R. The effects of obesity, smoking and problem drinking on chronic medical problems and health care costs. Health Affairs 21(2):245-253. 2002.}