KASR ALAINY

EFFECT OF FASTING ON PLASMA VISCOSITY IN CORONARY HEART DISEASE PATIENTS

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BY

GEHAD GAMAL ABD-ELSALAM ABD-ELALIM
M.B.B,Ch.

Supervised by

PROFESSOR. Dr.YASSER MOHAMMED BAGHDADY
PROFESSOR OF CARDIOLOGY- CAIRO UNIVERSITY

DR. REDA HUISSEN DIAB
LECTURER OF CARDIOLOGY- CAIRO UNIVERSITY

DR. WALEED ABD ELSALAM AMMAR
LECTURER OF CARDIOLOGY- CAIRO UNIVERSITY

FACULTY OF MEDICINE
CAIRO UNIVERSITY

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List of abbreviations

Abbreviation	Meaning
3.5 HPP-VIS	3.5 hour post prandial viscosity
ACE-I	Angiotensin Converting Enzyme Inhibitor.
ACS	Acute Coronary Syndrome
BMI	Body Mass Index.
BP	Blood pressure
CHARM study	Candesartan in Heart failure – Assessment of Reduction in Mortality and morbidity study in Preserved EF
CHD	Coronary heart disease
CHF	Congestive heart failure
CT	Computed tomography
CVD	Cardio-Vascular Diseases
DBP	Diastolic blood pressure.
DHF	Diastolic Heart Failure
DM	Diabetes Mellitus.
ECG	Electrocardiogram
F-VIS	Fasting Viscosity
FH	Family history.
HDL	High density lipoproteins
LDL	Low density lipoproteins
LV	Left Ventricle
MI	Myocardial Infarction
MRI	Magnetic resonance imaging
NYHA	New York Heart Association
SBP	Systolic blood pressure
SD	Standard deviation
TC	Total cholesterol
TG	Triglycerides
VIS	Viscosity

Abstract

As fasting is one of the principle duties in many religions, coronary heart disease patients often ask, “Is it possible for me to fast ?” or “Would fasting be harmful for my heart?” A definite answer for this question is still controversial . We have found that plasma viscosity increased significantly in ischaemic patients in correlation to normal subjects (P value = 0.014).

Plasma viscosity is significant higher in diabetic and hypertensive patients in comparison to non diabetic and normotensive subjects respectively.

Fasting results in insignificant increase in plasma viscosity in diabetic and hypertensive patients in comparison to non diabetic and normotensive subjects respectively.

Key words:

Ischemic , plasma viscosity.

Introduction

Over one billion people are fasting every year. People, who fast, neither eat nor drink anything during the fasting. The period in which the person fasts may vary depending on the geographic location of the country, and the season of the year, and can be as long as 14 hours/ day. [1]

The effects of hunger on the cardiovascular system are usually on the positive side Liebermeister H. and Bleckman A. didn't report any myocardial complications with fasting. On the other hand, Gamma E. et al., based on clinical observations, reported an increase in complaints of angina pectoris during fasting. [2-4]

Deterioration of cardiac performance due to myocardial ischemia was less in the fasting state. When hungry, catecholamine inhibition and reduced venous return cause a decrease in the sympathetic tone, which lead to a fall in arterial blood pressure, heart rate and cardiac output [5].

Moreover, Hussein et al. reported a reduced heart rate during fasting, concluding that was due to the inhibition of catecholamine production during hunger. An increase in catecholamine levels is held to be primarily responsible for complications arising from coronary heart disease. [6].

Hemorheology is concerned with the flow properties of cellular and plasmatic components of blood. The resistance of blood to flow is known as blood viscosity. High blood viscosity slows down the blood flow and results in stasis and occlusion Since erythrocytes make up approximately 99% of the blood cells, erythrocyte deformability is an important parameter. Increased plasma viscosity (PV) has been demonstrated in atherosclerotic disease such as ischemic heart disease and peripheral arterial diseases as well in arterial hypertension and in venous disorders[6]
.

Viscosity is defined as the ratio between shear stress and shear rate, and it is a measure of the resistance of blood to deformation. Whole blood is a shear-thinning

fluid. Viscosity is high at low shear rate (due to existence of aggregated red blood cells) and decreases as shear rate increases (when all cells are in suspension).

Besides, blood viscosity is determined by several structural factors such as cell concentration in blood, plasma viscosity, aggregation of red blood cells, and deformability of the red blood cells.

Aim of the work

The aim of this study is to assess the effect of fasting on plasma viscosity in coronary heart disease patients.

CHAPTER 1

Fasting

Fasting is primarily the act of willingly abstaining from some or all food, drink, or both, for a period of time. An absolute fast is normally defined as abstinence from all food and liquid for a defined period (12-14 hours). Over one billion people are fasting every year. Fasting is an integral part of many of the major religions including Islam, Judaism and Christianity. Many are dubious as to whether the physiological effects are as beneficial as the spiritual promoted by these religions. There is a significant community of alternative healers who believe that fasting can do wonders for the human body .Fast does not chemically begin until the carbohydrate stores in the body begin to be used as an energy source. The fast will continue as long as fat and carbohydrate stores are used for energy, as opposed to protein stores. Once protein stores begin to be depleted for energy (resulting in loss of muscle mass) a person is technically starving. [1]

The Physiological Changes of Fasting

The effect of experimental short-term fasting on carbohydrate metabolism has been extensively studied , it has been uniformly found that a slight decrease in serum glucose 3.3 mmol to 3.9 mmol (60 mg/dl to 70 mg/dl) occurs in normal adults a few hours after fasting has begun. However, the reduction in serum glucose ceases due to increased gluconeogenesis in the liver. That occurs because of a decrease in insulin concentration and a rise in glucagon. There is a slight decrease in serum glucose in the first days of Ramadan, followed by normalization by the twentieth day and a slight rise by the twenty-ninth day of Ramadan.

Many of the most dramatic changes that occur in the body during fasting take place on the first three days of the fast. These occur as the body switches from one fuel source to another. Normally, the primary form of energy the body uses for energy is glucose. There is enough of this sugar source for 8-12 hours of energy and usually, it is completely exhausted within the first 24 hours of fasting. Once the liver's stores of glycogen are gone, the body begins to shift over to what is called ketosis. This shift generally begins on the second day of fasting and completed by the third. It first converts glycerol, available in the body's fat stores. So it makes the rest that it needs from catabolizing or breaking down, the amino acids in muscle tissue, using them in the liver for gluconeogenesis .By the third day ketone production is sufficient to provide nearly all the energy the body needs and the body's protein begins to be strongly conserved. Over a 30 day, a fasting person generally loses a maximum of 1-2 pounds of muscle mass.[2]

Positive side of fasting

"Fasting is simply a process of deep physiological rest. This rest period helps you rebuild functioning power and recover from the energy dissipation caused by hectic daily schedules and abusive living habits"

Frank Sabatino, D.C., Ph.D.

Fasting and cardiovascular benefits

The effects of fasting on the cardiovascular system are usually on the positive side, Liebermeister H. and Bleckman A. didn't report any myocardial complications with fasting or hunger[3] , in the same time deterioration of cardiac performance due to myocardial ischemia was less in the hunger state.[4]

When fasting, catecholamine inhibition and reduced venous return cause a decrease in the sympathetic tone, which lead to a fall in arterial blood pressure, heart rate and cardiac output.[5]

Also Hussain R. et al., have shown fasting to be an effective treatment for hypertension, one of the most important risk factors for coronary heart disease. [6]

Moreover, inhibition of catecholamine production during fasting and hunger explain the cardio-protective effect of fasting , on the other hand , increase in catecholamine levels during ischemic event is held to be responsible for complications arising from coronary heart disease .(7)

In a large study in Turkey, Temizhan A. et al., reported all the patients hospitalized in the coronary care unit and emergency service of internal medicine between the years 1991 and 1997, during, after and before Ramadan, and 1655 of 5016 patients were found to have acute coronary heart disease events.