

COURSE CODE: PHS 306

COURSE TITLE: CARDIOLOGY

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ARTERIAL BLOOD PRESSURE

It is defined as the lateral pressure exerted by the column of blood on the wall of the arteries. Arterial blood pressure can be expressed in four different terms:

- (1) Systolic blood pressure
- (2) Diastolic blood pressure
- (3) Pulse pressure
- (4) Mean arterial blood pressure

Systolic blood pressure: It is defined as the maximum pressure exerted in the arteries during systole of the heart. Normal systolic pressure = 120mmHg (110 to 140mmHg)

Diastolic blood pressure: It is defined as the minimum pressure exerted in the arteries

during diastole of the heart. Normal diastolic pressure = 80mmHg (60 to 80mmHg)

Pulse pressure: This is defined as the difference between the systolic pressure and the diastolic pressure. Normal pulse pressure: 40mmHg

Mean arterial blood pressure: This is defined as the average pressure existing in the arteries. Normal mean arterial pressure = 93mmHg.

VARIATIONS

Blood pressure is altered in physiological and pathological conditions.

PHYSIOLOGICAL VARIATIONS

Age: Arterial blood pressure increases as age advances

Sex: In females, up to the period of menopause, arterial pressure is 5mmHg, less than in males of the same age.

Body built: Pressure is more in obese

persons than in lean persons.

Emotional conditions: During excitement or anxiety, the blood pressure is increased due to the release of adrenaline.

After meals: arterial blood pressure is increased for few hours after meals due to increase in cardiac output.

FACTORS MAINTAINING ARTERIAL BLOOD PRESSURE

Factors maintaining arterial blood pressure is divided into two: Central factors and Peripheral factors

Central factors are the factors pertaining to the heart and they include Cardiac output and Heart rate.

Peripheral factors are the factors pertaining to the blood and its vessels and they include Peripheral resistance

- (1) Blood volume
- (2) Venous return
- (3) Elasticity of blood vessels

- (4) Velocity of blood flow
- (5) Diameter of blood vessels
- (6) Velocity of blood

Cardiac Output, Heart Rate, Peripheral Resistance, Blood Volume, Venous Return, Velocity of Blood Flow and Viscosity of Blood are all directly proportional to Arterial blood pressure.

Elasticity of Blood Vessels and Diameter of Blood Vessels are inversely proportional to Arterial blood pressure.

REGULATION OF ARTERIAL BLOOD PRESSURE

- (1) Nervous mechanism or Short term regulatory
- (2) Renal mechanism or Long term regulatory
- (3) Hormonal mechanism
- (4) Local mechanism

Nervous mechanism;

When the blood pressure is altered, nervous system brings it back to normal within few minutes, although nervous mechanism is quick acting, it operates only for a short period of time. It operates through;

Vasomotor system

- Vasomotor center
- Vasoconstrictor fibers
- Vasodilator fibers

(1) Vasomotor Center: is bilaterally situated in the reticular formation of medulla oblongata and the lower part of the pons.

Vasomotor center consists of three areas:.

- (1) Vasoconstrictor area
- (2) Vasodilator area
- (3) Sensory area

Vasoconstrictor Fibers: They belong to the sympathetic division of autonomic nervous system. They play a major role than the vasodilator fibers in the regulation of blood pressure.

Vasodilator Fibers: are composed of three types

- (1) Parasympathetic vasodilator fibers
- (2) Sympathetic vasodilator fibers
- (3) Antidromic vasodilator fibers

RENAL MECHANISM FOR REGULATION OF BLOOD PRESSURE

Kidneys play an important role in the long-term regulation of arterial blood pressure. Kidneys regulate arterial blood pressure by two ways:

- (1) By regulation of ECF volume
- (2) Through renin-angiotensin mechanism

HORMONAL MECHANISM FOR REGULATION OF BLOOD PRESSURE

Many hormones are involved in the regulation of blood pressure.

Hormones that increase arterial blood pressure are:

- (1) Adrenaline
- (2) Noradrenaline
- (3) Thyroxine
- (4) Aldosterone
- (5) Vasopressin
- (6) Angiotensin
- (7) Serotonin

Hormones that decrease arterial blood

pressure are:

- (1) Vasoactive intestinal polypeptide
- (2) Bradykinin
- (3) Prostaglandin
- (4) Histamine
- (5) Acetylcholine
- (6) Atrial natriuretic peptide
- (7) Brain natriuretic peptide
- (8) C-type natriuretic peptide

LOCAL MECHANISM FOR REGULATION OF BLOOD PRESSURE

In addition to nervous, renal and hormonal mechanisms, some local substances also regulate the blood pressure. The local substances regulate the blood pressure by vasoconstriction or vasodilation.

MEASUREMENT OF ARTERIAL BLOOD PRESSURE

Blood pressure is measured by two methods:

- (1) Direct method
- (2) Indirect method

APPLIED PHYSIOLOGY

- (1) Hypertension
- (2) Hypotension

HYPERTENSION: Hypertension is defined as the persistent high blood pressure.

TYPES OF HYPERTENSION

Hypertension is divided into two types:

- (1) Primary hypertension or essential hypertension
- (2) Secondary hypertension

HYPOTENSION: Hypotension is the defined as the low blood pressure.

TYPES OF HYPOTENSION

- (1) Primary hypotension
- (2) Secondary hypotension