



Measurement of Blood Pressure “Non-Invasive Method”

By
Assist. Prof. Dr Dler Gallaly

PhD in Medical Physiology

Dept. of Medical Technical Radiology
Faculty of Applied Sciences
Tishk International University
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Mob.#: (+964) 750 461 87 58
Email: dler.qader@tiu.edu.iq



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- **Sphygmomanometer:**
 - **Description and Types.**
- **Non Invasive Methods for Measuring BP.**
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- **Normal Values of BP.**
- **Factors that affect BP measurement**



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Objectives:

At the end of this experiment, you will be able to:

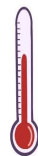
- Describe the different types of Sphygmomanometers
- Measure BP in human beings via different methods
- Describe the Korotkoff's sounds.
- Know Normal Ranges and Values of BP.
- Discuss the factors that affect BP.



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Vital Signs:

- **Vital signs** are measurements of the body's most basic functions.
- They are crucial for assessing physical health, detecting medical problems, and monitoring patients.
- The primary "**standard**" vital signs are:
 - ✓ body temperature,
 - ✓ pulse rate,
 - ✓ respiration rate, and
 - ✓ **blood pressure (BP).**

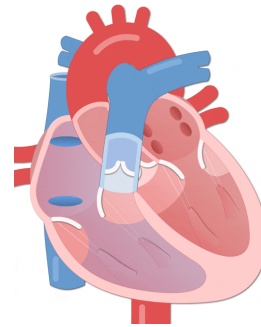


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Blood Pressure (BP):

- **BP is usually recorded as:**

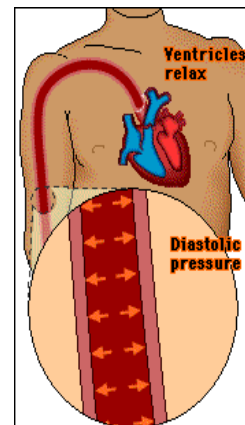
- Systolic BP/Diastolic BP
- SBP is the **peak pressure**, which occurs near the beginning of the cardiac cycle when the ventricles are contracting (**ventricular systole**)
- Diastolic BP is the **minimum pressure** in arteries, which occurs near the end of the cardiac cycle when the ventricles are filled with blood (**ventricular diastole**).



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Blood Pressure (BP):

- ▶ BP is the force exerted by circulating blood against the walls of the blood vessels due to contraction of the heart and influenced by the elasticity of the vessel walls.
- ▶ The term BP generally refers to **arterial pressure**, due to the fact, that **they are the vessels where the pressure is measured**.



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Introduction:

- **Aim:**
 - To determine Blood Pressure of the given subject at rest.
- **Principles:**
 - The **pressure of blood in the brachial artery** is **balanced** against the **pressure of air in a rubber cuff** surrounding the artery.
 - The pressure of air in the cuff is then measured by means of a **mercury manometer**.



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Apparatus Required:

- **Apparatus Required:**
 - Stethoscope
 - Sphygmomanometer
- **Types of Sphygmomanometers:**
 1. Aneroid
 2. Electronic
 3. Mercuric

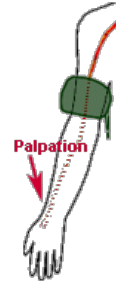


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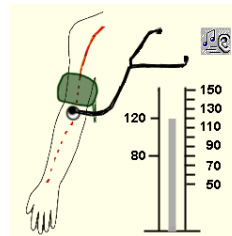
Non Invasive Methods for BP Measurement:

- Two Methods are using for Measuring BP:

1. Palpatory method



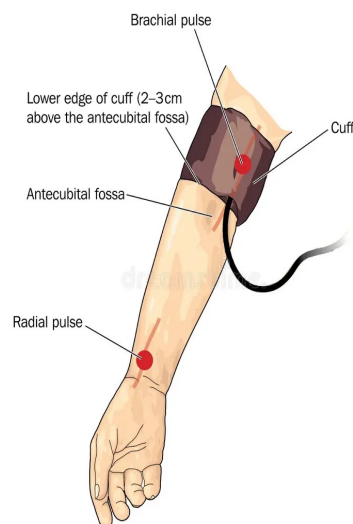
2. Auscultatory method



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① Palpatory method:

- The subject is asked to sit and allowed relax for 5 min.
- The cuff is tied around the upper arm with the lower border of the cuff not **<2.5 cm** above the **cubital fossa** or **elbow**.
- The **radial pulse** is palpated while the cuff is being inflated to a pressure slightly above the level at which the radial pulsation is no longer felt.



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① Palpatory method:

1. Now lower the pressure slowly by slightly opening the **release valve** and take the reading on the **manometer when the pulse is just palpable** that gives the **systolic pressure (SBP)**.
2. Diastolic pressure (DBP) cannot be determined by this method.



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② Auscultatory method:

1. The **stethoscope** is placed over the brachial artery.
2. The pressure in the cuff is raised above the SBP (by ~30mm.Hg) previously determined by the palpatory method.
3. The pressure is then lowered gradually (2–3 mm/sec.).
4. The sounds that are heard are the **Korotkoff's sounds**.



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Korotkoff's sounds:

- **arterial sounds** heard through a stethoscope applied to the **brachial artery** distal to the cuff of a sphygmomanometer that change with varying cuff pressure.
- are **pulsatile circulatory sounds** heard upon auscultation of the brachial artery.
- are **due to blood jetting through the partly occluded vessel**.
- Used to determine SBP & DBP

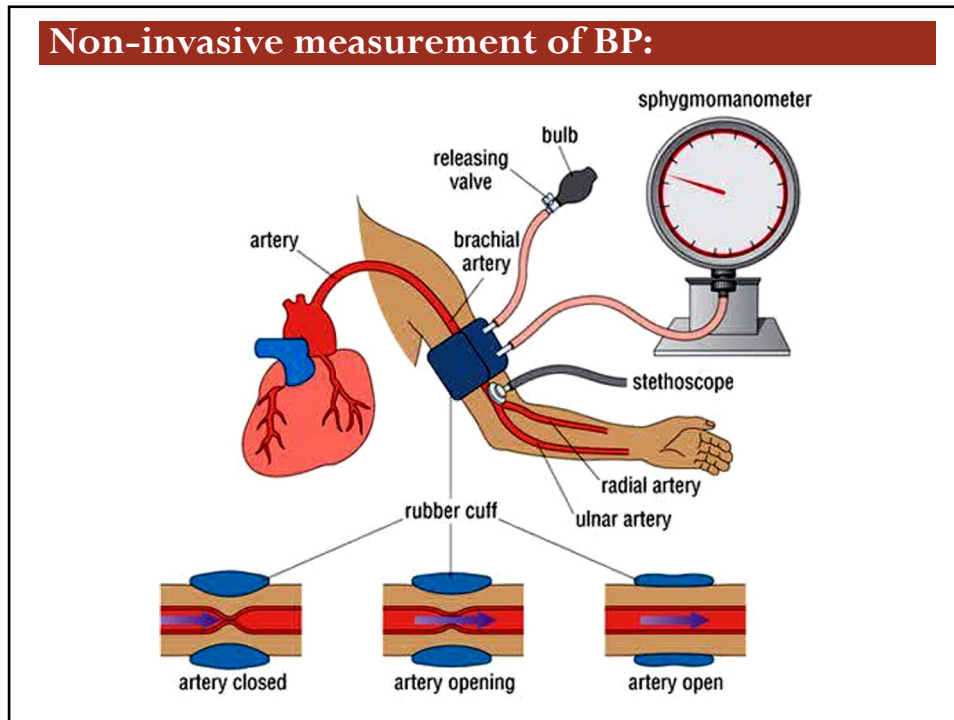


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Korotkoff's sounds:

- **Korotkoff's sounds have Five Phases:**
 - A. 1st phase (first sound): **sharp tapping** sound (SBP).
 - B. 2nd & 3rd phases, **swishing sound** (murmur & then louder)
 - C. 4th phase, the sound becomes **muffled (soft)**.
 - D. 5th phase, **disappearance of the sound** (DBP).

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Normal Values:

In Healthy Adults:

- The average SBP is **100–130 mm Hg**.
- The average DBP is **60–80 mm Hg**.

In Children:

- It is **~100/60 mm Hg**.

In the elderly:

- It is **~140/90 mm Hg**

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Pulse Pressure:

Pulse Pressure: is the difference between the SBP & DBP

PP=30–60 mm Hg.



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Factors that influence BP:

- **Age:**
 - ✓ BP increases with age due to the structural changes in the arteries.
- **Stress:**
 - ✓ Stimulation of the sympathetic nervous system increases cardiac output and vasoconstriction of the arterioles → ↑ BP.
- **Gender:**
 - ✓ Females usually have lower BP than male due to hormonal variations. After menopause, women have higher BP than before.
- **Diurnal variations:**
 - ✓ BP is usually lowest early in the morning (metabolic rate is lowest) then rises throughout the day and peaks in the late afternoon or early evening.

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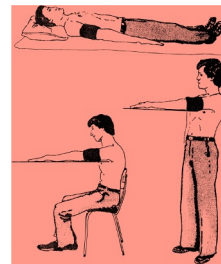
Factors that influence BP:

- **Exercise:**
 - ✓ Physical activity increases the cardiac output → ↑ BP
- **Obesity:**
 - ✓ Childhood and adult obesity predispose to hypertension.
- **Medications:**
 - ✓ Many medications may increase or decrease BP.
- **Disease process:**
 - ✓ Any condition affecting the cardiac output, blood volume, blood viscosity, and/or compliance of the arteries has a direct effect on the BP.

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Physiological Variations in BP:

- BP is slightly lower in women than men.
- During sleep, SBP is less.
- Persons with slender build have got a lower BP than those of heavy build.
- BP is also increased after meals.
- Muscular exercise causes an increase in the BP.
- Emotional excitement causes an increase in the BP.
- **The BP, especially the DBP, is:**
 - highest in the standing position,
 - lower in the sitting ,
 - lowest while the subject is lying down.



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Scientific Video Link:

How to Take a Blood Pressure Measurement (Systolic and Diastolic Sounds)

<https://www.youtube.com/watch?v=soR8THwQzBw>

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Questions/Comments



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