Blood pressure

The blood pressure means the force of blood exerted against the blood vessel wall.

Arterial blood pressure (ABP) is one of essential parameters in cardiovascular physiology.

Arterial blood pressure is measured with a sphygmomanometer and it almost always is measured in millimeters of mercury (mm Hg)

Actually, blood pressure means the force exerted by the blood against any unit area of the vessel wall. When one says that the pressure in a vessel is 50 mm Hg, this means that the force exerted is sufficient to push a column of mercury against gravity up to a level 50 millimeters high. If the pressure is 100 mm Hg, it will push the column of mercury up to 100 millimeters.

• Blood pressure is recorded as a fraction:

systolic pressure over the diastolic pressure and expressed in millimeters of mercury (mm Hg).

• A typical blood pressure for a healthy adult is 120/80 mmHg.

Systolic pressure is the maximum pressure exerted by the blood against the artery walls.it results when the ventricles contract. Normally, it measures 120 mm Hg.

Diastolic pressure is the lowest pressure in the artery. It results when the ventricles are relaxed and is usually around 80 mm Hg.

Classification of blood pressure:

Category	SBP	DBP
Normal	<120	<80
Prehypertension	121-139	81-89
Stage 1 hypertension	140-159	90-99
Stage 2 hypertension	≥160	≥100

Physiological variation: -

1- Age: The ABP increase with age.

2- Sex: in women is slightly less than men.

3- It is more at evening and less in morning.

4- It is more after meal exercise and well-built person.

5- It is less in sleep and in lying position.

There are two methods to measurement of ABP:

1- Direct method: - A cannula or needle filled with anticoagulant is inserted in artery. Then it is connected to the manometer.

2- Indirect method:

A- Palpatory method: The SBP can be determined by inflating an arm cuff and then letting the pressure fall and determining the pressure at which the radial pulse first becomes palpable.

B- Auscultatory method: It is standard method of taking a patient blood pressure by use technique developed by Korotkoff in 1905. The arterial pressure in human is routinely measured by this method by using instrument which is called a sphygmomanometer.

Sphygmomanometer parts:

1- Graduated vertical limb. It has marking from 0 – 250 mmHg from below upward.

2- Inflatable rubber cuff.

3- Rubber bulb with valve.

4- Release screw.

5- Mercury reservoir.

6- Rubber tubes.

Auscultatory method for measuring systolic and diastolic pressures:

To measure the BP in human beings we need :

1- Sphygmomanometer.

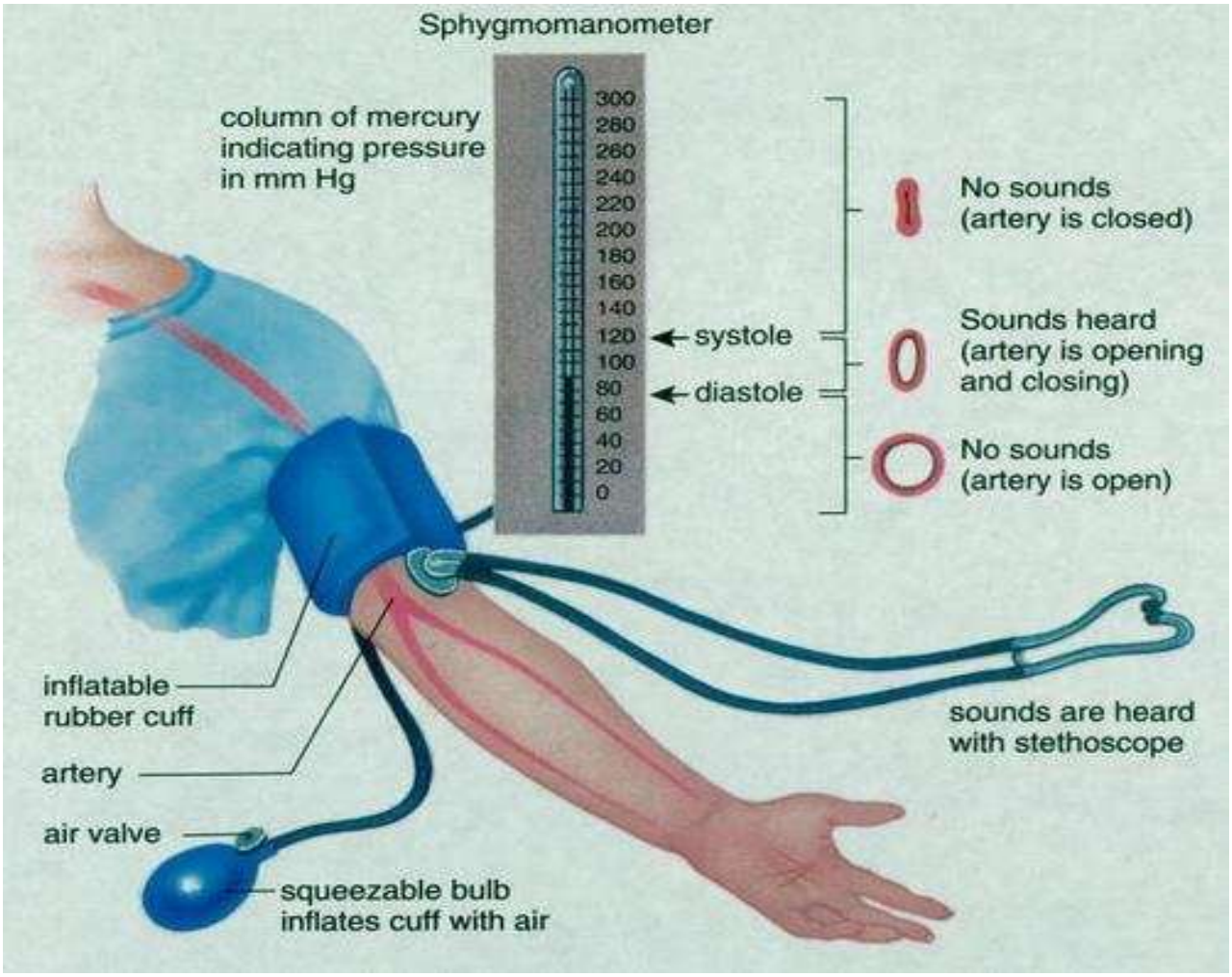
2- Stethoscope.

3- Subject.

Procedure

1- Subject should be relaxed, sitting or lying for five minutes.
2- Manometer is placed at level of observer's eyes.
3- All clothing should be removed from upper arm.
4- The arm of subject should be supported to avoid contraction which leads to false measurement.
5- Inflatable arm cuff is applied around the upper arm **not too tightly** at level of heart
6- The bell of stethoscope is placed slightly on the brachial artery. Don't put too much pressure on bell that may occlude arterial flow.
7- - Cuff is inflated by a rubber squeeze bulb to pressure above expected SBP (no sound is heard) 20 to 30 mmHg. wait 15 – 30 seconds.
8- The pressure in the cuff is lowered slowly to hear soft sound by open release valve. So pressure falls at 2 -3 mmHg per second.
9- When the **first sound** is heard, the **systolic BP** is measured. Listen until the sound **disappears**, at this level **Diastolic BP** is measured .

Wait 1 - 2 minutes before repeating pressure on the same arm.


Sphygmomanometer
column of mercury indicating pressure in mm Hg
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
systole
diastole
No sounds (artery is closed)
Sounds heard (artery is opening and closing)
No sounds (artery is open)
inflatable rubber cuff
artery
air valve
squeezable bulb inflates cuff with air
sounds are heard with stethoscope