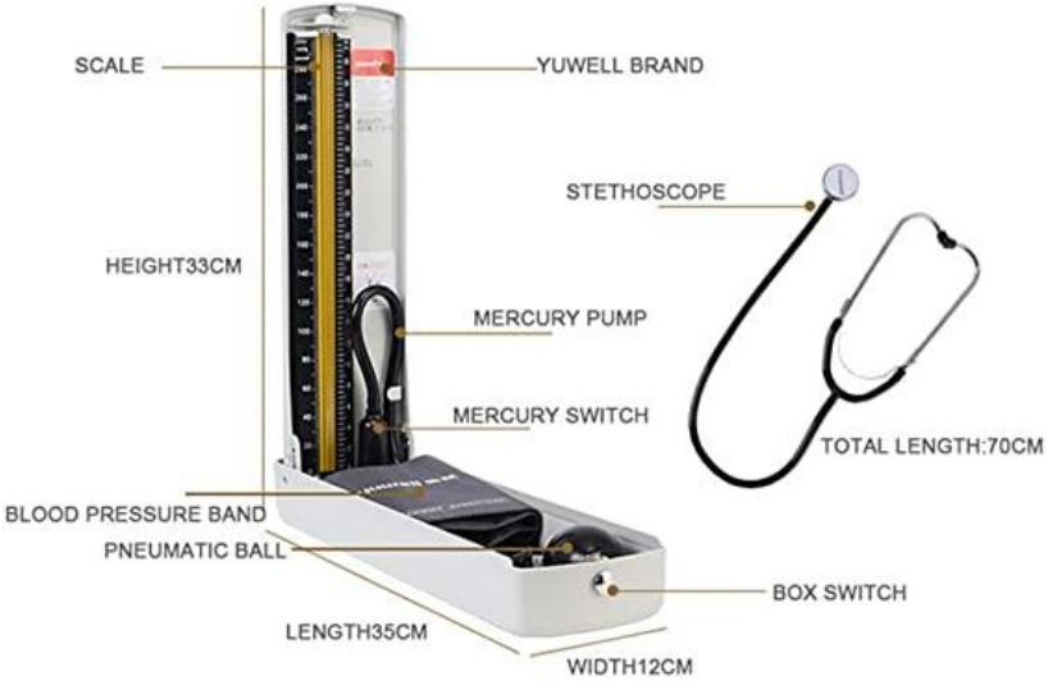
**EXPERIMENT NO.: 9** **DATE:**

AIM: TO RECORDING OF BLOOD PRESSURE IN VARIOUS POSTURES, DIFFERENT ARMS, BEFORE AND AFTER EXERTION AND INTERPRETING THE RESULTS

## REQUIRMENTS

Sphygmomanometer and stethoscope.




## THEORY

Blood Pressure (BP) is the force or pressure which the blood exerts on the wall of blood vessels. When the left ventricle contracts and pushes blood into the aorta the pressure produced within the arterial system is called systolic blood pressure and in the complete cardiac diastole stage, the heart is resting following the ejection of blood, the pressure within the arteries is called diastolic blood pressure. In adult normal systolic BP ranges about 110-130 mm Hg and the diastolic BP ranges about 70-85 mm Hg in adult.

**Clinical significance:**

Blood pressure, more than the normal range is called hypertension and blood pressure less than the normal is called hypotension.

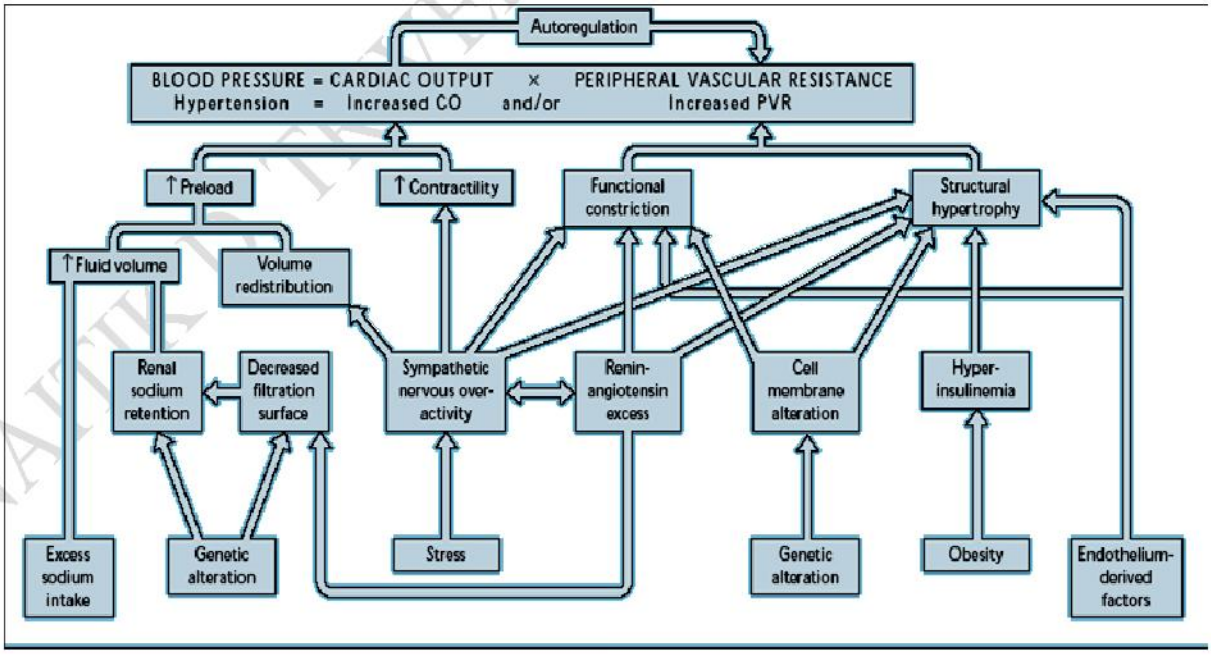
**Classification of hypertension in adults**

| Category | Systolic BP | Diastolic BP |
|---|---|---|
| Optimal | <120 | <80 |
| Normal | 120–129 | 80–84 |
| High Normal | 130–139 | 85–89 |
| Hypertension grade I (Mild) | 140–159 | 90–99 |
| Hypertension grade II (Moderate) | 160–179 | 100–109 |
| Hypertension grade III (Severe) | ≥180 | ≥110 |
| Isolated systolic hypertension | ≥140 | <90 |

## CAUSES OF HYPERTENSION:

1. Genetic variation (overexpressed or underexpressed genes)
2. Hypertensinogenics (high alcohol intake, high salt intake, obesity, insulin resistance)
3. aging and perhaps
4. sedentary lifestyle
5. Stress
6. low potassium intake
7. low calcium intake. explain
8. Coarctation of aorta explain
9. Diabetes mellitus
10. Hypercholesterolemia

## PATHOGENESIS OF HYPERTENSION:



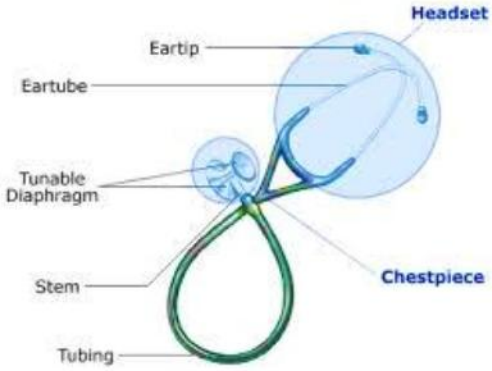
## SPHYGMOMANOMETER

A **sphygmomanometer**, is a device used to measure blood pressure. It is consist an inflatable cuff to collapse and then release the artery under the cuff in a controlled manner, and a mercury or mechanical manometer to measure the pressure.

It is an instrument for measuring blood pressure, typically consisting of an inflatable rubber cuff which is applied to the arm and connected to a column of mercury next to a graduated scale, enabling the determination of systolic and diastolic blood pressure by increasing and gradually releasing the pressure in the cuff.

## STETHOSCOPE

It amplify the sound and it is made up by 7 parts:




1. **Chestpiece**

   "Stethos" means "chest," so this is the logical place to start. The chestpiece is the part of the instrument that you hold against the body of the patient.

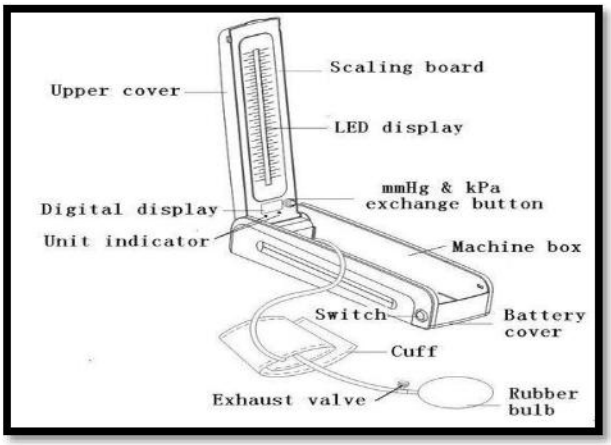
2. **Diaphragm**

   It may be single-sided or double-sided.

   - A two-sided chestpiece will typically have a diaphragm on one side and a deep cup-shaped side called the bell.
   - Both single-sided and double-sided pieces will usually have a flexible ring called a chill ring encircling them, which helps to make an airtight seal and buffer the patient against the coldness of the part.

3. **The stem** is what connects the chestpiece to the tubing.
4. **Acoustic tubes:** The acoustic tubes are the hollow rubber-like tubes that connect the chestpiece to the ear tubes.
5. **Headset:** This is typically the metal portion of the stethoscope.
6. **Ear tubes:** The ear tubes are hollow metal tubes that connect to the acoustic tubes on one end and the earpieces on the other.

7. **Earpieces:** Earpieces are the small tips on the ends of the ear tubes that fit into your ears. Some stethoscopes may have a choice of hard plastic or soft silicone earpieces.




A] Manual sphygmomanometer B] Digital sphygmomanometer


C] Aneroid sphygmomanometer

**PRINCIPLE OF SPHYGMOMANOMETER**

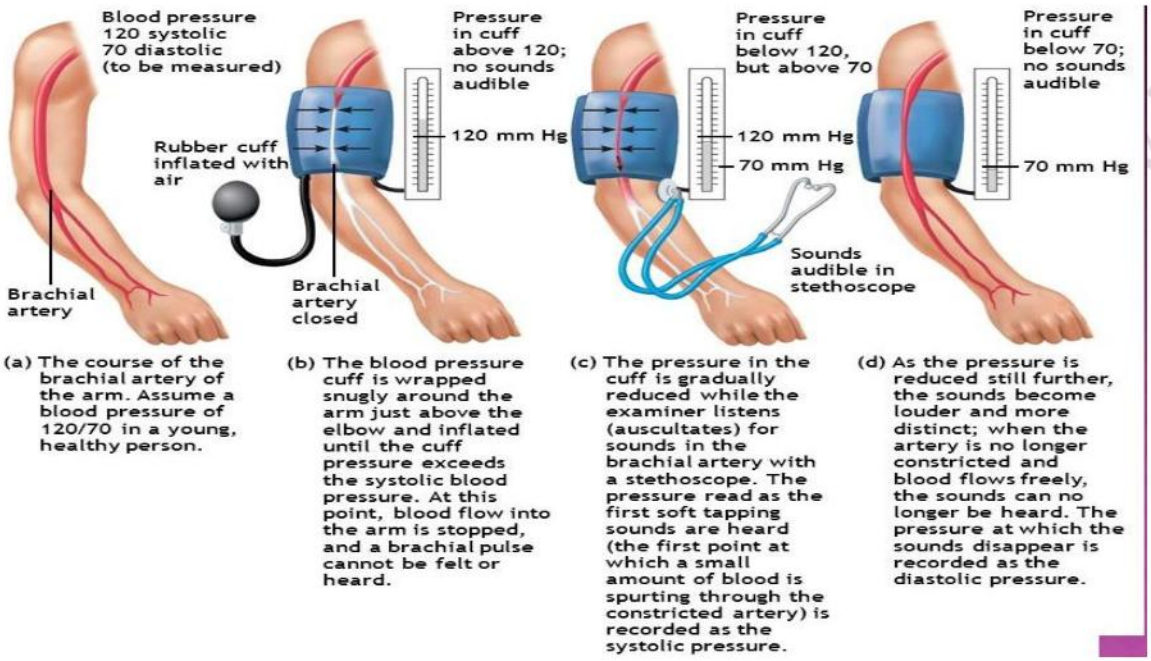
The flow through a large size artery is obstructed by means of air pressure exerted through a rubber bag wrapped around the limb.

The pressure is slowly released and the entry of the blood through the obstruction is studied by three methods:

1. Feeling of the pulse **(palpatory method)**
2. Observation of oscillations of the mercury level **(oscillatory methods)**
3. Hearing with the stethoscope the sound produced in the segment of the artery distal obstruction **(auscultatory method).**

The blood flow stops when pressure transmitted to the artery through the rubber bag is equal to or more the blood pressure. The first entry of blood through an obstruction indicates the blood pressure.

Usually arm or thigh is used because there is used because there is only one big blood vessel runs superficially in each of these parts.




(a) The course of the brachial artery of the arm. Assume a blood pressure of 120/70 in a young, healthy person.

(b) The blood pressure cuff is wrapped snugly around the arm just above the elbow and inflated until the cuff pressure exceeds the systolic blood pressure. At this point, blood flow into the arm is stopped, and a brachial pulse cannot be felt or heard.

(c) The pressure in the cuff is gradually reduced while the examiner listens (auscultates) for sounds in the brachial artery with a stethoscope. The pressure read as the first soft tapping sounds are heard (the first point at which a small amount of blood is spurting through the constricted artery) is recorded as the systolic pressure.

(d) As the pressure is reduced still further, the sounds become louder and more distinct; when the artery is no longer constricted and blood flows freely, the sounds can no longer be heard. The pressure at which the sounds disappear is recorded as the diastolic pressure.

## PROCEDURE

**Note: Follow the same procedure before and after exercise.**

- Place the Sphygmomanometer on a desk
- Ask the subject to seat calm on a table or chair and place lower hand on the desk with closed fist and uppersame line with the heart.
- Cuff is wrapped around the upper arm just above the elbow.
- The chest piece of the stethoscope is placed upon the brachial artery.
- The other ends of the stethoscope are connected with two ears.
- The bag of the cuff is filled by the pump up to 240 mm Hg. pressure.
- The pressure inside the cuff is released slowly by losing the air with the air adjustment screw. As the pressure is released sudden appearance and disappearance of a sound is heard and recorded. Also observe the movement of mercury inside the tube of sphygmomanometer.
- Sudden onset of trapping sound is systolic blood pressure and the sudden disappearance of sound is diastolic pressure.

## MTHODS OD RECORDING OF BLOOD PRESSURE

### 1. Palpatory method

During the release of sphygmomanometer pressure fix eye at mercury level and finger at the pulse (At the start it is disappeared). When the pulses reappear gives the systolic

pressure. This is palpalatory method. This method does not give any idea about diastolic pressure. The systolic pressure measure by this method is about 5-10 mm lower than actual systolic pressure.

2. **Oscillatory methods**

When the pulse appears, it is also noted that mercury stars oscillating. The first oscillation gives systolic pressure read within 15 secs. On continuation of deflation the oscillation start increasing in magnitude and then slowly diminish. The level at which the oscillations are maximum is taken as the diastolic pressure which read within 30 secs. This is called oscillatory methods

3. **Auscultatory method**

After inflation of cuff, the chest piece of stethoscope placed over the brachial artery in the cubical fossa and deflation is started by slowly releasing the pressure. The level at which a sudden tap sound is heard is the systolic pressure. The sound suddenly gets muffled and disappears is the diastolic pressure. The sound heard are Korokorr's sound. These are due to interrupted flow of blood.

## OBSERVATION TABLE AND RESULT:

1. **Blood Pressure by right arm**

| Before Exercise | | After Exercise | |
|---|---|---|---|
| **Systolic BP mmHg** | **Diastolic BP mmHg** | **Systolic BP mmHg** | **Diastolic BP mmHg** |
| | | | |

2. **Blood Pressure by left arm**

| Before Exercise | | After Exercise | |
|---|---|---|---|
| **Systolic BP mmHg** | **Diastolic BP mmHg** | **Systolic BP mmHg** | **Diastolic BP mmHg** |
| | | | |

## PRECAUTIONS

The cuff should be wrapped tightly, the cuff bag should be air free, the apparatus should be kept at the level of heart, pumping and measuring should be done carefully.

## CONCLUSION

- From the result my blood pressure is in normal/abnormal range.
- It Indicates person is normal/hypertensive/hypotensive.

**SIGNATURE OF TEACHER**