

Blood Pressure

By

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Objectives

- To be able to measure arterial blood pressure using a sphygmomanometer
- To recognize the effects of exercise on the arterial blood pressure

Blood pressure

The force exerted by the blood against any unit area of the vessel wall

Bl. Pressure 50mmHg:

Means that the force exerted is sufficient to push a column of mercury against gravity up to a level of 50mmHg high.

Normal systolic pressure ranges from 100 to 140 mm Hg.

Normal diastolic pressure ranges from 60 to 90 mm Hg.

Equipment

1. A stethoscope
2. A sphygmomanometer
3. A bicycle and/or a treadmill



Measurement of arterial blood pressure

Precautions for measuring arterial blood pressure

- The cuff size should be appropriate for the age and built of the subject. A large cuff is recommended for obese subjects while a smaller one is available for use with children.
- The cuff must be applied snugly (not too tight and not too loose) about 4 cm above the cubital fossa.
- Take care that the free margin of the cuff is not on the course of brachial artery i.e. to make sure that the rubber bag within the cuff is on the medial side so that it can occlude the brachial artery when the cuff is inflated.

- It is important that the manometer should be at the same level as the heart to exclude the effect of gravity while measuring the blood pressure.
- The mercury manometer should be in the vertical position.
- Check that there is an adequate amount of mercury in the bulb of the instrument. This can be done by seeing whether the mercury level is at the zero position of the manometer.
- The subject must be physically and mentally relaxed and in a comfortable environment.

PALPATORY METHOD

(This method only gives an estimate of the systolic blood pressure)

- The subject's arm should be resting comfortably so that it does not need to be actively supported while the blood pressure is being taken.
- A standard cuff (12 x 24 cm) is applied like a bandage about 4cm above the elbow joint.
- Inflate the cuff until the radial pulse cannot be felt. By compressing the brachial artery, the pulse or pressure wave can no longer be transmitted to the radial artery.
- Deflate the cuff slowly. Note the pressure at which the radial pulse can be felt again for the first time. This will be the systolic blood pressure.

AUSCULTATORY METHOD

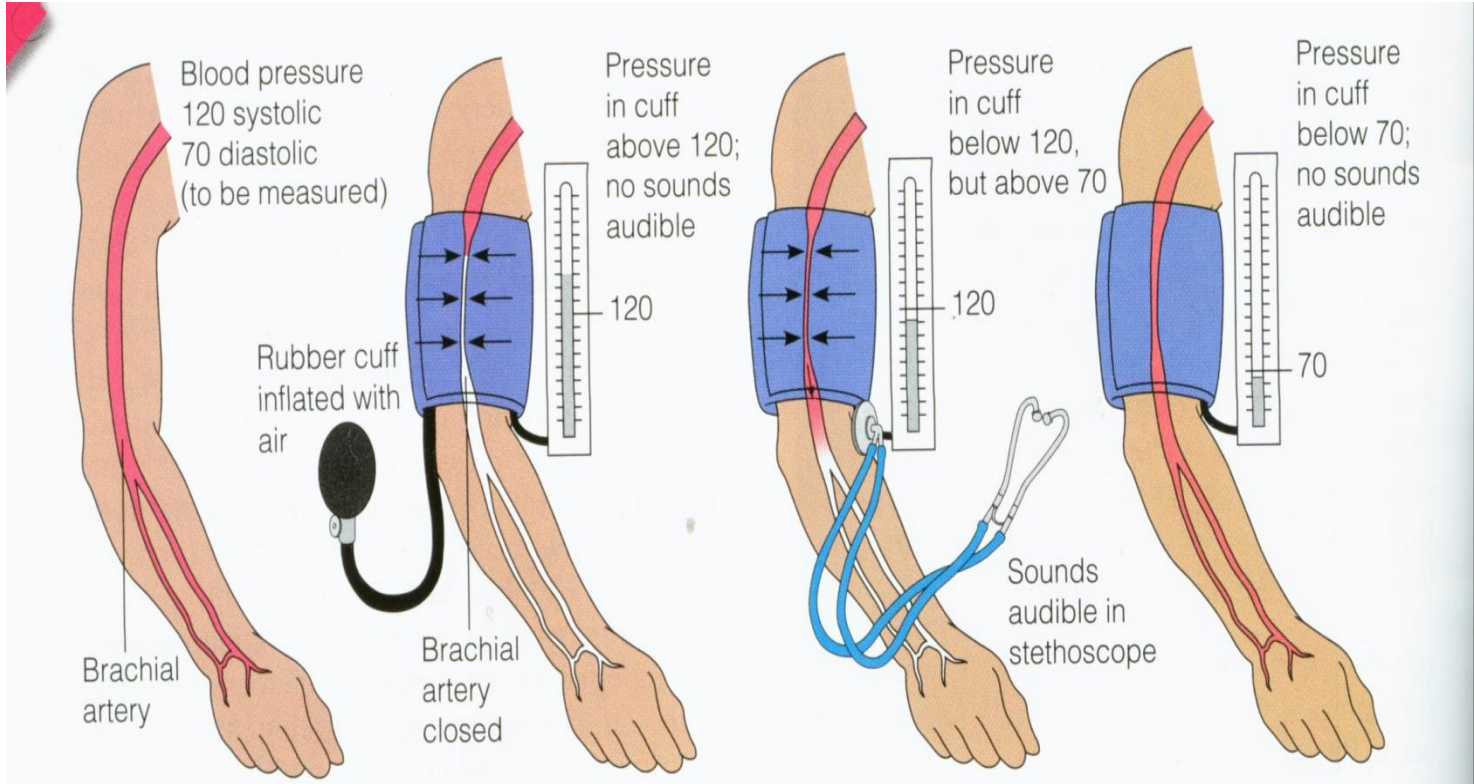
(This method measures both systolic and diastolic blood pressures)

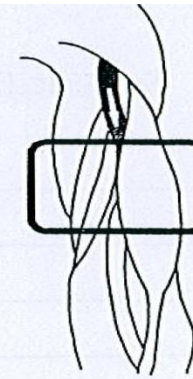
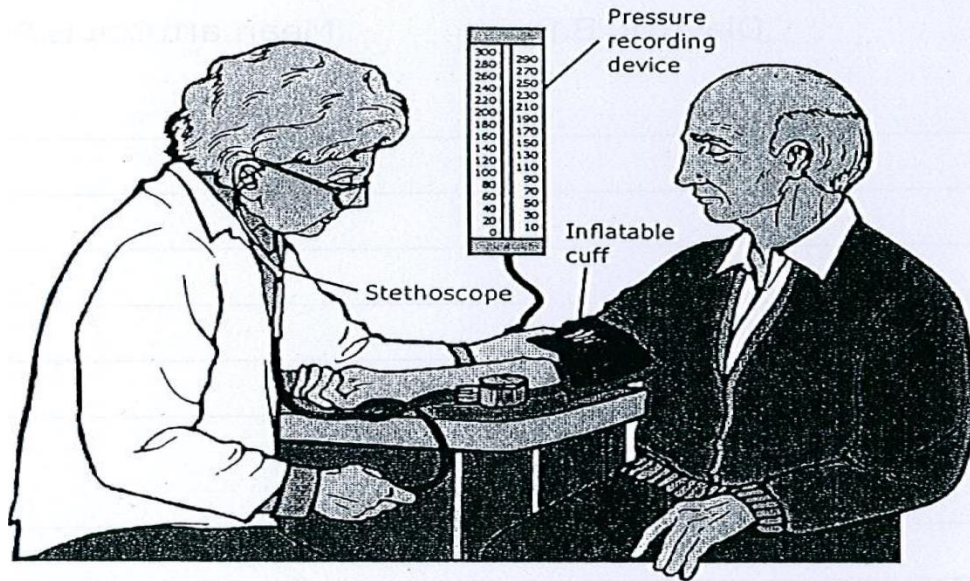
- _ Inflate the sphygmomanometer cuff until there is no radial pulsation.
- _ Place the diaphragm of the stethoscope over the brachial artery just above and on the medial side of the elbow joint.
- _ Deflate the cuff slowly. A series of sounds are usually heard



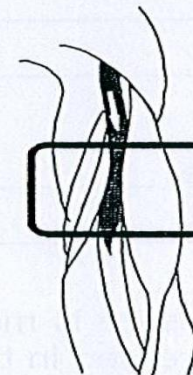
The korotkov sounds

- These sounds are produced by turbulent flow in the constricted brachial artery.
- **Phase 1:** The appearance of a clear tapping sound. This is the first sound that is heard and it represents the Systolic Pressure.
- **Phase 2:** Blowing or swishing sounds.
- **Phase 3:** The sounds become sharper and crisper.
- **Phase 4:** An abrupt muffling of sounds.
- **Phase 5:** All sounds disappear. The point where the sound disappears is the diastolic blood pressure.

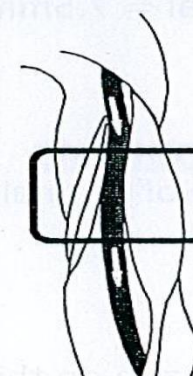




Cuff pressure is greater than 120mmHg.
No blood flows through vessel.
No sound is heard.

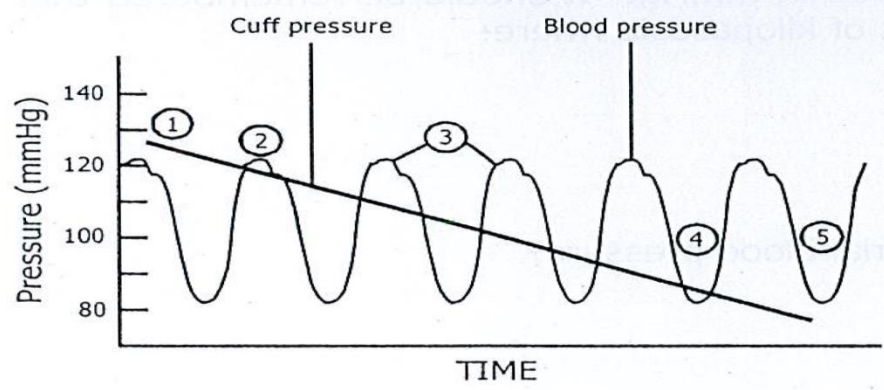


Cuff pressure is between 120 and 80mmHg.
Blood flows through vessel is turbulent whenever blood pressure exceeds cuff pressure.
Intermittent sounds are heard as blood pressure fluctuates throughout cardiac cycle.



Cuff pressure is less than 80mmHg.
Blood flows through vessel in smooth, laminar fashion.
No sound is heard.

(B)



The pulse pressure

It is the difference between systolic and diastolic blood pressures.

- Systolic pressure = 120 mmHg and Diastolic pressure = 80 mmHg; then
- Pulse Pressure = Systolic - Diastolic pressure i.e. $120 - 80 = 40$ mmHg.

The mean arterial blood pressure

It is the average blood pressure within the arteries during a whole cardiac cycle and it is the force responsible for maintaining a continuous forward flow of the blood in the circulation during the whole cardiac cycle.

M.A.B.P.= diastolic blood pressure + $\frac{1}{3}$ pulse pressure

The effects of exercise on the systolic & diastolic blood pressures

MILD TO MODERATE EXERCISE

- Systolic BP increases, while Diastolic BP remains the same.
- Because of sympathetic stimulation, the cardiac output increases, which in turn increases the systolic BP, but no effect on diastolic BP.

SEVERE OR HEAVY EXERCISE

- Systolic BP increases further and Diastolic BP decreases
- More sympathetic stimulation will increase the Systolic BP further and the Diastolic BP drops because of a net decrease in the total peripheral resistance due to the more vasodilatation effect on the arterioles supplying the exercising skeletal muscles than the vasoconstriction effect on the arterioles supplying the other tissues.

Factors affecting blood pressure

- **Posture:**

In erect posture: the systolic falls a little but soon returns to normal by the compensatory mechanisms.

- **Age:** blood pressure increase with age.

- At birth: 50/30.

- Adult: 120/80.

- Old age: 170/90.

- **Sex:**

Blood pressure is lower in females until menopause.

- **Body build:**

Obesity increase blood pressure.

- **Diurnal variation:**

Blood pressure is lower in the morning.

- **Digestion:**

Systolic blood pressure rises by 6-8 mmHg after meals (1 hour).

- **Exercise:**

Systolic blood pressure increase while diastolic blood pressure remains unchanged

- **Temperature:**

Cold causes vasoconstriction so increase blood pressure due to increase peripheral resistance

- **Emotions:**

Increase blood pressure

It drops during sleep and excessive hemorrhage.

THANK YOU