Cardiovascular System

Sheet 1

Subject | Pharmacology

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Corrected by | ...

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**** please refer to the slides , I didn't mention what is written in the slides**

- **Normal blood pressure → 120/80 (120→ systolic → when the heart contracted , 80→diastolic → when the heart relaxed)**
- **Hypertension→ elevated the blood pressure above 140/90 →It's the prehypertension state**
- **Two main contributing factors in the BP : cardiac output(CO) & peripheral vascular resistance (PVR)**
- **Increase the blood volume → will increase the pressure on the wall of blood vessels**
- **Increase the contraction of the smooth muscle of the blood vessels→ leading to narrowing the blood vessels → increase PVR→ increase BP**
- **Usually , it is asymptomatic disease → having the elevated BP but there is no symptoms→ its bad condition → its called silent killer → because it has severe complications→ could cause damage of certain organs:**
  1- Heart → heart failure , hypertrophy, MI
  2- Blood vessels →change their structure (thickness of their wall , hypertrophy) → then there will be decrease the blood supply

to the orangs due to the narrowing in the blood vessels. Also, can affect the blood vessels in the brain → causing stroke

3- Kidney →can be damaged by having →chronic kidney failure

- So, we need to diagnose the hypertension early to prevent these complications
- If these problems happen , they will persist along time
- to diagnose a patient with hypertension →we need the average of 14 reading during 7 days (twice a day , one in the morning and the other at night) → why we take the average reading ? because we have variation : during stress and excitement (over activation of sympathetic system) there will be high epinephrine(adrenaline) & norepinephrine→ causing constriction of the heart → increase PVR → increase heart rate. According to these differences, at morning the BP will high BUT in the night will be low (circadian variation of blood pressure)
- multifactorial abnormalities can lead to high BP:
  1- genetics (family history)
  2- stress (over activation of sympathetic)
  3- environment and diet(smoking → nicotine will bind to nicotinic receptors in the synapse ganglia in the neuromuscular junction (of sympathetic and parasympathetic)→ the tone that is innervated the blood vessels → the sympathetic→ lead to constriction of the blood vessels→ increase BP),,, salts→ high Na+→ high water → high blood volume→ high pressure in the blood vessels→high venous blood return to the heart → high preload(increase the heart filling)→ high BP
- secondary hypertension→ a disease that will cause hypertension such as tumor in the adrenal gland
- BP variations:

  1-white coat → normal BP in the house when it is measured but high in the clinic→ due to stress

2-masked hypertension→ people have hypertension but the don't know OR in the clinical have normal BP but in the house abnormal BP

- **Women before menopause have low chance to develop hypertension than men → due to estrogen has vascular protective function BUT after menopause women and men have the same chance to develop hypertension**
- **Mortality is related to BP→ more associated with systolic pressure→ common in elderly BUT the diastolic hypertension , it is said to be common in the patient below 40**
- **Factors that can lead to increase the coronary heart diseases:**
  1- Hypertension
  2- High cholesterol
  3- High glucose
  4- Smoking
  5- Left ventricular hypertrophy (LVH)
- **Ways to regulate BP:**
  1- Minute to minute

Low BP→ sense the baroreceptors→ stimulate sympathetic pathway→ release epinephrine and norepinephrine→bind to beta 1 adrenergic receptor in the heart → increase heart rate→ Increase cardiac output→ increase the action of alpha receptors in smooth muscle of the blood vessels→ vasoconstriction→increase PVR → BP

2- Kidney →(for chronic hypotension)→lowering the renal blood flow→ release renin → release angiotensin ll (neuropeptide)→ will bind to vascular smooth muscle receptors → causeing high PVR → high BP,,,,,,OR angiotensin can bind to its receptors in the kidney → causing releasing of aldosterone → increase the reabsorption of Na+ and water→ increase the blood volume→increase BP**Note: orthostatic hypotension→ due to change the position**