**HND 2nd Semester**

**Course Title: Anatomy Instructor: Dr. Ahmed Hayat**

 **MID Term Assignment Marks: 30**

***NOTE: Mention your name and roll number on the assignments.***

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Q1: Write a paragraph on the process of food digestion. Highlight the functions of each organ involved.

**Digestive system :**The digestive system is also known as the gastrointestinal tract or alimentary canal.

**.** The digestive system is a organs system within human and other animal with take in food digest it and absorb energy and nutrient and expels the remaining wasting..

**Functions of digestive system:**

**.** **Ingest:**  food (eating and drinking).

. Mixes and move the content along the alimentary tract .

. **Mechanical breakdown of food:** Digestion consist of mechanical breakdown of food e.g. mastication (chewing).

**. Chemical digestion:**  of food into small molecule by enzyme.

. **Absorption:**  by which digestive food substance pass through the walls of some organs of the alimentary canal into the blood for circulation.

.  **Elimination:**  food substance that have been eaten but cannot be digested and absorbed are excreted from the alimentary canal as faces by the process of defecation.

**Major organs of digestive system:**

**.** Mouth

. Pharynx

. Esophagus

. Stomach

. Small intestine

. Large intestine

. Rectum

**Accessory digestive system:**

**.** Liver

. Gall bladder

. Pancreas

. Salivary glands

**Mouth (Tongue):**

. The tongue is a muscular organs in the mouth , that manipulates food for mastication , and is used in the act of swallowing..

. It is the primary organs of taste .

. The tongue upper surface (dorsum) is covered by taste buds housed in Q2 lingual papillae

**Functions of mouth (tongue):**

. Mastication (chewing).

. Deglutition (swallowing)

. Speech

. Taste.

. **Salivary glands:** Humans have 3 paired of major salivary gland

**1.parotids gland :**Found in interior ear and skin.

.The 2 parotids glands are major salivary glands.

. The largest of the salivary glands.

**2.sublingual gland:** Found in underneath the tongue.

**3.submandibular gland:** Found in underneath the mandible.

**.Pharynx:**

. The pharynx is the part of the throat that is behind the mouth and nasal cavity and above the esophagus and the larynx.

. The pharynx is the portion of the digestive tract that receives the food from the mouth.

**.Esophagus:**

**.** The esophagus is commonly known as the food pipe.

. The esophagus is a muscular tube connecting the throat (pharynx) with the stomach.

**Length:** 25cm

**Width:** 2cm

**Functions of esophagus :**  . Formation of the bolus

. Swallowing

. Food is ingested through the mouth and when swallowed passes first into the pharynx and than into esophagus.

. Reducing gastric reflux.

. Construction of upper and lower esophageal sphincters help to prevent reflux ( backflow) of gastric contents and acid into the esophagus, protecting the esophageal mucosa.

**Stomach:** The pouch like organs .

. **Contain two sphincter ;**

1. Cardiac sphincter
2. Pyloric sphincter
3. **Cardiac sphincter:** near the esophagus
4. **Pyloric sphincter:** near the small intestine

**Regions:** 4 regions of the stomach are

1 . Cardiac stomach

2.Fundic stomach

3.Body of stomach

4.pyrolic stomach.

. Contain thick folds called rugae at it layer, for providing larger surface area for providing larger surface area of expansion , secretion, digestion and absorption.

**Gastric juice:** Gastric juice is a digestive fluid form in the stomach and it composed of hydrochloric acid (HCL), potassium chloride (KCL), and sodium chloride (NACL)

**Functions of gastric secretary cells:**

**.** **Chief cells :** secrete pepsinogen.

**.parietal cells :** secrete hydrochloric acid (HCL) .

**.mucous cells:** secrete mucous and alkaline substance to help neutralize HCL in the gastric juice.

**. G cell:** secrete the hormones called gastrin , which stimulates the parietal cells and overall gastric.

**.Pancreas:** The pancreas is the glandular organs in the digestive system.

. **Located:** abdominal cavity behind the stomach.

**.length:** 6 inch.

**Structure of pancreas :** 4 structure of pancreas

1. Head of pancreas

2. Neck of pancreas

3. Body of pancreas

4. Tail of pancreas

**Functions of pancreas :**

**.**The pancreas is involved in blood sugar control and metabolism of the body.

. Each types of cell secretes a different types of hormones.

**Alpha cell:** secrete glucagon (increase glucose in blood)

**Beta cell:** secrete insulin (decrease glucose in blood)

**Delta cell:** secrete somatostatin (regulate / stops alpha and beta cells )

**Gamma cells:** secrete pancreatic polypeptides

**Liver:**

**.** The liver is a organs system.

. Detoxifies various metabolic , synthesized proteins, and produces biochemical necessary for organs.

**Structure of liver:**

. The liver is a reddish brown wedge shaped .

. **Weight:** 1.44- 1.66 kg

. **Width:** 15 cm

 **. Lobes:** 2

. Heaviest internal organs and largest glands in the human body

 **Functions of liver:** synthesis of liver and breakdown of liver

**Synthesis: .**protein produce and secreted by the liver.

. The liver play a major role of carbohydrates ,protein, and lipid metabolism.

**Breakdown:** The liver is responsible for the breakdown of insulin and hormones.

.The liver breakdown bilirubin into bile.

. The liver stored glucose, vitamins A,D,B12, K.

**Blood supply:** Hepatic artery .

**Venous Drainage:** Hepatic veins .

**Gall bladder:** Gall bladder is small hollow organs, where bile is stored and concentrated before it is released into the small intestine.

**Structure of gallbladder:**

**Shape :**  pear shaped gallbladder lies beneath the liver.

**Length:** 7 to 10 cm

**Diameter:** 4 cm

**Divided :** fungus, body, the neck.

**Functions of gallbladder:** The gallbladder is stored in bile, needed for the digestion of fats in foods

**Small intestine:**  The small intestine is the part of gastrointestinal tract between stomach and large intestine, .

**Structure of small intestine:**

**Length :** 3m to 5m

**Diameter:** 3cm or 1 inch

**Parts:** 3 parts of small intestine

1.Duodenum

2 Jejunum

3.Ileum

**Functions of small intestine:**

**Digestion:** Many of digestive enzyme that acts in the small intestine are secreted by pancreas and liver.

. And enter by the small intestine via the pancreatic duct digestion of protein and carbohydrates.

**Absorption: .**Digestive food is now able to pass into the blood vessels in the wall of the intestine through either diffusion or active transport.

**.** The small intestine is the most of the nutrients from ingested from ingested food are absorb

.The small intestine support the body immune system.

**Large intestine:** .The large intestine is also known as larger bowel or colon.

. **Structure of large intestine:**

**Length:** Male: 166cm

 .Female:155cm

**Sections:** This colon is consist of 5 colons .

1.cecum

2.ascending colon

3.transverse colon

4.Decending colon

5.sigmoid colon and rectum

**Functions of large intestine:**

**.** The large intestine absorbed water and any remaining absorbable nutrients from the food before sending the in digest able matter .

. The colon absorb vitamins that are created by colon bacteria , such as vitamin k.

**Gut flora:** The large intestine houses over 700 species of bacteria that perform a variety of functions.

. Un digest polysaccharides (fiber) are metabolized to short chain fatty acids by bacteria in large intestine.

**Process of food digestion:**

**.** The mouth beginning of the digestive system.

. Chewing and grinding the food with the teeth , chewing break the food into small pieces that are moved easily digested.

. From pharynx foods travels to the esophagus.

. By mean of the series of contraction is called **peristalsis,** the esophagus deliver the food into a stomach.

. The stomach secrete acids and powerful enzymes that continue the process of breaking down the food.

. When it leaves the stomach , food is the consistency of a liquid from there the food moves to the small intestine.

. The small intestine continues the process of breaking down the food by using enzymes released by the Pancreas and bile from the liver.

. Bile is compound the aids in the digestion of fats and eliminate waste products from the bloods.

. The duedonum is largely responsible for continuously the process of breaking down the food with the jejunum and ileum is mainly responsible for the absorption of nutrients into the bloodstream.

. A stool is stored in the sigmoid colon into rectum..

Q2: How kidneys are involved in urine formation. Explain the process step by step in detail.

**urinary system:** The urinary system is also called ( renal system) or ( urinary tract) .

.its consist of;

1.kidney (two)

2.uretera (two)

3 bladder (one)

4.urethra (one)

**1.Kidney :**The kidney are a paired of excretory organs, situated on the posterior abdominal wall, one on each side of the vertebral column, behind the peritoneum.

**Location: .**vertically extend from upper border of 12 thoracic vertebra T12 to third lumber vertebra L3.

.The asymmetry within abdominal cavity caused the position of the liver, typically result in the right kidney being slightly lower and smaller than the left.

**Measurements of kidney:**

**Colour :** Reddish brown

**Length:** 11 cm long

**Width:** 5 cm broad

**Thickness:**3 cm thick

**Weight:** Male : 150 gm

 Female :135 gm

**Nephrons:** The nephron is the structural and functional of kidney.

**2.ureters:**The ureters are the pair of narrow ,thick walled muscular tubes which convey urine from the kidney to urinary bladder.

.Each ureters is about 25 cm long .

. The upper half lies in the abdomen.

. The lower half lies in the pelvis.

. It measures 3mm diameter

**3.Urinary Bladder:** . The urinary bladder is a hollow muscular organ, which a functions as the reservoirs for the urine received from the kidneys and to discharge it out periodically.

**Capacity:** The capacity of the bladder is 220 ml.

. Filling up to 500 ml may be tolerated , but it become pain full.

 **4 .Urethra :** The urethra is a canal extending from the neck of the bladder to the exteriors.

. Male : 20cm long.

. Female: 3-4 cm long .

**Urine Formation:** The kidney filter unwanted substances from the blood and produced urine to excrete them.

.**3 main steps of urine formation :**

1.Glomerular filtration

2.reabsorption

3. Secretion

**1. Glomerular filtration:** blood courses through the glomeruli, much of it fluids containing both useful chemicals and dissolved waste materials, and soaks out the blood through the membrane osmosis and diffusion.

. It is then filtered and than flow into the bowman’s capsule.

. The product formed is collectively known as glomerular filtration, water, waste products, excess salts (Na+, and K+), glucose, and other chemicals that have been filtered out of the blood.

**2.Reabsorption:**Reabsorption begins in the proximal convoluted tubules(PCT) and continuous in the loop of Henle ., distal convoluted tubules (DCT) and collective tubules.

. About 99% of the 180 L of water that leave the blood each day by glomerular filtration returns to the blood from the proximal tubule through the process of passive reabsorption .

. Glucose is entirely reabsorbed back into the blood from the proximal tubules .

. Sodium ions (Na+) and other ions are only partially reabsorbed from the renal tubules back into the blood.

. Amount depend largely on how much salt we take in the from the foods that we eat..

**3.Secretion :**secretion is Reabsorption in reverse.

. Secretion substance from blood in tubules .

. Substances are secreted through either on active transport mechanism or as a result of diffusion across the membrane.

. Secretion play a role in maintaining the body’s acid-base balance.

. Filtration of water and dissolved substance out of the blood in the glomeruli and into bowman ‘s capsule.