Prof ANIL KUMAR (Zoology)
B.Sc HONS Part III Paper - V
Topic - Physiology of Digestion in Mammals
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Q. Given an account of physiology of digestion in mammals.

Ans. Digestion is an adaptation to deal with larger particles in order to break them to such a size that intracellular digestion can take place. In this process digestion occurs outside the cells in a tube called as gut or alimentary canal.

Digestion may be studied under the following heads—

1. Buccal digestion 2. Gastric digestion 3. Intestinal digestion.

1. Buccal Digestion : In buccal cavity, the food is chewed so that it may be swallowed easily; while chewing there is also an increase in the secretion of saliva which soften the food and swallowing became easier.

The saliva coming from salivary gland is viscous and colourless. Its PH ranges from 6.2to. 7.4. The saliva contains a digestive enzyme ptyalin which hydrolyses the starch first to split it into doxitrins and then to maltose.

Ruminants (cow, buffallo, etc.) have no ptyalin in their saliva. A few other enzymes are also found in human saliva, such as lipase, proteinase, sulphatase etc. whose functions is to digest food particles sticking on the teeth and thus to deep the mouth clean.

2. Gastric Digestion : After swallowing the food passes down the oesophagus by peristaltic movements crastric juice is poured out in the stomach. The gastric juice contains 97-99 percent water. The rest of the gastric juice contains HCl, pepsinegen, mucin and inorganic salts.

The enzymes secreted in the stomach are pesin remain and aestric lipase.

(i) Digestion of Protein : The pepsin is secreted by the chief cells in the inactive state called. pepsinegen. The HCl activates this enzyme into pepsin at a pH of 4.6 below.

$$\text{Native protein} \xrightarrow[\text{pH 1·5–3}]{\text{Pepsin}} \text{Prosteoses, peptony polypeptides.}$$

$$\text{Calcium casein (milk)} \xrightarrow[\text{Pepsin}]{\text{Pepsin}} \text{Calcium para casein + proteoses.}$$

$$\text{Calcium parrassein} \xrightarrow{\text{Pepsin}} \text{prosteores, pepton polypeptides.}$$

The renin is the milk-coagulating protein of enzyme changing soluble protein of the (casein) into insoluble paracase in presence of Ca^{++}

$$\text{Raini+milk protein (casein)} \xrightarrow{Ca^{++}} \text{palacosein.}$$

(ii) Digestion of Fat : Grastric lipase is produced only in traces by the gastric glands which digest same the amulsified fat into fatty acids and glycerol.

Grastric lipase + fat → Glycerol + fatty acids.

No digestion of carbohydrates occurs in the stomach.

3. Intestinal Digestion : The gastric chyme moves to the next region, the duodenum, by passing through the phulrus little by little. He first of all the pancreatic and bile juices mix with the chuyme, the average PH of the pancreatic juice ranges from 7.5 to 8.0.

Following enzymes occur in the pancreatic juice—

Trypsin, Chymotrypsin, Peptidase, Nuclease, lipase Amyleso, Esterase, Collagense.

Trypsin and chymo trypsin are found in the form of their respective precurs trysinogen and chymotrysinogen, which are inactive.

(i) (a) Native Protein $\xrightarrow[\text{Chymotropsis}]{\text{Trypsin}}$ Protesoes + peptone + polypeptide

(b) Proteoses + pepton + polypeptide $\xrightarrow[\text{Chymotropsis}]{\text{Trypsin}}$ polypeptides dipeptides.

(ii) Carboxy Peptidase : It can not spilt protein like the above endepeptidase. It is an exopeptidase acts an proteoses, peptones. polypeptidase ect. connecting them into dipetias and amino acid.

(iii) Amino Peptidase : It is also an exopeptidase and its reaction is like that of carboxy peptidase.

Proteoses + peptonas + Polypeptidase

$\xrightarrow{\text{A min opeptidase}}$ dipeptidase + Amino — acids.

Dipeptidase → Amino – acids.

(iv) Amylopsin (Amylox) : Like ptyalin it coverts (hydrolyze starch (carbohydrates), dextrins and glycogen into maltose. It has greater digestive power than salivary amylase.

Starch $\xrightarrow{\text{Amylase}}$ Maltase.

(v) Steapsin (Pancaretic Lipax) : It hydrolyses fats into glycerol, fatty acids, monoglycerides and diglycerides in a medium having pH between 7 and 8. steapsin

fats $\xrightarrow{\text{Steapsin}}$ fatty acid + glycerol

(vi) Pancreatic Renin : It converts remaining milk -protein (casein) into solid paracasein.

(vii) Pancreatic Lactax : Transforms lactose (sugar) into maltose.

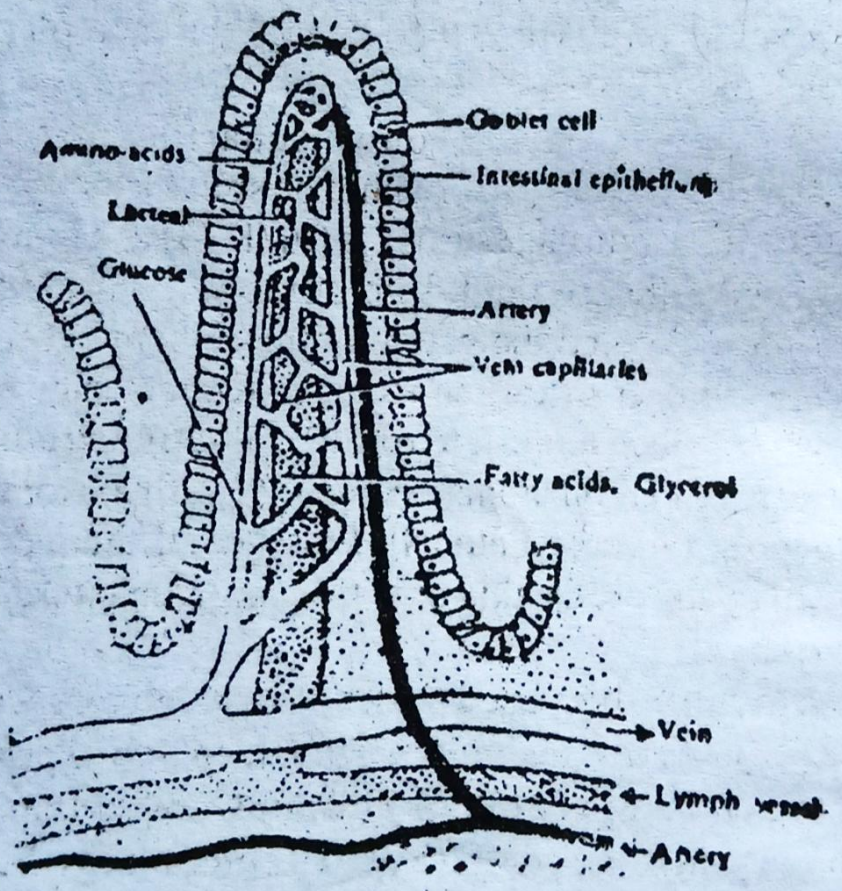
Lactose $\xrightarrow{\text{Lactose}}$ Glucose + galactose

(viii) Cholesteol Esterase : It esterifies the cholesterol into cholesterol esters which is absorbed.

(ix) Pancreatic Nucleases : They are found in the pancreatic juices as deoxyribomucleax and rinonuclease which hydrolyze nuclic acids into mononucleodas.

Absorption of Food : The villsaer is constant in motio during the digestion and absorption.

(a) Absorption of Protein : The smaller peptidas and amino acids produces in digestion are quickly absorbed through the intestinal mucosca are reach the hepatic portal vein.



(b) Absorptiofn of Carbohydrates : The final digested form of carbohydrates is chiefly in the form of simple monosaccharides. The hexose sugars are absorbed much farther than the pentose sugars glucose reaches the blood capilliaries and probably in smaller quantities it also reaches the lacteals.

(c) Absorption of Fats : Fatty acids and monoglycerides are almost wholly insoluble in water, so they cannot be absorbed directly. Bile salt combine with fatty acid to produce water soluble substances which can be absorbed.