

Lab 3: *IN VITRO* EVALUATION OF BULK FORMING LAXATIVES

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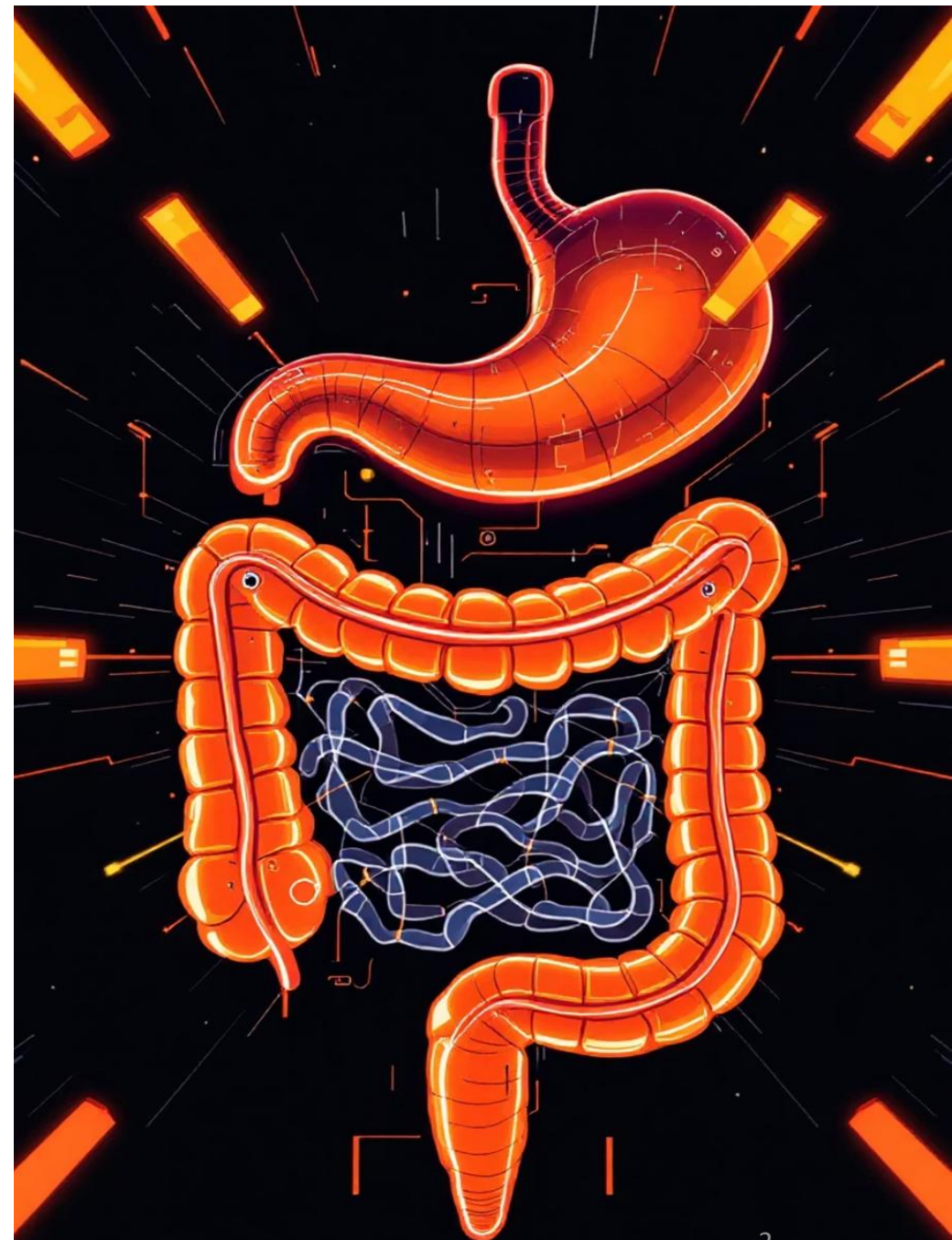
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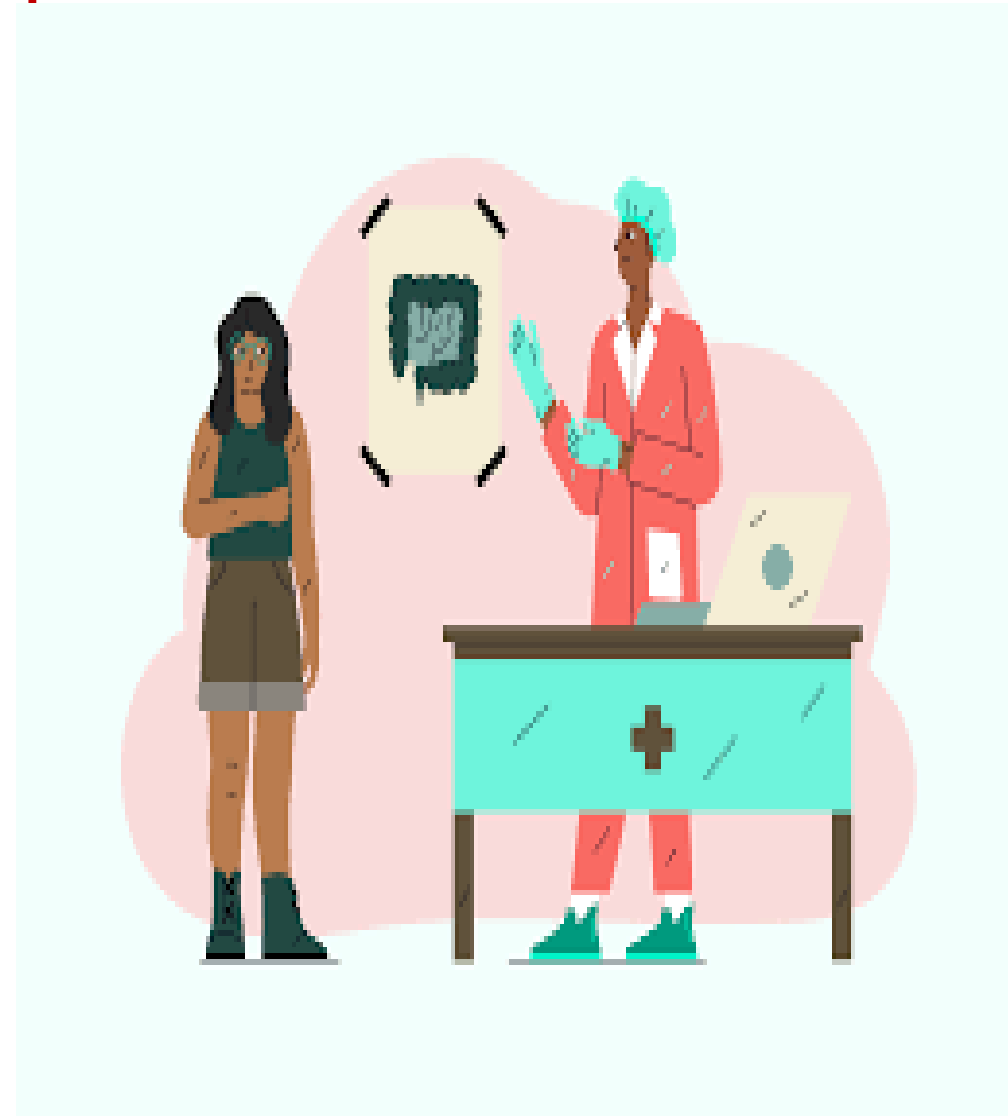
Introduction

- A laxative is a medicine that loosens the bowel contents and **encourages evacuation**.
- Laxatives taken regularly tend to deprive the colon of its natural muscle tone.
- Simple constipation is usually managed effectively by increasing the intake of **dietary fiber** and **fluids**



Laxatives should be generally avoided except where:

1. Straining exacerbates multiple illness conditions, including angina due to opioid intake or rectal bleeding, such as in the case of hemorrhoids and fissures due to pain.
2. Some types of drugs induce constipation (opioid pain relievers like morphine, iron supplements, and antacids containing calcium or aluminum) due to reduce intestinal motility.
3. To get rid of parasites after anthelmintic treatment.
4. Essential for clearing the alimentary tract thoroughly before surgical and certain radiological procedures (e.g., colonoscopy)



Side effects of laxative:

1. Habit-forming laxatives.
2. Drug-drug interactions due to acceleration of transient time through the intestine, which may lead to poorly absorbed drugs. E.g.: Griseofulvine and controlled-release drugs
3. Electrolyte imbalance



10 Causes Of Constipation



Not Eating Enough Fiber



Not Drinking Enough Water



Out Of Balance Gut Bacteria



Certain Medications



Too Much Supplemental Calcium or Iron



Eating Too Much Dairy



Eating Too Much Sugar & Unhealthy Fats



Depression



Lack of Physical Activity



Laxative Abuse

Veda Life
Magazine, Health Center, Shop

Non-medicated treatment

Constipation Lifestyle Change

Fasting, chew well, drink warm water, fruits, vegetables, seeds/nuts, ghee/oil, yogurt, squatting, keep routine, sleep well & manage stress.



Classification of laxatives according to the mechanism of action:

- 1. Stimulant laxatives (irritants):** These agents act by stimulating intestinal motility. The most frequently used stimulant laxatives are castor oil (**TG mainly -ricinoleic acid esters- hydrolyzed by lipases to release ricinoleic acid that irritates and stimulates the mucosa of the intestinal wall so Increased motility**) cascara and senna.
- 2. Fecal softeners (emollient or wetting):** They act by lubricating the feces (liquid paraffin) or softening the feces (sodium dioctyl sodium sulfosuccinate as an anionic surfactant by **reducing surface tension** so, mix oily feces with water. This may cause a sufficient rectal stimulation to promote a bowel action. These drugs are useful in management of hemorrhoids and anal fissure.
- 3. Osmotic laxatives:** These act by maintaining the volume of fluid in the bowel by osmosis; e.g., magnesium carbonate, magnesium hydroxide and magnesium sulfate.

4. Bulk Forming Laxatives: The Focus of Lab 3



Mechanism of Relief

These agents relieve constipation by significantly **increasing the fecal mass** due to their water absorbing and retaining capacity. This greater mass distends the bowel wall, which reflexively stimulates the natural process of peristalsis.

Key Composition and Action

They are composed of various natural and semi-synthetic polysaccharides (psyllium) and cellulose derivatives (methyl cellulose) that:

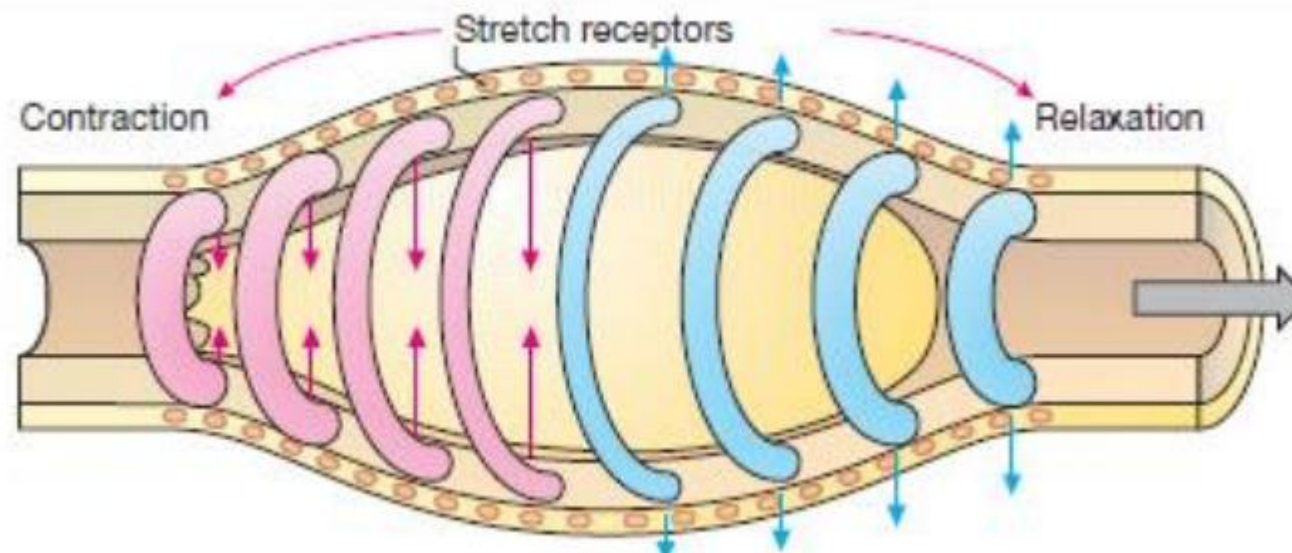
- Dissolve or swell when mixed with water.
- Form an emollient gel or viscous solution.
- Maintain the feces soft and well-hydrated.



Bulk laxatives:

Stimulation of peristalsis by intraluminal bolus:

- Ascending reflex contraction (red)
- Descending relaxation (blue)
- whereby the intraluminal bolus is moved in the anal direction



Time Course and Essential Considerations

Efficacy and Fluid Intake

12-24

Initial Effect (Hours)

The first signs of the laxative effect are usually apparent within this timeframe.

2-3

Full Effect (Days)

The maximum therapeutic benefit may not be fully achieved until the second or third day of consistent medication.

Fluid is critical: Adequate fluid intake must be maintained throughout the course of treatment to prevent potential complications such as intestinal obstruction. The agent's effectiveness is directly related to its **water-retaining properties** (i.e., its ability to swell).

Indications for using bulk forming agents:

Constipation caused by inadequate fiber intake.

Often recommended as the safest initial treatment for constipation during pregnancy due to minimal systemic absorption.

Anal fissure

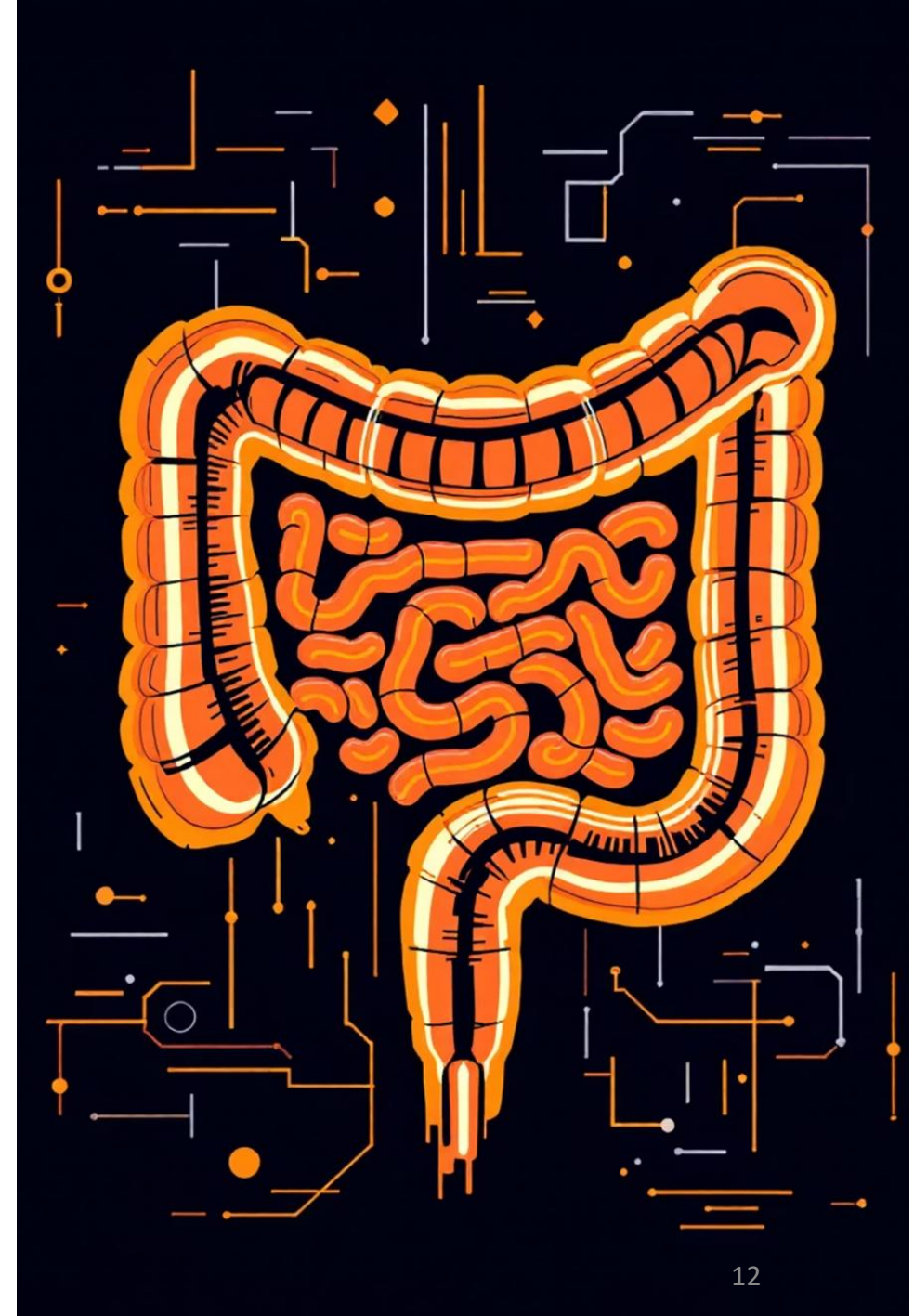
Hemorrhoids

Cautions



Adequate fluid intake should be maintained- **dehydration or restricted fluid intake may harden stools**

Caution in ulcerative colitis (inflammation of colon)- **irritate colon mucosa, obstruction, gases due to fermentation of fiber by colonic bacteria.**



Contraindications :



- **Intestinal obstruction**
- **colonic atony ” absence or lack of normal tone”**

Chia seeds (CSH) are rich in insoluble and soluble fiber — mainly mucilage — which **absorbs water** and forms a **gel-like mass in the intestine**.



This **increases stool bulk and softness**, stimulating peristalsis (the movement of the intestines).



Facilitates bowel movement in a way like classic bulk-forming agents such as psyllium



Aim of Experiment

In-vitro evaluation of the swelling properties of CSH were assessed in DW, 1 N NaOH and 1N HCl.



Experimental Procedure

1-Accurately weighed amount of dry CSH (3g) was placed in each of the three tea bags.

2- The tea bags were sealed and hung in the beakers having swelling media 150 ml of DW , 1 N NaOH and 1N HCl , at 37 °C.

3- After a pre-determined time interval (every 10 min), the tea bags were taken out from the swelling media and hung to remove excessive swelling media.

4- Later, the tea bags having swollen CSH were weighed and its swelling index in every swelling medium was calculated using the equation



$$\text{Swelling Index} = (W_t - W_0 / W_0) * 100$$

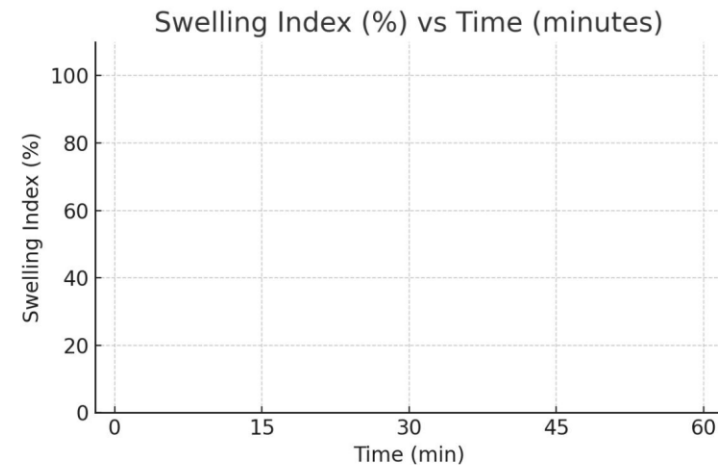
W_0 is the initial weight, W_t is the weight after a time interval



5. Record your results in tabular form and plot the following graph

6. Graph :

Plot the swelling index of the colloidal solution versus time in DW, acid, and alkali



Questions :

as a homework with report

- Why is evaluation carried out in neutral ,acidic and alkaline media ?
- What are the ideal swelling properties of bulk forming laxatives?

THANK YOU

