



UNIT-4

Digestion and Detoxification

Learning Outcomes

By the end of this unit the learner will be able to:

- ✓ Discuss what Digestion is.
- ✓ Outline the key points in maintaining a healthy digestive system.

Unit 4

Digestion and Detoxification

What is Digestion?

Digestion is the process of breaking down food so that it is small enough to be absorbed and used by the body for energy, or processed in other bodily functions. Digestion involves a number of different stages. The first phase is known as the cephalic (head) phase. It starts before food has even entered into our mouth. The sight, smell, taste, or even the thought of food, will activate saliva in the mouth, as well as digestive juices, which contains enzymes to break down food.

In the Mouth

Once food is in our mouth, the taste buds begin determining the chemicals within the food via their nerve endings, in order to give us the taste sensations of salty, sweet, sour, or bitter. As our teeth chew and grind down the food, it is mixed with saliva. This comprises many enzymes including salivary amylase, which begins to break down the long chains of starch found in foods such as bread, cereals, potatoes and pasta. Saliva also contains mucin, which moistens the food so it can pass easily through the digestive (gastrointestinal) tract.

The Oesophagus

After the food has been swallowed, it is carried down the oesophagus (a muscular tube) towards the stomach. The oesophagus can contract and relax in order to propel the food onwards, and each mouthful of food takes about six seconds to reach the stomach once swallowed.

The Stomach

The stomach is a sack made of muscle and, when it is empty, it has a volume of only 50 ml but this can expand to hold up to 1.5 litres or more after a meal. The walls of the stomach are made of three different layers of muscle that allow it to churn food around and make sure it is mixed with the stomach's acidic digestive juices. The presence of hydrochloric acid in the stomach prevents the action of salivary amylase and helps to kill bacteria that might be present. The stomach also produces the enzyme pepsin, which breaks down proteins (mostly found in meat, fish, eggs, and dairy products).

The hormone ghrelin is produced by cells lining the stomach. Ghrelin stimulates hunger and tends to increase before a meal and decrease after eating. This hormone forms part of the communication system between the gut and the part of the brain that controls hunger and satiety (how full you feel).

Food can remain in your stomach for a few minutes or several hours in the gastric phase where numerous acids and enzymes are released, including the hormone gastrin. When the food has been

churned into a creamy mixture known as chyme, the pyloric sphincter (an opening controlled by muscle) opens and chyme passes gradually into the small intestine.

The Small Intestine

About 3 ml of chyme is squirted into the small intestine at short intervals as the pyloric sphincter opens. This is known as the intestinal phase and causes the secretion of many hormones, which all aid the digestive process. The sphincter is designed to open partially so that large particles are kept in the stomach for further mixing and breaking down.

Digestion and absorption of fats, protein, and carbohydrates occurs in the small intestine. Three important organs are involved:

1. The gall bladder provides bile salts that help make fats easier to absorb.
2. The pancreas provides bicarbonate to neutralise the acidic chyme from the stomach, and also produces further digestive enzymes.
3. The intestinal wall contains cells that make up the wall of the small intestine. These cells help neutralise the acid and also, produces enzymes to digest food.

The inner surface of the small intestine is folded into finger-like structures called villi, which greatly increase the surface area available for absorption - in fact, the surface area of the villi is equivalent to that of a tennis court! Blood vessels receive the digested food from the villi where it's then transported through the blood stream to the liver via the hepatic portal vein. Fat can take much longer to be broken down, with the process of fat digestion and absorption taking between three and five hours. The unabsorbed residue of this process finally reaches the end of the small intestine and enters the large intestine.

The Large Intestine

This is one of the most metabolically active organs in the body. It measures about 1.5 metres and contains over 400 different species of bacteria that break down and utilise the undigested residues of our food, mostly dietary fibres. As the watery contents move along the large intestine, water is absorbed and the final product - faeces - is formed, which is stored in the rectum before excreting from the body.

The Importance of Digestion

The food that we eat - whether it is rice, chicken, bread, a piece of fruit, or even, orange juice - cannot be used by the body in its usual form. Foods and liquids need to be broken down mechanically and chemically into very small particles/molecules. These nutrient molecules are absorbed through the wall of the small intestine and transferred around the body via blood, to nourish cells and organs (from the brain to the immune system and even, into the cells in our feet), and to provide a source of energy.

The collection and elimination of waste products also is an important part of digestion. Indigestible parts of foods (fibre), older cells that line the digestive tract, and some water, are eliminated from the body as faeces. Thus, maintaining a healthy digestive system is extremely important for our general health and wellbeing.

Maintaining a Healthy Digestive System

Good (healthy) digestion is a 'silent' process – digestion, in some form, is always taking place, at any given time - while we rest, eat, sleep, or work. We generally only become aware of digestion when something goes wrong (e.g. if we eat foods that don't agree with our body or drink too much alcohol or say, if we become constipated or have gas).

Although the digestive system can withstand a lot of stress (from the foods we eat to emotional stresses), it can only do so for a limited period. Over time, the negative effects will accumulate and create health problems in the long-term. We should take some positive steps to maintain the health of our digestive system.

Key Points in Maintaining a Healthy Digestive System

A healthy digestive system can be maintained by:

1. Eating a healthy diet
2. Eating moderately, slowly, and regularly
3. Exercising regularly
4. Stopping/never beginning smoking
5. Reducing/managing stress levels

- **Eating a Healthy Diet**

Those foods should be eaten which are rich in fibre (vegetables, fruits, and whole grains/cereals). Fibre encourages passage of material through the digestive system and gives the correct consistency and bulk to stools. Ideally one should consume at least 30 g of fibre per day. A balanced diet, which is rich in fibre, may reduce the risk of developing diverticular disease, heart disease, or colorectal cancer. We should also try to reduce the intake of processed foods - these generally have little nutrition or fibre and often contain large amounts of saturated fats, salt and preservatives that can be harmful to the body.

Moderate amounts of 'good' fats (such as omega-3 and omega-6) should be eaten and the intake of saturated fats (e.g. animal fat) should be reduced. A diet high in fat can make the digestive system sluggish and may cause or aggravate diseases of the digestive system (and heart disease, as well).

Alcohol can inflame the lining of the stomach or oesophagus or cause symptoms of heartburn. Excessive intake of alcohol can lead to cirrhosis of the liver. Plenty of fluids should be consumed - especially water.

Water helps to dissolve some nutrients, encourages passage of waste through the digestive system, and helps soften stools.

- **Eating Moderately, Slowly, and Regularly**

Eating moderate portions can help maintain a healthy digestive system.

The process of digestion starts in our mouth. One should take time and eat slowly, chewing each mouthful well. Relaxing while we eat also helps the nerves of the digestive system, and food that is well chewed is easier to digest than larger pieces. One should eat regularly and should not skip meals - this will prevent overeating due to hunger and this prepares the digestive system for regular meals.

- **Exercising Regularly**

Regular cardiovascular exercise helps strengthen the muscles of the abdomen and reduces sluggishness by stimulating the intestinal muscles to push digestive contents through our system.

- **Stopping/Never Beginning Smoking**

Smoking lowers the pressure at the junction between the stomach and oesophagus, promoting backflow of stomach acid into the oesophagus (reflux) - which can result in heartburn and other complications. Smoking also aggravates peptic ulcers and certain inflammatory conditions of the bowels and it is linked with an increased risk of many cancers.

- **Reducing/Managing Stress Levels**

Stress affects the nerves of the digestive system and can upset the intricate balance of digestion. In some people stress slows the process of digestion, causing bloating, pain, and constipation while others may need to frequently empty their bowels and the stools may be more loose and watery than usual. Stress can worsen some conditions, such as, peptic ulcers or irritable bowel syndrome.

Stress and Digestion

What is Stress?

In order to understand what stress might be doing to our digestion we first need to understand what happens to our body when we are stressed. Like animals, we are programmed to react to danger with a physical response, which is known as 'Fight-or-Flight Syndrome' and this response is how our cave-dwelling ancestors would have reacted when confronted by a tiger. Without it, we would not have the energy to survive encounters with dangers.

Stress Hormones

Though the stress really starts in our brain when we become aware of a stressor, the hormones that begin the stress response come from our adrenal glands. The adrenal glands are the two small triangular glands that sit on the kidneys. They are endocrine glands, which mean that they secrete the hormones they make directly into the blood stream. The major stress hormone influence almost everybody function.

How Stress Makes Us Feel

If we are stressed, we might feel anxious, nauseous, teary, angry, or shaky. Sometimes, stress can cause our heart beat to beat faster. When we are undergoing stress, the following events can occur:

- The heart rate rises: this is to move blood with glucose and oxygen faster to our muscles so that we will have more energy to fight or run away from the tiger.
- The digestive and reproductive organs do not receive the energy they normally need because our body assumes that when we are fighting a tiger we are not lying under a bush digesting our meal.
- Our liver releases stored carbohydrates into our bloodstream as glucose and our body also starts to make more glucose from our own body proteins because it thinks that we will need extra sugar for energy for fighting. So when we are under stress our blood sugar levels rise.
- Cortisol is a natural anti-inflammatory hormone; therefore, stress causes cortisol levels to rise because the body thinks that the body is wounded and needs treatment.
- The cholesterol levels may also rise because it is a starter material for making cortisol and all the other adrenal hormones.

The Effects of Prolonged Stress

The body's response to stress is designed to be of short duration. Let's continue with the "cave person" analogy – imagine a cave person encountering a tiger - once the tiger has been killed, the cave person has successfully escaped, or if the situation, which caused the stress level to rise, is resolved, their cortisol levels diminish and the cave person is able to get on with their regular day-to-day activities.

The problem with our modern "tigers" – or stressors – is that they aren't going away. This changes the picture from one alternating between times of stress and times of relaxation to one where there is ongoing stress. This results in elevated cortisol levels that are ongoing. If our cortisol levels are too high over a long period of time, our adrenal glands will become exhausted by the need to produce high levels of cortisol all the time.

Eventually, they become depleted and then it will be difficult for them to produce high levels of cortisol even when they receive messages from the brain telling them to do so.

Stress and Hormones

The hormones in our body are always striving for balance. They operate in relation to each other. There is a direct connection between the adrenal stress and the thyroid. If the body is in a constant breakdown state and is not rebuilding itself, then the thyroid might slow down in order to stop the breakdown of body tissue. Remember, the thyroid is in the control of the rate of metabolism in the body. If the thyroid slows down for this reason then it might show up in blood test as low thyroid. The relationship between stress and the digestive problem may not be a direct one. You don't necessarily have an argument with your boss and immediately develop a stomach ache. What we can say is that if someone is leading a propensity to develop digestive problems, stress can make the problem worse. If the person then learns to relax and practices relaxation regularly, it can diminish the severity of the symptoms. Stress manifests itself mostly in the GI tract. Stress does mess with the stomach a little bit, but most of the responses occur in the intestines.

Food stays in the stomach for about 30 minutes but takes from 48 to 72 hours to pass through the whole of the digestive tract. Stress hormones slow digestion down, leaving food to fragment or stagnate and that can result in diarrhoea or constipation. Stress can also upset the balance of the gut flora which keeps the intestines healthy.

Stress Management Strategies

- The digestion is impaired if we are under stress because its energy is diverted to the organs and the systems, which are involved in fighting our stressors. When working on managing stress levels, we should take as much work off of the digestive system as possible.
- Smokers must consider giving up smoking - which drastically depletes the body of nutrients and since it is toxic, it is another 'tiger' in our physical bodies .
- People who do not exercise regularly should begin regular exercise programme.
- Poor blood sugar control is the second greatest stressor to the body after mental and emotional stress. The person should pay attention to managing the blood sugar.
- Ongoing stress rapidly uses vitamin C. Foods that are high in this vitamin should be used.
- These include citrus fruits, peppers, broccoli, strawberries and tomatoes.
- Vitamin B5 directly feeds the adrenal glands. Foods that are high in the B vitamins should be used to relieve these conditions. A whole food diet will contain all the B vitamins.
- Maintaining good potassium to sodium ratio is very beneficial. Vegetables, especially the leafy greens, have higher potassium to sodium ratio.
- Zinc and magnesium are minerals that are vulnerable to depletion during times of stress. Foods that are high in these minerals should be used. Wholegrain, nuts, seeds, leafy green vegetables, shellfish, and turkey's dark meat are all examples of these kinds of foods.

Detoxification

Every day we face toxicity: it comes from the environment, from pathogens, from chemicals we breathe in or eat, drugs, and even from the by-products of our metabolic processes. No matter how careful we are we cannot avoid all toxins. We have little control over our exposure to these chemicals. If we add to this burden the toxicity from lifestyle factors over which we do have some control, such as drugs use; the

consumption of foods with pesticides, food additives and colourings; smoking, sugar, alcohol, and artificial sweeteners, we can begin to imagine the burden we are putting on our bodies' detoxification system.

The Liver

The liver is the major detoxification organ in the body and has a tremendous job to do. It performs many functions including filtering and cleaning our blood, converting thyroid hormones, breaking down old hormones and creating new ones, making proteins, making bile, storing some nutrients and detoxifying toxins (symptoms of a toxic, overworked liver include, but are not limited to, migraines, eczema, skin rashes, and allergies).

The Two Phases of Detoxification

When our liver detoxifies a substance, it does so in two phases, appropriately named Phase I and Phase II. Phase I involves a lot of enzymes, which turn a toxin into a water-soluble form or into a more chemically active form. Phase I occurs in the liver but also elsewhere in the body; especially places where toxins may enter. If the toxin becomes water soluble, then it can be eliminated through the kidneys in the urine. If the toxin becomes more metabolically active, then it becomes more poisonous than the original one, but it does this because that is the form the toxin must be in, in order to go through phase II.

However, in this intermediate stage, the converted toxin has time to do some damage. Therefore it is important to have good liver health so that both phases are working well. The intermediate stage is the reason why poisonous mushrooms can kill someone.

After the intermediate stage the converted toxin is sent to Phase II. In this phase, the liver conjugates, or joins, chemicals to the toxin. This either renders the toxin totally harmless or converts it into a form that can be excreted through the urine or through the bile that the liver also creates.

Sources of Toxicity

Cigarette smoke, excess alcohol, sugar, drugs, excess caffeine, artificial sweeteners, food additives, and pesticides found on processed and non organic foods all create toxicity. Often we can choose to avoid many of these substances. Heavy metal exposure is another source of toxicity. Heavy metals include mercury, lead and cadmium. One can be exposed to these through the environment, the silver fillings in the teeth, cigarette smoking, old building paint and other sources. Eating an organic whole food diet that includes leafy greens and some raw nuts and seeds can help provide the body with nutrients it needs to help rid it of toxicity.

How Toxins Affect Hormones

There are toxins in the environment that have a direct impact on our hormones. They are hormone like substances that act in a similar way to human hormones when they enter the body. Xeno-oestrogens are

foreign substances that are not real oestrogen but act like it. These are chemicals are found in substances such as, plastic and pesticides. Oestrogen should be in balance with progesterone. The balance exists in the ratio between the two hormones, not their levels. If a woman has a higher amount of oestrogen compared to progesterone she is in oestrogen dominance which can put her at risk of developing cancers such as breast cancer.

Digestive Conditions

Some of the conditions associated with the digestive and detoxification system include:

Constipation

Constipation is usually caused by a disorder of the bowel's functions rather than a structural problem. Common causes of constipation include:

- Inadequate water intake
- Inadequate fibre in the diet
- A disruption of regular diet or routine, travelling
- Inadequate activity, exercise, or immobility
- Eating large amounts of dairy products
- Stress
- Resisting the urge to have a bowel movement, which is sometimes the result of pain from hemorrhoids
- The overuse of laxatives (stool softeners) which, over time, weaken the bowel muscles
- Hypothyroidism
- Neurological conditions, such as Parkinson's disease or Multiple Sclerosis
- Antacid medicines, which contains calcium or aluminium
- Medicines (especially strong pain medicines, such as narcotics, antidepressants, or iron pills)
- Depression
- Eating disorders
- Irritable Bowel Syndrome
- Pregnancy
- Colon cancer

In some cases, lack of good nerve and muscle function in the bowel may also be a cause of constipation.

Symptoms of Constipation

Symptoms of constipation can include:

- Infrequent bowel movements and/or difficulty having bowel movements
- Swollen abdomen or abdominal pain
- Pain
- Vomiting

How Is Constipation Diagnosed?

Most people do not need extensive testing to diagnose constipation. Only a small number of patients with constipation have a more serious medical problem, which is contributing to their constipation. If constipation is caused by colon cancer, early detection and treatment is very important.

How can Constipation be Prevented?

There are several things which can be done to prevent constipation. Among them:

- Eating a well-balanced diet with plenty of fibre. Good sources of fibre are fruits, vegetables, legumes, and whole-grain bread and cereal (especially bran). Fibre and water help the colon pass stool.
- Drinking 1 1/2 to 2 quarts of water and other fluids a day (unless fluid restricted for another medical condition). Liquids that contain caffeine, such as coffee and soft drinks, seem to have a dehydrating effect and may need to be avoided until the bowel habits return to normal. Some people may need to avoid milk, as dairy products may be constipating for them.
- Exercising regularly.

Indigestion

Indigestion is often a sign of an underlying problem, such as gastroesophageal reflux disease (GERD), ulcers, or gallbladder disease, rather than a condition of its own. Also called dyspepsia, it is defined as a persistent or recurrent pain or discomfort in the upper abdomen.

Symptoms of Indigestion

The symptoms of indigestion include:

- Burning in the stomach or upper abdomen
- Abdominal pain
- Bloating (full feeling)
- Belching and gas
- Nausea and vomiting
- Acidic taste
- Growling stomach

These symptoms may increase in times of stress. People often have heartburn (a burning sensation deep in the chest) along with indigestion. But heartburn itself is a different symptom that may indicate another problem.

Who Is at Risk for Indigestion?

People of all ages and of both sexes are affected by indigestion. It is extremely common. An individual's risk increases with excess alcohol consumption, use of drugs that may irritate the stomach (such as

NSAIDS, aspirin, etc.); other conditions where there is an abnormality in the digestive tract such as an ulcer, and emotional problems such as anxiety or depression.

What Causes Indigestion?

Indigestion has many causes, including:

- Ulcers
- G.E.R.D.
- Stomach cancer (rare)
- Gastro paresis (a condition where the stomach doesn't empty properly; this often occurs in diabetics)
- Stomach infections
- Irritable Bowel Syndrome
- Chronic pancreatitis
- Thyroid disease
- Pregnancy

Lifestyle:

- Eating too much, eating too fast, eating high-fat foods, or eating during stressful situations
- Drinking too much alcohol
- Cigarette smoking
- Stress and fatigue

How can Indigestion be Prevented?

The best way to prevent indigestion is to avoid the foods and situations that seem to cause it. It can be avoided by:

- Eating small meals
- Eating slowly
- Avoiding foods that contain high amounts of acids, such as, citrus fruits and tomatoes
- Reducing or avoiding foods and beverages that contain caffeine
- Smokers should consider quitting smoking, or at least, they should avoid smoking right before or after eating, since smoking can irritate the stomach lining
- Avoiding exercising with a full stomach
- Waiting at least three hours after eating before going to bed
- Sleeping with your head elevated (at least 6 inches) above the feet

Heartburn

Despite its name, heartburn has nothing to do with the heart (although some of the symptoms are similar to a heart attack). Heartburn is an irritation of the oesophagus caused by acid that refluxes

(comes up) from the stomach. Heartburn is also a symptom of more serious gastroesophageal reflux disease or G.E.R.D.

When swallowing, food passes down the throat and through the oesophagus to the stomach. Normally, a muscular valve, which is called the Lower Oesophageal Sphincter (LES), opens to allow food into the stomach (or to permit belching); then, it closes again. Then the stomach releases strong acids to help break down the food. But if the lower oesophageal sphincter opens too often or does not close tight enough, stomach acid can reflux or seep back into the oesophagus, damaging it, and causing the burning sensation, which we know as heartburn.

Heartburn Symptoms

Heartburn has several symptoms, including:

- A burning feeling in the chest just behind the breastbone that occurs after eating and lasts a few minutes to several hours.
- Chest pain, especially after bending over, lying down, or eating.
- Burning in the throat - or a hot, sour, acidic, or salty-tasting fluid at the back of the throat.
- Difficulty swallowing.
- Feeling food "sticking" in the middle of the chest or throat.

Heartburn Causes

Various lifestyle and dietary factors can contribute to heartburn by relaxing the lower oesophageal sphincter and allowing it to open, increasing the amount of acid in the stomach, increasing stomach pressure or making the oesophagus more sensitive to harsh acids.

These factors include:

Dietary Habits

- Eating large portions
- Eating certain foods, including onions, chocolate, peppermint, high-fat or spicy foods, citrus fruits, garlic, and tomatoes or other tomato-based products
- Drinking certain beverages, including citrus juices, alcohol, caffeinated drinks, and carbonated drinks
- Eating before bedtime

Lifestyle Habits

- Being overweight
- Smoking
- Wearing tight-fitting clothing or belts
- Lying down or bending over, especially after eating
- Stress

Ways to Alleviate Heartburn Symptoms

- Raising your head on your bed by about 6 inches can allow the stomach's contents to settle down.
- Eating meals at least three to four hours before lying down and avoiding bedtime snacks.
- Eating smaller meals.
- Maintaining a healthy weight to eliminate unnecessary intra-abdominal pressure caused by extra pounds.
- Limiting consumption of fatty foods, chocolate, peppermint, coffee, tea, fizzy drinks, and alcohol - all of which can relax the Lower Oesophageal Sphincter - and tomatoes and citrus fruits or juices, which contribute additional acid, can irritate the oesophagus.
- Giving up smoking, which also relaxes the Lower Oesophageal Sphincter.
- Wearing loose belts and clothing.

Heartburn can be treated with medicine. Medicines used to treat heartburn can range from over-the-counter remedies to medicine requiring a doctor's prescription.

Gallstones

Gallstones form in the gallbladder, which is a small organ located under the liver. The gallbladder aids in the digestive process by storing bile and secreting it into the small intestine when food enters. Bile is a fluid produced by the liver and is made up of several substances, including cholesterol, bilirubin, and bile salts.

What Are Gallstones?

Gallstones are pieces of solid material that form in the gallbladder. These stones develop because cholesterol and pigments in bile sometimes form hard particles.

The two main types of gallstones are:

- **Cholesterol stones** (which makes up approximately 80% of gallstone cases): these are usually yellow-green in colour.
- **Pigment stones:** these stones are smaller and darker and are made up of bilirubin.

What Causes Gallstones?

Several factors may come together to create gallstones, including:

- genetics (i.e., if others in your family have had gallstones)
- body weight
- decreased motility (movement) of the gallbladder
- diet

Gallstones can form when there is an imbalance in the substances that make up bile. For instance, cholesterol stones may develop as a result of too much cholesterol in the bile. Another cause may be the inability of the gallbladder to empty properly.

Pigment stones are more common in people with certain medical conditions, such as cirrhosis (a liver disease in which scar tissue replaces healthy liver tissue) or blood diseases such as sickle cell anaemia.

What Are the Risk Factors for Gallstones?

Risk factors for getting gallstones include:

Obesity - this is one of the biggest risk factors. Obesity can cause a rise in cholesterol levels and can also keep the gallbladder from emptying completely.

Oestrogen - women who are pregnant, take birth control pills, or hormone replacement therapy have higher levels of oestrogen. This can cause a rise in cholesterol, as well as, a reduction in gallbladder motility.

Ethnic Background - certain ethnic groups, including Native Americans and Mexican-Americans, are more likely to develop gallstones.

Gender and Age - gallstones are more common among women and older people.

Cholesterol Drugs - some cholesterol-lowering drugs increase the amount of cholesterol in bile, which may increase the chances of developing cholesterol stones.

Diabetes - people with diabetes tend to have higher levels of triglycerides (which is a type of blood fat), which is a risk factor for gallstones.

Rapid Weight Loss - if a person loses weight too quickly, his or her liver secretes extra cholesterol, which may lead to gallstones. Also, fasting may cause the gallbladder to contract less.

Symptoms of Gallstones

Gallstones often don't cause symptoms. Those that don't are called "silent stones". A person usually learns he or she has gallstones while being examined for another illness.

When symptoms do appear, they include the following:

- Pain in the upper abdomen and upper back. The pain may last a long time (several hours)
- Nausea
- Vomiting
- Other gastrointestinal problems, including bloating, indigestion, and gas

Enhancing the Process of Digestion

- Organic food is good for health. Sulphur-rich food, such as, garlic, onions, and eggs should be increased in the diet. These assist the liver detoxification pathways. Other foods that assist the liver include leafy greens and other vegetables: broccoli, cauliflower, brussels sprouts, cabbage, and avocado.
- Chewing the food properly also helps the digestive system work properly. Soups and pureed food should be increased in the diet.
- Sugar upsets the balance of healthy intestinal floras it also feeds pathogenic bacteria. The use of sugar should be minimised in the diet.
- Refined foods should be avoided as they have little nutritional value.
- All grains and beans should be soaked overnight or for at least eight hours before cooking.
- Fragmented foods, such as, live yogurt should be added to the diet. This will encourage the growth of good bacteria in the intestines.
- There are many herbs that can be extremely useful in digestion and detoxification. Silymarin or milk thistle helps protect the liver.

Further Reading:

- ✓ *Healthy Healing's Detoxification: Programs to Cleanse, Purify & Renew, (2008), By Linda Page*
- ✓ *Physiological Aspects of Digestion and Metabolism in Ruminants: Proceedings, (1991), edited by T. Tsuda, Y. Sasaki, R. Kawashima*
- ✓ *User's Guide to Detoxification: Discover How Vitamins, Herbs, and Other, (2005), By Shari Lieberman, James J. Gormley, Jack Challem*