

A COMPARATIVE STUDY OF AMINO ACIDS IN STOMACH REGIONS OF *FELIS CATUS* (DOMESTIC CAT) AND *SCIURUS CAROLINESIS* (EASTERN GRAY SQUIRREL)

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ABSTRACT : Amino acids were analyzed in stomach regions of males & females of *Felis catus* (Domestic Cat) & *Sciurus carolinesis* (Eastern Gray Squirrel), where it was stated that there are (18) amino acids as following : Aspartic acid (Asp), Glutamic acid (Gla), Serine (Ser), Arginine (Arg), Asparagine (Asn), Cysteine (Cys), Alanine (Ala), Proline (Pro), Glycine (Gly), Threonine (Thr), Tyrosine (Tyr), Valine (Val), Methionine (Met), Histidine (His), Isoleucine (ile), Leucine (leu), Phenylalanine (Phe) and Lysine (lys). Results have shown there are significant differences in concentration of amino acids between different region of stomach between males & females of *Felis catus* in part and between males & females of *Sciurus carolinesis* (Eastern Gray Squirrel) in other part, as stated there are significant differences in concentrations of amino acids between males & females of various types subject of study.

Key words : Amino acids, stomach, felis, squirrel.

INTRODUCTION

Amino acids play significant role to keep natural functions & nutrition of body (Reeds and Burn, 2001; Jobagen *et al*, 2006). Amino acids organize metabolic paths of cell, which are necessary to survival like development, growth, proliferation, so these are called functional amino acids (Wu, 2009; Wu, 2010), they include amino acids as Arginine (Arg), Cysteine (Cys), Glycine (Gly), Leucine (leu), proline (Pro), Tryptophan (Try). Also include amino acids which contain two groups of dicarboxylic amino acid like Glutamine (Glu) & Aspartic acid (Asp). Which reinforce process of use food proteins. Concentrations of amino acids differentiation in various species of vertebrates such as amino acid of Glycine (Gly) are founded with high concentrations in most sorts of vertebrates except human (Wang *et al*, 2008; Kim and Wu, 2004).

Digestion of food proteins starts in gastric cavity, then continues to digesting them in intestinal cavity, until absorb them completed in striated bordered of enterocytes. Hydrochloric acid which is excreted from parietal cells and gastric proteases to analyze initially of proteins in stomach cavity (Rezaei *et al*, 2013). Indicated (Peitz and Lochmiller, 1993) through their study to assess type of food protein by analysis stomach kyme of rats Gttun rats

(*Sigmondon hispidus*), there are differentiations in concentrations of amino acids, where groups of rats which are feed by natural food of rodents there were low concentration of amino acid of Histidine (His) reached (82%), While concentration of amino acid of Threonine (The) high reached (119%). Whereas concentration of amino acid of Arginine (Arg) low reached (84%), concentration amino acid of Serine (Ser) & Alanine (Ala) high reached (114%) in groups of rats which are feed by rabbit food.

Schott *et al* (1983) founded through studying concentrations of free amino acids in intestine of growing rats that concentrations of free amino acids decline in intestine cavity of infant rats except amino acid of Lysine (Lys) in intestinal juice excretion until age (15) days. However, concentrations of amino acids increased in intestinal tissues between (10 – 15) days. Indicated (Flint *et al*, 2001; Savage *et al*, 1987) through their study to role of amino acids are founded in food proteins to extraction of stomach by their effect to release intestinal hormones CCK, Pyy & intestinal peptides which work to organize pyloric pressure and stomach movement Tissues of gastrointestinal tract have effect on metabolism of amino acids in growing animals (Burrin, 2002). Protal – drained visceral tissues are included largely gastrointestinal tissues, which contribute with limits

between (3 – 6%) of body weight but they form (20 – 35%) of total protein of body, and dismiss energy (Stoll *et al*, 1999a; Nieto and Lobley, 1999). Molecule structure of protein in intestinal tissues higher than its rates in peripheral tissues like muscles (Attaix *et al*, 1986; Davis *et al*, 1996).

The amino acid Taurine (Tau) is one of more than other amino acids availability in bodies of vertebrates. Where it is founded with high concentrations during periods of embryonic development makes to protect stomach mucous membrane against wounds (Kato *et al*, 2002; Ma *et al*, 2009). Where, it is built by oxidation Cysteine (Cys) amino acid & Methionine (Met) amino acid (Jacobsen *et al*, 1968; Ueki and Stipanuk, 2007), Taurine (Tau) amino acid to be stored in parietal cells within stomach and smooth muscles in body (Lobo *et al*, 2000; Ma *et al*, 2003). Indicated (Ball *et al*, 2007) that there are species of Feline family have ability to construct amino acid of Citrulline (Cit) in Parietal cells of gastrointestinal epithelial cells with restricted quantities. Arginine (Arg) amino acid has important role to oxide nitric, which has significant role in function of vascular system within digestive tract, there were founded that pigs work to build amino acid of Arg in the kidney when they eat foods have low concentration of Arginine (Arg) amino acid (Easter *et al*, 1974; Easter and Baker, 1976), also indicated (Edmonds *et al*, 1987; Southern and Baker, 1984) that there young of pigs do not grow well when eat food has low concentration of amino acid of Arginine (Arg).

MATERIALS AND METHODS

Amino acids were partitioned, then were diagnosed depending on standard samples of amino acids by use high performance liquid chromatography (HPLC). Where Chromatography was injected with known concentrations amounted (ImM/L) per standard amino acid and in conditions of separation as shown in below :

C18 (150x4.6) (5.0 Mm)	Colum long
2.0 MI/min	Flow
Shimadzu	Wave length
25°C	Temperature
Fluorescence	Detector type
A: buffer N ₂ HPOU B: mix=H ₂ O.CH ₃ CN.MeO ₄	Carrier phase

Analysis of amino acids were done as depend on Pachwell *et al* (1997) as following :

1) (20 – 30) mg were mixed sample taken from stomach by use hand mixer device, then added (0.5 cm³) of Perechlorid acid to mixture.

2) These samples were poured into centrifuge with speed (4000 rev/min.) for 10 minutes.

3) Then (250 cm³) quantity was taken from supernatant and added to a quantity of Potassium hydrogen carbonate.

4) Mixture of liquid and put in ice bath for 15 minutes.

5) Mixture of liquid another time, then put in centrifuge with speed (6000 rev/min) for 10 minutes.

6) (250 cm³) was taken from supernatant, then add (375 cm³) of diluting buffer (Li Citrate) with concentration (0.2) standardization (pH = 1.3).

7) Amino acids were measured by use High performance liquid chromatography (HPLC).

8) Concentration of amino acids were counted by use equation as following :

Amino acid concentration (mM / L) = Area of amino acid beam in sample / Area of standard amino acid beam concentration of amino acid.

RESULTS

Rate of concentration amino acids were measured in four regions of stomach (cardiac, fundus, body & pyloric) of *Felis catus* and *Sciurus carolinesis* for both sexes (Table 1). Results of statistical study have shown when comparison males & females of *Felis catus* there are significant differences (P smaller or equals to 0.05) in concentration of amino acids in body region of the stomach of *Felis catus* (Fig. 1), while comparison of four regions of stomach shown that there are significant differences (P smaller or equals to 0.05) in concentration of amino acids between males & females of *Sciurus carolinesis*. However, it was stated that amino acids concentration in three regions of stomach (cardiac, fundus & body) high in stomach of females of *Sciurus carolinesis* (Eastern Gray Squirrel), but it was turned out that amino acids concentration in pyloric oregon only be high in stomach of males of *Sciurus carolinesis* (Eastern Gray Squirrel) (Fig. 2), whereas comparison between males of *Felis catus* & males of *Sciurus carolinesis* have shown there ar significant differences (P smaller or equals to 0.05) in amino acids concentration in stomach regions, amino acids concentration in three regions (cardiac, fundus and body) more concentration than in males of *Felis catus*, where amino acids concentration in pyloric region of stomach more in male of *Sciurus carolinesis* (Eastern Gray Squirrel) (Fig. 3). Also comparison between females of *Felis catus* & females of *Sciurus carolinesis* there are founded significant differences (P smaller or equals to 0.05) in amino acids concentration in stomach regions, and three

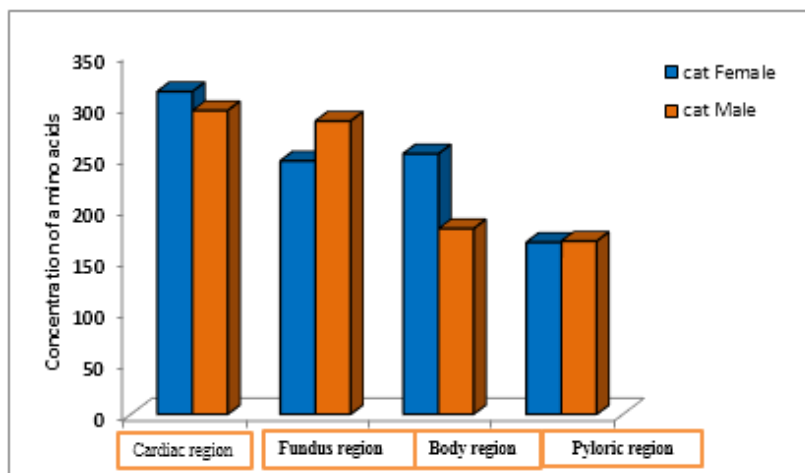


Fig. 1 : Shows mean of amino acids concentration in stomach regions in males & females of *Felis catus*.

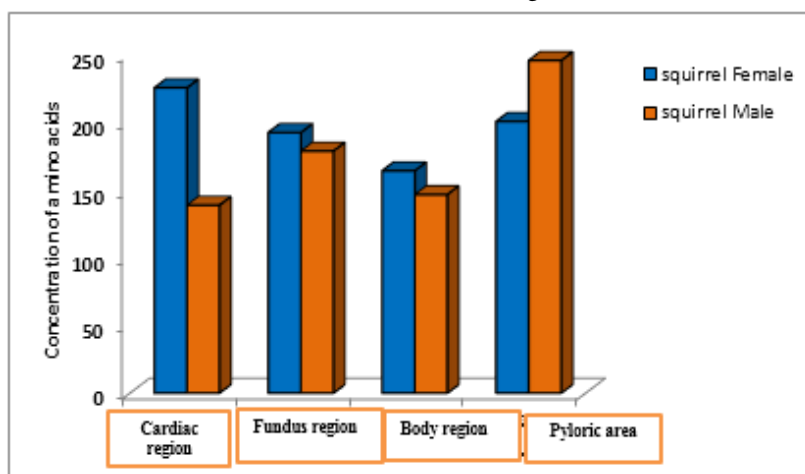


Fig. 2 : Shows mean of amino acids concentration in stomach regions in males & females of *Sciurus carolinesis*.

Table 1 : Shows mean of concentration amino acids were measured in four regions of stomach (cardiac,fundus, body & pyloric) of *Felis catus* and *Sciurus carolinesis*.

Animal	Sex	Rate of amino acids concentration			
		Cardiac region	Fundus region	Body region	Pyloric region
<i>Felis catus</i>	Female	313.241	245.875	252.895	166.883
	Male	294.810	284.631	180.254	168.093
<i>Sciurus carolinesis</i>	Female	225.447	192.388	164.140	200.533
	Male	138.728	178.705	146.609	245.63

regions (cardiac, fundus and body) were most more concentration of amino acids concentration in females of *Felis catus*, But pyloric region in stomach of female of *Sciurus carolinesis* (Eastern Gray Squirrel) more concentration of amino acids concentration (Fig. 4).

DISCUSSION

Amino acids perform basic role in bioactivities in body of living organism, where amino acids are founded in basic materials important in metabolism inside, And occurrence process of growth in living organism requires increase metabolism processes are constructive to protein.

There are strong relation between increase of levels amino acids and build proteins in tissues through process of growth (Jobgen *et al*, 2006).

Short *et al* (1973) has indicated that process of build DNA & mitotic division which takes place within cells of adult rats depends on provide amino acids to those animals, therefore available of amino acids is generally important to organize growth and differentiation in cells within gastrointestinal tract, so proteins of food and their digestive products have many conductive functions and physiological which are : Interventions with receptors,

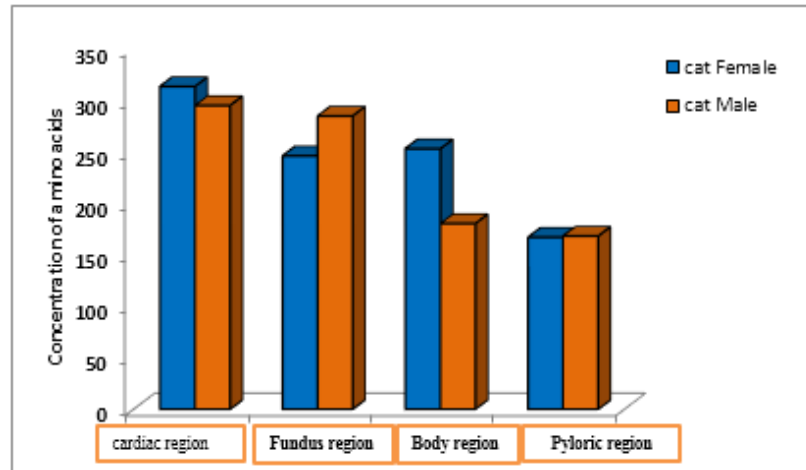


Fig. 3 : Shows mean of amino acids concentration in stomach regions in males of *Felis catus* & *Sciurus carolinensis*.

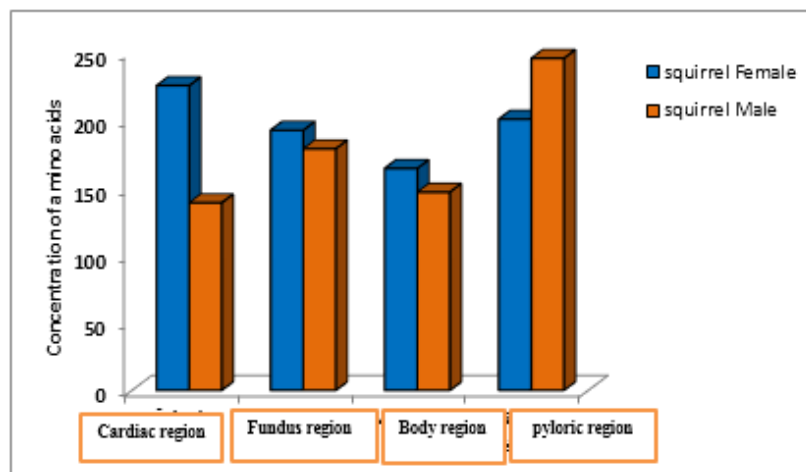


Fig. 4 : Shows mean of amino acids concentration in stomach regions in females of *Felis catus* & *Sciurus carolinensis*.

release to of hormones, effect on process of empty stomach, absorption and transfer of nervous signals to brain (Jahan-Mihan *et al*, 2011).

Results of statistical study have shown there are significant differences in concentration of amino acids in stomach males & females of *Felis catus* in body region in stomach of females of *Felis catus* comparison with males. These return to structural construction, physiological of organ, nature of nutrition, physiological state of males and females.

Results of current study stated are found significant differences in concentration of amino acids in stomach of males & females of *Sciurus carolinensis* and be high concentration in regions (cardiac, fundus and body) in stomach of females as comparison in stomach of males, but concentration of amino acids high in Pyloric region in stomach of males comparison with stomach of females, cause may returns to line of constructive structure, functional for each area of organ. Beach *et al* (1943) indicates that brain, liver, kidney contain big quantity of amino acids differ from amino acids in lung, stomach

(Schmidt, 1938) indicated that functional situation of animals have role to concentration of amino acids in organs, where concentration of proteins & amino acids decline within period of breastfeeding.

Current results study shows that there are significant differences in concentration of amino acids in stomach of males of *Felis catus* & *Sciurus carolinensis*, but concentration of amino acids high in pyloric region of stomach of males of *Sciurus carolinensis* as comparison with stomach of males of *Felis catus*. It is possible to interpret that with difference nature of nutrition, digestion of proteins between males of both species, and indicates (MacDonald *et al*, 1984) that ratio of proteins in food of *Felis catus* is (20%). And it is found that Ferret which one of mammals carnivorous to store (80%) of food which eaten within front parts of stomach (Evans, 1998). And degree of digestion proteins in stomach forms ratio (10–15%) of digested food (Brogstrom *et al*, 1957). Whereas, Low (1990) indicated to degree of digestion proteins forms (50%) of digested food and proteins were not absorbed at different areas of stomach (Zebrowska, 1980).

Results of statistical study have shown that there are significant differences in concentration of amino acids in regions of stomach in females of *Felis catus* & females of *Sciurus Carolinesis*, where three regions (cardiac, fundus & body) seem more concentration of amino acids in stomach of females of domestic cat as comparison with stomach of females of eastern gray squierrel. While it was stated that pyloricregion was most more concentration than acids in stomach of females of *Sciurus carolinesis* in comparison with stomach of *Felis catus*, interpretation of this returns to that structural, physiological constructive and nature of nutrition. And there are differences in rates of metabolism processes within tissues of digestive tract, so studies in different animals indicated that rates of construct proteins make big ratio in small intestine in comparison with stomach and large intestine (Attaix *et al*, 1992). As, Stoll *et al* (2000a) indicated that rate of proteins differentiates at small intestine itself. Where it is be higher in doudenum in contrast with other parts of small intestine. Studies have shown that rates of remain proteins are higher relatively in digestive tract in comparison with other tissues like muscles because of many hormone and nutrition coefficients (Baracos *et al*, 2000).

CONCLUSION

There are significant differences in concentration of amino acids between different ýregion of stomach between males & females of *Felis catus* in part, and between males & females of *Sciurus carolinesis* (Eastern Gray Squirrel) in other part.

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