

**Electrogastrographic Findings in  
Diabetic Patients (Both Insulin and  
Non-Insulin Dependent)  
With Delayed Gastric Emptying**

*Thesis*

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Internal Medicine*

*By*

**Marwa Mahmoud EL-Dahshan**

*(M.B,B.Ch)*

*Supervised By*

**Prof. Dr. Yehia Mohammed EL-Shazly**

*Professor of Internal Medicine*

*Faculty of Medicine-Ain Shams University*

**Dr. Khaled Hamdy Abd EL-Mageed**

*Assistant professor of Internal Medicine*

*Faculty of Medicine-Ain Shams University*

**Dr. Nanees Ahmed Abd EL-Mageed**

*Lecturer of Internal Medicine*

*Faculty of Medicine-Ain Shams University*

*Faculty of Medicine  
Ain Shams University*

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## *List of Abbreviations*

ALT	Alanine aminotransferase
AST	Aspartate aminotransferase
ASU	Ain Shams University
BUN	Blood urea nitrogen
CAN	Cardiovascular autonomic neuropathy
CNS	Central nervous system
CCK	Cholecystokinin
CBC	Complete blood count
CPM	Cycles per minute
CMV	Cytomegalovirus
DF	Dominant frequency
DM	Diabetes mellitus
DP	Dominant power
ECA	Electrical control activity
ERA	Electrical response activity
EGG	Electrogastrography
ENS	Enteric nervous system
EGD	Esophagogastroduodenoscopy
FFT	Fast Fourier Transform
FBG	Fasting blood glucose
FDA	Food and Drug Administration
FD	Functional dyspepsia
GERD	Gastroesophageal reflux disorders
GEA	Gastric electric activity

GES	Gastric electric stimulation
GE	Gastric emptying
GER	Gastric emptying rate
GI	Gastrointestinal
GCSI	Gastroparesis cardinal symptom index
HbA <sub>1C</sub>	Glycosylated hemoglobin
H pylori	Helicobacter pylori
2hrs PPG	2 hours postprandial glucose
IC	Instability coefficient
IGF-I	Insulin-like growth factor-I
ICC	Interstitial cells of Cajal
IBS	Irritable bowel syndrome
MMC	Migrating motor complex
MRI	Magnetic resonance imaging
nNOS	Neuronal nitric oxide synthase
NO	Nitric oxide
NUD	Non-ulcer dyspepsia
PC	Personal computer
PR	Power ratio
PT	Prothrombin time
SW	Slow wave
IC-SM	Submucosal interstitial cells of Cajal
SD	Standard deviation
SCF	Stem cell factor
TPN	Total parenteral nutrition
U/S	Ultrasonography

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# *Introduction & Aim of the Work*

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## **Introduction**

Diabetic gastroparesis is a common and debilitating condition affecting millions of patients with diabetes mellitus worldwide. Gastroparesis affects both type I (Insulin dependent) and type II (Non-Insulin dependent) forms of diabetes. Diagnosis requires identifying the proper symptom complex, while excluding other entities (peptic ulcer disease, rheumatological diseases, medication effects) (**Smith and Ferris, 2003**).

**Stacher et al., (2003)** concluded that impaired gastric emptying and altered intragastric meal distribution in diabetes mellitus are related to autonomic neuropathy.

Hyperglycemia also impairs gastric motility and emptying in subjects with diabetes. Since the control of gastric emptying determines the rate of glucose delivery to the small intestine, glucose control may become erratic when gastric emptying is abnormal (**Mathur et al., 2001**).

Neuromuscular abnormalities of the stomach maybe assessed noninvasively with gastric emptying tests, electrogastrography, and ultrasound (**Koch, 1999**).

The use of standardized real-time ultrasonography to determine gastric antral cross-sectional area in a single section of the stomach is a valid method for estimating gastric emptying rate (***Darwiche, 1999***).

Electrogastrography is the non-invasive measurement of gastric electrical activity. It is a reliable and accurate technique for the assessment of gastric myoelectrical activity providing information about frequency and regularity of the gastric slow wave. Electrogastrography has a developing role in the assessment of gastric dysfunction and on the effect of medical treatment (***Lawlor et al., 2001***).

Abnormal gastric slow-wave frequencies have been observed in diabetic gastroparesis and are associated with impaired antral motor activity (***Chang et al., 2001***).

## **Aim of this Work**

To evaluate electrogastrographic changes in both insulin and non-insulin dependent diabetic patients with and without delayed gastric emptying.



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# *Review of Literature*

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