الآية

بسم الله الرحمن الرحيم

قال تعالى

{وَقُلِ اعْمَلُوا فَسَيَرَى اللَّهُ عَمَلَكُمْ وَرَسُولُهُ وَالْمُؤْمِنُونَ وَسَتُرَدُّونَ إِلى عالِمِ الْغَيْبِ وَالشَّهادَةِ فَيُنَبِّئُكُمْ بِما كُنْتُمْ تَعْمَلُون}

(صدق الله العظيم)

(سورة التوبة 105)

Abstract

This study conducted to establish a population database for pancreas length and width using (CT) scan and classify the texture of computed tomography images of pancreas in diabetic patient and find the values of various parameter of texture prosperities for classification. The data were collected from 213 non- diabetic with no history of pancreas disease who had undergone abdominal CT scan between 2015 and 2017, and ages of 2 to 97years old. The study revealed that the pancreas measurement was 29.94 ± 6.36 for head length, 25.07 ± 5.62 mm for head AP diameter, 61.43 ± 15.36 mm for body length, 22.74 ± 6.08 mm for body AP diameter, 33.94± 9.11 mm for tail length, 19.83 ± 6.43 mm for tail AP diameter and pancreas CT number which was evaluated as Hounsfield was 49.11 ± 8.81for pancreas , 49.46 ± 8.03for spleen and 37.61 ± 5.65 for vertebral body diameter.

Data were presented as mean and standard deviation (SD) for all of the variables. Showed results which were significant at $P < 0.05$. We measured pancreas length and width in Pancreas measured values were computed from the contour of the pancreas on each CT image. In addition to total pancreas measurements, the density was determined by CT Hounsfield (HU). And in childhood and adolescence, the pancreas measurements and CT(HU) increased linearly with age and then declines thereafter. We provide enduring population highlighting data for pancreatic parenchymal measurements in Sudanese as well pancreatic CT (HU).

Also this study concern to characterize the pancreas area to head, body and tail using Gray Level Run Length Matrix (GLRLM) and extract classification features from CT images. The GLRLM techniques included eleven's features. To find the gray level distribution in CT images it complements the GLRLM features extracted from CT images with runs of gray level in pixels and estimate the size distribution of the sub patterns. analyzing the image with Interactive Data Language software

to measure the grey level distribution of images. The results showed that the Gray Level Run Length Matrix and features give classification accuracy of pancreas head 89.2%, body 93.6 and the tail classification accuracy 93.5%. The overall classification accuracy of pancreas area 92.0%. Also this study c the calcification accuracy of the normal pancreas 100%, diabetic pancreas is 100% and over all accuracy of pancreas area100%.

These relationship patients are stored in a Texture Dictionary that can be later used to automatically annotate new CT images with the appropriate pancreas area names.

ملخص البحث

أجريت هذه الدراسة لإنشاء قاعدة بيانات سكانية لطول وعرض البنكرياس باستخدام التصوير المقطعي المحوسب ولتحليل نسيج الصور المقطعية المحوسبة للبنكرياس في مرضي السكري باستخدام برامج تحليل الطيف المحوسبة (IDL).تم جمع البيانات من 213 من عينه طبيعية مرجعية مع عدم وجود تاريخ مرضي للبنكرياس للذين خضعوا لإجراء فحص أشعة مقطعية للبطن باستخدام جهاز الأشعة المقطعية متعددة المقاطع بين عامي 2015 و 2017، من سن 2 إلى 97 سنة من العمر. أظهرت الدراسة أن قياس البنكرياس كان 29.94 ± 6.36 لطول الرأس و 25.07 ± 5.62 ملم لقطر الرأس و 61.43 ± 15.36 ملم لطول الجسم و 22.74 ± 6.08 ملم لقطر الجسم و 33.94 ± 9.11 ملم لطول الذيل و 19.83 ± 6.43 ملم لقطر الزيل كثافة النسيج الطبيعي للبنكرياس وجدت 49.11 ± 8.81 للبنكرياس، 49.46 ± 8.03 للطحال وقيمة قطر الجسم الفقري البطني 37.61 ± 5.65 .تم عرض البيانات على أنها وسط حسابي وانحراف معياري لجميع المتغيرات. أظهرت النتائج التي كانت مطابقه ل P <0.05. قمنا بقياس طول وعرض البنكرياس وتم حساب القيم المقاسة من حدود البنكرياس على كل صور الأشعة المقطعية. بالإضافة إلى قياس البنكرياس الكلي تم قياس كثافة النسيج الطبيعي للبنكرياس. وأظهرت النتائج أنه خلال مرحلة الطفولة والمراهقة، أن قياسات البنكرياس و كثافة النسيج الطبيعي للبنكرياس زادت خطيا مع التقدم في السن ثم انخفضت بعد ذلك.

أيضا هذه الدراسة تتعلق بتوصيف منطقة البنكرياس إلى الرأس والجسم والذيل باستخدام الأوامر الإحصائية العليا وشملت أحد عشر خاصية للعثور على توزيع امتداد مستوى الرمادي في الصور المقطعية المستخرجة من الصور المقطعية وتحليل الصورة باستخدام برنامج IDL لقياس توزيع مستوى الرمادي من الصور وأظهرت النتائج أن حساسية التصنيف لمنطقة الرأس 89.2و 93.6٪، للجسم ودقة تصنيف الذيل 93.5٪. دقة التصنيف العام لأجزاء للبنكرياس 92.0٪. وأيضا في هذه الدراسة تم اجراء مقارنه بين البنكرياس الطبيعي وبنكرياس مرضي السكري وأظهرت النتائج أن حساسية التصنيف للبنكرياس الطبيعي 100% و للبنكرياس مرضي السكري 100% . أي بنسبة تفريق تصل الي 100% ما بين البنكرياس الطبيعي وبنكرياس مرضي السكري.

هذه العلاقات خزنت في شكل مترجم يمكنه التعرف علي اجزاء البنكرياس بصوره تلقائية وتسميه مناطق البنكرياس الثلاثة كما هي مخزنه في المترجم.

Dedication

This work is lovingly dedicated:

*-To my mother **Amna Elameen**, for her warm love and care support*

*-To my father **Elhaj Elbasheir** without his support this project would not have been made possible*

-To my sisters, brothers for their help and support

- To my friends for their valuable advice

- To the all dearest people in my life

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LIST OF ABBREVIATIONS

Abbreviations	Full Name
SMA	Superior mesenteric artery
IVC	Inferior Vena cava
SPINK1	Serin Protease Inhibitor Kazal Type1
CT	Computed Tomography
MDCT	Multi detector Computed Tomography
HU	Hounsfield unit
GLCM	Gray-Level Co- Occurrence Matrix
GLRLM	Gray Level Run Length Matrix
PH	Potential of Hydrogen
CCK	Cholecystokinin
GIP	Glucose Dependent Insulin Otropic Peptide
KVP	Kilo voltage peak
DM	Diabetes Mellitus
T1DM	Type1 Diabetes Mellitus
T2DM	Type2 Diabetes Mellitus
PDX1	Pancreatic duodenal homeobox1

PRS1	Pancreatic trypsinogen gene
SRE	Short Run Emphasis
LRE	Long Run Emphasis
GLN	Gray Level Non uniformity
RLN	Run Length Non uniformity
RP	Run Percentage
LGLRE	Low Gray Level Run Emphasis
HGLRE	High Gray Level Run Emphasis
SRLGLE	Short Run Low Gray Level Emphasis
SRHGLE	Short Run High Gray Level Emphasis
LRLGLE	Long Run Low Gray Level Emphasis
LRHGLE	Long Run High Gray Level Emphasis