



Is Advanced Statistical Computing Technology a Clue in Applied Medicine? A Study using Data Mining as a Predictor Technology in Gastroenterology & Bariatric Surgery; Novel Elbanna Operations

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Abstract- Advanced computer science is very important in applied medicine, we have several publications regarding use of data mining computing technology in many clinical fields, here we will present to our experience in gastroenterology and surgery using data mining in obesity related gastrointestinal motility disorder; (IBS) and surgical bariatric approaches. Obesity is a chronic disease that is increasing in prevalence worldwide, data from United States and those from other countries are indicative of a major international epidemic, a steady and distressing increase worldwide, whatever numbers of large epidemiologic studies have evaluated the relationship between obesity and several Co- morbidities. Furthermore; obesity – related - morbidities are common diseases affecting population.

Keywords: *IBS, BMI, obesity, Elbanna, data mining.*

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Abstract- Advanced computer science is very important in applied medicine, we have several publications regarding use of data mining computing technology in many clinical fields, here we will present to our experience in gastroenterology and surgery using data mining in obesity related gastrointestinal motility disorder; (IBS) and surgical bariatric approaches. Obesity is a chronic disease that is increasing in prevalence worldwide, data from United States and those from other countries are indicative of a major international epidemic, a steady and distressing increase worldwide, whatever numbers of large epidemiologic studies have evaluated the relationship between obesity and several co - morbidities. Furthermore; obesity - related - morbidities are common diseases affecting population. Irritable bowel syndrome (IBS) is a common gastrointestinal disorder with special concern for those with comorbid or morbid obesity, characterized by chronic or recurrent abdominal pain with constipation, diarrhea and/or an alternation of the two, and often bloating. Patients often use manipulation of diet as a mean of controlling symptoms. Adopting a healthy lifestyle, one that includes not smoking or drinking excess alcohol, eating right, daily physical activity, and a healthy weight, is associated with improving IBS-related morbidities. Bariatric surgery would be the clue therapy if diet and medical therapies fail. Novel Elbanna techniques are bariatric maneuvers successfully performed to those with morbid or comorbid obesity in more than 200 patients. Although data mining is very common applicable method in economy and global trade, it is not fully known by most of physicians and surgeons worldwide, for its limited use in applicable medicine. To our knowledge, there is no previous studies can evaluated such a relationship between IBS and BMI using Data mining computing analysis, also we used data mining to compare both Elbanna bariatric techniques, to look for the best leading factors in both Elbanna bariatric operations.

Keywords: IBS, BMI, obesity, Elbanna, data mining.

I. INTRODUCTION

Obesity impairs health related quality of life (HRQL) in adolescents. Obesity is increasing in prevalence worldwide, unfortunately many of

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obese and morbid obese individuals suffering irritable bowel syndrome (IBS) dominant constipation. Prevalence of obesity was 35.5 and 35.8 percent among adult American men and women respectively, interestingly many of those with high BMI may complaining of IBS- dominant constipation. Irritable bowel syndrome (IBS) is a serious health problem that affects an estimated 10–15% of people worldwide and has economic consequences in the United States of over \$30 billion annually [1]. IBS is characterized by abdominal pain or discomfort and is associated with changes in stool frequency and/or consistency. The etiopathogenesis of IBS may be multifactorial, as is the pathophysiology, which is attributed to alterations in gastrointestinal motility, visceral hypersensitivity, intestinal microbiota, gut epithelium and immune function, dysfunction of the brain-gut axis or certain psychosocial factors. Current therapeutic strategies are often unsatisfactory. There is now increasing evidence linking alterations in the gastrointestinal microbiota and IBS [2-7]. Furthermore weight reduction may improve the psycho-organic symptoms of chronic IBS [8-11]. Data mining is applicable in economics, business, global trade and biology with limitation use in clinical medicine. In their graphical representations, The advanced neural network is a data mining trying to mimic the human brain connecting attributes to each other aiming to compare these information-related attributes to one another, finally looking for the strongest connections, the neural mining nets are drawn using nodes (ganglia) and neurons (nerves). Using the routine graphical view, may be very difficult to be read also it may need a long time to be understood, which can often happen when there are plenty of numbers of examined attributes, the computer can read the network and apply the suitable required model to score the applicable data in order to make useful predictions and publishable results [12].

II. PATIENTS AND METHODS

We retrospectively reviewed the files of 2 groups of patients; first group (Gastrointestinal group);

was 35 Patients (16 male and 19 female) aged 13 to 83 years old, presented in the period from 1/9/2011 to 30/8/2012 with psychosomatic manifestations of Irritable Bowel Syndrome (IBS) in the form of Intermittent colicky abdominal pain, frequent changes in the bowel habit; constipation on top of chronic diarrhea or diarrhea on the top of chronic constipation, back ache, anxiety disorders and infrequent attacks of nausea and vomiting. Investigations were done to exclude other comorbidities e.g.: U/S, CT, Gastroscopy or even, full colonoscopy when IBD; (Crohn's, ulcerative), malignancy or other diseases suspected. Diagnosis of (IBS) was done by exclusion. All patients received both pharmacotherapy and psychotherapy; One by One psychoanalysis. BMI was calculated for each patient before dedicated therapy.

Second group (Obesity group) was 20 patients underwent bariatric surgery aged 22 to 39 years old, 13 Male and 7 female in the period from 20/11/2012 to 21/11/2013, using Elbanna operations; Elbanna intestinal bypass (for 10 patients) and Modified Elbanna; Intestinal bypass with fundal resection (for the other 10 patients).

III. STATISTICAL-ANALYSIS

10 folds cross validation using naive Bayes application was helpful to demonstrate our results specifically, a descriptive model was generated using a decision tree algorithms. The decision tree decided the most significant independent variable in each stage of predicting dependent variables. (Using the Rapid Miner, Rapid I, version 4.6, Berlin, Germany), in both gastrointestinal and the bariatric groups was a successfully application in clinical medicine.

IV. RESULTS

Following the 35 patients for 12 months duration, 18 individuals (12 male and 7 female) improved, whatever 17(8 male and 9 female) did not improve.

17 out of 18 patients, showed clinical improvement (94.4%), had normal BMI or slightly overweight, whatever 6 out of 17, did not improve (35.2%) were overweight, obese or morbid obese.

Regarding who underwent novel Elbanna operations, there was significant Excessive Weight Loss (EWL) in those underwent Modified Elbanna technique, than those underwent classic Elbanna operation (90 ± 10) versus (71 ± 9.2).

V. DISCUSSION

Data mining as a discipline is largely transparent to the world Most of the time, we never even notice it is happening. But whenever we sign up for a grocery store shopping card, place a purchase using a credit card, or surf a web site, we are creating data.

These data are stored in large sets on powerful computer systems owned by the companies we deal with every day. Lying within those data sets are patterns-indicators of our interests, our habits and our behaviour, indeed companies will know about customers distribution areas. In another point of view application of data mining in medicine could discover many of obscured factors led to several morbidities and mortalities according to our previous publications, furthermore using of data mining in medical fields is encouraged [13]. There are several well-established health hazards associated with obesity, including liver disease, Diabetes Mellitus, heart disease, cerebrovascular stroke, certain cancers, osteoarthritis, gastrointestinal motility disorders, sexual disorders and depression. Weight loss is encouraged in any mean to overcome morbidity and diseases – affecting survival [14,15]. IBS related-obesity is not uncommon problem especially in those with morbid obesity associated intestinal microbiota. The percentage of Americans with a BMI above 25 kg/m² or 30 kg/m² has been determined in several government surveys, beginning in 1960. In 2009 to 2010 the prevalence of obesity was 35.5 and 35.8 percent among adult American men and women, respectively. In Canada more than 27 percent of men and 23 percent of women are obese. Reported prevalence rates of obesity include 11 percent of men and 10 percent of women in Belgium (2002 to 2004), 23 percent of men and women in the UK (2009), 24 percent of men and 34 percent of women in Mexico (2006), 9 percent of men and 27 percent of women in South Africa (2003), 50.5% of boys and 46.5% of girls in Kuwait and 8 percent of men and 13 percent of women in Pakistan (1994) [16-19]. Diagram (1)

Diagram (1)

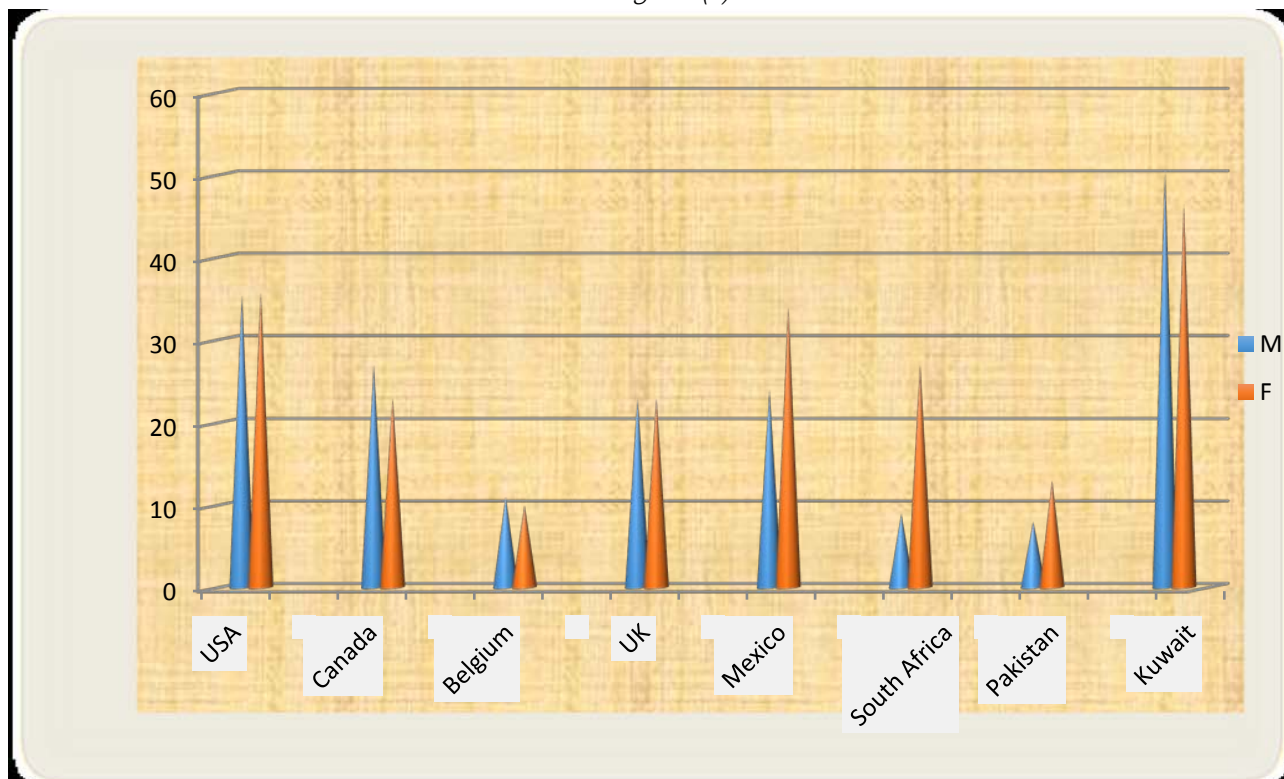


Diagram (1) showing the percentage of obesity in different populations worldwide, USA; Canada; & Mexico; are examples of North and South America; UK; & Belgium; are examples of Europe; Pakistan; & Kuwait; are examples of Asia; whatever South Africa is the only example of Africa due to lack of information-related obesity in different African countries. Note the average obesity of Female to Male in all countries 53% versus 47%.

For patients with BMI ≥ 40 kg/m² who have failed to lose weight with diet, exercise and drug therapy, and those with BMI >35 kg/m² with obesity-related comorbidities, bariatric surgery become the definitive clue, whatever the laparoscopic bariatric approach is preferred over the open approach, because of improved recovery and lower morbidity and is the most common approach used worldwide [21].

Irritable bowel syndrome (IBS) is a common gastrointestinal disorder worldwide with special concern to obese patients, characterized by chronic or recurrent abdominal pain with constipation, diarrhea and/or an alternation of the two, and often bloating. It is well recognized in many with high BMI, that ingestion of food is a trigger for functional bowel symptoms, particularly those with chronic irritable bowel syndrome (IBS). Occasionally chemicals fall to control the associated IBS-morbidities, whatever nutritional elements could improve the course of such chronic functional bowel disorder. Patients often use manipulation of diet as a means of controlling symptoms. Despite description of multiple dietary methods, few have scientific backing or quality evidence of efficacy [21,22].

Accordingly, obesity - related IBS morbidities should be considered. To our knowledge no previous studies could evaluate such a relationship of IBS and High BMI using Data mining computing analysis.

Patients who responded to the IBS-therapy were on controlled medications, some of them withdrew the medications completely. The gold standard for helping patients with IBS to lose weight is behavioral counseling providing advice on how to increase physical activity and reduce calorie intake in a high-intensity program with a qualified healthcare provider. According to our experience, patients presented with IBS, have shown sustain improvement in both their organic and psychogenic symptoms related-chronic IBS, when weight reduction is obtained. Our current study dedicating that psychogenic programs together with gaining ideal BMI significantly improve quality of life. Such as this can reliably produce and sustain IBS-free Symptoms.

Rapid I showed the association between overall outcome therapy and BMI, it was evaluated the positive and negative groups for the therapy, according to different related factors, examining those with BMI >25 (Figure.1).

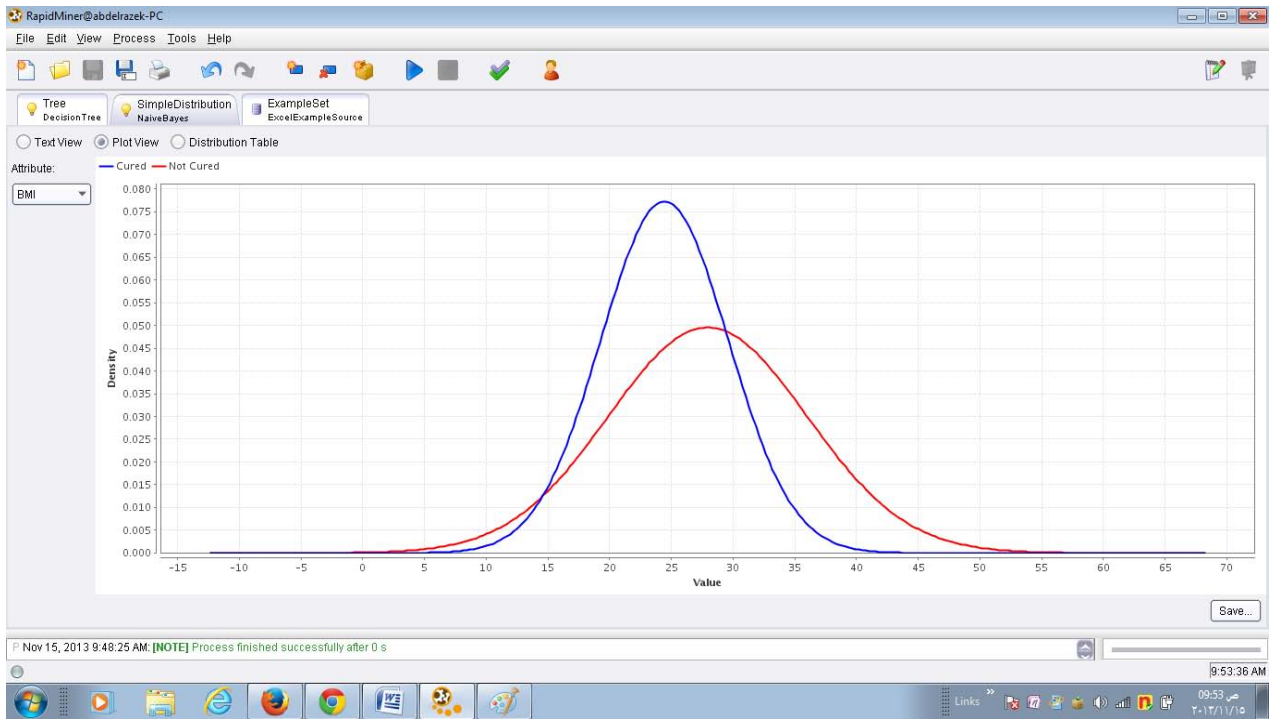


Figure 1 : showing improved group(Blue) and unimproved (Red), patients with IBS, in related to BMI. BMI; (Mean \pm SD) for improved group (24.44 ± 5.17), for unimproved (27.94 ± 8.05).

Using Rapid Miner version 4.6.Berlin, revealed a significant relation in those who improved to overall chemical, nutritional and psychotherapy; (94.4%), whatever (35.2%) of those did not improve due to overweight, obesity or morbid obesity and (23.5%) due

to obesity or morbid obesity, explaining insignificant relationship in non responding group.

The decision tree algorithm showed such a preliminary idea about IBS associated BMI (Figure 2).

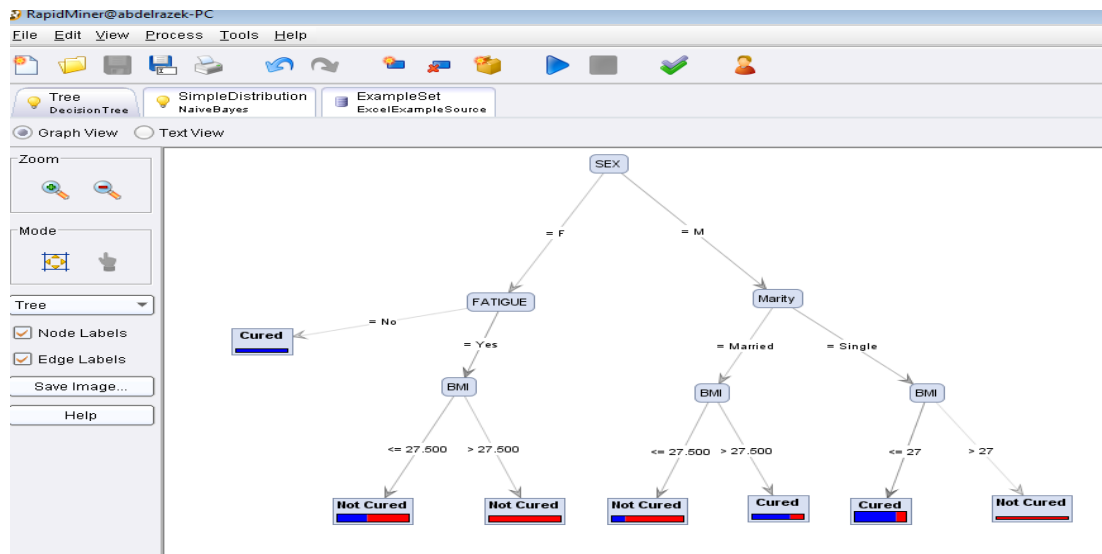


Figure 2 : Showing the Decision tree Algorithm Created by (Rapid I, Rapidminer Ver.4.6, Berlin, Germany). Note the Correlation Between IBS Outcome Therapy and Corresponding BMI, Marriage and Fatigue are Considerable Factors.

Unfortunately obesity became a worldwide stigma, microbiota that increase with obesity have a strong retaliation with IBS, currently obese subjects are often exposed to public disapproval because of their fatness affecting significantly their psychosocial

behavior, affecting the progressive course of chronic IBS in a psychosomatic way of explanation. According to our point of view, if diet, exercise or drugs failed to control morbid obesity or co- morbid obesity disorders, bariatric surgery should be considered aiming to

overcome obesity related morbidities including functional bowel disorder. A new trend of bariatric operation; Novel strategy using a good digestive & selective absorption technique has been evaluated; Modified intestinal bypass (Elbanna operation) or with fundal resection (Modified Elbanna), informed as a brief poster presentation or a talk discussion presentation in congresses of the international federation for the surgery

of obesity and metabolic disorders (IFSO) 2009 and 2013.

Elbanna techniques were experienced in more than 200 patients, in the period from 1998 till 2013, showed significant improvement in BMI related morbidities by avoiding vitamins and trace elements deficiency obtained followed other surgical diversion techniques (Figure 3).

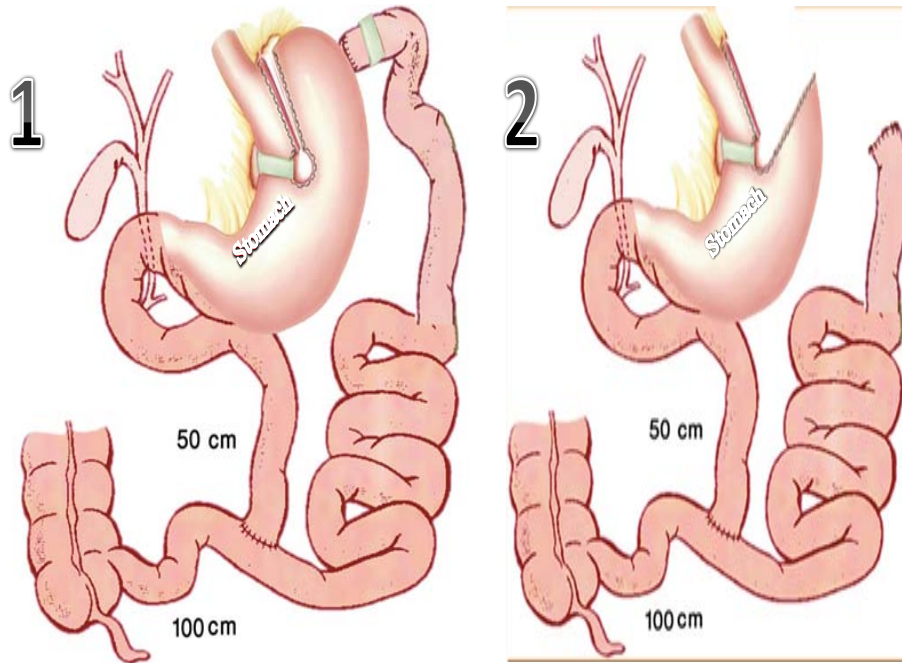


Figure 3 : 1-Elbanna operation; Modified Intestinal Bypass. 2- Modified Elbanna; with Fundal Resection. In Both Operations No nutritional, Vitamins or Minerals deficiencies.

Figure(3).Elbanna

Comparing two surgical techniques using the data mining computing analysis could find a significant EWL in the modified technique with significant overall success comparing to Elbanna operation, whatever

each operation has its indication according to each patient's condition (Figure 4). In another point of view, bariatric Elbanna techniques are better in young age, that EWL is significantly higher in young group (Figure5).

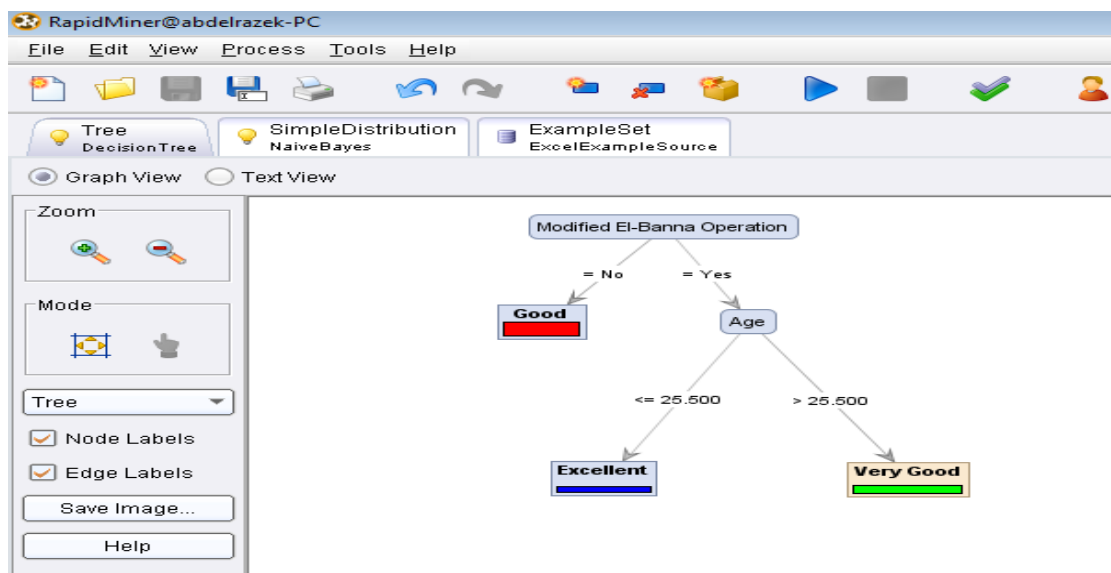


Figure 4 : Showing the decision tree algorithm for EWL in both EI Banna techniques.



Figure 5 : Showing age group corresponding EWL inpatients underwent Elbanna operations; Young are better.

The message we have to sail for readers that to enjoy a healthy lifestyle, one that includes not smoking or drinking excess alcohol, eating right, daily physical activity, and a healthy weight and psychogenic stability is associated with improving quality of life. Every Effort should be gained to prevent obesity. Bariatric surgery would be the clue therapy if diet and medical therapies fail. Data mining computing analysis should be considered more and more in applied medicine, sure it is a clue in many obscured diseases we do not know. Using Data mining in applied medicine is of great important consideration, to predict factors leading to disease progression and even which may lead to associated morbidities such as high BMI and IBS-associated morbidities.

VI. STUDY LIMITATIONS AND FUTURE RECOMMENDATIONS

In the current research we just present to a preliminary study, whatever our clinical experience played a major role in assessing the information mentioned in our current study. Given a small sample size we recommend a second study involving more patients with multidisciplinary disorders, our results must be confirmed using more evidence-based criteria using more data mining applicable opportunities.

Our results might be changed according further innovations in Elbanna techniques, furthermore expected more data with large sample groups may significantly changed our results variations.

According to our point of view, Data mining is still unknown in many medical fields; whatever it has a great importance in business, economy, global trade negotiations, national labour relations and even a break

through in evolutionary biology and software engineering.

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