بسم الله الرحمن الرحيم

قال تعالى:

لا يَكْلِفُ اللَّهُ نَفْسًا إِلاًّ وَسُعِّهَا لَهَا مَا كَسَبَتْ وَعَلَيْهَا مَا أَكْتَسِبَتْ رَبُّنَا لَا تُؤَاخذُنَا إِن نَّسِينَا أوْ أَخَطَّأْنَا رَبَّنَا وَلَا نَحْمِلْ عَلَيْنَا إِضْرًا كَمَا حَمَلْتَهُ عَلَى الْذِينَ مِن قَبْلِنَا رَبَّنَا وَلَا نَحْمِلْنَا مَا لَا طَأْقَةَ لَنَا بِهِ وَأَغْفِرْ لَنَا وَارْحَمْنَا أَنتَ مُوَلَّدُنَا فَانْصُرْنَا عَلَى الْقُوَّمِ الْكَافِرِينَ

سورة البقرة الآية (286)
Dedication

To

My family
**********
My Teachers
*************
My Friends
*************
My Colleagues
Acknowledgements

I extremely grateful to many people who supported me during the preparation of this study. Firstly, I would like to express my deep gratitude to my supervisor Dr. Hussan Ahmed Hassan for his supports and advice.

Also great thanks to the staff of Radiology department in Almarkaz Altebi Alhadeeth and Alneleen Medical Center for their helps to complete the study, and I would like to thank every one who has participated in the completion of this study.

I would like to sincerely thank my family for their consistent mental support. Finally, Thanks by every means of thanks for every person help in successful of this research.
## Contents

<table>
<thead>
<tr>
<th>Page</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>II</td>
<td>Dedication</td>
</tr>
<tr>
<td>III</td>
<td>Acknowledgements</td>
</tr>
<tr>
<td>IV</td>
<td>Contents</td>
</tr>
<tr>
<td>V</td>
<td>List of Tables</td>
</tr>
<tr>
<td>VI</td>
<td>List of Figure</td>
</tr>
<tr>
<td>VII</td>
<td>Abstract</td>
</tr>
<tr>
<td>VIII</td>
<td>المستخلص</td>
</tr>
<tr>
<td>IX</td>
<td>Abbreviations</td>
</tr>
</tbody>
</table>

### Chapter One

1. Introduction 1.1
2. Objectives of the study 1.2
3. Problem of the study 1.3
4. Overview of study 1.4

### Chapter Two

3. Pervious study 2:1
4. Discovering M.R.I 2:2
5. The MR component 2.3
6. The magnet 2.3.1
7. Resistive magnets 2.3.1.1
8. Permanent magnet 2.3.1.2
9. Superconducting magnets 2.3.1.3
10. The coils 2.3.2
11. Shim coil 2.3.2.1
12. Gradient coils 2.3.2.2
13. RF coils 2.3.2.3
14. THE COMPUTER SYSTEM 2.3.3
15. Image quality 2:4
16. Technique of Lumbar Spine 2:5
17. 2:5:1 Common indications
18. 2:5:2 Equipment
19. 2:5:3 Patient positioning
### Chapter Three

<table>
<thead>
<tr>
<th>12</th>
<th>Introduction 3:1</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Materials and Methods 3.2</td>
</tr>
<tr>
<td>12</td>
<td>3:3 Instrument &amp; Data analysis</td>
</tr>
<tr>
<td>12</td>
<td>Data collection 3:4</td>
</tr>
<tr>
<td>12</td>
<td>Study duration 3:5</td>
</tr>
<tr>
<td>13</td>
<td>Study variables 3:6</td>
</tr>
<tr>
<td>13</td>
<td>Sampling &amp; area of study 3:7</td>
</tr>
<tr>
<td>13</td>
<td>Inclusion criteria 3:8</td>
</tr>
<tr>
<td>13</td>
<td>Population of study 3:9</td>
</tr>
<tr>
<td>13</td>
<td>Ethical issues 3:10</td>
</tr>
<tr>
<td>13</td>
<td>Technique 3:11</td>
</tr>
<tr>
<td>13</td>
<td>Equipment 3:11:1</td>
</tr>
<tr>
<td>13</td>
<td>Patient positioning 3:11:2</td>
</tr>
<tr>
<td>14</td>
<td>Protocol 3:11:3</td>
</tr>
</tbody>
</table>

### Chapter Four

<table>
<thead>
<tr>
<th>15</th>
<th>Table 4-1: Distribution of patients according to Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>Fig 4-1: Distribution of patients according to Age</td>
</tr>
<tr>
<td>16</td>
<td>Table 4-2: Distribution of patients according to sex</td>
</tr>
<tr>
<td>16</td>
<td>Chart 4-2: Distribution of patients according to sex</td>
</tr>
<tr>
<td>17</td>
<td>Table 4-3: Degree of image quality</td>
</tr>
<tr>
<td>17</td>
<td>Fig 4-3: Degrees of image quality</td>
</tr>
<tr>
<td>18</td>
<td>Table 4-4: Degrees of Anatomy Appearance</td>
</tr>
<tr>
<td>18</td>
<td>Fig 4-4: Degrees of Anatomy Appearance</td>
</tr>
<tr>
<td>19</td>
<td>Table 4:4 Degrees of pathology appearance</td>
</tr>
<tr>
<td>19</td>
<td>Fig 4:4 Degrees of pathology appearance</td>
</tr>
<tr>
<td>20</td>
<td>Table 4:5 Crosstabing of Age and MR machines</td>
</tr>
<tr>
<td>20</td>
<td>Table 4:6 Chi-Square test of crosstabing of age and MR machines</td>
</tr>
<tr>
<td>21</td>
<td>Table 4:7 Crosstab of image quality and MR machines</td>
</tr>
<tr>
<td>21</td>
<td>Table 4:8 Chi-Square test of Crosstab of image quality and MR machines</td>
</tr>
<tr>
<td>22</td>
<td>Table 4:9 Crosstab of anatomy appearance and MR machines</td>
</tr>
<tr>
<td>22</td>
<td>Table 4:10 Chi-Square test Crosstab of anatomy appearance and MR machines</td>
</tr>
<tr>
<td>Page</td>
<td>Table 4:11 Crosstab of pathology appearance and MR machines</td>
</tr>
<tr>
<td>------</td>
<td>----------------------------------------------------------</td>
</tr>
<tr>
<td>23</td>
<td>Table 4:12 Chi-Square test of Crosstab of pathology appearance and MR machines</td>
</tr>
</tbody>
</table>

**Chapter Five**

- Discussion 5-1
- Conclusion 5-2
- Recommendations 5-3
- References 5-4

**Appendix**

- Data collection sheet Appendix 1
- Appendix 2
- Appendix 3

**List of Tables**

- Table 4-1: Distribution of patients according to Age
- Table 4-2: Distribution of patients according to sex
- Table 4-3: Degree of image quality
- Table 4-4: Degrees of Anatomy Appearance
- Table 4:4 Degrees of pathology appearance
- Table 4:5 Crosstabing of Age and MR machines
- Table 4:6 Chi-Square test of crosstabing of age and MR machines
- Table 4:7 Crosstab of image quality and MR machines
- Table 4:8 Chi-Square test of Crosstab of image quality and MR machines
- Table 4:9 Crosstab of anatomy appearance and MR machines
- Table 4:10 Chi-Square test Crosstab of anatomy appearance and MR machines
- Table 4:11 Crosstab of pathology appearance and MR machines
- Table 4:12 Chi-Square test of Crosstab of pathology appearance and MR machines

**List of Figures**

- Fig 4-1: Distribution of patients according to Age
- Chart 4-2: Distribution of patients according to sex
- Fig.4-3: Degrees of image quality
- Fig 4-4: Degrees of Anatomy Appearance
- Fig4:4 Degrees of pathology appearance
Abstract

MRI scan play important role in diagnostic radiology, make possible study of sectional anatomy, evaluate the texture of soft lesion, three dimension imaging and fast sequence examination.

The aim of this study to compare between two MR machine with different magnetic power the first 1.5 tesla an the second 0.3 tesla to determine the best in quality between them.
Random sample consist of 20 patient divided 50:50 between the two MR machine. The patient data registered (age and gender). Their age ranged from 20 to 80 years old. The study was done in (ALmarkz ALtiby ALhdeeth) and (ALNileen Medical Center).

The Chi square test was applied to collected data and the output values showed clearly the MR machine 1.5T was better than MR machine 0.3T in lumbar spine image quality.
تم اجراء الدراسة في (المركز الطبي الحديث) و (مركز النيلين الطبي).

تم تحليل البيانات المأخوذة بواسطة (Chi-Square test) واظهرت القيم المخرجة بواسطة التحليل افضلية جهاز الرنين المغناطيسي بقوة 1.5 تسلا على نظيره في جودة الصور الفقرات القطبية.

:ABBREVIATIONS

.A summary of common abbreviations in M.R.I and throughout the research

A................................................................. Anterior
ASIS............................................................Anterior superior iliac spine
AVM............................................................Arterio venos malformation
CNR............................................................Contrast to noise ratio
CNS.................................................................Central nervous system
EPI...............................................................Echo planar imaging
FAST............................................................Fourier acquired steady state
FID...............................................................Free induction decay signal
FLAIR............................................................Fluid attenuated inversion recovery
F.MRI.............................................................Functional MRI
FSE...............................................................Fast spin echo
GFE.............................................................Gradient field echo
GR.................................................................Gradient rephrasing
I.................................................................Inferior
IR.................................................................Inversion recovery
MAST..........................................................Motion artifact suppression
MR.................................................................Magnetic resonance
MRA...............................................................Magnetic resonance angiography
MRI..............................................................Magnetic resonance imaging
PC...............................................................Phase contrast
PD...............................................................Proton density
ROI..............................................................Region of interest
SE...............................................................Spin echo
SNR.............................................................Signal to noise ratio
SS...............................................................Single shot
STIR.............................................................Short time inversion recovery
TE...............................................................Echo time
TOF.................................................................Time of flight
TR.................................................................Repetition time
TSE..............................................................Turbo spin echo