



# **Investigating the Relationship between Estrogen and Short Stature among Young Females in Gaza**

**A Thesis**

*Submitted for the award of the degree of*  
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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

فَلِلَّهِ الْمُلْكُ الْأَمِينُ  
إِذَا دُعِيَ إِلَى اللَّهِ وَالْيَوْمِ  
الْآخِرِ أَقْبَلُ لِلْعَرْشِ  
الْمَجِيدِ

صَدَقَ اللَّهُ الْعَظِيمُ

*Dedication*

*To my beloved mother,*

*To my wife,*

*To my brothers,*

*To my sisters,*

*To my daughter*

*Noor*

*And*

*To my sons,*

*Ahmed, Samir, Abed Rahman and*

*Monir*

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# Contents

| Contents                                                                                                                          | Page     |
|-----------------------------------------------------------------------------------------------------------------------------------|----------|
| List of Abbreviations .....                                                                                                       | i        |
| List of Tables .....                                                                                                              | iv       |
| List of Figures.....                                                                                                              | viii     |
| Abstract .....                                                                                                                    | 1        |
| <b>1. Introduction</b> .....                                                                                                      | <b>3</b> |
| <b>Aim of the work</b> .....                                                                                                      | <b>5</b> |
| <b>2. Review of Literature</b> .....                                                                                              | <b>6</b> |
| 2.1 Normal growth .....                                                                                                           | 6        |
| 2.2 Growth plate physiology .....                                                                                                 | 8        |
| 2.3 Estrogens and 17 $\beta$ -Estradiol .....                                                                                     | 9        |
| 2.4 Growth Hormone (GH).....                                                                                                      | 16       |
| 2.4.1 Regulation of growth hormone secretion .....                                                                                | 17       |
| 2.4.2 Metabolic effects of growth hormone .....                                                                                   | 18       |
| 2.4.3 Growth Hormone Signalling .....                                                                                             | 19       |
| 2.4.4 Effects of growth hormone on bone metabolism .....                                                                          | 20       |
| 2.5 Insulin Like Growth Factor-1 .....                                                                                            | 24       |
| 2.5.1 IGF System, Receptors .....                                                                                                 | 26       |
| 2.5.2 Insulin like growth factor binding proteins.....                                                                            | 27       |
| 2.6 Estrogen and growth hormone interactions.....                                                                                 | 35       |
| 2.7 Ghrelin .....                                                                                                                 | 38       |
| 2.8 Growth hormone secretagogues (GHS) and ghrelin:<br>mechanism of action and possible physiological role on GH<br>release ..... | 39       |
| 2.9 Insulin .....                                                                                                                 | 41       |

---

## **Contents** (*cont...*)

| <b>Contents</b>                                                                              | <b>Page</b> |
|----------------------------------------------------------------------------------------------|-------------|
| 2.10 Ghrelin and insulin secretion .....                                                     | 42          |
| 2.11 Osteocalcin .....                                                                       | 43          |
| 2.12 Thyroid Stimulating Hormones .....                                                      | 45          |
| 2.13 Gonadotropins: follicle stimulating hormone (FSH)<br>and luteinizing hormone (LH) ..... | 46          |
| 2.14 Lipoproteins and Triacylglycerols (TAG) .....                                           | 50          |
| 2.15 Liver enzyme AST, ALT and ALP .....                                                     | 53          |
| 2.16 Calcium, magnesium and phosphorus .....                                                 | 55          |
| <b>3. Materials and Methods</b> .....                                                        | 59          |
| 3.1 Study design .....                                                                       | 59          |
| 3.2 Settings of the study .....                                                              | 59          |
| 3.3 Study population .....                                                                   | 59          |
| 3.4 The sample size .....                                                                    | 59          |
| 3.5 Ethical considerations .....                                                             | 60          |
| 3.6 Sample and sampling method .....                                                         | 60          |
| 3.7 Questionnaire .....                                                                      | 60          |
| 3.8 Exclusion criteria .....                                                                 | 60          |
| 3.9 Samples collection and storage procedure .....                                           | 61          |
| 3.10 Laboratory tests .....                                                                  | 62          |
| 3.10.1 Determination of estradiol hormone (E2) level .....                                   | 63          |
| 3.10.2 Determination of ghrelin hormone level .....                                          | 65          |
| Quality control of Ghrelin .....                                                             | 70          |
| 3.10.3 Determination of osteocalcin hormone level .....                                      | 70          |

---

## **Contents (cont...)**

| <b>Contents</b>                                                                            | <b>Page</b> |
|--------------------------------------------------------------------------------------------|-------------|
| Quality control of osteocalcin .....                                                       | 73          |
| 3.10.4 Determination of growth hormone (GH) .....                                          | 73          |
| Quality control of GH .....                                                                | 76          |
| 3.10.5 Determination of insulin like growth factor- 1 (IGF-1) level .....                  | 76          |
| Quality control of IGF-1 .....                                                             | 79          |
| 3.10.6 Determination of insulin like growth factor binding protein-3 (IGFBP-3) level ..... | 79          |
| Quality control of IGFBP-3 .....                                                           | 81          |
| 3.10.7 Determination of thyroid stimulating hormone (TSH) level .....                      | 82          |
| Quality control of TSH .....                                                               | 83          |
| 3.10.8 Determination of Insulin level .....                                                | 84          |
| 3.10.9 Determination of Prolactin (PRL) level .....                                        | 86          |
| 3.10.10 Determination of Follicle Stimulating Hormone (FSH) level .....                    | 87          |
| 3.10.11 Determination of Luteinizing Hormone (LH) level...                                 | 89          |
| 3.10.12 Determination of Progesterone Level .....                                          | 91          |
| 3.10.13 Determination of Glucose .....                                                     | 92          |
| 3.10.14 Determination of serum cholesterol .....                                           | 93          |
| 3.10.15 Determination of serum triacylglycerols .....                                      | 94          |
| 3.10.16 Determination of serum high density lipoprotein cholesterol (HDL-C) .....          | 95          |
| 3.10.17 Determination of serum low density lipoproteins cholesterol (LDL-C) .....          | 97          |
| 3.10.18 Determination of serum transaminases Activity ....                                 | 97          |
| 3.10.19 Determination of alkaline phosphatase (ALP) Activity .....                         | 98          |

---

## **Contents**

| <b>Contents</b>                             | <b>Page</b> |
|---------------------------------------------|-------------|
| 3.10.20 Determination of magnesium .....    | 98          |
| 3.10.21 Determination of phosphorus .....   | 99          |
| 3.10.22 Determination of calcium .....      | 100         |
| 3.11 Statistical analysis .....             | 100         |
| Quality control for chemistry profile ..... | 101         |
| <b>4. Results</b> .....                     | 102         |
| <b>5. Discussion</b> .....                  | 197         |
| <b>Summary</b> .....                        | 214         |
| <b>Conclusion</b> .....                     | 216         |
| <b>Recommendations</b> .....                | 216         |
| <b>References</b> .....                     | 218         |
| <b>Arabic Summary</b> .....                 |             |
| <b>Arabic Abstract</b> .....                |             |

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## **List of Abbreviations**

| <b>Abbrev.</b> | <b>Full-term</b>                               |
|----------------|------------------------------------------------|
| ALS            | Acid labile subunit                            |
| ALT            | Alanine aminotransferase                       |
| ALP            | Alkaline phosphatases                          |
| ARC            | Arcuate nucleus of the hypothalamus            |
| AST            | Aspartate aminotransferase                     |
| BMI            | Body mass index                                |
| BMD            | Bone mass density                              |
| CVD            | Cardiovascular disease                         |
| CDGD           | Constitutional delay of growth and development |
| CGD            | Constitutional growth delay                    |
| CHD            | Coronary heart disease                         |
| EDTA           | Ethylenediaminetetraacetic acid                |
| ELISA          | Enzyme-linked immunosorbent assay              |
| E2             | 17 $\beta$ -Estradiol                          |
| E3             | Estriol                                        |
| ER $\alpha$    | Estrogen receptor alpha                        |
| ER $\beta$     | Estrogen receptor beta                         |
| ERE            | Estrogen receptor element                      |
| E1             | Estrone                                        |
| FH             | Final height                                   |

## **List of Abbreviations** *(cont...)*

| <b>Abbrev.</b>  | <b>Full-term</b>                             |
|-----------------|----------------------------------------------|
| FSH             | Follicle stimulating hormone                 |
| FSS             | Familial short stature                       |
| GnRH            | Gonadotrophin-releasing hormone              |
| GH              | Growth hormone                               |
| GHBP            | Growth hormone binding proteins              |
| GHD             | Growth hormone deficiency                    |
| GHI             | Growth hormone insensitivity                 |
| GHR             | Growth-hormone receptor                      |
| GHRH            | Growth hormone releasing hormone             |
| GHRP            | Growth hormone releasing peptide             |
| GHSs            | Growth hormone secretagogues                 |
| GHS-R           | Growth hormone secretagogues receptor        |
| HV              | Height velocity                              |
| HDL-C           | High-density lipoprotein cholesterol         |
| 17 $\beta$ -HSD | 17 $\beta$ -hydroxysteroid dehydrogenase     |
| ISS             | Idiopathic short stature                     |
| IGFBP-3         | Insulin like growth factor binding protein 3 |
| IGF-1           | Insulin-like growth factor 1                 |
| JAK2            | Janus Kinase 2                               |
| LDL-C           | Low-density lipoprotein cholesterol          |
| LH              | Luteinizing hormone                          |
| MOH             | Ministry of Health                           |
| NGHD            | Non-growth hormone deficient short stature   |

## **List of Abbreviations**

| <b>Abbrev.</b> | <b>Full-term</b>                                  |
|----------------|---------------------------------------------------|
| OPD            | Outpatient department                             |
| PTH            | Parathyroid hormone                               |
| PHV            | Peak height velocity                              |
| PKA            | Protein kinase A                                  |
| PKC            | Protein kinase C                                  |
| rhGH           | Recombinant human GH                              |
| rhIGF-1        | Recombinant human insulin like growth factor 1    |
| SS             | Short stature                                     |
| STAT           | Signal transducer and activators of transcription |
| SRIF           | Somatostatin release–inhibiting factor            |
| SH2            | Src Homologus                                     |
| SDS            | Standard deviation score                          |
| SOCS2          | Suppressors of cytokine signalling 2              |
| TSH            | Thyroid stimulating hormone                       |
| T4             | Thyroxine                                         |
| TAGs           | Triacylglycerols                                  |
| T3             | Triiodothyronine                                  |
| -2SD           | Two standard deviations below the mean            |
| VLDLs          | Very low-density lipoproteins                     |

## LIST OF TABLES

| Table No   | Title                                                                                                           | Page |
|------------|-----------------------------------------------------------------------------------------------------------------|------|
| Table 2.1: | Effect of estrogens on female bone throughout lifespan .....                                                    | 12   |
| Table 2.2: | Regulation of endogenous GH secretion .....                                                                     | 17   |
| Table 3.1: | Ghrelin standard dilution .....                                                                                 | 67   |
| Table 3.2: | Result of Ghrelin calibrator .....                                                                              | 70   |
| Table 3.3: | Result of osteocalcin calibrator .....                                                                          | 73   |
| Table 3.4: | Result of GH calibrator .....                                                                                   | 76   |
| Table 3.5: | Result of IGF-1 calibrator .....                                                                                | 79   |
| Table 3.6: | Result of IGFBP-3 calibrator .....                                                                              | 81   |
| Table 3.7: | Result of TSH calibrator .....                                                                                  | 83   |
| Table 3.8: | Result of chemistry profile control .....                                                                       | 101  |
| Table 4.1: | Average of age, height, weight and body mass index (BMI) for cases and controls ...                             | 103  |
| Table 4.2: | Average of serum levels of estradiol, ghrelin and osteocalcin for cases and controls .....                      | 104  |
| Table 4.3: | Average of serum levels of prolactin, LH, FSH and progesterone for cases and controls .....                     | 105  |
| Table 4.4: | Average serum levels of IGF-1 and IGFBP-3 for cases and controls .....                                          | 107  |
| Table 4.5: | Average serum levels of GH, Insulin and TSH for cases and controls .....                                        | 108  |
| Table 4.6: | Average serum activity of AST, ALT and ALP for cases and controls .....                                         | 109  |
| Table 4.7: | Average serum levels of calcium, magnesium and phosphorus for cases and controls .....                          | 109  |
| Table 4.8: | Average of serum levels of glucose, cholesterol, triacylglycerols, HDL-C and LDL-C for cases and controls ..... | 112  |

---

## **LIST OF TABLES** *(cont...)*

| <b>Table No</b> | <b>Title</b>                                                                      | <b>Page</b> |
|-----------------|-----------------------------------------------------------------------------------|-------------|
| Table 4.9:      | Average of atherogenic indices one and two for cases and controls .....           | 113         |
| Table 4.10:     | Correlation between estradiol and hormones of cases and controls .....            | 114         |
| Table 4.11:     | Correlation between estradiol and chemistry profile of cases and controls.....    | 116         |
| Table 4.12:     | Correlation between height and hormones of cases and controls .....               | 119         |
| Table 4.13:     | Correlation between height and chemistry profile of cases and controls .....      | 121         |
| Table 4.14:     | Correlation between ghrelin and hormones of cases and controls .....              | 122         |
| Table 4.15:     | Correlation between ghrelin and chemistry profile of cases and controls .....     | 125         |
| Table 4.16:     | Correlation between osteocalcin and hormones of cases and controls .....          | 127         |
| Table 4.17:     | Correlation between osteocalcin and chemistry profile of cases and controls ..... | 129         |
| Table 4.18:     | Correlation between prolactin and hormones of cases and controls .....            | 131         |
| Table 4.19:     | Correlation between prolactin and chemistry profile of cases and controls .....   | 133         |
| Table 4.20:     | Correlation between LH and hormones of cases and controls .....                   | 135         |
| Table 4.21:     | Correlation between LH and chemistry profile of cases and controls .....          | 138         |
| Table 4.22:     | Correlation between FSH and hormones of cases and controls .....                  | 140         |
| Table 4.23:     | Correlation between FSH and chemistry profile of cases and controls .....         | 141         |

## **LIST OF TABLES** *(cont...)*

| <b>Table No</b> | <b>Title</b>                                                                           | <b>Page</b> |
|-----------------|----------------------------------------------------------------------------------------|-------------|
| Table 4.24:     | Correlation between progesterone and hormones of cases and controls .....              | 144         |
| Table 4.25:     | Correlation between progesterone and chemistry profile of cases and controls .....     | 145         |
| Table 4.26:     | Correlation between GH and hormones of cases and controls .....                        | 147         |
| Table 4.27:     | Correlation between GH and chemistry profile of cases and controls .....               | 149         |
| Table 4.28:     | Correlation between IGF-1 and hormones of cases and controls .....                     | 150         |
| Table 4.29:     | Correlation between IGF-1 and chemistry profile of cases and controls .....            | 150         |
| Table 4.30:     | Correlation between IGFBP-3 and TSH, insulin of cases and controls .....               | 153         |
| Table 4.31:     | Correlation between IGFBP-3 and chemistry profile of cases and controls .....          | 154         |
| Table 4.32:     | Correlation between TSH and insulin of cases and controls .....                        | 155         |
| Table 4.33:     | Correlation between TSH and chemistry profile of cases and controls .....              | 157         |
| Table 4.34:     | Correlation between insulin and chemistry profile of cases and controls .....          | 159         |
| Table 4.35:     | Correlation between glucose and chemistry profile of cases and controls .....          | 163         |
| Table 4.36:     | Correlation between cholesterol and chemistry profile of cases and controls .....      | 164         |
| Table 4.37:     | Correlation between triacylglycerols and chemistry profile of cases and controls ..... | 171         |
| Table 4.38:     | Correlation between HDL-C and chemistry profile of cases and controls .....            | 174         |