Evaluation of The Potential Role of miR-214 in Osteoporosis via Osterix

Thesis

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By

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بسم الله الرحمن الرحيم
قالوا
سبحانك لا علم لنا
إلا ما علمتنا إنك أنت
العليم الحكيم
صدق الله العظيم
سورة البقرة الآية: ٣٢

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Nesma Mohamed

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List of Abbreviations

Abbrev.	Full-term
ALP	**:** Alkaline phosphatase
ATF4	**:** Activating transcription factor 4
AUC	**:** Area under the curve
BGLAP	**:** Gamma-carboxyglutamic acid-containing protein
BIRC7	**:** Baculoviral IAP repeat-containing protein 7
BMD	**:** Bone mineral denisty
BMI	**:** Body mass index
BMM	**:** Bone marrow monocytes
BMPs	**:** Bone morphogenetic proteins
BMSCs	**:** Bone marrow mesenchymal stem cells
BSP	**:** Bone sialoprotein
CatK	**:** Cathepsin K
Col1α1	**:** Collagen type I α1
CRP	**:** C-Reactive Protein
CT scan	**:** Computed tomography scan
CT	**:** Threshold cycle
DEXA	**:** Dual X-ray absorptiometry
DICER	**:** An enzyme that in humans is encoded by the DICER1 gene
Dlx5	**:** Distal-less homeobox 5
Dmp1	**:** Dentin matrix protein 1
Dnm3	**:** Dynamin-3 is a protein that in humans is encoded by the DNM3 gene

dNTPs : Deoxyribonucleotide triphosphate

DROSHA : Class 2 ribonuclease III enzyme encoded by the DROSHA gene

FC : Fold change

FN : False negatives

FP : False positive

FRAX : Fracture Risk Assessment

HCC : Hepatocellular carcinoma

HR-pQCT : High-resolution peripheral QCT

LMHF : Low magnitude high frequency

LRP5 : Low-density lipoprotein receptor-related protein 5

MDCT : High-resolution multidetector CT

MEKK2 : Mitogen-activated protein kinase kinase kinase 2

miRNA : microRNA

MMP13 : Matrix Metalloproteinase 13

MRI : Magnetic Resonance Imaging

mRNA : Messenger RNA

MSCs : Mesenchymal stem or stromal cells

NFIC : Nuclear factor 1 C

NPV : Negative predictive value

nt : Nucleotide

OC : Osteocalcin

OD : Optical density

OP : Osteopontin

OPG : Osteoprotegerin

Osx : Osterix

PHEX : Phosphate regulating endopeptidase homolog X-linked
PKA : Protein kinase A
PKC : Protein kinase C
PPV : Positive Predictive Value
pQCT : Peripheral quantitative computed tomography
PSI : Pseudoshikonin I
Pten : Phosphatase and tensin homolog
PTH : Parathyroid hormone
QCT : Quantitative computed tomography
QUS : Quantitative ultrasonography
r : Pearson correlation
RANKL : Receptor activator of nuclear factor kappa-B ligand
RISC : RNA-induced silencing complex
RNAa : RNA-induced gene activation
RNAi : RNA interference
ROC : Receiver Operating Characteristics curve
RQ : Relative quantification
rRNA : Ribosomal RNA
RT : Reverse transcription
RT-PCR : Reverse transcription polymerase chain reaction
Runx2 : Runt-related transcription factor 2
Runx3 : Runt-related transcription factor 3
SATB2 : Special AT-rich sequence-binding protein 2
SCC : Squamous cell carcinoms
SD : Standard deviation
siRNAs : Short interfering RNAs

SMURFs : Smad ubiquitination regulatory factors

snoRNAs : Small nucleolar RNAs

snRNAs : Small nuclear RNAs

SOST : Sclerostin

STAT1 : Signal transducer and activator of transcription 1

TGFβ : Transforming growth factor beta

TN : True negative

TNF : Tumor necrosis factor

TP : True positive

tRNAs : Transfer RNAs

UBC9 : Ubiquitin-conjugating enzyme 9

UTR : Untranslated regions

UV : Ultraviolet

VDR : Vitamin D receptor

XBP1 : X-box binding protein 1

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Abstract

Background: The identification of genes associated with osteoporosis can help reveal underlying biological mechanisms that may lead to development of new therapeutic targets or biomarkers for early detection of the disease.

Aim of the study: to investigate the involvement of the osteoblast-specific transcription factor "osterix" and miR-214 in the pathogenesis of primary osteoporosis.

Patients and methods: the expression of osterix gene and miR-214 in the bone samples was evaluated using real-time-polymerase chain reaction in osteoporotic patients (n = 26) compppared to healthy controls (n = 14).

Results: The expression of miR-214 levels was significantly higher in the osteoporotic group as compared to the control group ($P \leq 0.01$), on the other hand the expression of osterix level was significantly lower in the osteoporotic group as compared to the control group ($P \leq 0.01$).

Conclusion:

Both osterix and miR-214 could have a potential role in the pathogenesis of primary osteoporosis.

KEYWORDS: Osterix , osteoporosis, miR-214,bone tissue