

UNDER PEER REVIEW

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3 Research paper

4 SERUM MAGNESIUM LEVELS IN WOMEN WITH

5 BREAST CANCER IN BENIN CITY, NIGERIA

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9 Abstract

10 The purpose of the present study was to compare the serum magnesium

11 levels of patients with breast cancer and those without the disease. Venous blood

12 was obtained from participants and serum magnesium levels was determined

13 using standardized laboratory methods. Results showed that ~~there's~~ therewas a statistical

14 reduction ($P < 0.05$) in serum magnesium levels of patients with breast cancer

15 compared to the control.

16 What is the conclusion?

17 Key words: serum magnesium, breast cancer.

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20 Introduction

21 Breast cancer is the commonest malignancy among females worldwide¹.

22 The exact cause of breast cancer is unknown ~~but~~, however some risk factors

23 include age, family history, life style (alcohol consumption, hormone use),

24 obesity, ~~reproductive and other factors~~ REFRAME. Researchers at the University of North

25 Dakota, country???? are suggesting that analysis may be ignoring a more important factor –

26 magnesium. REFRAME.

27 Aleksandrowicz et al also reported in Poland that inadequacy of

28 magnesium and antioxidants are important risk factor in predisposing to

29 leukemia².

30 Studies have shown that 46% of patients admitted to an ICU (intensive

31 care unit) in a tertiary cancer center presented with hypomagnesemia and they

32 concluded that the incidence of hypomagnesemia in critically ill cancer patients is

33 high³. The incidence rises to ~~as high as~~ 60 to 65% in ?????? patients in all intensive care

34 setting in which nutrition, diuretics, hypoalbuminemia, and aminoglycosides may

35 play important roles^{4,5,6}.

36 Over 300 enzymes systems that influences the metabolism of

37 carbohydrate, amino acids, nucleic acid and protein and ion transport, requires

38 magnesium^{7,8}. The role of magnesium in fatty acid and phospholipids acid

39 metabolism, that affect permeability and stability of membrane, ~~are being~~ were

40 elucidated^{9,10,11}.

41 It has been proposed that magnesium is central in the cell cycle, and that
42 its deficiency is an important conditions in pre cancerous cell
43 transformation^{12,13,14}. Magnesium deficiency would therefore lead to physiological
44 decline in cells therefore setting the stage for cancer.

45 It is known that carcinogenesis induces magnesium distribution
46 disturbance, which cause magnesium mobilization through blood cells and
47 magnesium depletion in non-neoplastic tissue. Magnesium deficiency seems to
48 be carcinogenic and in case of solid tumours a high level of supplemented
49 magnesium inhibits carcinogenesis¹⁵.

No gap in knowledge was raised.

50 The objective of this study is to evaluate and compare serum magnesium
51 levels of patients with breast cancer with those without the disease.

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55 Patients and methods

56 A total of 60 female participants from Central Hosp, Benin City, Nigeria were
recruited for this study from the female

57 surgical ward central hospital Benin City from between 1st July 2011 through 31st
October

58 2012 (15 months). 30 of these women (50%) had breast cancer and 30 women

59 (50%) without the disease were served as control.

60 The study was approved by the management of the hospitals and
61 participation was voluntary.

62 Biochemical analysis was done at the Department of Cehemical Ppathology,

63 University of Benin Teaching Hospital.

64

65 Sample collection and preparation

66 Venous blood was obtained from participant, allowed to clot, and retract and then

67 centrifuged at 3000 RPM for 15mins. The sera were harvested and stored frozen

68 at -200c until analysis was carried out.

69

70 Data analysis

71 Data analysis was conducted using the general linear model of SAS (Statistics
72 for agric and science)^{?????}, 2004 model. The result of the study was expressed as
73 mean $\pm$ standard error of mean.

74 Analysis of variance was used to test for difference in the group. Duncan's

75 multiple range tests was employed to separate ????? the mean that show significant
76 difference.

77

78 Assay method

79 Serum magnesium levels was ere assayed for using the direct spectrophotometric
80 method. In the reaction, magnesium forms a coloured complex with calmagite in

81 alkaline medium to produce a red complex that is which was measured

82 spectrophotometrically at 539 nm. EGTA (ethylene glycol tetra acetic acid)
83 ~~serves to complex and~~was added to prevent calcium interference, and a surfactant
eliminated~~s~~

84 the effect of protein. The colour produced ~~is~~was proportional to the magnesium
85 concentration¹⁶.

86 The concentration of magnesium ~~is~~was obtained from the equation

87 Absorbance of sample x concentration of standard

88 Absorbance of standard

89 ~~Using this method, the normal range for serum magnesium was 1.3—2.5m Eq/L.~~

90

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92 Result

93 Participants were menopausal and post menopausal women. ~~Patient with breast cancer~~

94 ~~mean age group was 55±1.6 (range 45 to 65) years and the mean age of the~~

95 ~~control was 51±1.4 (range 42 to 66)~~

96 ~~Serum magnesium level of the participant with CA breast was 1.095±0.007~~

97 ~~and the control was 2.520±0.053 (P<0.05).~~

98 ~~Findings below is an histogram of serum magnesium levels of breast~~

99 ~~cancer patients vs control~~RECAST

100

101

102 ~~This is an histogram showing serum magnesium level of breast cancer patient vs~~

103 ~~control~~

RECAST. No reference ws made to any table.

104

105 Key

106 Control

107 Breast Cancer Patient

108

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0.5

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1.5

2

2.5

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109 Discussion

110 The findings from this study showed reduced serum magnesium level in

111 breast cancer patients compared to the control.

112 Studies have ~~showed~~shown that 4% of breast cancer women in the United

113 ~~ki~~Kingdom are due to alcoholic consumption^{REF???}. It was ~~showed~~shown that
women who had

114 one or two drinks a day had increased ~~their~~ risk of developing breast cancer by 10%,

115 while those that had more than three drinks a day raised their risk by 30%. This

116 probably may be due to the fact that alcohol causes a reduction in magnesium
117 levels. According to [Dr. Russell Blaylock](#), low magnesium level is
associated with

118 dramatic increase in free radical generation as well as glutathione depletion and
119 this is implicated in infection and cancer¹⁷.

120 Studies have shown an increase cancer rate in region with low

121 magnesium level in soil and drinking water [Ref???](#). School of public health at the

122 Kaohsiun [Mmedical College](#) in Taiwan, found that magnesium also exerts a

123 protective effect against gastric cancer¹⁸. Pretreatment hypomagnesemia has

124 been reported in young leukaemic children, 78% of whom have history of

125 anorexia, and have excessive gut and urinary loss of magnesium.

126 Study from Sweden reported that women with the highest magnesium

127 intake had a 40% lower risk of developing cancer than those with the lowest

128 intake of mineral²⁰. Research also reported from the school of public health at the

129 University of Minnesota have [just-????](#) concluded that diet rich in magnesium
reduced

130 the occurrence of colon cancer²¹. [No year in the ref.](#)

131 It has also been reported that cancer patient receiving chemotherapy may

132 be at high risk for developing hypomagnesemia due to side effects such as

133 diarrhea that can deplete magnesium stores²².

134

135 Conclusion

136 We have demonstrated from this present study that the participant with breast

137 cancer have reduced serum magnesium level compared to the control and it is

138 advisable to add magnesium as an adjuvant therapy in their management.

139 Magnesium should also be routinely assayed for in patients with breast cancer as

140 a baseline investigation and during the course of chemotherapy.

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