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## Brief Communications

### Hemoglobin, folate and vitamin B<sub>12</sub> status of economically deprived elderly women

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#### ABSTRACT

Anemia with iron, folate, and/or vitamin B<sub>12</sub> deficiency is common among elderly. Limited studies have been carried out in India. The study was undertaken to assess the status of hemoglobin, serum folate and vitamin B<sub>12</sub> of economically deprived elderly women (aged 60 to 70 years) residing in Delhi, India. A total of 60 elderly women were enrolled in the study. Blood samples were analysed for hemoglobin, serum folic acid, vitamin B<sub>12</sub>. Anemia was observed among 66.67% of the participants. The prevalence of mild, moderate and severe anemia was 28.3%, 35% and 3.3% respectively. Around 12% and 38% of participants had low serum folate (<10 nmol/L) and vitamin B<sub>12</sub> levels (<150 pmol/L) respectively.

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#### INTRODUCTION

Anemia is common among elderly with approximately one-third having iron, folate, and/or vitamin B<sub>12</sub> deficiency.<sup>1,2</sup> Vitamin B<sub>12</sub> deficiency due to intrinsic factor deficiency and malabsorption are common among older people. Folate deficiency occurs mainly due to poor diet, intestinal malabsorption, excessive alcohol intake and in people with excessive demands or medical conditions or use of certain drugs.<sup>3</sup> There is limited data in the country on status of hemoglobin, folate and vitamin B<sub>12</sub> among elderly. This study was undertaken with the aim to assess the levels of hemoglobin, folate and vitamin B<sub>12</sub> among economically deprived elderly women residing in Delhi.

#### MATERIAL AND METHODS

The study was carried out from January to March 2013 among 60 elderly women aged 60 to 70 years, residing in an urban slum, Kirti Nagar, West Delhi. Those suffering from chronic disease were not enrolled. Institutional ethical clearance was obtained. A written informed consent was taken from all the study volunteers. Blood samples collected

were analyzed for hemoglobin, vitamin B<sub>12</sub>, folate and homocysteine.

All biochemical analysis was done at National Accreditation Board for Testing and Calibration Laboratories (NABL) Accredited Laboratory, Centre for Promotion of Nutrition Research and Training with special focus on North-East, Tribal and Inaccessible Population (Indian Council of Medical Research), New Delhi. Hemoglobin was analyzed using direct cyanmethemoglobin method. Dietary intake of nutrients was collected using 24 hour recall method and food frequency questionnaire.

Anemia was defined as <7.45 mmol/L using World Health Organization (WHO) cut off for hemoglobin.<sup>4</sup> Folate and vitamin B<sub>12</sub> deficiency was defined as <10 nmol/L and <150 pmol/L respectively according to WHO, Technical Consultation on Folate and Vitamin B<sub>12</sub> Deficiencies.<sup>5</sup>

#### RESULTS

Out of 60 study volunteers, 40 (66.67%) were anaemic. The mean hemoglobin (Hb) of the study volunteers was 6.95 mmol/L. The prevalence of mild, moderate and severe anemia was 28.3% (Hb; 6.83-7.39 mmol/L), 35% (Hb;

4.96-6.76 mmol/L), and 3.3% (Hb; <4.96 mmol/L) respectively. Around 12% and 38% of participants had serum folate <10 nmol/L and vitamin B<sub>12</sub> <150 pmol/L respectively. Around 12.5% and 35% of the study volunteers had anemia as well as deficiency of folate and vitamin B<sub>12</sub> respectively. Both serum folate and vitamin B<sub>12</sub> deficiency was observed to higher in vegetarian (18.75% and 50% respectively) than non vegetarian (6.67% and 30% respectively).

Information on dietary intake of nutrients was also collected from 49 elderly women. Nutrient intake of elderly women indicated gross inadequacy in folate, vitamin B<sub>12</sub>, vitamin B<sub>6</sub>, vitamin A, riboflavin, carotenes and minerals like zinc, magnesium and iron. Energy, protein, calcium, niacin and ascorbic acid were moderately adequate.

## DISCUSSION

Our study indicated prevalence of anemia as 67 % among elderly women. A study carried out among economically deprived elderly in Kishanganj, Bihar, India also reported prevalence of anemia as 63%.<sup>6</sup> Shrivastava et al also reported prevalence of anemia as 67.6% and 69.8% among elderly males and females respectively in a hospital based study carried out in Karnataka, India.<sup>7</sup> An ICMR study carried among adolescent girls and pregnant women indicated prevalence of anemia over 85%.<sup>8</sup>

Our study also showed that around 12% and 38% elderly women had low levels of serum folate (<10 nmol/L) and vitamin B<sub>12</sub> levels (<150 pmol/L) respectively. This may be due to low intake of folate and vitamin B<sub>12</sub> rich foods like milk and milk products, meat and meat products. Studies have shown that folate and vitamin B<sub>12</sub> intake were associated with plasma folate and vitamin B<sub>12</sub> concentration.<sup>9</sup>

A study conducted in Bangalore, India revealed that about 16% of south Indian elderly population belonging to upper middle and upper income group had subnormal plasma vitamin B<sub>12</sub> levels.<sup>10</sup> Hospital based studies carried out in Ahmedabad, India<sup>11</sup> reported prevalence of vitamin B<sub>12</sub> deficiency as 62.5 % among elderly. Similar to our findings, a study carried out among 470 children (12-52 months) in National Capital Territory (NCT) of Delhi revealed 38% prevalence of vitamin B<sub>12</sub> deficiency.<sup>12</sup>

Vitamin B<sub>12</sub> deficiency was observed to be more common among anemic subjects in the present study. A study carried out among 794 economically deprived adolescent girls (11-18 years) residing in Delhi, India also reported that prevalence of folic acid and vitamin B<sub>12</sub> deficiency among those who were anemic was 5.0 % and 63.3 % respectively.<sup>13</sup> Gopinath et al<sup>14</sup> also reported that vitamin B<sub>12</sub> deficiency rather than serum folate deficiency was associated with anemia.

A review on prevalence of vitamin B<sub>12</sub> deficiency among vegetarians indicated that prevalence ranged from 0 to 86.5% among elderly.<sup>15</sup> Our study also revealed that vitamin B<sub>12</sub> deficiency was 50% among vegetarians and 30% among non vegetarians.

Anemia with vitamin B<sub>12</sub> and folate deficiency is common among economically deprived elderly women. However, the present study has been conducted in a small number of subjects and may not actually represent the study population. Hence, the data may be used to plan studies with larger sample size in future.

## CONFLICT OF INTEREST STATEMENT

The authors declare that there are no conflicts of interest.

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