

## Impact of Anaemia on Morpho-physiological Variables of Rural Jat Women

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**ABSTRACT** Anaemia is a major public health problem at all ages worldwide. The present study aimed to investigate impact of anaemia on various morpho-physiological variables of 300 aged and elderly Jat women (anaemic=274, non-anaemic =26), ranging in age from 40-70 years and residing in rural areas of Haryana. To assess the impact of anaemia, fourteen morpho-physiological variables (height, weight, waist circumference, hip circumference, biceps skinfold, triceps skinfold, supra-iliac skinfold, subscapular skinfold, calf skinfold, systolic blood pressure, diastolic blood pressure, pulse rate, right hand grip strength, left hand grip strength ) were taken on each subject. Findings revealed that non-anaemic women showed better physical performance as compared to anaemic Jat women. Non-anaemic Jat women were taller and significantly heavier than anaemic women. Grip strength (both right and left hand), circumferential measurements and all skinfold thicknesses of non-anaemic subjects were found to have higher mean values than anaemic aged and elderly subjects. Blood pressure and pulse rate of anaemic women revealed higher mean values than non-anaemic women.

### INTRODUCTION

Anaemia is a common clinical problem at all ages, but this is especially true among the elderly (Balducci 2003; Nissenson et al. 2003). Undiagnosed or untreated anaemia is associated with an increased risk of mortality (Izaks et al. 1999; Landi et al. 2007), a decreased quality of life (Dharmarajan et al. 2006) and reduced work capacity and poor obstetric performance (Basta et al. 1979; Garn et al. 1981). In the aged and elderly population, anaemia is a risk factor for cardiovascular health and early death. In addition, anaemia also causes fatigue and leads to negative impact on cognitive and physical functions as well as on the quality of life, thereby serves as a marker of increased vulnerability (Gabrilove 2005). Numerous cross-sectional studies have previously documented prevalence of anaemia and age-related changes in haemoglobin values for older adults (Ania et al. 1997; Kaur and Kochar 2009; Smith 2000), while little attention has been given to the impact of anaemia on morpho-physiological variables among aged and elderly

women. Hence, the present study is an attempt to quantify the impact of anaemia on fourteen morpho-physiological variables of aged and elderly rural Haryanvi Jat women.

### MATERIAL AND METHODS

The current cross-sectional research was based on a sample of 300 rural Jat women (anaemic=274, non-anaemic=26), ranging in age from 40 to 70 years, belonging to middle socio-economic status. The data were collected from the year 2006 to 2007 from rural areas of Haryana, North India. All the subjects were physically and mentally normal and were not suffering from any chronic disease at the time of data collection. Pregnant and lactating women were also excluded from the study. Age in years was obtained from the date of birth of those women who were between 40-55 years of age. Most of the elderly rural women could not recall their date of birth. So, age had to be ascertained by recollection with some important socio-cultural and historical events, like age at marriage, age of the first child, any important festival and partition etc. With this cross-questioning, it was possible to ascertain nearly the correct age of the subject. Haemoglobin estimation was done using Cyanmethaemoglobin method (INACG 1985). According to World Health Organization (1992) criteria, anaemia was defined as a haemoglobin level less than 12g/dl. Weight

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and height of all the subjects were taken by weighing machine and anthropometer respectively. Circumferential (waist and hip circumference) body dimensions were measured with steel tape. Biceps, triceps, supra-iliac, sub-scapular and calf skinfolds were taken using Harpenden skinfold caliper following standardized techniques as recommended by Weiner and Lourie (1969). Hand grip strength (kg) of all the females was measured with Dynamometer. Systolic and diastolic blood pressure of each subject was taken using mercury Sphygmo-manometer and a stethoscope, after the subject had rested at least for 15-20 minutes. The Statistical Package for Social Sciences (SPSS) version 14.0 was used for data analysis. Students' t-test was used to find out the magnitude of anaemic-non anaemic difference for each variable.

## RESULTS

Mean, standard deviation and t-values for fourteen morpho-physiological variables (height, weight, waist circumference, hip circumference, biceps skinfold, triceps skinfold, supra-iliac skinfold, subscapular skinfold, calf skinfold, systolic blood pressure, diastolic blood pressure, pulse rate, right hand grip strength, left hand grip strength) for anaemic and non-anaemic aged and elderly Jat women are presented in table 1. Non-anaemic women were taller ( $153.99 \pm 5.96$  Vs  $153.41 \pm 5.99$ ) and significantly heavier ( $60.88 \pm 11.47$  Vs  $55.60 \pm 8.61$ ) than anaemic rural Jat women. Waist circumference ( $81.52 \pm 8.81$  Vs  $79.66 \pm 7.22$ ) and hip circumference ( $93.41 \pm 8.22$  Vs  $89.64 \pm 8.97$ ) revealed greater development among non-

anaemic women than anaemic women but significant difference was reported in hip circumference only. Biceps skinfold ( $16.14 \pm 3.29$  Vs  $17.17 \pm 3.31$ ), triceps skinfold ( $20.13 \pm 3.54$  Vs  $21.25 \pm 3.04$ ), supra-iliac skinfold ( $22.83 \pm 4.22$  Vs  $23.17 \pm 3.88$ ), subscapular skinfold ( $28.08 \pm 5.24$  Vs  $29.17 \pm 6.17$ ), and calf skinfold ( $20.89 \pm 4.19$  Vs  $22.83 \pm 4.60$ ) showed lower mean values in anaemic women than non-anaemic women and significant difference was found only for calf skinfold. Systolic ( $131.48 \pm 10.40$  Vs  $124.46 \pm 12.21$ ), diastolic blood pressure ( $83.04 \pm 6.45$  Vs  $81.17 \pm 7.40$ ) and pulse rate ( $81.09 \pm 9.28$  Vs  $79.42 \pm 6.33$ ) of anaemic women demonstrated higher mean values than non-anaemic women, but the significant difference was witnessed only for systolic blood pressure. Right hand grip strength ( $20.06 \pm 5.14$  Vs  $23.38 \pm 5.67$ ) and left hand grip strength ( $16.92 \pm 5.16$  Vs  $18.46 \pm 4.84$ ) of non-anaemic women was found to have greater mean values than anaemic women, although highly significant difference was reported only for right hand grip strength.

## DISCUSSION

Anaemia is a common condition in the older people and the prevalence of anaemia rises with increasing age. Present study revealed that aged and elderly anaemic women were shorter and lighter than their non-anaemic counterparts. Baig-Ansari et al. (2008) found that non-anaemic women were significantly taller, weighed more, and had a higher body mass index than anaemic women of Pakistan. Choi et al. (2004) also stated that body mass index of females with anaemia was significantly lower than those with normal

**Table 1: Mean, standard deviation and t- values of various morpho-physiological variables of anaemic and non-anaemic rural Jat women**

Morpho-physiological variables	Anaemic women Mean $\pm$ S.D	t-value	Non-anaemic women Mean $\pm$ S.D
Height (cm)	153.41 $\pm$ 5.99	-0.45	153.99 $\pm$ 5.96
Weight (kg)	55.60 $\pm$ 8.61	-2.79**	60.88 $\pm$ 11.47
Waist circumference (cm)	79.66 $\pm$ 7.22	-1.18	81.52 $\pm$ 8.81
Hip circumference (cm)	89.64 $\pm$ 8.97	-1.98*	93.41 $\pm$ 8.22
Biceps skinfold (mm)	16.14 $\pm$ 3.29	-1.47	17.17 $\pm$ 3.31
Triceps skinfold(mm)	20.13 $\pm$ 3.54	-1.50	21.25 $\pm$ 3.04
Suprailiac- skinfold (mm)	22.83 $\pm$ 4.22	-0.37	23.17 $\pm$ 3.88
Subscapular skinfold (mm)	28.08 $\pm$ 5.24	-0.95	29.17 $\pm$ 6.17
Calf skinfold (mm)	20.89 $\pm$ 4.19	-2.15*	22.83 $\pm$ 4.60
Systolic blood pressure (mm of Hg)	131.48 $\pm$ 10.40	3.12***	124.46 $\pm$ 12.21
Diastolic blood pressure (mm of Hg)	83.04 $\pm$ 6.45	1.35	81.17 $\pm$ 7.40
Pulse rate( beats/ minute)	81.09 $\pm$ 9.28	0.86	79.42 $\pm$ 6.33
Right hand grip strength (kg)	20.06 $\pm$ 5.14	-3.00***	23.38 $\pm$ 5.67
Left hand grip strength (kg)	16.92 $\pm$ 5.16	-1.40	18.46 $\pm$ 4.84

haemoglobin level. Anaemic rural Haryanvi Jat women of the present study displayed less development of circumferential measurements (waist and hip circumference) as compared to non-anaemic women. Likewise, Colin-Ramirez et al. (2003) also observed that anaemic subjects had lower waist and hip circumference than the non-anaemic subjects. In the current cross-sectional study, systolic and diastolic blood pressure as well as pulse rate of anaemic Jat women were higher than non-anaemic women. Kalra et al. (2003) indicated that anaemia is a common comorbidity in chronic heart failure and is associated with impaired functional capacity and cardiac function. Similar finding were noticed by Anand et al. (2005) and Komajda et al. (2006). It was observed that decrease in haemoglobin concentration reduces the availability of oxygen to the tissues, which in turn affects the cardiac output among anaemic subjects (Beaton et al. 1989). In the present study anaemic women demonstrated lower muscle strength (right hand=20.06 Vs 23.38; left hand=16.92 Vs 18.46) as compared to non-anaemic Jat women. Colin-Ramirez et al. (2003) also found that anaemic subjects had less grip strength than the non-anaemic subjects. Community-dwelling older persons in the Chianti area in Italy also displayed significantly lower handgrip strength (25.3 Vs 27.1) among anaemic persons than persons without anaemia (Brenda et al. 2004). Studies of Cerretelli (1992) and Dodd et al. (1993) have observed that lower levels of haemoglobin were able to influence oxygen delivery to skeletal muscle and consequently negatively impact muscular strength. Li (1993) also observed that compared with non-anaemic women, anaemic women workers in China were 15% less efficient in performing their work. Izaks et al. (1999) documented that in anaemic persons of 85 years and older have higher mortality rates than persons who are not anaemic. Sen and Kanani (2006) studied young adolescent girls and demonstrated that adverse impact of anaemia remained after controlling for undernutrition (BMI). Denny et al. (2006) also explored impact of anaemia in community dwelling elderly and found that anaemia was a risk factor for functional and cognitive decrease. According to an epidemiological study supported by the National Institute on Aging (NIA), anaemia doubles the risk that an older person will develop serious physical declines that can erode the ability to live inde-

pendently (Penninx et al. 2003). Hence comparison of morpho-physiological variables of anaemic and non-anaemic women of present study suggests that anaemia is likely to adversely affect physical work capacity and general well being of aged and elderly women.

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