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SHORT COMMUNICATION

COMPARISON OF ANTHROPOMETRIC INDICATORS IN ANEMIC AND NON-ANEMIC FEMALES

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ABSTRACT

Background: The anemia is the one of the biggest burden of diseases worldwide, peculiarly in developing world, it is more commonly found in women as compared to men. The anthropometric indicators like BMI, waist circumference or waist to hip ratio has been associated with cardiovascular risk factors, diabetes, blood pressure and cholesterol profile. The current literature survey reveals that BMI could be the possible anemic indictor, however a comprehensive study pinpointing on anemia and its anthropometric indicators is not available yet, especially in young girls. The present work thus focuses on whether the anthropometric indicators could be the potential indicators of anemia or not. **Methodology:** A case control was performed through a random sampling method for the time period of (04) four months. The sample comprised of 86 females. The complete blood count (CBC) was measured in aseptic condition. Anthropometric indices were measured and analyzed statistically. **Results**: Weight, waist circumference (WC), BMI (Body mass index), WHR (waist to hip ratio) and WHtR (Waist to height ratio) were observed significantly reduced (P=0.06, P=0.006, P= 0.02, P= 0.007, P= 0.0007) in anemic (50.86kg ± 12.9, 71.13cm ±16.49, 20.85Kg/m^2 ± 5.16, 0.77 ± 0.05, 0.44±0.07) as compared to non anemic females (53.65kg ± 8.43, 92.18cm ± 11.16, 23.40 Kg/m^2 ± 3.49, 0.83 ± 0.16, 0.49 ± 0.06). **Conclusion:** The anthropometric indices were observed significantly decreased in anemic as compared to non-anemic.

Keywords: BMI, Waist to hip ratio (WHR), waist circumference (WC), anemia

INTRODUCTION

Anemia is a globally wide spread health issue indicated by depleted number of red blood cells and the reduced oxygen-transporting capacity of hemoglobin (Mujica-Coopman et al., 2015). Because of impaired oxygen binding capacity, anemia has critical health implications which seriously affect both mortality and morbidity (Le, 2016). Certain common deficiencies consequently leads to anemia are iron deficiency, insufficient vitamin B12, disorders of hemoglobin like sickle cell anemia, although iron deficiency remarkably contributes in Iron-deficiency anemia affected 1.2 billion people globally in 2013(Abubakar, et al., 2015). However physical pathologies, including acute and chronic inflammation (Kaitha, et al., 2015) hematological disorders (Young, 2018) and infections also play a part in the likelihood of anemia (Ruiz, et al., 2016). Complications of anemia are fatigue and congestive heart failure, severity frequency increases as the anemia progresses(Adamu et al., 2017)

Anemia is growing rapidly and emerging as a threat even in the developed world, United States (US) represents a prevalence of 4.0-7.0% during 2003 to 2004 and 2011 to 2012 (Le, 2016). Previous Studies reported that anemia in early childhood may contribute to irreversible body development, mainly in the brain and leads to increased mortality among infants and toddlers (Li et al., 2017). According to WHO women and young children, are the most vulnerable group, have shown moderate-to-severe anemia and indicates that over 20% of the population of most of the member countries is affected(De Benoist, et al., 2008). Pakistan, and Sri Lanka between the early 2000s and 2012, shows greater rise in anemia prevalence among young women (Stevens et al., 2013).

Generally, anemia is linked with nutrition (McLean, et al., 2009), gender (Kajimoto et al., 2017) or with inheritance (Rosselli, 2017, Saraf et al., 2016), however, the recent work establishes its strong links with anthropometric indices (Ghadimi, et al., 2015; Qin et al., 2013). The prediction of hemoglobin level on the bases of anthropometric indicators or vice versa could give a new insight and scope to the hematological studies.

Hence the target group is non pregnant female and the aim of the study is to find out the anthropometric indicators could be the potential indicators of anemia.

MATERIAL AND METHODOLOGY

The total duration of study was four (04) months from August 2017-December 2017. A case control study was done and the data was acquired through random sampling method. The sample size (n) was 86. A self-structured questionnaire was used which comprised of socio demographic characters were distributed to the female participants aged between 18-30years. The participants on medication, minerals/multivitamins or those who were not willing to provide a sample of blood were excluded. Further-

more those who were having abnormal menstrual cycles were also excluded.

The samples were taken in a well-lit, quiet, calm and aseptic environment through disposable syringes (Thizhou Jinqing Medical Instrument China). Two point five (2.5cc) blood was taken from Medial Cubital vein and transferred in tubes (Atlas-Labovac Italiano) having an anticoagulant EDTA (AK3EDTA), complete blood count (CBC) was done by hematology analyzer. All the precautionary measures were followed.

Height and weight were measured by Stadiometer (SECA, 2017, Pakistan) and digital weighing machine with the accuracy of ±1mm and ± 100gm. For BMI calculation, weight was divided by height square. The Hip (by keeping feet together) and the waist (from the front side)were measured by non-retractable and flexible measuring tape (Warsi, et al., 2018).

Statistical Analysis: The data was shown as arithmetic means ± SD. Statistical Package for Social Sciences (SPSS version 21) was used to analyse the data. An unpaired t test (for normal distribution) as well as Mann- Whitney test (in case if the data could not pass the normality test) was used.

RESULTS

The sample size was 86 and the response rate was 100%. The definition of Anemia (according to world health organization criteria for female) is the hemoglobin level less than 12g/dl (WHO, 2011). As illustrated in Table-1, Weight, waist circumference (WC), BMI (Body mass index), WHR (waist to hip ratio) and WHtR (Waist to height ratio) were reduced significantly (P=0.06, P=0.006, P= 0.02, P= 0.007, P=0.0007) inanaemic (50.86kg ±12.9, 71.13cm ± 16.49, 20.85Kg/m^2 ±5.16, 0.77±0.05, 0.44±0.07) as compared to normal females (53.65kg±8.43, 92.18 cm±11.16, 23.40Kg/m^2±3.49, 0.83±0.16, 0.49 ±0.0 6).

Table- 1: Anthropometric indices of female.

Anthropometric indices	Anemic	Non anemic	p-Value
Age(years)	20.3±1.64	24.07±3.58	.0001*
Weight(Kg)	50.86±12.9	53.65±8.43	0.06#
Height (cm)	156.03±5.65	151.32±5.10	0.6
Waist (cm)	71.13±16.49	92.18±11.16	0.006#
Hip (cm)	89.7 ±11.19	92.18±11.17	0.35*
BMI(Kg/m^2)	20.85±5.16	23.40 ±3.49	0.02*
WHR	0.77 ±0.05	0.83±0.16	0.007#
WHtR	0.44±0.07	0.49±0.06	0.0007*

* Indicates unpaired t test. # indicates Mann- Whitney test

DISCUSSION

The present study focuses on the comparison of anthropometric indicators in anemic versus normal individual and whether the anthropometric indicators could possibly predict the anemia or not. To this end, weight, BMI and waist to hip ratio and some novel indicators such as hip circumference, waist circumference, waist to height ratio were used first time to detect anemia in a particular target group (female aged between 18-30 years) the weight, waist, hip circumference, WhtR, WHR and BMI were observed reduced in anemic than those of non-anemic females. The results are consistent with whatever was reported in association of anemia with anthropometric indices in men (Faheem, et al., 2019). The connection between anemia ie whether anemic condition is leading to low body weight and low BMI or the less anthropometric indices are the main reason of anemia is not yet known.

The middle upper arm circumference is found less in anemic individual (Laghari et al., 2017) similarly, various studies show the association of anemia with BMI in university students (Faheem et al., 2019, Shill et al., 2014), moreover, in Chinese women the highest concentration of hemoglobin was reported in obese female as compared to other BMI groups (Qin et al., 2013), in Russian population elevated hemoglobin level is linked with higher waist to hip ratio (Bikbov et al., 2019), on the contrary elevated BMI is reported in those who were having less hemoglobin level (Altunoglu, et al., 2014), similarly significant poor iron status is seen in obese children (Amato et al., 2010). Hence the evidence are suggesting that anthropometric indicators are associated with hemoglobin level however the investigation at molecular level is the need of time moreover, in order to view the clear picture of the aspect of the anemia and anthropometric indicators relationship; a giant cross sectional study comparing different nationalities is recommended.

CONCLUSION

The study concludes that reduced anthropometric indicators could be the potential indicators of anemia.

Disclosure statement

The collaborators of this work have no any financial or ethical conflict of interests.

Ethical Approval:

The experimental work was carried out in accordance to1964, declaration of Helsinki (DoH) and its later revisions for ethical standards.

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