Research Article

INTERNATIONAL RESEARCH JOURNAL OF PHARMACY

www.irjponline.com

ISSN 2230-8407 [LINKING]

CORRELATION OF IRON DEFICIENCY ANEMIA TO GROWTH FACTORS IN INDIAN ADOLSCENT FEMALES

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How to cite: Sarkar A, Vashisth R. Correlation of iron deficiency anemia to growth factors in Indian females of age 12-14 years: A clinical study. International Research Journal of Pharmacy. 2019;10(11):12-15.
Doi: 10.7897/2230-8407.1011313

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ABSTRACT

Background: iron deficiency is found in over 30% of the evaluated Indian population, indicating a critical degree of the disease, Indians are considered a high-risk group based on data gathered from prior research about the diagnosis of iron-deficiency anemia in Indian individuals.

Aim: to evaluate the growth variables that affect the development of iron deficiency anemia in females aged 12 to 14 as well as strategies for improving the diagnosis

Methods: 354 girls between the ages of 12 and 14 were enrolled in the study; their mean age was 12.8±0.64 years. For evaluation, all of the included participants were split into four groups: LID (n=90), an iron deficit I (n=112), an iron deficiency II (n=50), and controls (102 subjects, lacking iron deficiency). Clinical history and anthropometric measurements were measured by a single professional with specialised training in the area. The study subjects were also evaluated using a variety of anthropometric indices related to their age, such as Stenia (conventional units), Pignet (cm), Quetelet (conventional units), Rohrer (conventional units), Eisman (cm), and Brugsha (conventional units).

Results: 25% (n=8) of research participants reported positive chikungunya IgM antibodies, according to ELISA data. By using RT-PCR, dengue was found in 43.75% (n=14) of the study subjects. Using RT-PCR analysis, none of the participants had positive results for chikungunya. Class I with chikungunya in 18.75% (n=6), Grade I in 6.25% (n=2), Grade II in 37.5% (n=12), Grade III in 18.75% (n=60), Grade IV in 12.5% (n=4), and chikungunya in 6.25% (n=2).

Conclusion: The current study suggests that growth rates in teenage girls with type I and type II iron deficiency anemia are much lower, which lowers the use of reserve funds and maintains tissue pool levels.
Keywords: iron deficiency anemia, latent deficiency anemia, haemoglobin, adolescence, and ferrostatus.

INTRODUCTION

Numerous epidemiological research carried out over the globe have demonstrated that iron deficiency anemia , which is the manifestation of iron deficiency, shockingly affects younger females and those who are childbearing age. Studies conducted in India on iron deficiency anemia reveal that it is more common in environmentally vulnerable areas. Based on earlier research, determining the haemoglobin levels in the blood is a major factor in identifying iron deficiency anemia. The participants with the latent type of iron-deficiency anemia are kept out of the evaluation and go unnoticed using this approach of identifying the condition. This demonstrates that the true prevalence of iron deficiency is unknown everywhere, even in India.1

Given that iron deficiency is found in over 30% of the evaluated Indian population, indicating a critical degree of the disease, Indians are considered a high-risk group based on data gathered from prior research about the diagnosis of iron-deficiency anemia in Indian individuals. In light of these findings, appropriate action must be taken to prevent iron deficiency anemia from spreading to a critical level in the general population, particularly among females.2.

Nearly 40% of the examined participants were female, and iron deficiency anemia is more frequent in young subjects going through puberty and adolescence. Increased haemoglobin loss due to the menarche onset is also linked to these age groups, since they are also linked to elevated growth spurts and high growth rates. Due to dietary deficiencies, these age groups have a high nutritional need for iron, which is typically not met by the foods consumed. According to international data, the incidence of iron deficiency anemia in young people ranges between 8.2-40%, whereas the prevalence of latent iron deficiency (LID) is about between 22-40%.3

According to statistics from earlier studies published by various authors, iron deficiency anemia affects 15–65% of children and is more common in states and regions where nutrition is poor. It also affects school-age children, primarily girls, and has a very high prevalence. Despite several focused initiatives, this high frequency has not dropped in decades. In individuals who have reached menarche, in conscripts, in teenagers, and in females in senior school, the situation deteriorates.4 Therefore, the purpose of the current study was to evaluate the growth variables that affect the development of iron deficiency anemia in females aged 12 to 14 as well as strategies for improving the diagnosis.

MATERIALS AND METHODS

The purpose of the current study was to evaluate growth variables that affect the development of iron deficiency anemia in females aged 12 to 14 as well as strategies for optimising the diagnosis. The female subjects in the research were those who were attending the Institute's outpatient department between the ages of 12 and 14. 354 girls between the ages of 12 and 14 were enrolled in the study; their mean age was 12.8±0.64 years. All subjects gave their verbal and written informed permission after being fully told about the study's design.

Female volunteers between the ages of 12 and 14 who were willing to engage in the study were the inclusion criteria for the research. Females with additional severe nutritional deficits, people with syndromes, mentally challenged participants, and patients for whose permission could not be obtained were the exclusion criteria. For evaluation, all of the included participants were split into four groups: LID (n=90), an iron deficit I (n=112), an iron deficiency II (n=50), and controls (102 subjects, lacking iron deficiency).

The study subjects took a thorough history, including demographic information, and then performed a thorough clinical assessment on each included participant. After that, each study subject's anthropometric measurements—including absolute body surface, relative body surface (cm2/kg), arm and leg lengths, chest circumferences, head circumferences, body lengths, and body weights—were measured by a single professional with specialised training in the area.

Following the evaluation of the anthropometric parameters, the degree of growth in body weight and length in females according to age and the severity of iron deficiency were observed. The study subjects were also evaluated using a variety of anthropometric indices related to their age, such as Stenia (conventional units), Pignet (cm), Quetelet (conventional units), Rohrer (conventional units), Eisman (cm), and Brugsha (conventional units).

Chicago Inc., USA's SPSS version 20 was used to statistically evaluate the gathered data. The data were presented as a mean, standard deviation, percentage, and number. At $p<0.05$, the significance threshold was maintained. Outcomes

RESULT

The purpose of the current study was to evaluate growth variables that affect the development of iron deficiency anemia in females aged 12 to 14 as well as strategies for optimising the diagnosis.

A total of 354 female participants in the research were split into 4 groups for assessment: LID (n = 90), an iron deficit I (n = 112), an iron deficiency II (n = 50), and controls (n = 102 patients, who did not have an iron deficiency).

When anthropometry indicators were evaluated in the study females according to the degree of iron deficiency, relative body surface was substantially larger in LID (649.6± 8.78) than in the 416.6± 17.4 controls ($p<0.001$), as well as in IDA-I ($p<0.001$) and IDA-II ($p<0.001$). Between IDA-I and II, a non-significant difference was observed. But only between controls and LID, LID and IDA-II, and IDA-I and IDA-II was absolute body surface significant ($p<0.001$).

There was a significant difference in leg length between the LID, IDA-I, IDA-II, and control groups (p<0.05 and <0.001). With the exception of controls and IDA-I, arm length also revealed statistically significant effects across all groups (p<0.001). With p<0.001, the chest circumference of IDA-II was substantially greater than that of controls, IDA-I, and IDA-II. In comparison to controls and LID, head circumference was considerably greater in IDA-I and IDA-II (p<0.01). In comparison to controls and IDA-I, body length was considerably greater in LID (p<0.001). Additionally, in IDA-II in contrast to LID and controls. Table 1 shows that there was a significant difference in bodyweight (p<0.01) across the research groups, with the exception of LID and controls.

Regarding the evaluation of several anthropometric indices in the female study, it was observed that, with regard to Stenia, the differences in findings between the LID, IDA-I, IDA-II, and control groups were not statistically significant. IDA-II, 30.5±0.88, for Pignet was much lower than IDA-I, 33.6±0.89, LID, 34.6±1.09, and controls, 34.4±1.03 (p<0.01). Controls and LID (p<0.05), controls and IDA-II (p<0.01), IDA-II and LID (p<0.05), and IDA-II and IDA-I (p<0.05) all showed a statistically significant difference with regard to Quetelet. The Rohrer index showed a statistically significant difference between IDA-II and LID (p<0.05). The difference between all the groups for the Erisman index was statistically significant (p<0.05). According to Table 2, the value of IDA-II, 50.6±0.35, for the Brugsha index was substantially greater than the values of LID and IDA-I, with p<0.01 and p<0.001, respectively.

DISCUSSION

The purpose of the current study was to evaluate growth variables that affect the development of iron deficiency anemia in females aged 12 to 14 as well as strategies for optimising the diagnosis. A total of 354 female participants in the research were split into 4 groups for assessment: LID (n = 90), an iron deficit I (n = 112), an iron deficiency II (n = 50), and controls (n = 102 patients, who did not have an iron deficiency). Regarding the anthropometry indicators, relative body surface was substantially larger in LID (649.6± 8.78) compared to 416.6± 17.4 controls (p<0.001), IDA-I (p<0.001), and IDA-II (p<0.001) in the study of females depending on the degree of iron deficiency. Between IDA-I and II, a non-significant difference was observed.

But only between controls and LID, LID and IDA-II, and IDA-I and IDA-II was absolute body surface significant (p<0.001). The findings of Felt B et al. (2006) and Azzopardi DV et al. (2009), whose authors reported identical results for body surface area in their research as in the current study, were comparable to these results. The findings of the study demonstrated a substantial difference in leg length between the LID, IDA-I, IDA-II, and control groups (p<0.05 and <0.001). With the exception of controls and IDA-I, arm length also revealed statistically significant effects across all groups (p<0.001). With p<0.001, the chest circumference of IDA-II was substantially greater than that of controls, IDA-I, and IDA-II. In comparison to controls and LID, head circumference was considerably greater in IDA-I and IDA-II (p<0.01).

In comparison to controls and IDA-I, body length was considerably greater in LID (p<0.001). Additionally, in IDA-II in contrast to LID and controls. All research groups had considerably greater bodyweights (p<0.01), with the exception of LID and controls. These findings were consistent with research conducted in 2011 by Shankaran S et al. and in 2010 by Zhou WH et al., both of whom reported similar anthropometric characteristics to those found in the current study.

When the study's female participants' various anthropometric indices were evaluated, it was discovered that, for Stenia, there was no statistically significant difference between the LID, IDA-I, IDA-II, and control groups. IDA-II, 30.5±0.88, for Pignet was much lower than IDA-I, 33.6±0.89, LID, 34.6±1.09, and controls, 34.4±1.03 (p<0.01).

Controls and LID (p<0.05), controls and IDA-II (p<0.01), IDA-II and LID (p<0.05), and IDA-II and IDA-I (p<0.05) all showed a statistically significant difference with regard to Quetelet. The Rohrer index showed a statistically significant difference between IDA-II and LID (p<0.05). The difference between all the groups for the Erisman index was statistically significant (p<0.05). In terms of the Brugsha index, IDA-II's value of 50.6±0.35 was much higher than LID's and IDA-I's, with p<0.01 and p<0.001, respectively. The results of the current study were in line with those of Wyatt JS et al.9 in 2007 and Forman KR et al.10 in 2014, whose findings also indicated a comparable relevance in the anthropometric indices.

CONCLUSION

Within its limitations, the present study reported a significant reduction in the growth rate of the adolescent females having the severity of IDA-II which is targeted to decrease the reserve fund consumption and maintenance of the tissue pool. However, the present study had a few limitations including small sample size, short monitoring time, and geographical area biases. Hence, more longitudinal studies with larger sample size and longer monitoring period will help reach a definitive conclusion.

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TABLES

Anthropometry Indicators	Controls (n=102)	LID (n=90)	p-value	IDA-I (n=112)	p (1-3)	P (2-3)	IDA-II (n=50)	P (1-4)	P (2-4)	P(3-4)
Relative body surface	416.6±17.4	649.6±8.78	<0.001	537.7±9.05	<0.001	<0.001	520.8±8.36	<0.001	<0.001	N. S
Absolute body surface	1.33±0.04	1.38±0.04	N. S	1.36±0.04	<0.05	N. S	1.45±0.016	<0.001	<0.01	<0.05
Leg length (cm)	78.3±0.52	79.7±0.39	<0.05	81.3±0.56	<0.001	<0.05	81.7±0.45	<0.001	<0.1	N. S
Arm length (cm)	65.3±0.76	68.2±0.46	<0.001	68.1±0.49	<0.001	N. S	69.5±0.46	<0.001	<0.05	N. S
Chest circumference (cm)	74.2±0.98	75.4±1.03	N. S	75.3±0.75	N. S	N. S	78.4±0.68	<0.001	<0.05	<0.01
Head circumference (cm)	54.6±0.16	54.9±0.19	N. S	55.3±0.22	<0.01	<0.05	55.5±0.22	<0.001	<0.05	N. S
Body length (cm)	149.8±0.78	153.4±0.73	<0.05	153.7±0.88	<0.01	N. S	155.6±0.88	<0.001	<0.05	N. S
Body weight (kg)	41.5±1.14	43.8±1.23	N. S	44.6±0.89	<0.05	N. S	47.5±0.65	<0.001	<0.05	<0.05

Table 1: Anthropometry indicators based on iron deficiency severity in the study subjects

Indices	Controls (n=102)	LID (n=90)	p-value	IDA-I (n=112)	p (1-3)	p (2-3)	IDA-II (n=50)	p (1-4)	p (2-4)	p (3-4)
Stenia (conventional unit)	0.98±0.03	0.98±0.04	N. S	0.97±0.03	N. S	N. S	0.92±0.014	<0.05	<0.5	N. S
Pignet cm	34.4±1.03	34.6±1.09	N. S	33.6±0.89	N. S	N. S	30.5±0.88	<0.01	<0.01	<0.01
Quatelet (conventional unit)	18.6±0.39	17.4±0.48	<0.05	18.7±0.26	N. S	N. S	19.9±0.31	<0.01	<0.05	<0.05
Rohrer (conventional unit)	1.25±0.04	1.22±0.04	N. S	1.26±0.04	N. S	N. S	1.29±0.028	N. S	<0.05	N. S
Erisman, cm	-2.66±0.56	-6.66±0.48	<0.001	-5.51±0.45	<0.01	<0.05	4.53±0.76	<0.001	<0.01	<0.001
Brugsha (conventional unit)	49.7± 0.57	4.93±0.39	N. S	48.6± 0.36	N. S	N. S	50.6± 0.35	N. S	<0.01	<0.001

Table 2: Anthropometry indices based on iron deficiency severity in the study subjects