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Research Article

Prevalence of Anemia Among Camel Milk Consumers and Non-Consumers Non-Pregnant Women Within Reproductive Age Group in A Rural Area of Rajasthan: A Community Based Cross-Sectional Study.

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Abstract

Introduction: Anemia is an important nutrition disorder with major public health importance. In India, anemia prevalence among non-pregnant women (aged 15-49 years) was 57.2% (NFHS-5, 2020-2021). Being rich in iron and other micronutrients camel milk might decrease the nutritional anemia prevalence. The objective was to determine the prevalence of anemia among camel milk consumer vs non-consumer non-pregnant women within reproductive age group in a rural area of Rajasthan.

Methods: A community-based study was conducted among 30 adult female camel milk consumers (CMC). All the participants meeting eligibility criteria were recruited. Same numbers of adult female non-camel milk consumers (NCMC) were recruited with respect to similar age, sex, residence. After taking informed consent a semi-structured interview schedule containing socio-demographic, dietary characteristics was introduced to all participants in June, 2013. The participants were assessed for their haemoglobin levels from fingertip capillary blood using Cyanmet Haemoglobin method as suggested by Dacia and Lewis (1975). Prevalence of anemia in each group was compared. Data was entered into Microsoft Excel version 2013 and analysed in Stata version 13.

Results: The mean (SD) Hb (g/dL) level of the female in the CMC and NCMC categories was found to be 11.34 (1.01) and 10.76 (1.57) in adult males respectively. This difference was statistically non-significant (p-value 0.47). None of the subjects suffered from severe anemia. Prevalence of anemia was more (66.7%) among non-consumers than camel milk consumers (56.7%). There was a significant difference between these groups (p value 0.007).

Conclusion: Prevalence of anemia among camel milk consumers was lower than non-consumers non-pregnant women within reproductive age group with relatively higher levels of hemoglobin in the former group. Future studies are recommended for further inference.

Keywords: Anemia, haemoglobin, non-pregnant, camel milk, women within reproductive age group.

1.Introduction

Being a major nutrition disorder anemia serves significant public health importance. Anemia among non-pregnant women within reproductive age group (aged 15-49 years) causes fatigue, lathery, concentration deficit leading to decreased economic productivity. Anaemia is more common now than last few years in this community. In India, anemia prevalence among women within reproductive age group increased from 53.3% (NFHS-4, 2015-2016) to 57.2% (NFHS-5, 2020-2021). In Rajasthan, anemia prevalence among this population increased from 46.8% (NFHS-4, 2015-2016) to 54.7% (NFHS-5, 2020-2021) [1-4].

Iron content in camel milk ranges from 0.3-0.8 mg/L. Improvements in absorption, an increase in iron reserves and hemopoesis are caused by lower molecular casein protein. High levels of vitamin C in camel milk enhance the absorption of iron from non-heme sources Ferric is reduced to ferrous iron, which is readily accessible. High protein, calcium content in dairy products inhibits the absorption of iron; vitamin C counters this. It has vitamin B12, folate, and zinc, all of which prevent nutritional anaemia. Studies on anaemia in this group that consumes camel milk are few and far between. As a result, we carried out this research [5-9].

2. Material and Methods

The participants in this study were Riakas, a camel-rearing community living in the villages of Morkhana, Palana and Udasar in rural Bikaner, Rajasthan. For calculating sample size, no pertinent study could be located. All the eligible participants who have been ingesting camel milk every day for the past year have been recruited. Participants who had undergone a blood transfusion within the previous year, had a history of piles, anal fissure, hematemesis, malaria, hemoptysis, or severe blood loss were excluded. The objective was to determine the prevalence of anemia among camel milk consumer vs non-consumer non-pregnant women within reproductive age group in a rural area of Rajasthan.

A pilot study was carried out in the village of Bhamatsar. A total of 30 participants meeting eligibility criteria were recruited. Thirty non camel milk consumers in the same age group residing in similar rural setting were recruited for comparison the sixty participants were introduced to a semi-structured interview schedule covering socio-demographic and nutritional characteristics from June 1 through June 30, 2013, after taking their informed consent.

Participants' fingertips were cleansed, and a sterilized disposable needle was used to pierce the fingertip in order to draw 0.02 ml of blood into a dry pipette. The blood was spilled onto a little piece of Whatman no. 1 filter paper (7 × 7 cm). The drying process for the filter paper takes around 20 minutes. The sample that was thus obtained was taken to the lab for hemoglobin measurement. Blood was deposited on a portion of filter paper, which was then broken up and placed in a test tube containing 5 ml of Drabik's reagent (0.2 g of potassium cyanide and 1 g of sodium bicarbonate diluted in 1000 ml distilled water). The blood sample was extracted into Drabik's reagent after 30 minutes, and the absorbance of this solution was measured at 540 nm using a photoelectric colorimeter. Using a hemoglobinometer, the amount of haemoglobin in the blood was calculated (Systronics, 185). According to Dacia and Lewis' (2011) recommendation, the Cyanmet Haemoglobin technique was used to determine the participants' haemoglobin levels. Their haemoglobin levels were evaluated in comparison to the norm [9,10].

2.1 Statistical Analysis

Data were collected in the interview schedule and entered into Microsoft Excel version 2013 and analysed in Stata version 13 (StataCorp. 2013. Stata Statistical Software: Release 13. College Station, TX: StataCorp LP.). Characteristics of participants were described as mean (standard deviation) for continuous variables frequencies and percentages for categorical variables (age-group, education). Prevalence was calculated. P-value <0.05 was considered statistically significant.

2.2 Ethical Clearance

The ethics committee at Swami Kishanganj Rajasthan Agricultural University, Bikaner, granted its approval.

3. Results

Almost one third of the participants (33%) were in the age group of 30-40 years from both the groups. Mean (SD) age (years) was 35.4 (17.2) and 35.9 (18.8) in experiment and NCMC groups, respectively. Their education was ranging from primary to graduate, however 66 percent from CMC and 59 percent from NCMC group were found to be illiterate, 6 and 8 percent subjects from CMC and NCMC group were graduate respectively. Subjects belonging to joint families were 89 percent and 78 percent respectively from both the CMC and NCMC groups. Only 20 and 25 percent families from both the categories staying in pucca houses, respectively.

All the subjects were consuming camel milk due to its easy availability, therapeutic values and traditional household practice. Whereas 75% subjects were consuming camel milk due to its high nutritive values and 65% had it owing to its low cost. The dietary information was recorded for each of the subjects under study. From the finding of food intake, it has been clearly established that all the subjects were found to be consuming high amount of cereal (bajra) 355.40-610.35g and moderate amount of pulses 17.20- 33.35g, green leafy vegetable 21.40-33.60g, roots and tubers 97.20-203.40g, other vegetables 23.40-35.4g, fruits 11.43-26.95g, milk and milk products 34.50-420g, fat and oils 8.70-31.05g and sugar jaggary 9.90-32.60g. All of the patients were found to be inadvertently consuming insufficient amounts of pulses, green leafy vegetables, other vegetables, fruits, milk and milk products, fat, sugar, and jaggery. While it was noticed that consumption of grains, roots, and tubers was insufficient compared to the ICMR's recommended intake [11].

3.1 Haemoglobin Estimation of The Subjects

Because the synthesis of haemoglobin (Hb) is sensitive to the lack of various nutrients, including protein, iron, vitamin

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B12, and folic acid, it is frequently employed as a measure of nutritional status. The mean (SD) Hb (g/dL) level of the female in the CMC and NCMC categories was found to be 11.34 (1.01) and 10.76 (1.57) in adult males respectively. This difference was statistically non-significant (p-value 0.47).

Table 1: Mean (Sd) Haemoglobin (G/Dl) Level of The Participants

Parameter Haemoglobin g/dL	CMC (n=30)	NCMC (n=30)	p-value
Mean (SD)	11.34 (1.01)	10.76 (1.57)	0.47

Further review of showed that none of the subjects suffered from severe anemia. Prevalence of anemia was more (66.7%) among non-consumers than camel milk consumers (56.7%). There was significance difference between these groups (p value 0.007).

Table 2: Classification of Participants with Respect to Anemia Status

Classification (Hemoglobin in g/dL)	CMC (n=30) N (%)	NCMC (n=30) N (%)	p-value (Chi square)
Total anemia			
< 12.0	17 (56.7)	20 (66.7)	0.007
Severe anemia			
< 7.0	-	-	-
Moderate anemia			
7.0-9.9	1 (3.3)	3 (10)	<0.001
Mild anemia			
10.0-11.9	16 (53.4)	17 (56.7)	0.14
Normal			
> 12.0	13 (43.3)	10 (33.3)	0.003

4. Discussion

This study tried to compare anemia prevalence among camel milk consumers and non-consumers non-pregnant women within reproductive age group of residing in rural area of Rajasthan. We found that mean (SD) hemoglobin (g/dL) level was greater in camel milk consumers than in non-consumers. The difference was statistically non-significant. Similar result was found by Abdurrahman et al. among young children in Ethiopia, Muleta et al. among preschool children in Ethiopia [12,13].

The prevalence of anemia among non-pregnant women within reproductive age group was 56.7% and 66.7% in camel milk consumers and non-consumers respectively with significant statistical difference. Due to high iron, vitamin C, vitamin B12, folate, zinc, and protein intakes associated with camel milk drinking, camel milk consumers may have a low prevalence of anaemia. Comparing camel milk to cow, goat, and buffalo milk, there is a tenfold increase in iron and a threefold increase in vitamin C. Finding in the non-consumer groups was similar to findings of NFHS-5 (2020-2021) in rural Rajasthan (24.6%). Comparable results were obtained by Abdurrahman et al., Muleta et al [12,13].

We have recruited all the non-pregnant women within reproductive age group consuming camel milk regularly at least for one year in the selected villages of rural Bikaner. After applying the exclusion criteria, all eligible individuals gave their consent to take part in the study. The study's conclusions are thus internally valid. One clinician measured and collected the blood sample. Interpersonal prejudice was reduced as a result. Regular calibration of the hemoglobinometer reduced instrumental error. To reduce the confounding effect, one non-camel milk consumer with a comparable age and place of residence was recruited for each camel milk consumer. It was a community level study.

The potential for recall bias and social desirability bias during interviews were significant issues. The sample size was not determined because there was no prior study in the same population. There were only 30 individuals in total, and they were all recruited. A larger sample size could boost the study's validity. To obtain better results and inferences, we advise conducting more in-depth research at the community level with a larger suitable sample size [4-18].

5. Conclusion

Camel milk consumers had lower prevalence of anaemia than non-consumer non-pregnant women within reproductive age group. The former group had substantially higher haemoglobin levels. This was one of the very few studies conducted in rural community settings. Thus, pragmatic results can be accepted. It is advised that additional research be conducted in the future.

Declaration

Ethical Approval and Consent to participate Ethical clearance was obtained from ethics committee of Swami Keshwa-

nand Rajasthan Agricultural University, Bikaner. Informed written consent was taken from the participants before data collection.

Consent for publication: Proper consent was taken for publication from the authority of Swami Keshwanand Rajasthan Agricultural University, Bikaner.

Availability of data and materials
all the relevant data and materials are available.

Competing interests
There was no conflict of interest between the authors.

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