

## Original article

# The hematological parameters assessment of migrant workers from Lao PDR, Cambodia and Myanmar

Kanchana Tomanakan<sup>1</sup> and Rumphin Phoka<sup>2</sup>

<sup>1</sup>Department of Medical Technology; <sup>2</sup>Check up Unit, Khon Kaen Hospital

### Abstract

**Background:** Anemia is a major health concern and occurs at all stages of life. The etiology of anemia is multifactorial. Primary causes of anemia include malnutrition, parasitic infection and inherited hemoglobin disorders. Hb concentration is the most common used indicator of anemia at the individual and population level. The increasing foreign migrant workers from Lao PDR, Cambodia and Myanmar in Thailand affect current working status, while no data was presented in our studied areas. **Aim:** The study aimed to analyze the situation the burden of anemia in 3 groups of migrant workers from Lao PDR, Cambodia and Myanmar. **Methods:** A cross-sectional study was conducted among 499 migrant workers in Khon Kaen Province from October 2017 to September 2018. Venous blood samples were examined for complete blood count and film morphology. Hematology values were determined by automatic analyzer Sysmex XN3000 to provide WBC, RBC, Hb, Hct, platelet count, MCV, MCH, MCHC and RDW. **Results:** The 499 blood samples demonstrated anemia in 39 samples with overall 7.8% (39/499). The mean Hb concentration was  $10.7 \pm 1.04$  g/dL (9.48-11.9). For WBC, all blood samples and platelet counts were normal. Mean MCV, MCH and MCHC were slightly decreased but without significant association. ( $p = 0.07$ ) **Conclusion:** The study confirmed that hematological abnormalities in 3 groups of migrant workers were usually found. Decreased Hb correlated with blood film morphology. Our finding provides information to better manage anemia among migrant workers currently working in Thailand.

**Keywords :** ● Hematological parameters ● Anemia ● Migrant worker

**J Hematol Transfus Med. 2020;30:185-9.**

Received 5 March 2020 Corrected 11 March 2020 Accepted 30 March 2020

Correspondence should be addressed to Kanchana Tomanakan, Department of Medical Technology, Khon Kaen Hospital, Khon Kaen 40000

E-mail: tomanakanchana@yahoo.com

## นิพนธ์ต้นฉบับ

# การตรวจประเมินค่าทางโลหิตวิทยาในแรงงานต่างด้าวจากประเทศลาว กัมพูชา และพม่า

กาญจนา โทมานากาน<sup>1</sup> และ รำพิณ โปคา<sup>2</sup>

<sup>1</sup>กลุ่มงานเทคนิคการแพทย์ <sup>2</sup>งานตรวจสุขภาพ กลุ่มงานเทคนิคการแพทย์ โรงพยาบาลขอนแก่น 40000

### บทคัดย่อ

**ความเป็นมา** ภาวะโลหิตจางเป็นปัญหาทางสาธารณสุขที่มีความสำคัญในทุกช่วงวัย สาเหตุของโลหิตจางมีได้หลายแบบ เช่น การขาดสารอาหารที่จำเป็น การติดเชื้อพยาธิบางชนิด และการที่มีฮีโมโกลบินที่ผิดปกติ โดยทั่วไประดับของ Hb จะช่วยบ่งชี้ภาวะของโลหิตจางในกลุ่มประชากร ปัจจุบันมีการเพิ่มจำนวนของแรงงานต่างด้าวที่เข้ามาทำงานในประเทศไทย แต่ยังไม่มียุทธศาสตร์เกี่ยวกับการตรวจทางโลหิตวิทยาในแรงงานต่างด้าวในพื้นที่ขอนแก่นมาก่อน **วัตถุประสงค์** เพื่อตรวจและประเมินสถานการณ์การมีภาวะโลหิตจางในแรงงานต่างด้าว 3 ประเทศคือ ลาว กัมพูชา และพม่าที่เข้ามาทำงานในจังหวัดขอนแก่น **วิธีการ** รูปแบบการศึกษาแบบตัดขวางในช่วงเวลา ระหว่างเดือนตุลาคม 2560 ถึงเดือน กันยายน 2561 มีแรงงานต่างด้าวเข้าร่วมวิจัย 499 คน มีการขอจริยธรรมการวิจัยจากกรรมการวิจัย โรงพยาบาลขอนแก่นและขอเจาะเลือดเพื่อมาเตรียมสไลด์เพื่อดูลักษณะเม็ดเลือดและตรวจวัดค่า CBC (Complete blood Count) โดยใช้เครื่องอัตโนมัติ Sysmex XN3000 **ผลการศึกษา** จากเลือดของแรงงานต่างด้าว 499 ราย พบว่ามีความผิดปกติที่มีภาวะโลหิตจาง 39 รายคิดเป็นร้อยละ 7.8 ค่าเฉลี่ยของ Hb เท่ากับ  $10.7 \pm 1.04$  g/dL ( $9.48 \pm 11.7$ ) ในส่วนของค่าเม็ดเลือดขาว และเกล็ดเลือด มีค่าอยู่ในเกณฑ์ปกติ ส่วนของค่า MCV, MCH และ MCHC มีค่าต่ำกว่าเกณฑ์ปกติเล็กน้อยไม่มีนัยสำคัญทางสถิติ ( $p = 0.07$ ) **สรุป** การศึกษานี้ช่วยบ่งชี้ภาวะโลหิตจางในแรงงานต่างด้าวและข้อมูลสามารถนำไปใช้ในการบริหารจัดการทางสุขภาพในแรงงานต่างด้าวให้สามารถทำงานได้อย่างมีประสิทธิภาพต่อไป

**คำสำคัญ :** ● ค่าทางโลหิตวิทยา ● ภาวะโลหิตจาง ● แรงงานต่างด้าว

**วารสารโลหิตวิทยาและเวชศาสตร์บริการโลหิต. 2563;30:185-9.**

## Introduction

Anemia is one of the most common complications in developing countries in Southeast Asia. Primary causes of anemia including malnutrition, parasitic infection and inherited hemoglobin disorders.<sup>1,2</sup> Millions of Myanmar, Lao PDR and Cambodia natives have migrated to work in Thailand. Currently, mass migrations of foreign workers to Thailand may be increasing.<sup>3</sup> In addition, registered foreign workers have to screen in health programs before starting work in Thailand, and hematological values are not included in this health assessment.<sup>4</sup> Several studies have been conducted on anemia status among children, pregnant women and elderly group in many countries. They reported that low Hb concentration and red cell disorders were usually found in these groups.<sup>5-7</sup> Different ethnics have varying cultures and religious beliefs. Many studies have reported regarding migrant workers covering several aspects. Research among agricultural workers in Thailand revealed abnormal cholinesterase levels.<sup>8</sup> The clinical features of anemia have been studied among young Cambodian children indicating most hematologic variables and iron biomarkers were significantly lower among rural than urban children.<sup>9</sup> Regarding schoolchildren in Myanmar, a report in 2017 reported 46.4% of schoolchildren showed lower of Hb concentrations and their blood film showed red blood cell disorders. While a few studies have investigated anemia among foreign migrant workers in Thailand, this study aimed to assess hematological parameters of three groups of migrant workers from Lao PDR, Cambodia and Myanmar. The information should be used to create health policy to monitor migrant workers in Thailand.

## Materials and Methods

All 499 experimental subjects were migrant workers from Lao PDR, Cambodia and Myanmar working in Khon Kaen Province from October 2017 to September 2018. Complete blood count (CBC) and blood film

morphology were examined in venous blood samples. Blood counts were performed using the SysmexXN3000. The analyzer provided data of WBCs, RBCs, Hb level, platelet count, MCV, MCH, MCHC, RDW and five part differentials. Internal quality controls were tested before running samples. Blood slides were stained with Wright-Giemsa and follow by microscopic examination by a well-trained medical technologist. Anemia was defined as Hb level lower than 11 g/dL for both males and females based on the WHO cutoff value.<sup>10</sup>

## Data analysis

The prevalence of anemia was analyzed using SPSS, Version 16. Chi-squared tests were used to assess associations between categorical variables and the student t-test was used to compare differences in mean of continuous variables. P-values < 0.05 were considered statistically significant.

## Ethics Statement

Participation in our study was voluntary and anonymous; names or any personal identifiers of subjects were not recorded. The study was approved by the Ethics Committee of Khon Kaen Hospital, Thailand. (protocolKE61079) Each participant was informed about the process of blood collection and details of laboratory testing. Oral consent was obtained from the industry managers and migrant workers during site visit by the researchers.

## Results

Demographic data of 499 foreign workers (96 from Lao PDR, 192 from Cambodia and 211 from Myanmar) are described in Table 1. The subjects totaled 270 males and 229 females, so the sex proportions were similar. All participants showed no clinical signs or symptoms at the time of specimen collection. Their ages ranged from 19 to 54 years (median age = 32.499 years).

We examined blood films to confirm the prevalence of anemia and looked for signs of parasites such as malaria and filarial worm infection. No signs of parasitic infection were indicated in all blood films. Six

**Table 1** Demographic data of 3 ethnics of migrant workers in Thailand

Variable	Lao PDR (n = 96)	Cambodia (n = 192)	Myanmar (n = 211)	Overall (n = 499)
Age (median)	36 (21-52)	27 (19-49)	33 (19-54)	32 (19-54)
Sex				
Male	39	105	126	270
Female	57	87	85	229
Marital status				
Married	32	70	64	166
Not married	64	122	147	333
Household income				
> 10,000 baht	5	8	4	17
< 10,000 baht	91	184	207	482

**Table 2** Hematologic parameters of 3 ethnics of migrant workers in Thailand

Parameter	Lao PDR (n = 96)	Cambodia (n = 192)	Myanmar (n = 211)	Overall (n = 499)
WBC (X10 <sup>3</sup> /μL)	5.60 (4.6-7.8)	5.44 (4.3-7.9)	5.89 (4.6-8.06)	5.7 (4.3-8.06)
RBC (X10 <sup>6</sup> /μL)	4.3 (3.6-4.8)	3.8 (3.6-4.6)	4.5 (3.7-4.7)	4.1 (3.6-4.7)
MCV (fL)	81.5 (75.1-85.2)	79.5 (73.1-83.1)	82.5 (78.1-87.2)	83.5 (75.1-86.2)
MCH (pg/cell)	26.0 (23.7-28.9)	25.8 (23.7-28.9)	26.2 (23.7-28.9)	26.1 (23.7-28.9)
Hb (g/dL)	10.8 (9.5-11.8)	10.1 (9.48-11.9)	10.9 (9.53-11.3)	10.7 (9.8-11.7)
Hct (%)	28.5 (26.5-32.2)	26.7 (27.2-31.8)	30.9 (28.3-34.1)	28.7 (26.5-33.2)
Platelets (x10 <sup>3</sup> /μL)	179 (99-301)	184 (121-258)	203 (167-234)	198 (101-256)

cases from Lao PDR, 20 cases from Cambodia and 13 cases from Myanmar were mild to moderate anemia. No case of severe anemia was observed in this study. Our finding demonstrated the overall prevalence of anemia from three groups was 7.8% (39/499).

Table 2 demonstrates the results of hematological parameters of 499 migrant workers. The overall prevalence of anemia was 7.8% (39/499) with a higher prevalence found among migrant workers from Cambodia. The mean Hb concentration ( $\pm$  standard deviation) was  $10.7 \pm 1.04$  g/dL (9.8-11.7 g/dL) WBC and platelet counts of all subjects were normal in number and morphology. However, we found two cases of foreign workers exhibiting slightly increased eosinophil level but without statistical significance. Mean MCV, MCH and MCHC were slightly decreased but without significant association ( $p = 0.07$ ). In this study, age, sex and nationality had no association among the three groups of participants.

## Discussion

This constituted the first study to report ethnic differences in the hematological parameters used to diagnose anemia among migrant workers in Thailand. While related studies had included ethnicity as a variable in their study, most were conducted in one ethnic population. In addition, Asian ethnic studies are more likely to focus on inherited hemoglobinopathies such as thalassemia or G6PD.<sup>11,12</sup> Other reports found the majority (89%) of Myanmar workers had parasites transmitted by oral-fecal route. Our study observed eosinophilia in two subjects that were affected by parasites as in one related study.<sup>13</sup> One government school in North East Delhi found the prevalence of anemia was 45% similar to the study from rural India reporting the prevalence of anemia was 46 to 90%.<sup>14,15</sup> Among women in India, 84% pregnant and 92.2% lactating women were anemic with severe anemia, 9.2 and 7.3%, respectively.<sup>16</sup> According to the present

study, the overall prevalence of anemia was quite low (7.8%) when compared with one related report in Myanmar.<sup>5</sup> Also, the prevalence of hemoglobin disorders was 43% among Cambodian children.<sup>9</sup> Reasons given were due to different study groups and food consumption behaviors. Many studies have found that anemia is a common problem due to low income leading to insufficient dietary intake. This study focused on all of the hematological parameters among various migrant workers which differed from other related studies. We conducted a cross-sectional study to analyze hematological parameters. Therefore, a causative relationship could not be established because of the limitation of specimen collection and specific laboratory testing.

Further research is recommended to identify the specific risks for anemia. It may helpful to implement measures to improve the health status of migrant workers.

### Conclusion

This is the first formalized survey conducted among three groups of foreign migrant workers from Lao PDR, Cambodia and Myanmar.

### Conflict of interest statement

No conflict of interest was reported by the authors.

### Acknowledgments

The authors would like to thank Dr. Monthana Chantharaniyom, Director of Thalassemia Center, Khon Kaen Hospital for valuable suggestions. Our appreciation is extended to all staff for their technical support.

### References

1. WHO, Hemoglobin concentration for the Diagnosis of anemia and assessment of severity, World Health Organization, Switzerland (Internet). 2011. (Cited 2020);(about 1 p). Available from <http://www.who.int/vmnis/indicators/haemoglobin.pdf>.
2. Li L, Luo R, Sylvia S, Medina A, Rozozelle S. The prevalence of anemia in central and eastern China: Evidence from the China health and nutrition survey. *Southwest Asian J Trop Med Public Health*. 2015;46:306-21.
3. Huguet FW, Punpuing S, International migration in Thailand. Bangkok: International Organization for Migration; 2005.
4. International Organization for migration. Number of migrant labor work permits 1 June to 30 August (Internet) 2005. (Cited 2020); (about 1 p). Available from <http://www.iomseasia.org/index.php.module=pageslides&func=viewpub&tid=6&pid=317>
5. Wah ST, Yi YS, Khin AA, Plabplueng C, Nuchnoi P. Prevalence of anemia and hemoglobin disorders among school children in Myanmar. *Hemoglobin*. 2017;41:26-31.
6. Muslimah Y, Awaluddin SM, Omar M, Amahmad NA, Aziz FA, Jamaluddin R, Aris T, Tan MP. Prevalence of anemia among the elderly in Malaysia and its associated factors: Does ethnicity matter? *J Environ Public Health*. 2018; Apr 29.doi:10.1155/2018/1803025
7. Kritsiruwuthinan K, Ngrenngamlerl W. Asymptomatic malaria infections among foreign migrant workers in Thailand. *Asian Pacific J Trop Med*. 2011;5:60-3.
8. Thetkthuek A, Jaidee W. Factors that contribute to insecticide poisoning among immigrant agricultural workers in Thailand. *Int J Occu Env health*. 2017;23:60-70.
9. George J, Yiannakis M, Main B, Gevenish R, Anderso C, An US, Williams SM, Gibson RS. Genetic hemoglobin disorders, infection, and deficiencies of iron and vitamin A determine anemia in young Cambodian children. *The J of Nutrition*. 2012;142: 781-7.
10. WHO. Iron deficiency anemia: assessment, prevention and control. A guide for programme managers. Geneva: UNICEF/UNU/WHO. 2001.
11. Achoubi N, Asghar M, Saraswathy KN, Murry B. Prevalence of beta thalassemia and hemoglobin E in migrant populations of Manipur, North East India. *Gene Test Mol Biomarkers*. 2012;16: 1195-2000.
12. Bacone G, Gilder ME, Chowwiwat N, Gornsawun G, Win E, Cho WW, et al. Prevalences of inherited red blood cell disorders in pregnant women of different ethnicities living along the Thailand-Myanmar border. *Wellcome Open Research*. 2017;2(72): 1-21.
13. Nuchprayoon S, Sanprasert Y, Kaewzaithim S, Saksirisampant W. Screening for intestinal parasitic infection among Myanmar migrant workers in Thai food industry: a high-risk transmission. *J Immigration Minor Health*. 2009;11:115-21.
14. Agrawal KN, Gomber S, Bisht H, Som M. Anemia prophylaxis in adolescent school girl by weekly or daily iron-folate supplementation. *Indian Pediatr*. 2003;40:296-301.
15. Kanani S, Combating anemia in adolescent girls: a report from India. *Mothers Child*. 1994;13:1-3.
16. Agrawal KN, Agrawal DK, Sarma A, Sarma K, Prasad K, Kalita MC et al. Prevalence of anemia in pregnant and lactating women. *Indian J Med Res*. 2006;124:173-84.

