DOI: 10.17354/ijpphs/2016/41

Original Article

Knowledge, Attitude, and Practice of Budding Doctors in Prevention of Thalassemia

Sita Chatterjee[1], Tushar Kanti Mondal[1], Afifa Ahamed[2], Ishita Sarkar[3], Kaushik Sarkar[3], Bhaskar Shahbabu[3], Mausumi Basu[1]

[1]Associate Professor, Department of Community Medicine, Institute of Post-Graduate Medical Education and Research and Seth Sukhlal Karnani Memorial Hospital, Kolkata, West Bengal, India, [2]Demonstrator, Department of Community Medicine, Institute of Post-Graduate Medical Education and Research and Seth Sukhlal Karnani Memorial Hospital, Kolkata, West Bengal, India, [3]Junior Resident, All India Institute of Hygiene and Public Health (AIIH&PH), Kolkata, West Bengal, India

ABSTRACT

Introduction: β-thalassemia is the most common single gene disorder among Indian population. In ICMR, multicentric study in six cities of six states, the overall prevalence of β-thalassemia trait was 2.78% and varied from 1.48% to 3.96%.

Purpose: The purpose of this study was to assess the knowledge, attitude, and practices (KAP) about thalassemia among junior doctors of a tertiary care teaching hospital of Kolkata.

Materials and Methods: An institution-based descriptive study, cross-sectional in design, was carried out among 188 junior doctors from April 2014 to June 2014 using a pre-designed, structured, pre-tested, self-administered questionnaire. Statistical analyses were conducted by Statistical Package for Social Sciences (SPSS 22.0).

Results: Mean score of KAP was 11.46 ± 0.3; 7.30% ± 2.83, and 4.10 ± 0.76, respectively. About 78.72% participants had adequate knowledge, 80.85% had positive attitude, and only 33.51% had good practices.

Conclusion: Increasing emphasis on thalassemia in the undergraduate curriculum might improve budding doctor's KAPs about this deadly disorder.

Key words: Attitude, Junior doctors, Knowledge, Practice, Thalassemia

INTRODUCTION

Thalassemia/mediterranean anemia, an ancient group of disease that has existed for over 7000 years. The name "Thalassemia" comes from the ancient Greek word "thalassa" means "sea" as the ancients believed it was an "illness that came from the sea" and "heme" means blood. In 1925, pediatrician Thomas Benton Cooley published a work on thalassemia which was the first description of this disorder; and for a longtime, it was known as Cooley's anemia.[1]

Thalassemia is a general name for a group of autosomal recessive genetic blood disorders that involve abnormality in hemoglobin (Hb). Hb is made up of two kinds of protein-alpha- and beta-globin. The two main types of thalassemia are alpha and beta thalassemia: Individuals with alpha thalassemia do not produce enough alpha-globin chains causing excess beta-globin chains. Those with beta thalassemia do not produce enough beta-globin chains causing excess alpha-globin chains.[2]

Approximately 5.2% of the global population and 7% of pregnant women carry β- or α-thalassemias or other Hb disorders; among estimated annual births of 128,667,000, affected births with Hb disorders are 3,32,043 (sickle cell disorders 2,76,168 and major thalassemia 55875) (β- and α-thalassemia 42,409 and 13,466, respectively); transfusion-dependent thalassemia are 25,511; among them 11.72% (2989) are actually transfused annually; 22,522 annual deaths occur due to non-transfusion; among 97,630 known patients who are currently living with regular transfusions; 39% (37866) obtain adequate iron chelation therapy; whereas annual deaths due to iron overload are 2988.[3]

CORRESPONDING AUTHOR:
Dr. Mausumi Basu,
Department of Community Medicine, Institute of Post-Graduate Medical Education and Research and Seth Sukhlal Karnani Memorial Hospital, Kolkata, West Bengal, India. Phone: +91-9231441362.
E-mail: basu.mausumi544@gmail.com

Submission: 09-2016; Peer Review: 10-2016; Acceptance: 11-2016; Publishing: 12-2016

The inherited disorder of Hb, especially β-thalassemia, hemoglobin E (HbE), and HbS are a significant health problem in India; β-thalassemia is the most common single gene disorder among Indian population.[4] About 10% of the global thalassemia children born in India, every year.[5]

The 1989 WHO working group estimated 3.9% β-thalassemia carrier frequency in India.[6] Another WHO update on β-thalassemia in India indicated almost similar carrier frequency of 3-4%, which gave the current national population between 35.6 and 47.5 million carriers of the disorder nationwide[7] and with an estimate of 8000 to 10,000 new births each year.[8]

In different parts of India, the prevalence of hemoglobinopathies also differs. In ICMR multicentric study in six cities of six states, the overall prevalence of β-thalassemia trait was 2.78% and varied from 1.48% to 3.96%; Ludhiana and Kolkata showed the highest prevalence of 3.96% and 3.64%, respectively; whereas Dibrugarh had the lowest prevalence of 1.48%; HbD trait was mainly seen in Ludhiana (1.09%); HbE trait was highly prevalent in Dibrugarh (Assam) 23.9% and Kolkata (West Bengal) 3.92%. The prevalence of homozygous HbE disease was 5.33% in Dibrugarh and of HbE β-thalassemia was 1.44%.[9]

Although some studies in India and abroad have documented thalassemia knowledge, attitude, and practices (KAPs) among parents of thalassemia children, thalassemia patients/couples, pregnant women, and general population; studies among junior doctors about this topic is very few, especially in our country.

With this context, the present study was carried out to assess the KAPs about thalassemia among junior doctors of a tertiary care teaching hospital of Kolkata.

MATERIALS AND METHODS

Study Type, Study Setting, and Study Population

An institution-based observational descriptive study, cross-sectional in design, was carried out among junior doctors of a tertiary care teaching hospital of Kolkata, West Bengal, India, during the 3-month period from April 2014 to June 2014.

Inclusion Criteria

Junior doctors (interns, house-staffs, postgraduate trainees [PGTs]) who were available during data collection days and gave informed written consent to participate in the study.

Exclusion Criteria

Faculty members were excluded from the study.

Sample Size

Sample size was determined by applying the formula $4pq/L^2$ where p is the proportion of study population having adequate knowledge, q is the proportion of study population not having adequate knowledge, and L is allowable error of 5%. Considering 12.17% had adequate knowledge,[10] with a type-1 error of 5% (alpha = 0.05) and 95% level of confidence, the sample size was calculated as $4 \times 12.17 \times 87.83/(5)^2 = 171$; nonresponse rate was taken as 10%; hence, the target has been set to reach 188 participants to achieve the objectives of the study.

Sampling technique was nonprobability purposive sampling.

The study tool was a pre-designed, structured, pre-tested, self-administered questionnaire. The questionnaire had four parts: Part I consisted of information on the sociodemographic profile (5 items); Part II had questions regarding knowledge about thalassemia (16 items with a total score of 16); Part III dealt with attitude of the study population toward thalassemia (6 statements with a total score of 6); and Part IV was concerned about practices of the participants regarding thalassemia (10 practices with a total score of 10).

Based on available literatures on KAP about thalassemia, the questionnaire was designed in consultation with three experts, two from community medicine, and one from hematology department; for the convenience of the items in the questionnaire, it was given to 30 randomly selected junior doctors of the same institution; their views were collected and necessary minor changes were made. The junior doctors who were participated in the pilot study were not included in the study sample. The content and construct validity of the questionnaire were investigated by a research team and its reliability was confirmed by Cronbach's alpha test. Based on this test; all questions' reliability was higher than 78% and validity was higher than 80%.

Study Variables

a. Sociodemographic variables (five items): (1) age (in years), (2) gender (male/female/others), (3) place of residence (hostel resident/day scholar), (4) marital status, (5) designation (intern/house-staff/PGT)
b. Knowledge about thalassemia (16 questions): (1) hereditary nature, (2) role of consanguineous marriage, (3) sex distribution, (4) alpha thalassemia, (5) Beta-thalassemia, (6) thalassemia major, (7) thalassemia minor, (8) diagnosis, (9) management, (10) prevention, (11) chance of having thalassemia child in both carrier parent, (12) chance of having thalassemia child in one carrier parent, (13) life expectancy of thalassemia major, (14) life expectancy of thalassemia carrier, (15) most common type of thalassemia in West Bengal, (16) facilities for thalassemia testing in West Bengal
c. Attitude toward thalassemia (10 views): (1) want to marry a thalassemia carrier, (2) preference of consanguineous marriage, (3) want to test him/herself for thalassemia, (4) like to test spouse and children for thalassemia, (5) prefers mandatory pre-marital screening, (6) want to donate blood for thalassemia patients, (7) whether both carrier person should marry, (8) should carrier couples have pregnancy, (9) whether carrier couples should do pre-natal diagnosis (PND) test, (10) should carrier couples do Medical Termination of Pregnancy (MTP) if the test result of PND is positive for thalassemia
d. Practice on thalassemia (10 questions): (1) test done for thalassemia, (2) test of family members (spouse and children) done for thalassemia, (3) advised test for thalassemia, (4) marrying a thalassemia carrier in the family, (5) consanguineous marriage in the family, (6) pre-marital carrier screening (PMCS) done among family members, (7) PND for thalassemia done in family, (8) donated blood for thalassemia patients, (9) attended lectures/Continuing Medical Education s/workshops on thalassemia for last 3 years.

Methods of Data Collection

Nature and purpose of the study were explained to the study population in details; their anonymity and confidentiality were ensured; then their informed written consent was taken followed by administration of the questionnaire to get filled by themselves.

Data Analysis

Data were entered in Microsoft Office Excel 2010; statistical analyses were conducted using Statistical Package for Social Sciences (SPSS 22.0). Correlation of variables was studied using Chi-square test. The odds ratios and 95% confidence intervals were calculated. $P < 0.05$ was interpreted as statistically significant.

Operational Definitions

A. Residence
   1. Hostel resident: Junior doctors reside in hostel.
   2. Day scholar: Junior doctors reside at home.

B. Correct knowledge
   1. Hereditary nature: Thalassemias are autosomal recessive hereditary disorders.[11]
   2. Consanguineous marriage: A union between two individuals who are related as second cousins or closer, the offspring of a consanguineous union is expected to inherit identical gene copies from both parents.[12]
   3. Sex distribution: Both sexes affect equally.
   4. Alpha-thalassemias: Individuals do not produce enough alpha-globin chains causing excess beta-globin chains. It is primarily due to gene deletion directly causing reduced alpha-globin chain synthesis.[2]
   5. Beta-thalassemias: Individuals do not produce enough beta-globin chains causing excess alpha-globin chains. Beta thalassemias are usually caused by point mutations rather than large deletions.[2]
   6. Beta-thalassemia major: Has two genes for beta-thalassemia-homozygous for beta-thalassemia.[2]
   7. Thalassemia minor (carrier/trait): Has only one copy of beta-thalassemia gene- heterozygous for beta-thalassemia. People who are thalassemia minor carry the genetic trait for thalassemia but do not usually experience any health problem except a mild anemia.[2]
   8. Diagnosis of thalassemia: Doctors diagnose thalassemia by blood tests which include a complete blood count and high-performance liquid chromatography or automated capillary electrophoresis tests.[13,14]
   9. Management of thalassemia: Regular blood transfusion and chelation therapy.
   10. Prevention of thalassemia: Premarital counseling; PMCS; PND.
   11. Chance of having thalassemia child in both carrier parent - 25% chance in every pregnancy.
   12. Chance of having thalassemia child in one carrier parent - nil.
   13. Life expectancy of thalassemia major: Less than normal though dramatically improved usually up to 50s-60s years.
   14. Life expectancy of thalassemia minor: Normal.
   15. Common type of thalassemia in West Bengal: HbE beta-thalassemia.
   16. Facilities for thalassemia test at government setup: All medical colleges and district hospitals.
   17. Pre-marital counseling: Educational and supportive advice rendered to people planning marriage, by a clergy member skilled in counseling, a therapy professional, or some other properly skilled individual.[15]
   18. PMCS: Pre-marital counseling and pre-marital test in which couples that are going to get married are tested for genetic, infectious, and blood transmitted diseases to prevent any risk of transmitting any disease to their children.[16]
   19. Prenatal diagnosis: A screening test done for pregnant woman when there is a chance that the baby could be affected. This test finds out whether the unborn baby actually has thalassemia and which type, by chorionic villus sampling and/or amniocentesis.[2]

RESULTS

A total of 188 junior doctors were included in the present study whose age ranged between 22 and 36 years; mean age and standard deviation were 25 and 0.79 years, respectively; 64.36% were between 22 and 26 years age group; 71.81% were males; 59.04% were hoster residents; 75% were unmarried; 37.76% were interns; 26.07% were house- staffs; and rest 36.17% were PGTs (Table 1).

Table 2 demonstrated the KAP scores regarding thalassemia among the participants. Concerning knowledge, the mean score of knowledge was 11.46 ± 0.3 (score ± standard error). For each question, a correct response was given a score of 1, and an incorrect/do not know was scored as 0, thus the total possible score was ranged from 0 to 16, with higher score indicating better knowledge. Study population with scores of 12 (75%) and above was interpreted as having

Table 1: Distribution of the study population according to sociodemographic status (*n*=188)

Sociodemographic variables	*n* (%)
Age (years)	
22-26	121 (64.36)
27-31	48 (25.53)
32-36	19 (10.11)
Gender	
Male	135 (71.81)
Female	53 (28.19)
Current residence	
Day scholar	77 (40.96)
Hostel resident	111 (59.04)
Marital status	
Married	47 (25.00)
Single	141 (75.00)
Designation	
Intern	71 (37.76)
House-staff	49 (26.07)
PGT	68 (36.17)
Total	188 (100.00)

PGT: Postgraduate trainee

"adequate knowledge" and scores below 75% were considered as "inadequate knowledge." About 148 (78.72%) participants had adequate and 40 (21.28%) had inadequate knowledge about thalassemia. Similarly, the attitude was assessed using 10 questions, negative and positive attitude were considered if the correct questions score were <80% and ≥80%, respectively. About 80.85% and 19.15% of the study population had positive and negative attitude, respectively (mean score of attitude was 7.30% ± 2.83%). Furthermore, practices were assessed using 10 questions, bad and good practices were considered if the correct questions scores were less than 80% and more than or equal to 80%, respectively (mean score of practice was 4.10 ± 0.76). Only 33.51% had good practices and rest 66.49% had bad practices.

Indicators of knowledge of the study population about thalassemia were depicted in Table 3. About 85.11% knew that thalassemia is an autosomal recessive hereditary disorder. The unknown part of information consisted mainly of most common type of thalassemia in West Bengal (49.47%) and chance of having thalassemia child in both carrier parents and one carrier parent (59.04% and 59.57%, respectively).

Table 4 revealed indicators of attitude and practice among participants toward thalassemia. Only 17.03% of the study population preferred consanguineous marriage. About 54.78% had positive attitude regarding marrying a thalassemia carrier. About 80.85% and 82.40% participants wanted to test their blood and their spouses and children's blood for thalassemia, respectively. Their responses were supportive of PMCS (85.10%), PND (85.64%), and MTP if result of PND found positive for thalassemia (90.42%). Altogether 77.12% and 77.66% were of the opinion that carrier thalassemia couples should not marry and should not have children.

Regarding practice, 46.81% and 65.42% of the study population had tested their blood and their family members blood for thalassemia, 9.57% had consanguineous marriage within their family, 9.04% had major/minor thalassemia among their family members, only 8.50% had family history of marrying a thalassemia carrier, 40.42% participants practiced PMCS among family members, and 23.40% had done PND during pregnancy among their family.

Results of association between sociodemographic characteristics and knowledge and attitude were obtained from logistic regression modeling (Table 5). The significant contributing factors of thalassemia knowledge and attitude were increasing age, marital status (married), and designation ($P < 0.05$).

Table 2: Knowledge, attitude, and practice scores of thalassemia (*n*=180)

Score	*n* (%)
Knowledge (16 items)	
Adequate (≥12 or 75%)	148 (78.72)
Inadequate (<12 or 75%)	40 (21.28)
Attitude (10 items)	
Positive (≥8 or 80%)	152 (80.85)
Negative (<8 or 80%)	36 (19.15)
Practice (10 items)	
Good (≥8 or 80%)	63 (33.51)
Bad (<8 or 80%)	125 (66.49)
Total	188 (100.00)

Table 3: Distribution of the study population according to knowledge about thalassemia (*n*=188)

Information sought (knowledge)	Correct response, *n* (%)
Genetic nature of thalassemia - autosomal recessive	160 (85.11)
Role of consanguineous marriage in causation - yes	137 (72.87)
Sex distribution of thalassemia - equal	152 (80.85)
Alpha thalassemia - do not produce enough alpha-globin chains	123 (65.42)
Beta thalassemia - do not produce enough beta-globin chains	123 (65.42)
Thalassemia major - two genes for beta thalassemia	130 (69.15)
Thalassemia carrier/trait - one gene for beta thalassemia	123 (65.42)
Diagnosis by blood test-CBC, HPCL, Hb-automated capillary electrophoresis	172 (91.49)
Management - regular blood transfusion and chelation therapy	175 (93.08)
Prevention - PMCS, PND	130 (69.15)
Life expectancy of thalassemia major - less than normal	153 (81.38)
Life expectancy of thalassemia minor - normal	146 (77.66)
Most common type of thalassemia in West Bengal - Hb E-beta thalassemia	93 (49.47)
Facilities of thalassemia testing in West Bengal at government setup - all medical colleges and district hospitals	116 (61.70)
Chance of having thalassemic child in both carrier parents - 25% in every pregnancy	111 (59.04)
Chance of having thalassemic child in one carrier parent - nil	112 (59.57)

PMCS: Pre-marital carrier screening, PND: Pre-natal diagnosis, CBC: Complete blood count, HPCL: High-performance liquid chromatography, Hb: Hemoglobin

DISCUSSION

Knowledge

In the present study, 78.72% participants had adequate knowledge about thalassemia which was far higher than study by Seyam and Assemi at Guilan University among university students,[10] Pauisri *et al*. among pregnant women at Srinagarind Hospital of Thailand,[17] Miri-Moghaddam *et al*. among high school students at South-Eastern Iran,[18] Karimzaei *et al*. at Iranshahr city among carrier thalassemia marriage volunteers,[19] Mirza *et al*. at Pakistan among young people[20] where only 12.17%, 57.1%,14.7%, 20%, and 54.5%, respectively, had adequate knowledge about the disorder. However, study by Haque *et al*.[21] among future health-care providers of Malaysia showed that almost 90% (excellent 11%, good 46%, average 32%) had quite good knowledge which could be because they were the students of a medical campus. Medical students were taught in their curriculum about thalassemia and thus they scored well. Otherwise, general public and non-medical students depend on medical personnel, parents, friends, and media to improve their knowledge on thalassemia.

It has been observed that 85.11% of junior doctors of this study had correct knowledge about the inherited nature of the disease whereas a study by Murthy *et al*. among students of

Table 4: Distribution of the study population according to attitude and practice regarding thalassemia (*n*=188)

Information sought	*n* (%)
Positive attitude toward thalassemia	
Like to marry a thalassemia carrier	103 (54.78)
Not prefer consanguineous marriage	156 (82.97)
Want to test blood for thalassemia	152 (80.85)
Want to test spouse and children for thalassemia	155 (82.44)
Prefer mandatory PMCS	160 (85.10)
Both carrier persons should not marry	145 (77.13)
Carrier couples should not have pregnancy	146 (77.66)
Carrier couples should do PND	161 (85.64)
Carrier couples should do MTP if result of PND found positive for thalassemia	170 (90.42)
Want to donate blood for thalassemia patients	169 (89.89)
Good practices about thalassemia	
Blood test done for thalassemia	88 (46.81)
Blood test of spouse and children done for thalassemia	123 (65.42)
Advised blood test for thalassemia	119 (63.30)
PMCS done among family members	76 (40.42)
PND done among family members	44 (23.40)
Donated blood for thalassemia patients	72 (38.30)
Marrying a carrier person in the family	16 (8.51)
Consanguineous marriage in the family	18 (9.57)
Major/minor thalassemia in the family	17 (9.04)
Attended lectures/workshops/CMEs on thalassemia for last 3 years	50 (26.60)

PMCS: Pre-marital carrier screening, PND: Pre-natal diagnosis, CME: Continuing Medical Education, MTP: Medical Termination of Pregnancy

management and science university, Shah Alam, Malayasia[22] revealed that 66.3% of medical students and 36.7% of non-medical students knew that thalassemia is a familial disease. Knowledge regarding pattern of inheritance was also poor among future health-care providers of Malaysia.[17]

About 74.61% and 76.15% of our study population had correct knowledge about thalassemia major and thalassemia minor/carrier whereas there was confusion between the terms "thalassemia major" and "carriers" across medical and non-medical groups in Malaysia study[22] as participants were not able to tell the difference between the two.

Almost all (96.15%) junior doctors of the present study had correct knowledge about alpha and beta thalassemia; however, majority of participants in Malaysia[22] were unaware that there are different types of thalassemia and that alpha and beta thalassemia are the two most common types.

Specific knowledge regarding treatment and prognosis of the disease was good in this study; in contrast, it was poor among future health-care providers of Malaysia.[21]

It was seen that 86.16% of the study population had correct knowledge about the chance of having thalassemic child in both carrier parents; on the contrary study by Murthy *et al*.[22] revealed that many were unaware that both parents must be carriers to produce an affected child and that carrier parents have a chance of 1:2:1 of having children who are normal, carrier, and thalassemia major, respectively.

The significant contributing factors of thalassemia knowledge were increasing age, marriage, and higher education. However, there were no significant differences in terms of age, gender, and marital status in Malaysia study.[22]

The correlation between the age of the study population and their knowledge level showed perfect positive correlation and considered significant which was corroborative with the findings at Malaysia.[21]

Study by Haque *et al*.[21] and Miri-Moghaddam *et al.*[18] demonstrated that female participants (91%) had more knowledge than their male counterparts (85%) whereas our study demonstrated a slightly increased knowledge among males (81% vs. 71%) though it was not statistically significant.

Most respondents were aware of the concept of PMCS in the present study and Pakistan study.[20]

Attitude

About 59% of the Malaysian students[21] had quite good attitude (excellent 9%, good 22%, average 28%) which was far lower than our study where it was 80.85%. However, 85.7% pregnant women in Thailand[17] and 78.6% high school students in Iran had positive attitude toward thalassemia.[18]

In the present study, determinants of positive attitude were increasing age, marital status, and education. It was seen in this study and Malaysia study[21] that as the junior doctors age increased, their attitude toward thalassemia also became more positive. A study by Miri-Moghaddam *et al*.[18] and Haque *et al*.[21] demonstrated that female participants had quite good attitude (66%) in comparison to their male counterparts (44%) which was not in line with this study where more males had positive attitude (82.22%) than females (77.36%) though this relationship was not significant. Doctors' attitude toward thalassemia was very much related to their level of education in our study and Malaysia study.[21]

It was noticed in the present study that knowledge about thalassemia had a positive effect on attitude as those who had adequate knowledge had also more positive attitude. On the contrary, even though the future health-care providers had high level of knowledge, they were lack of good attitude toward thalassemia at Malaysia.[21]

This study detected a high acceptability of PMCS for thalassemia as 85% of the study population thought that premarital screening should be mandatory, similar to Malaysia study;[22] in contrast, only 59.4% university students at Pakistan[20] wanted pre-marital screening to be mandatory there.

About 80.85% of our study population wanted to know their carrier status and 82.44% wanted to know their spouses and children's carrier status; in Pakistan,[20] the corresponding figures were 60.4% and 69.1%, respectively.

Practice

In the present study, only 33.51% of the study population had good practices which was almost corroborative with Iranshahr study (26%).[19]

Almost half (46.90%) of our participants had tested their blood for thalassemia, which was almost similar to Malaysia[22] where 55.35% and 44.65% medical and non-medical students were tested for thalassemia trait.

Table 5: Association between knowledge and attitude and sociodemographic variables (*n*=188)

Variables	Knowledge				Attitude			
	Adequate, *n*=148 (%)	Inadequate, *n*=40 (%)	χ^2; *P*	OR (95% CI)	Positive, *n*=152 (%)	Negative, *n*=36 (%)	χ^2; *P*	OR (95% CI)
Age (years)								
22-26	89 (73.55)	32 (26.45)	6.12; 0.04	2.65 (1.14–6.15)	91 (75.21)	30 (24.79)	7.22; 0.02	3.35 (1.31–8.53)
27-31	41 (85.42)	7 (14.58)			43 (89.58)	5 (10.42)		
32-36	18 (94.74)	1 (5.26)			18 (94.74)	1 (5.26)		
Gender								
Male	110 (81.48)	25 (18.52)	2.17; 0.14	0.57 (0.27–1.20)	111 (82.22)	24 (17.78)	0.58; 0.44	0.73 (0.33–1.61)
Female	38 (71.70)	15 (28.30)			41 (77.36)	12 (22.64)		
Current residence								
Day scholar	56 (72.73)	21 (27.27)	2.79; 0.09	1.81 (0.89–3.67)	66 (85.71)	11 (14.29)	1.99; 0.16	0.57 (0.26–1.24)
Hostel resident	92 (82.88)	19 (17.12)			86 (77.48)	25 (22.52)		
Marital status								
Married	42 (89.36)	5 (10.64)	4.23; 0.03	0.36 (0.13–0.98)	43 (91.49)	04 (8.51)	4.58; 0.03	0.31 (0.10–0.94)
Single	106 (75.18)	35 (24.82)			109 (77.30)	32 (22.70)		
Designation								
Intern	47 (66.20)	24 (33.80)	11.04; 0	2.72 (1.17–6.32)	46 (64.79)	25 (35.21)	19.05; 0	3.44 (1.35–8.76)
House staff	41 (83.67)	8 (16.33)			44 (89.79)	5 (10.21)		
PGT	60 (88.24)	8 (11.76)			62 (91.18)	6 (8.82)		

OR: Odds ratio, CI: Confidence interval, PGT: Postgraduate trainee

Our study had several limitations. First of all, there were little relevant literatures available regarding KAP about thalassemia among medical students/junior doctors/practicing physicians in India, including West Bengal. Furthermore, junior doctors of only one institution were chosen.

CONCLUSION

This study fulfilled the objectives which were to assess the KAP of junior doctors in Kolkata regarding thalassemia. The data revealed that majority (78% and 80% respectively) of junior doctors had satisfactory knowledge and positive attitude about thalassemia though only 33% had good practice. Perhaps because they neither studied the disease properly nor they experienced being close to the patient who suffer from thalassemia. Moreover, they might have learned theoretically but not yet put their knowledge into practice. Studies with larger and more diverse samples are needed to confirm these results. Therefore, increasing emphasis on thalassemia in the undergraduate curriculum might improve budding doctor's KAPs about this deadly disorder.

Besides, the Ministry can make the screening test for thalassemia a compulsory for every medical student so that at least they know why they learn this type of blood disorder.

REFERENCES

1. The Origins of Thalassemia. Available from: http://www.thogde.org/c5/index.php/thalassemia-aid-without-borders/thalassemia/the-origins-of-thalassemia/. [Last accessed on 2016 Oct 16].
2. Cooley's Anemia Foundation. Leading the Fight against Thalassemia; 2011. p. 12. Available from: http://www.thalassemia.org/. [Last accessed on 2016 Oct 16].
3. Modell B, Darlison M. Global epidemiology of haemoglobin disorders and derived service indicators. Bull World Health Organ 2008;86:480-7.
4. Grow K, Vashist M, Abrol P, Sharma S, Yadav R. Beta thalassemia in India: Current status and the challenges ahead. Int J Pharm Pharm Sci 2014;6:28-33.
5. Bashyam MD, Bashyam L, Savithri GR, Gopikrishna M, Sangal V, Devi AR. Molecular genetic analyses of beta-thalassemia in South India reveals rare mutations in the beta-globin gene. J Hum Genet 2004;49:408-13.
6. World Health Organization. Guidelines for the Control of Haemoglobin Disorders: Report of the VIth Annual Meeting of the WHO Working Group on Haemoglobinopathies, Cagliari, Sardinia, 8-9 April. Geneva, Switzerland: WHO; 1989. p. 2. Available from: http://www.apps.who.int/iris/bitstream/10665/66665/1/WHO_HDP_HB_GL_94.1.pdf. [Last accessed on 2016 Oct 16].
7. WHO. Report of Joint WHO-TIF Meeting on Management of Haemoglobin Disorders (2nd: 2008: Nicosia, Cyprus 16-18 November 2007). Geneva, Switzerland: World Health Organization; 2008. p. 3. Available from: http://www.who.int/genomics/WHO-TIF_genetics_final.pdf. [Last accessed on 2016 Oct 16].
8. Madan N, Sharma S, Sood SK, Colah R, Bhatia LH. Frequency of ß-thalassemia trait and other hemoglobinopathies in Northern and Western India. Indian J Hum Genet 2010;16:16-25.
9. Mohanty D, Colah RB, Gorakshakar AC, Patel RZ, Master DC, Mahanta J, *et al.* Prevalence of ß-thalassemia and other haemoglobinopathies in six cities in India: A multicentre study. J Community Genet 2013;4:33-42.
10. Seyam SH, Assemi A. Study of the knowledge in Guilan University Students about thalassemia. J Urmia Nurs Midwifery Fac 2010;8:87-94.
11. Park K. Park's Textbook of Preventive and Social Medicine.23rd Edition. Bhanot Publishers. Jabalpur. Chapter 16; Genetics and Health:p824.
12. Bittles A. Consanguinity and its relevance to clinical genetics. Clin Genet 2001;60:89-98.
13. Clarke GM, Higgins TN. Laboratory Investigations of haemoglobinopathies and thalassemias: Review and update. Clin Chem 2000;46:1284-90.
14. NIH. National Institute of Health. National Heart, Lung and Blood Institute. U.S. Department of Health and Human Services. How are Thalassemias

diagnosed? Available from: http://www.nhlbi.nih.gov/health/health-topics/topics/thalassemia/diagnosis. [Last accessed on 2016 Oct 16].
15. Pam MS. Psychology Dictionary. What is Premarital Counseling? Definition of Premarital Counseling. Available from: http://www.psychologydictionary.org/premarital-counseling/. [Last accessed on 2016 Oct 16].
16. Eastern Biotech and Life Sciences. Pre Marital Screening. Available from: http://www.easternbiotech.com/resource_Pre%20marital%20screening.php24. [Last accessed on 2016 Oct 16].
17. Pauisri S, Saksiriwuttho P, Ratanasiri T. Knowledge and Attitude of pregnant women at risk for having a fetus with severe thalassemia after genetic counseling at Srinagarind Hospital. Thai J Obstet Gynaecol 2011;19:193-9.
18. Miri-Moghaddam E, Motaharitabar E, Erfannia L, Dashipour A, Houshvar M. High school knowledge and attitudes towards thalassemia in Southeastern Iran. Int J Hematol Oncol Stem Cell Res 2014;8:24-30.
19. Karimzaei T, Masoudi Q, Shahrakipour M, Navidiyan A, Jamalzae AA, Zoraqi Bamri A. Knowledge, attitude and practice of carrier thalassemia marriage volunteer in prevention of major thalassemia. Glob J Health Sci 2015;7:364-70.
20. Mirza A, Ghani A, Pal A, Sami A, Hannan S, Ashraf Z, *et al.* Thalassemia and premarital screening: Potential for implementation of a screening program among young people in Pakistan. Hemoglobin 2013;37:160-70.
21. Haque AE, Puteh FA, Osman NL, Zain ZA, Haque M. Thalassemia: Level of awareness among the future health care providers of Malayasia. J Chem Pharm Res 2015;7:896-902.
22. Murthy V, Venkateswaran SP, Barua A. Knowledge, awareness and participation of medical and non-medical students in the Malayasia National thalassemia prevention programme. Int J Hum Genet 2015;15:61-72.

HOW TO CITE THIS ARTICLE:
Chatterjee S, Mondal TK, Ahamed A, Sarkar I, Sarkar K, Shahbabu B, Basu M. Knowledge, Attitude, and Practice of Budding Doctors in Prevention of Thalassemia. Int J Prevent Public Health Sci 2016;2(4):18-24.