Lacunae in Patient Knowledge About Oral Anticoagulant Treatment: Results of a Questionnaire Survey

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Abstract Oral anticoagulation therapy is affected by the drug used, intensity of anticoagulation, physician's experience, patient compliance, laboratory testing and patient education. Patient education is a key factor in optimal anticoagulation and safety in patients on oral anticoagulant therapy. This study was done to assess the knowledge of patients regarding oral anticoagulant therapy in the outpatient setting. This prospective study was done over 2 months in 101 patients on outpatient oral anticoagulant therapy. A 20-point questionnaire on various aspects of oral anticoagulation therapy was administered to assess their knowledge. The answers were graded on a scale of 0–1. Scores were then added up to quantify the knowledge status in each patient. Descriptive statistics and Student's *t* test was used to analyse the data. The mean knowledge score among patients was 9.4/18 (52.2 %). More than half (52.8 %) of the patients had a score of <9. More than half (54.4 %) of the patients had adequate knowledge—(>80 % score-5.5/7) about the critical (must know) questions regarding OAT. Patients with age ≥ 60 years had lower mean scores compared to those <60 years of age ($p = 0.028$). Illiteracy was also associated ($p < 0.0001$)

with poor scores. There are significant lacunae in the knowledge about oral anticoagulation among patients on outpatient treatment. Older age and illiteracy were associated with poor knowledge among patients. More emphasis needs to be given to the vital aspect of patient education to make this therapy safer for patients.

Keywords Oral anticogulation therapy · Patient · Education · Knowledge · Questionnaire

Introduction

Oral anticoagulation therapy has been used in clinical practice for many decades now for the prevention and treatment of thromboembolic diseases. Despite its immense clinical usefulness over the years, this therapy still has a relatively high risk/safety profile [1]. Oral anticoagulation therapy (OAT) is affected by numerous factors related to the drug used, intensity of anticoagulation achieved, the physician's experience with the therapy and patient compliance. It also includes other physician, laboratory and patient related factors like frequent laboratory testing, strict dosage regulation, recognition and prompt treatment of thrombotic and hemorrhagic complications and patient education [1, 2]. With many patients being prescribed oral anticoagulation for months or for life, the role of patient education is very important in this treatment with a narrow therapeutic window. Patient education is now considered to be one of the key factors in optimizing treatment and reducing complication among patients on oral anticoagulant therapy [3–6].

This study was done to assess the knowledge of patients regarding various aspects of oral anticoagulant therapy in the outpatient setting.

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Materials and Methods

Study Design and Sample Population

This prospective study was done over a period of two months in a tertiary care teaching hospital in North India. A total of 101 patients, irrespective of their age or sex who were on outpatient oral anticoagulant therapy (nicoumarol or warfarin) for varying duration were included in the study. No standardized tool for educating patients was being used by all physicians or surgeons during the study period. Basic education regarding drug therapy including dietary advice was provided to these patients at the initiation of oral anticoagulation by the senior or junior consultant of the respective unit/department and was usually reinforced each time the patient reported for follow up. The patients were contacted personally and interviewed by the main author in the outpatient sections of the departments of Medicine, Cardiology, Neurology, General and Cardiothoracic surgery. A questionnaire with 20 questions on various aspects of oral anticoagulation therapy was administered to patients to assess their knowledge regarding oral anticoagulant therapy. Patients who were uneducated were assisted in completing the questionnaire after obtaining the information from them.

The demographic profile of the patients was also recorded which included information on age, sex, background, education status and duration of therapy. Questions related to the dosage, effects and complications of the therapy were considered as must know, that is, those critical for optimal control of anticoagulation.

Data Processing and Analysis

The answers to the questions were graded on a scale of 0–1 with a score of 1 for the most appropriate answer, 0.5 for the less appropriate answer (for questions with no absolute responses) and 0 for an incorrect answer. Scores were then added up to quantify the knowledge status in each patient. Average percentage scores were also calculated for each question. The same was also done separately for each of the must know questions. The results are presented as descriptive data. Mean scores $\pm$ standard deviations in subgroups of patient categorized on the basis of age, sex, background, education status, duration of therapy and prior information about the therapy were calculated. Statistical analyses were done to compare these subgroups using Student's *t* test and a *p* value of <0.05 was considered to be significant.

Ethical Considerations

The study was approved by the institutional research and ethics committee. An informed consent was obtained from

the patients who participated in the study after verbal explanation of the consent form in the language understood by them.

Results and Analysis

Age and Sex Distribution

The age of the patients ranged from 15 to 82 years with a mean age of 47.9 ± 13.9 years. Just over half (53 %) of the patients were in the age group of 41–60 years. Eighteen (17.8 %) patients were of age 60 years or above. There were 58 males and 43 females in the study group with a male to female ratio of 1.3:1.

Background and Education

Just over three fourths (76.2 %) of the patients were from semi-urban or urban background while the rest (23.8 %) belonged to rural areas. Sixty five (64.4 %) of the patients were educated while 36 (35.6 %) patients were uneducated.

Duration of Treatment

Sixty three (62.4 %) of the 101 patients had been taking oral anticoagulant therapy for more than 2 years. Just under one fourths (23 %) of the patients were on anticoagulation therapy between 3 months and 1 year. Only 16 (15.8 %) of the patients had been on short term (<3 months) therapy.

Verbal and Written Information Provided to Patients

Only verbal information regarding oral anticoagulant treatment had been given to 60 (59.4 %) patients while information regarding oral anticoagulation was given in only the written form as a booklet in 2 (1.9 %) patients. Twelve (11.9 %) of the patients had been given both verbal and written information. Twenty seven (26.7 %) of the patients did not receive verbal or written information regarding OAT.

Knowledge of Change in Pattern of Alcohol Intake and Precautions to be Taken During Pregnancy

Sixteen (27.6 %) of the male patients who answered the questionnaire did not make changes to their pattern of alcohol intake while on anticoagulant therapy. Only 14 (32.6 %) of the female patients were aware of the precautions to be taken during pregnancy with concomitant oral anticoagulant therapy.

Fig. 1 Shows the total scores in all patients ($n = 101$) for the 18 questions. Just over half (52.8 %) of the patients had scores of ≤ 9 . The dotted line denotes the median score of 9

Overall Knowledge Scores

The mean knowledge score among patients was 9.4/18 (52.2 %). The total scores were calculated by adding individual scores obtained by each patient. This thus reflected the knowledge status of each patient regarding OAT. The minimum score obtained was 4/18 in one patient while the maximum score was 17/18. More than half (52.8 %) of the patients had a score of ≤ 9 (Fig. 1).

The scores obtained by patients for each question were then averaged to assess the overall percentage knowledge among patients (Fig. 2). For nine of the questions (Q2, 4, 7, 8, 9, 11, 15, 16 and 18), the average score in 101 patients is < 50 %. These questions pertained to knowledge about the name and strength of the anticoagulant drug (Q2 and 4), effect of the drug on the body (Q7), name of the test used to monitor and the acceptable range (Q8 and 9), possible interaction with drugs and diet (Q11 and 18) and the

Fig. 2 Shows the average scores for each question in all patients ($n = 101$). The dotted line denotes the 50 % average score

Fig. 3 Shows the percentage scores for the seven critical (must know) questions among the patients ($n = 101$). Most patients had scores of above 60 %

knowledge about effects of under and over anticoagulation (Q15 and 16). Responses to questions 5, 6, 14 and 17 showed high scores (> 80 %). These related to the patient practices: time of taking the drug, regularity of intake, keeping appointments and handling a bleeding episode.

Knowledge Scores in 7 Critical (Must Know) Questions

More than half (54.4 %) of the patients had adequate knowledge—(> 80 % score-5.5/7) about the critical (must know) questions regarding OAT. Only 12 patients had a score of $\leq 3.5/7$. Of the seven critical questions, six were answered correctly by more than 80 % of the patients. The percentage scores for the seven critical (must know) questions are shown in Fig. 3. Most (95.5 %) of the patients had adequate knowledge about action to be taken during a bleeding episode; 73.3 % patients knew what to

Table 1 Shows the comparative mean scores between patient related factors

Parameter	Number of patients	Mean score	<i>p</i> value
Age (years)			
<60	83	9.7 ± 2.9	0.028*
≥60	18	8.0 ± 3.3	
Sex			
Males	58	9.8 ± 2.6	0.14
Females	43	8.9 ± 3.5	
Background			
Rural	24	8.6 ± 3.5	0.14
Semi-urban/urban	77	9.7 ± 2.8	
Educational status			
Uneducated	36	7.6 ± 2.2	<0.0001*
Educated	65	10.5 ± 2.9	
Duration of therapy (months)			
≤6	19	6.7 ± 2.5	0.53
>6	82	6.9 ± 2.8	
Verbal or written information given			
Yes	74	9.2 ± 2.9	0.39
No	27	8.6 ± 2.9	

* signifies statistically significant difference

do if they missed a dose; 76.2 % informed their local doctor about their OAT; 85.1 % kept their appointments; 93.1 % took the drug regularly; 61.4 % of the patients knew the dose of the anticoagulant prescribed to them while only 29.7 % knew about the effect of the drug on the body and resultant complications.

Comparison of Scores for Demographic Variables

Patients with age ≥60 years had lower mean scores compared to those <60 years of age. This difference was statistically significant ($p = 0.028$). A highly significant statistical significance ($p < 0.0001$) was also seen in knowledge scores between uneducated and educated patients. The difference in the mean scores among other categories was not statistically significant ($p > 0.05$) (Table 1).

Discussion

Our findings indicate an overall poor knowledge status among patients on oral anticoagulant therapy. The mean score was 9.4/18 with over half (52.8 %) of the patients having scores less than the median score of 9. Less than one fifth (17.8 %) of the patients in the study group had scores of 80 % or more indicating adequate knowledge in only small number of patients.

Other studies have also found inadequate knowledge among patients on anticoagulant therapy. Similar to our study, Tang et al. [6] also reported poor knowledge about warfarin therapy among 122 patients with an overall score of 0.48 ± 0.18 (<50 %) out of a total score of 1. Another study by Saligari et al. [7] using a knowledge evaluation questionnaire reported average scores of 6.63/12 which rose to 10.09/12 ($p < 0.0001$) after an educational intervention program. A study of 180 patients from a multi-ethnic population in Birmingham also reported gaps in the knowledge of patients from ethnic minorities and deficiencies in the provision of information. The overall knowledge score was poor (5.5/9) [8].

A questionnaire study among 140 patients attending an outpatient anticoagulation clinic showed that only 56.4 % of the patients had adequate knowledge about warfarin therapy [9].

In a study from Canada, a telephonic survey was conducted among patients 3–6 months following mitral valve replacement on warfarin related knowledge. The authors reported that 61 % of the patients had adequate knowledge (scores of ≤80 %) [10].

Another questionnaire study done in an anticoagulation clinic among 185 patients on warfarin therapy showed that the knowledge level of patients was adequate with 74.1 % of the patients answering 21 of the 29 questions in the questionnaire correctly. Adequate knowledge level among a majority of patients in this study could be attributed to the fact that it was done in a dedicated anticoagulation clinic [11].

In the present study, about 40 % of patients did not know about the dose of the prescribed drug. Nearly three fourths (70.3 %) of the patients were unaware of the effects of under and over anticoagulation. Only 8 % had knowledge about drugs that could potentially interact with the anticoagulant. Comparable findings have also been reported in a study of 150 patients on oral anticoagulant therapy from Ireland. The patient knowledge in this study too was found to be sub-optimal. Twenty eight percent of the patients could not describe their current therapy and potential complications from over and under dosage were unknown to 59 and 60 % patients respectively [4].

Nearly one fifth of the patients in the present study were unaware of the interaction of the anticoagulant with concomitant drug and alcohol intake. A study by Taylor et al. [3] showed only 14 % patients could identify three or more self prescribed agents that could interfere with warfarin therapy.

In our study, the scores obtained by patients for the seven critical (must know) questions were satisfactory. Hence it can be inferred that patients were adequately informed about handling of life-threatening aspects of anticoagulant therapy.

Elderly patients (age ≥ 60 years) in our study had significantly ($p = 0.028$) lower mean scores as compared to those with age < 60 years (8.0 vs. 9.7). Similar to our study, Tang et al. [6] found age to be inversely related to warfarin knowledge ($p < 0.001$). Similarly, Hu et al. [10] reported age to be negatively related to warfarin knowledge ($p = 0.007$). Nadar et al. [8] have also shown age more than 61 years to be a significant factor determining patient knowledge. A systematic review also reported inadequate knowledge about warfarin therapy in 50–80 % of the older patients [12].

Educated patients in our study had higher mean scores (10.5) compared to those who were uneducated (7.6) ($p < 0.0001$) Tang et al. [6] also reported illiteracy to be a major factor in determining patient warfarin knowledge and adequacy of anticoagulant control. They recommended more attention to be paid to the elderly and uneducated patients.

In our study, the duration of the anticoagulant therapy was not found to influence the knowledge status of patients in our study. This is in contrast to the results of the studies by Schulman [13] and Tang et al. [6] who found that duration of anticoagulant treatment had a significant bearing on warfarin knowledge. In the present study, lack of an organized dedicated anticoagulation service with individual physicians or surgeons handling the OAT is the most likely cause of this difference with patients on long term treatment getting no additional benefit regarding education.

Adequate patient knowledge has potential in making oral anticoagulant therapy more effective with simultaneous risk reduction. Studies have shown that adequate knowledge results in more therapeutic INRs [14]. Anticoagulation clinics also have the potential to offer better anticoagulation management in patients than care given by individual physicians [15]. Computerized decision support systems for anticoagulation [16] and telephonic consultations are new modalities that have helped to optimize oral anticoagulant treatment [17].

The issue of patient education regarding various aspects of oral anticoagulant therapy is especially pertinent to the scenario in most developing countries like India. A high patient load, majority of them with a rural background, poor literacy rates and low health awareness contribute to inadequate knowledge as compared to patients in developed countries. Also there are very few specialized clinics for delivery of anticoagulation services. More emphasis must be given by health care providers to the important aspect of patient education.

Conclusion

The findings of this study have shown significant lacunae in the knowledge about oral anticoagulation among

patients on outpatient treatment. Older age and poor education status were found to be associated with poor knowledge among patients. More emphasis needs to be given to the vital aspect of patient education especially in a diverse society like ours to make this therapy safer for patients.

One of the reasons responsible for the poor knowledge among patients in this study could be the lack of use of a standardized educational tool by health care givers to ensure that knowledge is imparted in a wholesome and consistent manner. It may be also be due to the fact that the patient education imparted during the review visits may not have readdressed the important aspects of oral anticoagulation therapy adequately.

Recommendations

In settings where oral anticoagulation is not managed by specialized anticoagulation clinics and where individual consultants are involved in imparting patient education, the quality of education is likely to be variable and may affect patient knowledge. We recommend that standardized education modules be made and used for patient education for safe and optimal oral anticoagulant treatment.

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Conflict of interest None.

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