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RESEARCH ARTICLE

Knowledge and Awareness regarding Dental Management of Hemophilic Patients among Students of a Malaysian University: A Cross-Sectional Study

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Abstract:

Background:

Improper management of bleeding disorders in the dental setting can lead to complications that can endanger the lives of such patients.

Objective:

This study aimed to assess the knowledge and awareness of dental management of hemophilia among undergraduate students of a Malaysian university.

Methodology:

A cross-sectional survey was conducted in the year 2018-2019 to collect the data. A 23-item questionnaire developed and validated by the authors was used to collect data on the knowledge and awareness regarding dental management of hemophilia patients. A total of 216 dental students participated in this research. Unpaired t-test and one-way ANOVA were used to compare the knowledge score between gender and academic year.

Results:

Only 21% of the participants were confident in treating a hemophilia patient. About 97% of the participants believed that the dental curriculum must be modified to emphasize the dental management of bleeding disorders. The overall mean of the knowledge score was 47.38% and awareness was 73.7% regarding the management of patients with hemophilia.

Conclusion:

The study revealed significant scope for improvement in the dental students' knowledge, which can be achieved by modifying the dental curriculum suitably to provide more emphasis on the management of bleeding disorders.

Keywords: Bleeding disorders, Dental management, Hemophilia, Inherited disorders, Knowledge, Awareness.

Article History

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1. INTRODUCTION

The growing body of evidence in the available literature indicates that the patients with congenital bleeding disorders (CBDs) tend to possess a substantially inferior quality of oral health than the general population, thus preordaining more invasive dental procedures [1, 2]. Improper management of

such procedures can lead to multiple complications, including hemorrhage, prolonged hospitalization, and associated psychological injury. Consequently, international guidelines have advocated the use of preoperative prophylactic guidelines [3].

Hemophilia is a group of inherited disorders caused by a lack of clotting factors, resulting in prolonged clotting time and profuse bleeding while sharing identical clinical manifestations [4]. This disorder has been broadly categorized as Hemophilia

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A, and B. Hemophilia A is the most prevalent, having an incidence of 1:5000 live male births and identified by the deficiency of factor VIII (FVIII). A deficiency of factor IX (FIX) is observed in Hemophilia B with a reported incidence of 1:30,000 male births. The differentiation between the types of hemophilia can be done using coagulation factor assays [5].

Bleeding risks during or post-treatment and concerns regarding the dental practitioner's knowledge and understanding of their bleeding condition and management are major causes of anxiety among patients with CBDs [6]. A considerable number of patients have even experienced refusal of treatment by dentists. This leads to individuals avoiding dental treatment until the need for treatment grows significantly [7].

The dental management of a hemophilic patient for various procedures and purposes ranges from systemic therapies and the use of antifibrinolytic agents to various additional considerations to limit or control hemorrhage. As opposed to the past dental procedures, minimally invasive dental approaches have been developed parallel to the advancements in hemostatic management. Systemic hemostatic management and factor coverage are not essential for all dental treatments. It is increasingly apparent that the factor replacement required to decrease the risk of hemorrhage linked with the dental procedure may be lowered or non-essential in numerous cases [5, 8].

The dental care team must develop an awareness of the CBD, its intensity, and the patient's history of reactions to dental procedures to construct a customized dental care plan. Understanding the continued risk of hemorrhage associated with particular dental treatments by the hemophilia multidisciplinary team (MDT) is also equally vital to guarantee appropriate hemostatic management. The tendency to hyperbolize dental procedures has also led to overprescribing factor replacement for certain procedures [1, 9]. To identify the appropriate treatment strategy and assess the risks involved, a close collaboration between the patient's MDT and the dentist is essential [10]. The involvement of a dentist as a part of the MDT has also been recommended by the World Federation of Hemophilia [11]. The preoperative management of patients with inherited bleeding disorders is decided by hematologists depending on the type of clotting factor deficiency, the bleeding severity, and the limited factor activity in the plasma [12].

Thus, it is rudimentary for knowledge diffusion to occur regarding bleeding disorders even at the undergraduate level since these patients are in dire need of extra care due to their health conditions. There is also a scarcity of current literature disseminating the knowledge and awareness of hemophilia among dental undergraduate students in Malaysia and other countries. Therefore, this study aimed to assess the knowledge and awareness of dental management of hemophilia among undergraduate students of a Malaysian University.

2. MATERIALS AND METHODS

Data for the study was collected through a cross-sectional survey conducted in the year 2018-2019. An online questionnaire assessing knowledge and awareness was the

instrument for data collection. A tool developed originally by Hasan and Kumar [13] for a similar study on undergraduate students of an Indian dental college was modified and used in the present study. After reviewing the existing questionnaire and consulting the experts, 22 questions were included in the initial draft. Out of which eight questions were regarding awareness and the remaining 14 were knowledge-based.

2.1. Content Validity

A total of ten experts validated the tool, which included two specialists from each of the following departments; periodontology, oral surgery, oral medicine, and pedodontics. Experts were asked to rate the relevance of each of the items on a 4-point scale (Not relevant, Somewhat relevant, Quite relevant, Highly relevant). They were given a week for validation. After a week, the first drafts were collected from the experts, and Individual – Content Validity Index (I-CVI) was calculated. Three items with I-CVI <0.75 were removed from the questionnaire and were replaced with four new questions suggested by the panelists. Modifications were made to the first draft, and a second questionnaire containing eight items representing awareness and 15 items representing knowledge was generated and distributed to the experts for validation. We retained 23 questions with I-CVI >0.75 in the final tool. The CVI of these questions varied between 0.9 and 1. The mean I-CVI of all the items was 0.96.

2.2. Test and Retest Reliability and Internal Consistency

Test-retest reliability was assessed by administering the questionnaire twice to a group of 30 students selected at random with an interval of one week between the two tests. Cronbach's alpha was calculated to test the internal consistency reliability of the items. Internal consistency coefficients for the test data were 0.994 and 0.988 for the awareness and knowledge scale, respectively. For the retest data, internal consistency was 0.993 and 0.988, respectively. Test-retest reliability was assessed by computing the Intraclass Correlation Coefficient, which was 0.94. The coefficients indicate good internal consistency as well as test-retest reliability.

2.3. Study Population

All students at a Malaysian dental college registered in phase II of the dental graduation course as of October 2018 were the target population in this study. There were a total of 216 dental undergraduates in this institution/university.

2.4. Sample Size and Data Collection

Assuming that 50% of the students in the college have good knowledge of hemophilia and a population size (third-, fourth-, and fifth-year dental students) of 216, the study would require a sample size of 139 for estimating the expected proportion with 5% absolute precision and 95% confidence [14]. It was decided to collect data through complete enumeration (216 students). Data collection was carried out from October 2018 to January 2019.

2.5. Ethical Consideration

Ethical approval was obtained from Melaka-Manipal

Medical College Ethical Committee (MMMC/FOD/AR/B6/E C-2018 (04)). Participation was voluntary. Respondents were assured of the confidentiality of the data and participant information. The questionnaire was administered after explaining the objectives and procedures of the study. Research information sheets and consent forms were made available and signed by participants and witnesses before administering the questionnaire. The responses were submitted online by the research participants.

2.6. Statistical Analysis

The data obtained were analyzed using statistical packages for social sciences (version 15). Demographic data were summarized by computing frequency and percentages. Knowledge (15 items) score was computed, assigning a score of ‘1’ to the correct answer and ‘0’ to the incorrect answer. Similarly, the awareness (eight items) scale score was computed, assigning a score of ‘1’ to yes and ‘0’ to no. The scale scores were converted to percentages and were summarized by computing the mean and SD of the percentage scores. To study the association between year of study and level of knowledge, Analysis of Variance (ANOVA) followed by post hoc Tuckey’s test was used for pairwise comparison. To study the association between gender and level of

knowledge, the unpaired t-test was used. The probability value ‘p’ <0.05 was considered statistically significant.

3. RESULTS

A total of 216 dental students participated in this research. Of the total number of participants, 65 (30%) were males. Academic year-wise, 77 (36%) participants were from ‘Year 3’, 70 (32%) from ‘Year 4’ and 69 (32%) from ‘Year 5’. The sample includes 47 (22%) Malay, 104 (48%) Chinese, 51 (24%) Indians, and 14 (6%) from other ethnic backgrounds.

Overall mean (SD) of the knowledge score was 47.38 (17.81) percent and the awareness score was 73.73 (15.39) percent regarding the management of patients with hemophilia.

Table 1 shows the response to questions on awareness regarding dental management of patients with hemophilia. Only 21% of the participants were confident of treating a patient with hemophilia.

Table 2 shows the percentage of participants who correctly answered knowledge-related questions regarding dental management of patients with hemophilia. Only 15% of the participants knew the required minimum FVIII level before dental extraction and about 22% knew the FVIII level in case of mild hemophilia patients.

Table 1. Response to questions on awareness regarding dental management of patients with hemophilia.

Questions	Yes n (%)
Do you routinely ask your patients for a history of hemophilia/bleeding disorders?	175 (81.02)
Do you routinely ask your patients for a family history of bleeding disorders?	147 (68.06)
Are you aware of the preoperative precautions in treating a patient with hemophilia such as administration of tranexamic acid before a surgical procedure?	129 (59.72)
Are you aware of the post-operative precautions in treating a patient with hemophilia such as avoiding aspirin and other NSAIDs for pain management?	177 (81.94)
Are you aware that patients with hemophilia if improperly managed can bleed to death after extraction?	192 (88.89)
Are you confident in treating a patient with hemophilia?	45 (20.83)
Do you think more emphasis must be given to the dental curriculum regarding dental management of bleeding disorders in dental clinics?	209 (96.76)
Is a physician's consent required before an extraction?	200 (92.59)

Table 2. Questions with correct answers on knowledge regarding dental management of patients with hemophilia and the percentage of students who selected the correct responses.

Questions and Correct Response	n (%)
Hemophilia A is the deficiency of: a) Factor VIII	197 (91.20)
Hemophilia B is the deficiency of: b) Factor IX	192 (88.89)
How is Von Willebrand Disease (VWD) different from hemophilia? c) Bleeding time is usually prolonged in VWD while normal in hemophilia	111 (51.39)
Oral manifestations of hemophilia include all except: c) Ulcers	155 (71.76)
Which of the following statements are true regarding the clinical manifestation of hemophilia: a) Hemophilic patients may experience joint pain due to hemarthrosis	122 (56.48)
Systemic diseases causing coagulation defects are all except c) Chronic obstructive pulmonary disease	102 (47.22)
Which dental procedure can be done in a hemophilia patient that poses the least risk of bleeding? a) Root canal treatment	101 (46.76)
What is the most common investigation to do preliminary testing for hemophilia? a) aPTT and PT	70 (32.41)

(Table 2) contd.....

Questions and Correct Response	n (%)
What is the factor VIII level in the case of mild hemophilia patients? c) 6-25%	47 (21.76)
The minimum Factor VIII level before dental extraction should be: c) 50%	33 (15.28)
Can antifibrinolytics be administered to patients with hemophilia? a) Yes	63 (29.17)
Desmopressin is a synthetic antidiuretic hormone that stimulates the release of factor VIII. What is the mode of administration? c) Oral, subcutaneous and intravenous	56 (25.93)
Which type of anesthesia is not preferred in patients with hemophilia? b) Nerve block anesthesia	100 (46.30)
When is factor VIII therapy given? c) Can be given both preoperatively and postoperatively	68 (31.48)
Which of the following drugs is contraindicated in a hemophilic patient? b) Acetylsalicylic acid	118 (54.63)

Table 3. Comparison of mean knowledge score between gender, ethnicity and academic year

Variables	n	Mean	SD	t/F	P-value
Gender	-	-	-	-	-
Male	65	47.59	17.28	-0.12	0.908
Female	151	47.28	18.09	-	-
Ethnicity	-	-	-	-	-
Chinese	104	50.13	18.42	2.798	0.063
Indian	51	43.66	13.75	-	-
Malay	47	45.11	19.37	-	-
Academic year	-	-	-	-	-
Year 3	77	40.95	16.60	8.65	<0.001
Year 4	70	49.81	18.04	-	-
Year 5	69	52.08	17.01	-	-

Tukey's post hoc pairwise comparison:

Year 3 vs. Year 4; P=0.0058; Year 3 vs. Year 5: P=0.004; Year 4 vs Year 5: P=0.717

MMMC dental undergraduates' knowledge regarding dental management of patients with hemophilia: Gender-wise and ethnicity-wise, the dental students' knowledge scores did not differ significantly. However, there was a statistically significant difference in the mean knowledge percentage scores among the three academic years of dental students ($p < 0.001$) (Table 3). Tuckey's post hoc pairwise comparison showed that the mean knowledge percentage score was significantly higher among 4th and 5th-year students than 3rd-year students. There was no significant difference in the awareness scores between gender ($t_{214} = 1.771$, $p = 0.078$), ethnicity ($F_{(2,199)} = 0.473$, $p = 0.624$) and academic years ($F_{(2,213)} = 0.925$, $p = 0.398$).

4. DISCUSSION

People with congenital bleeding disorders constitute only a tiny proportion of the population. The lack of experience in dealing with such patients makes managing patients suffering from bleeding disorders challenging for most dentists. Thus, patients with hemophilia often face obstacles in gaining access to primary dental care. The possibility that mild hemophilia may be diagnosed late during adolescence if surgeries, trauma, or dental extraction have been avoided must also be deliberated [15]. Therefore, in some cases, the diagnosis of a patient with hemophilia maybe first done by a dentist [16]. Although dentists can play a crucial role in diagnosing hemophilia and improving their quality of oral health, there is a scarcity of studies assessing the knowledge and awareness of hemophilia or any bleeding disorders among dental students and general dentists. Rahman, *et al.* Carried out a cross-sectional survey to evaluate U K hemophilia treaters' knowledge of prolonged bleeding associated with dental procedures. They found that the ability of hemophilia treaters to assess the bleeding risks associated with dental procedures was poor, and there was a proclivity to overprescribe systemic hemostatic treatments for dental procedures [1]. This demonstrates the importance of a quid pro quo between the dentists and the physicians treating

the hemophiliacs to arrive at a suitable treatment plan. Another study conducted by Robati *et al.* In Shiraz city showed a paucity of knowledge regarding bleeding disorders among general dentists [17]. A study by Ribeiro *et al.* Undertaken to evaluate the knowledge of Von Willebrand's disease among final year dental students in Brazil showed that they possess limited knowledge of the disease [18].

This is the first study evaluating the knowledge and awareness of hemophilia among dental students in Malaysia. Dental undergraduate students begin their clinical work in the third year of their studies. They must be aware of the special considerations required if and when a patient has been identified with a bleeding disorder such as hemophilia. Therefore, this study was carried out only on the third, fourth and final year students.

The clinical history is frequently used to make a diagnosis of hemophilia. In this regard, hemophilia can be suspected if there is a familial history of bleeding only in males or if minor injuries and dental manipulations cause increased bleeding [19]. The majority of the participants in the present study responded that they routinely ask the patients for a history of bleeding disorders/hemophilia and details about family history of bleeding disorders. This showed that the students had a good

awareness that a thorough history becomes one of the essential tools for diagnosing hemophilia. More than half of the participants responded that they are aware of the pre and post-operative precautions in treating patients with hemophilia, such as administering tranexamic acid before surgeries and avoiding aspirin and NSAIDs for pain management. Antifibrinolytic agents such as tranexamic acid and ϵ -aminocaproic acid (EACA, CaproaminR) have been in use before surgery. These drugs bind to the plasminogen binding site to inhibit fibrinolysis [20]. The following doses can be administered *via* oral, intravenous, or topical routes: EACA 300 mg/kg/day, every 4-6 hours; AMCHA 30 mg/kg/day, every 2-3 hours [19]. Aspirin is avoided as it affects platelet aggregation. It has been demonstrated that monotherapy with aspirin can prolong bleeding time in patients. The dentist may also have to evaluate the risk of thromboembolic events due to drug interruption or discontinuation while managing patients on antithrombotic drugs [21, 22]. The use of non-steroidal anti-inflammatory drugs (NSAIDs) along with antiplatelet therapies can increase the possibility of bleeding. The patient's hematologist must be consulted before using NSAIDs due to their effect on platelet aggregation [4]. Furthermore, NSAIDs may also inhibit the cardioprotective action of low-dose aspirin [23]. The majority of the participants were aware of the consequences of improper management of hemophilia and agreed that a physician's consent is required before extractions. Less than half the participants were confident about treating patients who have hemophilia. The majority of the participants felt that more focus must be provided in the dental syllabus regarding dental management of bleeding disorders. These responses point toward a lack of adequate training in managing these patients and improving the prominence of managing hemophiliacs in the dental curriculum.

Less than half the participants had good knowledge regarding the dental management of hemophiliacs. Bleeding from multiple sites in the mouth, which frequently includes gingival and post-extraction hemorrhages, is a common characteristic of hemophilia. Depending on the severity, a patient with hemophilia may suffer from multiple oral bleeding events in his life [4]. It was discovered that 14% of all hemophilia patients, including 30% of cases with the mild type, were diagnosed after a significant oral bleeding episode. The labial frenulum and the tongue were the most prevalent sites of oral hemorrhage [24]. Patients may experience spontaneous bleeding when brushing their teeth, during periodontal disease, or food abrasion due to the existence of expanded capillaries near to the surface of thinner parts of the gingiva [15]. More than half the participants answered the questions regarding hemophilia's oral and clinical manifestations correctly. Parallel to the knowledge of oral manifestations in hemophiliacs, the knowledge regarding the dental procedures requiring additional considerations is also of paramount importance. However, less than half the participants seemed knowledgeable in these aspects. Routine dental evaluations and care do not necessitate increasing the factor level. Still, adequate coverage is required before and sometimes after intensive procedures such as deep cleaning or plaque/tartar removal [15]. "Guidelines for dental treatment of patients with inherited bleeding disorders" (The World Federation of Hemophilia 2020) recommends

preoperative systemic hemostatic measures and consultation with a hematologist for surgery, extractions, and any dental treatment involving inferior alveolar block anesthesia and lingual infiltration anesthesia [11]. The rich vasculature and the blind injection procedure of the inferior alveolar nerve block make factor replacement a necessity. There is a risk of bleeding into the surrounding muscles, leading to the formation of a hematoma in the retromolar or pterygoid areas, potentially compromising the airway [25]. The intraligamentary or intraosseous technique could also be considered alternatives to the mandibular block [12]. Although those with vasoconstrictors may give further local hemostasis, there are no restrictions on the type of local anesthetic agent utilized. Less than half the participants knew about inferior alveolar nerve block being contraindicated in the case of hemophiliacs. In patients with bleeding disorders, periodontal surgery should always be considered a high-risk procedure with a considerable risk of blood loss.

This study demonstrated a general lack of knowledge and confidence among dental students regarding managing patients with hemophilia. There is a consensus among the students that more emphasis must be provided in the dental curriculum regarding the dental management of hemophiliacs. The importance of dental students being kept abreast of current information and knowledge about managing bleeding disorders cannot be downplayed. The students of the fourth and fifth years have greater practical and theoretical exposure than third-year students. Oral surgery as a subject begins in the third year, and the related topics are elaborated more during the fourth and fifth years. The third-year students usually possess only a generalized theoretical knowledge of bleeding disorders. In contrast, fourth and fifth years are exposed to more patients with medical emergencies and are better prepared to handle such emergencies, including possible complications due to bleeding disorders. This accounts for the variation in the mean knowledge percentage score among fourth and fifth-year students compared to the third-year students.

There is also a need for further survey-based research in Malaysia and other geographical locations to evaluate dental students' knowledge regarding hemophilia and other inherited bleeding disorders and make necessary changes to the curriculum if found lacking.

An improvement in knowledge and awareness can improve hemophiliacs' overall health and welfare and may even save lives.

The limitation of this study includes population sampling done only among dental students in Melaka-Manipal Medical College, which may not reflect true understanding and awareness of all dental students in Malaysia regarding dental management of hemophilic patients who undergo minor oral surgical procedures. The data collection taken at a certain period may not represent the true knowledge of the students regarding dental management of hemophilia. There was also a scarcity of studies in the literature regarding dental students' knowledge and awareness to compare and contrast our findings.

CONCLUSION

This study indicated that less than half the participants possess sound knowledge. However, the awareness of dental students regarding hemophilia remains high. There is still scope for improvement in the knowledge of the dental students, which can be achieved by altering the dental curriculum to provide more emphasis to the management of bleeding disorders and by continuing dental education programs aimed at imparting and amplifying existing knowledge.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study was approved by the Ethics Committee of the Melaka-Manipal Medical College Ethical Committee (MMMC/FOD/AR/B6/E C-2018 (04)).

HUMAN AND ANIMAL RIGHTS

No animals were used for studies that are the basis of this research. All the humans experiments were conducted in accordance with the Helsinki declaration of 1975.

CONSENT FOR PUBLICATION

Informed consent has been obtained from the participants involved.

STANDARDS OF REPORTING

STROBE guidelines were followed.

AVAILABILITY OF DATA AND MATERIALS

The datasets analyzed during the current study are available from the corresponding author upon reasonable request.

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None.

CONFLICT OF INTEREST

The authors declare no conflict of interest financial or otherwise.

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Declared none.

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