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Assessment of Health Literacy in Orthopedic Trauma Patients in a Major Hospital, Riyadh, Saudi Arabia

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ABSTRACT

Background: *Health literacy is defined as the degree of a person's ability to retain, process, communicate, and comprehend basic health information. Inadequate health literacy impacts individuals of all ethnicities, ages, and educational levels. This study aimed to measure the level of comprehension in orthopedic trauma patients regarding their injuries, operations, postsurgical instructions, and general orthopedic health literacy.* ***Materials and methods:*** *A cross-sectional study that utilized a self-administered questionnaire was handed out conveniently to 245 patients attending the trauma orthopedic clinics at King Abdulaziz Medical City, Riyadh. The questionnaire was composed of 3 parts: the first was demographic data, second was about questions pertaining to the comprehension of their injury, the third was questions measuring general orthopedic literacy.* ***Results:*** *Mean age was 41 years old, and 75.1% were males. Out of all patients, 87% (n=213) successfully named the bone that they injured. On the other hand, only 11% (n=27) were able to select the correct answer regarding general X-ray facts. The group with a higher financial status scored higher on general orthopedic literacy questions (41% ± 20.5) than the group with a lower financial status (34% ± 22.8) (p=0.03). Forward logistic regression revealed that females were significantly more capable to tell what's not true about X-rays than males (OR 0.25, 95% CI 0.09 to 0.66).* ***Conclusion:*** *Our orthopedic trauma population highlighted a significant lack of comprehension to their injuries, post-operative instruction, the course of their treatment and general orthopedic knowledge. Audits and development strategies, if implemented, followed by long-term studies of an improved method of communication between health care provider and the patient can shed light on potential risk factors and ensure an effective level of understanding for the patient.*

Keywords: Orthopedic trauma, Health literacy, X-rays, Healthcare

INTRODUCTION

Health literacy is defined as the degree of a person's ability to retain, process, communicate and comprehend basic health information, and use this information to make a suitable health decision [1]. Health literacy requires an individual's capability with numerical data, comparing and choosing health plans, and basic knowledge of health topics. Adequate health literacy has been linked with better rates of hospitalization, health status, health care cost and less use of services for complications of disease [2-5]. Inadequate health literacy impacts individuals of all ethnicities, ages, and educational levels. However, the effects of lower health literacy impact the lesser economical population and minorities in disproportionate levels. It impacts the population's access and ability to search for health services, adopting healthier lifestyles, making better health decisions, and is associated with higher costs and worse outcomes [6]. In addition, communication errors due to inadequate health knowledge have shown to affect compliance and dissatisfaction with the level of care provided [7,8]. Areas of confusion or incomprehension for patients usually were in medications, diagnosis and discharge instructions, and with limited knowledge in prevention methods and self-management of situations. These factors all predispose to more frequent emergency room visits and more difficult management of chronic illnesses [9-12].

Traumatic injuries are a major cause of morbidity and mortality worldwide. They account of over 9% of global mortalities and millions of admissions and follow-ups [13]. In Saudi Arabia, traumatic injuries are a major burden on disabilities, leading to multiple hospitalizations the population. They are the leading cause of death and a significant

cause of morbidity. A study was conducted including 10,847 patients from the trauma registry showed over 9% deaths with traffic accidents (52.0%) and falls (23.4%) being the most frequent causes of morbidity and mortality [14]. Adequate health literacy and ensuring sufficient post-discharge management discussion with patients will aid in recovery and decrease the burden of injury [15]. A survey by Kadakia, et al., measuring the health literacy of orthopedic trauma patients attending their first operative clinic showed a limited level of comprehension. Questions pertaining to injury were administered to evaluate levels of literacy in patients considering the level of education, socio-economic status and other demographics [16]. Also, the general health literacy in people complaining of musculoskeletal discomfort can be measured utilizing a specific literacy survey named the Literacy in Musculoskeletal Problems project (LiMP) to assess literacy and risk factors for limited comprehension [17].

The aim was to measure the level of comprehension in orthopedic trauma patients regarding their injuries, operations, postsurgical instructions, and general orthopedic health literacy.

PATIENTS AND METHODS

Setting

This study was conducted at King Abdulaziz Medical City, founded on the 1st of May 1983, is a governmentally funded hospital in the eastern region of Riyadh city, Saudi Arabia.

Sample

This study was a cross-sectional design that utilized a self-administered questionnaire which was handed out conveniently to patients attending the trauma orthopedic clinics for follow-ups or first-time visits and was approached in the clinic waiting area. Patients that sustained a traumatic injury or were following up on a procedure from a previous trauma had the ability to comprehend the language of the questionnaire (Arabic and/or English language), and were between the ages 16-80 years old were included. A previous study has shown that the level of comprehension of patients was 50.8% [16]. With a margin of error of 5% and a confidence level of 95%, the required sample size was 377 subjects. Raosoft sample size calculator was used.

Instruments

The questionnaire was composed of 3 parts: the first was demographic data, second was about questions pertaining to the comprehension of their injury, the third was questions measuring orthopedic general knowledge. An informed consent was the cover page of the questionnaire which was self-administered and collected at one point in time by the research team. The demographic section inquired about gender, age, education level, financial status, and living situation (location, living status, etc.).

The trauma-related section was based on Kadakia, et al., a study which is composed of 4 orthopedic trauma-related questions inquiring about patient's knowledge of their injury, type of fixation, weight-bearing status and expected recovery time [16]. The general orthopedic literacy section was assessed utilizing the "Literacy In Musculoskeletal Problems" (LiMP) project [1,7]. This part included questions related to anatomical knowledge and terminology, the familiarity with common orthopedic conditions, and finally measuring patient's comprehension of diagnostic tests and treatment methods. The questionnaire was subjected to forward translation to Arabic, an expert panel and back translation, pre-testing and cognitive interviewing, obtaining the final version and reliability testing preceding proposal approval. The demographic data served as a grouping variable for the study, while the knowledge of trauma injury and general orthopedic background served as outcome variables. Both were presented as categorical data.

Ethical Considerations

Ethical approval was granted by King Abdullah International Medical Research Center's institutional review board. Willing participants of the study were given a summary of the study's aim attached to the consent sheet. Complete confidentiality was secured, and participants were given the opportunity to withdraw themselves at any given time. Participants also received a faculty member's contact information in case they had any questions regarding the study later on.

Data Management and Statistical Plan

Data was entered on SPSS version 20, IBM, Armonk, NY, United States of America. Categorical variables were described as frequencies and percentages. Chi-square test and forward logistic regression were used to assess the

relationship between outcome variables (categorical variables for the answered questions) and baseline characteristics. The 95% CI and OR were reported. All tests were considered significant if the p-value was less than 0.05.

RESULTS

A total of 245 subjects completed the survey. Table 1 summarizes subjects demographic and baseline characteristics. Age was variable, with the majority of patients (35.7%) falling between 21-30 years. Total 148 (75.1%) were males. When subjects were asked about visiting the orthopedic clinic for the first time since their injury, 88 patients (36.2%) said "yes". Educational levels were categorized based on high school degree, with 147 (60.7%) subjects not getting a high school degree.

Table 1 Subjects demographics and baseline characteristics

Variable		N	%
Age (Years)	<20	33	13.90%
	21-30	85	35.70%
	31-40	61	25.60%
	41-50	29	12.20%
	>50	30	12.60%
Gender	Male	184	75.10%
	Female	59	24.10%
First visit	No	155	63.80%
	Yes	88	36.20%
Educational Level	Less than a High school degree	147	60.70%
	High school and above	95	39.30%
Financial status	Monthly income <7000 Saudi Riyals (SR)	113	48.10%
	Monthly income is 7000 SR or above	122	51.90%
Living status	Alone	21	8.70%
	With Company	221	91.30%
Location	Al Riyadh	191	78.00%
	Others	54	22.00%

Subjects were asked 4 questions pertaining to their knowledge about their injury and the course of treatment. Figure 1 shows the responses to the trauma comprehension questions. Most of the subjects (87%) successfully identified the injured bone. In addition, those who knew the expected time of bone healing were 130 (53%) subjects.

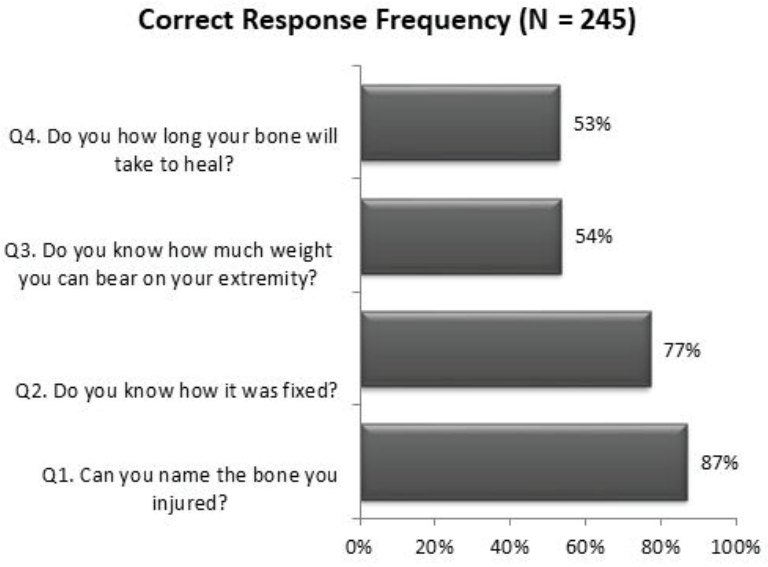

Figure 1 Overall performance by all participants on trauma-related health questions (N=245)

General orthopedic health literacy was assessed by asking the subjects 7 questions from the LiMP questionnaire.

Figure 2 shows the response of the general orthopedic literacy questions. Responses were variable, as 156 (64%) subjects answered correctly to "The knee is a?" question. On the other hand, only 26 (11%) subjects answered correctly to "All of the following facts about X-rays are true except?" question.

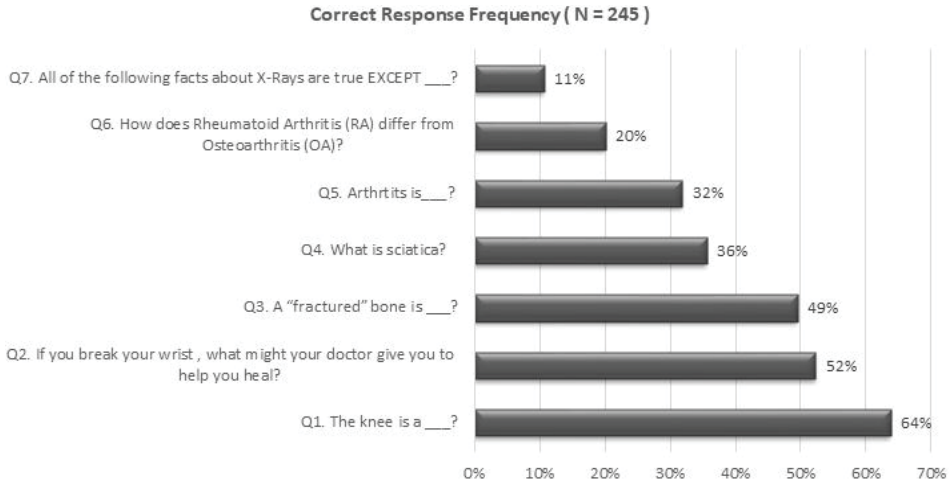

Figure 2 Overall performance by all participants on general orthopedic health literacy questions (N=245)

Table 2 investigates the relation between the baseline characteristics of our sample and their overall performance on both trauma-related and general orthopedic knowledge questions. Males answered slightly more correctly on both categories of questions (68% ± 28.6 on trauma-related questions, 37.9% ± 21 on LiMP questions) than their counterparts. A significance level was found when looking at the participants based on their financial status. The group with a monthly income of 7000 SR and above scored higher on LiMP questions (41% ± 20.5) than the group of a monthly income less than 7000 SR (34% ± 22.8) (p-value=0.03). On the other hand, participants with less than a high school degree scored slightly lower (66.2% ± 27.7 on trauma-related questions, 37.2% ± 21.5 on LiMP questions) than participants with a high school degree and above (69.5% ± 29.9 on trauma-related questions, 38.1% ± 21.8 on LiMP questions) with no significance level detected (p-value=0.38 on trauma-related questions, p-value=0.77 on LiMP questions).

Table 2 Overall performance on both categories of questions by participants in relation to their baseline characteristics

Variables		N	Trauma related questions			LiMP Questions		
			Mean	SD	p-value	Mean	SD	p-value
Gender	Male	184	68.60%	28.6	0.28	37.90%	21	0.8
	Female	59	64.00%	28.3		37.10%	23.7	
Age	<20	33	66.70%	29.1	0.68	32.00%	16.8	0.41
	21 - 30	85	67.40%	26.7		38.70%	23.7	
	31 - 40	61	64.80%	32.4		36.30%	20.8	
	41 - 50	20	65.50%	27.1		42.40%	18.9	
	>50	30	74.20%	27.5		37.60%	24.5	
First visit	No	155	69.00%	27.5	0.26	38.30%	21.9	0.59
	Yes	88	64.80%	30.2		36.70%	21.3	
Educational Level	Less than a high school degree	147	66.20%	27.7	0.38	37.20%	21.5	0.77
	High school and above	95	69.50%	29.9		38.10%	21.8	
Financial status	Monthly income <7000 SR	113	66.60%	29.6	0.83	34.80%	22.8	0.03
	monthly income is 7000 SR or above	122	67.40%	27.6		41.00%	20.5	
Living status	Alone	21	79.80%	20.3	0.01	35.40%	23.7	0.63
	With Company	221	66.30%	29		37.80%	21.4	
Location	Al Riyadh	191	67.00%	28.7	0.51	38.50%	21.7	0.22
	Others	54	69.90%	28.1		34.40%	21.2	

Forward logistic regression analysis was utilized to assess the relationship between baseline demographics and the responses to trauma-related questions, and questions from the LiMP questionnaire. In Table 3, participants who lived alone significantly answered the question "Do you know how much weight you can bear on your extremity" more correctly than participants who lived with the company (OR 5.56, 95% CI 1.53 to 20.17). Females were significantly more capable to tell what's not true about X-rays than males, as the question from the LIMP questionnaire required the participants to choose the false X-rays statement (OR 0.25, 95% CI 0.09 to 0.66). In addition, having a better financial status is associated with knowing more about sciatic nerve pain or sciatica than those with a lower financial status (OR 0.5 95% CI 0.27 to 0.9).

Table 3 Forward logistic regression analysis of the baseline characteristics' predictors of trauma and general orthopedic health literacy

Variable	Category	p-value	OR	95% CI for OR	
				Upper	lower
How much weight can you bear?					
Living status	Alone	0.009	5.560	20.170	1.533
	With company	1.000			
X-ray facts					
Gender	Male	0.005	0.253	0.662	0.097
	Female	1.000			
What is sciatica?					
Financial status	<7000SR	0.021	0.500	0.902	0.277
	≥ 7000 SR	1.000			
The knee is..?					
First visit	No	0.038	1.878	3.407	1.035
	Yes	1.000			
Location	Al Riyadh	0.032	0.476	0.939	0.241
	Others	1.000			

DISCUSSION

Adequate knowledge about the treatment plan, mechanism of injury, instructions before/after surgery play a pivotal role in the recovery phase for the patient. Deficiencies in health literacy are a risk for sub-optimal outcomes for the patient, difficulty in communication between health care provider and receiver, and a cause for personal and social economic burden [18-20].

Even though tools and development plans were implemented to identify subjects at risk for low health literacy, it still remains a struggle for health care providers [21]. This was also seen in orthopedic patients where they showed difficulties in comprehension in the clinical setting [22]. To add, previous articles have shown poor recalling and comprehension in orthopedic patients postoperatively. Hutson and Blaha reviewed 38 patients that have undergone total knee replacement and found that only 11% recalled the risk of nerve damage and 82% recalled the risk of infection [23]. Moreover, Kadakia, et al., reported that out of 146 patients, 33% could not correctly identify the hardware used in their surgery and 52% could not correctly name their injured bone [16]. Previous studies have revealed that positive medical outcomes in heart failure patients were associated with good comprehension and health literacy [24,25]. Even though patients in these studies were not orthopedic patients, it emphasizes the role of adequate health literacy and comprehension on the medical outcomes of the patients.

This study highlighted some inadequacies in our patients' understanding of treatment plans and discharge orders. Out of 245 participants in our study, only 53% were able to recall the estimated healing time for their recovery, and 23% did not know the type of hardware (if fixation with hardware was required) used in their treatment. Moreover, 46% of the participants did not recall the acceptable weight bearing status for the affected bone from their doctor's post-operation instructions. This particularly plays an important role in patients' recovery and might lead to a reinjury or exacerbation of the current bone injury. This low reporting could possibly be explained by the difference in the interpretation of some words being used between physicians and patients, for example, the word "heal". Patients may understand the word "heal" as the ability to resume daily life activities prior to injury while physicians may mean the union of fracture after surgery. This is also seen with Calkins, et al., reporting when they surveyed 99 physicians and

their patients in regard to discharge treatment plans [26]. They reported that 95% of their physicians believed their patients understood their instructions, when in fact only 58% of the patients understood their doctor's orders. On the other hand, our population scored 87% when asked if they were able to answer/recall the name of the injured bone.

When comparing our results with Kadakia, et al., we found that they reported 54% of their population did not answer correctly when asked about weight bearing status and 33% did not identify the correct hardware used in their treatment. These reports were very similar to the data we reported 45% and 23% for both weight-bearing status and hardware identification, respectively. However, our results contrast with Kadakia, et al., in questions pertaining to naming the injured/broken bone and the required healing time. They reported 52% of their population could not identify the injured/broken bone in contrast to our 87% and 81% of their population did not know the estimated healing time compared to our 47% [16]. This further reaffirms that health care providers should perform audit and develop strategies to improve the patient's understanding of the doctor's instruction after discharge to improve outcomes and reduce unnecessary complications.

The LiMP questionnaire affirms a lack of understanding in questions inquiring about general orthopedic knowledge in anatomy and terminology (Q1), treatment and diagnosis (Q2, Q7), and musculoskeletal (MSK) conditions (Q3-Q6). When asked about questions pertaining to MSK conditions, over half our subjects failed to answer correctly in Q4 (36%), Q5 (32%), and Q6 (20%). To add, in questions examining the subject's knowledge in diagnosis and treatment, specifically Q7. "All of the following facts about X-rays are true EXCEPT?", only 11% were able to answer the question correctly. When compared with Rosenbaum, et al., the population we found similar results with our population [17]. Both populations showed decreased knowledge in "MSK conditions" questions, specifically Q6. "How does (RA) differ from (OA)", where 32.2% of Rosenbaum's population answered correctly compared to our 20%, Q3. "A fractured bone is?" Rosenbaum's population scored 47.5% compared to our 49%, and questions about diagnosis and treatment specifically Q7. "All of the following facts about X-rays are true EXCEPT?" Rosenbaum's population scored 8.4% compared to our 11%. However, Rosenbaum's population scored higher results in Q4 (56.8%), and Q5 (53.2%), and over half of both populations answered correctly in Q1. "The knee is?" Rosenbaum's population scored 66.5% compared to our 64% and Q2. "If you break your wrist" Rosenbaum's population scored 54% compared to our 52%. This was also seen in other orthopedic patient's knowledge articles [16].

In addition, forward stepwise logistic regression was done to assess the association of our demographic variables and patient orthopedic knowledge. A significant association was found between knowledge of weight bearing status and patient's living status. Patients that lived alone were 5.56 times more likely to know the appropriate post-operative weight bearing status as compared to patients living with the company. Moreover, an association with female gender was noted in regards to the knowledge of X-ray facts. This may be explained by the multiple antenatal visits and the instructions discussed between the health care provider and patient about the benefits and risks of different imaging modalities during their pregnancy. To add, patients with multiple visits after their treatment were associated with better understanding of orthopedic anatomy, specifically Q1. "The knee is?", then patients who attended only their first follow up appointment after treatment. Multiple follow-up appointments with the surgeon, where the patient's X-ray is reviewed along with the progress of treatment, can contribute to the increased comprehension of orthopedic anatomy.

CONCLUSION

Our orthopedic trauma population highlighted a significant lack of comprehension regarding their injuries, post-operative instruction, the course of their treatment and general orthopedic knowledge. This may affect the outcome of the patients' treatment course and their satisfaction with the level of care provided. Audits and development strategies, if implemented, followed by long-term studies of an improved method of communication between health care provider and the patient can shed light on potential risk factors and ensure an effective level of understanding for the patient. This, in turn, may be pivotal in enhancing patients' understanding of discharge instructions and help to eradicate common misunderstandings.

Limitations of the Study

Our study distributed several limitations. As with all convenient sampling studies, this study is highly susceptible to have biases that may over and under-represent the overall population. This study was conducted in a single trauma center, King Abdulaziz Medical City, which may affect the generalizability of this study. There also may be volunteer

bias. Patients with a better understanding or stronger recall of their previous visits may be more willing to complete the questionnaire. Finally, due to the inaccessibility to the female waiting area, equal gender distribution was not achieved in the sample studied, and thus might have affected female patients' representation.

DECLARATIONS

Conflict of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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