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Evaluate Pediatric Caregivers' Musculoskeletal Health Literacy in General Pediatric Orthopedic Clinic in Saudi Arabia, 2024

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ABSTRACT

Background: Musculoskeletal health is a global concern for school-age children. Children often face ergonomic risk factors in their daily activities, so it is important to raise parental awareness to prevent musculoskeletal disorders in their children.Health literacy (HL) related to musculoskeletal disorders (MSDs) in children is a field with limited previous evidence.

The study aimed: To evaluate pediatric caregivers' musculoskeletal health literacy and risk factors for lack of health literacy in general pediatric orthopedic clinic.

Methods and Materials:A cross-sectional study was conducted among a convenience sample of 200 caregivers of children presenting with musculoskeletal complaints at the general pediatric orthopedic clinic of a hospital in Makkah, Saudi Arabia. Caregivers who were taking their children for either first-time or follow-up visits were included in the study. Participants were excluded if they did not meet the above-mentioned criteria, had any cognitive impairment, or were unable to sign their own consent. Caregivers completed a demographic survey, the Literacy in Musculoskeletal Problems questionnaire, and the Newest Vital Sign to measure musculoskeletal and general health literacy, respectively.

Results: 46.7% of participants had low levels of musculoskeletal health. Additionally, 18.0% of individuals had inadequate general health literacy. The likelihood of worked in the healthcare industry ($p = 0.0055$), and those who had completed at least some college ($p = <0.0012$), according to multivariate logistic regression. Adequate general health literacy was only associated with at least some college experience ($p = 0.003$) according to multivariate logistic regression.

Conclusion: Nearly half of all caregivers who bring their children to a pediatric orthopedic clinic are not educated in musculoskeletal health and may not have the knowledge needed to make wise decisions regarding their child's care. Compared to limited general health literacy, limited musculoskeletal health literacy is more common.

Keywords: Musculoskeletal Health Literacy, Pediatric Orthopedics, Caregivers.

INTRODUCTION

Musculoskeletal disorders (MSDs) are responsible for a substantial disability burden over the life course and consume considerable healthcare resources[(1)]. MSDs in adults have been the subject to great research efforts in recent last decades, but clinical research on MSDs in children is still sparse[(2, 3)]. However, there is emerging

evidence showing that MSDs are common among children, and those suffering from them report a major impact on several areas of daily living, including less participation in leisure activities, more school absences, a restricted social life and a lower health-related quality of life[4-6]. Such disorders are also common reasons for care seeking among children, especially in primary healthcare settings[1].

In 2023, WHO defined musculoskeletal disorders (MSDs) as a group of conditions affecting the bones, muscles, and joints. It ranked as the leading cause of disability worldwide, with low back pain being the single leading cause of disability in 160 countries[7]. Its prevalence in school age children and adolescents was recorded by Ullah et al. (2022)[8] as 7% to 63%. Additionally, the evidence by Alias et al., (2020) [9] concluded that "the majority of school age children and adolescents (62%) had poor sitting posture while writing and reading. Musculoskeletal (MSK) regions affected due to poor posture were neck 61.3%, shoulder 57%, abdominal region 49.2%, posterior region 54.5%, and arm 72.3%."

For appropriate health care delivery and outcomes, compliance with and understanding of treatment plans is crucial. Most, if not all, health care decisions in children are made by their parents (caregivers). Thus, for pediatric patients it is the health literacy of the caregiver that is significant [10-12].General health literacy is defined as "the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions" by the Institute of Medicine [13]. People with low general health literacy have less understanding of and knowledge of medicine, are more likely to neglect critical preventive care, have worse chronic disease control, greater rates of health care utilization, and worse health care outcomes [14-16].

Furthermore, compared to patients who possess sufficient general health literacy, these individuals have been found to have greater health care costs [17-19]. Therefore, one of the most significant indicators of an individual's health state is their level of health literacy.Health literacy (HL) is a topic of growing importance in public health research and reflects the capacities of individuals to meet the complex demands of health in a modern society [20]. Variation exists in the scientific community regarding the conceptual understanding of HL and its terminology, leading to different interpretations of the concept in health and medical research [21].

In the present context, HL is understood as follows: People's knowledge, motivation, and competencies to access, understand, appraise and apply health information in everyday life concerning healthcare, disease prevention, and health promotion to maintain or improve quality of life during the life course [22].Despite the high prevalence of inadequate general health literacy, health care providers find it difficult to identify these patients [18, 23]. Over the last two decades, several instruments have been designed to evaluate health literacy based on reading and numeracy skills. Most of these measure general health literacy, while very few assess disease or specialty specific literacy [24-27].

To address this deficiency Rosenbaum et al., (2015)[27] created the Literacy in Musculoskeletal Problems (LiMP) survey, a validated nine-question instrument for measuring musculoskeletal health literacy in adults. While this survey has been used extensively in adult orthopedics, there are few studies of musculoskeletal health literacy as it pertains to the care of pediatric orthopedic patients [27, 28]. Caregiver decisions can have a significant impact on a child's health care outcomes and thus it is crucial to identify caregivers who possess limited musculoskeletal health literacy [29].

This study aims to evaluatepediatric caregivers' musculoskeletal health literacy regarding the anatomy, terminology, diagnosis, and treatment of common musculoskeletal conditions and its correlation with both general health literacy and caregiver demographic characteristics.

METHODS AND MATERIALS

A cross-sectional study was conducted among a convenience sample of 200 caregivers of children presenting with musculoskeletal complaints at the general pediatric orthopedic clinic of a hospital in Makkah, Saudi Arabia. Caregivers who were taking their children for either first-time or follow-up visits were included in the study. Participants were excluded if they did not meet the above-mentioned criteria, had any cognitive impairment, or were unable to sign their own consent.

A written consent was obtained from all willing participants. In addition, an informed consent handout containing a study summary, risks and benefits, and contact details for the research personnel was provided to each participant. The health literacy surveys, consent forms, and fact sheets were available in Arabic language. The physician was blinded to the responses of the participants and to the completeness of the questionnaires.

All participants first completed a three-minute demographic questionnaire, in which they were asked to identify their age, gender, race, highest level of education, whether or not they had ever worked in a health care field previously, and their child's musculoskeletal complaint. The caregiver's classification as having worked in a healthcare field was of their own subjective designation.Next, the caregiver's general health literacy was assessed using the Newest Vital Sign (NVS), a validated general health literacy instrument in which the caregiver answered six questions pertaining to an ice-cream label[30].

Adequate general health literacy was considered present when≥4 questions were answered correctly. Those participants with NVS scores of <4 were determined to have limited general health literacy [30]. To administer

the NVS a standardized nutrition label was given to each participant, followed by a research assistant verbally asking the participant each question. The NVS took less than five minutes to complete. The validated, self-administered LiMP survey was then given to participants to assess musculoskeletal health literacy, which took fiveminutes to complete [27, 28].

The survey's nine multiple-choice questions were based on the most commonly emphasized themes (anatomy, terminology, diagnosis, treatment) found in the patient education section of the American Academy of Orthopedic Surgeons (AAOS) website. The LiMP scores ranged from 0 to 9, with scores ≥6 indicating adequate musculoskeletal health literacy. Those with scores ≤ 5 were determined to have limited musculoskeletal health literacy. Cutoffs were based on a previous validation study based on the methods described by Pendlimari et al., (2012)[19]. It was written at a Flesch-Kincaid grade level of 4.2 as the readability of patient education materials is generally recommended to be no higher than a sixth-grade level [31].

The data was summarized using frequencies and proportions for categorical variables as well as mean and standard deviation for quantitative variables. In the univariate analysis the group comparisons were conducted using the chi-squared test for categorical variables. Multivariable logistic regression was used to model the odds of adequate musculoskeletal health literacy (LiMP score ≥ 6). The results were summarized using the odds ratio, corresponding 95% confidence interval and the p-value. The binomial distribution was used to compute the precision or margin of error of the 95% confidence interval for the sensitivity, positive predictive value (PPV), negative predictive value (NPV), and specificity of the NVS survey in predicting limited musculoskeletal health literacy. The significance level was set at 0.05. Statistical Analyses were performed using the SPSS (version 28).

RESULTS

A total of 200 participants completed the NVS instrument, and 199 completed the LiMP questionnaire. **Table (1)** summarizes the demographic and baseline characteristics of the study participants. Participants'age group from 35 to 44 was 39.9 %, female (77.1%), and had at least some college education (30.6%). In addition, 32.0% reported that they were currently or previously employed in a health care setting.

Table 1: Demographic characteristics of study participants

Demographics		**N (%)**
Age	18 to 24	22(12.0)
	25 to 34	59(32.2)
	35 to 44	73(39.9)
	45 to 54	23(12.6)
	55 to 64	3(1.6)
	65 to 74	3(1.6)
Gender	Male	44(22.9)
	Female	148(77.1)
Healthcare employee/profession	Yes	63(32.0)
	No	134(68.0)
Highest level of education completed	8^{th} grade or less	3(1.6)
	Some high school	11(5.9)
	High school	31(16.7)
	Some college of 2-year degree	57(30.6)
	4-year college graduate	46(24.7)
	More than 4-year college degree	38(20.5)

Table (2) showsthe risk factors for limited musculoskeletal health literacy. In the univariate analysis there was a significant association between the prevalence of adequate musculoskeletal health literacy and gender, level of education, and history of health care employment.

Table 2: Risk Factors for limited musculo skeletal health literacy

Demographics		**Inadequate MLN (%)**	**Adequate MLN (%)**	**P-value**
Age	18 to 24	14(63.6)	8(36.4)	0.0581

Demographics		Inadequate MLN (%)	Adequate MLN (%)	P-value
	25 to 34	(25)43.1	33(56.9)	
	35 to 44	30(41.1)	43(58.9)	
	45 to 54	8(34.8)	15(65.2)	
	55 to 64	0(0)	3(100)	
	65 to 74	3(100)	0(0)	
Gender	Male	26(59.1)	18(40.9)	0.0326
	Female	60(40.8)	87(59.2)	
Healthcare employee/profession	Yes	19(30.2)	44(69.8)	**0.0012**
	No	73(54.9)	60(45.1)	
Highest level of education	8^{th} grade or less	1(33.3)	2(66.7)	**0.0031**
	Some high school	7(63.6)	4(36.4)	
	High school	21(67.7)	10(32.3)	
	Some college or 2year associates	28(50.0)	28(50.0)	
	4 year college graduate	13(28.3)	33(71.7)	
	More than 4 years college	11(28.9)	27(71.1)	

ML=musculo skeletal health literacy

Table (3) shows the multivariable logistic regression for adequate musculoskeletal health literacy. On multivariable logistic regression there was no difference in adequate musculoskeletal health literacy between male and female caregivers (p = 0.062), however, a statistically significant difference existed between health care employee versus not (OR 2.96 (95% CI 1.37-6.36), p = 0.006), and at least some college versus not (OR 3.43 (95% CI 1.62-7.25), p = 0.001).

Table 3: Multivariable logistic regression for adequate musculoskeletal health literacy

Risk Factor	OR(95%CI)	P-value
Caregiverage≥ 35vs.not	0.88 (0.42,1.840)	0.737
Femalevs.Male	2.21 (0.96,5.09)	0.062
Healthcare employee vs.not	2.96 (1.37,6.36)	**0.006**
Atleast some college vs.not	3.43 (1.62,7.25)	**0.001**

CI=confidenceinterval

Table (4)shows the risk factors for limited general health literacy. In the univariate analysis there was a significant correlation between the prevalence of adequate general health literacy and level of education, and history of health care employment.

Table 4: Risk factors for limited general health literacy

Demographics		LimitedGHLN (%)	AdequateGHLN(%)	P-value
Age	18to24	8(36.4)	14(63.6)	0.0873
	25to34	7(11.9)	52(88.1)	
	35to44	9(12.3)	64(87.7)	
	45to54	5(21.7)	18(78.3)	
	55to64	1(33.3)	2(66.7)	
	65to74	1(33.3)	2(66.7)	
Gender	Male	8(18.2)	35(81.8)	0.8902
	Female	26(17.6)	122(82.4)	
Healthcareemployee /profession	Yes	6(9.5)	57(90.5)	**0.0293**
	No	30(22.4)	104(77.6)	

Demographics		LimitedGHLN (%)	AdequateGHLN(%)	P-value
Highest level of education	8thgrade or less	0(0.0)	3(100)	**0.0001**
	Some high school	4(36.4)	7(63.6)	
	High school	14(45.2)	17(54.8)	
	Some college or 2year associates	9(15.8)	48(84.2)	
	4year college graduate	2(4.3)	44(95.7)	
	More than 4years college	2(5.3)	36(94.7)	

GHL=generalhealthliteracy

Table (5) shows the multivariable logistic regression results for adequate general health literacy. Multivariable logistic regression only at least some college experience correlated with adequate general health literacy (OR 5.77 (95% CI 1.8- 18.1), p = 0.003).

Table 5: Multivariable logistic regression results for adequate general health literacy

Risk Factor	OR(95%CI)	P-value
Healthcare employee vs.not	2.05(0.73, 5.72)	0.1720
Atleast some college vs.not	5.77(1.8, 18.1)	**0.003**

CI=confidence interval

The mean LiMP score was 5.49 +/- 1. The prevalence of inadequate musculoskeletal health literacy among participants was 46.7%. Questions evaluating knowledge of musculoskeletal conditions were correctly answered by 57.8% of respondents (95% CI 54.3%-61.2%), while diagnosis and treatment questions were correctly answered by 36.4% (95% CI 31.9%-41.3%), and those pertaining to anatomy and terminology by 55.4% (95% CI 52.4%-58.3%).

The mean NVS score was 4.75 +/- 1.5. Limited general health literacy, as defined by a score of <4 on the NVS, was present in 18.0% (95% CI 13.3%- 23.9%) of participants. There was a statistically significant association between general health literacy as measured by NVS and musculoskeletal health literacy as measured by the LiMP (p<0.001). The sensitivity, specificity, positive predictive value and negative predictive value of the NVS in predicting inadequate musculoskeletal health literacy were 31.2% (95% CI 22.0%-41.6%), 92.5% (95% CI 85.7%-96.7%),78.4% (95% CI 63.6%-88.3%), 60.5% (95% CI 57.0%-64.0%), respectively.

Specifically, participants who were female (p = 0.033), had at least some college experience (p = <0.001), or held a current or prior position in health care (p = 0.001) experienced higher rates of adequate musculoskeletal health literacy as compared with the other study participants.

DISCUSSION

Overall, over half of the caregivers of pediatric orthopedic patients sampled lacked adequate musculoskeletal health literacy, even though they were exposed to their children's musculoskeletal issues. This is significantly higher than the nearly 20% of caregivers in the same cohort who were sampled for having poor general health literacy. The real rate of low musculoskeletal health literacy among all caregivers of pediatric orthopedic patients is probably significantly higher, given that the majority of our patient cohort had at least some college education.

The level of inadequate musculoskeletal health literacy and associated risk factors seen in this study are similar to that seen in the adult orthopedic population. Rosenbaum et al., (2015) [27] found limited musculoskeletal health literacy in 69% of adult orthopedic patients presenting to the emergency department of an academic medical center and limited general health literacy in 48% [27]. A follow-up study examining only patients presenting to the ED with foot and ankle complaints found a limited musculoskeletal health literacy of 32%, with the risk factors for limited musculoskeletal health literacy and those with a lower education level [19]. Limited musculoskeletal health literacy in those presenting for elective carpal tunnel release was found to be 34% by Rosenbaum et al., (2015) [27] while Noback et al., (2019) [32] found limited musculoskeletal health literacy of in 49% of patients presenting to either a foot and ankle or hand and wrist surgeon at an urban medical center.

This study also shows that tools designed to measure general health literacy may fail to identify a lack of musculoskeletal health literacy. The NVS has a sensitivity of about one-third when used to predict low musculoskeletal health literacy, making it an unreliable screening tool. However, it has a specificity of over 90% and as such if the patient has limited general health literacy is it very likely that they have limited musculoskeletal health literacy as well. Therefore, if the patient has adequate general health literacy further

testing is required to assess their musculoskeletal health literacy, but if the patient has inadequate health literacy it can be reasonably assumed that they likely have limited musculoskeletal health literacy as well. This indicates the need for dedicated instruments to measure musculoskeletal health literacy such as the LiMP.

Although general health literacy and musculoskeletal health literacy have been studied in the adult orthopedic population, there are very few studies which have examined the general and musculoskeletal health literacy of caregivers of pediatric orthopedic patients [33-37]. This is problematic as adequate health literacy allows caregivers to comprehend the medical knowledge needed to make informed decisions regarding the care of their children, and caregiver health literacy has been shown to directly impact pediatric outcomes in a variety of conditions [29, 38-42].

Su et al., (2020)[43] reported significant disparities in musculoskeletal health literacy in pediatric sports medicine patients and caregivers. They reported highly educated guardians were associated with higher directly assessed musculoskeletal health literacy. However, there are some differences between our two studies. Their study included patients age 10 to 17 years old presenting for sports-related musculoskeletal injuries and validated instruments of general health literacy or musculoskeletal health literacy were not used, but rather they developed their own questionnaire for direct assessment of musculoskeletal literacy. In our study, all patients presenting to ageneral pediatric orthopedic clinic were included and validated instruments of general health literacy and musculoskeletal health literacy were used [26, 27, and 30]. However, despite these differences, their findings are ultimately consistent with our own.

CONCLUSION

According to this study, nearly half of all caregivers for pediatric orthopedic patients might not have the knowledge and understanding needed to make wise decisions about their children musculoskeletal care, which could put children at risk for less-than-ideal results. A sufficient level of musculoskeletal health literacy was more likely to be had by those who had at least some college education and had held current or previous health care roles. Additionally, compared to inadequate general health literacy, the prevalence of limited musculoskeletal health literacy is significantly higher. Putting an emphasis on musculoskeletal education might help interventions to increase health literacy among caregivers of pediatric orthopedic patients.

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