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Identifying Factors Prevent Patients' Accessibility to Musculoskeletal Physical Therapy in Saudi Arabia: A Retrospective Cohort Analysis

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ABSTRACT: Background: Musculoskeletal disorders are common and linked to an increased risk of developing a disability. Although physical therapy is recommended for several musculoskeletal conditions, research shows the rate of patients' access to physical therapy clinics appears unchanged. Objective: We aimed to identify predictive factors to improve overall health status, better compliance, and better management of patients' conditions within physiotherapy services. We used electronic data for a retrospective cohort in Prince Sultan Military Medical City from 30 March 2022 to 22 May 2022. Considering gender, age, and the co-existence of other medical conditions, we compared users and non-users of physical therapy services after referral. Patients were grouped using their diagnosis from their index visit to the Spine, Lower extremity, and Upper extremity. We compared differences in patient factors between users and non-users of physical therapy using chi-square and t-tests. We estimated the minimum sample size to be 385, using 50% of the population portion. Results: We found a significant number of non-users were males and were from the orthopedic department. The association analysis revealed significant relationships between users and gender, user and clinic, and user and diagnosis. Conclusion: The high prevalence of non-users in OPD clinics, could be driven by: the lack of time and an understanding of the importance of the physical therapy course. The study guides healthcare professionals to highlight individuals at particular risk of not accessing physical therapy and indicates the benefit of accessing physical treatment in their case. Further, it encourages to design and implement a policy for people with OPD/Spinal disorder to ensure the continuity of care and to prevent any long-term impact on their health.

Keywords: *Musculoskeletal; physical therapy; access to care; orthopedics; spinal; patient adherence*

INTRODUCTION

Aging is an inevitable process, and within this process, multiple disorders occur. Musculoskeletal diseases are a global burden (Blyth et al., 2019). In the past three decades, musculoskeletal disorders status has not improved (Kyu et al., 2018), indicating the significance of this public health disease. The fragility of the skeleton is associated with aging (Black & Rosen, 2016; Eastell et al., 2016). However, elderly females have a higher risk than males with osteoporosis (Sugiyama & Oda, 2017). They also have a

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greater risk of Anterior cruciate ligament (ACL) injury from non-contact mechanisms than males (Montalvo et al., 2019). At the same time, athletes, primarily football players, have a greater prevalence of ACL injury from direct contact mechanisms (Agel et al., 2016). Furthermore, compared with males, females exhibit higher injury rates per exposure, theoretically because of anatomical variances of the lower kinematic chain (Montalvo et al., 2019). This evidence indicates that gender is a significant factor in musculoskeletal diseases. An arthritic joint, like a Hip or Knee, results from tear and wear on the joint and will affect the gait pattern, whether because of pain, stiffness, or weakness. Neglecting the problem will worsen it (King et al., 2018). Moreover, the lower back nerval interventions significantly impact the proper functioning of the urine and stool. Irritation, compression, or stimulation of these nerves can affect the bladder and fecal incontinence, like being unable to empty the bladder, overactive bladder, or constipation (Welk & Baverstock, 2020).

Musculoskeletal disorders have focused on alternative, non-pharmacologic treatment options such as physiotherapy (Qaseem et al., 2017). Among all musculoskeletal disorders, physiotherapy effectively improves pain in its after effects like function and activity (Qaseem et al., 2017). Numerous guidelines provide the effectiveness of physical therapy on musculoskeletal disorders (Chou et al., 2017; Lewis et al., 2019; Qaseem et al., 2017). Moreover, in clinical research, manipulation has helped improve the joint range of motion, reducing edema and muscle spasms; by extension, the pain will be reduced (Masaracchio et al., 2019; Xu et al., 2020). Although studies showed increasing referral rates, patients receiving physical therapy treatment did not increase (Dennis et al., 2018; Freburger et al., 2018; Thackeray et al., 2017; Zheng et al., 2017).

However, factors that affect physical therapy referral compliance in research exploration are lacking. Few of these studies have acknowledged cohorts from receiving a referral to the physical therapy clinic. Our work utilizes physical therapy referral as a starting point to estimate the accessibility rate to physical therapy care. We aim to characterize factors that identify physical therapy service users and non-users for musculoskeletal disorders. Our study is designed as a retrospective cohort and conducted using electronic medical records (EMR). The study sample included patients in Prince Sultan Military Medical City.

We included different variables to compare the differences between users and non-user, which are gender, age, weight, height, BMI, clinic, diagnosis, and comorbidity. Patients aged 18-64 who had visited with a physician for a new musculoskeletal diagnosis were referred to a physical therapy clinic. Physicians from the spinal clinic, orthopedic clinic, pain management, and primary care clinic. Patients are responsible for booking physical therapy appointments. We excluded patients who have received physiotherapy courses for the same joint for the last six months. We excluded patients with non-musculoskeletal causes for their symptoms and who were wheelchair-bound. Cancer patients, patients representing infection, systemic disease, and end-stage renal disease. We dichotomized referrals into users and non-users within 30 days of referral. A physical therapist manually documents each time a patient schedules an appointment.

Understanding these factors would help develop policies in the referral form that indicate the risk and prevalence of musculoskeletal disorders in females, encouraging adherence and compliance with appointments in the physical therapy clinic. Identifying factors that impact patient compsubstantially impactssubstantial impact on patient health and the progress of treatment plans (Jin et al., 2008). The previous report indicates that training workshops on communication skills for physiotherapists have improved patient adherence (Lonsdale et al., 2017). This study would provide translation to our clinic activity, improve patient health, and reduce musculoskeletal disorders and disability in our Saudi community. The proposed work aligns with the Saudi 2030 vision of improving healthcare system services.

This main objective in this work was to identify predictive factors to improve overall health status, better compliance, and better management of patients' conditions. We aimed to characterize predictive factors including gender, age range, preexisting other health conditions, and diagnosis that might affect the commitment to attending physiotherapy sessions. This work aimed to guide healthcare professionals and policymaking individuals to highlight individuals at risk of not accessing physical therapy.

METHODOLOGY

Sample size: Since the sample size of patients dropping physical therapy referrals is not well characterized, we estimated the minimum sample size to be 385, using 50% of the population portion and indicating that 385 or more are needed to express a confidence level of 95% within ±5% of the study value.

Participants: A total of 740 males and females aged 15 to 83 participated in the study. Participants were patients referred to the physical therapy department for a musculoskeletal disorder.

Study Designed and Procedure: A retrospective study was conducted in Prince Sultan Military Medical City from 30 March 2022 to 22 May 2022. We identified the patients with a new musculoskeletal disorder from the electronic referrals. Patients who have an index visit were referred by a physician and referred from the Orthopedic Department, Spinal Department, and Primary Care. Referrals from these departments are considered an entry point to the Physical Therapy department for patients with an ambulatory musculoskeletal disorder. We included patients with a new musculoskeletal disease. A new musculoskeletal disorder is identified as described previously (Sharpe et al., 2021), six months of lacking a previous diagnosis for the same body region. To ensure that each patient referred to the physical therapy clinic in the period mentioned earlier is seeking care for a new

musculoskeletal condition, we checked the index visit. We exclude non-ambulatory patients and patients who are severely ill. One hundred sixty patients were excluded; they were diagnosed with cancer, end-stage renal disease, and any diagnoses of cauda equina indicating paraplegia, hemiplegia, quadriplegia, and wheelchair dependence within six months of their index visit. Furthermore, we excluded cases where individuals diagnosed with trauma or/and surgery within the last four weeks were also excluded.

Referrals are ordered electronically by a physician who decides if the patient needs physical therapy care. Patients are responsible for booking an appointment in the physical therapy department.

Outcome variable: Patients were categorized into users and non-users. Patients who booked an appointment in the physical therapy department within one month of the referral were included. Physical therapists in PSMMC's system manually input sessions of care into the medical record number each time a patient starts physical therapy.

Factor: the study's key elements were either predisposing or need factors, based on Andersen's Behavioral Model of Health Services. Predisposing factors included age, gender, and obesity. Obesity was estimated based on their BMI within the last six months; if not, it was considered missing. On the other hand, need factors included patients' diagnoses and comorbidity. Additionally, we considered the referring providers' specialties and grouped them into orthopedic, spinal, and primary care. Patients were grouped using their diagnosis from their index visit into Spine (cervical pain, thoracic, and lumbar), Lower extremity (hip, knee, ankle, and foot), and Upper extremity (shoulder and elbow). Ethical approval was granted from the Institutional Review Board at Prince Sultan Military Medical City in Riyadh, Saudi Arabia (IRB#1636).

Statistical Analysis: We compared differences in patient factors between users and non-users of physical therapy using chi-square and t-tests. Descriptive statistics for the continuous variables are reported with standard deviations (SD) and means. A significant level of $P < 0.05$ was used for all analyses. All statistical tests were performed using the SPSS version 25 software.

RESULTS

Descriptive statistic:
A total of 730 patients were referred to the physical therapy clinic. Ninety-one patients reduced this cohort study after excluding comorbid conditions and those who received physical therapy sessions for the same joint within six months. Of the remaining 639 patients, 273 (42.7 %) came to the physical therapy clinic, and 366 (57.3%) did not attend. The majority were females a 70.4% of the sample, whereas 26.6% were males. About 77.3% of participants attend OPD clinics. In terms of diagnosis, a 57.7% of cases presented by lower extremity diagnosis, and 18.2% presented by upper extremity diagnosis. Most of the participants, about 53.8%, do not have any Comorbidity, where 24.4% of cases are presented by one comorbidity and 15.0% by two comorbidities. Table 1 describes our cohort study.

Table 1: Baseline description of a retrospective study

Variable		Frequency	Percent	Standard deviation
Physical therapy	User	273	42.7%	0.495
	Non-User	366	57.3%	
Gender	Male	189	26.6%	0.456
	Female	450	70.4%	
Clinic	[a] OPD	494	77.3%	0.419
	Spinal	145	22.7%	
Diagnosis	Lower extremity	369	57.7%	0.840
	Upper extremity	116	18.2%	
	Spine	154	24.1%	
Comorbidity	0	344	53.8%	0.982
	1	156	24.4%	
	2	96	15.0%	
	3	35	5.5%	
	4	8	1.3%	

Note: OPD: [a] Orthopedics.

Additionally, the sample population has a mean age of 47.42±15.142, with a mean height of 160.29±9.452 and a weight of 79.63±15.922 where the sample population has a mean BMI of 31.21±6.677(Table 2).

Table 2: Participant's demographics

Variable	[a] N	Mean	Standard Deviation
[b] **Age**	639	47.42	15.142
[c] **Height**	639	160.29	9.452
[d] **Weight**	639	79.63	15.922
[e] **BMI**	639	31.21	6.677

Note: [a] N: number, [b] age (years), [c] height (cm), [d] weight (KG), and [e] BMI: body max index.

Association Between Variables:
Next, we analyzed the association between factors using the person chi-square test (Table 3). The results indicated that the clinical factor was significant and found a considerable difference between diagnosis and user of physical therapy services. Females scored significantly higher in users of physical therapy services. For comorbidity, there was no statistically significant association between physical therapy and the presence of comorbidity when we used the person chi-square.

Table 3: Physical therapy users and non-users after referral for a musculoskeletal disorder by a medical care provider

Variable		Physical therapy		Pearson Chi-Square	Sig.
		User	Non-user		
Gender	Male	51 (18.7%)	138 (37.7%)	27.168	0.000
	Female	222 (81.3%)	228 (62.3%)		
Clinic	OPD	199 (72.9%)	295 (80.6%)	5.295	0.021
	Spinal	74 (27.1%)	71 (19.4%)		
Diagnosis	Lower extremity	144 (52.7%)	225 (61.5%)	4.893	0.087
	Upper extremity	55 (20.1%)	61 (16.7%)		
	Spine	74 (27.1%)	80 (21.9%)		
Comorbidity	0	141 (51.6%	203 (55.5%)	1.037	0.904
	1	69 (25.3%)	87 (23.8%)		
	2	43 (15.8%)	53 (14.5%)		
	3	16 (5.9%)	19 (5.2%)		
	4	4 (1.5%)	4 (1.1%)		

Note: [a] sig: significance, [b] OPD: Orthopedics

Moreover, we used an independent t-test to find the difference between users and non-users of physical therapy with the other variables (Table 4). The independent t-test was applied to examine the differences between the variables. A statistically significant difference exists between the height and user/ non-user of physical therapy. However, no statistical significance exists between weight, age, BMI, or user/ non-user of physical therapy.

Table 4: Predictor of physical therapy for patients with musculoskeletal disorders

Variable	Physical therapy	N	Mean	Standard Deviation	T	Sig.
Age	User	273	47.70	14.639	0.414	0.679
	Non-user	366	47.20	15.522		
Height	User	273	158.78	8.156	-3.645	0.000
	Non-user	266	161.42	10.178		
Weight	User	273	78.83	15.817	-1.108	0.268
	Non-user	266	80.24	15.995		
BMI	User	273	31.34	6.412	0.412	0.681
	Non-user	266	31.12	6.876		

Note: [a] N: number, [b] age (years), [c] height (cm), [d] weight (KG), and [e] BMI: body mass index, [f] sig: significance, [g] t: t-test.

DISCUSSION

The present study compared users and non-users of physical therapy services after referral. The findings of this study enable a more profound understanding of factors preventing accessing physical therapy services. We found that a significant number of individuals didn't attend. Most of them were males. This study found that most non-users were from the orthopedic department. Our analysis includes age, height, weight, BMI, and comorbidity. About half of them have non-other medical conditions, and 25%

have one co-existing disease, which was insignificant. The association analysis revealed significant between users and gender, user and clinic, and user and diagnosis.

A similar study conducted recently at the University of Utah Health reported an association between poor adherence to physical therapy and ethnicity, public insurance, obesity, and urgent care referrals. Our study included patients from early 2022, i.e., the third year of the COVID-19 pandemic, where the number of cases has declined (Al-Ahdal & Al-Ahdal, 2020). Yet, this pandemic has affected the population's lifestyle and daily habits (Caroppo et al., 2021). Researchers reported that pandemic would increase in sedentary behavior (Margaritis et al., 2020). Moreover, during the pandemic, people changed their lifestyles to increase the time of sitting; therefore, the amount of time of immobility increased (Ammar et al., 2020). For example, the referral response rate of primary care (Watt et al., 2021), and psychiatric clinics has decreased (Chen et al., 2020). Furthermore, a study conducted after COVID-19 and the pandemic found that the rate of non-users increased due to a sedentary lifestyle (Ayele et al., 2022).

Person chi-square showed a significant association between gender and accessing physical therapy services after referral. Additionally, an association was documented between users and the clinic and the diagnostic condition. Consistent with other studies (Babwah et al., 2006; Neal et al., 2005; Sninsky et al., 2015) they found that female patients were more frequent in attendance than male patients. There is less work commitment among primarily unemployed females (Babwah et al., 2006). Also, the distance between them and the clinic could contribute (Sninsky et al., 2015). However, there was conflicting evidence. A report found that male patients were more regular in attending compared with female patients, and it was because of their culture. Females in Pakistan need a male guardian to accompany them (Mahmood et al., 2020). An Independent t-test found a significant difference between the user and height. Height is a critical disease factor (Lai et al., 2018), but no study has been done on height and attending an appointment.

A regression model represented a moderate correlation between the predictors (Gender, height, clinic) and the use of physical therapy. The notably high prevalence rate of non-users in OPD clinics. We anticipated that two factors could drive this: the lack of time and understanding of the importance of the physical therapy course. In support of this, previous studies found a lack of time to receive physical therapy services (Bhavsar et al., 2021). Another report concluded that attending a course of physical therapy (multiple sessions) and lack of time is a confounding factor for not using physical therapy services (BUTT et al.). Additionally, a study demonstrated that patients were unsatisfied due to a lack of information about the treatment plan and session (O'Keeffe et al., 2016). Additionally, a study reported that the usual reasons that non-users give are mistakes, misunderstandings, and forgetfulness (Neal et al., 2005). This indicates that raising patients' awareness of the clinical significance of attending and completing the physical therapy course is critical. In addition, improving the communication system with patients could reduce the number of non-users, by avoiding misunderstanding and mistakes. Surprisingly, studies in Saudi Arabia show a low percentage of lack of transportation (AlSadhan, 2013; Shabbir et al., 2018). Yet, studies on the challenges of accessing physical therapy sessions are sparse. Indicating an unmet need in this area of study, and it must be considered in the future.

Regression analysis showed statistical significance, indicating that the regression model statistically significantly predicts the outcome variable (physical therapy), indicating a good fit for the data. Hence, the mean age of our study is young. Most likely, they are employees who need time off from work to schedule an appointment, unlikely elderly individuals. A systemic review studied the non-users in general; reported that younger patients with an age range of 17-40 were more tending to miss their appointments (George & Rubin, 2003). The period for booking an appointment (30 days) should be extended. Accumulated evidence indicated that most non-users were young due to lack of time (Boos et al., 2016; Elkhider et al., 2022; Faiz & Kristoffersen, 2018; George & Rubin, 2003; Neal et al., 2005), In other hand, several studies showed similar findings of the non-users' rate decreased with increasing age (Neal et al., 2005), and the likelihood of non-users reduced with aging since their daily schedule is flexible. It is essential to maximize the efficiency of our health resources.

Our retrospective cohort study is the first to investigate patients' rates of accessing physical therapy services in Saudi Arabia and the first to present associations between patients' variables available from EMR. Using Andersen's Behavioral Model of Health Services is a strength of this study. It highlights a substantial number of physical therapy referrals are non-users. The low percentage of users suggests that many patients needing physical therapy are not accessing the clinic. Previous studies show that females and older people often use physical therapy services (Freburger & Holmes, 2005; Rommel & Franziska, 2017). Most of the non-users are males. They are indicating the unmet need to address these gaps. We suggest: 1) include full explanations of the benefit of completing the physical therapy sessions in the referral form, mainly for male patients. 2) include a physical therapist in physician clinics. The scope of practice for therapists includes a wide range of interventions that will help a patient and his physician set a realistic and achievable treatment plan (Rommel & Franziska, 2017). 3) Conduct educational workshops for health practitioners, including physiotherapists, highlighting knowledge needed to provide adequate patient counseling regarding following referral to physical therapy course. This move would reduce the number of referral non-users by addressing all patients' questions and needs about changing clinics. Additionally, this would strategize the referral by targeting the destination clinic and filtering the referral numbers.

Non-user is a multifactorial concern that causes a considerable waste of resources, limits the provision of preventive care, and negatively affects patient health. As forgetting was found to be a frequent cause of missed sessions, introducing a telephone reminder system or/and SMS reminder system might be an affordable and effective first measure to address non-users. A study was conducted in 2020; they established SMS reminder system, and their non-user rates were reduced by over 30% (Berliner

Senderey et al., 2020). Another study used an open-access scheduling system, and their non-user rates had been decreased (Ansell et al., 2017). The younger population prefers open-access scheduling systems due to understanding demand and matching capacity (Ansell et al., 2017; Belardi et al., 2004; Cameron et al., 2010), which was a successful system in several studies. As a web-based appointment system, it was an excellent method for reducing non-user rates (Zhao et al., 2017). Although several studies show that phone call reminder significantly has higher non-users (Hashim et al., 2001; Parikh et al., 2010), while receiving SMS reminder did not increase the rate of non-users (Downer et al., 2006; Geraghty et al., 2008). Therefore, the booking system should be expanded so the patient has many options and serves the entire population.

Policymakers should consider all options to optimize the number of appointments per day, and researchers should further investigate non-users for each specialty and level of care. We also recommend developing a practice guideline that may help supervisors further tailor their reminder systems for their service. A reminder, whether an SMS or email, provides additional information like orientation, health information, and the clinic's location.

The study is the first to report these findings; however, some limitations exist. For example, we didn't consider the geographical residence of the patients. Further study is needed to distinguish the enabling reasons, whether rural or urban or a problem with transport or lack of understanding of the role of physiotherapy. Improving access to physical therapy clinics demands enhancing the methods of referring. Most importantly, it improves patient health outcomes.

CONCLUSION

The study highlighted that the policymaker must design and implement a policy for people with OPD/Spinal disorder to ensure the continuity of care and to prevent any long-term impact on their health. This study would fill our knowledge gap in understanding factors contributing to dropping physical therapy referrals.

Ethics statement

The studies involving human participants were reviewed and approved by the Institutional Review Board at Prince Sultan Military Medical City in Riyadh, Saudi Arabia (Ref. No. HP-010R079). The date of approval 19th of September 2022.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Informed Consent

It is not applicable.

Author contributions

TA: conceptualization, methodology, and writing—review and editing. AA, AA, and RA: Data collection and technical assistance. TA and SA: writing—original draft preparation. All authors have read and agreed to the published version of the manuscript.

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