

Original Article

Work related thumb pain, its prevalence, risk factors and prevention among physical therapists

Areesa Yaseen¹, Hajra Yaseen² & Amna Yaseen³

¹Jinnah Post Graduate Medical Centre (JPMC)

²Jinnah Sindh Medical University (JSMU)

³Dow University of Health Sciences (DUHS)



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Corresponding Author Email:

amna_yaseen2011@yahoo.com

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Abstract

Background: Previous studies conducted worldwide which indicated that many physical therapists are prone to develop a thumb pain just because of their occupation. The nature of the work in a physical therapy practice is physically demanding which prone the physiotherapists to work related thumb pain (WRTP) as it involves repetitive tasks, high force manual techniques for treating patients. The objective of this study was to investigate the prevalence, risk factors and consequences of thumb pain arising due to physiotherapy.

Methodology: An observational cross-sectional study was conducted from December 2017 to December 2018 and participating population included both male and female physiotherapists who are currently in practice. Participants that have undergone forearm or hand surgery, the victim of rheumatoid arthritis (RA) and those who were retired or working out of Karachi were excluded. The sample size was calculated through open epi version 3.0 and data was collected from 100 subjects from districts of Karachi (Saddar, Liaquatabad, North Karachi, Gulberg, North Nazimabad, Malir, Gulshan, Korangi and Orangi). The data was analyzed using SPSS Version 22. Pearson's Chi-square test was used to find out the association between WRTP among physical therapists.

Results: According to the study results physical therapists are at increased risk of developing WRTP, with a prevalence of 48%. Physiotherapists that are most commonly affected by WRTP are 39% and they aged <30 years. It was found more prevalent among manual therapists (29%). Trigger point therapy is mentioned by 23% of the respondents as an important pain exacerbating cause for their WRTP. Also, manipulation (17%) and mobilization (17%) are the techniques that result in thumb pain. Change in the choice of treatment techniques (17%) is a consequence of WRTP.

Conclusion: Physical therapists who are using manual therapy techniques in musculoskeletal conditions experienced more WRTP. However, thumb pain is mostly provoked by trigger point therapy. The best therapy for WRTP is rest, considering the most satisfaction about this treatment.

Keywords

Out-Patient Clinics, Work Related Thumb Pain, Trigger Point Therapy, joint mobilization, physical therapist



Introduction

The World Health Organization (WHO) defines a work-related musculoskeletal disorder (WRMSD) as a form of illness ranging from acute transitory disorders to irreversible injuries and disabilities that are caused or worsened by work or physical activities¹. It is found that WRMSD is a universal problem which causes chronic pain and physical disability which affects the contemporary workforces^{2&3}. The highest percentage of WRMSD's are among physical therapists⁴. Previous literature suggests that the prevalence of WRMSD among physical therapists is 32%⁵, while mentioning a lifetime prevalence of WRMSD among physical therapists is 91% and 55% severally⁶. While Adegoke and his colleagues mentioned WRMSD among Nigerian Physiotherapists an annual frequency of 91%⁷.

The physically involving nature of the physical therapy profession may conduce to the risk of WRMSD leading to its high prevalence⁸. The work demands of physical therapists include high loading at hand joints and repetitive movements. Among physical therapists, the work related thumb pain is a most common problem. Wrist and hands are the second highest anatomical area of injury among physical therapists and its risk is increased because of hands-on of manual therapy techniques in the treatment of musculoskeletal conditions that were more commonly used in orthopedic OPDs or private clinics/practices^{6, 9-12}.

Though physical therapists have considerable knowledge of musculoskeletal injuries and its prevention strategies still a high incidence of work-related injuries are reported by physical therapists during their professional practice. Also, presently it is considered as one of the biggest medical issues among physical specialists^{13&14}. Anecdotal, thumb problems associated with the application of mobilization

techniques is one of the common complaint of physical therapists¹⁵.

Thumb joints are more vulnerable to biomechanical and work-related injuries in physical therapists⁴ because of manual therapy techniques like mobilization, manipulation and massage require greater hand forces which stresses the upper limb and compress the thumb joint^{5, 7 & 12}. The thumb is used as a pseudo-weight-bearing-joint when force is transmitted through the thumb physical therapist generates forces using their body weight, while the distal end of the thumb is met by the resistance of the tissue being treated. Therefore, it results in repetitive strain injuries in thumb^{6,11, 15&16}. Due to thumb pain physical therapists modify their hands on position while performing manual techniques. As a matter of fact, due to WRTP 43% to 91% physical therapists alter their manual techniques^{10&11}.

Other risk factors include: techniques include oscillatory movements, lifting or shifting of dependent patients, respond to abrupt movements by patients, applying manual therapy, confined workplace, age and gender⁸. This type of physical factors endangers physical therapists to a different type of work-related musculoskeletal injuries⁹.

This study has been conducted to identify the prevalence of WRTP in physical therapists and to explore the effects of particular causing factors of thumb pain among physiotherapists working in the Karachi city of Sindh province of Pakistan. Moreover, the study aims to determine the best therapy according to physiotherapists to treat their WRTP.

Methodology

A cross-sectional study was conducted from 2017 to 2018. The participating population included both males and females who were actively working physiotherapists. Data was

collected from clinics and rehabilitation centers from all the six districts of Karachi, namely Institute of Physical Medicine & Rehabilitation (IPMR), Liaquat National Hospital (LNH), Agha Khan University Hospital (AKUH), and Jinnah Post-Graduated Medical Centre (JPMC), ISRA rehab Centre, Indus hospital, Baqai Institute of Diabetology and Endocrinology (BIDE), Maa Ayesha hospital and Rabia moon rehab Centre. All participants who went through forearm or hand surgery, all the victims of RA and those who were retired or working out of Karachi were excluded from the study sample. To estimate the prevalence of WRTP, 100 active physiotherapists were included in the study sample. Non-probability convenient sampling technique was used for sampling.

A pre-designed questionnaire was used to record work related thumb pain in actively working physiotherapists¹⁷. The pre-designed questionnaire was divided into two sections. The questions in the first section included demographics, working experience (years), and working hours per week, work domain, clinical specialty and hand position while the execution of manual techniques on patients. Hand position which therapists are using were also inquired with images of frequently used methods⁴. The physiotherapists were asked to choose the hand position that was most consistent with their technique. The second section of the questionnaire was filled by only those physical therapists who had a history of thumb pain produced due to manual therapy. Questions included the detailed history of pain, it's location (like, at which joint mostly pain is felt), severity at Numerical Rating Scale (NRS) of 10, the causes and the consequences, the most aggravating technique and coping strategies they have already taken together with

their compliance and satisfaction about these treatments. Data was collected from study participants after receiving informed consent from each one of them.

The collected data was statistically analyzed using SPSS (Statistical Package for Social Sciences) version 22. Demonstrated in form of tables and graphs. Pearson's Chi-square test was used to find out the association between WRTP among physical therapists. A p value < 0.05 was considered as the level of significance.

Results

Results indicate that out of 100 respondents, females were slightly larger in number (56%) than males (44%). The majority of therapists surveyed (64%) are with professional experience as a physical therapist of 0-5 years. Only 3% have more than 26 years of working experience (Figure 1). Total percentage of physiotherapists working as manual therapists was 56%. While 16% were working in the neurology department. Other respondents were from gynecology or postnatal 10%, pediatric 8%, sports 4%, psychomotricity 1% and 5% in other fields.

Participating population was mostly young 69% were under 30 years. Only two of the participants were aged between 50 to 60 years. It was observed that 41% of the physiotherapists were working for less than 15 hours a week. About, 16% of participants were working for more than 45 hours a week. Young physiotherapists predominate the group of patients that are the victim of WRTP and they make 39 Pts (81%). Only 2% are aged between 51-60 years.

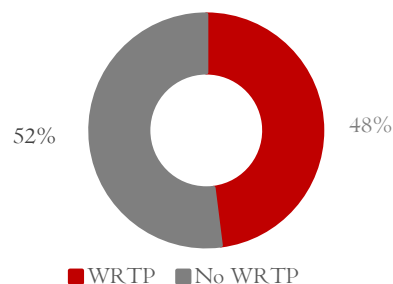
Table I: Demographic characteristics of study subjects

Variables	n(%)
Age (in years)	
<30	69(69)
31-40	21(21)
41-50	8(8)
51-60	2(2)
Gender	
Males	44(44)
Females	56(56)
Departmental Distribution	
Manual Therapists	56(56)
Neurology Department	16(16)
Gynecology Or Postnatal	10(10)
Pediatric	8(8)
Sports	4(4)
Psychomotricity	1(1)
Others	5(5)

Only 43% of the manual therapists choose hand position B in treating patients 32% choose position A and 20% choose position C. 5% of the study participants used other hand position in treating patients apart from positions mentioned in the questionnaire, described in table 2.

Table 2: Preferred hand position by physiotherapists

Hand position	n(%)
Hand position A: Thumbs not supported by index fingers, MCP joints are touching, thumbs are not overlapping	32 (32)
Hand position B: Thumbs are not supported by the index finger, MCP joint are not touching, thumbs are overlapping	43 (43)
Hand position C: Thumbs supported by index fingers, MCP joints are touching, thumbs are not overlapping	20 (20)



* WRTP = (work related thumb pain)

Figure I: Prevalence of work-related thumb problems among physiotherapists

Out of a hundred participants, 48% physiotherapists reported that they are experiencing WRTP while 52% had no WRTP. However, the prevalence of WRTP was better presented in female (25%) physiotherapists than males (23%).

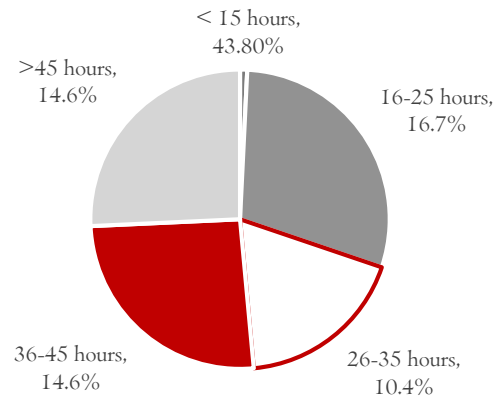
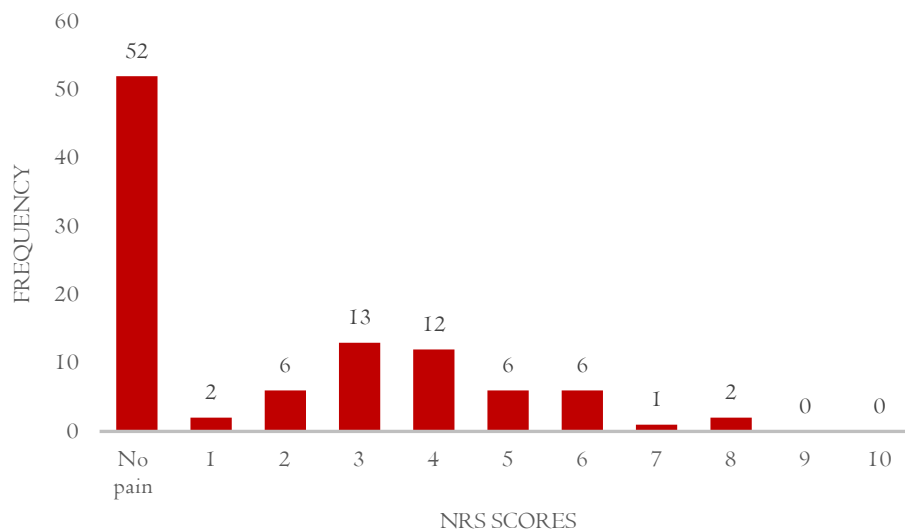


Figure 2: Working status of physiotherapists with WRTP

The greater frequency (43.8%) of potential respondents with WRTP work less than 15 hours in a week, however, 14.6% work between 36 to 45 hours per week.



*NRS= Numeric Rating Scale

Figure 3: Pain intensity according to the NRS Scores reported by physiotherapists with WRTP

To elaborate pain intensity of work related thumb pain, a 0-10 at NRS (where 0 indicates 'no pain' whereas 10 refers extreme pain) was set but participants who were experiencing thumb pain were observed with a score between 0-8 on NRS. However, most of them had pain intensity 3 on a scale of 10 as given in figure 3.

As expected the thumb of the dominant hand was more affected by 33% than the non- dominant hand 7% and 8% of the respondents have pain in both thumbs. The most of WRTP frequency was

found among participants in interphalangeal (IP) joint and metacarpophalangeal (MP) joint is 13%. IP joint and carpometacarpal (CMC) joint both, IP and CMC individually are hurting in 9% of subjects. Detailed statistics for hurting thumb joint is in table 3.

Table 3: Frequencies of thumb affected, joint hurting and its association with WRTP

Variables	Sub-categories	n(%)	p-value
Thumb affected	Thumb of dominant hand	33(33.0)	<0.001
	Thumb of non-dominant hand	7(7.0)	
	Both thumbs	8(8.0)	
Hurting joints	IP joint	9 (9.0)	<0.001
	MP joint	9 (9.0)	
	CMC joint	1 (1.0)	

*IPJ=interphalangeal joints; MPJ=metacarpophalangeal joints; CMCJ= carpometacarpal joint

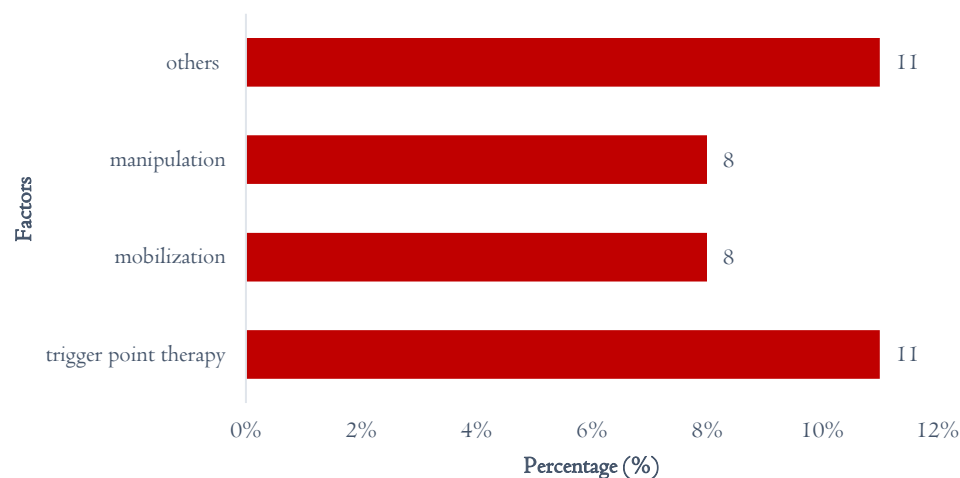


Figure 4: Factors associated with thumb pain among study subjects

Participants indicated more than one type of physiotherapy technique that elicited their pain. Trigger point therapy is cited by most (11%) of the respondents who are reporting WRTP as the most important pain aggravating factor. It is found that manipulation (8%) and mobilization (8%) are also the techniques that result in thumb pain. Across all specialty areas, the task showing an important relation with WRTP also included trigger point therapy and mobilizations (5%), also trigger point therapy and manipulation (4%) (Figure 4).

Table 4 lists the percentages of consequences as indicated by patients. Majority of the respondents (13%) modified their implementing treatment technique because of their WRTP. Some subjects (10%) changed their treatment technique to assuage their symptoms. Only 4% reduced the number of patients they were treating before the thumb problem. Career path change is another consequence of WRTP adopted by 1% of the participants. Mostly physical therapists changed their choice of treatment technique as a consequence of WRTP ($\chi^2 = 22.189$, $P < 0.001$).

Table 4: Consequences of thumb pain and its association with WRTP

Consequences of thumb pain	n(%)	p-value
Changing of implementation of treatment techniques	13 (13)	<0.001
Changing in choice of treatment techniques	10 (10)	<0.001
Reduction in working hours	7 (7)	<0.001
Reduction in number of patients being treated	4 (4)	0.001
Career change	1 (1)	0.061
Others	3 (3)	<0.001

*P-value < 0.05 considered as significant.

The current study also demands physiotherapists preferred treatment strategy to get rid of their WRTP. Results reveal five of the responding physiotherapists (5%) tried taping and rest. Similarly, 3% of the participating physiotherapists tried to treat their thumb pain with stabilization exercises, 22% of the physical therapists use rest (not do work) as it's coping up strategy. Attempt for medical intervention was also stated as an option for tried treatments but none of the physiotherapists used that strategy.

Fourteen physiotherapists (29%) tried to taping, 7 of them were very satisfied with it and six were just satisfied with the results of taping. out of thirty-seven respondents, 14% of respondents were very satisfied with rest. Therefore, it is clear that the rest turned out to be the most effective treatment in the physiotherapists included in this study. Which technique is applied by physiotherapists to treat their WRTP and to what extent it is effective is all well demonstrated statistically in table 5.

Table 5: Level of satisfaction and its relationship with treatment modalities

Level of satisfaction	Treatment modalities (n)					
	Taping	Medication	Stabilization exercise	Splint/Brace	Rest	Medical intervention
Very Satisfied	7	2	1	1	14	0
Satisfied	6	3	6	2	22	0
Neutral	1	3	1	0	1	0
Dissatisfied	0	0	0	0	0	0

*Values are given as n=frequency

When analysing the relationship between the used technique and the location of the pain by using the Chi-square test ($\chi^2 = 13.590$, $P=0.887$), an insignificant association is found between them and it becomes clear that "Position A" causes more pain on the MP joint of the thumb (44%), the IP joint is more painful in "Position B" (56%) and in "Position C" IP joint hurt very less (11%).

Discussion

This study demonstrated that 52% of the physiotherapists had thumb pain (Figure 1). According to the study by Van de Velde K, Cattrysse E in 2013, 40%

physiotherapists reported that they were having thumb pain¹⁷. Almost similar results were found in the previous study where 41% had thumb pain at the time of study and 65% had suffered from thumb

problem at any time in their life¹². The most frequently chosen score for thumb pain was found to be 3 on the scale of 10 at NRS (Figure 3). Also in the study by median score of participants with thumb pain was 3 on the same scale which is comparable with other research where the value of 30.2/100 and 4.2/10 were reported^{4, 17&18}.

Relation between WRTP and gender is found to be insignificant and this result is consistent with previous researches^{17&18}. Nevertheless, some studies did find gender as a cause of development of pain in thumb¹². We found an insignificant relation between thumb pain, age and area of practice. McMahon et al., 2006 indicated an association between thumb pain and massage or trigger point therapy as a cause of thumb problems which is in contrast to the results of this study and to the previous study¹⁸. Friction was not an answer option in this survey but it was found as a thumb pain provoking factor in former research¹⁹.

In the present study, it could not be determined that how many hours the physiotherapists needed to perform the manual techniques to develop thumb pain, shown that 60% of the therapists who spent 21 to 25 hours every week performing manipulation or mobilization techniques were facing thumb discomfort⁶.

The latter two gave the same outcome in the study by Valde & Cattrysse 2013¹⁷. This study too reports 1% effect of thumb pain on the career of physiotherapists. Valde & Cattrysse 2013 reported that only one therapist acknowledged that his thumb problems had consequences for his career¹⁷. While Cromie et al. 2000 found that one out of six physical therapists left the profession or changed setting due to work-related musculoskeletal disorder⁶. Thumb problems also had an influence on the performance of certain techniques.

In the former study Snodgrass et al., they found no significant differences in Pain and Non-Pain group for hand position⁴. Since the correlation in the present study was not statistically significant, we drew the same conclusion. Yet we found an age difference since younger physiotherapists did not support the thumbs with the index fingers and the thumbs were overlapping, while older physiotherapists support their thumbs and did not overlap their thumbs. As younger physiotherapists had more thumb pain, we can assume that overlapping or not supporting the thumbs causes more thumb pain (Table 1). The reason for the high percentage among young physical therapists may be due work burden or improper positioning of thumbs while applying manual therapy technique. Dominance of WRTP in younger physical therapists was also reported in former researches^{15, 17&19}.

Valde & Cattrysse in 2013 revealed rest to be most the most effective treatment (58%) for WRTP, which is in correspondence to the results of the present study (22%)¹⁷. A study of Rozenfeld et al. 2010 showed that 41.7% visited a fellow therapist or that they treated themselves when they had thumb pain²⁰. In the study of Wajon et al., 2003, this was only 6%¹⁹. In the same study, 29% tried a splint or tape as a treatment¹⁸. In the study of Valde & Cattrysse 2013, only 17% tried a splint or brace and twenty-six percent tried taping, which is almost equal (32%)¹⁷. In a study by McMahon et al. 2006, only 15% sought a solution in medication, while in another study it was 29%^{12&17}. In the present study, 29% tried taping, 17% tried medication and only 6% tried a splint or brace. The results may not be comparable because it is not known if, in the former studies, the possibility for more answer options existed (Table 5). A study of Walsh et al., 2011 concluded that taping had an effect on the perception of the stability of

the thumb; moreover using a tape did not have an effect on the force produced during mobilization²¹. The former studies did not investigate the satisfaction levels with different treatments which is important for the interpretation. It cannot be assumed that when many people have tried a treatment then it automatically becomes the best treatment. We have taken into account this issue in the current study.

Conclusion

This study aims to identify the prevalence, risk factors and the prevention of WRTP among physical therapists. It included active physiotherapists working in Karachi. Physical therapists are especially vulnerable to WRTP. Prevalence of WRTP is very high and could not be ignored. This study confirmed that the highest number of physiotherapists who are using manual therapy techniques to treat musculoskeletal conditions experienced more WRTP. The main adaptation to thumb problems is a change in the implemented treatment techniques. When we had to describe the optimum therapy, taking into consideration the number of therapists who tried the treatment and satisfaction about the treatment, and found that rest would be the best therapy.

Conflicts of Interest

None.

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