

## Radiographic Examination of Patients with Musculoskeletal Problems in General Practice

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**Abstract: Background and objectives:** Musculoskeletal conditions are commonly encountered by Family Physicians (FP). X-rays are routinely advised for joint pain and low backache. Lumbar spine radiography is the most common investigation requested by FPs. The utility of these x-rays is questionable in non specific low back pain and the actual physician ordering of x-rays do not correspond with recommendations. There is 0.6% - 3 % risk of various cancers due to X-ray exposure. This study aims to audit the current practice of FP for use of plain radiograph in the diagnosis of common musculoskeletal problems presenting to the Family Medicine clinics at the North West Armed Forces Prince Salman Hospital (NWAFFSH) in Tabuk, Kingdom of Saudi Arabia (KSA). **Methods:** A cross sectional study was conducted from June to August, 2010. Data of all x-ray requests for musculoskeletal problems made by the family physicians in the family medicine clinics of NWAFFSH (North West Armed Forces Prince Salman Hospital) in Tabuk, KSA was collected on a structured questionnaire and was entered and analyzed on SPSS version 16. X-rays requested for acute and chronic trauma were excluded. **Results:** A total of 1246 patients were referred to the Radiology Department for x-ray examination for musculoskeletal symptoms other than trauma. Among them 53% were males and 41% were 20-40 years of age. Low back pain was the most common symptom for which x-ray was requested (32%). Lumbosacral spine x-ray was the most frequently ordered investigation. Among these 74% were normal whereas 2 % revealed a diagnosis which was unrelated to the primary symptom. Radiological investigation ordered by a consultant was more likely to be abnormal (*p*- value 0.002) as compared to other family physicians with a trend as the seniority increases. **Conclusion:** There is a need to formulate clear guidelines for radio-diagnostic imaging in musculoskeletal conditions and their reinforcement among the family physicians.

[Israr Khan, Ali Faris Alamri, Mirza Ikram Ali Baig and Rahila Iftikhar. **Radiographic Examination of Patients with Musculoskeletal Problems in General Practice.** *Life Sci J* 2013;10(4):1982-1986]. (ISSN: 1545-1003). <http://www.lifesciencesite.org>. 262

**Key words:** X rays, musculoskeletal problems, family physicians

### 1- Introduction

It is known that symptoms of musculoskeletal diseases are most commonly encountered by the Family Physicians followed by diabetes mellitus, digestive disorders and cardiovascular disorders.<sup>1,2</sup> Diagnostic radiographs are an integral part of management of acute and chronic musculoskeletal symptoms and X-rays are routinely advised for musculoskeletal symptoms like joint pain, low backache and chest pain. General practitioners (GPs) often deviate from the clinical indications for advising radiographic investigations so much so that 60% of such referrals may not be in accordance with documented guidelines.<sup>3</sup> A study showed that more than 40% of the radiological examinations are excessive.<sup>4</sup> Even in developed countries it is observed that 6% of radiology referrals do not align with the National Radiology Referral Guidelines<sup>5</sup>.

A few studies have shown that among radiological investigations ordered, almost 50% were chest X-rays whereas, lumbar spine radiography was

found to be the most common investigation requested by GPs.<sup>6</sup> The utility of these x-rays is questionable especially in non specific low back pain and the actual physician ordering of x-rays do not correspond with recommendations.<sup>7,8</sup> Despite its limited use in diagnoses it involves a radiation dose 150 times that of a chest x-ray which means that the risks may outweigh the benefits. Diagnostic X-ray being the largest man made source of radiation exposure imposes risk of various cancers and the attributable risk has been calculated to be from 0.6% - 3 %.<sup>9</sup>

Previous studies show that there are some factors which influence the GPs ordering of diagnostic radiology which are clinical criteria, patients' wishes for radiography, uncertainty, professional dignity, access to radiology services, pressure from other health care providers/social security, expectations about the consequences of ordering radiography, emotional difficulty with adherence and improper access to health care services.<sup>10</sup>

Department of Family Medicine in North West Armed Force Prince Salman Hospital (NWAFFSH), Tabuk serves the military population where health care is free of cost; therefore cost is not a barrier in physician's inclination towards ordering radiological investigations. This study therefore aims to audit the current practice of general practitioners for use of plain radiograph in the diagnosis of common musculoskeletal problems presenting to the Family Medicine clinics of NWAFFSH in Tabuk, including clinical indications, compliance towards the referring protocol and quality of clinical information provided on referral from.

The results of this study may give an insight to the use of plain radiographic investigations by the GPs and whether these referrals are actually needed. Recommendations could be made according to the study findings on judicious use of plain radiographs in the evaluation of musculoskeletal pain and GPs could be provided with precise guidelines which will help in better utilization of resources both in radiology and family medicine and reducing the use of clinically unhelpful x-rays and exposure of patients to ionizing radiation.

## 2. Methodology

This is a cross sectional study which was conducted from June to August, 2010. Data was collected from the clinics of Family Medicine Department in Tabuk, Saudi Arabia. Family Medicine is one of the largest departments in the NWAFFSH, Tabuk. The department also provides supervision and support to nine peripheral clinics attached with military units offering primary health care services. At the time of this study, a total of 50 family physicians, 35 males and 15 females were working in the department and all of them were included in the study.

All family physicians, in order to refer a patient for diagnostic radiology, routinely fill a standardized referral request form with patient's identification, clinical history, examination findings, provisional diagnosis and required procedure with special instructions to carry out the investigation. This is a predesigned referral request form which is being used for all kinds of radiological procedures. When the patients presents to radiology for registration for the requested procedure, referral request form is scanned and saved in the computer and appointment date and time is given to the patient. During the procedure, the radiologist has access to the scanned referral request and reports procedure findings accordingly.

The principal investigator after obtaining a written permission from the concerned departments had the privilege to access the scanned referral

request and reports. Data of all x-ray requests for musculoskeletal problems made by the family physicians during the above period was entered and analyzed on SPSS version 16. X-rays requested for musculoskeletal symptoms due to acute and chronic trauma were excluded.

During the study period both referral request forms for radiological examination and procedure reports were examined on daily basis and required information transferred on a predesigned questionnaire. The patient's name, requesting family physicians and the reporting radiologist's names were kept confidential and were not considered in any aspect of this study.

## 3. Results:

During June to August, 2010 a total of 68,738 patients were seen in the Family Medicine clinics with an average daily turnover of 881 patients. A total of 1246 patients were referred to the Radiology Department for x-ray examination for musculoskeletal symptoms other than trauma. Among them 53% were males. Majority of the patients (41%) were 20-40 years of age followed by the older age group of more than 40 years (26%). The requested procedure was illegible in 15% of the request forms which were confirmed by a phone call to the family physician by the radiologist. Forty percent of the requests mentioned the clinical history of the patient and another 15% of the x-rays were marked as "urgent". Sixty four percent of the requests mentioned instructions for the procedure but the provisional diagnosis was provided in only 32 % of the patients.

The clinical indications for requested x-ray are listed in Figure 1. As low back pain was the most commonly encountered musculoskeletal symptom for which x-ray was requested (32%), lumbosacral spine x-ray was the most frequently ordered investigation (Figure 2). Table 1 shows the radiological diagnoses reported by the radiologist which was normal in 74% of the patients. Two percent of the radiology reports revealed a diagnosis which was unrelated to the primary symptom mentioned on the slip by the Family Physician.

Table 2 shows the association of designation of the Family Physician with probability of an abnormal radiology report. Radiological investigation ordered by a consultant in Family Medicine was more likely to be abnormal ( $p$ -value 0.002) as compared to other Family Physicians with a trend as the seniority increases.

## 4. Discussion and Conclusion:

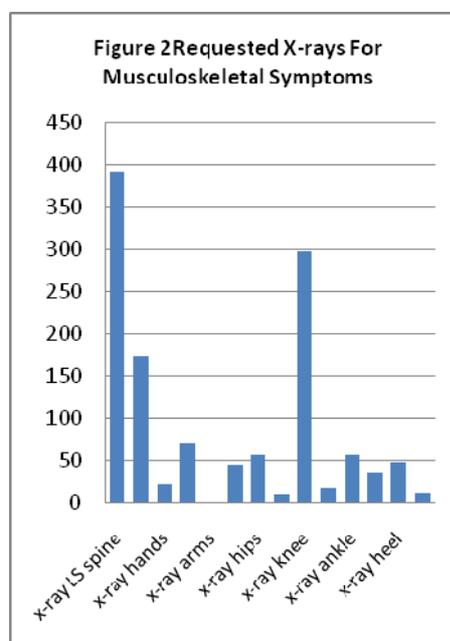
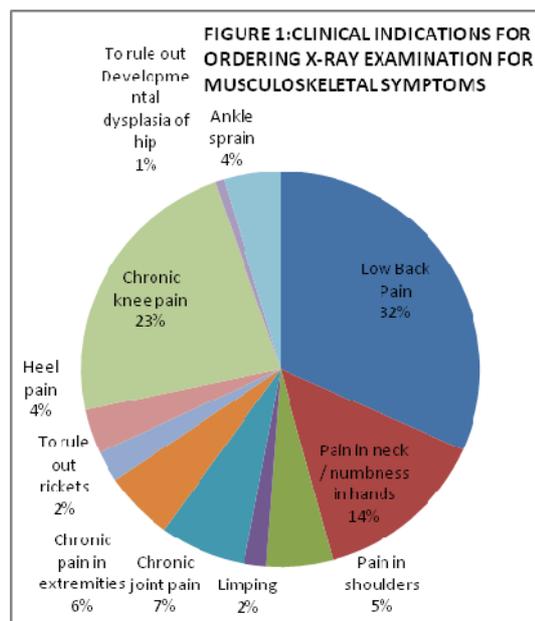
Family Physicians work at the front line in the modern health care system in Saudi Arabia. They

are responsible for integrating patients' history and physical examination and proceeding for further investigations to narrow down the differential diagnosis. Providing relevant clinical information on radiology referral requests makes the diagnostic procedure more relevant and effective. In our study only 40% of the referral requests in contrast to an international study in which 88% of the requests mentioned the clinical history. The provisional diagnosis was provided in 32% request slips which is consistent with the same study.<sup>11</sup>

Another finding was that majority of the patients referred to radiology were in the younger age group, although the common musculoskeletal problems reported like chronic back and knee pain are more common in elderly. This could be due the reason that NWAFFSH being a military hospital, a large number of its patients are young soldiers. This is evident in this study as the largest number of patients was of 20-40 years age group. This is contradictory to the guidelines from the Royal College of Radiologists, where radiography is indicated for young people (<20) or for those older than 55. The most common investigation ordered in our study was a back X-ray although, for the management of non-specific low back pain the utility of radiography already questionable, whereas patient satisfaction may be higher. Even in the presence of alarming symptoms, Magnetic resonance imaging is desirable instead of a plain x-ray.<sup>12</sup>

During the study period 1246 patients with various musculoskeletal complaints were referred for plain radiograph examination, out of which 74 % were normal. Among the abnormal reports majority were reported as degenerative change which raises the concern of physicians inappropriately ordering radiographic investigations and hence exposing young patients to unnecessary radiations. There are several factors which may be influencing this behavior. One of the factors which was significantly associated was the seniority of the physicians. Consultants were more likely to order tests which yielded abnormal reports. Other factors which need to be explored are patient satisfaction, communication skills and clinical competency of the physician. More than a decade back it was found that knowledge of primary health care physicians regarding commonly used radio-diagnostic investigations was deficient.<sup>13</sup> Another factor could be that the investigations in this military set up are offered free of cost which may decrease the threshold of the physician to order investigations without imposing any financial burden on the patient. On the other hand there is may be an inappropriate demand of the patients for diagnostic test to make an early diagnosis to justify sick leaves. There is also possibility of pressure on the physician

from parents and relatives of patient who may insist for x-rays. Exploring medical history, ruling out red flags, focused examination and adequate patient and/or family counseling may avoid unnecessary investigations. Physician also need to properly document the clinical history on the request slip in order to justify medical insurance claims.



Therefore, there is a need to formulate certain guidelines for the primary care physicians and their periodic re-enforcement for radio-diagnostic imaging. Studies in the past have shown that with clear guidelines, primary practitioners having access to diagnostic testing can utilize these resources as efficiently as hospital doctors.<sup>14, 15</sup> It is also recommended that frequent medical audit should be done and deficiencies should be communicated to the primary care physicians for better and efficient patient care and management.

Limitations of this study are that it is confined to a single institution where most the patients are serving military personnel. Hence, results cannot be generalized to other primary care centers or other communities. This study also does not address the adequacy of radiology referrals by other specialists such as orthopedic surgeons and rheumatologists which needs to be audited as well and compared with. The strength of the study is that it was conducted prior to military vacation (during June to August, 2010) when the patient flow was the highest, so the sample size was good.

**Table 1 Distribution of Radiological Diagnosis in Different Age Groups & Genders.**

RADIOLOGICAL DIAGNOSIS	AGE GROUPS IN YEARS														TOTAL	%
	≤ 1		2-5		6-12		13-20		21-40		41-60		≥ 61			
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female		
Normal study	12	12	21	17	20	17	31	25	267	186	125	129	36	29	927	74.39
Active rickets	3	-	3	1	-	-	-	-	-	-	-	-	-	-	7	0.56
Bony cyst	-	-	-	-	-	-	-	-	1	-	-	-	1	-	2	0.16
Calcaneal spur	-	-	-	-	-	-	-	-	2	4	4	6	1	1	18	1.44
Calcified tendonitis of rotator cuff	-	-	-	-	-	-	-	-	1	-	-	-	1	1	3	0.24
Cervical rib	-	-	-	-	-	-	-	1	2	1	3	4	-	1	12	0.96
Diffuse osteopenia with degenerative changes	-	-	-	-	-	-	-	-	-	-	2	3	3	4	12	0.96
Foreign body in soft tissues	-	-	-	-	-	2	-	-	3	-	1	-	-	-	6	0.48
Osteoarthritis of knee joint	-	-	-	-	-	-	-	1	2	5	10	31	15	20	84	6.74
Osteopenia	-	-	-	-	-	-	-	-	-	-	1	5	1	2	9	0.72
Spasm of para lumbar vertebral muscles	-	-	-	-	-	-	-	1	14	8	3	4	5	1	36	2.88
Spondylosis (Cervical)	-	-	-	-	-	-	-	-	2	1	6	14	5	4	32	2.56
Spondylosis (Lumbar)	-	-	-	-	-	-	-	-	21	9	17	20	10	7	84	6.74
Others	-	3	2	-	-	2	2	1	3	1	-	-	-	-	14	1.12
<b>TOTAL</b>	<b>15</b>	<b>15</b>	<b>26</b>	<b>18</b>	<b>20</b>	<b>21</b>	<b>33</b>	<b>29</b>	<b>318</b>	<b>215</b>	<b>172</b>	<b>216</b>	<b>78</b>	<b>70</b>	<b>1246</b>	<b>100</b>

**Table 2: Association of Designation of Family Physician with Probability of an Abnormal Report of Ordered Procedure.**

	Abnormal reports %	Odds Ratio	Confidence interval (CI)	p-value
<b>Procedure ordered by</b>				0.004*
GP	21	1.00		
RG (registrar)	22	1.061	0.54, 2.08	0.863
SR (senior registrar)	31	1.69	0.89, 3.20	0.109
Consultants	42	2.72	1.46, 5.08	0.002*

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10/9/2013