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Exploration of the Causes of Musculoskeletal Injuries of Different Age Groups in Local Society

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Authors' contributions

This work was carried out in collaboration between all authors. Authors SS, SJ and KK designed the study, wrote the protocol and wrote the first draft of the manuscript. Author BZS performed the statistical analysis and managed the analyses of the study. Author RJ managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Aims: To study the types of all possible injuries in different age groups and its prevalence in the Saudi society, especially in the city of Jeddah and its causes.
Study Design: A prospective study with a special questionnaire to collect data.
Place and Duration of Study: Department of Radiology (X-ray Unit), King Abdulaziz University Hospital, Jeddah, Saudi Arabia, for 6 months.
Methodology: A questionnaire developed by the authors was used to collect data. The questionnaire had two parts. The first part was used to collect demographic data, and the second part was used to determine the type of injuries (trauma, motor vehicle accident, sudden and chronic). The subjects of the survey were chosen randomly from the radiology department at King Abdulaziz University Hospital (KAUH). Then, SPSS 15.0 for Windows was used for statistical analyses. Data are presented using descriptive statistics and were analyzed using the chi-squared test.

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Results: The participants (subjects) were male (56.5%) and female (43.5%) that had a mean age of 28.98±1.09 years, a mean height of 148.02±1.55 cm, and a mean mass of 58.71±1.63 kg. The older adults were the majority (32.2%) in this study followed by pediatric (30.6%) where the immune is lower than the other age groups' categories and is more affected by musculoskeletal injuries.
The common injuries of the different musculoskeletal system were explored and obtained. That the highest percentage is related to trauma (58.9%) in all age groups, where the dominant percentage in trauma was in the pediatric age group (27.6%).
Through our study, it was found that there is a high significant relationship ($p < 0.05$) with a degree of freedom is (df=12) between age groups and type of injuries for all genders.
Conclusion: More education needs to be provided for our community in preventing and limiting personal injury especially in younger age groups.

Keywords: Injury; trauma; musculoskeletal; chronic; motor vehicle accident; age groups.

1. INTRODUCTION

Radiology is considered as one of the main branches of medicine that helps the physician to obtain a proper and accurate diagnostic for many kinds of diseases and injuries. The radiology departments in hospitals play the main role for most of the diagnostic. So, the information about anatomy and pathology can be gained and investigated using different modules of the radiology department in hospitals. Because of that, the idea of this project had been emanated to use the resultant reports in the radiology department at King Abdulaziz University Hospital (KAUH) to explore the reasons for musculoskeletal injuries for different age groups, where the musculoskeletal system is considered as one of the most important support systems in the body.

Thus, the musculoskeletal system consists of three general components that rely on each other in order to function properly. Injury to one of these components may lead to the dysfunction of and ultimately to the deterioration of the other two components. In addition, the musculoskeletal system relies on and supports the circulatory system and the nervous system. Musculoskeletal injuries can result in damage to either of these two systems, and damage to the circulatory and or nervous system can result in dysfunction or deterioration of the musculoskeletal system [1].

Generally, there are many types of musculoskeletal system injuries. The most of these injuries are as follows. Firstly, dislocation (luxation) that is encountered in trauma as a common type of dislocations such as in the shoulder, fingers or thumb, patella and hip. Secondly, partial dislocation (subluxation) is in which the vertebra is displaced posteriorly. Thirdly, a fracture (contusion) that is a bruise-type of injury with a possible avulsion fracture such as a hip pointer, or football injury involving a contusion of bone at the iliac crest of the pelvis [2].

In fact, one of the highest causes of death and disability in human kind is Injury. Previous investigators at the emergency department of Bugando Medical Centre in Northwestern Tanzania reported that motor vehicle accidents were the leading cause (39.3%) of musculoskeletal injuries in 150 patients. Pediatric injuries that are caused by road traffic accidents (RTAs) is among the major public health problem especially when they are not properly seated.

Trauma is an important cause of childhood morbidity and mortality in developed countries while causing a higher loss of life rates in modern societies. Children in primary school and lower ages are at higher risks for musculoskeletal injuries because they are simply unable to avoid many hazards of injuries due to their lower capability in judgment, and thus find themselves in a large danger of accidents. The causes and ways of pediatric injuries vary based on many factors, e.g. socioeconomic status, geographic area, and environment factors.

The more people can identify high-risk injury patterns, the more they provide care and, therefore, a further reduction in the number of children admitted to hospitals with trauma. Since some of the pediatric injuries are preventable, this study aims to provide a better understanding of the causes and injury patterns in patients undergoing medical imaging, thus, the results obtained by this work will be essential for the establishment of prevention strategies in addition to best of practice treatment protocols [3].

Other work aimed to determine the incidence of injuries of children participating in sports and to present advice on injury prevention. The highest incidence of sports injury was in the foot-ankle region, and the lowest incidence was in the hip-femur region. The incidences of injuries to the neck, shoulder, elbow, hand, wrist, superior dorsal region, waist, hip-femur region, knee, and foot-ankle regions were not statistically significant. It was concluded that the causes of injuries were examined to propose preventive measures to minimize their occurrence and severity [4].

Recreational activities are important for the normal healthy development of children. The number of children and adolescents participating in sports and play activities continues to increase each year. Many of these injuries are minor and heal uneventfully; some can lead to permanent impairment. Even minor injuries cause anxiety and pain for both the child and the parents, incur costs in terms of time and money, and may lead to functional restrictions [5].

Musculoskeletal disorders are one of the most common causes of disability for people around the world. In adults, musculoskeletal pain is a common reason for care seeking, especially in primary health care settings where it is typically assessed and managed. A better understanding of these conditions in children and adolescents is important for developing effective preventive strategies and to provide a better understanding of the origin and progression of chronic pain into adulthood [6].

The number of musculoskeletal injuries sustained by children and adolescents has increased markedly. This may reflect an increasing use of motorized and high-speed wheeled vehicles among this population. It is important to recognize the basic skeletal differences between children and adults, the common signs and symptoms of fractures, sprains, strains, and dislocations; and the initial treatment and stabilization of these injuries in children [7].

Radiographs are most advantageous in the evaluation of bony abnormalities such as fractures, dislocation and osteoarthritis. Radiography is the least expensive imaging modality [8].

Based on the previous work and investigations this study was conducted in order to detect the most common musculoskeletal injuries of different musculoskeletal systems.

2. MATERIALS AND METHODS

An ethical approval was issued by the KAUH Ethics Commission to permit the survey by the authors at the department of radiology in KAUH, and also the collection of the required data to finalize this study.

The authors and researchers made a study plan of this project which was executed by building an appropriate questionnaire to be filled up by the patients, which covers mainly prospective studies of randomly selected patients who came to an emergency unit and the outpatient from other departments at KAUH in Jeddah.

The study subjects were males and females that were investigated randomly, by collecting data from the PACS unit that exists in the radiology department in KAUH.

The participants had a mean age of 28.98±1.09 years, a mean height of 148.02±1.55 cm, and a mean mass of 58.71±1.63 kg. A questionnaire that was developed by the authors was used to collect data. The questionnaire had two parts; the first part was used to collect demographic data, and the second part was used to determine the incidences and regions (knee, upper limb regions, other lower limb regions, spine, and pelvis) of different types of injuries. After collecting data, the SPSS 15.0 program for Windows was used for statistical analyses purposes. Data were presented using descriptive statistics and analyzed using the chi-squared test.

3. RESULTS

The musculoskeletal (extremities) were the most frequent body region injured. This research found that in 56.5% male and 43.5% female.

The age groups are in five main categories; pediatric (0 – 15 years old), youth (15 – 25 years old), adult (25 – 40 years old), older adults (40 – 60 years old) and elderly (>60 years old) as described in Fig. 3. Next, each age group was split according to the different causes of related musculoskeletal injuries.

In fact, older adults were the majority (32.2%) in this study, followed by pediatric (30.6%) where the immune is lower than the other age group

categories and is more affected toward musculoskeletal injuries as it is seen in Fig. 1.

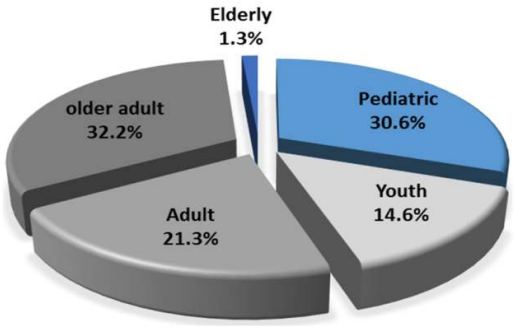

Fig. 1. Illustration of the percentage of age group for all injury types, for all subjects

The causes of disorders could be classified into four common causes as indicated in Fig. 2. It can be seen that the trauma cases were dominant (59.8%) in all category groups, especially in the pediatric age group (27.6%) as illustrated in Fig. 3. On the other hand, no chronic cases were reported in the pediatric and elderly age groups, as well as sudden cases in pediatric, as noted in Fig. 3. Fewer cases for the youth (1.7%) and elderly (0.3%) age groups of sudden were seen and noted, as well as chronic cases of the youth age groups (0.3%). It is worth mentioning that motor vehicle accidents were more frequent in the youth age group (5.6%). From another point of view, the sudden pain cases are dominant in older adult age groups (14%).

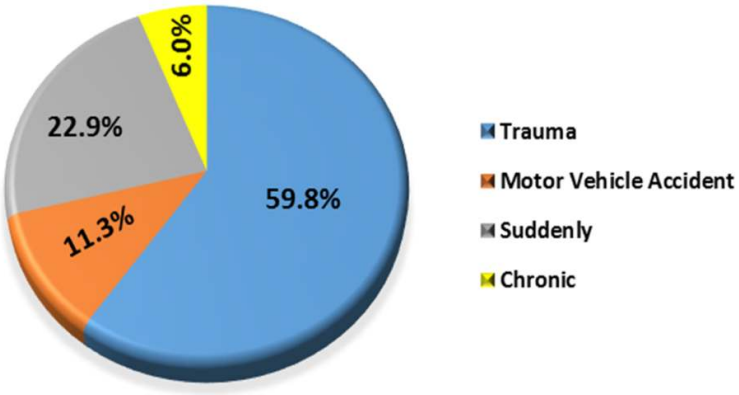

Fig. 2. Four common disorders for all genders and age groups

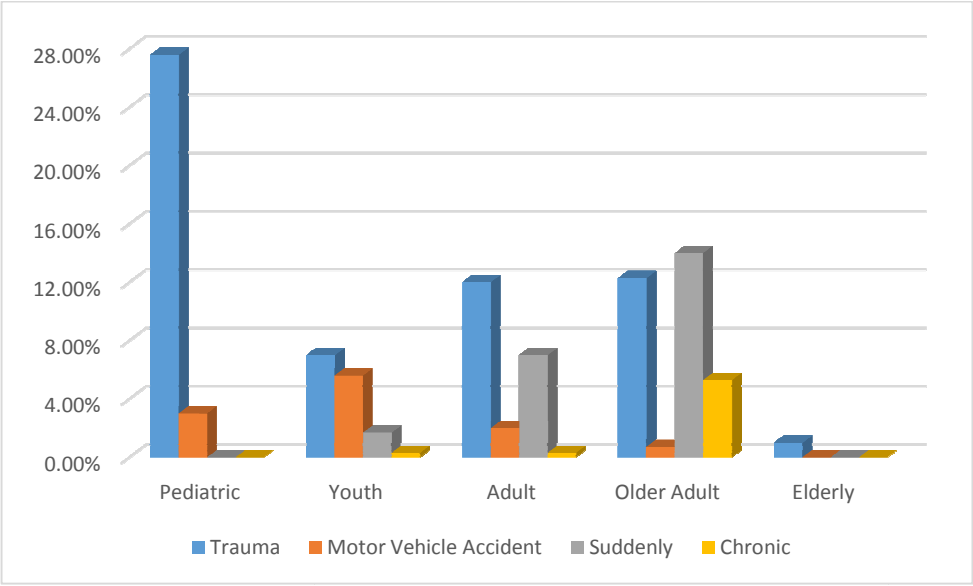

Fig. 3. Age groups categories for the four common disorders for all genders

4. DISCUSSION

During the data collection process, it was noted that there were limited emergency unit (ER) patients, because the ER department in KAUH was under reconstruction and so they weren't accepting all the ER cases. It is noticeable that the pathological indications of the musculoskeletal system had been increased possibly due to several factors such as; modern lifestyle, increasing in motor vehicle accident cases, modern sports and games and more hyperactivity in children due to video games violence.

It is also noticeable that there is an increase in children participating in sports nationally. With this increase (in participation in sports), there is also an increased risk of musculoskeletal injuries and disorders [9].

The metabolic rate is highest during the periods of rapid growth. As you get older, the amount of muscle decreases and metabolism naturally slows about 2-5% per decade after the age of 40, due to a decrease in lean mass and a greater percentage of body fatness [10]. Because of the fast metabolic rate that exists in the youth age group, only a minority had been injured for this age group (14.6%), which means that they have good health indications of the musculoskeletal system.

High incidence of injuries in the pediatric age group (30.6%) reflects a lack of coordination and unawareness of dangerous situations leading to accidents. In addition, this is the schooling age group and is usually involved in road traffic accidents as they rush through heavy traffic to and from their schools. These school-age group of children are usually very active and are often less supervised than pre-school age children. Also, the finding that most of the pediatrics injuries occurred at home demonstrates the important role of parental supervision as a key factor in child safety. The lack of advanced pre-hospital care and ineffective ambulance system for transportation of patients to hospitals are a major challenge in providing care for pediatrics injury patient [3].

The pre-hospital use of stabilization techniques improves the chances of a person surviving the journey to the nearest trauma-equipped hospital. Emergency medicine services determine which people need treatment at a trauma center as well as provide primary stabilization by checking and treating airway, breathing and circulation [11].

Injuries can be caused by any combination of external forces that act physically against the body. It is clear in our data that the dominant injury was trauma 59.8%, where it exists in all age groups and generally is produced by many factors such as blunt and penetrating, including falls, motor vehicle collisions, and gunshot wounds. Although the motor vehicle accidents' ratio for all subjects was 11.3%, this ratio can be considered as a cause of trauma either directly or indirectly.

Injury prevention strategies must be used to prevent injuries in children and older adults, which forms the majority of the local society (62.8%) and who are a high-risk population as noted in Fig. 1. Injury prevention strategies generally involve educating the general public about specific risk factors and developing strategies to avoid or reduce injuries. Legislation intended to prevent injury typically involves seatbelts, child car seats, helmets, alcohol control, and increased enforcement of the legislation. Other controllable factors, such as the use of drugs including alcohol or cocaine, increases the risk of trauma by increasing the likelihood of traffic collisions, violence and abuse occurring. Prescription drugs such as benzodiazepines can increase the risk of trauma in elderly people.

Trauma is the sixth leading cause of death worldwide, resulting in five million or 10% of all deaths annually [12,13]. It is the fifth leading cause of significant disability [12]. Injury affects more males; 68% of injuries occur in males [14] and death from trauma is twice as common in males as it is in females; this is believed to be because males are much more willing to engage in risk-taking activities [13]. Teenagers and young adults are more likely to need hospitalization from injuries than other age groups [15]. While elderly persons are less likely to be injured, they are more likely to die from injuries sustained due to various physiological differences that make it harder for the body to compensate for the injuries [15]. The primary causes of traumatic death are the central nervous system injuries and substantial blood loss [12].

In 2013, a number of 2,163 teens in the United States (U.S.) aged 16–19 were killed and 243,243 were treated in emergency departments for injuries suffered in motor vehicle crashes [16]. That means that six teens ages 16–19 died every day from motor vehicle injuries.

Young people aged 15-24 represent only 14% of the U.S. population. However, they account for 30% ($19 billion) of the total costs of motor vehicle injuries among males and 28% ($7 billion) of the total costs of motor vehicle injuries among females [17].

Similarly, in our study, it was found that around 50% of the injured subjects by motor vehicle accident were youth males, which confirms the previous study and ratios in the U.S. This high percentage indicates that the youth are more likely (than older drivers) to underestimate dangerous situations or not be able to recognize hazardous situations. Also, the presence of male youth passengers increases the likelihood of this risky driving behavior. Based on our questionnaire's questions and compared with the other age groups, the youth have the lowest rate of seat belt usage.

So, deaths and injuries resulting from crashes and accidents involving youth drivers should be prevented to minimize the risk of injuries and disorders. We believe that the seat belts reduce serious crash-related injuries and deaths by about half or more. Generally, driving is a complex skill, one that must be practiced to be learned well. Youths' lack of driving experience, together with risk-taking behavior, puts them at a heightened risk for crashes. The need for skill-building and driving supervision for new drivers is the basis for graduated driver licensing (GDL) programs, which exist in all Kingdom of Saudi Arabia (KSA) regions. GDL provides longer practice periods, limits driving under high-risk conditions for newly licensed drivers, and requires greater participation of parents in their youths' learning-to-drive. It is suggested that the more comprehensive GDL programs are associated with reductions of 38% and 40% in fatal and injury crashes, respectively, among 16-year-old drivers [18]. When parents know their region's GDL laws, they can help enforce the laws and, in effect, help keep their teen drivers safe.

Through our study, it was found that there is high significant relationship ($p < 0.05$) for the degree of freedom which is (df=12) between age groups and cause of injuries for all types of genders.

5. CONCLUSION

The high figure of musculoskeletal injuries affecting mainly the extremities is attributable to a large number of trauma where a high trauma incidence is approximately in all age groups and especially in pediatrics. This is possibly due to their less awareness of risk and harmful situations. The second trauma incidence rates were found in the adult and older adult groups due to less flexibility, obesity and aging.

At the same time, this research's results indicated a high probability of motor vehicle accidents in the youth age group that was mainly due to their careless driving at high speeds and mobile usage while driving.

Also, many patients who came with sudden or chronic pain were from an older adult group. This is maybe due to aging diseases or obesity as mentioned previously.

Authors recommended further investigations in common indications and causes based on other hospital (radiology department) information. This will reflect the community's major musculoskeletal disorders in the area surrounding the hospital. Also, they plan to conduct a thorough study to examine each type of injuries by studying the image findings and then determine the type of disorders existed in each one and its causes.

We also recommend extending our work to include patient education via campaigns and social media, as well as to provide health education via the best practice to prevent common injuries reported by the study.

CONSENT

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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