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PREVALENCE OF ROUNDED SHOULDER IN COMPUTER USERS: A CROSS-SECTIONAL STUDY

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Abstract

Background and aim: *The study's goal was to determine the prevalence of rounded shoulders in computer users. Computer technology has become a very important part of our lives. It impacts significantly our health, daily life and work and also the upper extremities of our body including shoulders, neck arms and hands.*

Methodology: *The research is based on observation. The study enlisted the participation of 377 people in total. Both males and females were included. A demographic questionnaire of Age, BMI etc. was used and VAS was also added to the survey. The participants were observed and shoulders were measured by different tools using a goniometer/flexible scale and wall stand test. Data were collected according to working hours/screen time.*

Results: *The results show 62.6% of participants with rounded shoulders. Most users were of young age and they spent different hours at the computer but minimum was 3 hours. There were 62.1% of users for more than a year and 41.6% of participants use a computer or laptop for more than 5 hours per day. The use of a computer for a long time without proper posture can cause rounded shoulders.*

Conclusion: *It is concluded that poor, long and sustained posture can cause rounded shoulders. It is also observed that the use of technology for a long time without a healthy lifestyle is also a cause of pain in individuals but all have their own experiences. The best prevention of rounded shoulders is to sit in proper posture or wear shoulder belts while using devices.*

Keywords: *Computer users, Forward Shoulder, Neck Pain, Rounded Shoulder, Shoulder Pain*

INTRODUCTION

The humerus and scapula form a ball-and-socket joint known as the shoulder joint. The ball is inserted into the socket of the other bone, allowing your shoulder to move more freely. The shoulder joint allows for a broad and adaptable range of motion (1, 2). It is protected by a layer of cartilage and consists of two major groups of joints. The acromioclavicular joint is formed between the upper part of the scapula and the collarbone. The glenohumeral joint is formed by the rounded apex of the humerus and the outer edge of the scapula (3,4). It is also commonly referred to as the shoulder joint. The shoulder joint is the body's most important mobile joint. It also permits the arm to move in a circular motion up and away from the torso. The rotator cuff is composed of four tendons. Tendons are the connective tissues that connect muscles and bones. Injury or swelling of the rotator cuff' s tendons or bones can make lifting the arm above the head painful or difficult.

The shoulder complex consists of the clavicle, scapula, and humerus, along with the glenohumeral and acromioclavicular (AC) joints that connect them. Additionally, the sternoclavicular (SC) joint serves as the complex's only connection to the axial skeleton. Anatomically, the shoulder complex comprises a scapulothoracic joint and a subacromial joint (5). These articulations work together to offer a range of mobility for the shoulder that no other joint mechanism can equal. All of the shoulder's joints move in unison and in harmony is required for full mobility. Along with elbow motion, this vast range of movement allows the hand to be located wherever inside the visual workspace. While some jobs and sports events need this range of motion, most daily tasks may be completed even if shoulder complex motion is gone, as long as mobility in the cervical spine and distal upper extremity joints are maintained (6).

The shoulder is a complex joint with a large range of motion and a variety of functional needs. To effectively identify and diagnose shoulder disease, one must have a strong knowledge of the complex network of bony, ligamentous, muscular, and neurovascular anatomy (7).

Physical examination is crucial in determining the severity of a patient's shoulder problems. Inspection, palpation, range of motion, strength, and neurovascular integrity must all be maintained just like any exam. However, because of the complexity of shoulder anatomy, specialized diagnostic techniques must be used to localize and assist in distinguishing disorders.

Both the glenoid and the humeral head are surrounded by a layer of hyaline articular cartilage. The rotator cuff is made up of four muscles that connect tendons to the proximal humerus: supraspinatus, subscapularis, infraspinatus, and teres minor (2, 4). Shoulder discomfort is caused by the joints and soft tissues that surround the shoulder. Some of the joints are the glenohumeral, acromioclavicular, and sternoclavicular. As you become older, you're most likely to suffer shoulder difficulties, especially beyond the age of 60 because the soft tissues that surround the shoulder degrade with age (5). The average amount of time spent on a computer, as well as the use of a computer mouse, has increased dramatically over time. Long, continuous posture, constant force, and highly repetitive movements are examples, as are psychological factors such as time constraints and high quantitative expectations at work (6, 7). As a result, shoulder diseases are becoming more prevalent, particularly among adolescents and young adults. These include internet access, cell phone use, and computer games (6). The acromial process of the shoulder joint, which extends along the line of gravity, characterises RSP. As the shoulder is raised, straightened, and rotated downwards, it bends. The pectoralis muscle shortens and alters normal muscle function. In patients with shoulder problems, shortening or adaptive tension of the pectorals minor muscles (PMm) is a potential biomechanical mechanism associated with changes in scapula alignment during arm lifting and movement of the scapula during shoulder difficulty (8, 9).

MATERIALS AND METHODS

This research employed a descriptive cross-sectional study design. Data were collected from both the public and private sectors of Gujranwala. The study was completed over a period of approximately 4 months. Non-probability convenience sampling was used as the sampling technique and the sample size was 377. The sample was selected based on specific inclusion and exclusion criteria. The inclusion criteria included individuals aged between 20 and 40 years, working more than 3 hours per day, and having at least 1 year of computer usage experience. The exclusion criteria were any type of fracture at the upper extremity (Cervical, Shoulder, Lumbar) in 6 months and any type of surgery at the upper extremity (Cervical, Shoulder, Lumbar) in 6 months. The tools used in this study were the flexible scale and VAS (Visual Analogue Scale).

DATA COLLECTION

We used a descriptive cross-sectional study design. To achieve the desired sample size of 377 participants, data were collected from both private and public offices and institutes in Gujranwala and the Demographic questionnaire with questions about Age, BMI and exclusion criteria was used for this study. A consent form was used to assure the participants that their privacy will remain secure. A flexible scale was used to assess the midline between the ear meatus and acromioclavicular joint (line of gravity) in participants, serving the purpose of the study. For the study, the flexible scale was placed on the acromioclavicular joint and the tilt was assessed whether the acromioclavicular joint (shoulder) is tilted forward or not. The wall stand test was also used to observe rounded shoulders (shoulder forward tilt) as participants stood against a wall in a comfortable and normal position. A visual Analogue Scale (Cronbach alpha = 0.95) was used to assess pain in the shoulder due to a rounded shoulder or irregular posture. Data and information were included from participants who met the inclusion criteria of the study, while participants who did not meet the inclusion criteria were excluded to reduce bias in the study results.

SURVEY FOR EVALUATION OF PATIENT'S SATISFACTION LEVEL

Subjects were selected by voluntary response sampling. A survey was conducted to assess patient satisfaction, and questionnaires were randomly filled out by respondents aged 20 to 40 years. Our questionnaire consists of two components: (a) The demographic profile section (b) the question specified for pain.

ETHICAL CONCERNS

This study was approved by the Ethical & amp; Research Committee of The University of Lahore and the teaching hospital associated with it. Consent was also obtained from the patients.

RESULTS

A total of 377 participants between the ages of 20 and 40 years old were included, and demographic data were collected through a questionnaire. The Frequency of demographic data of participants is mentioned in Table I which shows the list of variables with or without categories and the total number of participants.

Table I. Frequency of Demographic data Age, Gender and BMI of Participants

S #	Variables	Categories	n%
1	Age of the Participants (years)	20-25 years old	295 (78.2%)
		26-30 years old	55 (14.6)
		31-35 years old	15 (4%)
		36-40 years old	12 (3.2%)
2	Gender of the Participants	Male	143 (37.9%)
		Female	234 (62.1%)
3	BMI	<18.5 Underweight	6 (1.6%)
		18.5- 24.9 Normal	270 (71.6%)
		25- 29.9 Overweight	81 (21.5%)
		30- 34.9 Obese	20 (5.3%)

The inclusion criteria for participants were computer users for more than 1 year and working hours> 3 hours per day. In Fig. 1 working hours per day of the participants are shown as these hours divided into 3 groups. Most of the participants (n=157) were in 6-8 hours group.

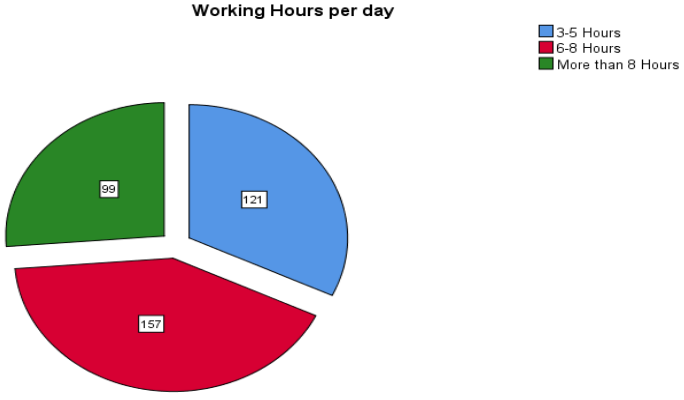

Fig. 1. Working hours per day of the participants

Out of the 377 participants, 236 exhibited rounded shoulders, while 141 participants (62.6%, p<0.001 in relation to gender) did not. Most participants had the right dominant hand. No pain was observed in 211 participants and only 166 participants had mild to moderate pain on VAS. Out of 377, male participants were 143 and 234 were female. We divided all the participants into four groups based on their mean age of ±23.80. Table II shows mean+ St.dev, minimum and maximum of the age and BMI. The minimum age was 20 and the maximum age was 40. The BMI of participants was 16.7 minimum and 33.6 maximum as some were obese.

Table II. Mean and Standard Deviation of Age and BMI of participants

	Mean±St. Deviation	Minimum	Maximum
Age	23.80±4.475	20	40
BMI	23.19±3.003065	16.7191	33.6012

There were 295 participants in the first group, which holds the major portion with ages between 20 and 25 (78.2 %). There were 377 participants with a mean weight of 64.918 kg and a mean height was 1.65 meters. Participants were divided into 4 groups based on their BMI, with a mean value of 23.67 (p=0.001). Group 2 holds 270 participants who have a BMI of 18.5-24.9. Participants were divided into 3 groups based on their working hours per day. In 1st group, there were 121 participants who worked 3-5 hours per day. Participants who worked 6-8 hours per day were assigned to the 2nd group, comprising 157 individuals (41.6%). Additionally, 99 participants were assigned to the 3rd group, as they worked more than 8 hours per day. Fig. 2 shows that the rounded shoulder is associated with the BMI of the participants. The rounded shoulder is statistically significant with the BMI of the participants.

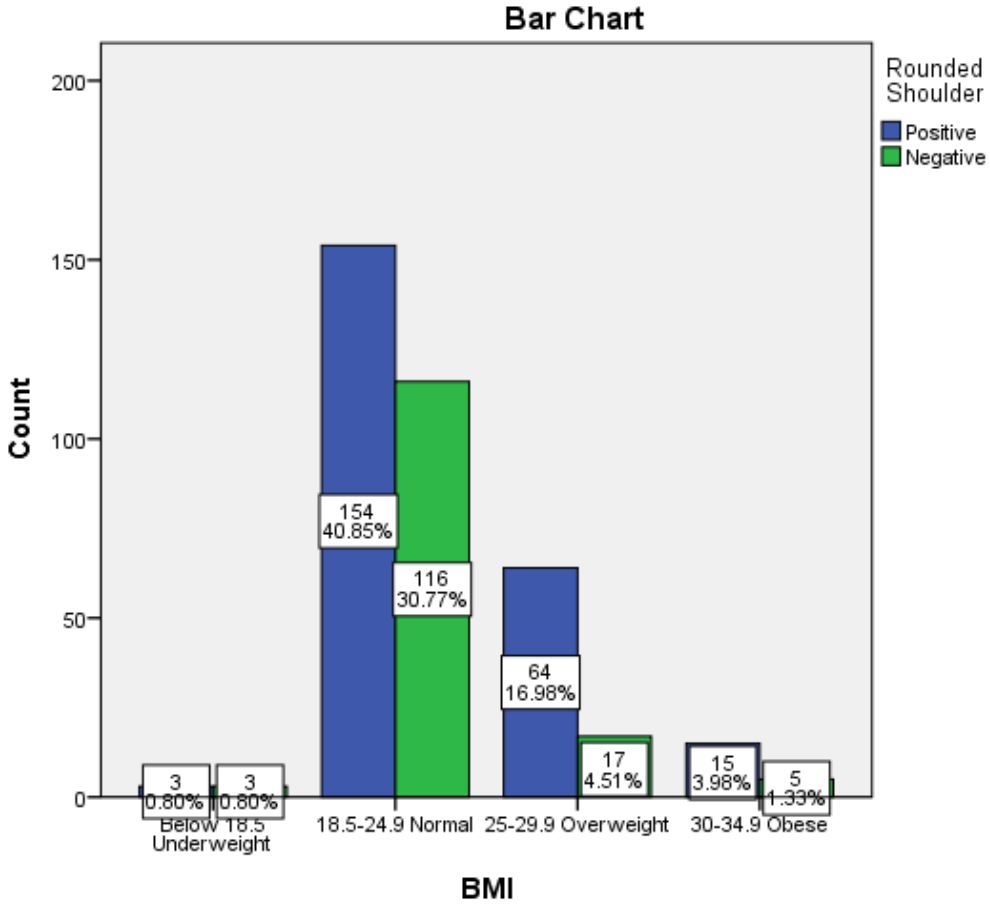

Fig. 2. Rounded shoulders with BMI of the participants

Table III displays 62.6% of participants with rounded shoulders and 37.4% were normal (negative). A total of 377 participants were observed, with more than half, specifically 62.6%, exhibiting rounded shoulders.

Table III. Result of rounded shoulder from total n=377 of participants

	N (%)
Positive	236 (62.6%)
Negative	141 (37.4%)
Total	377

DISCUSSION

Rounded shoulders are characterized by the protrusion and forward bend of the shoulder blades from the front plane (10). When working with small, portable devices, it is common to develop a forward head posture and rounded shoulders to some extent (11). A previous study on healthy subjects aged 20 to 50 reported a prevalence of 66 percent for forward head posture (FHP) and 73%for right rounded shoulder posture (RSP) (12). Lifting, pushing, pronation, and supination are among the most common upper limb actions associated with sustaining device load, operating control components, and utilizing devices (13). Work-related upper extremity musculoskeletal diseases appear to be becoming more common in many industrial nations (14). This is happening at the same time that the usage of computers is increasing. Increased working hours and time restrictions, as well as static postural limits, may be causing issues. As a result, more attention is being paid to the avoidance of work-related upper extremity musculoskeletal diseases among computer users (15, 16). Every year, significant funds are invested in healthcare issues in the United States. Controlling muscle tissue loss would result in billions of dollars saved each year (17). Suggestions for 'optimal' computer work changes are supposed to enhance postures, minimize muscle activity, and give upper-limb rest, preventing musculoskeletal diseases. Although the intensity of muscle activity during computer work is normally minimal, it appears that the increases gradually of certain muscle tissue recruited early and constantly over lengthy periods of time may be a pain-inducing process (18, 19). Moreover, computer work might entail fine-tuning, strong mental strain, and tight deadlines. These traits have also been connected to an increase in muscle activity, which has been associated with the development of pain (20, 21).

In this study, the aim was to assess the prevalence of rounded shoulders in computer users as we all know this is a technology era and in this technology world, everyone depends on different electronic items for their work, education and entertainment. In this study, a survey was held which included 377 participants to complete the study with both genders (male and female). The 377 participants were included according to the study criteria. The sample size of 377 meets without any biases in the selection of participants. The participants who have any kind of pathological issue, fracture or surgery in the upper extremity i.e. cervical, shoulder and lumbar region were excluded from the study to minimize the bias in the results of the study.

According to Screen Time data, the current study's findings align with and reinforce this statistic, with the sample of computer users averaging at least 3 hours per day (the majority of users were between 6-8 hours) using technology. The majority of participants said they used their laptops for an additional 1 to 10 hours per day outside of work or class, while some said they used their laptops for up to 16 hours per day. While the research did not specifically cover laptop postures, this auxiliary data emphasises the breadth of tech use beyond portable devices and urges more research.

The prevalence of rounded shoulders in computer users required for user interface and the necessity for more inquiry on the musculoskeletal effects of this tendency on the human body and occupational performance is highlighted in this paper. In this study, goniometric measurements of the shoulder were taken with participants, and the position of using the computer or laptop was observed. According to survey findings, 34.5% of work-related pain was self-reported by participants (moderate) and 44% had pain overall (moderate and severe).

The findings of this study confirmed a prevalence of positive rounded shoulder (62.6%) among users and offered a specific biomechanical explanation for this condition, highlighting the need for additional research on the muscular effects of incorporating technology into the profession. - Understanding

overall activity analysis, as well as definitions of habits, roles, and routines, gives professional therapists a distinct perspective on assessing and intervening in this trend. Precautionary strategies, climate change, equipment changes, and orthopaedic interventions (e.g. methods with physical agents, braces) as a preparation method to enhance professional performance are examples of interventions. Although changing the posture associated with small portable devices can be difficult, prevention may include looking at how much time you spend on your computer and laptop technology, as well as stretching to correct local imbalances in the muscular system. New technologies that promote balance and prevention may provide solutions. ScreenTime, a new technology feature, not only monitors usage but also allows for downtime in administration on specific apps and planned downtime derived from technology. Occupational therapists and other rehabilitative specialists play a crucial role in addressing this phenomenon, as it can have significant implications for an individual's daily life and work. Physical therapy can help correct this rounded shoulder position by recommending proper sitting, rest, and sleeping postures, as well as exercise and a healthy lifestyle.

CONCLUSION

In conclusion, a significant portion of the population is affected by poor, prolonged, and sustained posture. Computer and technology use is increased which affects a healthy lifestyle and due to a lack of good posture and a healthy life, people are experiencing pain also. Factors such as long working hours, occupation, and the use of computers in various positions contribute to rounded shoulder and other upper extremity diseases and pain.

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Conflict of Interest:

All authors have no conflict of interest.

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