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Original Research Article

Prevalence of Neuromuscular Pain and Injuries in Recreational Computer Gamers

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ABSTRACT

Background: Recreational computer gaming has become a dominant leisure activity among young adults, yet its musculoskeletal and neuromuscular health consequences remain underexplored compared to professional e-sports. Prolonged static postures, repetitive fine motor actions, and inadequate ergonomic practices may predispose gamers to pain and injuries.

Objective: To determine the prevalence, risk factors, and impact of neuromuscular pain and injuries among recreational personal computer (PC) gamers aged 18–30 years.

Methods: A cross sectional observational study was conducted over six months using an online self structured questionnaire. A total of 123 recreational PC gamers were recruited via snowball sampling. Data on demographics, gaming exposure, ergonomic practices, pain characteristics, and functional impact were collected. Descriptive statistics summarized prevalence patterns, while chi square tests assessed associations between pain severity and selected variables ($p < 0.05$).

Results: Participants had a mean age of 23.36 ± 2.91 years; 67% were male. Overall, 51.2% reported neuromuscular pain, most frequently in the neck (54%), lower back (34%), and eyes (32%). Pain severity was predominantly mild (49%), though 12% reported severe or very severe symptoms. Significant associations were observed between pain severity and weekly gaming exposure ($÷^2 = 20.59$, $p = 0.05$), daily exposure ($÷^2 = 12.10$, $p = 0.04$), and posture adjustment frequency ($÷^2 = 17.16$, $p = 0.02$). Despite recurring pain, only 22% sought medical attention, while many relied on self management strategies such as ice/heat therapy or physiotherapy.

Conclusion: Recreational PC gamers demonstrate a high prevalence of mild to moderate neuromuscular pain, strongly influenced by gaming duration, posture, and ergonomic practices. Underutilization of healthcare services highlights the need for awareness campaigns, ergonomic interventions, and preventive physiotherapy strategies to mitigate gaming related health risks in young adults.

KEYWORDS: Recreational computer gaming, Neuromuscular pain, Musculoskeletal injuries, Ergonomics, Posture.

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INTRODUCTION

The exponential rise in recreational computer gaming has transformed digital leisure into a dominant cultural phenomenon, particularly among young adults. While gaming offers cognitive stimulation and social engagement,

prolonged exposure to screen-based activities has been increasingly linked to adverse health outcomes, notably neuromuscular pain and musculoskeletal injuries. A recent cross-sectional study conducted in Saudi Arabia revealed that over 86% of competitive video gamers reported at least one site-specific musculoskeletal injury, with the lower back, neck, hand/wrist, and shoulder being the most affected regions [1]. Recent investigations into the health implications of electronic gaming have highlighted a growing concern regarding upper limb neuropathies among e-sports athletes. A cross-sectional study conducted in Saudi Arabia revealed a significantly higher prevalence of carpal tunnel syndrome in e-sports players compared to non-gaming controls, with symptoms such as radiating hand pain, numbness, and functional impairment linked to prolong gaming durations and repetitive wrist movements [2]. Moreover, male gamers exhibited more pronounced neuropathic symptoms than females, and symptom severity correlated positively with years of gaming experience and intensity of play [2]. The review also highlighted cases of thromboembolic events, seizures triggered by visual overstimulation, and autonomic nervous system hyperactivity, all of which contribute to increased oxidative stress and cardiac vulnerability in young e-sports athletes [3].

The exponential growth of the e-sports industry has introduced a unique set of musculoskeletal challenges that demand specialized clinical attention. Despite the physical demands placed on competitors who often perform 500–600 fine motor actions per minute for 5 to 10 hours daily there remains a significant gap in evidence-based healthcare tailored to this population [4].

The rise of e-sports as a global competitive and entertainment medium has prompted growing concern over its physical health implications, particularly among non-professional players. A recent cross-sectional study comparing e-sports participants with non-gamers revealed that while e-sports players demonstrated significantly faster reaction times suggesting enhanced cognitive processing, they also reported lower levels of physical activity and a higher incidence of gaming related discomfort [5]. As e-sports continues its rapid ascent as a structured competitive discipline, concerns regarding musculoskeletal health among players have gained prominence. A cross-sectional study of Danish e-sports athletes revealed that 42.6% experienced musculoskeletal pain, with the back, neck, and shoulders being the most commonly affected regions [6]. Neck pain and low back pain have emerged as significant health concerns among personal computer gamers, particularly in regions with high gaming engagement such as Saudi Arabia. A recent cross-sectional study found that 10.3% of gamers reported prior neck injuries and 27.2% had experienced back injuries, with pain prevalence strongly associated with prolonged gaming sessions and poor ergonomic habits key risk factors included playing for more than 10 hours per day, gaming every day of the month, leaning forward while seated, and using suboptimal seating arrangements. These findings underscore the urgent need for awareness campaigns promoting proper posture, ergonomic setups, and regular physical activity to mitigate the musculoskeletal risks inherent in sedentary gaming lifestyles [7].

Professional e-sports players have been studied, but recreational gamers remain underexplored. This study addresses that gap by examining prevalence, risk factors, and impact of neuromuscular pain in recreational PC gamers.

METHODOLOGY

Study Design: A cross-sectional observational study

Study Setting and Duration: The study was carried out using an online survey-based approach among recreational PC gamers over a period of six months.

Study Population: The study population consisted of recreational computer gamers aged 18–30 years who met the predefined eligibility criteria.

Sample size: 123 (was determined using the g power software)

Sampling Technique: Snowball sampling

Ethical Considerations: Ethical clearance was obtained prior to the commencement of the study. All participants were informed about the nature and purpose of the study, and informed consent was obtained electronically before participation. Confidentiality and anonymity of participant data were strictly maintained throughout the study.

Inclusion Criteria:

- Male and female participants
- Age group: 18–30 years
- Recreational PC gamers
- Minimum gaming experience of one year
- Average gaming exposure of ≥ 100 hours in the preceding two months
- Indian nationality

Exclusion Criteria

- History of recent surgery
- Fracture within the past six months
- Pregnancy
- Professional or competitive PC gamers
- Known underlying neurological disorders

Data Collection Tool: Data were collected using a self-structured questionnaire, designed to assess demographic details, gaming habits and exposure duration, ergonomic and postural practices, presence, severity, and recurrence of neuromuscular pain and injuries, impact of pain on daily activities, sleep, and gaming performance. The tool was validated using face validity. The questionnaire was administered through an online platform, and responses were recorded electronically through google form responses.

Study Procedure : After obtaining ethical approval, eligible participants were approached online and provided with a detailed explanation of the study. Upon providing informed consent, participants completed the online questionnaire independently.

Statistical Analysis: The collected data were compiled and analyzed using Microsoft Excel and Jamovi version 2.6. Descriptive statistics were used to summarize demographic variables and prevalence data. Inferential statistics were applied to assess associations between neuromuscular pain and selected gaming-related factors, with the level of significance set at $p < 0.05$.

RESULTS

This chapter presents the analysis and interpretation of data obtained from 123 participants. The Prevalence, risk factors, and impact of musculoskeletal and nerve related pain and injuries in recreational computer gamers, was assessed using a self-structured questionnaire. The findings are organized according to the study objectives and include descriptive statistics, and frequency distribution of responses for each question. Chi square test was used to check association between various variables. Statistical analysis was done using Microsoft Excel.

Summary of findings from the questionnaire:

Most participants reported moderate PC gaming exposure (1–10 hours/week), indicating recreational rather than excessive gaming habits.

Over-ear headsets were the most commonly used audio devices during gaming sessions.

A considerable proportion of participants reported a need to increase audio volume over time, suggesting possible auditory strain.

More than half of the participants positioned their screens at eye level, though a notable proportion maintained suboptimal screen heights.

The majority of participants engaged in continuous gaming for 1–2 hours without breaks, reflecting prolonged static postures.

A large proportion participated in intense or competitive gaming, requiring sustained concentration and rapid movements.

Postural adjustments were made mostly on an occasional basis, indicating partial ergonomic awareness.

Gaming environments were almost equally divided between dark and well-lit rooms.

Most participants perceived their gaming environment as comfortable or very comfortable.

Neck pain was the most commonly reported symptom, followed by lower back pain and eye strain.

Table 1: Descriptive Statistics of Age.

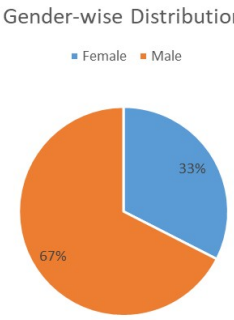
	Age (in years)
Mean	23.36
Median	23
Mode	22
SD	2.91
Minimum	18
Maximum	30

The participants were predominantly young adults with a mean age of 23.36 ± 2.91 years, indicating a relatively homogeneous age distribution.

Table 2: Gender-wise Distribution.

	Number of Participants	Percentage (%)
Females	40	33%
Males	83	67%

The sample comprised a higher proportion of males (67%) compared to females (33%), reflecting male predominance among recreational computer gamers.

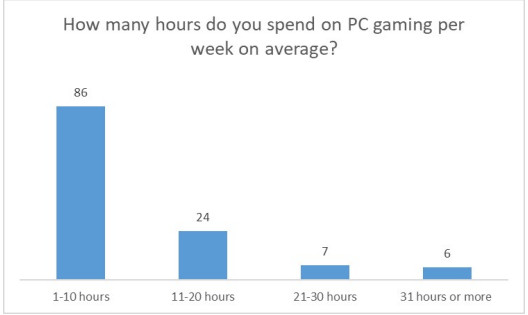


Prevalence, risk factors, and impact of musculoskeletal and nerve related pain and injuries in recreational computer gamers

The questionnaire was divided into two sections: Section A and B. Section A collected all the demographic data and Section B collected details about their gaming habits.

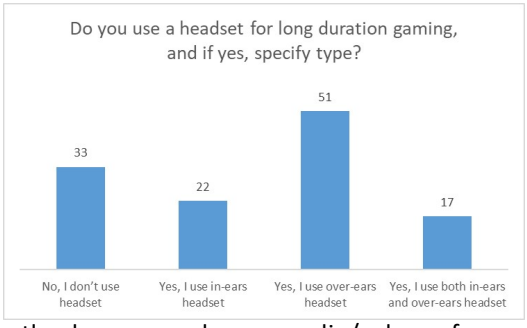
1. **How many hours do you spend on PC gaming per week on average?**

1-10 hours	86	70%
11-20 hours	24	20%
21-30 hours	7	6%
31 hours or more	6	5%



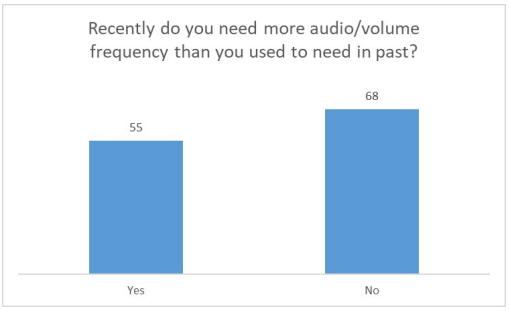
Do you use a headset for long duration gaming, and if yes, specify type?

No, I don't use headset	33	27%
Yes, I use in-ears headset	22	18%
Yes, I use over-ears headset	51	41%
Yes, I use both in-ears and over-ears headset	17	14%



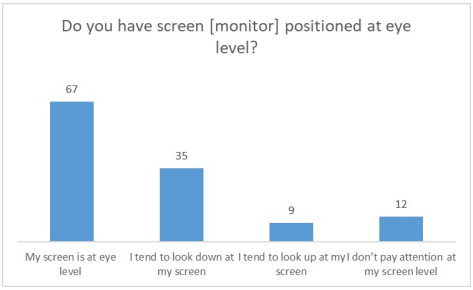
Recently, do you need more audio/volume frequency than you used to need in past?

Yes	55	45%
No	68	55%



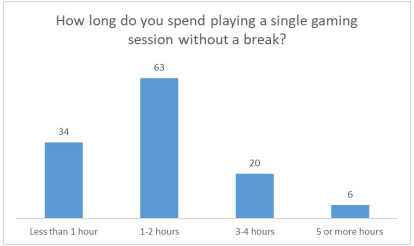
Do you have screen (monitor) positioned at eye level?

My screen is at eye level	67	54%
I tend to look down at my screen	35	28%
I tend to look up at my screen	9	7%
I don't pay attention at my screen level	12	10%



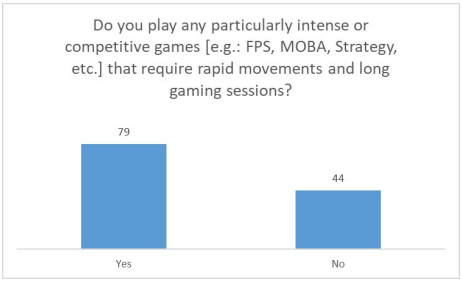
How long do you spend in a single gaming session without a break?

Less than 1 hour	34	28%
1-2 hours	63	51%
3-4 hours	20	16%
5 or more hours	6	5%



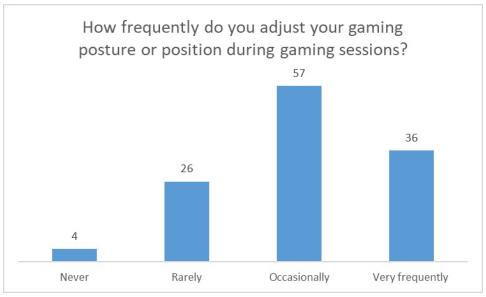
Do you play any particularly intense or competitive games (e.g.: FPS, MOBA, Strategy, etc.) that require rapid movements and long gaming sessions?

Yes	79	64%
No	44	36%



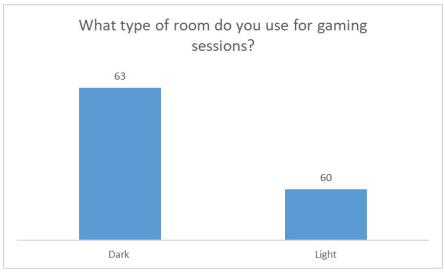
How frequently do you adjust your posture or position during gaming sessions?

Never	4	3%
Rarely	26	21%
Occasionally	57	46%
Very frequently	36	29%



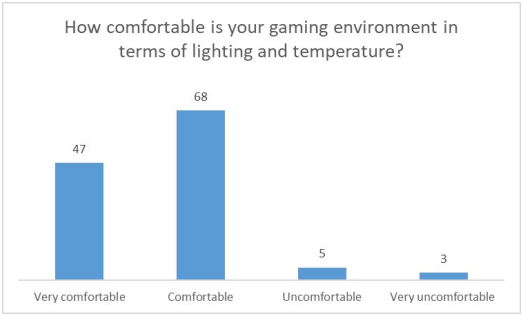
What type of room do you use for gaming sessions?

Dark	63	51%
Light	60	49%



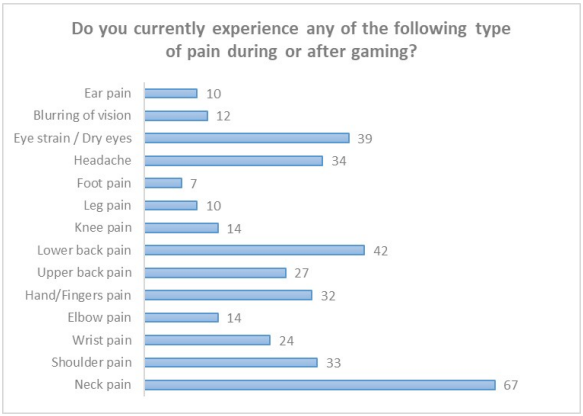
How comfortable is your gaming environment in terms of lighting and temperature?

Very comfortable	47	38%
Comfortable	68	55%
Uncomfortable	5	4%
Very uncomfortable	3	2%



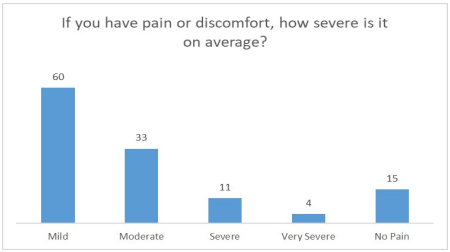
Have you ever been diagnosed with a muscle, oint, bone, or nerve related injury (e.g., joint pain, back pain, wrist pain, nerve pain, tingling, numbness)?

Joint pain / Symptom	Count	
Neck pain	67	18%
Shoulder pain	33	9%
Wrist pain	24	7%
Elbow pain	14	4%
Hand/Fingers pain	32	9%
Upper back pain	27	7%
Lower back pain	42	12%
Knee pain	14	4%
Leg pain	10	3%
Foot pain	7	2%
Headache	34	9%
Eye strain / Dry eyes	39	11%
Blurring of vision	12	3%
Ear pain	10	3%



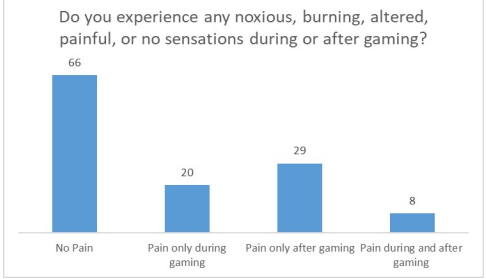
If you have pain or discomfort, how severe is it on average?

Mild	60	49%
Moderate	33	27%
Severe	11	9%
Very Severe	4	3%
No Pain	15	12%



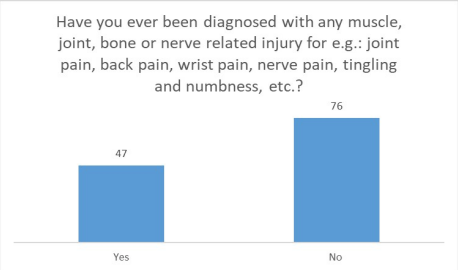
Do you experience any noxious, burning, altered, painful, or no sensations during or after gaming?

No Pain	66	54%
Pain only during gaming	20	16%
Pain only after gaming	29	24%
Pain during and after gaming	8	7%



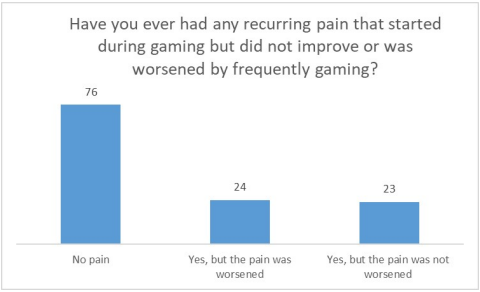
Have you ever been diagnosed with a muscle, joint, bone, or nerve related injury (e.g., joint pain, back pain, wrist pain, nerve pain, tingling, numbness)?

Yes	47	38%
No	76	62%



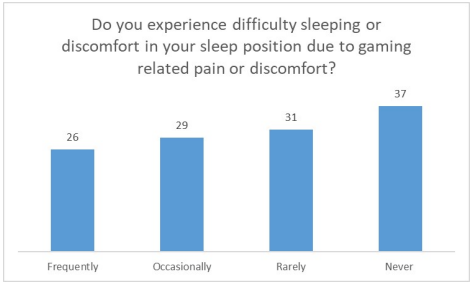
Have you ever had recurring pain that started during gaming but did not improve or worsened by frequent gaming?

No pain	76	62%
Yes, but the pain was worsened	24	20%
Yes, but the pain was not worsened	23	19%



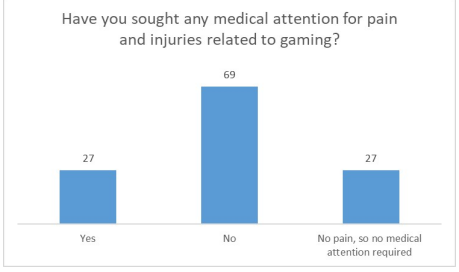
Do you experience difficulty sleeping or discomfort in your sleep position due to gaming related pain or discomfort?

Frequently	26	21%
Occasionally	29	24%
Rarely	31	25%
Never	37	30%



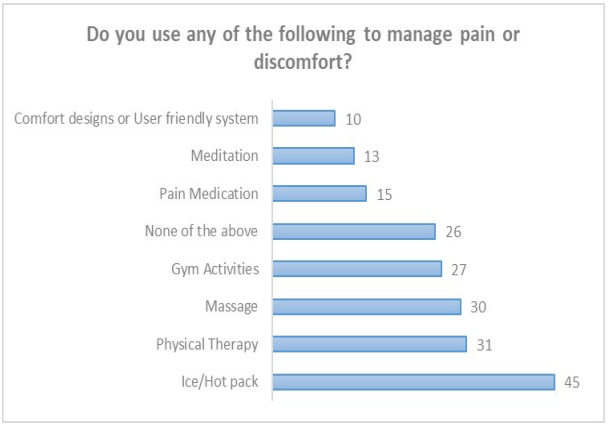
Have you sought medical attention for pain and injuries related to gaming?

Yes	27	22%
No	69	56%
No pain, so no medical attention required	27	22%



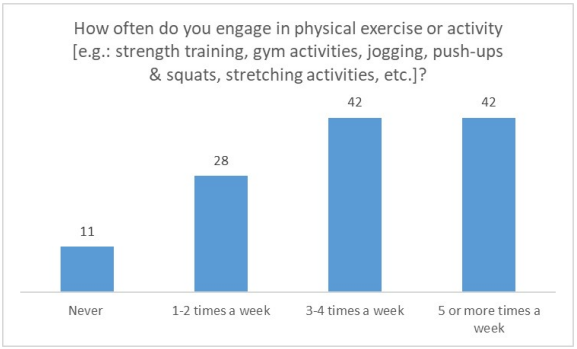
Do you use any of the following to manage pain or discomfort? (Select all that apply)

Item	Count	
Ice/Hot pack	45	23%
Physical Therapy	31	16%
Massage	30	15%
Gym Activities	27	14%
None of the above	26	13%
Pain Medication	15	8%
Meditation	13	7%
Comfort designs or User friendly system	10	5%



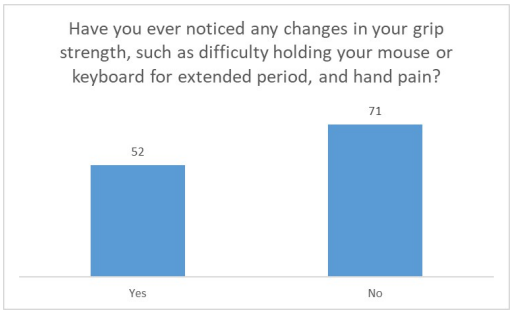
How often do you engage in physical exercise or activity (e.g.: strength training, gym activities, jogging, stretching, push ups & squats, etc.)?

Never	11	9%
1-2 times a week	28	23%
3-4 times a week	42	34%
5 or more times a week	42	34%



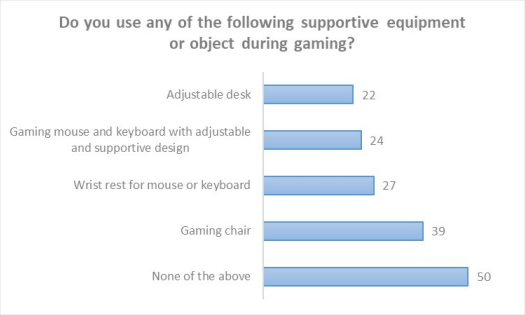
Have you ever noticed any changes in your grip strength, such as difficulty holding your mouse or keyboard for extended period, and hand pain?

Yes	52	42%
No	71	58%



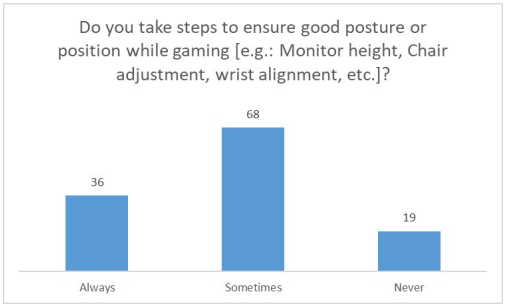
Do you use any supportive equipment or object during gaming? (Select all that apply)

Item	Count
None of the above	50
Gaming chair	39
Wrist rest for mouse or keyboard	27
Gaming mouse and keyboard with adjustable and supportive design	24
Adjustable desk	22



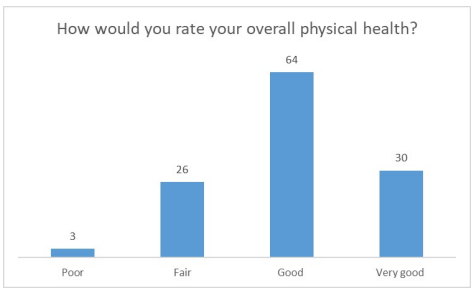
Do you take steps to ensure good posture or position while gaming (e.g.: monitor height, chair adjustment, wrist alignment, etc.)?

Always	36	29%
Sometimes	68	55%
Never	19	15%



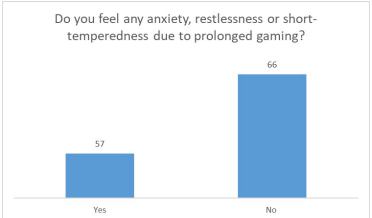
How would you rate your overall physical health?

Poor	3	2%
Fair	26	21%
Good	64	52%
Very good	30	24%



Do you feel anxiety, restlessness, or short temperedness due to prolonged gaming?

Yes	57	46%
No	66	54%



Do you feel your gaming habits are affecting your mental well-being in long-term?

Significantly	23	19%
Mildly	56	46%
Not at all	44	36%

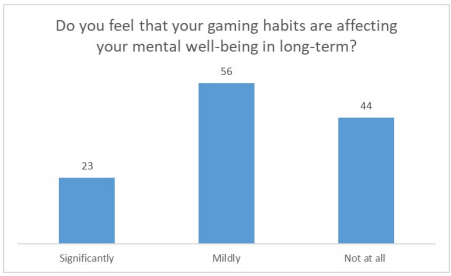


Table 3: Prevalence of Neuromuscular Pain.

	No Pain	Mild	Moderate	Severe	Very Severe
Males	45	14	13	7	4
Females	15	19	2	4	0

Hence, the prevalence can be calculated from the following:

	Males	Females	Total
Presence of Pain	38 (60.31%)	25 (39.68%)	63 (51.21%)
No Pain	45 (75%)	15 (25%)	60 (48.7%)

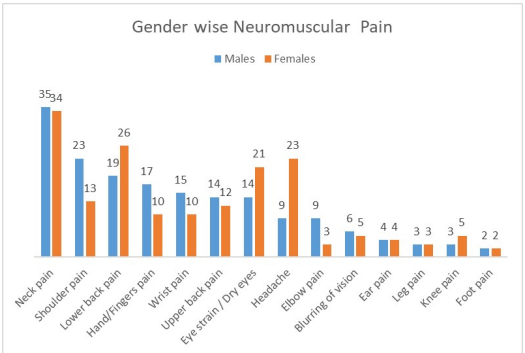
Overall pain prevalence was slightly higher among males, though females reported higher mild pain frequency, indicating gender-based differences in pain perception.

Distribution of Neuromuscular Pain as per different factors

1. Gender-wise

	Males	Females
Neck pain	35	34
Shoulder pain	23	13
Lower back pain	19	26
Hand/Fingers pain	17	10
Wrist pain	15	10
Upper back pain	14	12
Eye strain / Dry eyes	14	21
Headache	9	23
Elbow pain	9	3
Blurring of vision	6	5
Ear pain	4	4
Leg pain	3	3
Knee pain	3	5
Foot pain	2	2

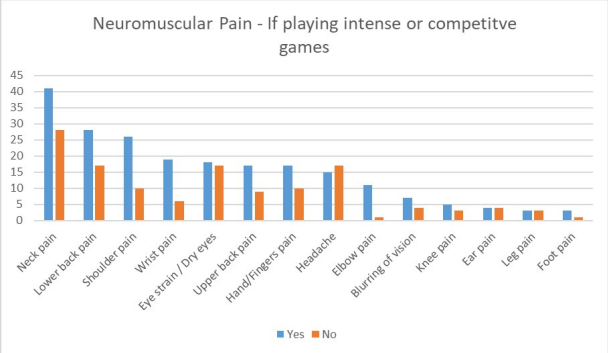
Neck pain was common in both genders, while females reported higher headache and eye strain prevalence.

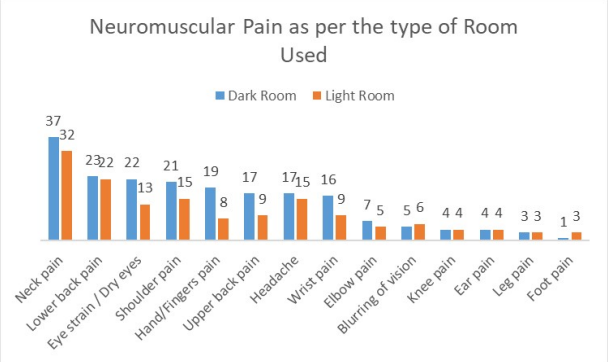


2. Type of Room Used

	Dark Room	Light Room
Neck pain	37	32
Lower back pain	23	22
Eye strain / Dry eyes	22	13
Shoulder pain	21	15
Hand/Fingers pain	19	8
Upper back pain	17	9
Headache	17	15
Wrist pain	16	9
Elbow pain	7	5
Blurring of vision	5	6
Knee pain	4	4
Ear pain	4	4
Leg pain	3	3
Foot pain	1	3

Participants gaming in dark rooms reported higher frequencies of eye strain and musculoskeletal complaints.





Symptom	Yes, played Intense and competitive game	Not played Intense or competitive game
Neck pain	41	28
Lower back pain	28	17
Shoulder pain	26	10
Wrist pain	19	6
Eye strain / Dry eyes	18	17
Upper back pain	17	9
Hand/Fingers pain	17	10
Headache	15	17
Elbow pain	11	1
Blurring of vision	7	4
Knee pain	5	3
Ear pain	4	4
Leg pain	3	3
Foot pain	3	1

Participants playing intense or competitive games showed higher prevalence of neck, shoulder, wrist, and elbow pain.

Associations between various Variables

	Chi square statistic	p-value
Pain Severity and Gender	2.877	0.57
Pain Severity and Frequency of exposure (weekly)	20.59	0.05
Pain Severity and Frequency of exposure (daily)	12.1	0.04
Pain Severity and Type of Game	8.06	0.08
Pain Severity and Type of Room	2.517	0.64
Pain Severity and Adjusting Posture	17.16	0.02

Pain severity showed significant association with weekly gaming exposure, daily gaming exposure, and frequency of posture adjustment. No significant association was observed between pain severity and gender, type of game, or room type.

The severity of pain was predominantly mild, with fewer participants reporting moderate to severe pain.

Pain was commonly experienced during or after gaming sessions, indicating a temporal association with gaming activity.

A substantial proportion reported a history of musculoskeletal or nerve-related conditions.

Many participants experienced recurring gaming-related pain, with some reporting worsening symptoms.

Sleep disturbances due to gaming-related discomfort were frequently reported.

Only a small proportion sought medical consultation, suggesting underutilization of healthcare services.

Some participants used pain-management strategies such as ice/heat therapy or physiotherapy, while many used none.

Despite regular physical exercise among most participants, a notable proportion reported hand discomfort or grip strength changes.

The use of ergonomic or supportive equipment was inconsistent across participants.

Most participants reported some effort to maintain proper posture during gaming sessions.

Overall self-rated physical health was largely good despite the presence of pain symptoms.

A substantial proportion reported anxiety, restlessness, or perceived long-term mental well-being effects associated with prolonged gaming.

DISCUSSION

The present study explored the prevalence, risk factors, and impact of musculoskeletal and neuromuscular pain among recreational computer gamers, and focused on gaming habits, ergonomic factors, pain severity, and outcomes related to physical and mental health. The findings provide valuable insight into the growing number of recreational gamers, particularly young adults. The results show a high prevalence of mild to moderate neuromuscular pain, affected mainly by gaming exposure duration, posture-related behaviors, and intensity of gaming, while the general health of the population is good. These findings align with study of Pelletier et al.[23], where musculoskeletal pain is prevalent among computer gamers due to poor posture and prolonged gaming.

The study population consisted predominantly of young adults with a mean age of 23.36 ± 2.91 years, indicating the age group most actively engaged in recreational computer gaming. Bunz U et al. [36] conducted a study wherein older adults use gaming not only for entertainment but also for therapeutic needs. The relatively narrow age range suggests a homogeneous cohort, reducing age-related confounding factors such as degenerative musculoskeletal changes. The male predominance (67%) aligns with existing trends in PC gaming participation and supports the representativeness of the sample for recreational gaming populations as seen in study of Overa S et al [40].

Most participants reported 1–10 hours of PC gaming per week, suggesting recreational rather than excessive gaming behavior. Despite this moderate exposure, a considerable proportion reported pain and discomfort, suggesting that even non-professional or non-excessive gaming can impose significant musculoskeletal issues. A review was done by Shen Y et al. [3] to understand the excessive use of these games can also be associated with several physical and psychological health problems. This finding challenges the common perception that gaming-related injuries are limited to professional gamers. Most of the participants engaged in continuous gaming sessions lasting 1–2 hours without breaks, reflecting prolonged static postures. Static loading of postural muscles, particularly in the cervical and lumbar regions, has been widely associated with muscle fatigue, reduced circulation, and accumulation of metabolic by-products, which may explain the high prevalence of neck and lower back pain observed in this study and also reported in study of Tholl et al. [8].

More than half of the participants reported positioning their screens at eye level, and some of them reported looking down or not paying attention to screen height. Suboptimal monitor positioning increases cervical flexion or extension, leading to increased mechanical stress on cervical structures as seen in study of Forman GN et al. [10]. The high frequency of neck pain reported supports the role of poor workstation ergonomics as a contributing factor.

Postural adjustment behavior revealed partial ergonomic awareness, with most participants adjusting posture only occasionally. The chi-square analysis showed a significant association between pain severity and frequency of posture adjustment, suggesting that infrequent postural changes may contribute to increased symptom severity. This finding underscores posture as a modifiable risk factor and highlights the importance of dynamic sitting and regular movement during gaming sessions. A study was done by Attiah M et al. [7] were gamers predominantly reported low back pain which aligns with the present study where spine was affected (here, neck pain).

Gaming environments were almost evenly divided between dark and light rooms. The overall room type did not show a statistically significant association with pain severity, symptom distribution analysis revealed higher frequencies of eye strain, neck pain, and upper limb complaints among participants gaming in dark rooms. Poor lighting conditions can increase visual strain, forward head posture, and compensatory musculoskeletal loading, which may explain these findings. On the contrary, a study of Ashok et al. [12]

reported non-significant findings of an association of forward head posture and musculoskeletal disorders in gamers.

Despite these associations, most participants rated their gaming environment as comfortable or very comfortable. This is suggestive that ergonomic risk and biomechanical safety needs to be evaluated more objectively. More than half of the participants (51.21%) reported the presence of neuromuscular pain, with neck pain being the most prevalent symptom, followed by lower back pain and eye strain. These findings are consistent with the study of Park SY et al. [37] where biomechanical demands of prolonged computer use, which typically involve sustained cervical flexion, scapular protraction, and lumbar loading.

Most of the participants reported mild pain severity which suggests early musculoskeletal strain rather than advanced pathology. However, a fair number reported moderate to severe pain, indicating progression in a subset of participants. Pain was most commonly experienced during or after gaming, reinforcing a temporal relationship between gaming activity and symptom onset.

Gender-wise analysis showed that overall pain prevalence was slightly higher among males, while females reported higher frequencies of mild pain, headaches, and eye strain. Similar observation was reported by Staffan Ekefjard et al. [14] where there is a high prevalence of physical symptoms, such as headache and eye symptoms, in professional e-sports gamers. Although the association between pain severity and gender was not statistically significant, these differences may reflect gender-based variations in pain perception, reporting behavior, and musculoskeletal loading patterns rather than true differences in injury risk.

Participants engaging in intense or competitive gaming demonstrated higher prevalence of neck, shoulder, wrist, and elbow pain as seen in study of Sant K et al. [9]. Competitive gaming often requires rapid, repetitive upper limb movements combined with sustained postural demands, increasing cumulative mechanical stress. The association between pain severity and type of game was not statistically significant, but the symptoms suggests that intensity and movement demands play an important role in causing neuromuscular pain.

One of the most important findings of this study is the significant association between pain severity and both weekly and daily gaming exposure. Participants with higher exposure demonstrated greater pain severity, supporting a dose-response relationship between gaming duration and neuromuscular symptoms also reported by Booth-Malnack K et al. [16]. Prolonged exposure increases cumulative loading, reduces recovery time, and may contribute to repetitive strain injuries. These findings demand the need to understand the importance of limiting continuous gaming duration, having breaks, and balancing gaming with physical activity, particularly in young adults who may otherwise consider themselves at low risk for musculoskeletal disorders.

Most of the participants also reported recurring pain that either persisted or worsened with continued gaming, indicating potential progression from transient discomfort to chronic symptoms. These findings are similar to a study of Hakala PT et al. [17] that reported problematic internet use is associated with an increased risk of recurrent pain symptoms among adolescents. Half of the participants experienced sleep disturbances due to gaming-related pain, which may further increase musculoskeletal symptoms by reducing tissue recovery and increasing pain sensitivity.

Despite these functional impacts, healthcare utilization was notably low, with only 22% seeking medical attention. This maybe because of normalization of pain, lack of awareness regarding long-term consequences, or perception of symptoms, which aligns by study of Fathuldeen A et al. [1].

Many participants relied on self-management strategies such as ice/heat application, massage, or gym activities, while a significant proportion used no intervention at all. Although most participants engaged in regular physical exercise, the persistence of pain and reports of grip strength changes suggest that general physical activity alone may not be sufficient

to counteract gaming-specific biomechanical stresses. Darwesh A et al.[39] reported that there was a significant decrease in hand grip strength of the prolonged user group compared with non-user group, while there was a non-significant difference between both groups in the pinch strength.

The inconsistent use of ergonomic equipment further highlights gaps in preventive behavior. While gaming chairs and wrist supports were used by some participants, nearly half reported using no supportive equipment, indicating an opportunity for targeted ergonomic education. Few participants reported anxiety, restlessness, or irritability associated with prolonged gaming, and a majority perceived at least mild long-term effects on mental well-being. A similar study was done by Joy EA et al.[38]

where it was reported that online gaming addiction is significantly associated with high perceived stress among adolescents. These findings are suggestive of the interconnected nature of physical discomfort and psychological strain, especially with activities involving prolonged screen time and high cognitive engagement. Most of the participants rated their overall physical health as good or very good, suggesting a disconnect between symptom experience and self-perceived health status. This may contribute to delayed behavioral modification and continued exposure to risk factors.

The findings of this study highlight the need for early ergonomic education, posture awareness, and structured break strategies among recreational gamers. Given the high prevalence of symptoms even at moderate gaming exposure levels, preventive interventions should not be limited to professional or high-intensity gamers alone.

Hence the present study suggests that recreational computer gaming is associated with a high prevalence of mild to moderate neuromuscular pain, mainly affecting the neck, lower back, and upper limbs. Pain severity is significantly influenced by gaming duration and postural behaviors, with notable functional and mental health implications despite low healthcare utilization.

Limitations

1. The cross-sectional design of the study restricts the ability to establish causal relationships between gaming exposure and the development of neuromuscular pain

2. The study had self-reported data for gaming habits, ergonomic practices, pain characteristics, and mental well-being. This can have recall bias, reporting bias, and individual variations in pain perception, affecting the accuracy of the responses.

3. The participants were only young adults limiting the generalizability of the findings to other age groups.

4. Objective outcome measures were not used.

Future Scope

1. A longitudinal or prospective cohort design can be adopted

2. More objective and biomechanical assessments can be used

3. Diverse age groups and gaming populations can be included

4. Psychosocial variables like stress levels, gaming addiction, sleep quality, and mental health outcomes can also be studied.

CONCLUSION

51.21% of recreational computer gamers experienced neuromuscular pain with a moderate gaming exposure. Neck pain was the most prevalent complaint, followed by lower back and upper limb discomfort. Pain severity was significantly associated with longer gaming duration and infrequent posture adjustment.

Conflicts of interest: **None**

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