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ORIGINAL ARTICLE

Prevalence of hypothyroidism in frozen shoulder patients in Qassim region, Saudi Arabia: a retrospective study

Ali T Aldhafeeri[1], Abdulmajeed A Alateeq[2], Khadijah R Al-Ruwaili[3*], Maram A Alghadoni[3], Lujain I Alsaleh[3], Bader A Aldakhil[3], Sarah A Alkuraydis[3]

ABSTRACT

Background: Frozen shoulder is often associated with other diseases like hypothyroidism. However, this relationship remains uncertain. Our aim in this study is to assess the prevalence of hypothyroidism in frozen shoulder patients.

Methodology: In this retrospective study, we reviewed the medical records of patients diagnosed with frozen shoulder from 1/1/2017 to 1/1/2020 in the hospital and documented any patient who met the imaging criteria, lab results, and physical examination note.

Results: A total of 91 confirmed frozen shoulder cases were included in this study (prevalence rate, 13.2%). Fifty-one cases (56.0%) were male. Among hypothyroid cases, the commonest age group was 51–60 years, and 41.7% cases were from this age group. Female gender was significantly associated with hypothyroidism among frozen shoulder cases (p-value 0.020). As predicted, a significantly higher Thyroid stimulating hormone (TSH) level was observed among hypothyroid cases than their counterparts (p-value < 0.001).

Conclusion: Frozen shoulder is a permanent severe limitation of the range of motion. It may occur more with people with a certain health condition such as thyroid diseases or following an injury or immobilization of the shoulder joint. Hereafter, we confirmed that hypothyroidism is significantly associated with frozen shoulder patients.

Keywords: Frozen shoulder, adhesive capsulitis, shoulder, hypothyroidism, thyroid diseases.

Introduction

Frozen shoulder or adhesive capsulitis is characterized by a painful, gradual loss of active and passive glenohumeral motion resulting from progressive fibrosis and the ultimate contracture of the glenohumeral joint capsule [1]. It is a chronic condition with a slow progression, and the complete recovery may take 3 years. Symptoms are usually classified into three stages. The American Academy of Orthopedic Surgeons describes stages as the first stage or freezing stage. The pain increases gradually, limiting shoulder motion, and tends to be worse at night. The pain could disturb sleep. This stage can last from 6 weeks to 9 months. In the second stage or frozen stage, pain does not worsen and may start to improve, but the stiffness remains, and daily activity may be restricted. It can last from 4 to 6 months. The last stage or thawing, recovery, and improvement start slowly in this stage, and a complete return to normal strength and motion typically takes from 6 months to 2 years. Frozen shoulder can be classified as either primary or secondary. Primary is idiopathic but often associated with other diseases such as diabetes mellitus (DM), thyroid disease, drugs, hypertriglyceridemia [2], or cervical spondylosis [3]. The secondary disease is mostly after surgery or trauma or injuries to the shoulder like rotator cuff tendinopathy and calcific tendinosis, which results in intrinsic

Correspondence to: Khadijah R Al-Ruwaili
*College of Medicine, Qassim University, Qassim, Saudi Arabia.
Email: 351204517@qu.edu.sa
Full list of author information is available at the end of the article.
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secondary frozen shoulder. There are extrinsic factors like a clavicular fracture, ipsilateral breast surgery [6]. The prevalence of adhesive capsulitis is between 2% and 5%, and the incidence is between 2% and 3% in the general population, and it primarily occurs in women more than men [4]. Patients usually present in the age of 50s, and onset before 40 is rare [5]. The other shoulder becomes affected, usually within 5 years [5]. It is well known that there is a connection between frozen shoulder and thyroid dysfunction; both hyper and hypothyroidism are associated with idiopathic and postoperative frozen shoulder [6]. According to a cross-sectional study done in Brazil, there is a high association between frozen shoulder and hypothyroidism and approved that higher serum TSH levels are associated with bilateral and severe frozen shoulder cases [7]. A nationwide longitudinal population-based study found that hyperthyroidism is a risk factor for adhesive capsulitis development [3]. A case-control study about risk factors of idiopathic frozen shoulder found hypothyroidism is a risk factor [8]. It is essential to mention that the conclusive relationship between frozen shoulder and thyroid disorders is still unknown [6].

There was no study on the prevalence of hypothyroidism in Saudi Arabia. We aimed to study the prevalence of hypothyroidism in frozen shoulder patients. The major objectives of this study were to estimate the prevalence of hypothyroidism in frozen shoulder patients. The minor objectives included: to decide the Commonage group in the frozen shoulder with hyperthyroidism and to determine the relationship between others comorbid autoimmune and frozen shoulder with hyperthyroidism.

Methodology

This was a Retrospective Chart Review-Analytic study-in which all medical records of patients who diagnosis with Frozen shoulder from 1/1/2017 to 1/1/2020 in the hospital at Al-Qassim region in Saudi Arabia, which has almost 600,000 people living on it. We included all patients who diagnosed with frozen shoulder. Any patients who had traumatic frozen shoulder were excluded. Regarding sample size, we included all patients who met the chosen criteria, which was expected to be around 100 patients. We reviewed his medical records for any patient who met the criteria to review imaging, lab results, and physical examination note. The data were retrospectively collected from the medical records. Then, we applied the inclusion and exclusion criteria. After that, we labeled the selected patients numerically from 1 to 100 to keep the patient anonymous. The medical card was reviewed. Then, the collected data entered into an Excel database then transferred to Statistical Package for Social Science (SPSS) for statistical analysis. Data were checked for correctness and completeness. Categorical variables were presented as frequencies and percentages. Continuous variables were presented as mean ± standard deviation. Continuous data were checked for normality by the Kolmogorov-Smirnov test and were found to be non-normally distributed. A Chi-square test was done to compare the variables between hypothyroid and non-hypothyroid cases. The TSH level was compared between studied diseases [thyroid, DM, hypertension (HTN), hyperlipidemia, and coronary artery disease (CAD)] by Mann-Whitney U test. The analysis was performed in 95% confidence interval using the SPSS, version 23.0 (IBM, Armonk, NY).

Results

A total of 91 confirmed frozen shoulder cases were included in this study. Fifty-one cases (56.0%) were male (Table 1). Among all cases, 12 cases were hypothyroid, making a prevalence rate of 13.2%. The prevalence rate of DM, HTN, hyperlipidemia, CAD, and cancer cases was 58.2%, 30.8%, 44.0%, 7.7%, and 1.1%, respectively (Figure 1). None of the cases had autoimmune diseases. The commonest age group among hypothyroid cases was 51–60 years. 41.7% of cases were from this age group. Female gender was statistically significantly associated with hypothyroidism among frozen shoulder cases (p-value 0.020). However, DM, HTN, hyperlipidemia, CAD, and cancer were not found to be associated with hypothyroidism (all p-values > 0.050) (Table 2). As expected, a significantly higher TSH level was observed among hypothyroid cases compared to their counterparts (p-value < 0.001) (Table 3). The difference between DM and non-DM, HTN and non-HTN, hyperlipidemia and non-hyperlipidemic, and CAD and non-CAD cases in terms of TSH level was not statistically significant (all p-values > 0.050) (Table 4).

Discussion

The current study found that the commonest age group among hypothyroid cases with the frozen shoulder was 51–60 years; 41.7% of cases were from this age group; this was in accordance with Schiefer et al. [6] in their study found that frozen shoulder mainly affects hypothyroid patients between the ages of 40 and 60 years, also Cohen et al. [9] stated that the mean ± SD of hypothyroidism patients with the frozen shoulder was 51± 11 and in another study by Inayat et al. [10]

Table 1. *Distribution of all cases by age and gender [n = 91].*

Characteristics	N	%
Age in years		
18-30	3	3.3
31-40	8	8.8
41-50	30	33.0
51-60	20	22.0
61-70	19	20.9
> 70	11	12.1
Gender		
Male	51	56.0
Female	40	44.0

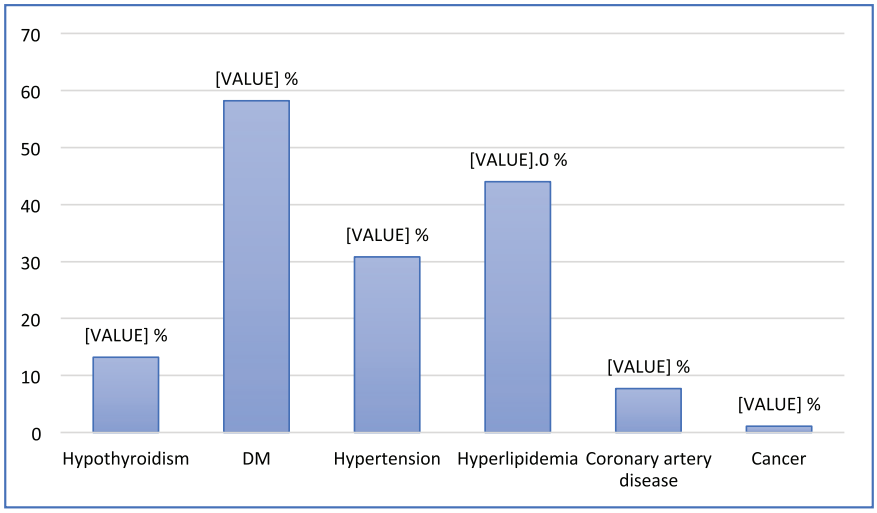

Figure 1. *Prevalence of specific diseases among frozen shoulder cases [n = 91].*

Table 2. *Comparison between hypothyroid and non-hypothyroid cases.*

Variables	Hypothyroid [*n* = 12]		Non-hypothyroid [*n* = 79]		Odds ratio	*p*-value
	N	%	*N*	%		
Age					-	0.143
18-30	0	0	3	3.8		
31-40	0	0	8	10.1		
41-50	3	25.0	27	34.2		
51-60	5	41.7	15	19.0		
61-70	1	8.3	18	22.8		
> 70	3	25.0	8	10.1		
Gender					4.645	0.020
Male	3	25.0	48	60.8		
Female	9	75.0	31	39.2		
DM [yes]	6	50.0	47	59.5	0.681	0.534
HTN [yes]	6	50.0	22	27.8	2.591	0.121
Hyperlipidemia [yes]	6	50.0	34	43.0	1.324	0.651
CAD [yes]	2	16.7	5	6.3	2.960	0.211
Cancer [yes]	0	0.0	1	1.3	0.867	0.695

Table 3. *TSH level among hypothyroid and non-hypothyroid cases.*

TSH level	All cases	Hypothyroid cases	Non-hypothyroid cases	*p*-value
Mean	3.4732	7.1616	2.4194	<0.001
Median	2.5550	8.0010	2.3220	
Standard deviation	2.96229	4.32247	1.10070	

the prevalence of frozen shoulder between 41 and 60 years was 70% [11]. In the current study, from a total of 91 confirmed frozen shoulder cases, Fifty-one cases (56.0%) were male; this was in accordance with Gothwal and Banseria [11] in their study as 56.1% were males [11]. In the present study, the female gender was statistically significantly associated with hypothyroidism among frozen shoulder cases (*p*-value 0.020). This was in accordance with Cohen et al. [9], who studied the association between frozen shoulder and thyroid diseases and found that 60% of participants were females. Also, Schiefer et al. [6] claimed that most of the patients affected by frozen shoulder with hypothyroidism were females [9,10]. Among all our studies, 12 cases were hypothyroid, making a prevalence rate of 13.2%. The prevalence rate of DM, HTN, hyperlipidemia, CAD, and

Table 4. *Mean TSH level in other studied diseases.*

Diseases	Attributes	TSH (mean + SD)	*p*-value
DM	Yes	3.16 ± 2.48	0.278
	No	4.00 ± 3.65	
HTN	Yes	4.23 ± 2.90	0.066
	No	3.10 ± 2.96	
Hyperlipidemia	Yes	3.17 ± 2.29	0.691
	No	3.88 ± 3.70	
CAD	Yes	5.39 ± 3.48	0.153
	No	3.28 ± 2.87	

cancer cases was 58.2%, 30.8%, 44.0%, 7.7%, and 1.1%, respectively. This was in contrast with Cohen et al. [9] as in his study, the prevalence of hypothyroidism was 29% while the prevalence of DM was 19%, HTN was 37%, and cancer prevalence was 5% [10].

However, current study results followed Schiefer et al. [6], who proved that hypothyroidism was significantly higher in the Frozen Shoulder group [27.2%] versus [10.7%] in the control group [9]. Also, the same study by Schiefer et al. [6] claimed that the bilateral frozen shoulder incidence was 6.2% with hypothyroidism, while it was 0.3% with DM and 6.5% in HTN patients and none of the cancer patients suffered a frozen shoulder [9]. In the present study, a significantly higher TSH level was observed among hypothyroid cases than their counterparts. The difference between DM and non-DM, HTN and non-HTN, hyperlipidemia and non-hyperlipidemic, and CAD and non-CAD cases in terms of TSH level was not statistically significant; this was approximately the same results of Schiefer et al. [6] who found an association between high serum TSH levels and both severe and bilateral frozen shoulder [9].

Conclusion

Frozen shoulder is a permanent severe limitation of the shoulder range due to inflammation and scarring around the shoulder joint. It may occur more with people with a specific health condition such as thyroid diseases, DM, and hypertriglyceridemia, or following an injury or immobilization of the shoulder joint. The main objective of our study was to estimate the prevalence of hypothyroidism in frozen shoulder patients. As conclusions of this study, we can confirm that hypothyroidism significantly associated with frozen shoulder, especially in females. Future studies need to focus on frozen shoulder severity, bilaterality, and time of injury if they are affected by thyropathy.

List of Abbreviations

CAD Coronary artery disease
DM Diabetes mellitus
HTN Hypertension
SPSS Statistical Package for Social Science
TSH Thyroid stimulating hormone

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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Consent to participate

Written informed consent was obtained from all the participants.

Ethical approval

The present study was approved by Regional ethics committee registered at National Committee for Bio and Med ethics (NCBE), Ministry of Health, Qassim, Saudi Arabia with registration number H-04-Q-001 dated 07-09-2020.

Author details

Ali T Aldhafeeri[1], Abdulmajeed A Alateeq[2], Khadijah R Al-Ruwaili[3], Maram A Alghadoni[3], Lujain I Alsaleh[3], Bader A Aldakhil[3], Sarah A Alkuraydis[3]

1. Orthopedic Assistant Professor, Consultant upper extremity and Arthroplasty Surgeon. College of medicine, Qassim university, Buraydah, Saudi Arabia
2. MD, orthopedic resident.
3. Medical Student, College of medicine, Qassim University, Qassim, Buraydah, Saudi Arabia

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