



Research Article

BUFFALOHUMP AND NON - SPECIFIC NECK PAIN – A CORRELATION STUDY

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ABSTRACT

Background: To infer the relationship between buffalo hump and non - specific neck pain.
Methods: 101 subjects were screened by convenience sampling. The buffalo hump was measured using the Vernier Caliper and Neck Circumference measurement and Northwick Park Neck Pain Questionnaire was taken from all the subjects. Correlation between neck pain and buffalo hump was analyzed using the Karl Pearson's correlation coefficient and Chi-square test and Spearman's rank correlation coefficient was used to measure association between nutritional status i.e. Body Mass Index with neck pain as well as with the buffalo hump.

Results: NPQ showed negative correlation with the buffalo hump ($r = -0.0394$, $p = 0.7154$). When BMI was taken into consideration, there was significant association shown between the BMI and Buffalo Hump ($p = 0.0001^*$), but neck pain showed negative correlation with BMI ($p = 0.3031$).

Conclusions: There was no statistical evidence shown between BMI and neck pain but a statistical correlation was evident between BMI and Buffalo hump presence. Women showed to have the presence of the buffalo hump, which was mainly seen amongst female college going students.

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INTRODUCTION

Spinal pain, primarily non-specific neck pain and low back pain^[1] are known to be the common health problems and sources of disabilities affecting the general population^[2] in terms of overall health and wellbeing.^[3] According to Shah *et al.* 47% of total neck pain cases are said to be self – reported^[2] and nearly 25% are estimated to opt for outpatient physical therapy clinics to treat the condition.^[4] Amongst the American population 22 - 70% individual are said to suffer from neck pain at least once in a life time,^[2] with non-specific neck pain alone having a prevalence of 40- 70% alone.^[1] It is also known to be a work associated problem that involves long standing static postures and or repeated upper extremity movements, e.g. office employees^[5] and is also associated with non – work related variables e.g. reading books, etc. which is said to have its effects mostly towards the western societies leading to an increase in the medical and socioeconomic hitches.^[2] Women are known to complain of neck pain more than men, as according to a study by René Fejer *et al.* it was stated that women have a different physiological mechanism for pain perception when compared to men.^[3] Hence, maybe considered as a reason as to why women suffer from this disability more than men.

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Long hours of gazing at versatile screens, work computers, or slumped sitting in front of the television on the couch and reading books are ways of life that force people to embrace various postural abnormalities that are directed towards various issues. These issues are only recently coming into limelight the present being the Buffalo Hump.^[6] This hump is known to have various synonyms such as the “dorso-cervical fat pad” as termed by surgeons, “interscapular hump”, “menopausal hump”, “local lipodystrophy”, “widow’s hump” and “dowager’s hump”.^[7] According to widely accepted terminologies and beliefs, it is described as an excessive accumulation of dense adipose tissue in the area where the neck meets the top of the thoracic spine i.e. the cervico-thoracic junction (C6- T4) (Refer to Fig 1), that presents in various sizes.^[7,8] The hump seen more in women is considered a physical disorder which is cosmetically unappealing and thus they choose to wear high neck apparels to camouflage the protuberance.^[8] This hump which is also a protective guard has been observed to develop after years of slouching^[9] which is a result of continuous forward protrusion of the neck that causes compression of the facet joints in the cervical region.^[7]

Cases of the Buffalo hump have shown to have associated signs of neck pain; difficulty in sleeping and/or postural changes,^[11,12] but the exact mechanisms is not very evident.^[7] Hence, has led to various growing questions that haven't been answered due to paucity of studies and dearth in literature to support the presence of the buffalo hump as causative factors

for neck pain. Therefore, on the basis of the available literature, the primary objective of this study is to infer the correlation between the buffalo hump and non – specific neck pain as well as to conjecture whether, there is any relation between body mass index and the buffalo hump and/or non-specific neck pain as well.



Figure 1 Buffalo Hump

METHODOLOGY

Study Design

The study design was a correlational study, implemented to study the relation between the buffalo hump and non – specific neck pain. An ethical clearance was obtained from the institutional ethical review committee. All subjects were screened and recruited as per to the inclusion and exclusion criteria's. Target population studied, were subjects presenting with buffalo hump and neck pain. The study was conducted between November 2017 and February 2018.

Participants Enrollment

A total of 106 subjects were screened from which 5 individuals were excluded as per to the exclusion criteria that were stated i.e. (1)Any serious injury, tumors,infection, or other non-mechanical cause of neckpain,^[13-16](2) clinically significant signs of herniated disk with positive radicular arm pain and cervical spondylosis, (3) history of fractures and any recent surgeries of the neck region within the past 6months, (4) Pregnant women,^[13] (5) Person with an intellectual, cognitive, developmental disability,^[13]as they did not fit the inclusion criteria's i.e. (1) Both genders, between the age group of 20 – 50 years of age,^[17] (2) Participants experiencing constant or frequently occurring neck pain for more than 3 or 6 months,^[18] (3)Participant with or without forward head posture,(4) Participants with a visible buffalo hump protuberance.^[18,19](5) Participants volunteering to participate in the study. All subjects read and signed the informed consent form that was approved by the institutional review board and was conducted in conformism with the ethical and humane principles of research after giving a verbal and written explanation. A brief demographic data was obtained from the subjects with respect to address, occupation, age, height, weight, etc. No sample size calculation was performed as it was an observational study the sample size was kept as open ended.

Recruitment

Participants recruited were subjects working and studying in the colleges and tertiary health care centre in Nehru Nagar, Belagavi, Karnataka presenting with neck pain and/or presenting with a visible buffalo hump as well as forward head posture, through word of mouth as well as based on convenience. The patients were assessed in both academic as well as a clinical environment.

Procedure

A brief demographic data was noted after participant had read and signed the informed consent. Each participant was then provided with a Northwick Park Neck Pain Questionnaire which was explained to them, it consisted of a total of 10 MCQ questions out of which participants had to tick mark the most appropriate answers. The 9th question was only applicable to those who drove a car and 10th question was not considered as the study didn't include any treatment satisfaction and was only a pure observational study. Each question was scored from 0 – 4 points based on the answer given. After subjects filled in the details the scores were then calculated according to number of questions answered i.e. if 8 questions were answered than the total score was multiplied by 32 and if 9 were answered, total score was multiplied by 36. Score having high percentage value were considered to have neck pain present as per to the questionnaire interpretation higher the percentage greater was the disability. Later the skin fold measure was measured using the vernier skin caliper. A mean reading out of 3 consecutive readings was considered which were taken at the cervico – thoracic junction (Refer to Fig 3(a)) followed by the neck circumference measure taken with a measuring tape with the individual in an erect standing posture with the neck in neutral position i.e. neither in flexion or extension with the participants concentrating at a point while the therapist took the measure of the neck circumference.(Refer to Fig 3(b))

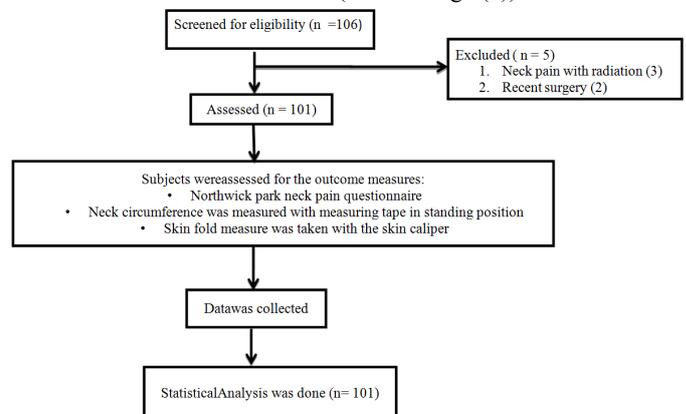


Fig 2 Flowchart of the recruitment of the participants for the study

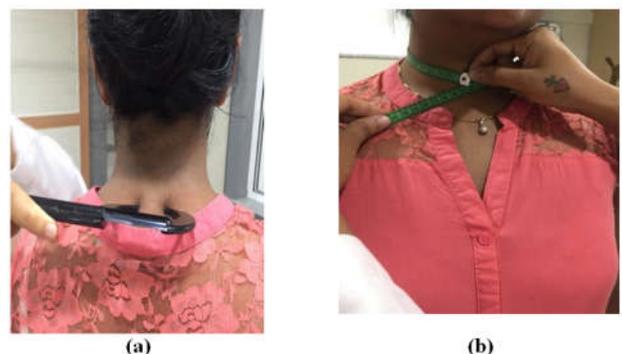


Figure 3 (a) skin fold measure with vernier skin calliper; (b) neck circumference measure with measuring tape.

Outcome measure

Skin fold measurement, neck circumference and Northwick park neck pain questionnaire were checked in each participant.

Northwick Park Neck Pain Questionnaire (NPQ)

It was developed at Northwick Park Hospital in Middlesex England. It is used to measure neck pain and the subsequent disabilities. It provides an objective measure to evaluate outcome and to monitor symptoms in patients with acute or chronic neck pain over time. It has good short term repeatability, a high internal consistency and a sensitivity to change. Each of the questions are divided into 5 answers. Each answer score point ranges from 0-4 (0 – no significant pain, 4-significant for worst pain). Only one answer is possible per parameter. The neck pain score is a sum of the points scored for the first 9 questions, (Question 9 is only applicable if patient drives a car in good health). If 9 question are answered then NPQ = [(neck pain score)/ 36 x 100%]. If 8 questions are answered then NPQ = [(neck pain score)/ 32 x 100%]. The minimum score = 0 and maximum score = 36 for 9 questions answered and 32 for 8 questions answered. Percentage ranges from 0-100% (higher the % greater is the disability and pain).^[21]

Neck circumference measurement

It is an index used(a) to describe upper body mass distribution (b) to identify persons with unhealthy weight and weight problem(c) can be used as a reliable tool for screening subject with unhealthy weight and weight problems, as it has shown to have good significant specificity, sensitivity and strong association with unhealthy weight related issues.^[22] It has also proved to have a very good inter- and intra – rater reliability.^[23] A measuring tape was used and a measurement midway of the neck, between mid-cervical spine and mid anterior neck, to within 1mm, with a plastic tape was taken. In men with a prominent laryngeal prominence (Adam’s apple) measurement was taken just below the same. The measurement is taken in subject in standing upright with the face directed forward and with shoulders relaxed. NC ≥37 cm for men and ≥34 cm for women subjects with BMI ≥25 kg/m² (normal weight) NC ≥39.5 cm for men and ≥36.5 cm for women subjects with BMI ≥30.0 kg/m² (unhealthy weight).^[22]

Vernier Skin calliper: Skin fold measure

It is an anthropometry measurement tool used to measure skin fold thickness i.e. thickness of double folds of skin and subcutaneous adipose tissue at specific sites on the body. It provides valuable information about distribution of subcutaneous body mass. The procedure and working of instrument is first explained to the participant. The participants are asked to feel the “pinch” on his/her hand. The caliper is placed with the head on the inside and outside of the hand and release the pressure. Show the participant the site where the measurements will be performed (suprascapular) site is marked with a pen or marking pencil. The skinfold is grasped firmly with the thumb and index finger of your left hand and pulled away from the body. With the caliper in your right hand, perpendicular to the skinfold, with the dial facing up place the caliper heads on the skinfold 1/3 to 1/2 inch (1 cm) away from your fingers holding the skinfold. Release the lever of the caliper and read the dial after approximately 4 seconds. (Waiting longer than 4 seconds will result in inaccurate smaller readings) The measurement is recorded to the nearest point 5 millimeters. A total of three calibrations are taken with a gap of 15 seconds between each measurement at the same

site so that the skinfold is allowed to “flatten” or return to normal between readings.^[24]

RESULTS

The mean age of the participants of the study was 22.39±2.99 Total no of male participants were 14 consisted of 13.86% of total samples collected and female participants were 87 that was 86.14% of total samples collected. This showed that women were more likely to have the complaint and more over people from the younger generation. When occupation was taken into consideration almost 48 out of the 101 samples were students which statistically consisted of 47.52% of the total samples.

1. The data showed no statistical correlation between the presence of the buffalo hump and non- specific neck pain. (Refer to Fig. 4) According to Karl Pearson’s correlation coefficient negative correlation with no statistical correlation was seen between the buffalo hump and non-specific neck pain was $r = -0.0394$, $p = 0.7154$. [Refer to Table: 1]
2. There was also no association seen between body mass index and neck pain: According to Chi square test score = 2.3852, $p = 0.3031$ (Refer to Fig. 5), which showed no significance. Positive significant correlation was seen between body mass index and buffalo hump when tested with Chi square test score = 16.3311, $p = 0.0001^*$. (Refer to Fig. 6)
3. Correlation when analyzed according to Spearman’s Rank correlation coefficient showed that there was only significance between the buffalo hump and body mass index $r = 1.9272$, $p = 0.05^*$ [Refer to Table: 2]

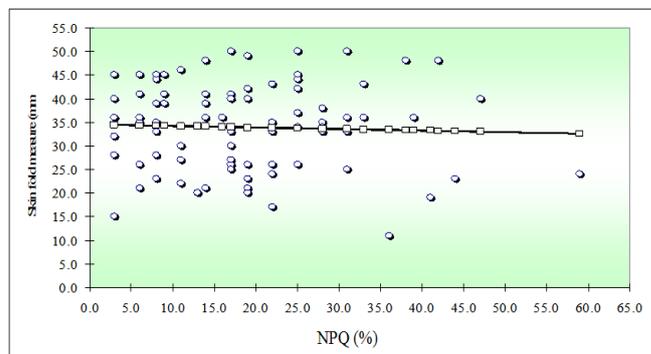


Fig 4 Scatter Diagram, representing negative correlation between NPQ (%) and skin fold measure (mm) by Karl Pearson’s correlation coefficient method.

Table 1 Correlation between NPQ (%) and skin fold measure (mm) by Karl Pearson’s correlation coefficient method.

Variables	Correlation between BMI scores with			
	N	Spearman R	t-value	p-level
Neck pain	101	-0.1259	-1.2630	0.2096
Buffalo hump	101	0.1902	1.9272	0.0568**

**p<0.1

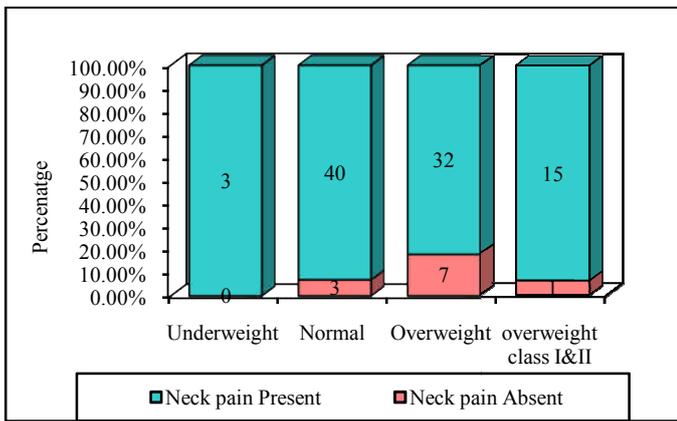


Fig 5 Association between BMI and Non - specific neck pain

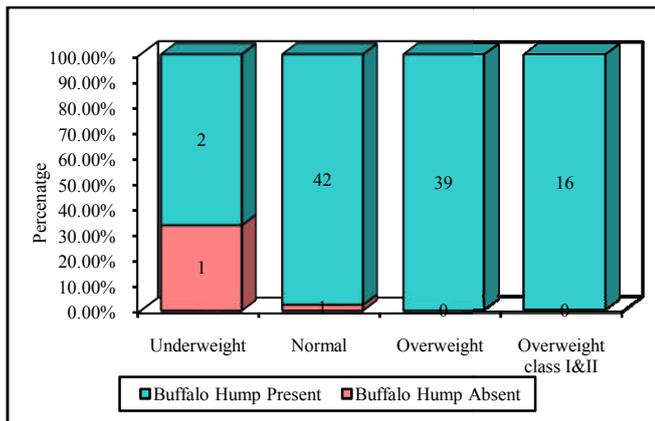


Fig 6 Association between BMI and Buffalo Hump

DISCUSSION

According to available literature, a few cases have shown that buffalo hump is associated with signs of neck pain,^[11,12] but we found no association between buffalo hump and non-specific neck pain.

Studies available state that the buffalo hump could be caused due to abnormal posture attained i.e. forward head posture which is in agreement to the present study as out of 101 participants 100 subjects presented with forward head posture which was examined based on observation in the present study. This posture is said to position the head in a sub – optimal position, putting more stress on the joints of the neck, therefore contributing to increased stress that is dealt by indirect lay down of connective tissue, increase thickness of the joints and bones in the cervical region.^[25] According to few studies the hump is said to develop as a mechanism to guard and protect the cervical region from the excessive stress.^[10] But, based on other studies it has been said that the localized collection of this adipose tissue could also have various ill-effects upon the cervical spine such as degeneration-dystrophic changes of the cervical spine and surrounding tissues, which could be contributory factors for headaches, unstable blood pressure, dizziness, limited movements of the cervical spine, and numbness of the digits of the upper extremity.^[7] These parameters were not analyzed in the present study, but two subjects that presented with radiation were excluded from the study. Literature also states that the hump could be a potential threat as it could lead to osteoporosis, cardio vascular disease, diabetes and bone fractures as well.^[8]

Boyoung IM, *et. al.* in his study stated that patients with neck pain present with FHP, an approximation of 60% patients with

neck pain are said to present with this posture.^[26] Hence, based on literature available, the possible explanation for the results obtained in the present study on the correlation between neck pain and buffalo hump, as stated in various studies, neck pain is caused due to the stresses imposed on the spine and the imbalance between the anterior and posterior neck muscles leading to abnormal stresses on the cervical spine, which is a result of abnormal posture mainly known as forward head posture,^[9,27,28] but the buffalo hump is said to be a protective mechanism that develops to safeguard the spine from further potential damage by the forward head postural defect,^[10] but as per to literature the hump can also be a potential cause of ill – effects, such as headaches, unstable blood pressure, dizziness, limited movements of the neck and numbness of the fingers.^[7,25]

A study by Maria M. Werthi *et. al.* concluded that person that have unhealthy weight and weight problems showed no association with neck pain^[7] which is agreeable with the baseline disability scores obtained in comparison with BMI from the present study, which showed no association between BMI and neck pain which was one of the secondary objectives of the present study. On the other hand there are various studies also contradicting this statement by stating person that have weight problem are more prone to develop neck pain.^[29-31] Another one of the secondary objective of the study was the association between BMI and the buffalo hump which showed to be correlated, which can be supported by results of other studies that have shown the hump is said to be prevalent among individuals that range from normal to extreme weights as per to the WHO BMI classification scores.^[7]

Conflict of Interest: The authors have declared no conflict of interest.

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Limitation

Subjects without neck pain were not included in the study

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