

**Original article:**

## **A Study of Hearing Loss in Deformity of Pinna in Wrestlers at Karnala Sports Academy, Panvel**

**\*Dr Tanush Shah , Dr Vaishali Sangole , Dr Kalpana Rajiv Kumar , Dr Jubina Puthen Purayil**

Karnala Sports Academy, Panvel , Maharashtra

Corresponding author\* ; Email shahtanush@gmail.com



### **Abstract**

**Introduction:** Since old times wrestling is one of the popular sport around the world. In India also it is also becoming more common. Here is a study of 80 wrestlers, in age group ranging from 13 to 29 years of age in whom hearing loss is compared between wrestlers who have perichondrial haematoma with those having normal ear.

**Objectives:** 1.To evaluate the prevalence of cauliflower ears in wrestlers according to their age and months of wrestling training. 2.To study correlation between positive ear symptoms in wrestlers with or without cauliflower ear. 3.To study the association between Pure tone audiometry results in cauliflower ears and non cauliflower ears at different frequencies.

**Method:** The cross sectional study was carried at Karnala Sports Academy, Panvel. The subjects present were the wrestlers attending the Sports Academy for a prize competition from all over Maharashtra, India. Sample size was 80 wrestlers. Patients included were 1.Subject giving history of trauma while wrestling. 2.Subject having visible deformity of pinna. 3.Subject aged between 16 years and 40 years. Patients excluded in the study were: 1.Hearing loss previous to history of wrestling. 2.Wrestlers who have undergone prior ear surgery. 3.Wrestlers who had other deformities of limb, chest. 4.History of continuous exposure to noise. 5.Previous history of treatment with ototoxic drugs.

**Results:** In total, 80 cases, including 27 wrestlers who had unilateral cauliflower deformity (20 wrestlers with right ear and 7 with left ear deformity), while 19 wrestlers with bilateral cauliflower ear were investigated. Out of 46 wrestlers who had cauliflower ear deformities, 31 was traumatic while in 3 it was self-inflicted. The percentage of Positive ear deformity was observed in as high as 37 subjects, followed by Pain in 25, Tragal tenderness in 12, Noise Exposure in 11, Fullness in the ear in 9. Ear bleed and giddiness was in 6 subjects and Tinnitus in 5 subjects. All the symptoms had significant p-value. The percentage of positive history of ear infection among cauliflower ears was about five times more than this finding among non-cauliflower ears. Pure tone audiometry examination results at frequencies ranging from 250 to 8Khz showed that frequency of hearing loss among cauliflower ears was higher than this rate among non-cauliflower ears at all frequencies. In our study hearing loss was defined as above 25 dB HL decrease in hearing threshold according to basic values at each frequency.

**Conclusion:** Ear guards are useful in protecting against the formation of auricular hematoma. Cosmetic problems alone may not justify the mandatory use of headgears by wrestlers. However the results of this study bring a real concern about the possible side effects of ear injury in wrestlers.

**Key words:** Hearing Loss, Hearing Tests, Pure Tone Audiometry.

## **Introduction**

Wrestling is a popular sport around the world and is being practiced since ancient times. It is a contact sport with extreme physical demands and its practices associated with high incidence of ear injuries second only to orthopedic. In such sports, atypical deformity of external ear identified as cauliflower ear has been reported. Cauliflower ear can be observed widely among wrestlers in some regions such as Asian countries.<sup>1</sup> In India its popularity is increasing everyday with wrestlers like Sushil Kumar, Yogeshwar Dutt and Amit Kumar Dahiya winning medals in Olympics and World Championships. However, there is little information in the literature about these injuries sustained by the Indian wrestlers.

Cauliflower ear is an acquired deformity of the external ear to which wrestlers and boxers are particularly vulnerable, due to trauma. The cause is bleeding within the external portion of ear, a condition known as hematoma auris, perichondrial hematoma or traumatic auricular hematoma. When the blood clot (hematoma) forms under the skin of the ear, the clot disrupts the connection between the skin to the ear cartilage. This hematoma might lead to cartilage necrosis through reduction of blood flow.<sup>2</sup> The cartilage has no other blood supply except from the overlying skin so if the skin is separated from the cartilage. It is deprived of nutrients and dies. The ear cartilage then shrivels up to form the classic cauliflower ear, so named because the tissue resembles that lumpy vegetable's surface. The condition is common in martial arts such as boxing, mixed martial arts or wrestling, and in full contact sports such as rugby union football.

Historically, the condition has usually been seen with wrestlers. As far back as ancient statues in Rome and Greece show resemblance of cauliflower ear. It was defined as 'An effusion of blood or of bloody serum between the cartilage of the ear and its perichondrium, occurring in certain forms of insanity and sometimes among same.

Wrestling has been a symbol of power and virility for the people in a number of countries. Wrestlers refuse to treat their ear hematoma to recognize as a 'badge of courage'. Therefore, wrestlers refuse to treat their ear hematoma in order to intentionally develop a cauliflower ear.<sup>3</sup> However injuries can significantly reduce the athletic life. Better understanding of potential injuries in wrestling or any other sport helps to implement preventive measures for better care of these athletes. A major thrust is required in this direction if we want our athletes to do well. This study is an attempt at identifying and characterizing these injuries sustained by Indian wrestlers.

## **Methodology**

The cross sectional study was carried at Karnala Sports Academy, Panvel. The subjects present were the wrestlers attending the Sports Academy for a prize competition from all over Maharashtra. Institutional ethics committee approval was taken. The approval number is.....

Sample size of 80 cases included in the study. In patients included the youngest was 13 years and oldest was 29 years old. Patients excluded were who had other deformities like limb, chest etc.

Demographic data, history of either previous disease related to hearing loss, probable symptoms of hearing loss and risk factors for hearing loss (including history of ear discharge, head trauma, radiotherapy, ototoxic drug intake, hypertension, thyroid disorders, noise exposure) were asked from subjects via questionnaire format.

The subjects underwent routine ENT, Systemic, and Audiometric Examination of ears with an otoscope was performed. The external canal and tympanic membrane of the wrestlers were observed carefully and any obstructions in the external canal, perforation of tympanic membrane or other abnormalities were reported. Audiometric assessment was conducted in a quiet place in each of the wrestling clubs but not in an audiometric test room, delivering pure tone stimuli to one ear at a time in frequencies of 250Hz, 500Hz, 1000Hz, 2000Hz, 4000Hz and 8000Hz at various selected intensities.

## Results

**Table 1: The distribution of cauliflower ears in wrestlers according to their age, and months of wrestling training.**

Variables	Number	Average Age in yrs	Average months of Wrestling training
Wrestlers with one cauliflower ear	27(33.75%)	17.39	54.91
Wrestlers with two cauliflower ears	19(23.75%)	17.68	53.04
Wrestlers with no cauliflower ears	34(42.5%)	17.11	47.82
Total	80(100%)	17.39	51.93

**Table 2. Comparison between the Positive Symptoms of Ear in Wrestlers with or without cauliflower Ear.**

Symptoms	Wrestlers with No Cauliflower Ear	Wrestlers with Cauliflower ear	Chi Sq Value	Significance P-Value
Pain	1 (1.25%)	25 (31.25%)	22.86	.000*
Deformity	0 (0%)	37 (46.25%)	49.27	.000*
Tinnitus	0 (0%)	5 (6.25%)	3.85	.050 <sup>*.b</sup>
Ear bleed	0 (0%)	6 (7.5%)	4.69	.030 <sup>*.b</sup>
Tragus tenderness	1 (1.25%)	12 (15%)	7.47	.006*
Fullness of ear	1 (1.25%)	9 (11.25%)	4.79	.029 <sup>*.b</sup>
Noise exposure	0 (0%)	11 (13.75%)	9.21	.002 <sup>*.b</sup>
Giddiness	0 (0%)	6 (7.5%)	4.69	.030 <sup>*.b</sup>

**Table 3. Comparison of abnormal findings examination of External and Tympanic Membrane in Wrestlers with or without cauliflower Ear.**

Examination	Non Cauliflower Ears	Cauliflower Ears	Chi Sq Value	P-Value
Ear wax	6 (7.5%)	6 (7.5%)	0.37	0.54
Infection	0 (0%)	5 (6.25%)	3.85	0.05
Canal stenosis	0 (0%)	1 (1.25%)	0.73	0.392
Tympanic membrane	10 (12.5%)	14 (17.5%)	1.04	0.904

**Table 4: Comparison of Abnormal otoscopic examination of external ear and tympanic membrane of wrestlers with or without cauliflower ear.**

Findings of Oscopic Examination	Non Cauliflower Ears	Cauliflower Ears	Chi Sqare Value	Significance P-Value
Inflammation	3 (3.75%)	2 (2.5%)	7.473	0.006
Perforation	2 (2.5%)	4 (5%)		
Plaque	3 (3.75%)	4 (5%)		
Retraction	2 (2.5%)	4 (5%)		

**Table 5: Association between Pure Tone Audiometry Results in Cauliflower ears and Non-Cauliflower ears at different Frequencies.**

Frequency	No Cauliflower ear		Cauliflower ear		t-Test P- Value	
	Right (Average dB)	Left (Average dB)	Right (Average dB)	Left (Average dB)	Right	Left
250	25.68	25.74	29.21	26.00	0.003	0.854
500	24.38	25.26	30.04	26.98	0.000	0.244
1000	25.09	24.65	29.15	27.87	0.001	0.017
2000	25.26	24.97	27.87	27.85	0.055	0.033
3000	24.56	24.71	27.87	27.74	0.023	0.030
4000	24.56	24.35	28.55	28.09	0.007	0.011
6000	24.47	24.35	28.53	27.87	0.009	0.016
8000	23.76	25.53	28.72	28.28	0.001	0.045

In total, 80 cases, including 27 wrestlers who had unilateral cauliflower deformity (20 wrestlers with right ear and 7 with left ear deformity), while 19 wrestlers with bilateral cauliflower ear were investigated. Out of 46 wrestlers who had cauliflower ear deformities, 31 was traumatic while in 3 it was self-inflicted.

The distribution of cauliflower ears in wrestlers according to their age and months of wrestling training is provided in Table 1.

Comparison between Positive Symptoms of Ear in wrestlers with or without cauliflower Ear is shown in Table 2. The percentage of Positive ear deformity was observed in as high as 37 subjects, followed by Pain in 25, Tragal tenderness in 12, Noise Exposure in 11, Fullness in the ear in 9. Ear bleed and giddiness was in 6 subjects and Tinnitus in 5 subjects. All the symptoms had significant p-value.

The percentage of positive history of ear infection among cauliflower ears was about five times more than this finding among non-cauliflower ears. This difference tended to be statistically significant (p value of 0.05).

Also results of examination of external canal and tympanic membrane of the wrestlers and otoscopic examination of external ear and tympanic membrane of wrestlers with or without cauliflower ear are presented in table 3 and 4.

Pure tone audiometry examination results at frequencies ranging from 250 to 8Khz showed that frequency of hearing loss among cauliflower ears was higher than this rate among non-cauliflower ears at all frequencies. In our study hearing loss was defined as above 25 dB HL decrease in hearing threshold according to basic values at each frequency. The results of pure one audiometry at different frequencies are displayed in Table 5.

## Discussion

To the best of our knowledge this is the first study using audiology tests at different frequencies in Wrestlers in India. The results of this study have shown that ‘cauliflower ear’ is common in wrestlers. In addition, the data suggests that the majority of those who had cauliflower ear have not received any treatment. This is probably because a severe cauliflower ear is recognized as a ‘badge of courage’. Therefore wrestlers refuse to have their ear hematoma untreated. The rate of hearing loss in wrestlers with cauliflower ear is higher than the rate among a control group of wrestlers without cauliflower ear. According to the results of PTA, hearing loss in all was significantly higher in cauliflower ears at all the frequencies. The higher prevalence of hearing loss among wrestlers who had cauliflower ears in this study might be because of two main reasons.

- a) Hearing loss associated with the cauliflower ear deformity.
- b) Hearing loss associated with injury to a deeper part of the ear.

Our finding supported results of previous study by Pardis et al.<sup>4</sup> and by Kordi et al.<sup>1</sup> The study by Kordi et al.<sup>1</sup>, which was a questionnaire based survey reporting significant differences between the rates of hearing loss in wrestlers with cauliflower ear (11.5%) in comparison with wrestlers without cauliflower ear ((1.8%) (P<0.05).

The percentage of positive history of ear infection among cauliflower ears was about five times more than this finding among non-cauliflower ears. This difference tended to be statistically significant (p value of 0.05). This could be considered as a possible reason for higher rate of hearing loss in cauliflower ear, hereby ear infection prevention and on time treatment of ear infections may be recommended to prevent possible hearing loss in wrestlers.

As a limitation of the study, the audiologic tests were performed in the wrestling academy. While according to standard protocols, the tests should be done in a sound protected place. In this regard, a quite silent condition in a private room in the wrestling academy was provided for performing audiologic tests. However within our limitations we recommend the importance of establishing preventive policies like mandatory use of ear gears.

## Conclusions

Ear guards are useful in protecting against the formation of auricular hematoma. Cosmetic problems alone may not justify the mandatory use of headgears by wrestlers. However the results of this study bring a real concern about the possible side effects of ear injury in wrestlers.

## Acknowledgements

Authors thank Mr. Kishore Raut (statistician), for his support. Also thankful to the authorities of Karnala sports Academy

## References

- 1.Kordi R, Mansournai MA, Nourian RA, Wallace WA. Cauliflower Ear and Skin Infections among wrestlers in Tehran. Journal of Sports Science Med. 2007;6:39-44.
- 2.Roy S,Smith LP. A novel technique for treating auricular hematoma in mixed martial artists( ultimate fighters). Am J Otolaryngol.2010;31(1):21-4.
- 3.Reid DC. Sports Injury Assessment and rehabilitation. New York: Churchill Livingstone;1992.
- 4.Pardis N, Mohsen R, Ruhollah N et al. Association between Hearing Loss And Cauliflower Ear in Wrestlers, a Case Control Study Employing Hearing Tests. Asian Journal of Sports Med. 2015; 6(2):1-6.

---

Date of Submission: 05 January 2020

Date of Peer Review: 21 January 2020

Date of Acceptance: 19 March 2020

Date of Publishing: 30 March 2020

Author Declaration: Source of support: Nil , Conflict of interest: Nil

Ethics Committee Approval obtained for this study? Yes

Was informed consent obtained from the subjects involved in the study? Yes

For any images presented appropriate consent has been obtained from the subjects: NA

Plagiarism Checked: Urkund Software

Author work published under a Creative Commons Attribution 4.0 International License



Creative Commons Attribution  
4.0 International License

CC BY 4.0

DOI: 10.36848/IJBAMR/2020/12512.55790