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Prevalence of Orthopnea in Older Individuals

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Abstract:
Introduction: *Orthopnea is a type of dyspnea which occurs when an individual experiences breathlessness after lying down flat on ones back. This study focused on seeing its occurrence in older individuals categorically from 65 years and onwards. It focused on studying the impact of age related changes and its association with Orthopnea. It also focuses on studying, does lifestyle factors have any impact on the occurrence of Orthopnea, does change in sleeping position have any effect on perceiving Orthopnea, are nocturnal awakenings frequent due to Orthopnea, does doing exercise have any effect on Orthopnea.*
Methodology and Process: *Total population of 200 was taken for this study, the population was undertaken according to the inclusion and exclusion criteria.The individuals were given brief introduction and written consent was taken. Data collection sheet and orthopnea related questionnaire were provided to the individuals. Data was obtained and responses were analysed under the guidance of the statistician.*
Results: *The prevalence of orthopnea in older individuals was 12.57% with a P value of less than 0.0001 and Chi square value 136.03. Majority of the individuals were above 80's and some were above 75 years old.*
Conclusion: *According to the data analysis prevalence of orthopnea was only 12.57% in older individuals. Co morbid status, exercise habits also had impact on the perception of orthopnea. Sleep habits like use of pillows, sleeping position, nocturnal awakenings were impacted by orthopnea.*
Key Words: *Prevalence, Orthopnea, Older individuals.*

INTRODUCTION

Old age population also known as the geriatric population is one of the most vulnerable population of the society. Various problems occur in elderly individuals involving various different systems. But how the aging progresses in each individual is highly subjective and is influenced by various personal as well as environmental factors. Various bodily systems are affected depending upon their capacity and usage done retrospectively.(1,2)

Aging is a normal and essential process and is required for the development of the individual. Aging is at its peak in the older age. The efficacy and capacity of various body systems starts to decline. The major body systems which are involved are the musculoskeletal, neurological, cardiovascular and respiratory systems. Their affection leads to the serious problems later.(1,2)

As perception of breathlessness is highly subjective, it also depends on the age of the individual. Therefore the older age population is classified into three different categories.

Classification-

- Young old: 65 to 75 years.
- Middle Old: 76 to 85 years.
- Older old: 86 yrs and above.

As the age advances there is reduction in capacity of respiration by 40%. The atrophy of muscles leads to reduced endurance increase in fatigue levels leading to uncomfortable respiration. (1,2)

The deterioration of respiratory system is faster than the any other system of the body.(1,2)

The capacities and the volumes are reduced as per age. (1)

This study mainly focuses on the effects of age on the respiratory system in terms of breathlessness and are there any factors responsible for the precipitation of breathlessness. Breathlessness is a common phenomenon which can be seen in the older age.(1,2). Medically it is addressed as dyspnea.

What are the factors which are responsible for development ofdyspnea:-

Anatomical and Physiological:-(1)

Increase resistance to respiration.

Reduction of muscle strength.

Expanding and recoiling capacity of the lungs reduces.

Stiffness of the chest wall might increase due to age related musculoskeletal changes of the ribcage.

Overall lung function is declined.

Other influential factors:-

Reduction in physical activity levels leading to more sedentary lifestyles.
Various other musculoskeletal disorder are also causative for the development of reduced mobility due to restrictions imposed. This becomes a habit and respiratory fitness is reduced. (1,2)
Psychological factors do play a role in the perception of dyspnea, example during an episode of uncomfortable respiration there are high chances of anxiety hitting in and causing exaggerated effect on the perception of breathlessness. (3)
Environmental factors like humidity, dry air, dust particles, pollution also contribute to the perception of dyspnea.(3)
Other important factors like heavy food, increase in gas production, increased abdominal weight leading to impaired function of diaphragm while lying down also might lead to the misleading perceptions of the breathlessness.(1,2)
This study also tries on finding any relation of basic comorbidities like Blood pressure, Diabetes with the perception of breathlessness with the help of questions.(3)
When an older individual experiences an episode of uncomfortable respiration, first instinct is to adjust and adapt the given problem, and not addressing it because of the fear of anything big ahead. It might lead to further problems if not addressed it earlier.(3) It might also be because the sedentary lifestyle misleads them from recognizing the issue of breathlessness as they don't try to physically exert themselves often.(3)
During an uncomfortable respiration individual might experience increased effort for the respiration, tightness in the chest, Gasping for air as ventilation is insufficient. If the episodes of uncomfortable respiration keeps on repeating then they might increase the use of accessory muscles of respiration. (3)
Primary muscles:-(4)
Inspiration:- Diaphragm, scelene, parasternals
Expiration:- as it is a passive process no muscles are used in the expiration.
Accessory muscles:- (4)
Inspiration:- sternocleidomastoid, upper trapezius, pectoralis major, pectoralis minor, subclavius and intercostals.
Expiration:- rectus abdominis, transverse abdominis, internal and external oblique, pectoralis major and intercostals.
One of the type of dyspnea is the orthopnea. Orthopnea is the perception of breathlessness that individual gets when he lies on his back down. It might affect the overall quality of sleep and also the duration of sleep.(4).
During normal inspiration there is decent of diaphragm downwards during inspiration and again the diaphragm moves upwards during expiration pushing the air out of the lungs. (4). It might happen during normal positions like sitting, standing the gravity might assist the function of diaphragm. [(4).] While lying down the diaphragm might be pushed upwards due to increased abdominal fat or contents or increased accumulation of gas or simply the position itself is responsible for pushing it upwards. This poses extra work on the diaphragm as well as the muscles of respiration. This compromises their optimal efficacy. This demands for compensatory changes to come to action.(5)
When breathlessness while lying down is perceived, the most effective compensatory change that the individual self applies is, elevation of his head with the help of pillows, change in sleeping position like assuming side lying position, high lying position or high side lying position.(6)
As the normal breathlessness is known to people and aware about it, the breathlessness while lying down or orthopnea is not so common and needs awareness about it is necessary to teach individuals the correct relaxation position and use of pillows for the same just as dyspnea relieving positions.(6)
Majority of the studies are focused on the orthopnea which experienced as a secondary symptom to the diseases like heart failure, COPD, asthama, chronic bronchitis allergic conditions.(6,7)
This study focuses on the finding the prevalence of orthopnea in olderindividuals considering only age related changes and its affect on respiratory system. It also focuses on the effect of comorbidities like bloodpressure and diabetes and its relation with breathlessness.
It also considers the effects of lifestyle factors on the perception of dyspnea majorly exercise focused. It also tries to find the effect of BMI on the perception of breathlessness.
Therefore identifying orthopnea and its causative factors are necessary to improve the quality of life of the individual.

MATERIALS AND METHOD

The study protocol was presented for approval in front of the institutional ethical committee and college research protocol committee of institution. After ethical approval the purpose of the study was explained to the participants. Written consent was taken from participants. Participants were screened based on the inclusion and exclusion criteria.

INCLUSION CRITERIA

The aged individuals who were 65 years and above and who were willing to participate in the study were selected for this research.

EXCLUSION CRITERIA

The aged individuals who had conditions like heart failure, asthma, chronic obstructive pulmonary disease[COPD], bronchitis were excluded from this study as it might lead to false positive results as orthopnea is considered to be one of the symptoms of the above conditions.

Procedure

The study was carried out in Karad, within a period of 6 months.At first the target individuals were scanned according to the inclusion and exclusion criteria. After identifying the target individuals for the study, a brief explanation was given to them regarding the study topic and what was the purpose of the study. Later written consent was taken from the individuals. It was followed by filling of the data collection, questionnaire related to orthopnea assessment was also filled in the pen and paper format, the questionnaire was given in the native language for better understanding by the individual. After collecting the responses from the individuals the data was analysed with the help of statistician and an in-stat software for statistical analysis. Based on the analysed data results and conclusions were obtained.

Ethical Approval And Participation Consent

The ethical approval for undertaking the proposed study Has been obtained from the Institutional Ethics Committee of Krishna Vishwa Vidyapeeth (Deemed to be University), Karad ,Maharashtra, India, with their letter no. KVV/IEC/1/2025 Dated January 23rd 2025. Written infromed consent was obtained from all the participants, who were assured of confidentiality and their right to withdraw at anytime.

OUTCOME MEASURE

The interpretation of the study was based on the orthopnea questionnaire. It was first developed in English language but later it was translated to the native Marathi language for better understanding by the individuals. The data was concluded by the statistical analysis for the same.

ORTHOPNEA QUESTIONNAIRE			
Sr. No	QUESTIONS [DEFINITION WAS PROVIDED BEFORE]	RESPONSES	
1	Are you aware about what is orthopnea?	Yes	No
2	2. Do you experience shortness of breath after lying down?	Yes	No
3	If yes then whats is its duration?	Immediately after lying down	It develops gradually over a period of time

4	If yes, then how much?	{5=severe and 1= no problem } according to wong baker scale	
5	How often do you wake up at night due to breathing difficulties while lying down?	Rarely	Often
6	Does changing your sleeping position improve the problem of breathlessness?	Yes	No
7	If yes then which position gives you the most relief?	side lying	semi reclined
8	8. Is the breathlessness so severe that you have to sit up in the middle of the night?	Yes	No
9	Do you experience laboured breathing while lying down ?	Yes	No
10	10. Do you experience chest pain or chest tightness when lying down?	Yes	No
LIFESTYLE QUESTIONS			
11	Do you use extra pillows to elevate you head when lying down?	Yes	No
12	Have you experienced any limitations in daily activities due to breathing difficulties at night?	Yes	No

13	Do you practice exercise in your daily life? (yoga, pranayam, walk etc.)	Yes	No

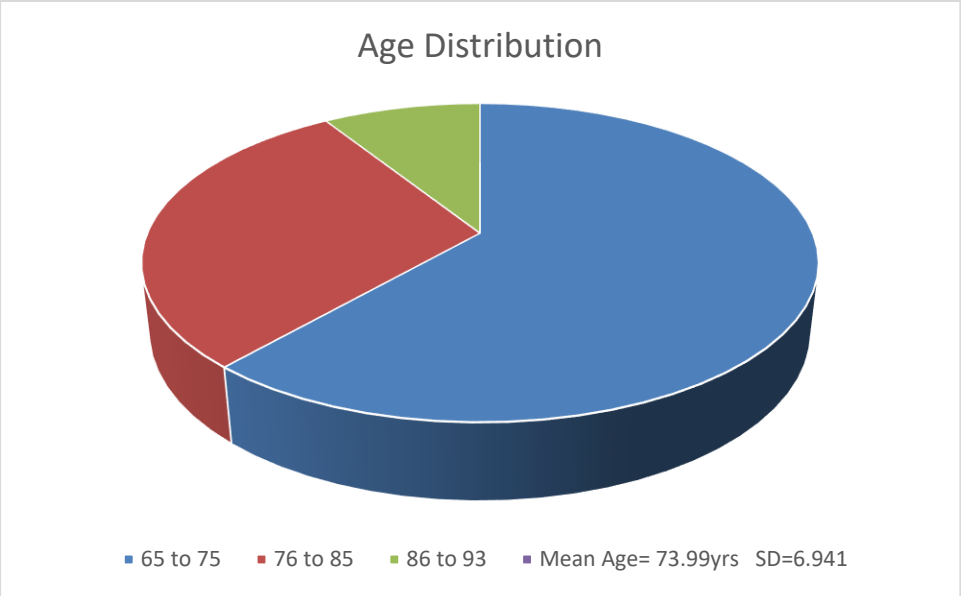
RESULTS

1. Age Distribution of the given population.

Table 1.

Age Groups	Frequency	Avg. Age	Percentage
65 to 75	123	69.3	61.5
76 to 85	59	79.2	29.5
86 to 93	18	86.8	9
Mean Age= 73.99yrs SD=6.941			

Chart 1.



Among the population of 200 individuals maximum population was under the age group of 65 to 75 years and minimum population was in the age group of 86 to 93 years. the Mean age of the total population was 73.99 years with an standard deviation of 6.941.

2. Gender distribution of the given population

Table 2.

Gender	Frequency	Percentage
Males	99	49.5
Females	101	50.5

Chart 2.

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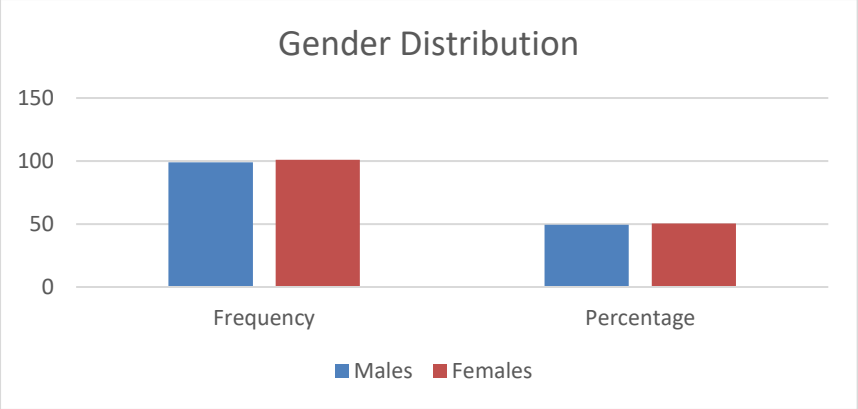


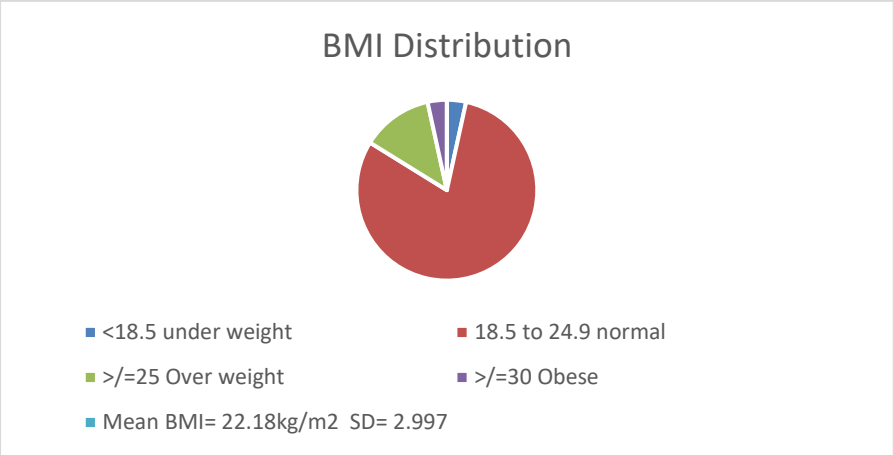
The sampled population had nearly equal numbers of male and females.

3. BMI Distribution of the given population

Table 3.

BMIkg/m2	Frequency	Avg.BMI	Percentage
<18.5 under weight	7	17.2	3.5
18.5 to 24.9 normal	164	21.3	82
>/=25 Over weight	26	26.8	13
>/=30 Obese	7	31.3	3.5
Mean BMI= 22.18kg/m2 SD= 2.997			

Chart 3.



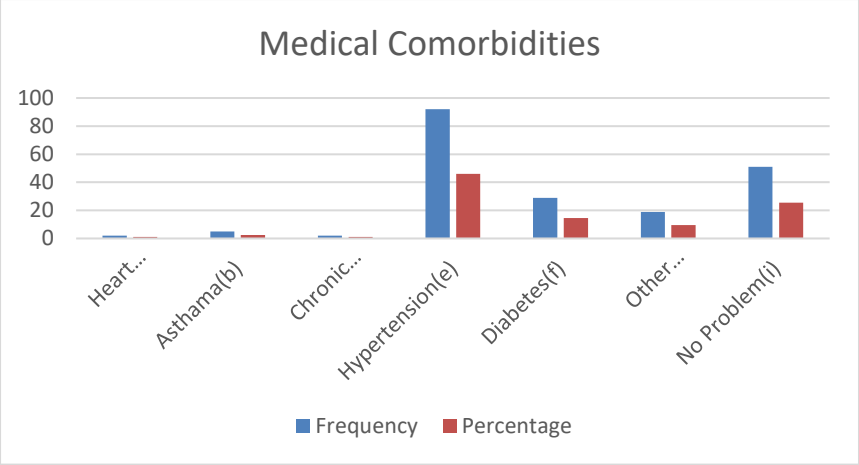
In the total population majority of the individuals were under the BMI of 18.5 kg/m^2 - 24.9kg/m^2, followed by 26 individuals were under the category of overweight with more than or equal BMI of 25 kg/m^2. The mean BMI of the total population is 22.18kg/m^2 with a standard deviation of 2.997.

4. The Frequency of medical co morbidities seen in the total population

Table 4.

Medical History	Frequency	Percentage
Heart Problems(a)	2	1
Asthama(b)	5	2.5
Chronic Bronchitis(c)	2	1
Hypertension(e)	92	46
Diabetes(f)	29	14.5
Other problems(h)	19	9.5
No Problem(i)	51	25.5

Chart 4.



Majority of the individuals had hypertension and diabetes followed other problems involving musculoskeletal disorders.

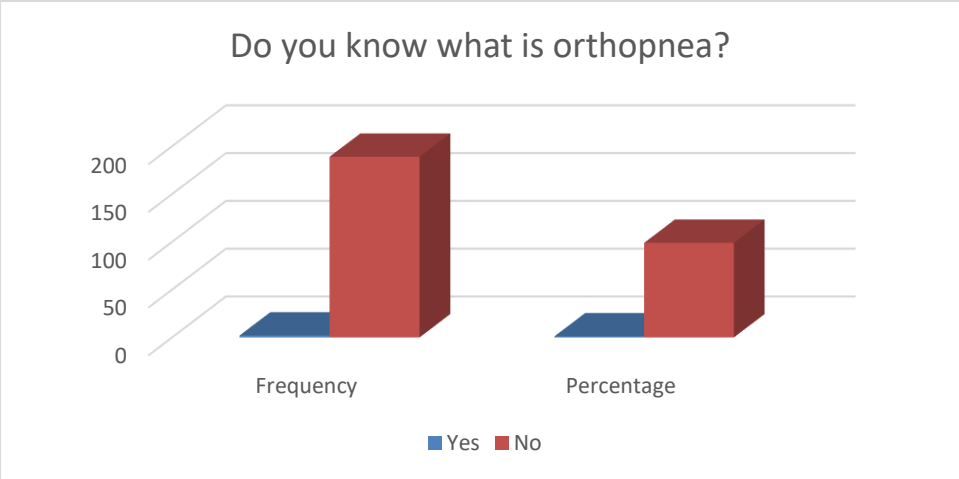
Among the total population of 200, 9 individuals came under the exclusion criteria of having heart problems, chronic bronchitis and asthma therefore they were excluded from the study.

5. Is the population aware about what is orthopnea?

Table 5

Response	**Frequency**	**Percentage**
Yes	2	1.04
No	189	98.9

Chart 5.



Majority of the individuals were not aware about occurrence of orthopnea.

6. The occurrence of orthopnea in the total population.

Table 6.

Response	**Frequency**	**Percentage**
Yes	24	12.56
No	167	87.4

Chart 6.

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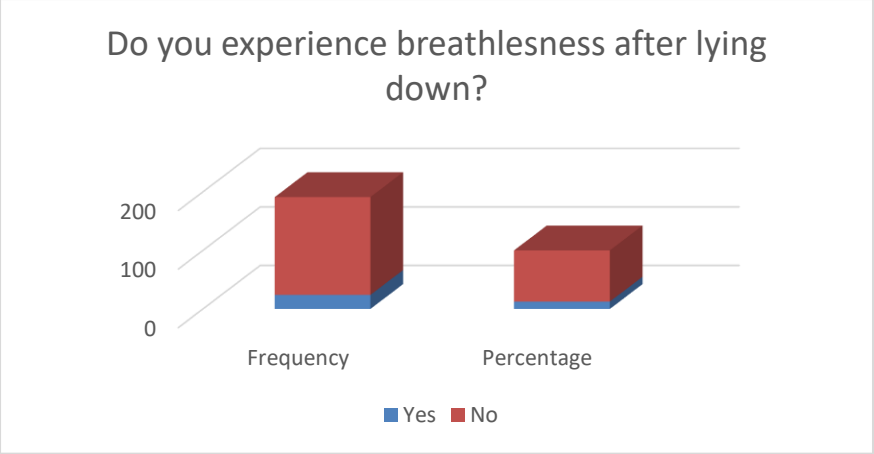
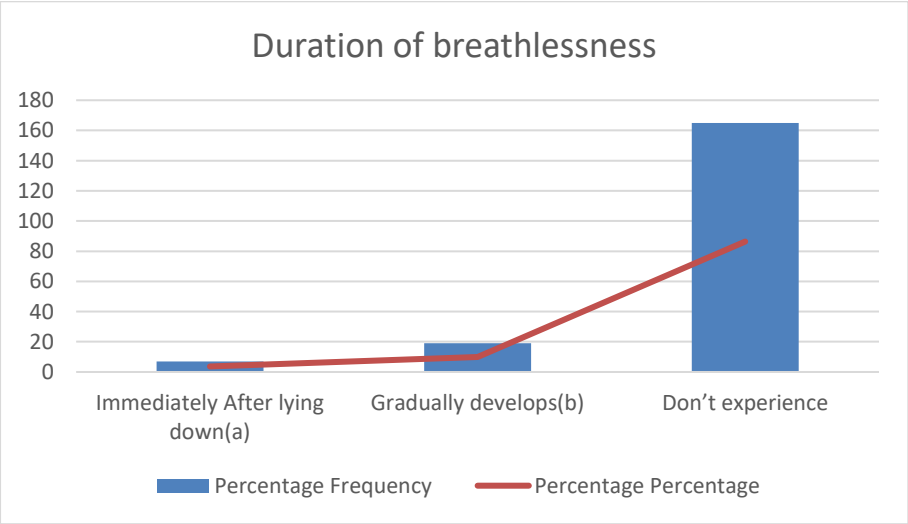


The individuals experiencing orthopnea are only 12.57% of the overall population
7. The duration of commencement of breathlessness after lying down.

Table 7.

Responses	**Frequency**	**Percentage**
Immediately After lying down(a)	7	3.66
Gradually develops(b)	19	9.94
Don't experience	165	86.38

Chart 7.



Majority of individuals didn't experience orthopnea, 19 of them experienced gradual development of symptoms followed by 7 individuals who experienced symptoms immediately after lying down.
8. Distribution of Nocturnal awakening in the population due to orthopnea.

Table 8.

Responses	**Frequency**	**Percentage**
Rarely(a)	19	9.94
Often(b)	7	3.66
Don't wake up(x)	165	86.38

Chart 8.

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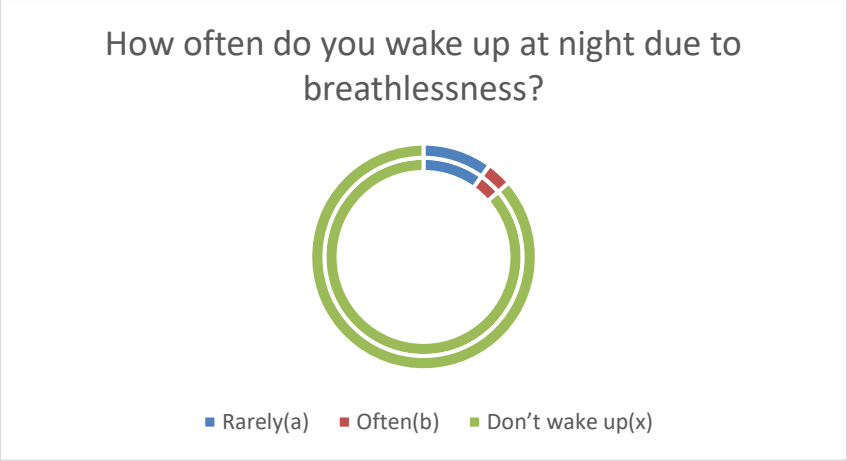


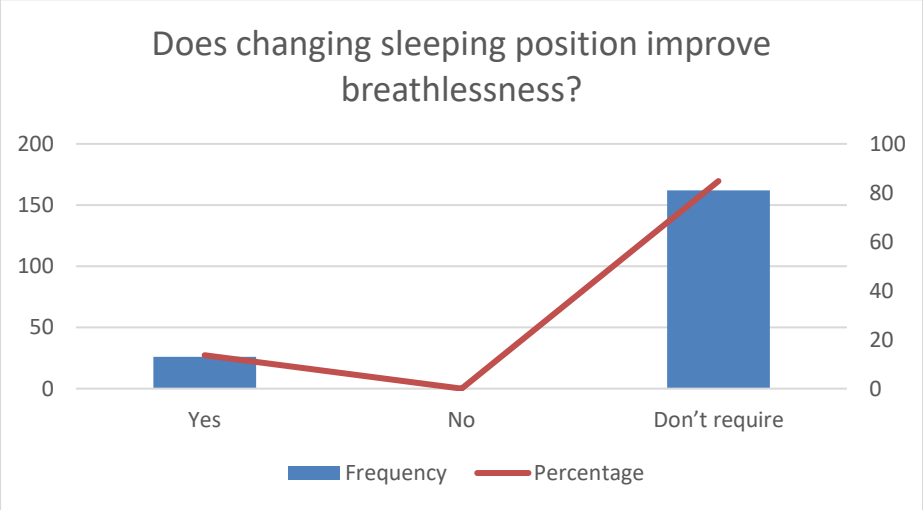
Out of the total population 7 individuals had often awakenings and 19 individuals rarely woke up due to breathlessness.

9. Sleeping position alteration and its effect on the perception of orthopnea.

Table 9.

Responses	**Frequency**	**Percentage**
Yes	24	12.5
No	0	0
Don't require	167	87.4

Chart 9.



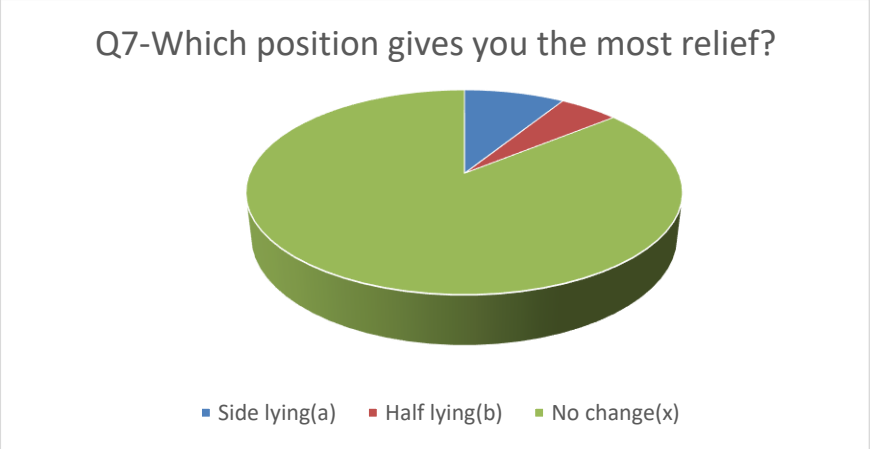
Alteration in sleeping position changed the perception of breathlessness after lying down.

10. Side lying position or Half lying position which sleeping position was more beneficial.

Chart 10.

Responses	**Frequency**	**Percentage**
Side lying(a)	14	7.32
Half lying(b)	10	5.23
No change(x)	167	87.4

Chart 10.



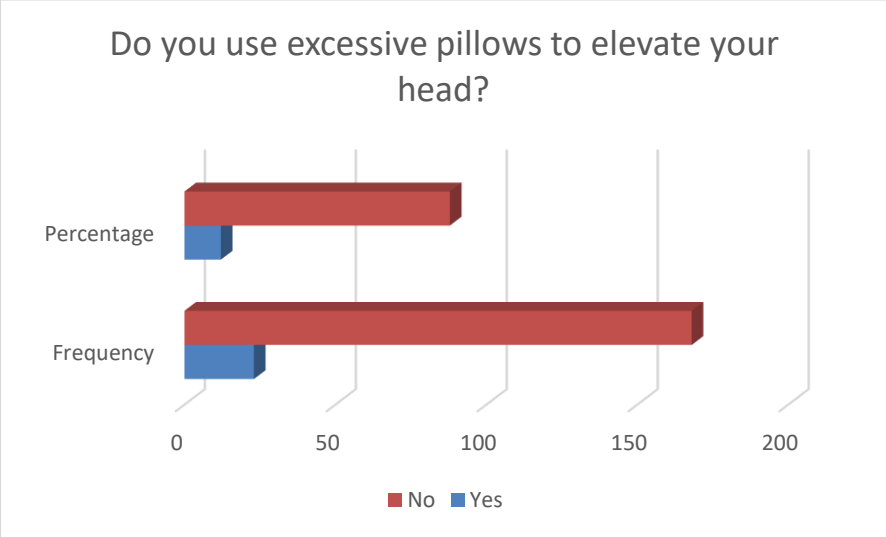
Majority of individuals are finding side lying position better than half lying position, but it is evident that change of position is required.

11. Distribution of population using extra pillows to elevate their head in order to tackle orthopnea.

Table 11.

Responses	**Frequency**	**Percentage**
Yes	23	12.04
No	168	87.9

Chart 11.



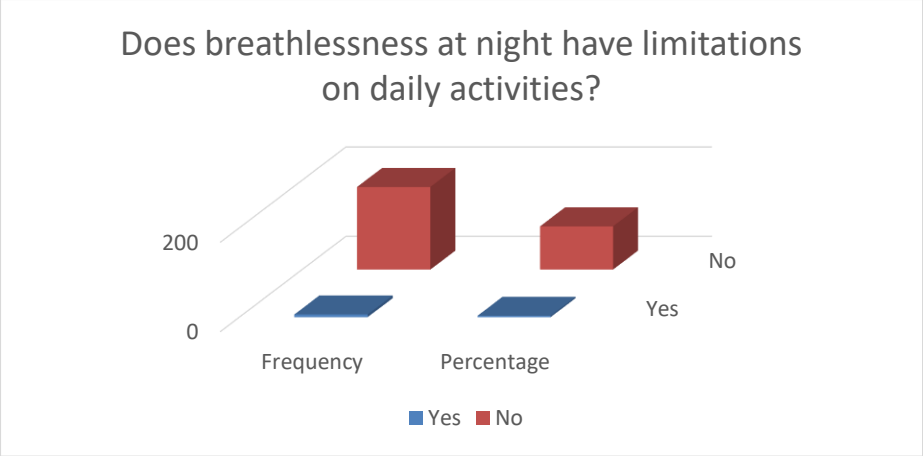
Of the total population 23 individuals required extra pillows to elevate their head while sleeping to tackle problems of orthopnea.

12. Limitations in ADL due to experiencing orthopnea at night.

Table 12.

Responses	**Frequency**	**Percentage**
Yes	6	3.14
No	185	96.8

Chart 12.



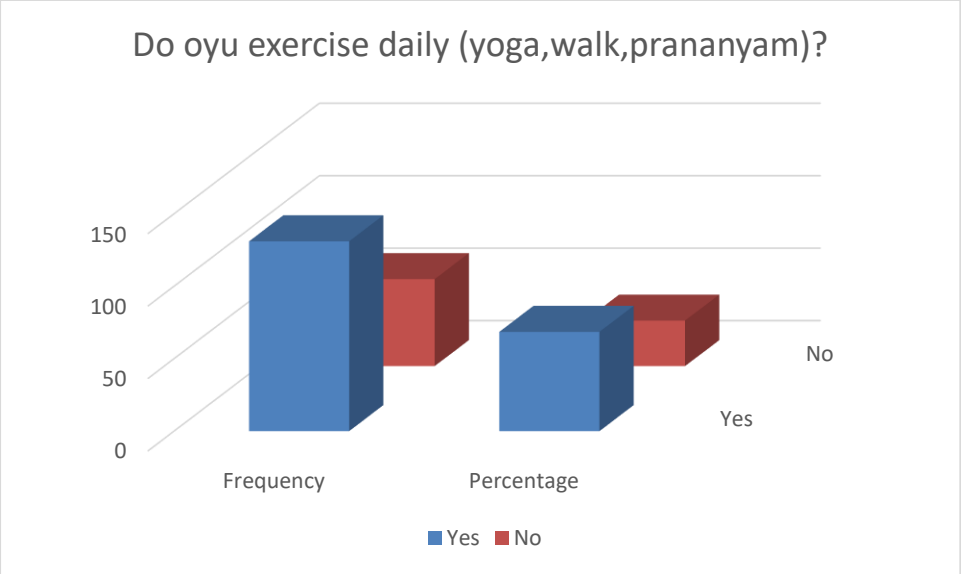
Very scarce amount of individuals from the population experienced limitations in ADL due to breathlessness at night.

13. Distribution of population which practices exercise in their daily routine.

Table 13.

Responses	**Frequency**	**Percentage**
Yes	131	68.5
No	60	31.4

Chart 13.



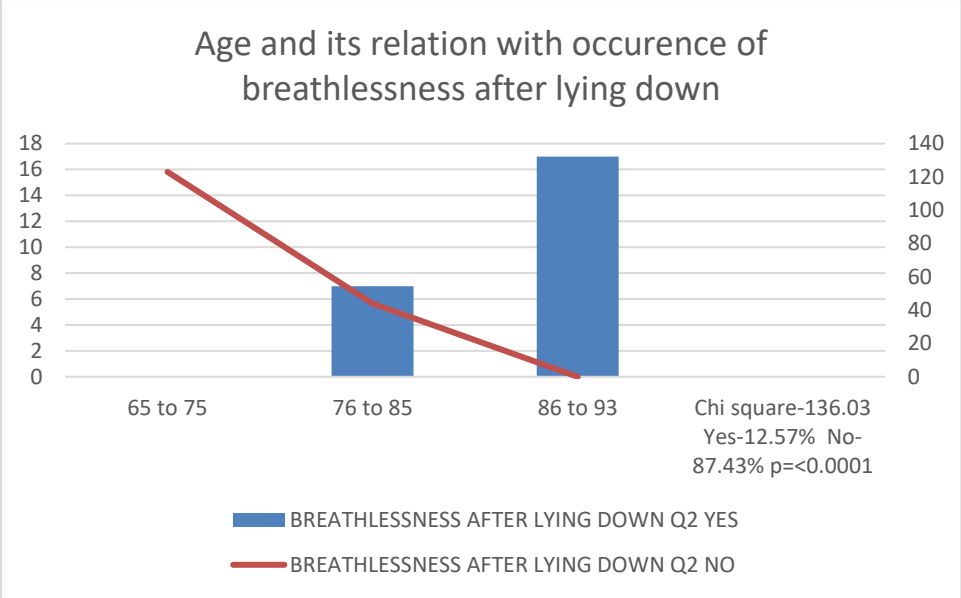
Out of the total population more than 50 % of population are exercising in their daily life.

14. Age related changes and its relation with occurrence of orthopnea

Table 14.

AGE GROUP	**YES**	**NO**
65 to 75	0	123
76 to 85	7	44
86 to 93	17	0
Chi square-136.03 Yes-12.57% No- 87.43% p=<0.0001		

Chart 14.



Majority of the individuals who experienced breathlessness after lying down were in the age group of 86 years and above followed by individuals of 76 to 85 years old.
Therefore total individuals who experienced breathlessness while lying down were 12.57% and those who didn't experience were87.43%.
Among 65-75yrs Nobody experienced breathlessness while lying down.
76-85yrs 12.6% experienced and 75.8% didn't experienced.
86-93yrs 17% experienced breathlessness while lying down.
Among the total population of 191, only 24 individuals experienced orthopnea out of which 17 individuals were under the age group of oldest old[86 years and above] , 7 individuals were in the age group of middle old [76 to 85 years].
Out of these 24 individuals 19 individuals had Blood pressure[BP], 5 individuals had diabetes.17 individuals rarely woke up at night due to orthopnea and 7 woke up often at night. 23 individuals found relief after changing their sleeping position. For 14 individuals side lying position gave relief, 10 individuals experienced relief in half lying position. 22 individuals experienced laboured breathing while lying down. 21 individuals used extra pillows to elevate their heads during supine position. Among the 24 individuals only 7 individuals did routinely exercise.

DISCUSSION

Orthopnea, defined as shortness of breath that occurs when lying flat and is relieved by sitting or standing, is a common symptom among older adults and often reflects underlying cardiopulmonary conditions. This study aimed to assess the prevalence of orthopnea among older individuals without any associations with cardiac or respiratory etiology and to identify potential associations with age, gender, and co-morbidities such as hypertension, diabetes.The findings revealed a **prevalence rate of 12.57**% of orthopnea in the older population, suggesting it is not common in individuals without any cardiac or respiratory associations. Orthopnea often reflects left-sided heart dysfunction, particularly in congestive heart failure (CHF), which is more common in aging individuals due to additive cardiovascular risk exposure. Additionally, age-related changes in pulmonary compliance and diaphragm mechanics could also contribute to this increased prevalence.
The data analysis highlighted that a higher proportion of older adults 86 to 93 or above years reported orthopnea compared to younger olds. This could be due to a higher incidence of age related changes respiratory system as well as cardiac system which are associated with dyspnea.
Another key observation was that individuals with co-morbid conditions, particularly hypertension and diabetes, had a greater prevalence of orthopnea. Many a times there is false perception of breathlessness while lying down due to overeating, accumulation of gas or abdominal obesity which restrict the space for diaphragm excursion.
Importantly, orthopnea may serve as a clinical indicator for early detection of worsening cardiac function in this age group. Given that many older adults may attribute their breathlessness to aging, routine

screening for orthopnea during clinical assessments could aid in earlier diagnosis and management of heart failure or other related disorders.

In terms of functionality, orthopnea significantly impacts quality of life, particularly sleep patterns and daily physical activity. Older adults experiencing orthopnea often report disturbed sleep due to the need for multiple pillows or sleeping in a seated position. This can lead to a series of negative health effects including fatigue, mood changes, and reduced mobility, which further aggravate the condition.

Additionally, physiological aging leads to reduced lung elasticity, calcification of the costal cartilages, and weakening of respiratory muscles, which may contribute to positional dyspnea. Thus, while orthopnea is traditionally linked with cardiac conditions, it is important to consider a multifactorialetiology in older individuals.

Despite its significant prevalence and impact, orthopnea remains under-recognized and under-reported, especially in resource-limited settings. The current findings underscore the need for a multidisciplinaryapproach involving geriatricians, cardiologists, and physiotherapists in the management of older individuals presenting with orthopnea.

Furthermore, physiotherapy interventions such as **breathing exercises, positioning strategies, and endurance training** may help improve respiratory efficiency and reduce symptoms. There is also potential for future studies to evaluate the effectiveness of specific physiotherapeutic approaches tailored to geriatric populations with orthopnea.

In conclusion, the study demonstrates that **orthopnea is only 12.57% prevalent in older individuals without any cardiopulmonary causes**symptom among older adults, particularly those with underlyinglifestyle related co-morbidities. Early identification and holistic management are essential to improving outcomes and quality of life in this growing population. Future research should explore the pathophysiological causes of orthopnea in the elderly and develop targeted interventions for its prevention and treatment.

CONCLUSION

The present study highlights that **orthopnea is 12.57% prevalent in older individuals and 87.43% individuals didn't experience orthopnea**, often indicating underlying cardiovascular or respiratory dysfunction.According to the results the prevalence of orthopnea in older individuals is very less i.e. 12.57%. Therefore the perception of orthopnea in older individuals who are without any heart or respiratory system related conditions is very scarce. Only age related changes are not fully responsible for occurrence of orthopnea. Other factors like nocturnal awakenings, change of sleeping position, use of extra pillows change according to the perception of breathlessness. Even though there are individuals with BP and diabetes who experience orthopnea, but the relation between the BP, diabetes and orthopnea has not been achieved in this study. The practice of exercise in individuals who experienced orthopnea is less, therefore the benefits of exercise should be incorporated in routine of the individuals experiencing it.Early identification and management of orthopnea are crucial, as it can serve as an early marker for future complications. Routine screening for symptoms of positional dyspnea in older adults, particularly those with known co-morbidities, is recommended. Moreover, a multidisciplinary approach that includes medical and physiotherapeutic interventions can improve patient outcomes and enhance quality of life. Future research should focus on establishing standardized screening protocols and evaluating targeted treatment strategies to address orthopnea in the elderly population.

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