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Study Of Effect Of Duration Of Diabetes On Lung Function Parameters.

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ABSTRACT

Diabetes mellitus (DM) is associated with various complications, including respiratory impairment. This study aimed to investigate the effect of DM duration on lung function parameters. A cross-sectional study was conducted involving male and female participants with T2DM and controls. Lung function parameters, including forced vital capacity (FVC), forced expiratory volume in one second (FEV1), peak expiratory flow rate (PEFR), and maximum voluntary ventilation (MVV), were assessed in relation to DM duration. A total of 68% male and 32% female cases and controls were included. FVC, FEV1, PEFR, and MVV exhibited significant declines with increasing DM duration ($p < 0.05$). Gender disparities were observed in the study population. Longer DM duration was associated with impaired lung function parameters, emphasizing the importance of proactive respiratory health management in individuals with T2DM. Comprehensive care strategies targeting glycemic control and respiratory health optimization are warranted to mitigate diabetes-related complications. Further research is needed to elucidate gender-specific differences and underlying mechanisms.

Keywords: Type 2 diabetes mellitus, lung function parameters, diabetes duration, respiratory impairment.

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INTRODUCTION

Diabetes mellitus, a chronic metabolic disorder characterized by hyperglycemia, is recognized as a major public health concern globally. Over the years, its impact has extended beyond glycemic control, affecting various organ systems, including the lungs. Mounting evidence suggests a bidirectional relationship between diabetes and lung function impairment, where diabetes may predispose individuals to respiratory complications, and impaired lung function may exacerbate diabetes-related complications. However, the precise influence of diabetes duration on lung function parameters remains a topic of ongoing research and debate. Understanding this relationship is crucial for optimizing clinical management strategies and improving outcomes for individuals with diabetes. By elucidating the effect of diabetes duration on lung function parameters, healthcare providers can better tailor interventions aimed at preserving respiratory health in diabetic populations. This study aims to contribute to this growing body of knowledge by investigating the association between diabetes duration and lung function parameters, shedding light on potential implications for clinical practice and public health policy [1-5].

METHODOLOGY

This cross-sectional study compared lung function parameters between 50 non-smoking diabetic patients and 50 age- and sex-matched healthy non-diabetic controls. Participants were recruited from relatives of diabetic patients visiting the outpatient department of a tertiary care center over one year. Subjects aged 35-55 years of both sexes were included, with systematic random sampling employed to mitigate selection bias. Exclusions comprised subjects below 35 or above 55 years, smokers, individuals with acute or chronic respiratory disease, and those with major neuropathy or cardiac conditions like IHD or RHD.

Anthropometric measurements including age, height, weight, and body mass index (BMI) were recorded using standardized techniques. A preliminary clinical examination was conducted to exclude any underlying medical issues. Pulmonary function tests (PFTs) were performed using computerized medspiror equipment manufactured by Chandigarh, following standard laboratory protocols. FVC, FEV1, FEV3, PEFR, and MVV were measured in a quiet laboratory setting between 8 am and 11 am to minimize emotional and psychological stress. Subjects received detailed instructions and demonstration before testing, with nose clips applied during maneuvers. Tests were repeated at least three times, and the best results were analyzed.

Inclusion criteria

- Patients of type-2 diabetes with age group 35-55 years.
- Controls of same age group with that diabetic patient.
- Patients of diabetes with different duration.

Exclusion criteria

- Subjects who smoke.
- Subjects suffering from acute or chronic respiratory diseases.
- Subjects suffering from major neuropathy.
- Subjects suffering from major cardiac diseases like IHD, hypothyroidism, hyperthyroidism, cerebrovascular accidents, etc.

RESULTS

Total numbers of male and female cases included in study are 68% and 32% respectively.

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Table 1: PFT in Duration wise subgroups of Type-2 diabetes mellitus

PFT (PFT in *L* / min)	Duration of DM years (Mean ± SD)			
	5-6	6-10	>10	P value
FVC	3.60±0.45	3.20±0.48	2.97±0.29	P=0.002*
FEV 1	2.97±0.36	2.66±0.37	2.49±0.23	P=0.003*
FEV 3	2.33 ± 0.70	1.90 ± 0.70	1.8 ± 0.63	0.197**
PEFR	8.35±0.89	7.38±1.29	6.72±0.92	P=0.001*
MVV	85.11 ± 13.6	83.4 ± 12.5	76.5 ± 13.1	p=0.034*

*Significant at 5 % level of significance
** Non-significant at 5 % level of significance

Graph 1: PFT in Duration wise subgroups of Type-2 diabetes mellitus

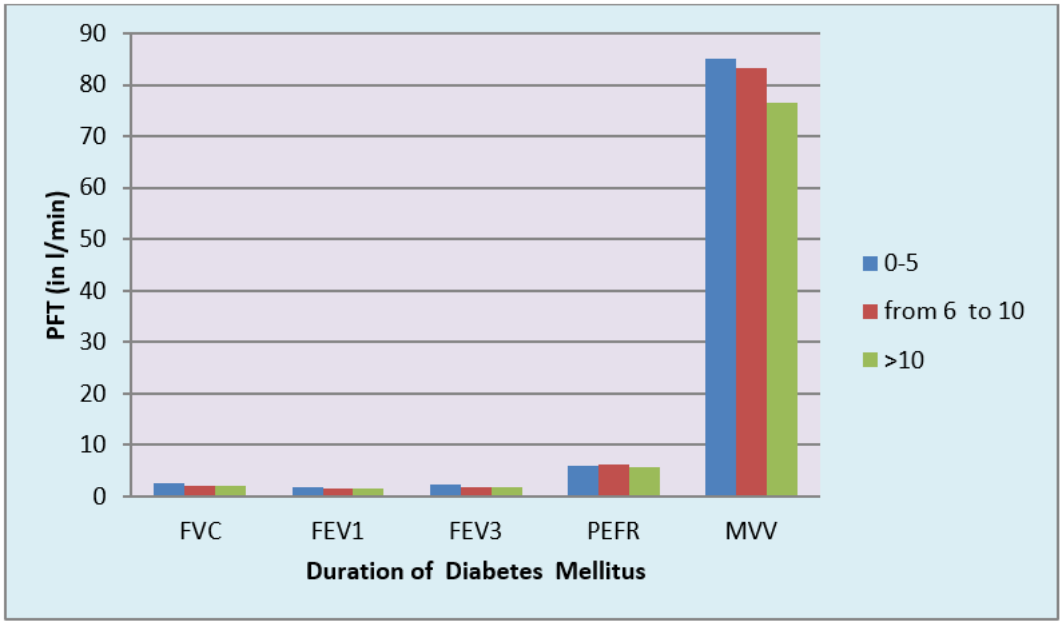

Table 1 and graph 1 shows the effect of duration of type 2 diabetes mellitus on pulmonary function test.

DISCUSSION

The findings from this study offer valuable insights into the relationship between the duration of Type-2 diabetes mellitus (T2DM) and lung function parameters, shedding light on potential implications for clinical practice and patient management. This discussion will delve into the key results observed in the study and their significance [6-14].

Effect of Diabetes Duration on Lung Function Parameters

The results demonstrate a significant association between the duration of T2DM and various lung function parameters. Notably, forced vital capacity (FVC) and forced expiratory volume in one second (FEV1) exhibited a progressive decline with increasing diabetes duration. This observation aligns with previous research highlighting the detrimental impact of diabetes on pulmonary function. The decreased FVC and FEV1 suggest impaired lung mechanics, possibly due to microvascular complications, inflammation, or neuropathy associated with long-standing diabetes.

Additionally, peak expiratory flow rate (PEFR) and maximum voluntary ventilation (MVV) also showed a significant decline with longer diabetes duration. These findings indicate compromised airway

function and respiratory muscle strength, further underscoring the adverse effects of chronic hyperglycemia on pulmonary health.

Clinical Implications

Understanding the relationship between diabetes duration and lung function parameters is crucial for clinical management. Healthcare providers should prioritize regular monitoring of lung function in diabetic individuals, especially those with longer disease duration. Early detection of pulmonary impairment can prompt timely interventions to mitigate progression and improve patient outcomes.

Moreover, the significant decline in lung function parameters emphasizes the importance of comprehensive care for individuals with diabetes. Integrated management strategies focusing on glycemic control, cardiovascular risk reduction, and respiratory health optimization are essential to address the multifaceted nature of diabetes-related complications.

Potential Mechanisms

Several mechanisms may underlie the observed association between diabetes duration and impaired lung function. Chronic hyperglycemia and insulin resistance contribute to systemic inflammation, oxidative stress, and endothelial dysfunction, which can adversely affect pulmonary vascular and parenchymal function.

Furthermore, diabetes-related microvascular complications, such as diabetic nephropathy and retinopathy, may extend to the pulmonary vasculature, leading to pulmonary hypertension and vascular remodeling. Neuropathic involvement may also impair respiratory muscle function and airway tone, exacerbating airflow limitation.

Gender Disparities

Interestingly, the study population comprised a higher proportion of male cases and controls compared to females. While the reasons for this gender disparity are not explicitly addressed, it underscores the need for gender-specific considerations in diabetes management and research. Future studies should explore potential differences in the impact of diabetes duration on lung function between males and females to tailor interventions accordingly.

Limitations and Future Directions

Despite its contributions, this study has certain limitations that warrant consideration. Firstly, the cross-sectional design limits causal inference, and longitudinal studies are needed to elucidate the temporal relationship between diabetes duration and lung function decline. Additionally, the study population may not be representative of broader demographics, necessitating validation in larger, more diverse cohorts.

Future research could also explore the influence of additional factors, such as smoking status, comorbidities, and medication use, on the relationship between diabetes duration and lung function. Furthermore, mechanistic studies investigating the molecular pathways underlying diabetes-induced pulmonary dysfunction could inform targeted therapeutic interventions.

Public Health Implications

The findings from this study have implications for public health policy and preventive interventions. Strategies aimed at early diabetes detection, glycemic control, and lifestyle modifications may help mitigate the long-term respiratory complications associated with diabetes. Moreover, integrating respiratory assessments into routine diabetes care protocols can facilitate timely interventions and improve overall health outcomes.

CONCLUSION

In conclusion, this study highlights the detrimental impact of diabetes duration on lung function parameters, emphasizing the need for proactive respiratory health management in individuals with T2DM. By elucidating the underlying mechanisms and clinical implications, this research contributes to the growing body of evidence linking diabetes and pulmonary dysfunction, paving the way for targeted interventions to optimize patient care and outcomes.

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