

Association between Quality of Life and Cardio Respiratory Fitness in Petrol Pump Workers in Ahmedabad City

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Abstract

Background and need of study: Petrol pump workers are incessantly exposed to petrol and diesel fumes and a long term exposure to these fumes lead to a detrimental effect on the cardio respiratory system and Quality of Life. Hence this study was undertaken to assess the cardio-respiratory fitness and Quality of Life and association between cardio respiratory fitness and Quality of Life in petrol pump workers.

Methodology: 60 non smokers, male petrol pump workers, 20-40 years age, who were working in various petrol filling stations as petrol filling attendants, 8 hours/day for ≥ 2 years in Ahmedabad city. Cardio respiratory fitness was assessed by 3 minute YMCA test and Quality of Life using SF12 Questionnaire. Spearman correlation was used between SF12 and YMCA test.

Results: Mean age was 31.46 ± 3.14 year. 41.67% of the workers who are poor cardio respiratory fitness, 31.67% of them have average, 23.33% of them have good and 3.33% of them have excellent cardio-respiratory fitness. Physical (48%) and mental (43%) score for Quality of Life in petrol pump workers. Significant difference was found between cardio respiratory fitness and mental health ($r = -0.0584$, $p < 0.001$) and cardio respiratory fitness and physical health ($r = -0.0501$, $p < 0.001$) in petrol pump workers.

Conclusion and implication: In petrol pump workers moderate affect the cardio respiratory fitness and quality of life as well as showed a moderate positive correlation between cardio respiratory fitness and Quality of life.

Keywords: Petrol pump workers, Quality of life, Cardio respiratory endurance

Introduction:

Air pollution from vehicles in a city like Ahmedabad is an inescapable part of the urban life. Petrol pump workers who are exposed to petrol and diesel fumes exhibit a number of clinical signs and symptoms which may be due to benzene toxicity and a long term exposure of it leads to poisonous effects on the respiratory functions.[1]

Both petrol and diesel undergo combustion in automobile engines and give rise to combustion-derived nano particles. These particles are highly respirable and have a large surface area which can carry a larger fraction of toxic hydrocarbons and metals on their surface. Up to 8 hours of benzene exposure concentrations usually average <1 ppm, but the exposure can reach upto 2-3ppm. Common aromatic compounds in the petroleum products are benzene, ethylbenzene, xylene and toluene. These are volatile. They easily disperse in air and become respirable. [2] Lung reactions to exposure to dust, gases, and fumes at work places have been studied in different populations. Petrol pump workers to get exposed to a high level of air pollution along with petrol and diesel vapors, both of these factors can affect the respiratory health of petrol pump workers.[3]

Working environmental factors that the physical and mental health the attendants thus having a negative impact on the quality of life of these petrol attendants. Petrol pump workers are incessantly exposed to petrol and diesel fumes and a long term exposure to these fumes lead to a detrimental effect on the cardio respiratory system and Quality of Life .Despite the number of petrol pumps in Ahmedabad there is scarcity of information regarding the cardio respiratory health and Quality of Life of these workers. Hence this study was undertaken to assess the cardio-respiratory fitness and Quality of Life in petrol pump workers and association between cardio respiratory fitness and Quality of Life in petrol pump workers.

Methodology:

Observational analytical study conducted at different petrol pump in Ahmedabad, Gujarat, India with Purposive sampling. Non smokers male ,20-40 years age, who were working in various petrol filling stations as petrol filling attendants,8 hours/day for ≥ 2 years were included whereas cardiovascular, respiratory, musculoskeletal and neurological disorders due to which YMCA test cannot be performed, surgery of abdomen (Last 3 months),malignancy, psychological conditions were excluded in present study.

Permission was taken from the manager of the petrol pumps to conduct the study. After the permission was granted, the study was carried out in 60 non smokers, male petrol pump workers who fulfill the inclusion-exclusion criteria. They were explained about the need of the study and procedure in the language they understand. Those willing to participate and fulfilling inclusion criteria were include in the study. Written informed consent was taken. Assessment was done according to the proforma in petrol pump workers and data was analysed

Outcome measure:

(1)Cardio respiratory fitness – 3 minute YMCA test: [2]

Each test starts with a 2-minute resting phase while subjects are seated on a chair. Subjects are required to step up and down on a 30 cm box for 3 minutes (step up-up- down-down). Stepping frequency is indicated by a metronome set at 96 beats per minute (4 clicks = one step cycle). The subject immediately stops upon completion of the test and then sits down and remains still. After 5 seconds, the subject heart rate is monitored for one minute. Finally, subject remain seated during a 5-minute recovery phase. VO_2max was calculated using an equation formulated by the Korean Institute of Sport Science as follows:

Males: $VO_2\max = 70.597 - 0.246 \times (\text{Age}) + 0.077 \times (\text{Height}) - 0.222 \times (\text{Weight}) - 0.147 \times (\text{HR})$ [4]

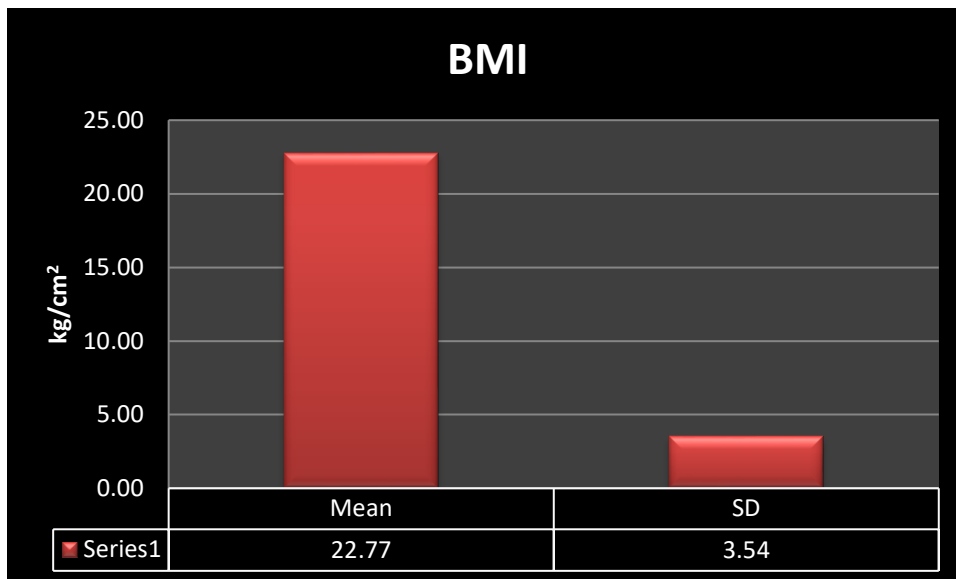
(2)Quality of Life - SF12 Questionnaire

SF-12 is a 12 item short form health survey is an abbreviated version of the 36 item short form health survey. The survey instrument has eight domains: physical functioning, physical role, bodily pain, general health, vitality, social functioning, emotional role, and mental health. The eight dimensions form has two summary score, physical and mental sub scores (PCS and MCS), with a possible total score ranging from 0 to 100. A higher SF12 score indicates better health.[5]

Statistical analysis: The data was analyzed by using the Microsoft Excel and SPSS v20. The mean and standard deviation (SD) were calculated and reported for the quantitative variables. Spearman correlation was used between SF12 and YMCA test. Level of significance kept at 0.05.

Result:

In present study 60 non smokers male petrol pump workers were included. Mean age was 31.46 ± 3.14 year with 48 male and 12 female in present study. Graph 1 shows in body mass index (BMI) in petrol pump workers.

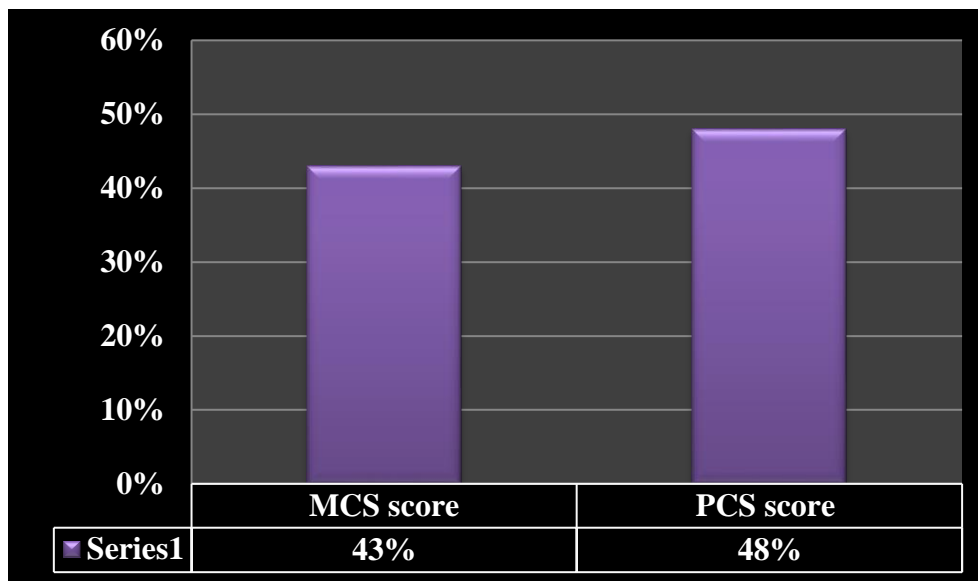


Graph 1: BMI (kg/cm²) in petrol pump workers

Table 1 shows cardio-respiratory fitness in petrol-pump workers. Graph 2 presents Physical and mental score in petrol pump workers. Correlation between Quality of life and YMCA test in showed in table 2.

Ratings(based on YMCA test)	No. of workers	%
Excellent	2	3.33
Good	14	23.33
Average	19	31.67
Poor	25	41.67

Table 1: Cardio-respiratory fitness in petrol pump workers



Graph 2: Physical and mental score in petrol pump workers

Outcome measure	r value	p value
Quality of life (mental health) and YMCA test	0.584	<0.001
Quality of life (Physical health) and YMCA test	0.501	<0.001

Table 2: Correlation between Quality of life and YMCA test

Discussion:

In present study 41.67% of the workers are poor cardio respiratory fitness, 31.67% of them have average, 23.33% of them have good and 3.33% of them have excellent cardio-respiratory fitness. So, in present study moderate affection of cardio respiratory fitness among petrol pump workers. Mehta JN et al concluded that exposure to petrol vapors and fumes, hydrocarbons markedly decreased the pulmonary functions FEV1, FEV6, FEV1 /FEV6, and PEFr relative to their age-matched controls.⁶

In present study moderate affected physical and mental score in petrol pump workers. Gaikwad PA et al found that safety and health issues, lack of protective equipments, work pressure, stress and provision of inadequate working tools are some of the environmental aspects that bring about poor quality of life experiences at petrol stations.¹ Kiriago AN et al. concluded that working environment aspects affect Quality of Work Life among petrol station attendants. Poor safety and health conditions that were reported to be present at petrol stations negatively affect the Quality of Work Life among employees⁷.

In present study moderate positive correlation between Quality of life and cardio respiratory fitness in petrol pump workers. Gaikwad PA et al found that petrol pump workers showed a decline in the mean PEFr value which was statistically significant. There was mild affection of exercise capacity and poor Quality of life among these attendants¹. Petrol is a complex combination of hydrocarbons which on emission generate particles. These particles due to their large surface area can carry various toxic

compounds that are likely to remain in atmospheric air for a longer period of time and long term exposure to such particles can cause chronic respiratory impairments like obstructive lung diseases (chronic bronchitis, emphysema, Asthma) or restrictive lung diseases (Interstitial lung disease).

Limitations of present study is physical activity level was not assessed according to age. Only male population was taken because of less female population works in petrol stations. Occupation, education was not included in the study. In Detail of medical condition was not evaluated. Multivariate analysis was not done.

Conclusion and Implication:

In petrol pump workers moderate affect the cardio respiratory fitness and quality of life as well as showed a moderate positive correlation between cardio respiratory fitness and Quality of life. For prevent these changes promote a regular medical observation and periodic medical checkups. Also, health education and training programs should be conducted for the workers. Thus, good ergonomic advice, adapting healthy lifestyle along with regular aerobic exercises, yoga and relaxation sessions will help them with overall improvement in their working efficiency and thus indirectly improve their fitness and Quality of life.

Conflict of Interest: No

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