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Respiratory disorders among petrol stations workers in Al-Bahah, Kingdom of Saudi Arabi

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***Abstract*---**Background: Long-term exposure to the compounds in petrol leads to deterioration of respiratory health for those exposed, even for seconds. The aim of this study to assess the impact of gases exhumed in a petrol station on the respiratory systems of petrol station workers through measuring the effect of petrol gases on the pulmonary functions and links to common respiratory symptoms. Methods: Comparative cross-sectional was formed by 208 workers were divided into two equal groups according to their exposure to petroleum vapors, case group represented the fuel workers who worked outdoor and control group represented the fuel workers who worked indoor without exposure to petroleum vapors. Using semi

structured survey including questions related to individual demographic variables, work characters, workload, variables related to health surveillance of workers as use of personal protective equipment (PPE). Results: The results showed no statistically significant difference regarding demographic character between two group. We detected statistically significant difference between PSW group with control group regarding clinical symptoms as cough, tiredness, fatigue and breathing difficulties. Finally, according to spirometer results we found decline in the respiratory function tests as (FVC, FEV1, PEF, FEV1/FVC, FEF25,50,75) among PSW group with statistically significant difference with control group. Correlation between respiratory function tests and different demographic variables, we observed significant negative correlation between age and FVC (r=-0.216, p =0.027) and FEV1 (r=-0.223, p=0.023). Similarly, age was correlated significantly and negatively with FEV1/FVC, FEF25, FEF50, FEF75 and FEF2575 ($p<0.05$). Length was correlated significantly and positively with FEV1, FEF50, FEF75 and FEF2575 ($p<0.05$). While there was no significant correlation regarding weight. Conclusion: From the results, it can be concluded that working in petrol stations for a longer period experienced difficulty in breathing and general body weakness, among other serious symptoms. Precautions and safety measures should be performed to maintain health status among petrol stations workers.

***Keywords*---**respiratory disorders, petrol stations workers, health.

Introduction

Respiratory diseases, which affect the lungs, are among the most common health problems globally. These conditions occur due to numerous factors, including smoking, infections, air pollution, and genes. Some people suffer from different categories of respiratory diseases. Among these conditions are those which result from damaged airways, such as chronic obstructive pulmonary diseases, asthma, and chronic bronchitis[1]. In addition, other conditions affect the alveoli, such as pneumonia, tuberculosis, lung cancer, emphysema, and pulmonary edema[1].

Unfortunately, the rate of incidence of respiratory diseases has increased considerably over the years, causing a high disease burden, and increasing mortality rates globally[2]. Thus, the high rate of pollution is the primary cause of high incidence of respiratory diseases. One of the leading causes of pollution is petroleum products, which are highly air-polluting fossil fuels[3]. When the fuels are burnt, they emit dangerous fumes, everyone is at risk of inhaling such fumes, the most at-risk groups are those people dealing with petroleum products as petrol station workers[4]. This population is exposed to fumes for long hours during work increasing the risk of pneumoconiosis and malignancies [5] depending on the extent of exposure and the concentration levels [6 7].

With urbanization and an increase in the number of automobiles in many cities and towns worldwide, the risk of pollution and exposure to dangerous inhalants

has increased[8]. Unfortunately, many filling stations around the world are operated by people who are exposed to fumes from the combustion of petroleum products[9]. Numerous epidemiological studies have revealed an increase in the rate of respiratory conditions due to exposure to pollutants[10]. The evidence suggests that the chemicals which are generated from petroleum fumes can cause serious medical problems as it affects the immune, cardiovascular, renal systems and skin [10].

Gasoline, the most commonly used fuel, compared to hydrocarbons such as methane and benzene, are dangerous chemicals comprising hydrogen and carbon molecules[11]. These substances make gasoline very dangerous when inhaled[12]. It can cause some of the damages and different types of respiratory diseases and extent of the impact depends on the level of exposure, which explains the high risk among individuals that work directly with chemicals, including petrol station workers[12]. Petrol and diesel vapors comprise of 95% acyclic and aliphatic compounds and 2% aromatic compounds. The best-refined petrol and diesel can contain approximately 3% benzene[13]. Among the compounds present in petroleum, constituents that make petrol, including benzene, toluene, ethylbenzene, and xylene (BTEX), which have the highest risk and threat to the respiratory health of petrol station worker [6, 14, 15,16]. Many studies have also pointed to the possibility of lung cancers among petrol station workers due to exposure to BTEX and other substances associated with petroleum vapor [17,18].

Some conditions are necessary to protect people working in petrol stations, such as proper ventilation and air conditioning to prevent gasoline vapors from causing lung diseases. Workers should also use protective equipment, such as masks, to avoid inhaling fumes. These measures are crucial in reducing the contact and inhalation of harmful chemicals[19].

Regardless of the high risk of exposure to pollutants that can cause respiratory diseases, many people working in petrol stations are unaware of the risk. They work without protective equipment such as masks and gloves, which could stop them inhaling and touching petroleum products. Lack of awareness and ignorance are the leading causes of the problem. Therefore, it is necessary to educate these who people can become more aware of the danger and take measures to protect themselves. They should be educated in using proper protective equipment and attend regular checkups. The checkups are essential measures to identify the damage early enough to prevent serious medical issues. This study findings will benefit the society by creating awareness of the impact of exposure to air pollution and the potential for respiratory disease. In this study we intend to explore and prove the harm that petroleum products may cause to petrol station workers, and the importance to impose preventive measures, including protective gear to reduce the prevalence of respiratory disease. The findings will improve the lives and wellbeing of petrol station workers.

Methods

Study design, setting

Comparative cross-sectional study that was conducted in the Al-Bahah region, for three months from January till March 2022.

Participants and sampling

The number of fuel workers presented in the petrol stations in Al-Bahaa region determines the number of subjects and sample size. 208 Fuel workers were taken as sample was convenient. Later The fuel workers were classified into two equal groups according to their exposure to petroleum vapors, case group represented the fuel workers who worked outdoor and control group represented the fuel workers who worked indoor without exposure to petroleum vapors.

Inclusion and exclusion criteria

Workers above 18 years old from all levels of education, willing to participate in the study after signing the informed consent and control group were chosen in this study with no previous history of chest and allergic problems as COPD, asthma, no history of smoking. While workers below 18 years old and refuse to participate in the study were excluded. One of the major reasons for not including female participants in the study is the fact that majority of workers in fuel stations is male.

Data collection instrument

Firstly, sociodemographic data were collected from the participants (age, educational level, marital status, monthly income, residence, weight, height) and data regarding the working shifts, working hours, number of cars exposed per day and years of experience.

Second phase included face to face interview using semi-structured questionnaire[20] formed of two parts, first one included question about health status of fuel workers regarding respiratory problems, any other medical comorbidities, previous infection with Corona virus, affection of smell and the presence of recent respiratory manifestations. Second part included questions regarding practice during work (wearing PPE, washing hands, taking daily shower). Questions were tested for validation using Cronbach's alpha test.

Respiratory function tests were measured for all participants using pneumotachometer, the parameters were Forced Vital Capacity (FVC), Forced Expiratory Volume in first second (FEV1), Peak Expiratory Flow Rate (PEFR), FEV1/FVC, FEF 25, FEF 50, FEF 75 and FEF 25-75. All detailed instructions were explained to the participants, to avoid any variations in the results all tests were taken at the same time of day.

Data management

Data were fed to the computer and analysed using Statistical Package of Social Service (IBM SPSS) software package version 24.0. (Armonk, NY: IBM Corp). Data were represented in tables and graphs, qualitative data e.g., age were described using number and percent. The Kolmogorov-Smirnov test was used to verify the normality of distribution, Quantitative data were described using range (minimum and maximum), mean, standard deviation, median, and interquartile range (IQR). Categorical qualitative variables were expressed as absolute frequencies (number) and relative frequencies (percentage). Chi-square test was used to measure the difference between two qualitative variables. Correlation analysis was conducted to assess the association between the continuous variables. The results were considered statistically significant when significant probability was less than 0.05 ($P<0.05$). P-value <0.001 was considered highly statistically significant (HS), and P-value ≥ 0.05 was considered statistically insignificant (NS).

Results

As regards to sociodemographic and working characteristics of the studied participants

Table 1 represented the sociodemographic and working characteristics of the fuel station workers working indoor and outdoor, it showed non statistically significant difference between two studied groups regarding age, marital status, weight, height, monthly income, smoking, living in station, time of working, working hours/day and years of experience. While about one quarter of petrol station workers (26.9%) had secondary education, 13.5% had primary education, 17.3% read and write, and 13.5% had university education with statistically significant difference (P-value=0.002) between control group as (22.2%) had secondary education, 32.7% had primary education, 19.2% read and write, and 14.4% had university education.

Health characteristics of the fuel station workers

None of the participants in both PSW and control groups had respiratory diseases or suffer from respiratory diseases after joining work and no one previously used any respiratory medications. Nine of PSWs had chronic diseases (8.7%) compared to one participant in control group with statistically significant difference between two groups (P-value=0.009). Also, none of the participants had been infected with the Corona virus during the past 30 days or had any symptoms in the past 30 days in both groups. About 36.5% of the PSWs reported that they had been affected by the smell of fuel while in the gas station yard, whereas 63.5% did not affected: the most prevalent symptom was headache (23.1%). Followed by cough (13.5%) then breathing difficulties (10.6%) with statistically significant difference with control group (P-value= <0.001&0.0029) respectively. Corresponding to 35% of control group reported that they had been affected by the smell of fuel while in the gas station yard, whereas 65.38% did not affected. The most prevalent symptoms were headache (19.2%), vomiting and nausea (11.5%) with no statistically significant difference with PSWs group (p-value=0.497&0.1389) respectively. (Table 2)

Regarding symptoms experienced in the past 30 days, the most prevalent symptom in PSWs group was headache (6.7%) with statistically significant difference with control group (P-value= 0.0305). (Table 2)

Practice of fuel station workers during work

Most PSWs wear a face mask while working in the gas station yard (76.9%), and the majority washes their hands before eating (97.1%), wash their hands after the daily work period ends (98.1%) and take a shower after the daily work period ends (84.6%). Most of them wear a mask as a protective gear while doing their work (83.7%). While two participants in control group had wear a face mask in the gas station yard (1.9%), and the majority washes their hands before eating (89.4%), wash their hands after the daily work period ends (25%) and take a shower after the daily work period ends (39.4%) with statistically significant difference between two groups. (P-value=<0.001&0.0027&<0.001) respectively. Majority of them wear a mask as a protective gear (mask) while doing their work (81.73%) with no statistically significant difference with PSW s group. Cases washed their hands after the daily work period ends more than controls (98.1% vs 25.0%), p<0.001. Similarly, cases take shower after the daily work period ends more than controls (84.6% vs 39.4%), p<0.001.(Table 3)

Comparison of lung function tests between the fuel station workers (cases) and controls

Table 4 shows the comparison in FVC between the fuel station workers (cases) and control group. The FVC was significantly higher in the control subjects compared to works of fuel station. The mean value (±SD) in fuel station workers was (2.52±0.61) and in the control group was (3.97±0.49), (p <0.001). In FEV1, the difference between both groups was statistically significant (2.38±0.61 vs 3.95±.48), (p <0.001). Furthermore, a significant difference was also noticed in PEF (7.82±1.57 vs 12.36±1.55), (p <0.001). The difference was also significant in FEV1/FVC (96.29±6.56 vs 99.51), (p <0.001). Moreover, there was a significant difference in FEF25 (5.95±2.06 vs 10.66±1.39), (p <0.001). and in FEF50 mean value (4.16±1.49 vs 7.69±1.27), (p <0.001). Similarly, significant differences were also noticed in mean values of FEF75 and FEF25-75 (p <0.001).

Correlation between lung function tests and age, weight, length and number of cars seen by day

There is significant negative correlation between age and FVC (r=-0.216, p =0.027) and between age and FEV1 (r=-0.223, p=0.023). Similarly, age was correlated significantly and negatively with FEV1/FVC, FEF25, FEF50, FEF75 and FEF2575 (p<0.05). Length was correlated significantly and positively with FEV1, FEF50, FEF75 and FEF2575 (p<0.05). There was no significant correlation between weight and lung function tests**.** (Table 5)

Discussion

In this study, we aimed to evaluate the respiratory function of fuel station workers and a control group with different occupations. There is no statistically

significant difference with respect to all demographic parameters in all cases in PSWs and control groups which is consistent with Indian study that was conducted to detect the effect automobile exhaust on cab drivers [21].

Workers at petrol stations are in continuous contact with fuels and constantly inhale the particles emitted by the vehicles they refuel. As a result of exposure to the fuel vapors, our study found symptoms among 36.5% of the workers, and the most prevalent symptom was headache (23.1%), followed by cough (13.5%), then tiredness and fatigue (6.7%). A previous study from Senegal found that the most prevalent symptom was cough, which was reported by 50% of the fuel station workers[22]. We detected statistically significant difference between two groups regarding clinical symptoms as cough, breathing difficulties and tiredness, fatigue, it was observed to be more in PSW group than control group, other Brazilian study[23] measure the exposure to benzene inhalation through clinical symptoms and urinary t,t-MA where the symptoms like headache, dizziness, fatigue and depression did not disclosed statistically significant difference in relation to t,t-MA in urine.

Regarding practice of our study sample, we found that the majority of PSWs group wear a face mask while working in the gas station yard, washed their hands before eating and after the daily work period (76.9% & 97.1% & 98.1%), respectively. Most of the workers in both (PSW and control) groups wear a face mask while carrying out their work (83.7%&81.73%). These findings indicate good practice among workers in this study. The same study from Senegal showed that none of the workers wear a face mask while working[22]. This substantial difference between our study and the previous study could be explained by the fact that our study was conducted during the COVID-19 pandemic, in which the wearing of a face mask was compulsory in the country.

In the current study we found that lung volumes in petrol pump workers were reduced in comparison to the controls (FVC, PEF, FEV1/FVC ratio, FEF25, FEF50, FEF75, and FEF25-75). These findings are consistent with many previous studies from different countries, in which decrement was observed in the lung function of fuel station workers [19,21,24,25,26].

Regarding FVC (L/sec), this study found a significant reduction in the mean FVC (L/sec) in fuel station workers in comparison with the control group. A previous study by Batta and coauthors (2015) [27] in Punjab revealed similar finding to this study where mean of FVC (L/sec) decreased significantly in petrol station workers. Petrol station workers are at risk of petrol vapor inhalation and also inhalation of automobile exhaust for a longer period of time (at least 8 hours per day for more than one year) and have a higher likelihood of developing chronic lung diseases, as indicated by the results in that study. In contrast to our study, a previous study by Anuja and colleagues (2014)[28] in Chennai found that the difference in mean of FVC (L/sec) in the exposed group and the unexposed group was not significant.

In this study, there was highly significant reduction in the FEV1 (L/sec) in the fuel station workers in comparison with the control group. A previous study by Dube et al. (2013) found that FEV1 (L/sec) the mean values of the fuel station

workers were significantly less than those of the control group[29]. The significant reduction reveals the harmful effect of benzene exposure on respiratory system physiology. The benzene content of petrol has typically been in the range of 1–5%. Benzene in petroleum vapor may be an exacerbating factor for the lung function abnormalities observed, as the study groups were non-smokers. However, one previous study by Singhal and coworkers (2014) [25] found that the mean of FEV1 (L/sec) was less in the fuel station workers group compared to that of the control group; but this difference was not statistically significant. Most of the petrol filling stations were situated near heavy traffics; the workers were therefore more prone to exposure to CO. The ambient air concentration of CO was maximum during peak working hours (6AM – 2PM), the workers were exposed to greater amounts of CO along with other air pollutants and solvents[19].

Regarding FEV1/FVC (%) in this study, there was a highly significant reduction in the FEV1/FVC (%) in fuel station workers in comparison with the control group. A similar observation was reported by a previous study conducted by Meo and coauthors (2015) [30], which concluded that there was a significant reduction in the mean of FEV1/FVC (%) in fuel station workers in comparison to age and sex matched healthy controls. Other studies reported similar finding to our own findings[25]. These results could be explained by the evidence of several studies that have found an increase in the incidence and sensitivity of the respiratory system to chronic bronchitis, bronchial asthma, and lung cancers. That is, the benzene as a carcinogenic compound affects the epithelial cells lining of the respiratory system, including terminal bronchioles, respiratory bronchioles and pulmonary alveoli. In contrast, Sharma and coresearchers (2015) [31] reported a non-significant reduction in the mean of FEV1/FVC (%) in petrol pump workers (86.11±12.32) in comparison to age and sex matched healthy controls (91.34±8.34). Begum and colleagues[10] also found no significant difference in FEV1/FVC (%) between fuel station workers and the controls.

Regarding FEF25-75% (L/sec), there was a highly significant reduction in the FEF25-75% (L/sec) in fuel station workers in comparison with the control group. Choudhari and coworkers (2013)[32] evaluated the pulmonary function of the fuel station workers and found that FEF 25-75% mean and SD values for the study group (71.6±18.3) decreased significantly in comparison to the control group (85.5±12.4). Similar findings were reported by Singhal et al. and Batta et al.[25,27].

It was reported in the literature that that inhalation of benzene and gasoline leads to lung function impairment[19]. The impairment of lung function test depends on the level of benzene derivatives in the air and consequently, in the blood[33]. In addition, it was found that workers in petrol pump stations are exposed to many other pollutants such as carbon dioxide (CO2), carbon monoxide (CO), nitrogen dioxide (NO2), sulphur dioxide (SO2) and particulate matter[10]. These chemicals are able to reach the deep regions of the lungs, can damage the surfactant concentration, and cause chronic inflammation in the lung parenchyma and narrowing of the small airways[33].

This study has its strengths and limitations. One of the strengths is the measurement of lung function parameters by a valid and a reliable instrument. This study is limited by its cross-sectional nature, in which the causative

relationship between the variables cannot be assured. This study was conducted in one city in the country, so generalizability to all the workers in the country cannot be achieved in addition to depending on the questionnaire in the clinical evaluation of the workers which may lead to bias and missing of other measurements as lab investigations.

Conclusion

This study confirms that those who have worked in petrol stations for a longer period experienced difficulty in breathing and general body weakness, among other serious symptoms. The results provide an indication that workers should be provided with protective gear to ensure that they are not in contact with the gaseous vapors emitted from petrol stations. Precautions and safety measures such as masks and gloves should be worn for the duration of work at the petrol station. Increased adverse effects on pulmonary function and other body systems are markedly affected by daily inhalation of petrol fumes. Medical observation including pre-employment and periodic examination for lung function tests should be performed. Education of workers about the use of preventive measures is highly recommended.

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Table 1: Differences in sociodemographic and working characteristics of the fuel station workers and control group

		Number %		P-value
		PSWs	Control	
Age (years)	≤ 35	63(60.6%)	64(61.5%)	0.8869
	>35	41(39.4%)	40(38.4%)	
Marital status	Married.	60(57.7%)	63(60.6%)	

	Unmarried	44(42.3%)	41(39.4%)	0.6721
Level of education	Read and write.	18(17.3%)	20(19.2%)	0.0022*
	Primary	14(13.5%)	34(32.7%)	
	Middle	30(28.8%)	12(11.5%)	
	High School	28(26.9%)	23(22.2%)	
	University	14(13.5%)	15(14.4%)	
Monthly income (SAR)	< 3000 SAR	104(100.0%)	100(96.2%)	0.6005
	3000 - 5000	0(0%)	4(3.8%)	
	>5000	0(0%)	0(0%)	
Smoking	No.	98(94.2%)	104(100%)	0.054
	Yes.	6(5.8%)	0(0%)	
Living in the station	No.	4(3.8%)	6 (5.77%)	0.516
	Yes.	100(96.2%)	98 (94.23%)	
Time of working	Day	38(36.5%)	36(34.61%)	0.9588
	Day and Night	31(29.8%)	32(30.76%)	
	Night	35(33.7%)	36(34.61%)	
Working hours/day	<12	5(4.8%)	10(9.61%)	0.1801
	≥12	99(95.2%)	94(90.38%)	
Years of experience	<5	79(76.0%)	83(79.81%)	0.7658
	5-10	13(12.5%)	10(9.6%	
	>10	12(11.5%)	11(10.57%)	
Number of cars served per working day	<100	36(34.6%)		
	100-200	47(45.2%)		
	>200	21(20.2%)		
		Mean (±SD)	Mean (±SD)	P value
Age		33.1 (±10.4)	32.5 (±6.9)	0.342
Height		164.9 (±6.3)	166.1(±5.8)	0.551
Weight		68.5 (±11.6)	70.2(±14.3)	0.424

*P-value=<0.05 considered statistically significant difference

Table 2: Health characteristics of the fuel station workers and control group.

		Number (%)		P-value
		PSWs	Control	
Do you suffer from respiratory diseases?	No	104(100.0%)	104(100.0%)	-
	Yes	0(0%)	0(0%)	
Did you suffer from respiratory diseases after starting this work?	No	104(100.0%)	104(100.0%)	-
	Yes	0(0%)	0(0%)	
Have you ever used any medicine for respiratory diseases?	No	104(100%)	104(100.0%)	-
	Yes	0(0%)	0(0%)	
Do you suffer from chronic diseases?	No	95(91.3%)	103(99.04%)	0.0095*
	Yes	9(8.7%)	1(0.96%)	
Have you been infected with Corona virus in the past 30 days?	No	104(100%)	104(100%)	-
	Yes	0	0	

Have you ever been affected by the smell of fuel while within the gas station yard?	Breathing difficulties	11(10.6%)	1(0.9%)	0.0029*
	Cough	14(13.5%)	1(0.9%)	<0.001*
	Headache	24(23.1%)	20 (19.2%)	0.4970
	Vomiting and nausea	6(5.8%)	12(11.5%)	0.1389
	Tiredness & fatigue	7(6.7%)	1(0.9%)	0.0305*
	Itching	3(2.9%)	1(0.9%)	0.3126
	No	66(63.5%)	68(65.38%)	0.7720
Have you had any symptoms in the past 30 days?	Breathing Difficulties	3(2.88%)	0	0.3126
	Cough	2(1.92%)	0	0.5608
	Headache	7(6.73%)	1(0.9%)	0.0305*
	Vomiting and nausea	1(0.96%)	0	-
	Tiredness & fatigue	1(0.96%)	0	-
	Itching	1(0.96%)	0	-
	No	92(88.46%)	103(99.03%)	0.0016*

*P-value=<0.05 considered statistically significant difference

Table 3: Practice of fuel station workers during work.

		Number (%)		P value
		PSWs	Control	
Do you wear any protective gear while in the gas station yard?	Mask	80(76.9%)	2(1.9%)	<0.001*
	No	24(23.1%)	102(98.1%)	
Are hands washed before eating?	No	3(2.9%)	11(10.6%)	0.0270*
	Yes	101(97.1%)	93(89.4%)	
Are hands washed after the daily work period ends?	No	2(1.9%)	78(75.0%)	<0.001*
	Yes	102(98.1%)	26(25.0%)	
Do you take a shower after the daily work period ends?	No	16(15.4%)	63(60.6%)	<0.001*
	Yes	88(84.6%)	41(39.4%)	
Do you wear any protective gear while doing your work? If the answer is yes, mention it	Mask	87(83.7%)	85(81.73%)	0.7134
	No	17(16.3%)	19(18.26%)	

*P-value=<0.05 considered statistically significant difference

Table 4: Comparison of lung function tests between the fuel station workers (cases) and control group

	Cases	Control Group	
	Mean(±SD)	Mean(±SD)	P value
FVC	2.52(±0.61)	3.97(±0.49)	<0.001
FEV1	2.38(±0.61)	3.95(±0.48)	<0.001
PEF	7.82(±1.57)	12.36(±1.55)	<0.001

FEV1/FVC	96.29(±6.56)	99.51(±1.53)	<0.001
FEF25	5.95(±2.06)	10.66(±1.39)	<0.001
FEF50	4.16(±1.49)	7.69(±1.27)	<0.001
FEF75	2.40(±1.01)	4.45(±1.00)	<0.001
FEF25-75	3.93(±1.43)	3.97(±0.49)	<0.001

*P-value=<0.05 considered statistically significant difference

Table 5: Correlation between lung function tests and age, weight, length and number of cars seen by day

	Length		Weight		Age		Number of Cars seen by day	
	r	p	r	p	r	p	r	p
FVC	.158	.108	.162	.101	-.216*	.027	.198*	0.044
FEV1	.198*	044	.145	142	-.223*	.023	0.152	0.123
PEF	.127	.198	.075	.450	-.088	.373	-0.057	0.568
FEV1/FVC	.192	.051	-.057	.564	-.208*	.034	0.028	0.774
FEF25	.182	.064	.083	.400	-.300**	.002	0.020	0.842
FEF50	.206*	.036	.021	.831	-.381**	<0.001	0.034	0.734
FEF75	.312**	.001	-.040	.690	-.331**	.001	0.046	0.646
FEF2575	.246*	.012	-.004	.968	-.400**	. <0.001	0.029	0.773